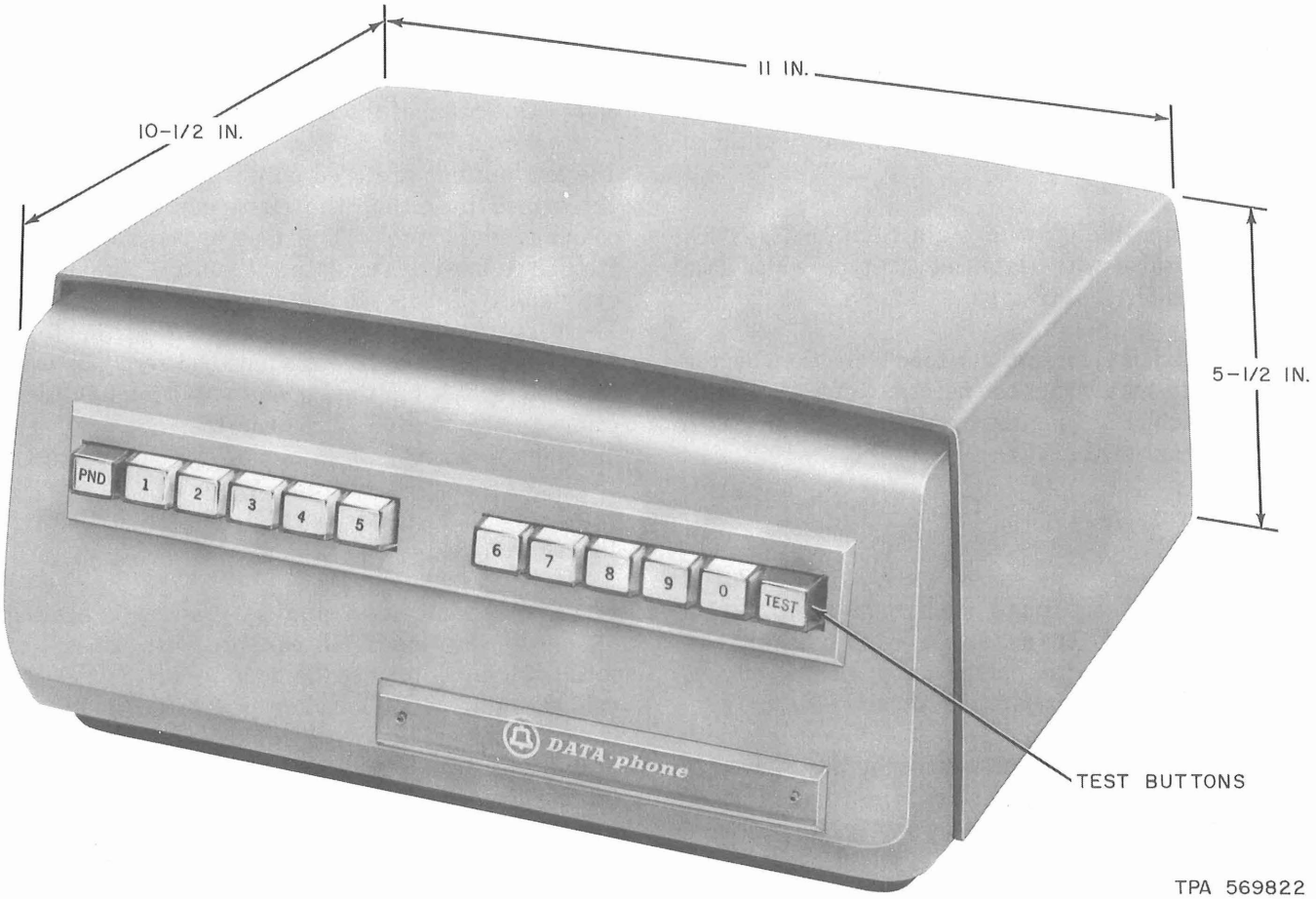
DATA AUXILIARY SET 801C-TYPE

REFERENCE GUIDE



Data Auxiliary Set 801C3 or 801C4—Front View

1. GENERAL

1.01 Data Auxiliary Set (DAS) 801C-type is a TOUCH-TONE® Automatic Calling Unit (ACU) which may be used with most Bell System data sets. The ACU enables business machines to automatically originate DATA-PHONE® service calls on facilities equipped for TOUCH-TONE dialing.

