DATA AUXILIARY SETS 801A5 AND 801A6 FOR AUTOMATIC CALLING DESCRIPTION AND OPERATION

CONTENTS PAGE

1. GENERAL

1.01 This section provides a general description of Data Auxiliary Sets (DAS) 801A5 and 801A6 and describes some of the possible optional modes of operation. This section may be used to provide general information on DAS 801A5 and 801A6, and in conjunction with other practices to assist in effectively installing and maintaining the DAS.

1.02 This section is reissued to add information on the use of the speaker in DAS 801A5 and 801A6, to revise the title, and to add a functional description. Since this is a general revision, arrows ordinarily used to indicate changes have been omitted. DAS 801A5 and 801A6 will be referred to in this section as ACU unless special applications make it necessary to refer to the data auxiliary set by complete nomenclature.

1.03 DAS 801A5 and 801A6 are "any number" dial pulse ACUs intended for use in DATA-PHONE® or similar service. Automatic calling units cannot be used on lines where operator intercept (CAMA) is required. These ACUs are controlled by a customer business machine under conditions determined by the selection of customer options.

1.04 Data Auxiliary Sets 801A5 and 801A6 supersede Data Auxiliary Sets 801A1, 801A2, 801A3, and 801A4, (manufacture discontinued), retain all the features of the replaced ACUs, and incorporate the following design improvements:

- Compatibility with Data Sets 103E, 103G, and also with Data Set 101 when used with DAS 811B1
- Provides for answer-tone detection either by the ACU or by the associated data set on an optional basis
- Provides either contact or voltage interface on an optional basis.

1.05 Data Auxiliary Sets 801A5 and 801A6 are essentially the same except that 801A6 contains two additional printed circuit boards (CP AS8 and CP AS9) which provide ACU answer-tone detection capabilities.

1.06 The ACU is normally installed in association with a customer business machine and a DATA-PHONE data set. Information on the business machine and data set is not included in this section.

2. PHYSICAL DESCRIPTION

2.01 Externally, both ACUs are identical in appearance except for the designation strip on the rear of the ACU. Each is contained in a two-tone gray, nonintegrated housing having dimensions as shown in Fig. 1, and each weighs approximately 16 pounds.

2.02 There are 12 translucent buttons across the front of the ACU which are utilized in the test mode. This action makes possible the self-testing of the ACU.

2.03 The ACU will operate over an ambient temperature range of 40°to 120°F and a relative humidity of 20 to 95 percent. They require approximately 15 watts of 117-volt 60-Hz ac power from a local U grounding type outlet.

