DATA AUXILIARY SET 801CR-L1/2
DESCRIPTION AND OPERATION

CONTENTS PAGE

1. GENERAL

1.01 This section contains the physical and functional descriptions and operation procedures for data auxiliary set (DAS) 801CR-L1/2. Data auxiliary set 801CR-L1/2 replaces DAS 801C-list type and meets the requirements of the FCC Registration Program for use with data sets in registered arrangements. Section 590-011-202 provides registered station arrangements that include multiset installations in 40A3 data mountings and Bell System provided cabinets.

1.02 When this section is reissued, the reason for reissue will be contained in this paragraph.

1.03 Data auxiliary set 801CR-L1/2 (Fig. 1) provides automatic calling capability for a data station and is referred to in this section as an ACU (automatic calling unit). Data auxiliary set 801-CR-L1/2 operates only on telephone (data) lines arranged for TOUCH-TONE® service.

1.04 General information concerning registered ACUs and arrangements follows.

- Registered versions of Bell System ACUs include an "R" in the ACU code.
- Bell System switched network ACUs not having an "R" in the ACU code are "grandfathered."
- "Grandfathered" DAS 801C-type may be connected in registered arrangements provided the interface with the switched network is made with the proper cord as shown in the connection diagrams in Section 598-088-200.
- Data auxiliary set 801CR may be connected in "grandfathered" arrangements provided the interface with the switched network is made with the proper cord as shown in the connection diagrams in Section 598-088-200.
- Connection to the telephone line in registered arrangements must be made with the proper cord to the proper voice or data jack as shown in the connection diagrams in Section 598-088-200.
- In arrangements of one to five ACUs and data sets, a mixture of "new-family" data sets may be used. "New-family" data sets are 103JR, 113CR, 201CR, 202SR, 208BR, and 212AR.

