DATA SERVICE UNIT AND CHANNEL SERVICE UNIT FOR DATAPHONE® SWITCHED DIGITAL SERVICE REFERENCE GUIDE

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1. GENERAL

1.01 This section covers the 501A-type data service unit (DSU) and 550A-type channel service unit (CSU) when used in the switched digital data system (SDDS).

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The DSU and CSU are used to interface the customer-provided equipment (CPE) at an SDDS station to the SDDS network on a 4-wire full-duplex (FDX) basis.

A. Data Service Unit

1.04 The DSU (Fig. 1) converts the serial, unipolar data signals received from the CPE on the customer interface leads to the modified, bipolar signals used on SDDS loops and transmits them to the SDDS network via the 4-wire local transmission facilities. In normal bipolar format, a binary 0 is transmitted as zero volts and a binary 1 is transmitted as either a positive or negative pulse which is opposite in polarity to the previous binary 1. The SDDS modifies this format so that network control codes incorporate bipolar violations where two successive pulses (1s) have the same polarity. To avoid dc buildup on the line, each bipolar violation has a polarity opposite to that of the previous violation, thus making the sum of the signal voltage equal to zero. Conversely, the DSU converts the modified, bipolar signals received from the SDDS network on the 4-wire local transmission facilities to the serial, unipolar signals used by the CPE and transmits them toward the CPE on the customer interface leads. It also provides automatic equalization and loop-loss adjustment for the receive pair of the 4-wire local transmission facility.

1.05 The DSU provides all of the control, timing, and data interface leads required by the CPE. The data and clock signals of a 501A-L1/3 or 501A-L1/3/4 DSU (56 kb/s) conform to the requirements of a balanced direct-coupled interface as specified in CCITT Recommendation V.35, while control signals at the data interface conform to EIA Standard RS-232-C. The customer automatic calling interface (ACI) of a 501A-L1/3/4 DSU conforms to the electrical characteristics of EIA Standard RS-366.

1.06 The DSU may be locally or remotely looped back at either the 4-wire local facility side or customer interface side. This allows a remotely

Fig. 1—501A-Type DSU and DAS 821A-L1 Type

located serving test center (STC) to make remote tests of the 4-wire local facility (channel loop-back) or 4-wire local facility and DSU (DSU loop-back).

B. Data Auxiliary Set

1.07 The DAS 821A-type (Fig. 1) may, as a customer option, be used in conjunction with the 501A-type DSU in providing manual origination, termination, and answering of SDDS calls. Visual call status indications and audible alerting are also provided. The DAS 821A, when used, must be used with the 501A-L1/3/4 (automatic and manual originate and answer).

C. Channel Service Unit

1.08 The CSU (Fig. 2) accepts serial, balanced bipolar signals from the CPE, adjusts the levels, filters them, and transmits them toward the SDDS network over the 4-wire local transmission facility. Conversely, it accepts the balanced bipolar signals from the SDDS network and transmits them toward the CPE on the customer interface leads. Like the DSU, it also provides automatic equalization and loop-loss adjustment for the receive pair of the 4-wire local transmission facility.

1.09 Unlike the DSU, the CSU provides the CPE with only the minimum number of interface leads required to match the CPE to the 4-wire local transmission facility (two control leads and four data leads). These are the status indicator (SI) and ground (GRD) control leads, the transmitted data (DT1 and DR1) leads, and the received data (DT and DR) leads. The electrical characteristics of the signals on the SI lead conform to the EIA Standard RS-232-C, and the GRD lead provides ground return for the SI lead. The four data leads (DT1, DR1, DT, and DR) provide a balanced, 135-ohm interface for the CPE. The signals on these leads conform to the balanced bipolar (return-to-zero) format used by the SDDS rather than either the EIA Standard or the CCITT Recommendation.

1.10 When used with a CSU, the CPE must be capable of generating the balanced bipolar data signals used by the SDDS at the 56-kb/s rate. In addition, the CPE must provide its own timing recovery.

1.11 The CSU provides only the channel loop-back feature for remote testing by the STC and no test switch is provided.

2. PHYSICAL AND ELECTRICAL CHARACTERISTICS

A. Data Service Unit

2.01 The 501A-type DSU (Fig. 1) consists of a transmitter, receiver, control logic, automatic line buildout (ALBO), fixed line buildout (FLBO), and customer interface circuits mounted on two circuit packs (CPs) interconnected by a flexible cable harness. If the optional ACI is provided, the DSU will contain three CPs. The CPs are contained in a basic housing similar to that of the

Fig. 2—550A-Type CSU

208A-type data set. This housing consists of front and rear molded black plastic faceplates mounted on an extruded aluminum frame.