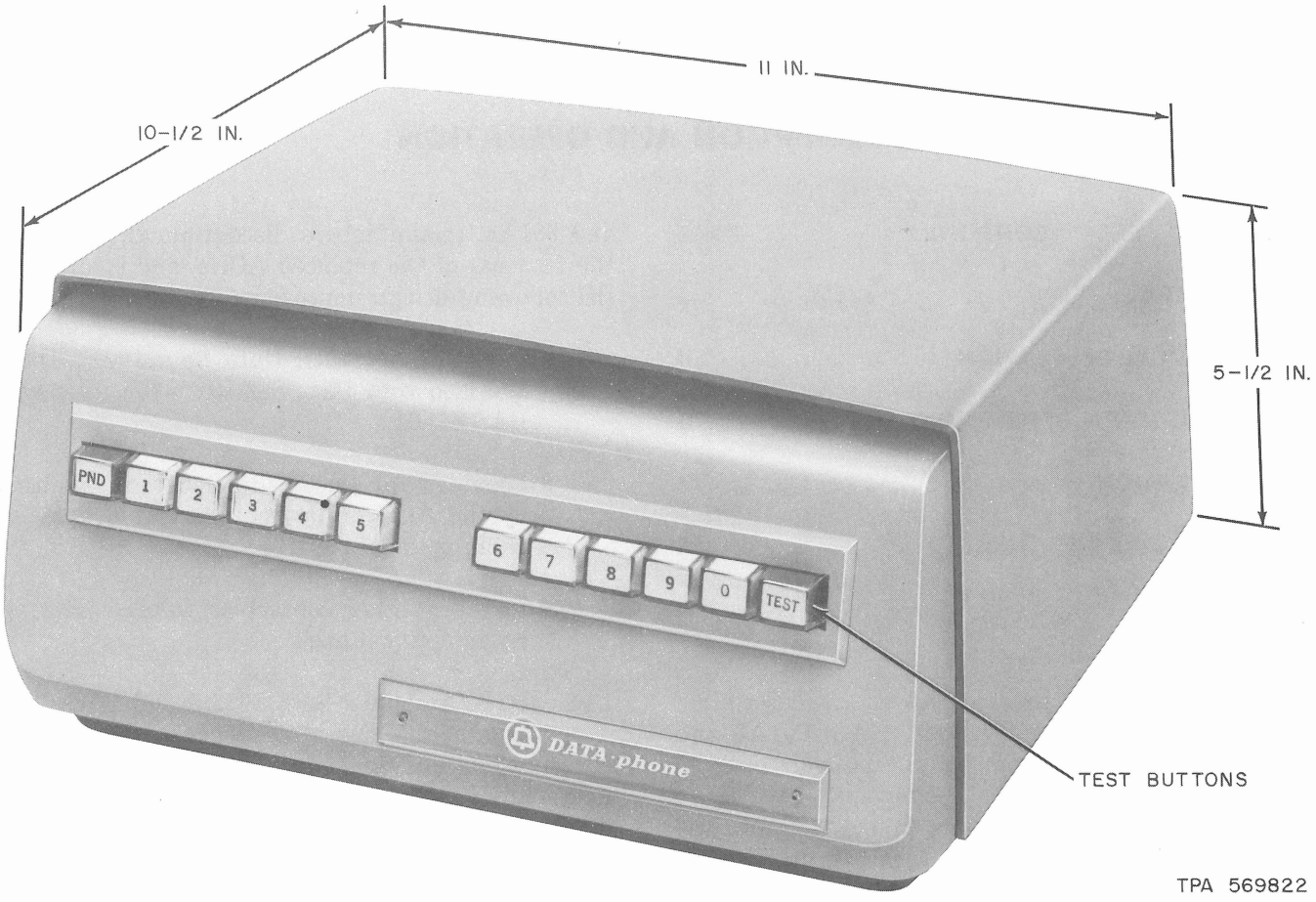


Fig. 1—Data Auxiliary Set 801A-Type, Front View

2.04 The rear of each ACU (Fig. 2) contains a power cord connector, interface connector, and mounting cord.

2.05 There are two cords furnished with the ACU: a 10-foot, 3-conductor power cord (KS-14532-L16) and a 5-1/2 foot mounting cord (D10P-61).

> ***Note:*** A plug-ended M14C-61 cord is available and must be ordered separately and substituted for the D10P-61 when the associated data set requires it. The cord replacement procedure is described in the section entitled Data Auxiliary Sets 801A5 and 801A6 for Automatic Calling—Maintenance (598-010-301).

2.06 Internally, the ACU consists of six wire-spring relays, a power supply, a test call speaker, one terminal board (TB1), one option board (TB2), eight printed wiring boards for DAS 801A6 and six for 801A5, and an ACR adjustment switch mounted on the baseplate per Fig. 3 and 4.

2.07 The ACR (abandon call and retry) timer can be adjusted to give a minimum of 7-, 10-, 15-, 25-, or 40-second time intervals. In DAS 801A5 and 801A6 series 5 and above, there is a 40-second monitor switch position that makes it possible to monitor the progress of a normal call. For information on making this adjustment, refer to the section entitled Data Auxiliary Set 801A5 and 801A6 Automatic Calling Unit—Installation (598-010-201).

