

## DATA AUXILIARY SETS 801C3 AND 801C4

### DESCRIPTION AND OPERATION

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#### 1. GENERAL

**1.01** This section provides a general description of Data Auxiliary Sets (DAS) 801C3 and 801C4 and describes some of the possible optional modes of operation. The section may be used to provide general information on DAS 801C3 and 801C4, and it may also be used in conjunction with other practices to assist in effectively installing and maintaining this apparatus.

**1.02** This section is reissued to add information on the use of the automatic calling unit (ACU) speaker and to comply with the latest BSP format by adding a functional description. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted.

**1.03** DAS 801C3 or 801C4 provides a means for a business machine to automatically originate DATA-PHONE® calls on facilities equipped for TOUCH-TONE® dialing, and is referred to as an automatic calling unit or ACU.

**1.04** DAS 801C3 and 801C4 are designed to supersede DAS 801C1 and 801C2, respectively. They retain all of the features of the older models they supersede, and incorporate the following new features:

- Compatibility with Data Set 103E- and 103G-types and also with Data Sets 101-type when used with a 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, a 12-combination TOUCH-TONE transmitter is provided rather than the 10-combination type that was standard on series 1 and 2 of the DAS 801C3 and 801C4. To provide a 12-combination TOUCH-TONE transmitter on series 1 and 2, circuit pack (CP) AS28 is removed and replaced with CP AS64.

**1.06** The DAS 801C3 provides for automatic calling without answer-tone detection and *requires a ground-start line*. This set provides a voltage interface to the customer equipment.

**1.07** The DAS 801C4 provides for automatic calling with answer-tone detection. The 801C4 can detect the 350- and 440-Hz dial tone and therefore does not require a ground-start line. Ground-start operation without dial tone detection may be used if desired. The DAS 801C4 provides a voltage interface to the customer equipment.

**1.08** The DAS 801C3 and 801C4 are compatible with most data sets; however, since the data set is the controlling factor in a station installation, compatibility should be verified by consulting the appropriate section for the data set. Table A lists the data sets that are currently compatible with the ACU and restrictions that may apply.

**1.09** The ACUs normally installed are associated with a customer business machine and a DATA-PHONE data set. Information on the business machine and data set is not covered in this section.

**1.10** Automatic calling units cannot be used on lines where operator intercept (CAMA) is required.

**TABLE A**  
**DATA SETS COMPATIBLE WITH 801C3 AND 801C4**

DATA SET	RESTRICTIONS
103A } 103E } 103G } 202C } 401J } 402C } 602C }	801-type must be equipped with Q option when a 10-conductor cord (M option) is used with the ACU.
201A } 202D } 402D }	None
101A } 101B } 101C }	When used with 804A DAS
202D } 205B 2 only } 301B } 303C }	When used with 811B DAS
	When used with 804M or 804L DAS

## 2. PHYSICAL DESCRIPTION

**2.01** Each DAS 801C3 or 801C4 is housed in a 2-tone plastic housing having no provision for a handset. Figure 1 shows the front panel and gives the physical dimensions of the DAS 801C3 and 801C4.

**2.02** Two cords are supplied with each data auxiliary set:

- (a) D10P-61 mounting cord (spade-tipped)

*Note:* On some installations, as indicated in the appropriate section for the associated data set, it is necessary to replace the mounting cord with a M14C-61 cord (plug-ended), which must be ordered separately. The cord replacement procedure is described in the section entitled Data Auxiliary Sets 801C3 and 801C4, Installation (598-012-201).

- (b) KS-14532-L16 power cord.

**2.03** The cord and connector required for connecting the business machine to the ACU interface is supplied by the customer. This cord should not exceed 50 feet in length and should be equipped with a plug that mates with the KS-19087-L6 connector on the ACU. For the location of this connector, refer to Fig. 2.

**2.04** The DAS 801C3 and 801C4 are designed to operate properly within the ranges of the environmental conditions given below.

Ambient temperature range +40 to 120°F

Relative humidity range of 20 to 95 percent.

**2.05** The DAS 801C3 and 801C4 require approximately 15 watts of 117-volt 60-Hz ac power. The customer must provide a standard 3-wire grounding-type power receptacle. This receptacle must be on a circuit that is not controlled by a switch in order to avoid service interruption.

