SUBRATE OFF-NET EXTENSION ARRANGEMENT

TEST PROCEDURES

DIGITAL DATA SYSTEM

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1. GENERAL

1.01 This section contains test procedures for the Digital Data System (DDS) subrate off-net extension arrangements.

1.02 This section is reissued to delete information concerning the 950-type testboard (Mfr Disc) and to add information concerning the Automated Bit Access Test System (ABATS), which replaces the 950-type testboard. Revision arrows are used to emphasize the more significant changes.

1.03 ▶The subrate off-net extension arrangement provides access to the DATAPHONE® Digital Service via analog data circuits. This arrangement is primarily for customers located outside of a Digital Data System (DDS) Digital Serving Area (DSA).◀

1.04 ***Caution: Tests in this section interrupt customer service; therefore, they must only be performed as part of authorized maintenance.***

1.05 The tests covered in this section are as follows:

- ***Power Supply Test:*** This test verifies the presence of the required input voltages to the 831A DAS.

- ***Customer Station Loopback Test:*** This test is performed from the DDS serving test center (STC), and it verifies operation of the entire off-net extension from the STC through the data set at the customer station (Section 314-901-500), if Bell System provided. Tests are limited to facility tests (829-type DAS loopback) when customer owns the data set. This test requires no action at the 831A DAS area.

- ***Data Service Unit (DSU) Loopback Test:*** This test is performed from the DDS STC, and it verifies the proper operation of the DDS network portion of the off-net extension (Section 314-901-500). This test requires no action at the 831A DAS area.

- ***831A DAS Loopback Test:*** This test is performed from the DDS STC, and it verifies proper operation of the DDS network and the off-net extension to the output (customer station side) of the 831A DAS (Section 314-901-500). The TEST switch on the 831A DAS must be operated (depressed) during this test. Note that no loopback is provided at the input (DDS network side) of the 831A DAS.

Note: A description of the loopback points in a subrate off-net extension is given in Section 314-919-100.

- ***Transmission Tests:*** These tests are normally performed from the private line STC and are used to verify the performance of the link between the customer station and the DDS hub office. Jack access to this link is also provided by the TRANS and REC TST jacks on the 829-type DAS.

- ***Interface Tests:*** These tests verify the presence of the required interface signals between the 831A DAS and (1) the hub office data set and (2) the 500A DSU (Mfr Disc). The 500A DSU must be ordered on a "as required" basis. The 500A DSU is obtained through common stock inventory.

- ***Timing Phase Test:*** This test checks the phase stability between the DDS network clock and the off-net extension clock signals.

- ***The 829-type DAS Local Test:*** This test is used to verify proper operation of the amplifier and attenuation circuits in the 829-type DAS by comparing the measured total gain or loss of the circuits to the calculated sum of gains and losses of the circuits.

1.06 The tests given in this section are intended for use in conjunction with the trouble isolation procedures in Section 314-919-300 for maintenance testing. They may be performed individually or in any combination as dictated by the maintenance requirements. ▶Tests involving the use of DATAPHONE II data sets should be performed according to the steps given in Section 592-040-520.◀

1.07 The probable causes given in conjunction with the tests in this section assume that all trouble isolation and corrective procedures in Section 314-919-300 have been performed as specified.

2. APPARATUS

2.01 The following test equipment is required to perform the procedures given in this section.

- 901-type data test set (DTS) (interface test adapter only)
- 914C DTS
- KS-16979 volt-ohm-milliammeter (VOM)
- Dual trace oscilloscope (Tektronix 422 or equivalent)
- M25A-61 cords (two)
- TTS-4B transmission test set
- 171C adapter
- 2W6A cords (two)

- 3P6A cord.

3. TEST PROCEDURES

POWER SUPPLY TEST

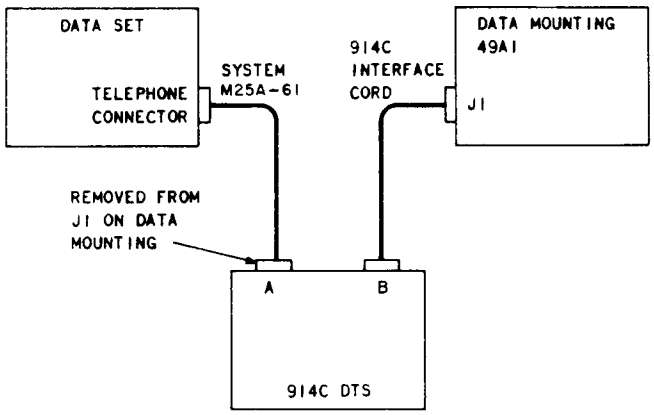
3.01 The power supply is tested using the 914C DTS (paragraph 3.02) or the 901 DTS interface test adapter and KS-16979 VOM (paragraph 3.03).