> ***Note:*** Only the 40-second position of the 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 so the timer will not expire in

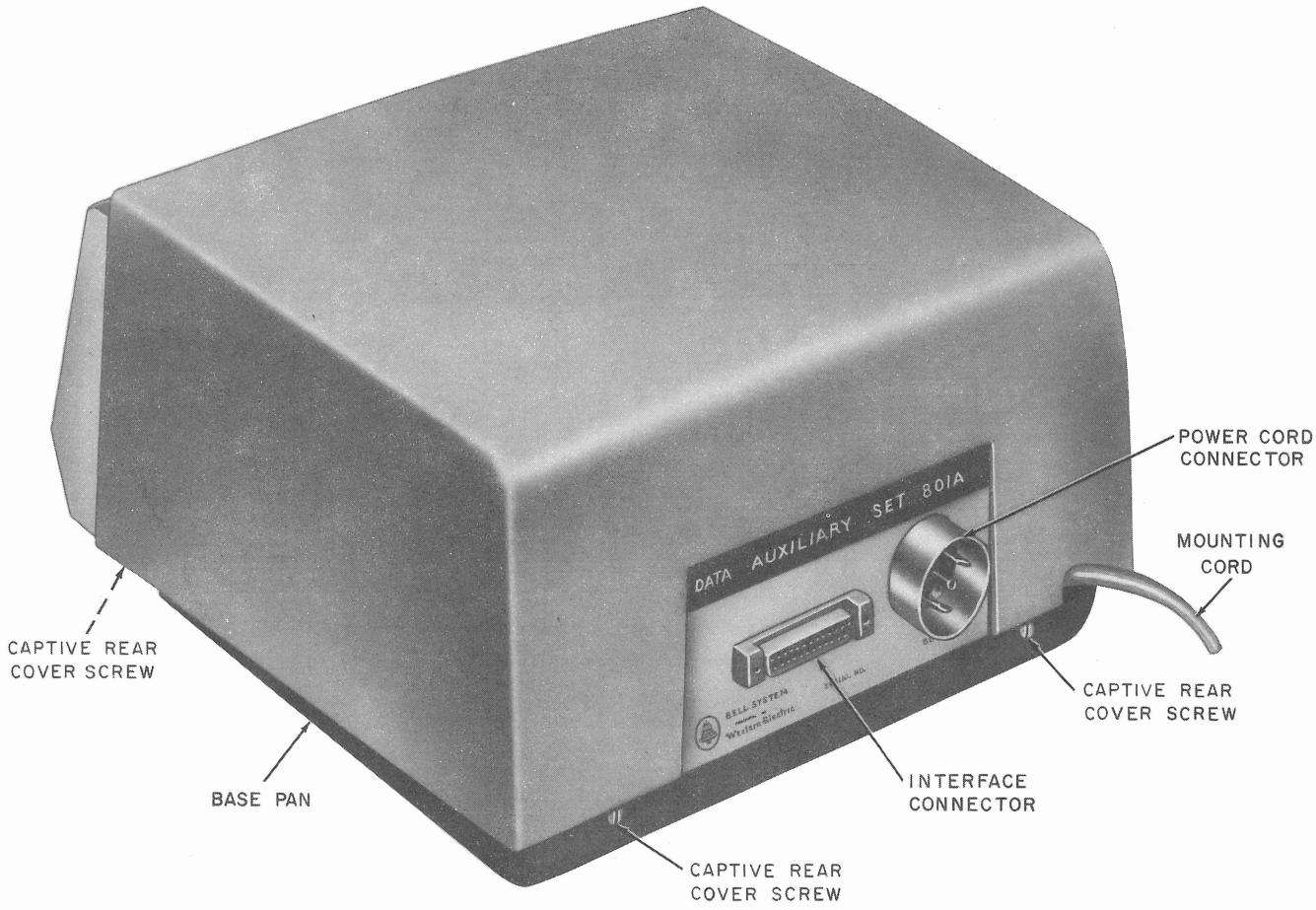


Fig. 2—Data Auxiliary Set 801A-Type, Rear View

less than 40 seconds with the ACU in the test mode. This facilitates the testing of the dial-pulse generator and associated circuits.

