

## 97A CONTROL UNIT DESCRIPTION AND MAINTENANCE COMMON SYSTEMS

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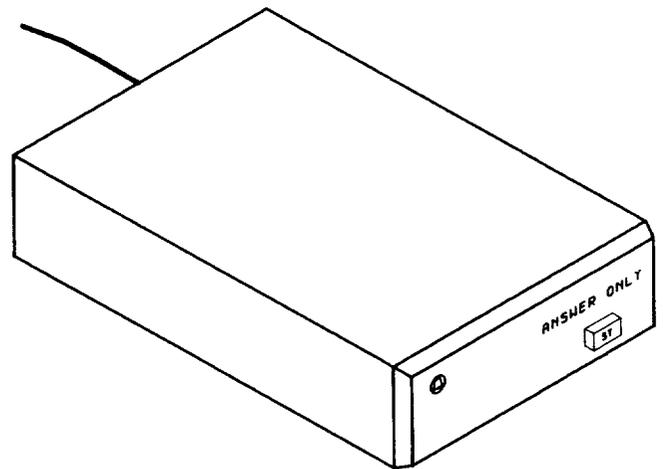
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**1. GENERAL**

**1.01** This section contains the physical and functional description, installation, connection, operation, and test procedure information for the 97A control unit (Fig. 1).



**Fig. 1—97A Control Unit**

**NOTICE**

Not for use or disclosure outside the  
Bell System except under written agreement

## SECTION 201-844-100

**1.02** This section is being reissued for the following reasons:

- (a) To provide ordering information for the M13F cord
- (b) To update Fig. 2.

Revision arrows have been used to denote significant changes and additions.

**1.03** The 97A control unit is used to terminate 2-wire switched telephone metallic facilities and is controlled by the customer-provided central trunk test unit (CTTU) interface circuit. The control unit automatically answers calls originated by the remote trunk test unit (RTTU) destined for the CTTU. Stations equipped with a 97A control unit require no intervention by an attendant, since the device operates in an automatic answer-only mode.

## 2. PHYSICAL DESCRIPTION

**2.01** The 97A control unit basically consists of a printed circuit pack assembly (RG5 circuit pack), housing assembly, power cord and transformer, M13F cord, and 153AM2 adapter.

### A. RG5 Circuit Pack

**2.02** The RG5 circuit pack consists of a printed circuit board and associated components. The overall dimensions are 10.4 inches long, 5.5 inches high, and 1.1 inches wide. The RG5 circuit pack weighs 1 pound. A faceplate is provided which contains the status indicators and one push-to-lock, push-to-release test switch. All interconnections to the circuit board are made via an edge connector at the rear of the board.

**2.03** The test switch performs the same function in the RG5 circuit pack as in the 97A control unit. The status indicators also perform the same function; however, in the circuit pack, the lamps are viewed directly, while in the control unit the lamps illuminate dropout graphics. The RG5 circuit pack is designed for mounting in a 40A3 or 40A4 data mounting.

**2.04** The status indicators consist of the following:

- TR - terminal ready
- MR - modem ready

- MC - modem check
- TM - test mode.

**2.05** These indicators light under the following conditions:

- Idle mode (on-hook, self-test [ST] switch released, data terminal ready CD lead off) MC indicator is lighted.
- Armed mode (on-hook, ST test switch released, lead CD on) MC and TR indicators are lighted.
- Active mode (off-hook, ST test switch released, lead CD on) MC and TR indicators are lighted; MR indicator is lighted when the control unit answers (goes off-hook).
- Test mode (not connected to CTTU, ST test switch depressed) MC indicator is lighted; TM indicator lights when ST switch is depressed; MR indicator lights when control unit answers (goes off-hook); and TR indicator lights only if lead CD is on.

### B. 97A Control Unit

**2.06** The 97A control unit consists of an RG5 circuit pack enclosed in a data mounting, an M13F cord, and a 153AM2 adapter.

**2.07** The data mounting is an extruded aluminum shell measuring 2.2 inches high, 5.8 inches wide, 11 inches long, and weighs 4 pounds with the RG5 circuit pack installed. The data mounting and circuit pack, plus the transformer, weigh approximately 5 pounds. The front cover is molded black plastic with four translucent designations and a cutout for the test switch. The rear cover is also molded black plastic with a cutout for the two interface connectors and the power cord.

