

## E2 STATUS REPORTING AND CONTROL SYSTEM

### REMOTE CALL-UP TEST SET

### DESCRIPTION, OPERATION, AND MAINTENANCE

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#### 1. GENERAL

**1.01** This section covers the description, operation, and maintenance of the Remote Call-Up (RCU) test set model RCU-100. The test set (Fig. 1) is used for acceptance and maintenance of the RCU circuit module in E2 remotes. Tests using the RCU test set are covered in the appropriate equipment maintenance sections.

**1.02** The RCU test set simulates the input/output (I/O) device used at Transmission Surveillance Centers (TSC), Transmission Surveillance Auxiliary (TSA), or other I/O devices which can connect to the RCU circuit module of an RCU-equipped remote.

**1.03** The RCU feature provides the capability of transmitting up to 16 words of binary-coded information at a time between E2 remote stations under the control of an E2 central. Under normal conditions, the RCU request is initiated at a remote station by an I/O device associated with another system. During maintenance, the test set initiates the RCU request. The request can be initiated at any time, but is recognized by the central only during alarm polling of the requesting remote. Once the remote is alarmed and the RCU request is acknowledged by the central, the central automatically interrupts the alarm polling sequence. The central then sends a transmit data command to the remote requesting the RCU transfer. Once

the transfer of data by the remote is complete, the central resumes alarm polling.

#### 2. PHYSICAL DESCRIPTION

**2.01** The RCU test set (Fig. 1) is housed in a 15-inch by 17-inch by 11-inch portable cabinet. All controls for operating the test set and indicator lamps for monitoring the results are contained on the front panel of the test set. The visual indicators consist of 23 single light-emitting diodes (LED) and one numeric LED readout. The logic for the test set is contained on two printed circuit boards. The set is designed for operation from 120 Vac, 60 Hz.

**2.02** The test set is connected to the RCU circuit module via connectorized cables. Two 50-pin connectors, labeled CONNECT TO J1 (input to the test set) and CONNECT TO J2 (output from the test set) are located on the rear of the test set.

#### 3. OPERATION

**3.01** As mentioned previously, the RCU test set simulates an I/O device which uses the Remote Call-Up feature of E2. The test set provides all the proper indications to the RCU circuit module and acts upon the signals given to it by the RCU circuit module.

**3.02** The test set can be used in two types of configurations: off-line testing and on-line testing. Off-line testing requires the use of an RCU test set and an E-telemetry station test set (KS-20937). In this configuration, the remote under test is disconnected from the facility and connected to the E-telemetry station test set. The telemetry test set then assumes the role of both a central and a remote; the RCU test set is connected to the circuit module, acting as the I/O device.

**3.03** The front panel of the RCU test set is divided into four sections (Fig. 2); they are the transmit, I/O control Indications, receive, and