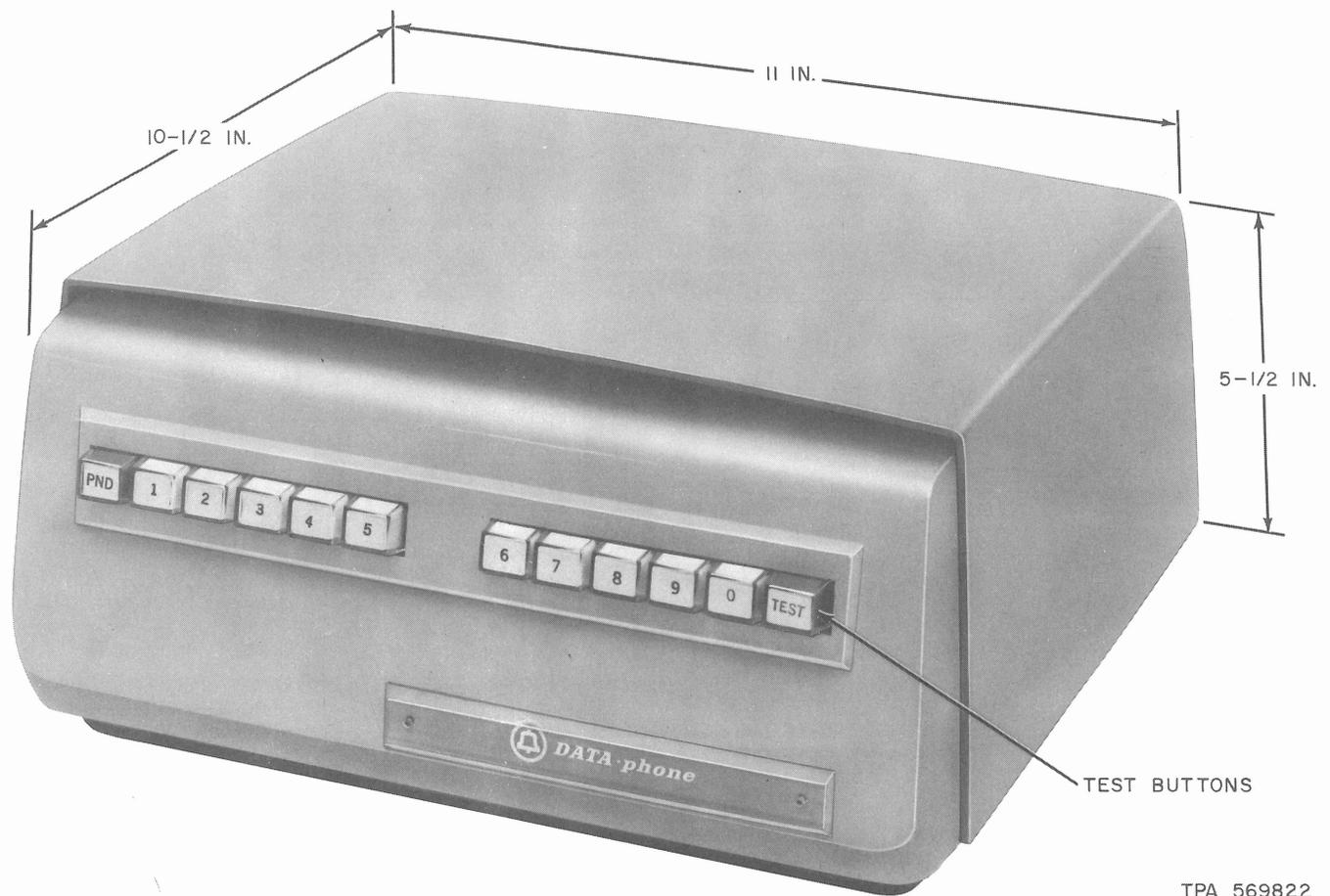


Fig. 1—Data Auxiliary Set 801C3 or 801C4—Front View

**2.06** The DAS 801C3 and 801C4 provide a means of testing that is independent of the business machine control signals. The test buttons shown in Fig. 1 are used to simulate the control signals that are furnished by the business machine. These buttons can be used to generate the tones for the numbers 1 through 9 and zero; however, the frequencies for the 11th and 12th 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).

**2.07** 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.

**2.08** The ACR timer can be adjusted to give nominal 7-, 10-, 15-, 25-, or 40-second time intervals. In DAS 801C3 and 801C4 series 5 and above, there is an additional 40-second monitor switch position that makes it possible to monitor the progress of a normal call using the ACU speaker. For information on setting the ACR timer switch, refer to the section entitled Data Auxiliary Sets 801C3 and 801C4, Installation (598-012-201). Refer to Fig. 3 for a view of the data auxiliary set with the cover removed and the ACR timer switch.