1.02 This section is reissued:

(a) To add information regarding use of ACUs on operator-assisted calls

(b) To add conversion and disposition information

(c) To add indication of preferred maintenance spares

(d) To combine Tables B and E.

1.03 The ACU is capable of calling any telephone number using information furnished by the business machine where second dial tone or CAMA is not required.

1.04 The current standard models of DAS 801C-type (801C3, 801C4) are designed only for voltage signals, conforming to EIA Standard RS-232-A, at the customer interface. DAS 801C3 and 801C4 are later versions of the 801C1 and 801C2 (Manufacture Discontinued) and provide the following additional capabilities:

- Compatibility with Data Sets 103E, 103G, and also with Data Set 101-type when used with DAS 811B-type
- Provision for answer-tone detection by the data set without the necessity of the business machine presenting an end-of-number (EON) signal to the ACU
- 4-wire operation

1.05 Beginning with series 3, the 801C3 or 801C4 ACU is equipped with a 12-combination TOUCH-TONE transmitter rather than the 10-combination transmitter used on the 801C1, 801C2 and earlier series of 801C3 and 801C4.

1.06 Table A lists data sets that are currently compatible with the standard models of DAS 801C3 and 801C4.

1.07 ▶An ACU cannot be used to dial calls that will require operator assistance; for example, an ACU cannot be used where toll calls are switched to a CAMA operator so the calling number can be obtained.◀

2. PHYSICAL AND ELECTRICAL CHARACTERISTICS

2.01 The DAS 801C-type, which is 11 inches wide, 10-1/2 inches deep, and 5-1/2 inches high, is enclosed in a 2-tone gray case and weighs 16 pounds.

2.02 The DAS 801C-type requires 15 watts of 117 Vac 60-Hz power supplied by the customer through a common 3-wire grounding type receptacle.

2.03 Environmental conditions required for proper operation of DAS 801C-type are as follows:

- Ambient temperature range — +40 to +120°F
- Relative humidity range — 20 to 95 percent

3. OPERATION

3.01 Operation of the ACU is dependent on control signals furnished by the business machine. The test buttons are used only when a test is being performed by either the customer or telephone company personnel. The test buttons shown in Fig. 1 are used to simulate the control signals that are usually furnished by the business machine. These buttons can be used to generate the tones for the numbers one through nine and zero; however, the frequencies for the eleventh and twelfth tones cannot be generated using the test buttons. For information on making a test of the data auxiliary set using the test buttons, refer to the section entitled Data Auxiliary Sets 801C3 and 801C4, Test Procedure (598-012-501).

3.02 When the data auxiliary set is placed in the test mode, all call progress tones (dial tone, ringing, etc) can be monitored on the test call speaker. This speaker is located inside the cover of the ACU. DAS 801C3 and 801C4 series 5 or higher can also monitor normal calls placed by the associated business machine. The ACU can be conditioned to the monitor mode by placing the ACR timer select switch in the extreme clockwise position (position 6).

3.03 The data auxiliary set has an abandon-call and retry timing circuit that is referred to in this section as an ACR circuit. The function of this circuit is to supply a signal to the business machine when dial tone, interdigital, or call completion time (answer signal received) exceeds a preset time interval.

3.04 The ACR timer can be adjusted to give 7-, 10-, 15-, 25-, or 40-second time intervals with a tolerance of +20, −0 percent. For information on making this adjustment, refer to the section entitled Data Auxiliary Sets 801C3 and 801C4, Installation (598-012-201).