3. FUNCTIONAL DESCRIPTION

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

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 outpulsed by depressing the proper key. The sound of the outpulsed digits will be heard in the ACU speaker. The ACU will automatically terminate the test mode 40 seconds after the last key is pushed (except for the PND key which causes immediate termination).

3.03 The interface gates accept either an EIA voltage or contact closure on the NB (number), CRQ (call request), and DPR (digit present) leads from the business machine. These signals drive the pulse counter, DPR relay, and CRQ relay, respectively.

3.04 The pulse counter is set to a binary number by the signal applied to the NB1, NB2, NB4, and NB8 leads at the time the DPR function is turned on. The pulse counter counts down under the control of trigger pulses from the dial pulse generator until the binary count is 0000. At this time, a signal is sent to the dial pulse generator to terminate the dial pulsing action. Since the pulse counter begins when a DPR signal is applied and counts for a length of time determined by the binary number set on the NB leads, the pulse counter in effect determines the digit being dialed.

3.05 The interdigit timer receives a signal from the pulse counter turning off PND (present

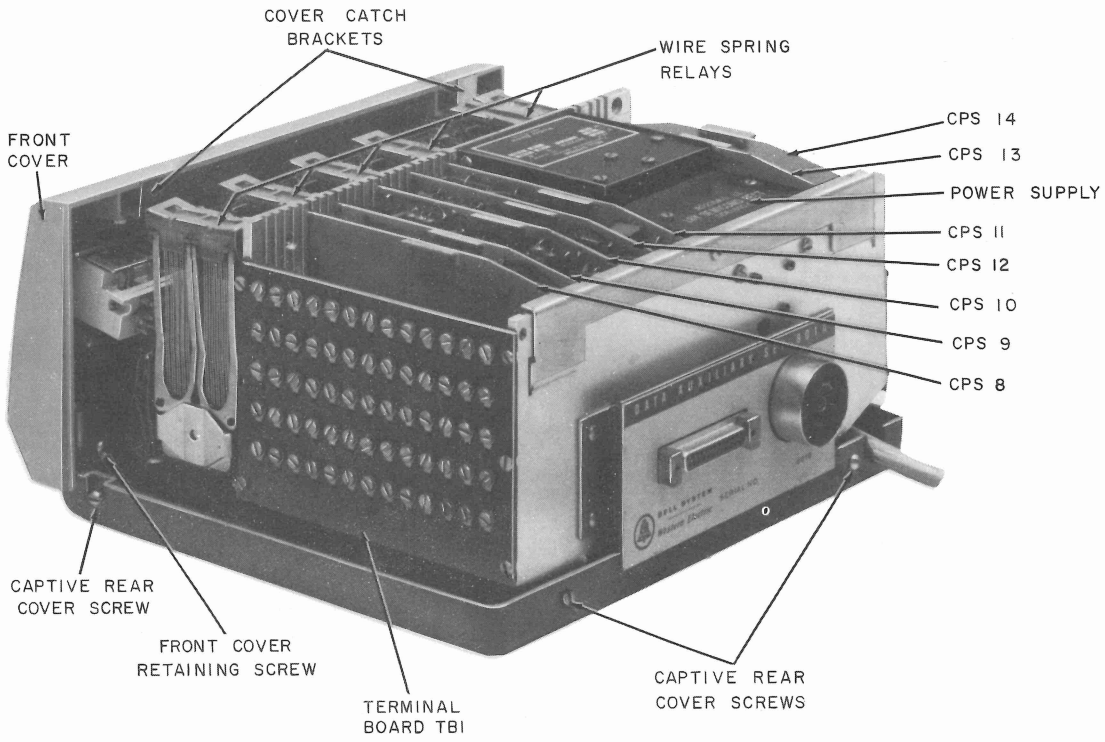


Fig. 3—Data Auxiliary Set 801A-Type, Rear Cover Removed

next digit) (PND lamp goes out). The interdigit timer controls the time PND remains off. This time is nominally 600 msec and is the minimum time required between the dialing of each digit.