**Note:** Only the 40-second ACR timer setting can be checked or verified when the ACU is placed in the test mode by operation of the TEST key. The timer circuits are designed

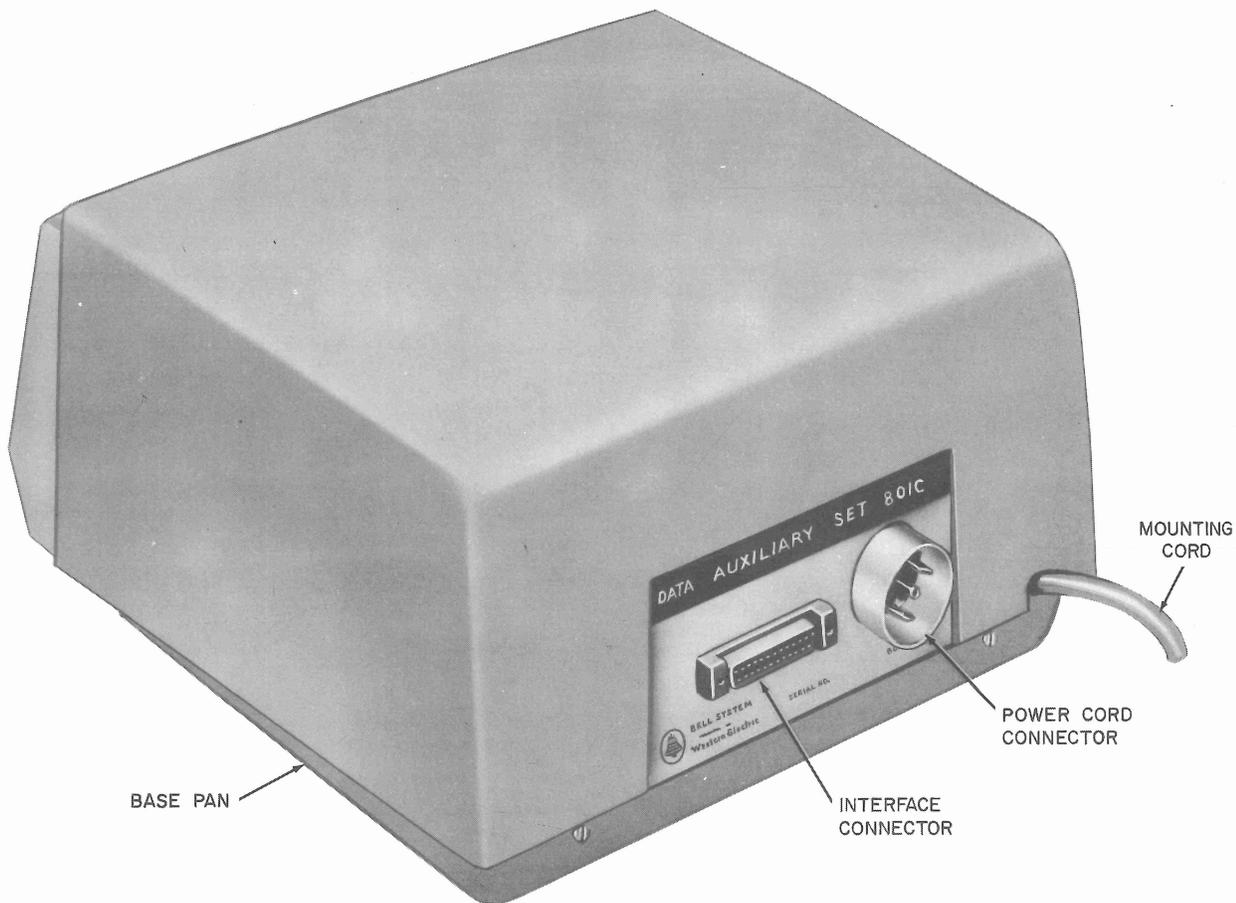


Fig. 2—Data Auxiliary Set 801C3 or 801C4—Rear View

so that the timer will not expire in less than 40 seconds with the ACU in the test mode, thereby facilitating the testing of the TOUCH-TONE transmitter and associated circuits.

**2.09** Table B gives the options available for the Data Auxiliary Sets 801C3 and 801C4. The table indicates the options that are factory furnished, ie, wired at the factory, and the options that can be provided at the time of installation by installing the appropriate straps. Refer to the DAS 801C3 and 801C4 installation section for information on the strapping required to install the various options.

**2.10** The DAS 801C3 can be converted to an 801C4 by the installation of two circuit packs (CP AS9 and CP AS27). Conversely, the 801C4 can be converted to an 801C3 by the removal of the circuit packs. Refer to Fig. 4 for the location