TABLE A

DATA SETS COMPATIBLE WITH DATA AUXILIARY SETS 801C3 AND 801C4

ACU	DATA SET	RESTRICTIONS
801C4	103A	When used with DAS 804B: ACU option Q must be installed when DS 103A is supplied with D35C cord; ACU option F must be installed when DS 103A is supplied with D25C cord.
801C3 or 801C4	103E	None
801C3 or 801C4	103G	
801C4	202C	
801C4	401J	
801C4	402C	
801C4	602C	
801C4	201A	When used with DAS 804A
801C4	202D	
801C4	402D	
801C3 or 801C4	101A	When used with DAS 811B
801C3 or 801C4	101B	
801C3 or 801C4	101C	
801C4	202D	When used with DAS 804M or 804L
801C4	205B2	
801C4	301B	
801C4	303C	

4. SERVICE ORDER INFORMATION

4.01 ▶Service orders for data services should describe the desired service by USOC and should not specify particular data auxiliary set codes. The encoding procedure to determine the appropriate USOC suffixes is described in Section 590-000-100. Service order information and customer option decisions which must be made to determine the USOC are listed in Table B, Table C and 4.03. An explanation of features and options common to most data sets 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. Intercity Service Manual (ISM) Section 87 gives customer billing nomenclature, shows tariff listings for data services, and provides general reference information.

4.02 Service orders received by Plant or Engineering Departments should identify data services by USOC designation rather than by specific data auxiliary set codes. USOC suffix decoding procedures are described in Section 590-000-100. Engineering or Plant Department personnel responsible for selecting data auxiliary sets are not compelled to use any particular data auxiliary set codes specified or suggested on the service order. To achieve

TABLE B

SERVICE OFFERINGS

CURRENT STANDARD AND SUBSTITUTE 801C-TYPE AUTOMATIC CALLING UNITS

USOC	FEATURE	MODEL	NOTES	ITEM*
DAZ	Without answer-tone or dial-tone detection	801C3	1	A6
		801C1	2, 3, 4	
		801C4	5	
DLC	With answer-tone and dial-tone detection	801C4	1	A6
		801C2	2, 3, 4	

* The ITEM column refers to descriptive information in Section 590-000-101.

Note 1: Current standard model.

Note 2: Use on 2-wire operation only. The DAS 801C3 is best suited for low speed data sets such as Data Set 101 (with 811B) that require "handshaking." The DAS 801C1 is not a suitable substitute unless an EON can be generated by the business machine.

Note 3: Cannot be used with Data Sets 103E, 103G, and 101C.

Note 4: DAS 801C1 and C2 should be upgraded to Series 4 (EM 442).

Note 5: DAS 801C4 has answer-tone and dial-tone detection which are not used.

maximum reuse of data auxiliary set apparatus, the oldest apparatus that will perform the service as described by the USOC codes should be utilized first. When the desired data auxiliary set model is not available from telephone company stocks (field or class C), the use of an available substitute is preferred over the purchase of a new current model.◀

4.03 The following paragraphs provide detailed information on customer options. The option designations (eg, ZH) are provided for Plant and Engineering information and should not appear on service orders.

(a) ***Decision A—2-wire or 4-wire option:***

(1) ***1. 2-Wire Operation (Option ZH):*** This is a factory-wired option and is used for all 2-wire central office line installations.

(2) ***2. 4-Wire Operation (Option ZJ):*** This option is specified when the ACU is used on 4-wire central office lines. Its use is presently limited to DAS 801C4 used with Data Sets 202D, 205B2, 301B2, 303-type, or working into the 758C PBX.

(b) ***Decision B—Call terminated either through ACU or through data set after DSS (data set status) ON:***

(1) ***3. Through ACU (Option Z or A):*** The business machine can terminate calls originated by the ACU via the call request lead (CRQ). CRQ is held on for the duration of the call and is turned off to terminate the call (1-lead control). The ACU response to turning off CRQ depends upon the option installed. If option Z is installed, the ACU will seize the telephone (data) line from the data set and hold it until the data set releases

TABLE C

CUSTOMER OPTION DECISION TABLE

DECISION	OPTION	DESIG-NATION
A	1. 2-wire	ZH*
	2. 4-wire	ZJ
B	3. Call terminated through ACU	Z or A
	4. Call terminated through data set after DSS ON	G or ZD
C	5. ACR timer stopped after DSS ON	R*
	6. ACR timer not stopped after DSS ON	H
D	7. Line transfer controlled by end-of-number signal from customer terminal (see Note 1)	B*
	8. No end-of-number signal from customer terminal (see Note 2)	
E	9. Line transfer after ACU answer-tone detection (801C4 only)	B*
	10. Data set answer-tone detection without EON	E
F	11. Loop start (801C4 only)	Y*
	12. Ground start	V or ZK

* Factory-supplied option.