3.02 ***914C DTS Procedure:*** Perform the 914C DTS procedure as follows:

(a) Prepare the test setup shown in Fig. 1.

(b) At the 914C DTS, set the FUNCTION switch to OFF and operate the POWER switch.

Requirement: The POWER lamp illuminates.



914C DTS MATRIX PROGRAM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	
GRD	O	O	O	O	O	O	O	O	O	O	●	O	●	O	O	O	O	O	O	O	O	O	O	O	O	O	GRD
SD	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SD
RD	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	RD
SI	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SI
DSI	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DSI
DS2	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS2
S2	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S2
DS3	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS3
TPI	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	TPI
TP2	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	TP2
S3	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S3
DS4	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS4
DS5	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS5
S4	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S4
SCT	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SCT
S5	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S5
SCR	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SCR
DS6	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS6
S6	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S6
DS7	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS7
DS8	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS8
S7	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S7
TP3	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	TP3
S8	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S8
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	

914C DTS SWITCH SETTINGS

SWITCH	SETTING
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER
INTERFACE SELECTORS	DEPRESSED

Fig. 1—Setup for Power Supply Test Using 914C DTS

(c) On the 914C DTS, set the VERTICAL MONITOR to 2, RANGE switch to DCV 30, and POLARITY switch to REV.

(d) On the 914C DTS, set the FUNCTION switch to VOLT INT.

Requirement: Meter indicates −12 volts. If meter does not indicate −12 volts, see paragraph 3.04 for probable causes of trouble.

(e) On the 914C DTS, set the FUNCTION switch to OFF, VERTICAL MONITOR to 3, RANGE switch to DCV 10, and POLARITY switch to NOR.

(f) On the 914C DTS, set the FUNCTION switch to VOLT INT.

Requirement: Meter indicates +5 volts. If meter does not indicate +5 volts, see paragraph 3.04 for probable causes of trouble.

(g) On the 914C DTS, set the FUNCTION switch to OFF, VERTICAL MONITOR to 20, and RANGE switch to DCV 30.

(h) On the 914C DTS, set the FUNCTION switch to VOLT INT.

Requirement: Meter indicates +12 volts. If meter does not indicate +12 volts, see paragraph 3.04 for probable causes of trouble.

(i) On the 914C, set the FUNCTION switch to OFF and release the POWER switch.

(j) Disconnect the 914C DTS and restore the system to the normal configuration.

3.03 ***901 DTS Interface Test Adapter Procedure:*** Perform the 901 DTS interface test adapter procedure as follows:

(a) Prepare the test setup shown in Fig. 2

(b) Using the VOM, measure voltages from terminals 11 or 13 (ground) of the interface test adapter and the terminals listed below:

ADAPTER TERMINAL	REQUIRED VOLTAGE
2	−12V

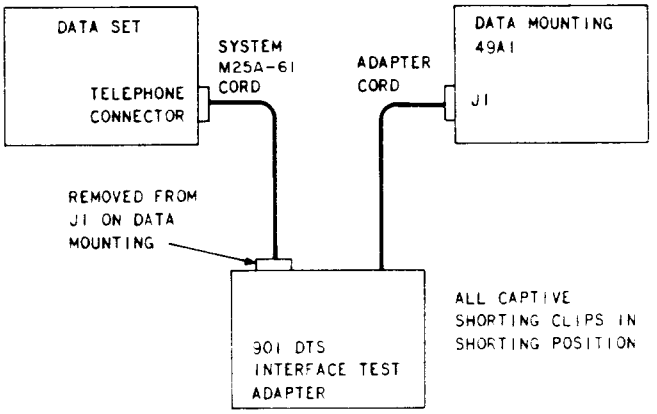


Fig. 2—Setup for Power Supply Test Using Interface Test Adapter

ADAPTER TERMINAL	REQUIRED VOLTAGE
3	+5V
20	+12V

Requirement: Voltages are correct. If voltages are not correct, see paragraph 3.04 for probable causes of trouble.

(c) Disconnect the interface test adapter and restore the system to normal configuration.

3.04 ***Probable Causes of Trouble:*** If any requirement fails to be met, disconnect the cord from J1 on the 49A1 data mounting and repeat the power supply test. If one or more requirements fail to be met, both with and without the cord connected at J1, the probable cause of trouble is the spare M25A-61 cord from the data set or in the data set itself. If one or more requirements fail to be met, only with the cord connected to J1, a short is indicated in the data mounting wiring or the 831A DAS.

Note: This test is not sensitive to an open circuit in the data mounting or the 831A DAS.