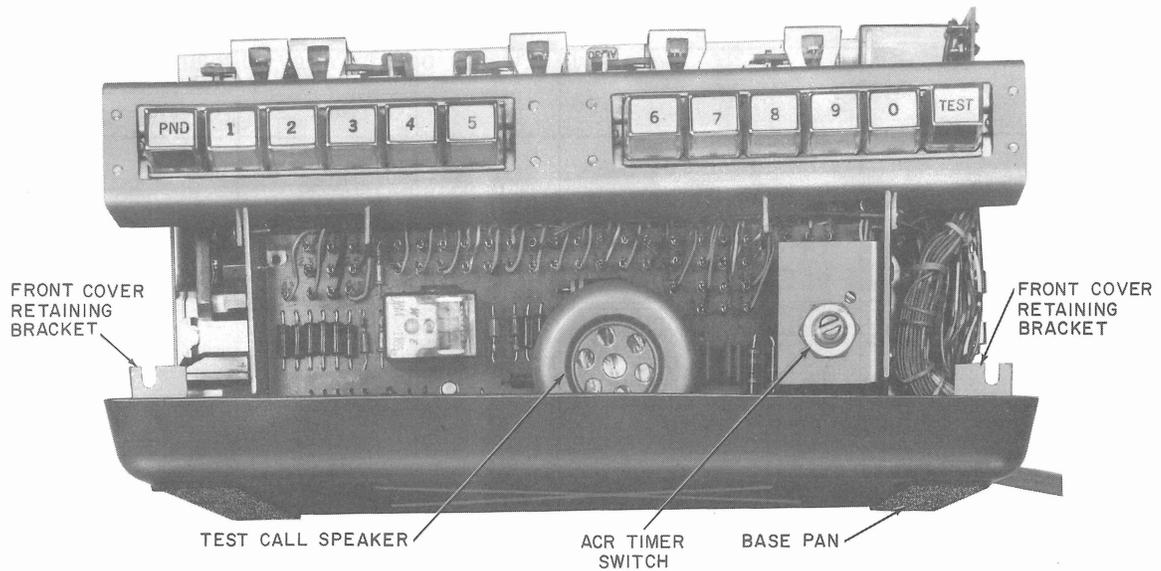
of these circuit packs. When installing the circuit packs or when substituting circuit packs (to clear trouble, etc) care must be taken to insert the circuit packs into the correct slot and to seat each circuit pack firmly in the connector.

**2.11** Information on the installation and removal of circuit packs is given in the section entitled Data Auxiliary Sets 801C3 and 801C4, Maintenance (598-012-301).

**2.12** Table C gives the interface pin assignment for the 801C3 and 801C4.

### 3. FUNCTIONAL DESCRIPTION

**3.01** This part describes the major functional components that make up the DAS 801C-type ACU. A block diagram is provided in Fig. 5.



**Fig. 3—Data Auxiliary Set 801C3 or 801C4—Cover Removed, Front View**

**3.02** The test keys allow the testing of the ACU dialing function without external test equipment. Depressing the TEST key puts the ACU in the test mode. When the ACU is in the test mode, digits may be transmitted by depressing the proper key. The TOUCH-TONE signals will be heard in the ACU speaker. The ACU will automatically terminate the test mode 40 seconds after the last digit was transmitted.

**3.03** The digit relays located on CP AS28 or CPAS64 control the TOUCH-TONE transmitter of the ACU. The relay drivers receive a number in binary form from either the test keys (test mode) or from the business machine (normal operation) via the NB1, NB2, NB4, and NB8 interface leads.

**3.04** Since each decimal digit is represented by two different transmitted frequencies, the ACU transmits to the CO the dual frequency corresponding to the binary digit appearing on the number leads. The output of the transmitter is connected to the telephone line via a telephone network.

**3.05** The ACR timer starts when CRQ is turned on and is reset with each operation of the PND relay. At the end of the ACR time interval, a signal is sent to the business machine suggesting that the call be aborted and another call attempt

made at a later time. The time may be preset to intervals of 7, 10, 15, 25, and 40 seconds.

**3.06** The intercall, oscillator, and DP timers are all delay relay drivers. The intercall timer delays for at least 1 second the release of the DP relay. This provides a 1-second interval between calls to ensure the central office has recognized the on-hook condition. The DP timer provides approximately 27-msec delay after DPR is turned on by the business machine before the DP relay operates to ensure the digit relays have operated. When the DP relay operates, the PND timer (oscillator timer) is enabled. The oscillator timer times the length of the TOUCH-TONE oscillator signal (approximately 50 msec). The PD relay then operates, causing PND to turn off.

**3.07** The digit delay timer provides a 15-msec time delay so the next dialing cycle may not begin before central office response time requirements are met.

**3.08** The control circuits and relays provide signals to the business machine and the data set which are used to indicate the status of the ACU and telephone circuits.