Note 1: If Decision D is 7, ACU option B must be installed in 801C3 or 801C4 and Decision E is limited to 9.

Note 2: If Decision D is 8, then the choice must be made in Decision E between an 801C4 with option B or option E in 801C3 or 801C4.

from the data mode. This option is normally used with data sets that have line-holding relays. If option A is installed, the ACU will when CRQ is removed present a "clear" indication to the data set in the form of a contact closure. This indication signals the data set to go on-hook and is normally used in data sets which have no line-holding relay or which for some other reason require such an indication.

(2) ***4. Through Data Set (Option G or ZD):*** The business machine can terminate calls originated by the ACU via a signal to the data set. This is normally done by removal of the data terminal ready signal (DTR) to the data set. In this mode, the business machine would be conditioned to remove the CRQ signal after the DSS signal is received from the ACU (2-lead control). Either of two wiring options (G or ZD) may be used to provide this mode of call termination. These options differ only in the way calls are terminated in the test mode. If option G is connected, test calls are terminated by opening the loop, and if option ZD is connected, test calls are terminated by a contact closure to the data set resulting from operation of the CL relay.

(c) ***Decision C—ACR timer stopped or nor stopped after DSS ON:***

(1) ***5. Stop ACR Timer (Option R):*** When this option is installed, the ACR timer which is adjustable from 7 to 40 seconds is stopped or disabled when DSS turns on. The ACR timer interval begins initially with CRQ on and is reset during the dialing sequence each time the present next digit (PND) signal to the business machine goes off. At the end of the ACR timer interval, a signal is sent from the ACU to the business machine as an indication the call should be abandoned and tried at a later time. The option to stop the ACR timer when an indication is received (DSS ON) that the data set has entered the data mode is normally used. If EON operation is used or if the business machine programmer wishes to utilize the ACR ON function to perform some function in the business machine, option H may be used.

(2) ***6. Continue ACR Timer (Option H):*** When this option is installed, the ACR timer continues to run even though the data set has entered the data mode. In the EON mode, where the business machine must recognize when the called station has answered, this option may be used to give an indication when a preset time has passed, thus avoiding the need for a special timer in the business machine.

(d) ***Decision D—Control of line transfer to data set:***

(1) ***7. EON Signal (Option B):*** This mode is used when the data set is to be placed off-hook upon receipt of an EON code from the business machine. The EON procedure can be used for the data sets specified in Table A. However, using the EON code is not recommended for two reasons:

- Except for Data Sets 101C (811B) or 103E and 103G, most data sets cannot hold the line during dc loop interruptions that may occur immediately after dialing.
- Except for Data Sets 101C (811B) or 103E and 103G, an ACU with answer-tone detection provides the most reliable means of assuring that the called station has been reached.

(2) ***8. No EON Signal:*** With this mode of operation, the ACU or data set must detect the answering signal without requiring an EON signal from the terminal.

(e) ***Decision E—ACU answer detection, or data set answer detection without EON:***

(1) ***9. ACU Answer Detection (Option B):*** This mode is recommended for Data Set 103A and all 200, 300, 400, and 600 series data sets. When this option is used, the frequency of the answer-tone detector circuit must be selected and the choice made whether to transfer the telephone line to the data set at the beginning or end of the answer tone. Data Set 103A2 uses the 2225-Hz detector. All others use 2025-Hz detection. Data Set 103A-type uses beginning of tone. All others use end of tone.

(2) ***10. Data Set Answer Detection Without EON (Option E):*** When the ACU seizes the line and starts dialing, the data set is placed off-hook. When the called station transmits an answer tone, the data set answers the tone and signals the ACU to turn DSS on and remove itself from the line so that data transmission can start. This option was designed for data sets that "handshake", such as the 101 (with 811B), 103E, and 103G installations.

(f) ***Decision F—Loop start or ground start***

(1) ***11. Loop Start (Option Y—801C4):*** This option allows the 801C4 to use loop start 2- or 4-wire operation. It is limited to those central offices capable of generating the 350-Hz and 440-Hz dial tones that can be detected by the ACU. This option is not recommended where 2-way operation is anticipated, due to the "glare" problem.