1.05 The following is a technical specification summary for DAS 801CR-L1/2:

Operation: TOUCH-TONE operation only

Interface Voltages: Per Electronic Industries Association (EIA) RS-366

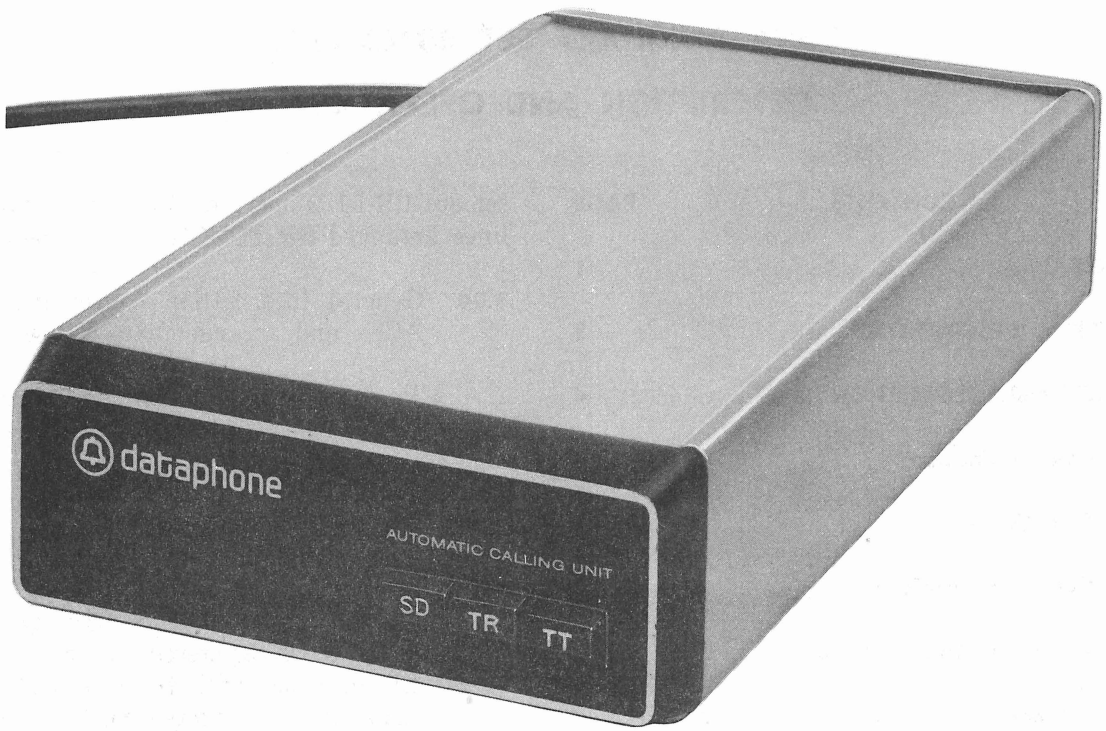

Fig. 1—DAS 801CR-L1/2—Front View

Line Requirements: 2-wire switched network

Power Requirements: 105 to 129 volts at 57 to 63 Hz, approximately 8 watts

Ambient Temperature Range: +40 to +120°F

Relative Humidity Range: 20 to 95 percent.

2. PHYSICAL DESCRIPTION

2.01 List code designations have been assigned to DAS 801CR as follows.

- Data auxiliary set 801CR-L1: Printed circuit pack (Fig. 2).
- Data auxiliary set 801CR-L1/2: Printed circuit pack DAS 801CR-L1 and 52A2 data mounting. The data mounting consists of a housing, front and rear covers, interface assembly with an attached power cord, power transformer KS-21239-L5, and M15H cord.

DAS 801CR-L1

2.02 The printed circuit pack consists of two printed circuit modules interconnected by flexible cables. The circuit pack measures 5.5 inches wide, 10.4 inches long, and 1.5 inches high, and weighs approximately 1.6 pounds. The circuit pack has a faceplate on which are mounted four status indicators and three test switches.

2.03 The four status indicators are light emitting diodes (LEDs) that monitor four of the interface leads. When the circuit pack is installed in the housing with the covers installed, the LEDs illuminate "dropout" graphics on the front cover. "Dropout" graphics provide for the appearance of a 2-letter abbreviation when the indicator is lighted and a continuous black opaque surface when the indicator is off.