3.06 The dial pulse generator is started by the receipt of a DPR signal after PND is on. The dial pulse generator is a free-running multivibrator which operates a relay at the dialing pulse rate of 10 pps. A contact in series with the telephone line provides the dialing action. With each relay operation, a trigger pulse is supplied to the pulse counter. The generation of dial pulses ends when the pulse counter has counted down to a binary 0000. At this time the PND interface lead will turn off.

3.07 The interface circuits furnish control signals to the business machine as either a contact closure or a bipolar voltage (determined by the option selected).

3.08 The ACR timer starts when CRQ is turned on and resets with each operation of the PND relay. If the ACR timer times out, a signal is sent to the business machine requesting that CRQ be removed and the call be attempted at a later time. The ACR timer may be preset to intervals of 7, 10, 15, 25, and 40 seconds.

3.09 The control circuits provide signals to the business machine and the data set to indicate the status of the ACU and the telephone circuit.

3.10 The tip monitor circuit monitors the telephone line to detect incoming calls and provides line status information to the business machine.

3.11 The monitor amplifier is a 3-stage audio amplifier that is intended to drive the ACU speaker.

3.12 The limiter detector is used in conjunction with the answer-tone detector to detect 2025 or 2225 Hz (wiring option S or T). The detection of answer tone is used to signal the data set to go into the data mode.

Note: The limiter detector and the answer-tone detector of Fig. 5 are used only in the DAS 801A6 ACU.