**3.09** The monitor amplifier is a 3-stage audio amplifier that drives the ACU speaker.

TABLE B

FEATURE OR OPTION		DESIG	AVAILABILITY	
			801C3	801C4
Answer Detection	Detect End of Answer-Tone	W	NA	*
	Detect Beginning of Answer-Tone	X	NA	†
	Detect 2025 Tone	S	NA	†
	Detect 2225 Tone	T	NA	*
Ground start	With	V	†	*
	Without	Y	NA	†
Mounting Cord	D10P-61	M	†	†
	M14C-61	N	*	*
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	*	*
ACR timer stopped when DSS is turned on		R	†	†
ACR timer not stopped (timing continued) when DSS is turned on		H	*	*
Data set answer detection without end of number (EON)		E	*	*
ACU answer detection or end of number (EON)		B	†	†
Isolated TK contact		ZA	†	†
Isolated CL contact		ZC	*	*
Grounded CL and TK contacts		ZB	*	*
Terminate the call via the data set after DSS ON (line transfer in test)		G	*	*
Terminate the call via the data set after DSS on (CL contact in test)		ZD	*	*
Terminate the call via the CRQ signal after DSS ON (line transfer)		Z	†	†

TABLE B (Cont)

FEATURE OR OPTION	DESIG	AVAILABILITY	
		801C3	801C4
Terminate the call via the CRQ signal after DSS ON (CL contact)	A	*	*
2 Wire	ZH	†	†
4 Wire	ZJ	*	*
4 Wire — Ground start	ZK	*	*
801C Control of DLO lead	ZM	†	†
DLO controlled by ACU and data set	ZL	*	*

NA — Not available

\* Installation option — Option to be wired in at installation if required as the data auxiliary set is not shipped with this option.

† Standard or factory furnished option.

**3.10** The limiter detection detects dual frequency TOUCH-TONE dial tone (350 and 440 Hz) and either the 2025- or 2225-Hz answer tone signal used by the answering station. Dial tone detection is used in originating calls on loop-start lines. After detecting answer tone, a signal is sent to the data set putting it into the data mode.

**3.11** The tip monitor circuit is used in ground start operation and allows the ACU to detect an incoming call and to detect a tip ground (when the ACU is attempting to originate a call).

#### 4. OPERATION

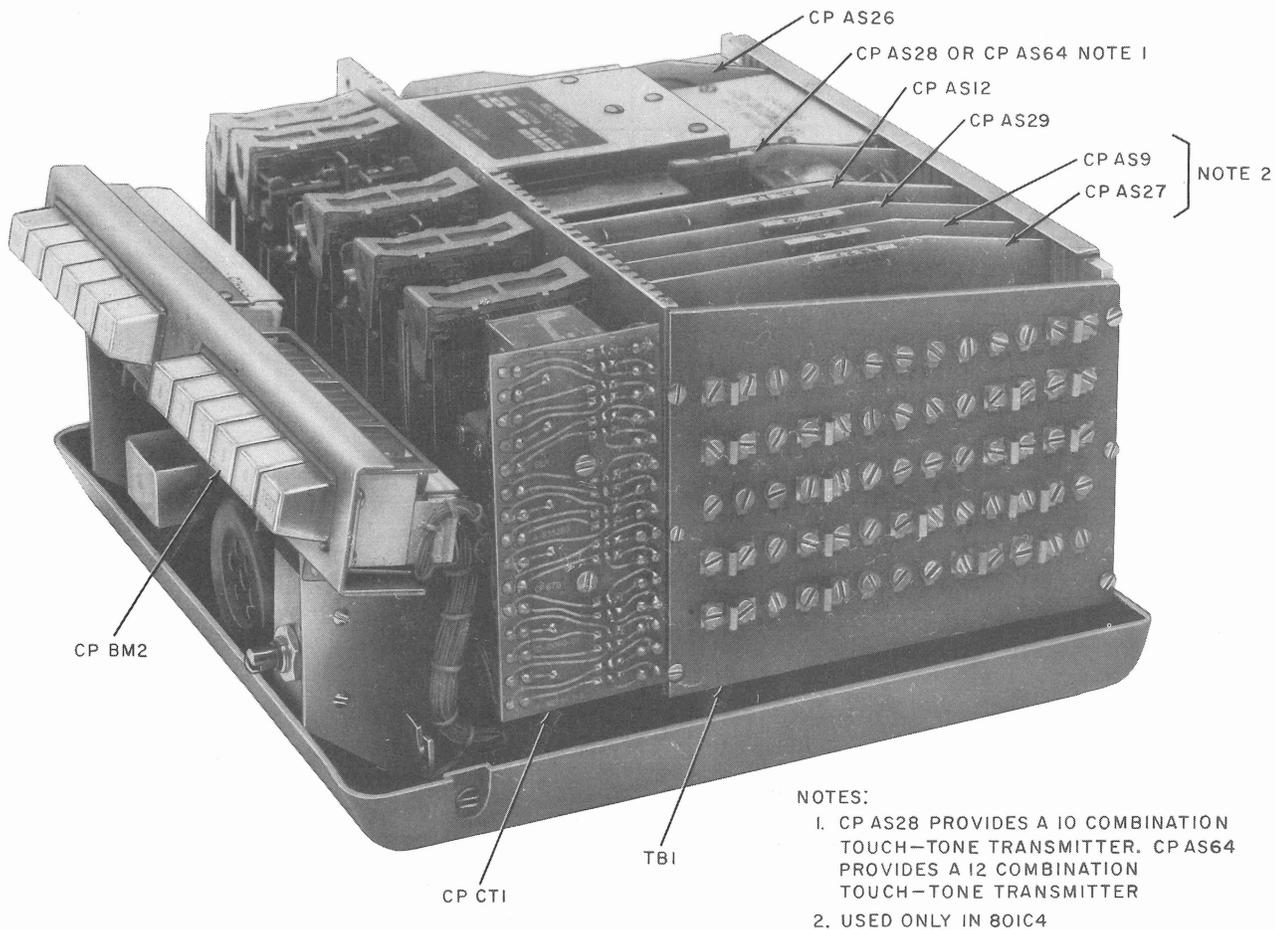
##### **4.01 Automatic Origination (Ground Start):**