LOOPBACK TESTS FROM DDS STC

3.05 To isolate a trouble to the 831A DAS area, loopback tests are performed from the DDS STC through the data set at the customer station, the 831A DAS, and the DSU. Detailed trouble isolation procedures using these tests are given in Section 314-

901-300, and detailed procedures for performing the tests are given in Section 314-901-500.

3.06 ▶ ***Caution: The manual tests will be preempted and terminated by the automatic tests.*** The preferred method of accessing the DDS network is through the ABATS which is a remote testing system capable of testing bidirectionally on DDS. The Special Service Center/Centralized Test Center (SSC/CTC) enters commands via a DATASPEED® 40/2 terminal set to gain access to ABATS. At the hub office, the Bit Access Test System (BATS), also referred to as the KS-21899 data test system, provides the actual test functions for locating trouble. The BATS is manually operated or can be remotely operated by ABATS. When a trouble condition has been localized to the 4-wire local loop and the loop terminates in the hub office, the Line Access Test System (LATS) equipment under control of the sequence controller (SC), located at the hub office, provides access to that 4-wire local channel to enable voltmeter testing. The LATS is used only on loops that terminate in hub offices. For loops that are not accessible by LATS, refer to the SSC for testing. In most cases, the Switched Maintenance Access System/Switched Access Remote Test System (SMAS/SARTS) at the intermediate or end office provides the tester with the ability to test the local loop without the assistance of another tester in a distant office. The ABATS remote test procedures are given in Section 314-901-531.◀

3.07 ***Caution: Operating the 831A DAS TEST switch interrupts customer service. Ensure that this switch is operated only in conjunction with authorized maintenance testing.*** No action is required at the 831A DAS area for the customer station or the DSU loopback tests. The 831A DAS loopback requires that the TEST switch on the 831A DAS be operated (depressed). Release the TEST switch at the conclusion of the test. The indicator in the TEST switch will be orange when the switch is released (normal operation).

TRANSMISSION TESTS

3.08 ***Caution: Inserting plugs into the TRANS and REC TST jacks interrupt customer service. These jacks are to be used only in conjunction with authorized maintenance.*** To isolate troubles within the link between the customer station and the DDS hub office, transmission tests are normally performed from the private line STC. Jack access to this link is also provided by the TRANS and REC TST jacks on the 829-type DAS. These are terminating jacks and require the use of 600-ohm test equipment. The 829-type DAS at the customer station may be remotely looped back when testing from the 829-type DAS at the hub office by transmitting a 2713-Hz tone toward the station from the TRANS TST jack for 5 seconds. Release of the DAS 829-type loopback is accomplished by again applying the 2713-Hz tone for 5 seconds. The required tone may be obtained from a 406A (or equivalent) tone generator.

DATA SET/DAS INTERFACE TEST

3.09 The test of the interface between the hub office data set and 831A DAS may be performed using either the 914C DTS (paragraph 3.10) or the 901 DTS interface test adapter and the KS-16979 VOM (paragraph 3.11).

3.10 ***914C DTS Procedure:*** Perform the 914C DTS procedure as follows:

(a) Prepare the test setup as shown in Fig. 3.

(b) At the 914C DTS, operate the POWER switch.

Requirement: The POWER lamp illuminates.

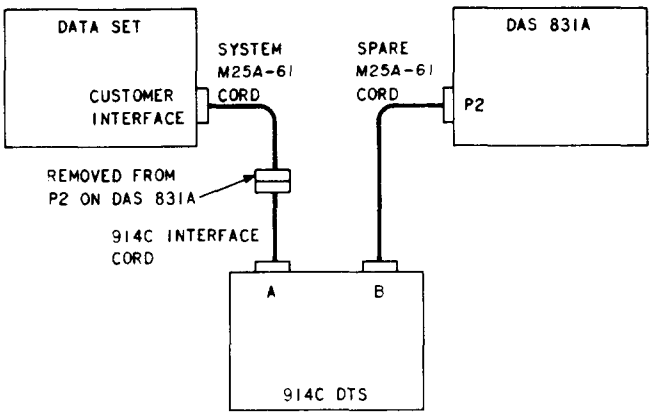
(c) Request the DDS STC to arrange for near-end loopback test with loopback at the customer station and send mux out-of-sync code.

Requirement: Indicator DS2 on the 914C DTS is illuminated and indicators DS1 and DS3 are not illuminated. If indications are not correct, see paragraph 3.12 for probable causes of trouble.

(d) Request the STC to send a 511-bit random word.

Requirement: Indicators DS1, DS2 (data sets 208A and 209A), and DS3 on the 914C DTS are illuminated.

(e) Request the STC to terminate the loopback test.