2.04 The indicators function as follows.

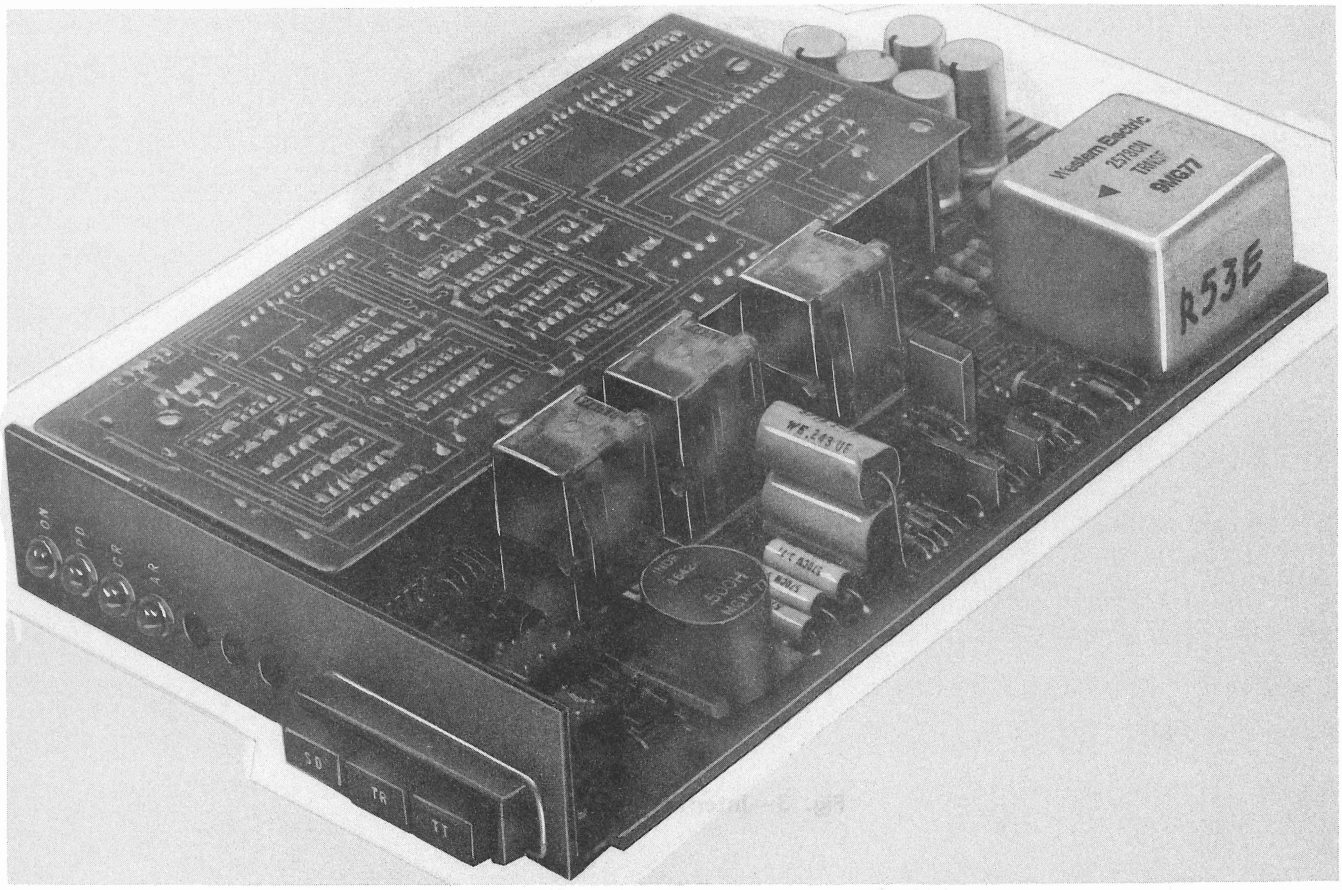

Fig. 2—DAS 801CR-L1

- ON: Lighted when the power indication (PWI) lead is ***on.***
- PD: Lighted when the present next digit (PND) lead is ***on.***
- CR: Lighted when the call request (CRQ) lead is ***on.***
- AR: Lighted when the abandon call and retry (ACR) lead is ***on.***

2.05 The three test switches are nonlocking pushbuttons designated TT (test transmit circuits), TR (test receive circuits), and SD (slow dialing). The function of these switches is described in Part 3.

DAS 801CR-L1/2

2.06 This list code specifies the single set configuration. It consists of the printed circuit pack previously described, enclosed in a 52A2 data mounting. The housing of the data mounting is extruded aluminum with a brushed finish and front and rear black plastic covers. The circuit pack plugs into an interface assembly (Fig. 3) that mounts in the rear of the housing.

2.07 The housing with the circuit pack installed measures 5.8 inches wide, 10.9 inches long, and 2.2 inches high, and weighs approximately 5-1/2 pounds. The KS-21239-L5 power transformer weighs approximately 1 pound.

2.08 The interface assembly has two interface connectors that are accessible through the rear cover. One connector is a KS-19087-L6 and provides an interface between the ACU and the customer-provided equipment (CPE). The CPE must be equipped with a cable terminated in a Cinch or Cannon DB-19604-432 plug wired in accordance with Table A. The cable should not exceed 50 feet in length. The interface to the