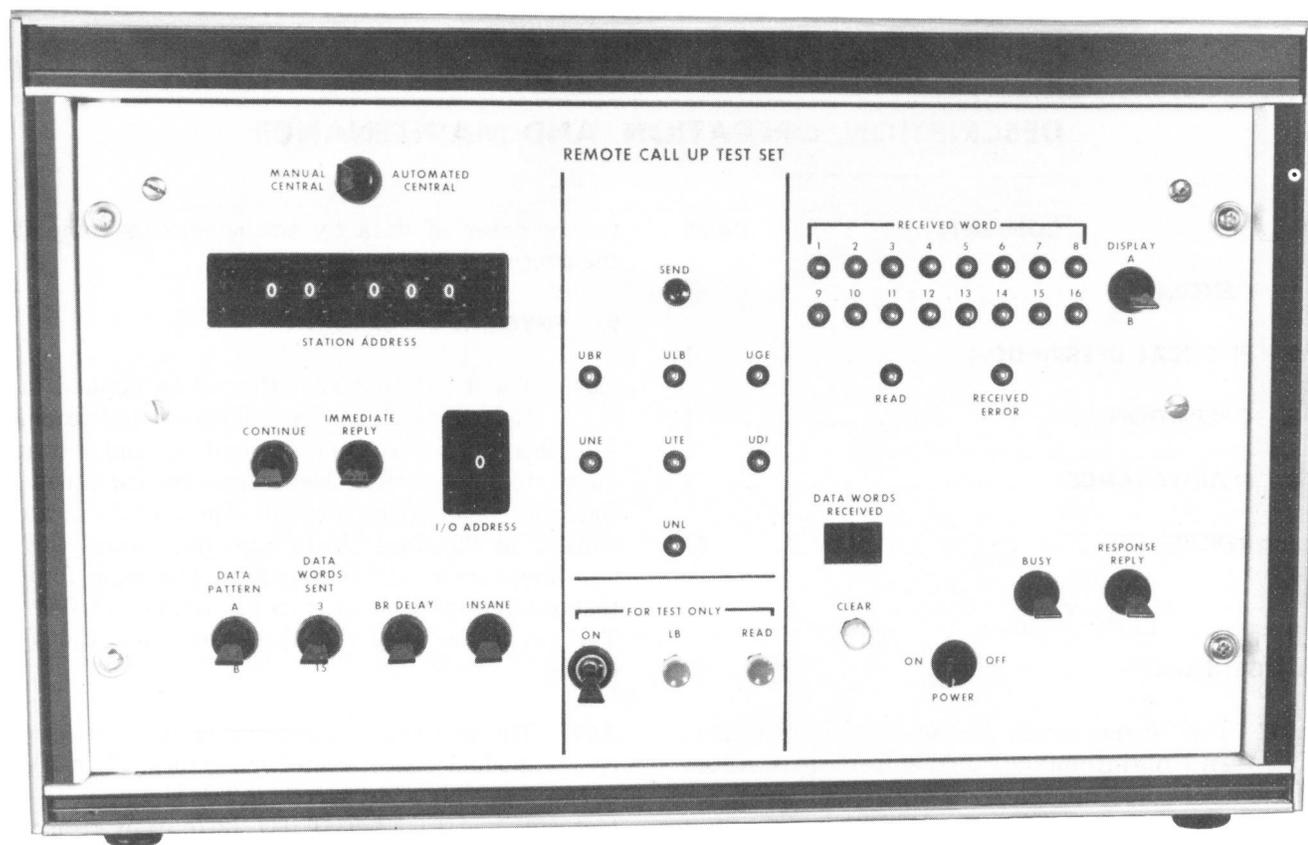


Fig. 1—RCU Test Set

test sections. Each of the controls and indicators are described below under their respective sections.

### *Transmit Functions*

**STATION ADDRESS**—Two independent sets of thumbwheel switches to address either E2 remotes monitored by E2 manual centrals (the two switches on the left), or automated centrals (the three switches on the right).

**MANUAL CENTRAL/AUTOMATED CENTRAL**—A two-position switch which selects the appropriate set of STATION ADDRESS thumbwheel switches.

**I/O ADDRESS**—A thumbwheel switch which selects the I/O device address.

**CONTINUE**—When in the CONTINUE position, sends a request to the E2 central for a second

transmission immediately following the first transmission.

**IMMEDIATE REPLY**—Requests an immediate reply from the addressed remote.

**DATA PATTERN A/B**—This switch allows the data bits outputted to the circuit module to contain alternate 1s and 0s. In position A, all odd-numbered words have all odd-numbered bits at logic 1, and all even-numbered words have all even-numbered bits at logic 1. Conversely, in position B, all odd-numbered words have all even-numbered bits at logic 1, and all even-numbered words have all odd-numbered bits at logic 1.

**DATA WORDS SENT 3/15**—This switch requests either 3 or 15 data words to be sent from the RCU test set.

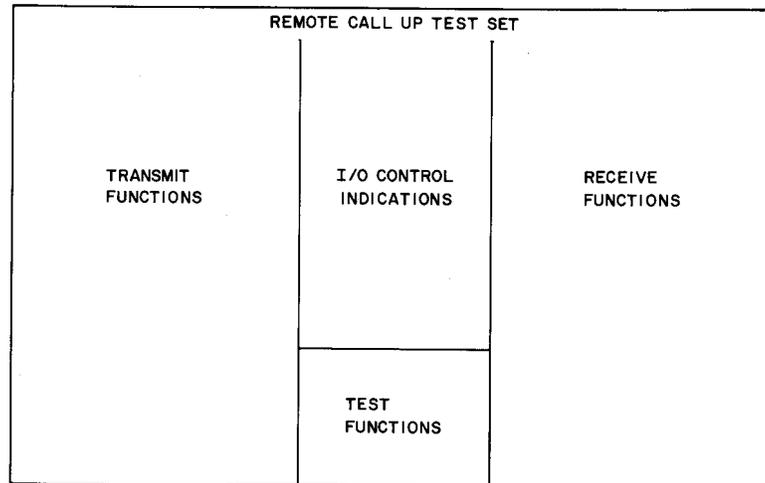


Fig. 2—Location of Controls and Indicators for the RCU Test Set

**BR DELAY**—This switch, when in the up position, generates a delay which causes the RCU circuit module to ignore data from the test set. In the down position, no delay is generated.

**INSANE**—This switch, when in the up position, instructs the circuit module to ignore further commands from the test set. In the down position, the RCU circuit module accepts all commands from the test set.

#### *I/O Control Indications*

**SEND**—This switch allows the test set to initiate the RCU transmit function.

The following are control indications received from the RCU circuit module.