914C DTS MATRIX PROGRAM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	
GRD	●	O	O	O	O	O	●	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	GRD
SD	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SD
RD	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	RD
SI	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SI
DSI	O	O	O	●	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DSI
DS2	O	O	O	O	O	●	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS2
S2	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S2
DS3	O	O	O	O	O	O	O	●	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS3
TPI	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	TPI
TP2	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	TP2
S3	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S3
DS4	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS4
DS5	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS5
S4	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S4
SCT	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SCT
S5	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S5
SCR	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SCR
DS6	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS6
S6	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S6
DS7	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS7
DS8	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	DS8
S7	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	S7
TP3	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	TP3
SR	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	SR
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	

914C DTS SWITCH SETTINGS

SWITCH	SETTING
INTERFACE MODE	VOLTAGE
TEST SET MODE	SER
INTERFACE SELECTORS	DEPRESSED

INDICATOR LIGHTS

DS1 RS TO DATA SET
DS2 DSR TO DAS 831A
DS3 COD TO DAS 831A

Fig. 3—Setup for Data Set/DAS Interface Test Using 914C DTS

(f) Release the POWER switch, disconnect the 914C DTS, and restore the system to the normal configuration.

3.11 ***901 DTS Interface Test Adapter Procedure:*** Perform the 901 DTS interface test adapter procedure as follows:

(a) Prepare the test setup as shown in Fig. 4.

(b) Request the DDS STC to arrange for a near-end loopback test with the loopback at the customer station and send mux out-of-sync code.

(c) Using the VOM, measure the voltage from terminal 1 to terminals 4, 6 (data sets 208A and 209A only), and 8 of the interface test adapter.

Requirement: Voltage on terminal 6 is greater than +3 volts and the voltage on termi-

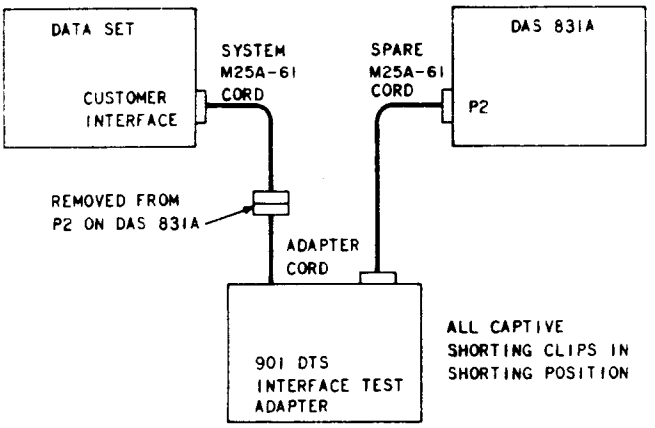


Fig. 4—Setup for Data Set/DAS Interface Test Using Interface Test Adapter

nals 4 and 8 is less (more negative) than −3 volts.

(d) Request the STC to send a 511-bit random word.

(e) Using the VOM, measure voltage from terminal 1 to terminals 4, 6 (data sets 208A and 209A only), and 8 of the interface test adapter.

Requirement: Voltage on terminals 4, 6, and 8 is greater than +3 volts. If voltage is not correct, see paragraph 3.12 for probable causes of trouble.

(f) Request the STC to terminate the loopback test.

(g) Disconnect the interface test adapter and restore the system to the normal configuration.

3.12 ***Probable Causes of Trouble:*** The probable causes of failure to meet the requirements in the data set/DAS interface test are given in Table A. If the trouble involves the request-to-send (RS) signal, further trouble isolation may be accomplished by performing the DSU/DAS interface test and, if required, the DSU local test. See Section 595-200-500 for further information regarding the DSU local test.

DSU/DAS INTERFACE TEST

3.13 The DSU/DAS interface test may be performed using either the 914C DTS (paragraph 3.14) or the 901 DTS interface test adapter and KS-16979 VOM (paragraph 3.15).

3.14 ***914C DTS Procedure:*** Perform the 914C DTS procedure as follows:

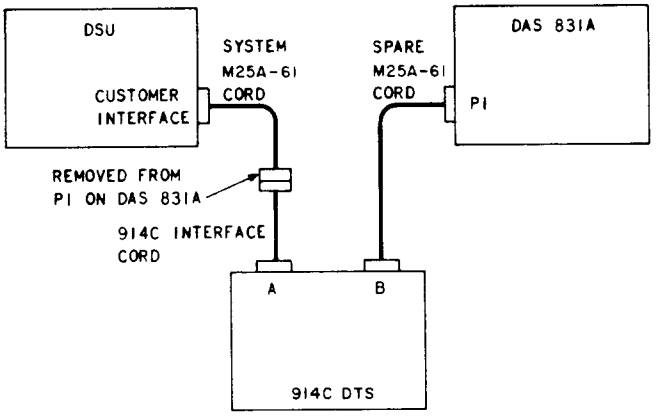
(a) Prepare the test setup as shown in Fig. 5.