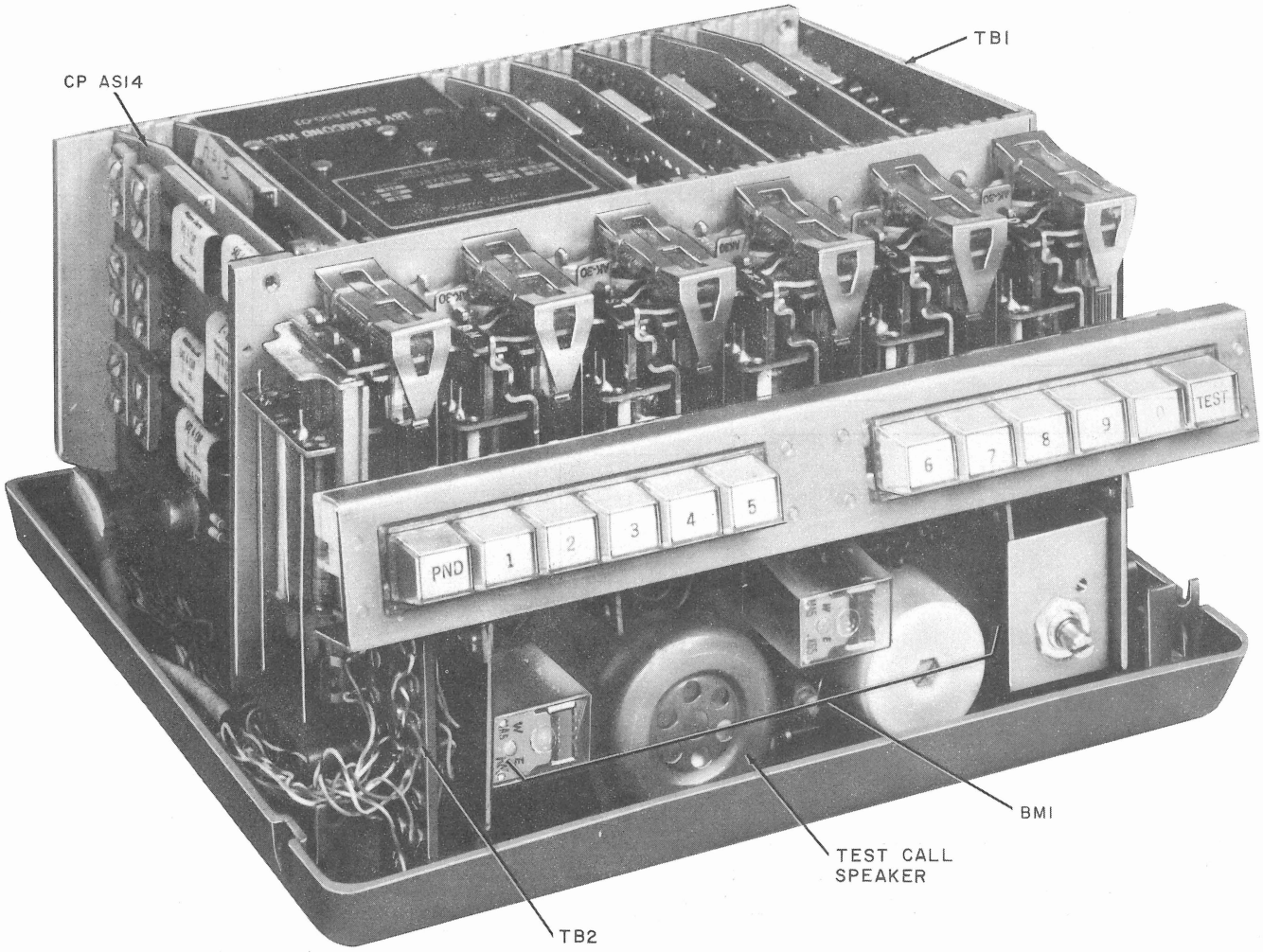


Fig. 4—Data Auxiliary Set 801A-Type, Front Inside View

4. OPERATION

4.01 ***Automatic Origination:*** The business machine starts the call origination process by turning on CRQ. 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.

A ground start telephone line must be provided.

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 both DLO and PND.

If the central office does not ground the tip side within the time allocated by the ACR timer, the ACR will turn on. This indicates to the business machine that the call should be abandoned and reestablished.

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. The dial pulse generator sends that digit to the central office and then turns off PND. The business machine turns off DPR in response to