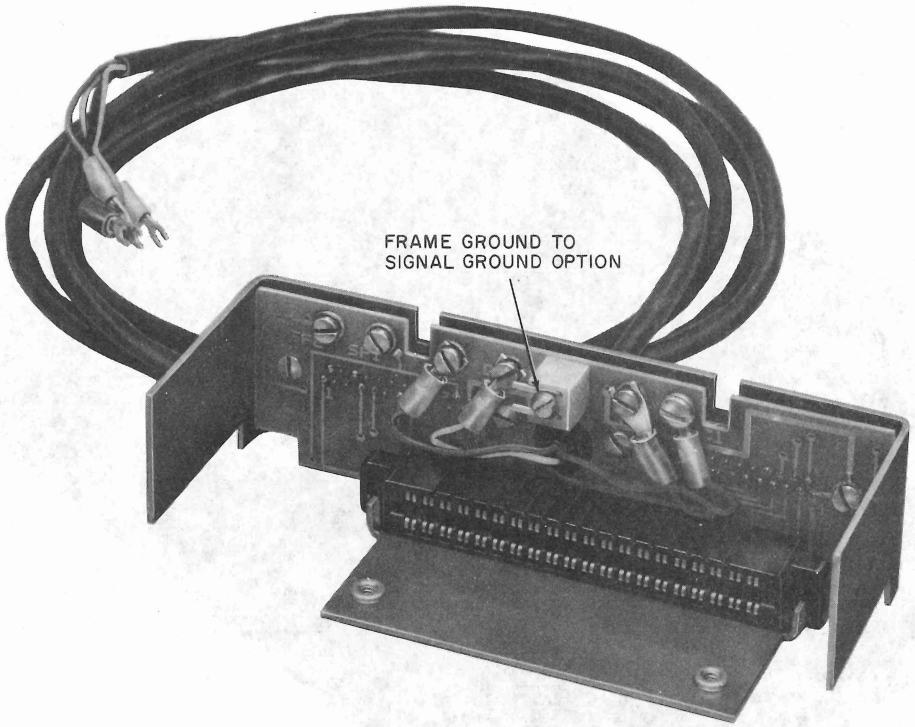

Fig. 3—Interface Assembly

telephone equipment is a KS-19088-L22 connector for the M15H cord. The M15H cord is equipped with three connectors to permit direct connection of the ACU, data set, and telephone equipment.

2.09 Power to the ACU is provided by a KS-21239-L5 transformer that plugs directly into a 117-Vac, 60-Hz, 3-wire grounded outlet. This transformer provides center tapped 24 Vac and a ground on four screw terminals. Connections to the power transformer are made through the 4-conductor cord that is attached to the interface assembly.

2.10 The ACU can be equipped with a 107A or 107B loudspeaker set for call progress tone supervision and for use during tests. This loudspeaker set is silent except during call setup. Refer to Section 598-088-200 for connection information for the loudspeaker set.

3. FUNCTIONAL DESCRIPTION

3.01 This part contains information pertaining to ACU call origination, test modes, interfaces, and options.

A. Call Origination

3.02 To originate a call, the CPE signals the ACU via lead CRQ (call request). The ACU operates on either ground start or loop start lines (with proper options installed).

(a) ***Ground Start:*** The ACU signals the central office (CO) by grounding the ring lead of the telephone line. The CO, which has to be provided with the appropriate ground start circuits, responds by grounding the tip lead of the telephone line as a go-ahead signal. The tip lead monitor of the ACU detects this ground and signals the CPE by use of the PND (present next digit) lead.

(b) ***Loop Start:*** The ACU signals the CO by going off-hook. The CO returns dial tone as an indication that dialing may commence. The dial tone is detected by the ACU, which then signals the CPE by use of the PND lead.

3.03 The CPE now presents to the ACU, digit by digit, the telephone number to be dialed, each time indicating on the DPR (digit present)

TABLE A

CUSTOMER INTERFACE

PIN NO.	LEAD	EIA LEAD DESIG	SIGNAL PRESENTED TO CPE OR ACU	FUNCTION
	Frame Ground	AA	Ground	Ground (Note 1)
2	Digit Present	DPR	ACU	Controls when ACU may read signals presented on digit signal circuits
3	Abandon Call and Retry	ACR	CPE	Indicates to abandon call and retry at a later time
4	Call Request	CRQ	ACU	Requests ACU to originate a call
5	Present Next Digit	PND	CPE	Controls presentation of digits on digit signal circuits
6	Power Indication	PWI	CPE	Indicates if power is available in ACU
7	Signal Ground	AB	Ground	Common ground reference for all circuits except AA
9	Reserved for Testing (+ Power)			+ Power for testing
10	Reserved for Testing (— Power)			— Power for testing
13	Call Origination Status	COS (Note 2)	CPE	Indicates status of automatic call origination procedures
14	Digit Signal Circuit — Low Order	Number Bit NB1	ACU	Parallel binary signals (eg, digits of the called number) are presented to the ACU
15	Digit Signal Circuit — Second Order Bit	Number Bit NB2	ACU	
16	Digit Signal Circuit — Third Order Bit	Number Bit NB4	ACU	
17	Digit Signal Circuit — High Order Bit	Number Bit NB8	ACU	
22	Data Line Occupied	DLO	CPE	Indicates if tel line is in use

Note 1: If Frame Ground is required, connect connect to ground at transformer.