(b) At the 914C DTS, operate the POWER switch.

TABLE A

DATA SET/DAS INTERFACE TEST — TROUBLE INDICATIONS

TROUBLE INDICATION		FUNCTION	PROBABLE CAUSE
914C DTS	901 INTERFACE TEST ADAPTER		
DS1	Terminal 4	Request to send to data set	DSU, interface wiring between DSU and DAS 831A, DAS 831A
DS2	Terminal 6	Data set ready from data set (208A- and 209A-types only)	Data set, interface wiring between data set and DAS 831A
DS3	Terminal 8	Carrier on delayed from data set	Data set, interface wiring between data set and DAS 831A



914C DTS MATRIX PROGRAM

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	
GRD	●	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	GRD
SD	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SD
RD	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	RD
SI	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SI
DSI	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DSI
DS2	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS2
S2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S2
DS3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS3
TPI	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TPI
TP2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TP2
S3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S3
DS4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS4
DS5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS5
S4	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S4
SCT	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SCT
S5	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S5
SCR	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	SCR
DS6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS6
S6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S6
DS7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS7
DS8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	DS8
S7	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S7
TP3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	TP3
S8	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	S8
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	STG	

Fig. 5—Setup for DSU/DAS Interface Test Using 914C DTS

Requirement: The POWER lamp illuminates.

(c) Request the DDS STC to arrange for a near-end loopback test with loopback at the customer station and send mux out-of-sync code.

Requirement 1: Indicators DS1 and DS2 on the 914C DTS are extinguished if the data set at the station location is equipped with the ***switched*** carrier option. If indications are not correct, see paragraph 3.16 for probable causes of trouble.

Requirement 2: Indicator DS1 on the 914C DTS is illuminated and indicator DS2 is extinguished if the data set at the station location is equipped with the ***continuous*** carrier option. If indications are not correct, see paragraph 3.16 for probable causes of trouble.

(d) Request the STC to send a 511-bit random word.

Requirement: Indicators DS1 and DS2 on the 914C DTS illuminate. If indications are not correct, see paragraph 3.16 for probable causes of trouble.

(e) Request the STC to terminate the loopback test.

(f) Release the POWER switch, disconnect 914C, and restore the system to the normal configuration.

3.15 ***901 DTS Interface Test Adapter Procedure:*** Perform the 901 DTS interface test adapter procedure as follows:

(a) Prepare the test setup as shown in Fig. 6.

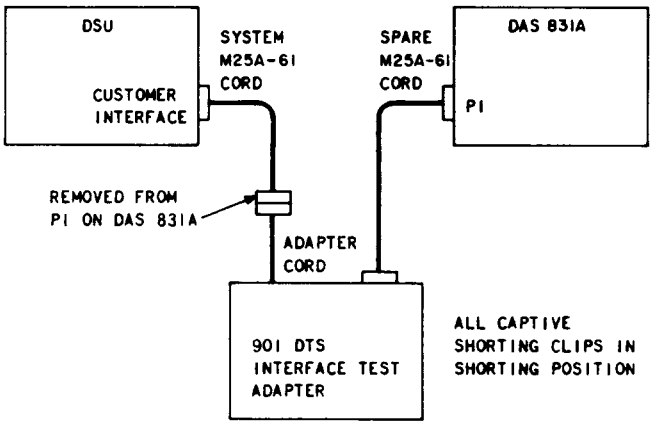


Fig. 6—Setup for DSU/DAS Interface Test Using Interface Test Adapter

(b) Request the DDS STC to arrange for near-end loopback test with loopback at the customer station and send mux out-of-sync code.

(c) Using the VOM, measure voltage from terminal 1 to terminals 4 and 6 of the interface test adapter.

Requirement 1: Voltage on terminals 4 and 6 is less (more negative) than −3 volts if the data set at the station location is equipped with the ***switched*** carrier option. If voltage reading is not correct, see paragraph 3.16 for probable causes of trouble.

Requirement 2: Voltage on terminal 4 is greater than +3 volts and on terminal 6 is less (more negative) than −3 volts if the data set at the station location is equipped with the ***continuous*** carrier option. If voltage reading is not correct, see paragraph 3.16 for probable causes of trouble.

(d) Request the STC to send a 511-bit random word.

(e) Using the VOM, measure voltage from terminal 1 to terminals 4 and 6 of the interface test adapter.