The business machine starts the call origination process by turning on CRQ (call request). If DLO (data line occupied) is off (communication channel is not in use), the ACU will seize the telephone line and appear off-hook to the central office by grounding the ring lead. The central office will respond by grounding the tip side of the line when it is prepared to accept dial information. The ACU detects this ground, completes a loop from tip to ring, removes the ground from the ring lead and turns on DLO and PND (present next digit).

**4.02 Loop-Start Operation:** The business machine originates a call request by turning on CRQ. If the telephone line is idle (DLO off), the ACU will appear off-hook to the central office by connecting a line-holding coil across tip and ring. The central office responds by connecting a 350-440-Hz dial tone to the line. The ACU detects the dial tone and turns on DLO and PND.

**4.03** In response to PND on, the business machine sets the four number leads (NB1, NB2, NB4, or NB8) for the digit it wants dialed and then turns on DPR (digit present). The TOUCH-TONE transmitter sends that digit to the central office and then turns PND off. The business machine turns off DPR in response to PND off and then may set the number leads for the next digit to be dialed. When PND goes back on and the number leads have been set to the next digit, the business machine turns DPR on and the ACU dials that digit. This process is continued until the last digit is dialed.

**Note:** Any delay by the business machine in turning DPR off or on will increase the time used to dial the telephone number. If this time exceeds the ACR timer interval,



**Fig. 4—Data Auxiliary Set 801C3 or 801C4—Cover Removed Showing the Circuit Pack Locations**

ACR will turn on, signaling the business machine to abandon the call and try later.

After the last digit has been transmitted, the ACU is ready to transfer the telephone line to the associated data set. If the ACU timer is in the 40-second monitor position (available only in series 5 and above), progress of the call may be monitored by the ACU speaker.

#### **4.04 Methods of Transferring the Line to the Data Set**

(a) **Data Set Answer Detection Without End-of-Number:** This mode of operation is provided by wiring option E for Data Auxiliary Sets 801C3 and 801C4 and is intended for use only with those data sets capable of "handshaking." The data set is placed off-hook when the business

machine presents the first digit to be dialed. After the last digit is dialed and the connection is established, a tone is sent by the called station. This tone will be detected by the data set and a signal from the data set will cause DSS (data set status) to turn on. This will cause the ACU to remove itself from the telephone line so that data transmission may take place.

(b) **Data Set Answer Detection With End-of-Number:** This form of detection is provided in either ACU (801C3 or 801C4) by strapping in wiring option B. After all digits have been presented to the ACU, the business machine then presents the EON (end-of-number) code on the number leads of the ACU and turns on the DPR (digit present). The presentation of EON causes the ACU to place the data set on the telephone line and allows it to detect