Note 2: Previously called Data Set Status (DSS).

lead that the coding of the four digit signal leads (NB1, NB2, NB4, and NB8) is completed. For each digit received from the CPE, the ACU transmits the appropriate TOUCH-TONE combination of frequencies to the telephone line. The PND lead is turned ***off*** after each combination of frequencies is transmitted and is turned ***on*** again to request the next digit.

3.04 When dialing has been completed and the telephone connection has been established, the data set at the distant end transmits an answer tone to the local ACU. This answer tone is detected by the ACU. Following detection, the telephone connection is transferred to the local data set. The two connected data sets can now communicate with each other.

3.05 A second dial tone detection feature is available with DAS 801CR-L1/2 (loop start operation only for both first and second dial tone). If the ACU is used on a circuit where a second dial tone will be encountered, the CPE must present a binary coded digit 13 on leads NB1-NB8 after the first dial tone is detected and after the access code is dialed. When the DPR lead turns ***on***, this instructs the ACU to revert to the dial tone detection mode.

3.06 The status indicators on the ACU can also be used to observe call progress. When the CPE initiates a call, the CR indicator lights. As soon as the ACU goes off-hook, receives and detects dial tone, the PD indicator lights. During subsequent dialing of each individual digit, the PD indicator will blink off momentarily. Thus, in a typical DDD call, PD will blink off and on 10 times in rapid succession over a period of about 1 second. While this is too fast to count digits by visual check, deviation from the normal rhythm can be observed.

3.07 At the end of digit out-pulsing, the CR and PD indicators remain lighted during call setup, during ringing and answering, and during transmission of answer tone. Following recognition of answer tone, the DATA lamp on the associated data set or telephone set lights when the data set enters the data mode.

3.08 While the data set is in the data mode, the PD indicator remains lighted for the duration of the call. The CR indicator remains lighted if option Z (terminate call via ACU after DSS ***on***) is installed, because the CPE keeps the CRQ lead ***on*** until the end of the call. If option G (terminate call via data set after DSS ***on***) is installed, the CPE may turn ***off*** the CRQ lead (and cause the CR indicator to go off) at any time during the call.

3.09 If option H (do not stop ACR timer when DSS goes ***on***) is installed in the ACU, the AR indicator lights a specific number of seconds after going off-hook or after a digit is dialed (time is determined by and is equal to the ACR timing option installed). If option R (stop ACR timer when DSS goes ***on***) is installed, the AR indicator lights as explained unless the associated data set enters the data or talk mode before the end of the ACR timing interval.

B. Test Modes

3.10 Data auxiliary set 801CR-L1/2 contains built-in test features that can be used to perform tests of the ACU during installation or maintenance. These tests use the test switches and status indicators on the ACU. Procedures and requirements for these tests are contained in Section 598-088-500.

Dial Tone Detection Test

3.11 This test checks that the ACU can initiate a request for dial tone and recognize dial tone from the CO. The test uses the TR switch and the CR and PD indicators. Depressing the TR switch locally turns ***on*** the CRQ lead, lights the CR indicator, and initiates a dial tone request to the CO. When dial tone (or ground start) is returned and detected, the PD indicator lights. This indicates that the dial tone detection circuitry is operating properly.

ACR Timer Test

3.12 This test checks that the abandon call and retry timer in the ACU is operating properly. It can also be used to determine which timing interval is installed in the ACU without having to disassemble the ACU. The test uses the TR switch and the AR indicator. If the ACR timer is to be checked, the TR switch is kept depressed after the dial tone test for an additional period greater than the ACR timing interval (optionally 7, 14, 28, or 56 seconds). The AR indiator will light at the end of this interval as a check that the ACR timer is functioning.