Requirement: Voltage on terminals 4 and 6 is greater than +3 volts. If voltage is not correct, see paragraph 3.16 for probable causes of trouble.

(f) Request the STC to terminate the loopback test.

(g) Disconnect the interface test adapter and restore the system to the normal configuration.

3.16 ***Probable Causes of Trouble:*** The probable causes of failure to meet the requirements in the DSU/DAS interface test are given in Table B. In case of a trouble involving the data set ready (DSR) signal, further trouble isolation may be accomplished by performing the DSU local test in Section 595-200-500.

TIMING PHASE TEST

3.17 The timing phase test requires the use of two 914C DTSs, two 901 DTS interface test adapters, or one of each. In addition, a dual trace oscilloscope such as Tektronix type 422, or equivalent, is required.

Note: This test should only be performed when the reported trouble involves periodic burst of errors and the trouble cannot be isolated using loopback and interface tests. The entire off-net extension portion of the channel being tested must be installed and operating before this test can be performed.

TABLE B

DSU/DAS INTERFACE TEST — TROUBLE INDICATIONS

TROUBLE INDICATION		FUNCTION	PROBABLE CAUSE
914C DTS	901 INTERFACE TEST ADAPTER		
DS1	Terminal 4	Request to send to DSU	DAS 831A
DS2	Terminal 6	Data set ready from DSU	DSU, interface wiring from DSU

3.18 Perform the test as follows:

(a) Prepare the test setup as shown in Fig. 7.

(b) Connect INPUT 1 of the oscilloscope to terminal 15 and ground to terminal 1 of the interface test adapter or 914C DTS connected between the 831A DAS and the DSU.

(c) Connect INPUT 2 of the oscilloscope to terminal 17 of the interface test adapter or 914C DTS connected between the 831A DAS and the data set.

(d) Set the controls on the oscilloscope as given in Table C.

Note: For detailed operating instructions of the Tektronix 422 oscilloscope (or equivalent), refer to the manufacturer's instruction book.

(e) Request the STC to transmit the repeated all 1s code toward the off-net extension under test.

(f) Set the oscilloscope power switch to ON and adjust the oscilloscope for a presentation similar to that shown in Fig. 8.

(g) Observe the drift of the pulses on the lower trace with respect to the pulses on the upper trace.

Requirement: No drift is observed. However, some jitter may be present and is considered normal.

Note: If the above requirement is not met, request that the data set at the customer location be checked to verify that an M23B cord is present and connected. If the M23B cord is connected, request that the analog portion of the off-net extension be checked by the private line STC.

DAS 829-TYPE LOCAL TEST

3.19 The local test of the 829-type DAS is performed using a TTS-4B transmission test set and a 171C adapter.

3.20 The local test for a 829-type DAS installed in a 46D1 data mounting is given below.

(a) Remove the 829-type DAS to be tested from the 46D1 data mounting and install the 171C adapter in the position previously held by the 829-type DAS.

(b) Insert the 829-type DAS to be tested into the end of the 171C adapter.

(c) Arrange the strapping plugs on the 171C adapter terminals T, R, T1, and R1 to make connection between the top and bottom left jacks (Fig. 9).

(d) Apply power to the TTS-4B, and allow it to warm up and stabilize. Then calibrate using instructions printed on the instrument case.

(e) Set the controls on the TTS-4B as follows:

- SEND FREQ to 1000 Hz

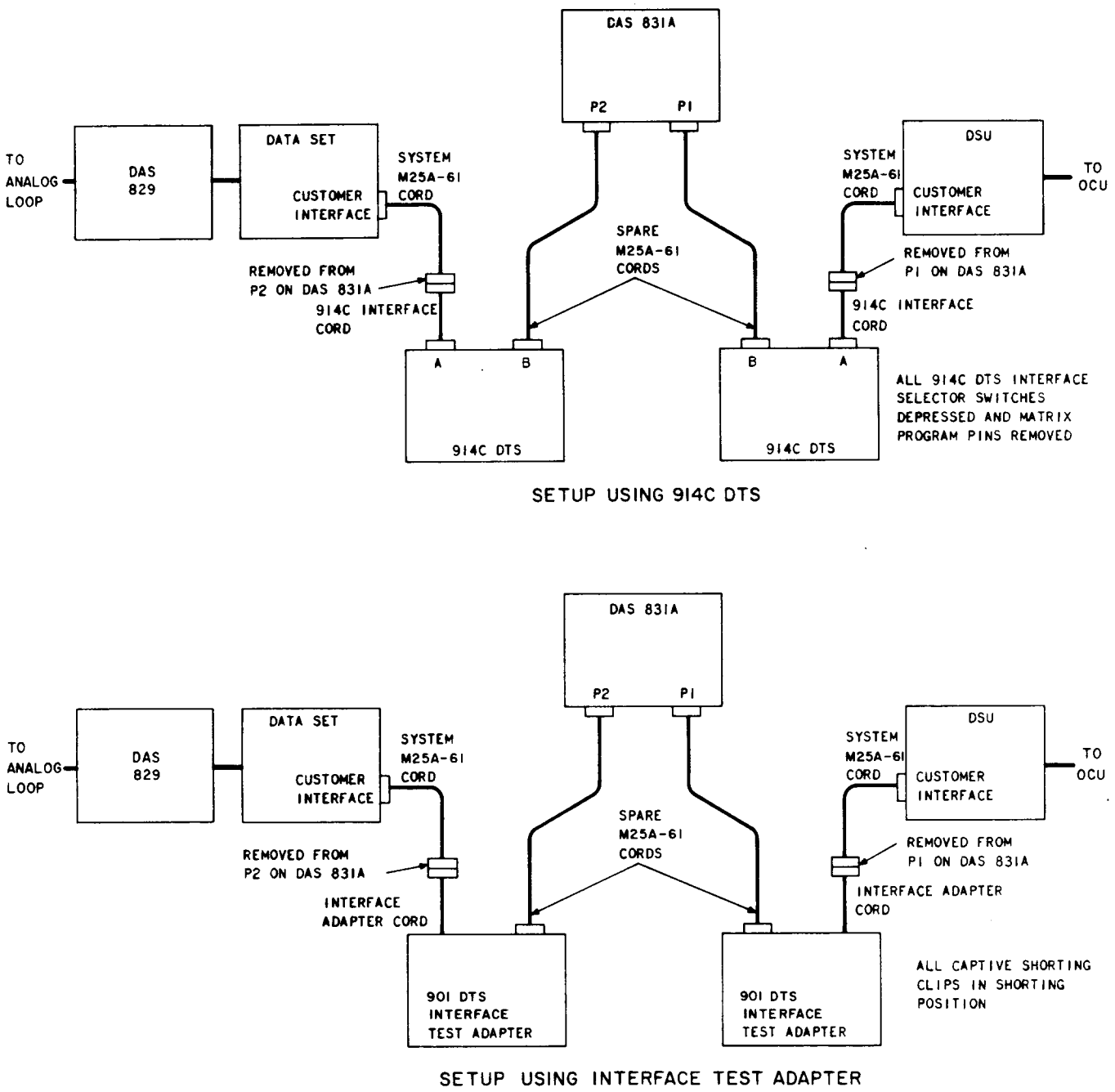


Fig. 7—Setup for Timing Phase Test

- SEND LEVEL to −40
- SEND IMP to 600Ω
- FUNCTION to SEND + TALK + REC
- REC IMP to 600Ω.

(f) Verify that the 829-type DAS options are installed as specified on the service order or circuit layout record card (CLRC).

(g) At the faceplate of the 829-type DAS under test, insert one end of the 3P6A cord into the

TABLE C

CONTROL SETTINGS FOR OSCILLOSCOPE

CONTROL	POSITION
TRIGGERING source	CH 1
TRIGGERING coupling	AC
TRIGGERING SLOPE	Positive going
TRIGGERING LEVEL	AUTO
Vertical mode	ALT
Input coupling (both channels)	AC

REC TST jack and insert the other end into the TRANS TST jack.

(h) Using a 2W6A cord, connect the TTS-4B SEND 310 jack to the strapping plugs at terminals T and R on the 171C adapter (Fig. 9).

(i) Using a 2W6A cord, connect the TTS-4B REC 310 jack to the strapping plugs at terminals T1 and R1 on the 171C adapter (Fig. 9).

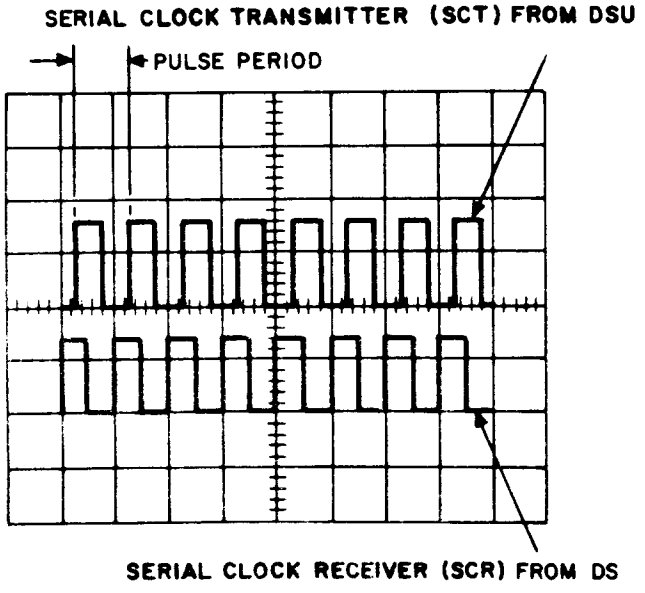


Fig. 8—Timing Phase Test—Oscilloscope Presentation

(j) Adjust the SEND LEVEL on the TTS-4B to obtain a REC LEVEL reading of between −16 and −25 dB.