2.02 The 501A-type DSU is approximately 16 inches wide, 11.4 inches deep, 4.3 inches high, and weighs 17.3 pounds. The DSU operates in an environment of 40 to 120°F, with a relative humidity of less than 95 percent.

2.03 Power requirements for the self-contained 83A power unit are uninterrupted 105 to 129 Vac at 57 to 63 Hz. A 3-conductor ac power cord KS-14532, L20, 10 feet in length, is provided with the DSU.

2.04 An assembly containing a 3-position slide switch and four light-emitting diode (LED) indicators (designated as PWR, NS, LL, and RT) is provided. The DSU is furnished with the assembly mounted on the front faceplate. However, the assembly may be mounted behind either the front or rear faceplate as customer Option XN or XM.

2.05 The 501A-type DSU is equipped with one logic board CP and one analog board CP and, optionally, an ACI CP as shown in Fig. 3. LD3 CP performs the DSU logic functions and LD2 CP (56 kb/s) is the analog board. An optional LD4 CP provides automatic call originating capability for CPE equipped to originate SDDS calls and also provides interface for the 821A-type DAS to manually originate, terminate, and answer calls.

2.06 All customer options are selected with the switches on LD2 (56 kb/s) CP, with the exception of the ACI call termination options. These options are selected with the screw switch located on LD4 CP.

2.07 All customer data interface leads of a DSU operating at 56 kb/s are terminated in a 34-pin connector. CPE used with a 56-kb/s DSU must be terminated in a Winchester MRA-34P-JTC6-H8 plug, Burndy MS34 PM-124, AMP5-202431-2, or equivalent.

B. Data Auxiliary Set

2.08 DAS 821A-type is designed for desk-top mounting and consists of a housing, ringer CP (841572290), dial CP (841316243), tone ringer,