Answer Tone Detection Test

3.13 This test checks that the ACU can recognize answer tone sent from a distant-end data set. The test uses the TR switch and the AR, CR, and PD indicators. The test requires a data set at the distant end or the assistance of the data test center (DTC). The associated telephone set is used to dial the distant-end data set (or DTC). The TR switch is depressed immediately upon hearing answer tone in the receiver. The CR and PD indicators light. The AR indicator lights:

- In less than 1 second if the ACU is equipped with detect beginning of answer tone option
- When answer tone ceases if the ACU is equipped with detect end of answer tone option.

3.14 When the TR switch is released, the CR and AR indicators go off. When the TR switch is depressed again, the CR and AR indicators light immediately.

Out Dialing Sequence Test

3.15 This test checks that the ACU can translate the binary inputs correctly and generate the combinations of tones required for all 10 digits. This test uses the TT and SD switches and the CR and PD indicators.

3.16 This test is performed by dialing the CO ringback number. If a loudspeaker set is used, the digits being transmitted can be heard when the TT switch is depressed. If the digits have been transmitted properly, the CO responds with a double beep. Depressing the SD switch slows down the dialing sequence so that the number of digits dialed can be counted.

Note: If a loudspeaker set is not used, the tones can be heard by connecting a 1011-type handset across tip and ring.

C. Customer Interface

3.17 The customer interface is accessible through the 25-pin male connector at the rear of the ACU. Connector pin numbers and the corresponding lead designations are shown in Table A. The customer interface conforms to EIA Standard RS-366.

D. Telephone Line Interface

3.18 The telephone line interface is accessible through the 25-pin female connector at the rear of the ACU. Connector pin numbers and the corresponding lead designations are shown in Table B.

TABLE B

TELEPHONE LINE INTERFACE

PIN NO.	DESIGNATION	FUNCTION
4	SH2	Switchhook 2
7	T	Tip
8	R	Ring
12	SP2	Speaker 2
14	C	Control to indicate data set is off-hook
16	D1	Control to place data set off-hook
21	DT	Data tip
22	DR	Data ring
23	TK	Talk
24	SP1	Speaker 1
25	GRD	Ground

E. Options

3.19 Data auxiliary set 801CR-L1/2 is provided with options that must be installed prior to placing the ACU in service. The options are installed by setting switches on the ACU as described in Section 598-088-200. Refer to Table C for a summary of these options and the equivalent options of all available ACUs.

4. OPERATION

4.01 Data auxiliary set 801CR-L1/2 (in conjunction with the CPE) operates automatically in originating a call, transferring the line to the data set, and terminating the call. Attendant operation is not required. Refer to Part 3 for a detailed description of the ACU operation.