(k) Observe and record the new SEND LEVEL.

(l) Use the following formula to calculate and verify the SEND LEVEL:

SEND LEVEL = (+REC) or (−GAIN) + TRANS + INSERTION LOSS + REC LEVEL

The value of the SEND LEVEL is a sum of the following:

- REC LEVEL—reading between −16 and −25 dBm on the TTS-4B meter.
- INSERTION LOSS—loss due to slope equalization circuitry and hazardous protection circuitry. These values are shown in Table D.
- REC—loss of the REC attenuator located on the attenuator pad in the 829A-L1 DAS.
- GAIN—gain of the amplifier in the receiver path (829B-L1 DAS or 829C-L1 DAS) measured between the REC IN and REC TST jacks. It is considered to be a negative loss.

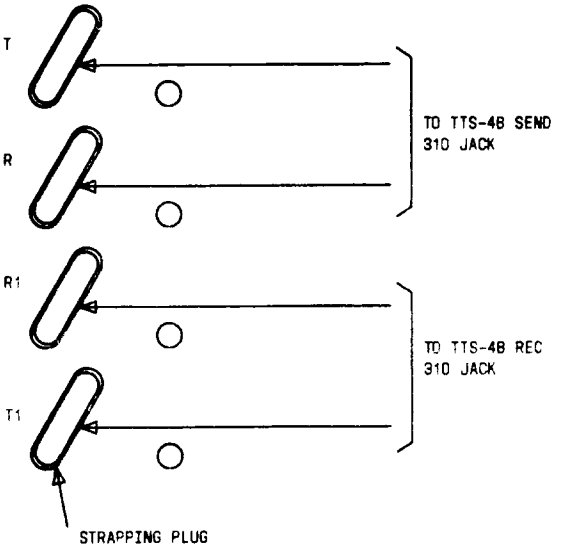


Fig. 9—171C Adapter—Test Connections

- TRANS—loss of the TRANS attenuator located on the attenuator pad in the 829-type DAS.

Requirement: The SEND LEVEL recorded in (k) equals the calculated SEND LEVEL. An example of the use of the formula for calculating the SEND LEVEL is as follows:

- An 829B-L1 DAS with a 600-ohm option is tested for purposes of this example. Gain control R28 is adjusted to −5 dB between the REC IN and REC TST jacks in the receive path.

TABLE D

INSERTION LOSS — 600-OHM TERMINATIONS

DAS 829-TYPE	OPTION	INSERTION LOSS (DB)
829A-L1	600	1.8
829A-L1	1200	2.6
829B-L1	150	4.8
829B-L1	600	1.0
829B-L1	1200	2.2
829C-L1	359A	9.0 to 12.0*
829C-L1	359K	7.7 to 10.7*

*Loss is dependent on equalizer strap options.

Note: The gain control adjustment is made during installation of the 829B-L1 DAS and the 829C-L1 DAS. It is described in Section 314-919-200 entitled Subrate Off-Net Extension Arrangement, Installation and Connections, Digital Data System.

- The TRANS pad in the 829-type DAS is adjusted for a loss of 3 dB (viewed numbers of 1.0 and 2.0 appear on the TRANS pad). For this example, the value of the REC LEVEL, INSERTION LOSS, GAIN, TRANS, and SEND LEVEL is as follows:

REC LEVEL = −19.0 dBm (reading on TTS-4B)

INSERTION LOSS = 1.0 dB (from Table D)

GAIN = 5.0 dB gain as adjusted by R28 and receive level gain strap

TRANS = 3.0 dB (adjusted on TRANS pad)

SEND LEVEL = −(−5 dB) + 3.0 dB + 1.0 dB + (−19 dBm) = −10.0 dBm

−10.0 dBm would be expected value for the SEND LEVEL reading on the TTS-4B.

(m) If all test requirements are met, the local test is complete.

(n) Disconnect all accessory test leads between the 171C adapter and the TTS-4B.

(o) Remove the 829-type DAS from the 171C adapter; remove the adapter from the 46D1 data mounting; and install the 829-type DAS into the slot in the 46D1 data mounting vacated by the adapter.