**2.08** A KS-21239, L5 transformer, which is attached to the mounting by a power cord, a transformer mounting screw, an M13F cord, and a 153AM2 adapter are included with the data mounting. The transformer plugs into a standard nonswitched 117-volt, 60-Hz, 3-wire grounded outlet.

**2.09** When RG5 circuit pack is placed in the data mounting with the covers installed, the lamps illuminate dropout graphics on the front cover. Dropout graphics produce the appearance of a 2-letter abbreviation when a particular indicator is lighted (refer to paragraphs 2.04 and 2.05 for information on the status indicators). A continuous black opaque surface is displayed when all indicators are off.

**2.10** A screw switch option is provided on the data mounting for connecting frame ground to signal ground. The common ground option is not recommended when the control unit is used with the CTTU.

### 3. FUNCTIONAL DESCRIPTION

**3.01** This part contains a functional description of the control unit and associated interfaces.

#### A. Customer Interface

**3.02** The customer interface conforms to Electronic Industries Association (EIA) Standard RS-232-C. A 25-pin female connector is provided on the mounting. The connector pin designations and functions are listed in Table A.

#### B. Telephone Line Interface

**3.03** A 25-pin plug is provided on the data mounting for all telephone line connections. The connector pin designations and functions are listed in Table B.

#### C. General Operation

**3.04** The 97A control unit is used for answer-only service.

**3.05** The unit controlled by the CTTU interface circuit is used to provide a secure data link between CTTU and RTTU. A secure link permits only legitimate CTTU stations to control RTTUs.

**3.06** The CTTU interface circuit turns the CD lead **on** causing the control unit to enter the armed mode. The control unit answers incoming calls from the RTTU and applies a 1004-Hz tone to the line only when in this mode. Calls placed when the control unit is unarmed are not answered.

**3.07** The control unit is disconnected from the line by turning the CD lead **off** for at least 50 milliseconds or by letting the 14-second abort timer expire. The control unit then enters the normal idle (on-hook) mode.

TABLE A

CUSTOMER INTERFACE

| EIA DESIGNATION | CIRCUIT              | CIRCUIT PACK CONNECTOR PIN ASSIGNMENT | CUSTOMER INTERFACE CONNECTOR PIN ASSIGNMENT |
|-----------------|----------------------|---------------------------------------|---|
| AB              | Signal ground*       | —                                     |   |
| CB              | Clear to send        | 5                                     | 5   |
| CC              | Data set ready       | 6                                     | 6   |
| CF              | Carrier detector     | 8                                     | 8   |
| +P              | Data set test (+12V) | 27                                    | 9†  |
| -P              | Data set test (-12V) | 26                                    | 10†   |
| CD              | Data terminal ready  | 22                                    | 20  |
| CE              | Ring indicator       | 23                                    | 22  |

\* Not wired in connector but available in data mounting

† All other interface connector pins on the mounting are unused. As specified in EIA Standard RS-232, connector pins 9 and 10 are not to be used by the CPE.

**D. Interface Circuits**

**3.08** The interface circuits conform to EIA Standard RS-232-C, with the exception of the CB lead.

**3.09 Signal Ground (AB):** This circuit provides a ground reference potential for all interface circuits. If an earth ground reference is required, signal ground can be connected to earth ground. This is accomplished via the common ground option on the 97A control unit data mounting connected to the ac power cord third connector and then to the outlet ground.

**3.10 Data Terminal Ready (CD):** This circuit is used to arm the control unit. The CTTU interface circuit presents an **on** signal placing the control unit in the armed mode. If the control unit is in the armed mode and an **off** signal is presented for at least 50 milliseconds, the control unit returns to the idle mode.

**3.11 Clear-to-Send (CB):** This circuit deviates from its normal use as specified in RS-232-C. The CB circuit signal indicates the status of the control unit. This is accomplished by internally connecting leads CD and CB together. Detection of a signal on CB indicates the control unit is armed (via lead CD).

**3.12 Data Set Ready (CC):** This circuit provides control unit status information. The **off**

condition indicates the control unit is in the idle mode, and the **on** condition indicates the control unit is in the active mode. Once **on**, the CC circuit remains **on** for the duration of the call.

**3.13 Ring Indicator (CE):** This circuit indicates an incoming call, presents an **on** signal during ringing, and an **off** signal during the silent interval or when ringing is not present.

**3.14 Carrier Detected (CF):** This lead is present but not used.

**4. INSTALLATION**

**A. General**

**4.01** The control unit provides DATAPHONE\* data communications service as described in Section 314-205-501, over an ambient temperature range of 40° to 120° F with a relative humidity range of 20 to 95 percent.