(2) ***12. With Ground Start Operation (Remove Option Y, Install V or ZK):***

Ground start ACUs are not compatible with (a) step-by-step (SXS) common control, (b) SXS noncommon control arranged for TOUCH-TONE service. To provide service in these offices, a DAS 801C2 or 801C4 arranged for loop start must be used.

With Ground Start (2-wire) (Option V): This mode must be used if the 801C3 is used. Ground start operation is preferred, especially if 2-way traffic is anticipated.

With Ground Start (4-wire) (Option ZK): The ACU signals off-hook on the ring side of the transmit pair and monitors the tip side of the receive pair with this option. It should be used for any 4-wire application where possible, especially where 2-way service is anticipated.

4.04 ***Telco Options:*** Telephone company options are listed in Table D, and are described in detail (a) through (g).

(a) ***10-conductor or 14-conductor mounting cord:*** The 10-conductor cord (option M) is standard. The 14-conductor cord (option N)

TABLE D

TELCO OPTIONS

OPTION		DESIG-NATION
Mounting Cord	10-conductor	M*
	14-conductor	N
Data Mode	Data set to data mode by contact to DT	Q*
	Data set to data mode by isolated contact	F
	Data set to data mode by grounded contact	ZG
Contact	Grounded TK and CL contacts	ZB
	Isolated TK contact	ZA*
	Isolated CL contact	ZC
Call Termination	Terminate call by line transfer	G or Z*
	Terminate call by clear contact	ZD or A
Data Line	Data line occupied control by ACU	ZM*
	Data line occupied control by ACU and data set	ZL
Answer-tone (801C4 only)	Detect 2025 answer tone	S*
	Detect 2225 answer tone	T
Answer-tone (801C4 only)	Detect beginning of answer tone	X*
	Detect end of answer tone	W

* Factory-supplied options

M14C-61 or M14D-61 (101C with 811B only) must be ordered separately. The following lists some of the data set installations and the mounting cords required.

- 101 with 811B (M14D cord)
- 103A (if supplied with old D25C cord, uses M14C cord; if supplied with D35C cord, uses D10P cord)
- 402C and 402D transmit-receive terminal (D10P cord)
- 402D receive terminal (D10P cord)
- 201A3, A4 (D10P cord)
- 202D, 205B2, 301B, or 303, with DAS 804M (4-wire) (801C4 only, uses M14C cord).

(b) ***Data set to data mode by contact to DT or by isolated contact or by grounded contact:***

(1) ***By Contact to DT (Option Q):*** With this option, a contact of the ANS relay in the ACU is connected to the DT lead. This provides a path for the line hold (H) relay in the data set to operate and start the sequence which places the data set on-line in the data mode. This option is required for Data Set 103A (with new D35C cord) and all 200, 400, and 600 series data sets operating in the 2-wire mode.

(2) ***By Isolated Contact (Option F):*** This option provides an isolated contact of the ANS relay to transfer the data set to the data mode. It should be specified for Data Sets 101 (with 811B), 103A (with D25C cord), and 202D, 205B, 301B, and 303-type, using DAS 804M.

(3) ***By Grounded Contact (Option ZG):*** This option provides a grounded contact of the ANS relay to transfer the data set to the data mode. It should be specified for 103E and 103G installations.

(c) ***Grounded TK and CL contacts or isolated TK contact or isolated CL contact:***

(1) ***Grounded TK and CL Contacts (Option ZB):*** This option provides a grounded contact of the CL and TK relays. It should be specified for Data Sets 103E and 103G and for Data Sets 202D, 205B, 301B, and 303-type with DAS 804M. The grounded TK

contact is not used. The grounded CL contact is used to clear (disconnect) these specific data sets.

(2) ***Isolated TK Contact (Option ZA):*** This option is required only for Data Set 103A. This contact was provided for the 103A to control the ACU since the 103A does not provide sufficient contacts to perform the complete function.

(3) ***Isolated CL Contact (Option ZC):*** This option is required for Data Set 101 (811B).