**TABLE C**  
**801C PIN ASSIGNMENT**

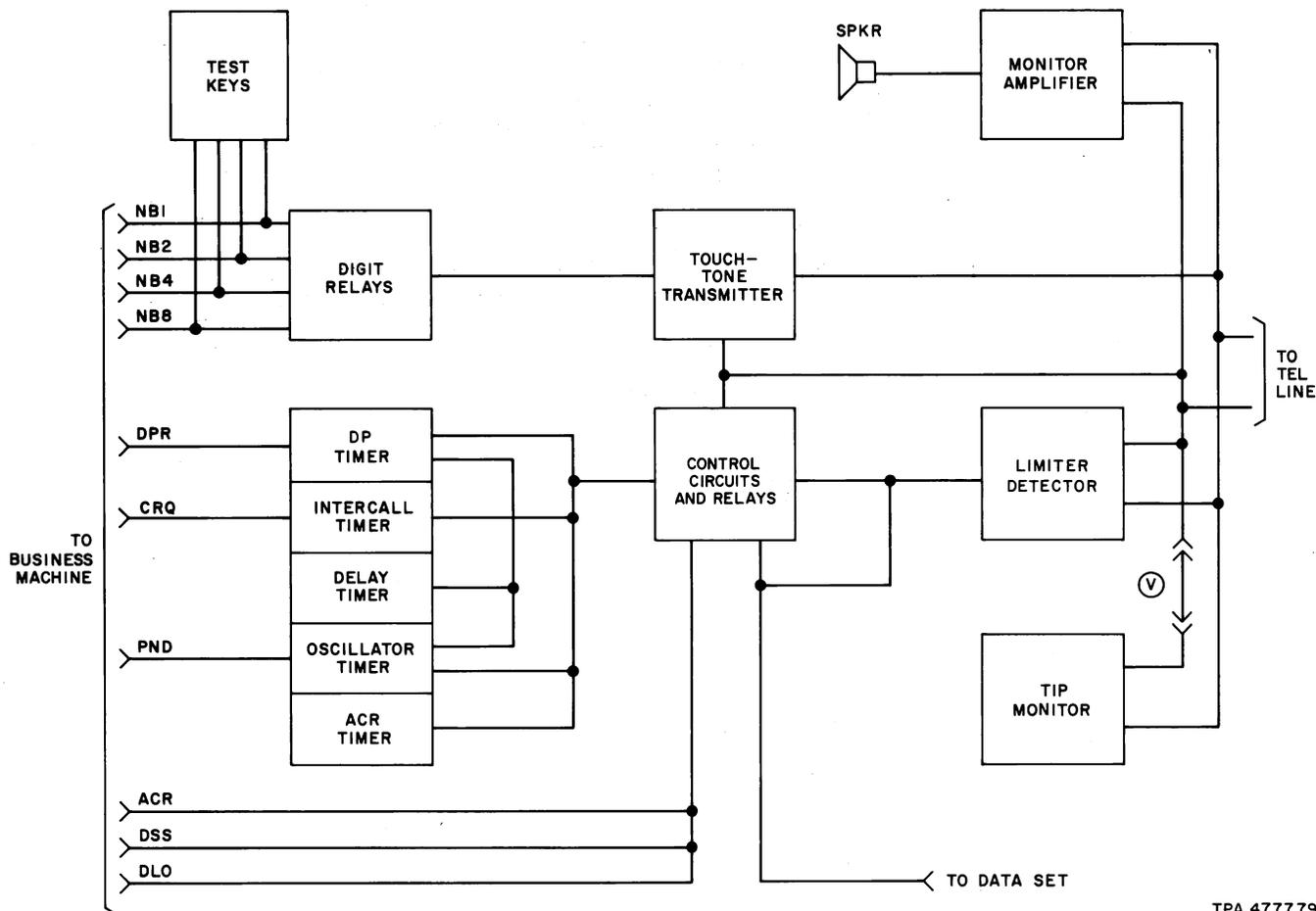
PIN	LEAD DESIGNATION	
1	Frame Ground	(FGD)
2	Digit Present	(DPR)
3	Abandon Call and Retry	(ACR)
4	Call Request	(CRQ)
5	Present Next Digit	(PND)
6	Power-Indication	(PWI)
7	Signal Ground	(SGD)
8	Not Used	
9	+ Power	(+P)
10	- Power	(-P)
11	Not Used	
12	Not Used	
13	Data Set Status	(DSS)
14	NB1	} Digit Leads
15	NB2	
16	NB4	
17	NB8	
18	Reserved	
19	Reserved	
20	Reserved	
21	Reserved	
22	Data Line Occupied	(DLO)
23	Reserved	
24	Not Used	
25	Reserved	

the answer tone from the distant station. When answer tone is detected, the data set signals the ACU that the data set is in the data mode. The ACU turns on DSS and removes itself from the telephone line.

(c) **ACU Answer Detection:** The answer detection circuitry is provided in Data Auxiliary Set 801C4 only with installation of wiring option B. Whenever the ACU has seized the telephone line, dial-go-ahead has been detected, and a digit is not being dialed, the answer detector is

prepared to detect an answer tone. When the called station answers and sends back the proper answer tone, the ACU answer detector will recognize the tone, transfer the telephone line to the data set. The DSS (data set status) lead will be turned on when the data set is in the data mode and data transmission may take place.