**Note:** These environmental operational limits are valid only if no condensation occurs.

**4.02** The control unit should be located near the CTTU interface circuit since the customer-provided interface cord should not exceed 50 feet in length to conform to EIA recommended standards.

\* Registered service mark of AT&T.

**TABLE B**

**TELEPHONE INTERFACE**

| DISIGNATION | DESCRIPTION                   | CIRCUIT PACK CONNECTOR PIN ASSIGNMENT | 25-PIN PLUG PIN ASSIGNMENT |
|-------------|-------------------------------|---------------------------------------|----------------------------|
| LG          | Lamp ground from control unit | 35                                    | 4                          |
| T           | Tip telephone line lead       | 20                                    | 7                          |
| R           | Ring telephone line lead      | 19                                    | 8                          |
| T1          | Tip telephone line lead       | 34                                    | 21                         |
| R1          | Ring telephone line lead      | 33                                    | 22                         |
| TDG         | Talk-data ground lead         | 36                                    | 25                         |

**4.03 Caution: When mounting the power supply (transformer) to the wall power outlet—if the wall outlet has a metal cover, do not use the center screw to mount the transformer. When this center screw is removed, it is possible for the metal cover to fall across the prongs of the transformer.** Low-voltage alternating current is supplied to the control unit by wall transformer KS-21239, L5 attached to the power cord of the mounting. The KS-21239, L5 transformer is plug-mounted. The plug should be used to secure the transformer to the power outlet, where local regulations permit, by using an attached 6-32 by 1/2-inch oval head machine screw. The customer must provide ac power of 105 to 129V at 57 to 63 Hz at a standard 3-wire grounded power receptacle that is easily accessible to the control unit. The receptacle should not be under control of a switch. The power required per set is approximately 8 watts. Approximately 3 watts of this is dissipated in the wall transformer.

**4.04** A 25-pin KS-19087, L6 connector is provided at the rear of the control unit for connection to the CTTU. This connector is designed to connect to a customer-provided Cinch\* plug or Cannon† DB-19604-432 plug equipped with a DB-51226-1 hood, or equivalent. The telephone line connects to the 153AM2 adapter and the M13F cord of the control unit. In addition, the M13F cord connects to a 25-pin KS-19088, L22 connector provided at the rear of the control unit.

#### B. Circuit Pack Removal and Replacement

**4.05 Caution: If the circuit pack is removed from the mounting, it should be handled by the nonconductive surfaces only. Otherwise, certain circuit components may be damaged.** The RG5 circuit pack must be removed from the mounting to be accessible. The RG5 circuit pack should be removed from the mounting as follows:

- (1) Remove the front cover by gently squeezing it at the top to disengage the top hooks; then, rotate it down and out of the mounting.

\*Registered trademark of TRW, INC.

†Registered trademark of International Telephone and Telegraph (ITT).

- (2) Remove the circuit pack from the mounting by pulling on the handle or by gently prying behind the faceplate with fingers.

**4.06** To replace the RG5 circuit pack in the mounting, proceed as follows:

- (1) Slide the circuit pack into the mounting, ensuring that it is firmly seated at the rear.
- (2) Hook the tabs on the bottom of the front cover into the detents in the bottom of the mounting, and gently press the top of the front cover into the mounting until it snaps into place.

#### 5. CONNECTIONS

**5.01** The control unit transmit level is fixed at a level not to exceed -9 dBm under any operating condition. The control unit is designed to be connected to a basic access line having parameters specified in Section 314-205-501.

**5.02** The station arrangements described in this part apply to the 97A control unit only. Refer to Section 590-011-202 for a description of the station arrangements using the RG5 circuit pack with associated 40A3 or 40A4 data mountings.

**5.03** Connect the D4BU and M13F cords to the 153AM2 adapter. Also, connect the KS-21239, L5 transformer cord and the other end of the M13F cord to the control unit as shown in Fig. 2.

**Note:** The D4BU cord, 7-feet in length, is used for connection to a voice jack (USOC RJ11C). The D4BU cord is available in 14- and 25-foot lengths in addition to the standard 7-foot length.

**5.04** After installation is completed, the control unit should be tested to determine if it is operating properly. Refer to Part 6, TEST PROCEDURES.