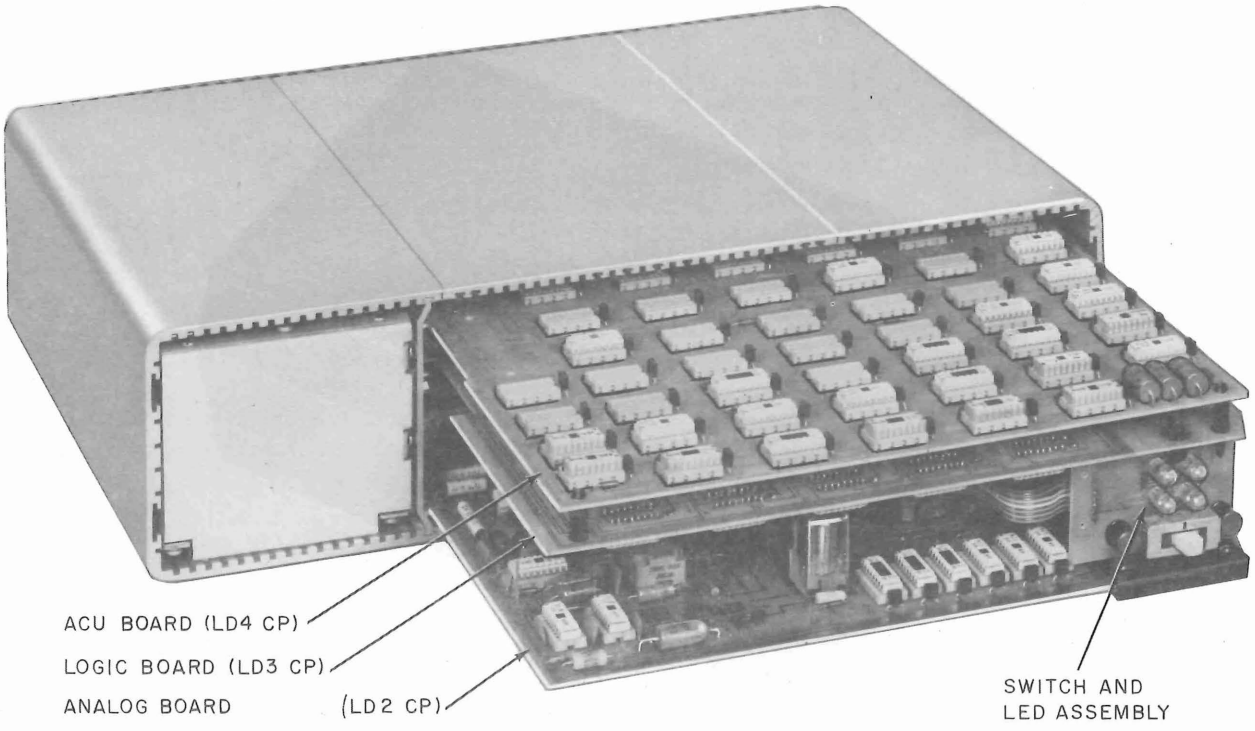

Fig. 3—501A-Type DSU—Front Internal View

and a 6-foot cord terminated with a 50-pin connector for connection to the 501A-type DSU.

2.09 The dimensions of DAS 821A-type are approximately 6.5 inches wide, 4.1 inches deep, and 2.3 inches high. The DAS weighs approximately 1.9 pounds. The DAS operates in an environment of 40 to 120°F, with a relative humidity of less than 95 percent. The required operating voltages (5 Vdc and 12 Vdc) are obtained from the associated 501A-type DSU. Maximum power dissipation is 1.5 watts.

C. Channel Service Unit

2.10 The 550A-type CSU (Fig. 2) consists of the transmit filter, transmit line lightning protection, FLBO, ALBO, and customer interface circuits mounted on two CPs which are interconnected by a flexible cable harness. The two CPs and a 96A power unit are contained in a housing with a black plastic snap-on cover.

2.11 The CSU is approximately 8 inches wide, 5 inches deep, 2.75 inches high, and weighs approximately 3.5 pounds. The CSU operates in an environment of 40 to 120°F, with a relative humidity of less than 95 percent.

2.12 The dc voltages required by the two CSU CPs are provided by the 96A power unit. The 96A power unit requires an uninterrupted 57 to 63 Hz ac power source of 105 to 129 volts. The 3-conductor power cord is a part of the 96A power unit and requires an ac outlet that accepts a plug with two parallel blades and a round ground pin. The cord for connection to the 4-wire facility is not supplied with the CSU.

2.13 Two LEDs are visible through the CSU cover. They are designated as PWR (power) and TST (test). For locations where access to the customer interface connector is restricted, the CSU may be mounted with the power cord and interface connector on either the right or left side. After mounting the CSU, the cover is replaced with the lettering right side up.

2.14 The CSU contains the HR-type transmitter CP and one HR-type receiver CP, both of which have speed-sensitive circuitry.

2.15 The customer interface leads of the CSU are terminated in a 15-pin connector that requires the interface cord of the CPE to be equipped with a Cinch DAMA-15-P plug, or equivalent.

2.16 The FLBO network is associated with the receive line and may be switched in or out by a roller-type switch (S1) located on the receiver CP. The ground option is selectable by means of a screw switch (S2) located on the receiver CP.

3. SERVICE ORDER INFORMATION

3.01 Service orders for Dataphone switched digital service must describe the desired service by uniform service order code (USOC) and not by DSU or CSU apparatus codes. The encoding procedures for determining the appropriate USOC are described in Section 590-000-100. An explanation of features and options common to most data services is given in Section 590-000-101. A rapid cross-reference between USOC, data sets, and reference guides is presented in Section 590-000-102. For customer billing nomenclature, data service tariff listings, and general reference information, refer to Section 82 of the Intercity Service Manual (ISM). Customer option decisions which must be made to determine the USOC suffix are listed in 3.04. Telco option decisions are listed in 3.06.

3.02 The CSU is an inherent part of the switched digital access line (SDAL) and therefore has no USOC. When a DSU is not specifically requested, a CSU will be provided. The CSU customer option YK (signal ground connected to frame ground) is normally provided. If the CSU customer option YL (signal ground disconnected from frame ground) is specifically requested by the customer, it should be indicated on the universal system service order (USSO) as a remark (RMK) entry for the circuit location (CKL).

3.03 The following service order information is provided in tabular form:

- Service Offerings—Current Standard Models—Table A
- DSU Customer Options (USOC SDH, SDK, and SDO)—Table B
- Telco Options for the DSU (USOC SDH, SDK, and SDO) and CSU—Table C.

Customer Options

3.04 The customer has the additional option, for both the DSU and CSU, of removing the grounding strap connecting the signal ground to the frame ground. The customer option should be indicated in the remark (RMK) column. The lack of an entry indicates that the grounding strap is to be connected in its normal manner.