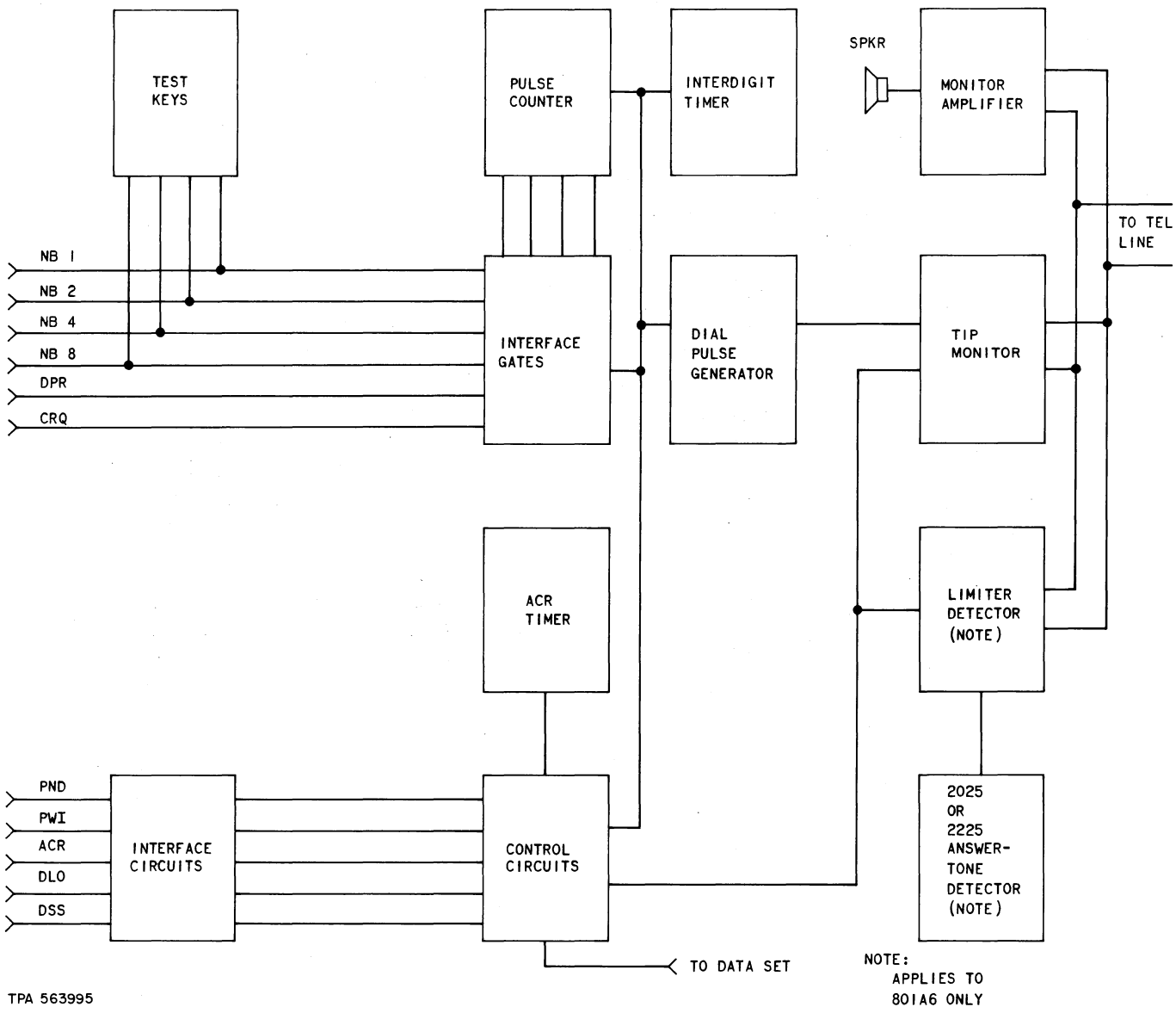


Fig. 5—Data Auxiliary Set 801A, Functional Block Diagram

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. If the ACR timer is in the 40-second monitor position, progress of the call may be monitored by the ACU speaker.

Any delay by the business machine in turning DPR off or on will increase the time used to dial the telephone number. If the delay between the dialing of each digit exceeds the ACR timer interval, ACR will turn on.

After the last digit has been tramsmitted, the ACU is ready to transfer the telephone line by the optional methods in 4.02.

4.02 ***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 and is intended for use with those data sets capable of

"handshaking." With the E option installed, the data set answer detector is on the telephone line whenever the line has been seized by the ACU. 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 is detected by the data set and a signal from the data set will cause the DSS (data set status) lead in the ACU to turn on. This will cause the ACU to disconnect from the telephone line in order that data transmission may now take place. A DSS ON indication informs the customer that the system is in the data mode.

(b) ***Data Set Answer Detection With End-of-Number:*** This form of detection is provided by strapping in the B wiring option. In this case, after the digits of a telephone number have been dialed, the business machine presents an EON (end-of-number) code combination on the number leads of the ACU and turns on the DPR. The EON code causes the ACU to transfer the telephone line to the data set and puts the data set off-hook. The data set can then detect answer tone and must do any "handshaking" necessary in the preparation for data transmission. When the data set detects answer tone, it will cause the DSS lead to turn on.

(c) ***ACU Answer Detection:*** The answer-detection circuitry is provided in DAS 801A6 only with installation of wiring option B. Whenever the ACU has 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, and place the data set in the data mode. The DSS lead will be turned on and data transmission may take place.

4.03 ***Call Termination When Calls Are Originated Automatically:*** When calls are originated automatically, they may be terminated either via the ACU or the data set, as follows.