TABLE C
EQUIVALENT OPTIONS OF ALL AVAILABLE ACUS

	DESCRIPTION	DATA AUXILIARY SETS					
		801CR-L1/2	801C-L1/2	801C1 & 2	801C3 & 4	801A1, 2, 3, 4	801A5 & 6
	Ground Start (4-Wire)	Not Avail.	Not Avail.	Not Avail.	ZK	Not Avail.	Not Avail.
	Ground Start (2-Wire)	V	V	V	V	Fac. Wired	Fac. Wired
	Without Ground Start (Loop Start)	Y	Y	Y	Y	Not Avail.	Not Avail.
Options Depend on Data Set Used	Detect End of Answer Tone	W	W	W	W	W	W
	Detect Beginning of Answer Tone	X	X	X Note 1	X Note 2	X Note 3	X Note 5
	Detect 2025-Hz Answer Tone	S	S	S	S	S	S
	Detect 2225-Hz Answer Tone	T	T	T Note 1	T Note 2	T Note 3	T Note 5
	Data Set to Data Mode by Contact to DT	Q	Q	Q	Q	Q	Q
	Data Set to Data Mode by Isolated Contact	Not Avail.	Not Avail.	Remove Q	F	Remove Q	F
	Data Set to Date Mode by Grounded Contact	ZG	ZG	Not Avail.	ZG	Not Avail.	ZG
	Data Set Answer Detection Without End of Number	Not Avail.	E	Not Avail.	E	Not Avail.	E
	ACU Answer Detection or End of Number	Fac. Wired	B	Fac. Wired	B	Fac. Wired	B
	Isolated TK Contact	Not Avail.	ZA	Fac. Wired	ZA	Fac. Wired	ZA
	Isolated CL Contact	Not Avail.	Not Avail.	Not Avail.	ZC	Not Avail.	ZC
	Grounded TK and CL Contacts	Use ZP	Use ZP	Not Avail.	ZB	Not Avail.	ZB
	No Clear Signal, No TK Contact	ZN	ZN	Not Avail.			
	Clear Signal to Data Set	ZP	ZP				
Customer Options	Terminate Call Via Data Set After DSS on (line transfer in test)	G	G	Remove Z	G	Z	G
	Terminate Call Via Data Set After DSS on (CL contact in test)	G	G	Not Avail.	ZD	Not Avail.	ZD
	Terminate Call Via ACU After DSS on (line transfer)	Z	Z	Z	Z	Remove Z	Z
	Terminate Call Via ACU After DSS on (CL contact)	Z	Z	Not Avail.	A	Not Avail.	A
	Stop ACR Timer When DSS Goes on	R	R	R	R	Y	R
	Do Not Stop ACR Timer When DSS Goes on	H	H	Remove R	H	Remove Y	H
	7-Second ACR Timing	ZQ	ZQ	Screwdriver Adjustment			
	14-Second ACR Timing	ZR	ZR				
	28-Second ACR Timing	ZS	ZS				
	56-Second ACR Timing	ZT	ZT				
	SG Connected to FG	ZU	ZU	Strap	Strap	Strap	Strap
	SG Not Connected to FG	ZV	ZV	No Strap	No Strap	No Strap	No Strap
	2-Wire	Fac. Wired	Fac. Wired	Fac. Wired	ZH	Fac. Wired	Fac. Wired
	4-Wire	Not Avail.	Not Avail.	Not Avail.	ZJ	Not Avail.	Not Avail.

TABLE C (Contd)

EQUIVALENT OPTIONS OF ALL AVAILABLE ACUS

DESCRIPTION	DATA AUXILIARY SETS					
	801CR-L1/2	801C-L1/2	801C1 & 2	801C3 & 4	801A1, 2, 3, 4	801A5 & 6
DLO Controlled by ACU	Fac. Wired	Fac. Wired	Fac. Wired	ZM	Fac. Wired	Fac. Wired
DLO Controlled by ACU and Data Set	Not Avail.	Not Avail.	Not Avail.	ZL	Not Avail.	Not Avail.
Contact Interface	Not Avail.	Not Avail.	Not Avail.	Not Avail.	U Note 6	ZE
Voltage Interface	Fac. Wired	Fac. Wired	Fac. Wired	Fac. Wired	V Note 7	ZF
Mounting Cord — 13-Conductor	Not Avail.	M13G	Not Avail.	Not Avail.	Not Avail.	Not Avail.
Mounting Cord — 10-Conductor	Not Avail.	Not Avail.	M	M	K	M
Mounting Cord — 14-Conductor	Not Avail.	Not Avail.	N Note 4	N	M	N
Mounting Cord — 15-Conductor	M15H	Not Avail.	Not Avail.	Not Avail.	Not Avail.	Not Avail.

Note 1: Available only in 801C2

Note 2: Available only in 801C4

Note 3: Available only in 801A1 and 2

Note 4: P in early production sets

Note 5: Available only in 801A6

Note 6: Available only in 801A2 and 3

Note 7: Available only in 801A1 and 4

4.02 For instructions on operating the test switches, refer to Section 598-088-500.

5. REFERENCES

5.01 The following Bell System Practices provide additional information on DAS 801CR-L1/2:

SECTION	TITLE
590-011-202	Registered Data Sets—Station Arrangements for Registered Data Sets in 40A3 Data Mountings
598-088-200	Data Auxiliary Set 801CR-L1/2—Installation and Connections
598-088-500	Data Auxiliary Set 801CR-L1/2—Test Procedures

5.02 More detailed information on DAS 801CR-L1/2 can be obtained from CD- and SD-1D259-02.