(d) ***Terminate call either by line transfer method (option G or Z) or by clear (CL) contact method (option ZD or A):*** The method of causing the data set to release the line when a call is terminated is a function of the type of data set used. Data sets which have line-holding relays may use either the line transfer or the CL contact method of releasing the line. Data sets without line-holding relays or data sets that for some other reason need a command to go on-hook must utilize the CL contact method.

(1) ***Terminate Call by Line Transfer (Option G or Z):*** The decision as to whether G or Z is used is determined as described in the customer option paragraphs. The line transfer option causes the ACU to seize the line from the data set long enough for the line-holding relay to drop out resulting in an on-hook condition. Option G or ZD is normally specified for Data Sets 103A and all 200, 400, and 600 series operating in the 2-wire mode.

(2) ***Terminate Call by CL Contact Method (Option ZD or A):*** The choice between option ZD or A is a function of the customer's choice of call termination options. In the CL contact method, a contact closure is supplied to the data set to initiate the call termination procedure within the data set. Option ZD or A is normally specified for Data Sets 101-Type (with DAS 811B), 103E, and 103G, plus any installations using DAS 804M (4-wire).

(e) ***Data line occupied controlled by ACU or by ACU and data set:***

(1) ***By ACU (Option ZM):*** This option is standard and should be used with all installations except those where DAS 804M is used.

(2) ***By ACU and Data Set (Option ZL):*** This option is provided for use with 4-wire installations using the 804M where the business machine must be notified that the line is busy in a test mode as well as in the normal talk and data modes.

(f) ***Detect 2025 or 2225 answer tone (DAS 801C4 only):***

(1) ***2025 Answer Tone (Option S):*** This option conditions the ACU answer detector to respond to 2025 Hz. It should be used for Data Set 103A1 and all 200, 300, 400, and 600 series.

(2) ***2225 Answer Tone (Option T):*** This option conditions the ACU answer detector to respond to 2225 Hz. It should be used with the Data Set 103A2.

(g) ***Detect beginning or end of answer tone:***

(1) ***Beginning of Answer Tone (Option X):*** This option causes the ACU to transfer the line to the data set after receipt of approximately 200 msec of valid answer tone. It should be specified for the Data Set 103A.

(2) ***End of Answer Tone (Option W):*** This option causes the ACU to transfer the line to the data set after completion of a valid answer tone. This option should be specified for the 200, 300, 400, and 600 series data sets.

5. SUBSTITUTE DATA SETS

5.01 The data auxiliary set models listed in Table B may be used to supply the services described in this section. ▶The restrictions which apply when earlier model ACUs are used are listed as footnotes to Table B. These result primarily from options which are available in the later models but not in earlier models. In general the earlier models:

- Do not provide for 4-wire operation

- Cannot allow the data set to detect an answering signal without an EON signal from the customer

- Cannot provide certain control functions to the data set such as (1) data set to data mode by grounded contact (2) signals from the ACU clear relay which operates on call termination.

6. CONVERSION AND DISPOSITION INFORMATION

6.01 Refer to Table E for recommendations concerning the conversion and disposition of existing models of 801C-type ACUs.

6.02 Maintenance centers should carry only DAS 801C4 as maintenance spares to provide backup for all 801C-type units. Any other 801Cs in maintenance spare stock should be returned to Western Electric Service Centers for reuse or appropriate disposition.◀

7. REFERENCES

7.01 The following drawings, specifications, and sections provide additional information on Data Auxiliary Set 801C-type and associated equipment.

(a) Schematic diagrams—SD-1D035-01 (801C1), 801C2); SD-1D103-01 (801C3, 801C4)

(b) PELs 7438, 7558

(c) ELs 25 and 16

(d) EMs 442 and 645

(e) BSPs 598-012-XXX series.

TABLE E

DISPOSITION AND CONVERSION INFORMATION

DATA AUXILIARY SET	LATEST SERIES	MANUFACTURE STATUS	REPLACED BY	CONVERTIBLE TO	RECOMMENDED DISPOSITION
801C1	4	MD	801C3	None	Upgrade to latest series or salvage*
801C2	4	MD	801C4	None	Upgrade to latest series or salvage*
801C3	5	Active	—	801C4	Repair or convert
801C4	5	Active	—	801C3	Repair

* Salvage means to return units to service centers for best salvage allowance.