TABLE A

SERVICE OFFERINGS
CURRENT STANDARD MODELS

USOC	FEATURE	SERVICE BIT RATE	MODEL
SDH++	Automatic Answer Only—DSU	56 kb/s	501A-L1/3
SDK++	Automatic Originate and Answer—DSU	56 kb/s	501A-L1/3/4
SDO++	Automatic and Manual Originate and Answer—DSU	56 kb/s	501A-L1/3/4 and 821A-L1 DAS
*	CSU	56 kb/s	550A-L1/5

* See paragraph 3.02.

TABLE B

DSU CUSTOMER OPTIONS
(USOC SDH, SDK, AND SDO)

DECISION	OPTION	DESIGNATION
A	1. Permanent ON request to send	YS
	2. Terminal controlled request to send	YT
B	3. Permanent carrier	XA
	4. Terminal controlled carrier	XB
C	5. Front faceplate switch and LEDs	XN
	6. Rear faceplate switch and LEDs	XM
D (Note)	7. Automatic call termination via call request or data terminal ready circuits	XO
	8. Automatic call termination via data terminal ready circuit only	XP
E	9. Enable terminal controlled not ready	XQ
	10. Disable terminal controlled not ready	XR

Note: Not applicable for answer-only DSU (ie, USOC SDH ++).

TABLE C

TELCO OPTIONS FOR THE
DSU (USOC SDH, SDK, AND SDO) AND CSU

OPTION	DESIGNATION	
	DSU	CSU
FLBO network installed	WV	WV
FLBO network removed	WW	WW

3.05 For each station, the customer may select the basic single line service or, if he has more than one station, he may select multiline terminal hunting. The stations to be included in each hunting group must be located in the same switched digital serving area. Up to 20 stations may belong to the same terminal hunting group. Each station in a terminal hunting group will be assigned a separate 7-digit directory number. When multiline hunting is desired, this would be identified by the field identifier HTG (hunting). Use of this field identifier code is in the AT&T Universal Service Order (USO) manual.

Telco Options

3.06 ***Fixed Line Build-Out (FLBO) Network Installed (WV):*** This option must be provided when the calculated insertion loss for the local cable pairs is less than 10 dB. When installed, this option extends the range of the automatic line build-out (ALBO) so that the proper signal levels are delivered to the DSU or CSU receiver when short local cable pairs are used.

3.07 ***FLBO Network Removed (WW):*** This option must be provided when the calculated insertion loss for the local cable pairs is 10 dB or more. When installed, this option reduces the range of the ALBO so that the proper signal levels are delivered to the DSU or CSU receiver when long local cable pairs are used.

4. REFERENCES

4.01 The following Bell System Practices (BSPs), circuit descriptions (CDs), and schematic diagrams (SDs) provide additional information on the 501A-type DSU and 550A-type CSU.

NUMBER	TITLE
CD & SD-1D253-01	501A-Type Data Service Unit
CD & SD-1D255-01	DAS 821A
CD & SD-1D234-01	550A-Type Data Service Unit

SECTION	TITLE
314-900-100	Digital Data System—Private Line Service—Overall Description
314-900-101	Switched Digital Data System—Overall Description
590-005-100	Data Service Unit and Channel Service Unit—For Dataphone Digital Service—Reference Guide
595-100-100	Digital Data System—550A-Type Channel Service Unit—Description
595-100-150	Digital Data System—550A-Type Channel Service Unit—Test Access Arrangement
595-100-180	Digital Data System—550A-Type Channel Service Unit (CSU)—Summarizing Specification
595-100-200	Digital Data System—550A-Type Channel Service Unit—Installation and Connections
595-100-300	Digital Data System—550A-Type Channel Service Unit—Maintenance
595-100-500	Digital Data System—550A-Type Channel Service Unit—Test Procedures
595-300-100	Switched Digital Data System—501A-Type Data Service Unit—Description and Operation
595-300-180	Switched Digital Data System—501A-Type Data Service Unit—Summarizing Specification
595-300-200	Switched Digital Data System—501A-Type Data Service Unit—Installation and Connections
595-300-300	Switched Digital Data System—501A-Type Data Service Unit—Maintenance
595-300-500	Switched Digital Data System—501A-Type Data Service Unit—Test Procedures
598-085-100	Switched Digital Data System—Data Auxiliary Set 821A-Type—Identification
880-601-115	Digital Data System—Local Loop—Engineering Guidelines