(a) ***Terminate Call via ACU:*** Turning off CRQ will cause the data station to go on-hook when either the Z or A wiring option is installed. The ACU can cause an associated data set to go on-hook by either of the following methods.

(1) The line transfer method (Z wiring option) is used with data sets that go on-hook if the telephone line current is interrupted. The call is terminated when the business machine turns off the CRQ by transferring the telephone line from the data set to the ACU until the data set goes on-hook. Then the ACU goes to the idle state.

(2) The CL contact method (A wiring option) is used when the business machine turns off CRQ and the ACU signals the data set to go on-hook via a contact closure. This signal is held until the data set is on-hook, at which time the ACU returns to its idle condition.

(b) ***Terminate Call via Data Set:*** The call is terminated via the data set with wiring option ZD or G installed in the ACU. If the customer wishes to terminate a call before the system is in the data mode, CRQ should be turned off. After the system is in the data mode, CRQ may be turned off at any time. Then, call termination is accomplished by dropping data terminal ready (CD) signal to the data set.

4.04 ***Manual Origination:*** A call may be originated manually by using the telephone associated with the data set. Although the attendant need not be aware of it, the ACU is involved in the call origination process in order to ground start the telephone line to get the dial tone. When the associated telephone set is taken off-hook, the ACU automatically seizes the telephone line and grounds the ring lead. When the central office is ready for dial information, the tip is grounded and dial tone is applied. The ACU detects the grounded tip, turns on DLO, removes the ring ground, and returns the line to the data set and telephone set. The ACU will monitor the telephone line and turn off DLO as soon as the line becomes idle.

4.05 ***Test Mode:*** The 12 pushbutton-type test buttons 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 A shows the pushbutton lamp assignments and briefly describes their functions. Refer to the section entitled Data

Auxiliary Set 801A5 and 801A6 for Automatic Calling—Test Procedures (598-010-501) 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 (telephone) line.

4.06 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. Refer to Fig. 4 for a view of the data auxiliary set with the cover removed.

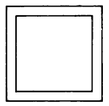
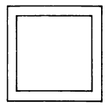
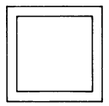
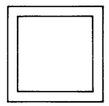
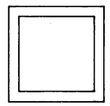
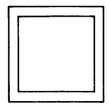
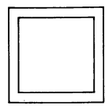
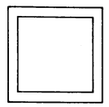
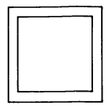
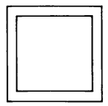
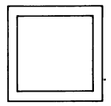
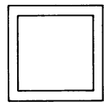
5. REFERENCES

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

SECTION	TITLE
CD & SD-1D082-01	Data Systems Stations—Data Auxiliary Set 801A-Type—Automatic Calling Unit
590-008-100	Data Auxiliary Set 801A-Type—Reference Guide
598-010-201	Data Auxiliary Sets 801A5 and 801A6 for Automatic Calling—Installations and Connections
598-010-301	Data Auxiliary Sets 801A5 and 801A6 for Automatic Calling—Maintenance
598-010-501	Data Auxiliary Sets 801A5 and 801A6 for Automatic Calling—Test Procedures

TABLE A

TEST BUTTON ASSIGNMENTS AND FUNCTIONS

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 *	USED TO SEND DIGIT 2 *	USED TO SEND DIGIT 3 *	USED TO SEND DIGIT 4 *	USED TO SEND DIGIT 5 *	USED TO SEND DIGIT 6 *	USED TO SEND DIGIT 7 *	USED TO SEND DIGIT 8 *	USED TO SEND DIGIT 9 *	USED TO SEND DIGIT 0 *	USED TO PLACE ACU IN TEST MODE. ILLUMINATED IN THIS MODE.

* WHEN THE PND EXTINGUISHES WAIT FOR IT TO RELIGHT BEFORE OPERATING THE NEXT DIGIT BUTTON.