**4.05 Call Termination:** When calls are originated automatically they are terminated if CRQ is turned off before the ACU turns DSS on. Once DSS is turned on, the call may be terminated in



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Fig. 5—Data Auxiliary Set 801C3 or 801C4—Functional Block Diagram

either of two ways, depending upon which options are selected:

(a) **Through ACU (Wiring Option Z or A):**

With this option, the business machine must maintain an on condition on the CRQ lead for the duration of the call. The business machine can abort the call at any time by turning CRQ off.

(b) **Through Data Set (Wiring Option G or ZD):**

The business machine can terminate ACU-originated calls through the data set by turning off data terminal ready (DTR). In this mode of operation, CRQ is normally dropped by the business machine after DSS is turned on.

**4.06 Manual Origination:** A call may be originated manually by using the telephone associated with the data set. When the data set is in the

talk mode, an off-hook indication is presented to the ACU. The ACU presents a DLO signal to the business machine to prevent the business machine from originating a call. For more detailed information on ACU operation, refer to the section entitled Data Auxiliary Sets 801C3 and 801C4 For Automatic Calling, Theory Of Operation And Supplementary Information (598-012-151).

**4.07 Test Mode:** The twelve test pushbuttons on the front panel are used to test the ACU without external test equipment. A call origination may be made using these pushbuttons to accomplish the operation normally done by the business machine. Table D shows the pushbutton lamp assignments and briefly describes their functions. Refer to the section entitled Data Auxiliary Set 801C3 and 801C4 For Automatic Calling, Test Procedures (598-012-501) for test operation of the test buttons.



*The test mode cannot be used as an alternate mode to transmit data because the ACU automatically times out within 40 seconds, and disconnects the data set (telephone) line when the test of the ACU is completed or 40 seconds after the last pushbutton is depressed, whichever occurs first.*

**4.08** 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.

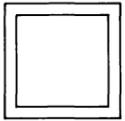
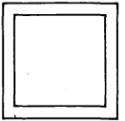
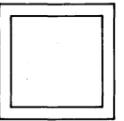
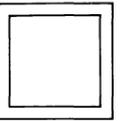
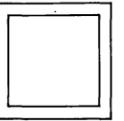
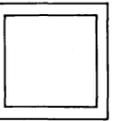
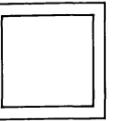
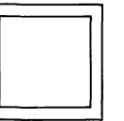
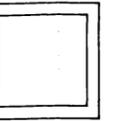
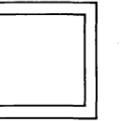
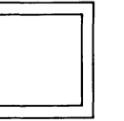
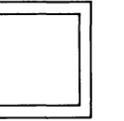
## 5. REFERENCES

**5.01** For additional information relating to this section, refer to the following list:

SECTION	TITLE
CD-&SD-1D10301	Data Systems Station Data Auxiliary Set 801C3, 801C4 Automatic Calling Unit

SECTION	TITLE
590-008-101	Data Auxiliary Set 801C-Type Reference Guide
598-012-151	Data Auxiliary Sets 801C3 and 801C4 For Automatic Calling—Theory of Operation and Supplementary Information
598-012-201	Data Auxiliary Sets 801C3 And 801C4—Installation
598-012-301	Data Auxiliary Sets 801C3 And 801C4—Maintenance
598-012-501	Data Auxiliary Sets 801C3 And 801C4—Test Procedure

TABLE D

TEST BUTTONS LEFT TO RIGHT FROM FRONT OF ACU												
TEST BUTTON DESIGNATION	PND	1	2	3	4	5	6	7	8	9	0	TEST
TYPE OF LAMP FURNISHED	52A	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	52A
TEST BUTTON FUNCTIONS	LAMP ON INDICATES THAT THE NEXT DIGIT MAY BE PRESENTED. ALSO USED TO RELEASE THE ACU FROM THE TEST MODE.	USED TO SEND DIGIT 1 FREQUENCY (1209~ AND 697~) TO CO LINE	USED TO SEND DIGIT 2 FREQUENCY (1336~ AND 697~) TO CO LINE	USED TO SEND DIGIT 3 FREQUENCY (1477~ AND 697~) TO CO LINE	USED TO SEND DIGIT 4 FREQUENCY (1209~ AND 770~) TO CO LINE	USED TO SEND DIGIT 5 FREQUENCY (1336~ AND 770~) TO CO LINE	USED TO SEND DIGIT 6 FREQUENCY (1477~ AND 770~) TO CO LINE	USED TO SEND DIGIT 7 FREQUENCY (1209~ AND 852~) TO CO LINE	USED TO SEND DIGIT 8 FREQUENCY (1336~ AND 852~) TO CO LINE	USED TO SEND DIGIT 9 FREQUENCY (1477~ AND 852~) TO CO LINE	USED TO SEND DIGIT 0 FREQUENCY (1336~ AND 941~) TO CO LINE	USED TO PLACE ACU IN TEST MODE. ILLUMINATED IN THIS MODE.