#### 6. TEST PROCEDURES

**6.01** These procedures are to be used when testing the 97A control unit after initial installation or during a maintenance visit. If a control unit is defective, it should be replaced. The defective control unit should be tagged with a description of the trouble, carefully packed, and returned to the service center for repair.

**6.02** Before proceeding with testing the control unit, verify that the data loop has been tested and meets requirements specified in Section 314-205-501.



***Take the necessary steps to ensure that the customer is not billed for test calls. Refer to the Section 010-250-001, Crediting Charges on Test Calls.***

**A. Data Set Ready Circuit—Local Test**

**6.03** This test checks the operation of the data set ready circuit. Perform the test as follows:

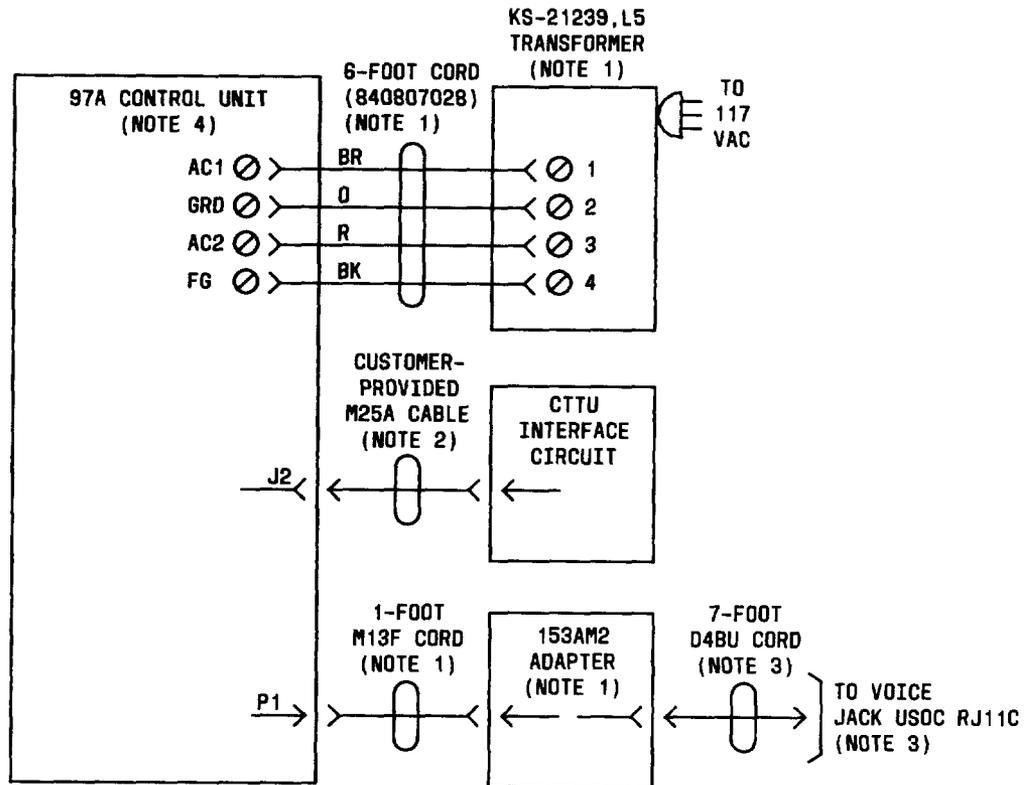
(1) Apply power to the control unit; the MC indicator will light.

(2) Depress the ST switch on the control unit; the TM indicator will light.

(3) From a nearby telephone, dial the telephone number associated with the control unit. The control unit will answer the call at the end of the first ringing interval. In addition, the MR indicator on the control unit will light. In the handset, a 1004-Hz tone is heard for approximately 14 seconds. The control unit disconnects from the line at the end of the tone (14 seconds).

(4) Place handset on-hook; the TR indicator lights only if CD lead is on.

(5) Place handset on-hook.



NOTES:

1. SUPPLIED WITH 97A CONTROL UNIT.
2. THE M25A CABLE IS SUPPLIED WITH THE CTTU INTERFACE CIRCUIT. IN ADDITION, THE TOTAL DISTANCE FROM THE 97A CONTROL UNIT TO THE CTTU INTERFACE CIRCUIT MUST NOT EXCEED EIA RS-232-C STANDARDS.
3. D4BU CORD AND VOICE JACK USOC RJ11C MUST BE ORDERED SEPARATELY.
4. P1 AND J2 ARE 25-PIN CONNECTORS.

Fig. 2—97A Control Unit Connections