UBR—user buffer ready

ULB—user load buffer

UGE—user group end

UNE—user no error

UTE—user transmission error

UDI—user data ignored

UNL—user no load

#### *Receive Functions*

**RECEIVE WORD**—Sixteen LEDs (numbered 1 through 16) which display one word received by the test set from the RCU circuit module.

**DISPLAY A/B**—This switch allows the test set to display all odd-numbered data words in position A, or all even-numbered words in position B.

**READ**—This light, when on, indicates the presence of valid data.

**RECEIVE ERROR**—This light, when on, indicates that invalid data is being received.

**DATA WORDS RECEIVED**—An LED numeric readout which indicates the number of data words received by the test set.

**CLEAR**—This switch resets the DATA WORDS RECEIVED display to 0.

**BUSY**—This switch, when in the up position, notifies the RCU circuit module that the test set will not accept data at this time.

**RESPONSE REPLY**—This switch allows the RCU circuit module to answer with a 3- or 15-word data response transmission.

**Test Functions**

**TEST**—This switch, in the TEST position, allows the test set to function as an I/O device for the circuit module. In the ON position, it places the test set in the self-test mode.

**READ**—This switch simulates RCU READ pulses for testing the test set.

**LB**—This switch simulates RCU ULB pulses for testing the set.

**4. MAINTENANCE**

**4.01** Chart 1 provides a functional test of the RCU test set. This test should be performed on a periodic basis to ensure that the test set is functioning properly. If any of the requirements of the test are not met, the test set should be returned directly to the manufacturer for repair.

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**CHART 1**

**FUNCTIONAL TEST OF THE RCU TEST SET**

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**APPARATUS:**

Volt-Ohm-Milliammeter (VOM), KS-14510-L1, or equivalent

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**STEP**

**PROCEDURE**

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- 1 Set the STATION ADDRESS thumbwheel switches to 00 000.
- 2 Set the I/O ADDRESS thumbwheel switch to 0.
- 3 Set the MANUAL CENTRAL/AUTOMATED CENTRAL switch to the MANUAL CENTRAL position.
- 4 Set the DATA PATTERN, DATA WORDS SENT, BR DELAY, and INSANE switches to the down position.
- 5 Set the CONTINUE and IMMEDIATE REPLY switches to the down position.
- 6 Set the BUSY and RESPONSE REPLY switches to the down position.
- 7 Set the DISPLAY switch to the B position.
- 8 Set the POWER switch to ON.
- 9 Set the TEST switch to ON.
- 10 Depress the LB pushbutton.

**Requirement:** The UBR and ULB indicator lamps shall blink.

- 11 Set the BR DELAY switch to the up position.

## CHART 1 (Cont)

STEP	PROCEDURE
12	Depress the LB pushbutton.  <b>Requirement:</b> The UBR and ULB indicator lamps shall blink, but a delay shall exist between the ULB and UBR blink.
13	Set the BR DELAY switch to the down position.
14	Depress the READ pushbutton.  <b>Requirement:</b> The READ and UDI indicator lamps shall blink.
15	Depress the CLEAR pushbutton.  <b>Requirement:</b> The DATA WORDS RECEIVED display shall read 00.
16	Depress the READ pushbutton.  <b>Requirement:</b> The DATA WORDS RECEIVED display shall increase once each time the pushbutton is depressed.
17	Depress the READ pushbutton until the DATA WORDS RECEIVED display reads 15.
18	Depress the CLEAR pushbutton.  <b>Requirement:</b> The DATA WORDS RECEIVED display shall read 00.
19	Set the DATA WORDS SENT switch to 3.
20	Depress the LB pushbutton several times.  <b>Requirement:</b> The DATA WORDS RECEIVED display shall cycle in a 1, 2, 3, 1, 2, 3, or 0, 1, 2, 3, 0, 1, 2, 3 sequence.
21	Set the DATA WORDS SENT switch to 15.
22	Depress the LB pushbutton at least 15 times.  <b>Requirement:</b> The DATA WORDS RECEIVED display shall cycle in a 1 through 15, or 0 through 15 sequence.
23	Depress, in order, the CLEAR and the SEND pushbuttons.  <b>Requirement:</b> The UBR indicator lamp shall blink.
24	Set the RESPONSE REPLY switch to the up position.

## CHART 1 (Cont)

STEP	PROCEDURE
25	Depress the READ pushbutton three times.  <b>Requirement:</b> The DATA WORDS RECEIVED display shall cycle 0, 1, 2, 0, and the UBR and UDI indicator lamps shall blink when the display goes from 2 to 0.  <b>Note:</b> When the DATA WORDS RECEIVED display returns to 0, the READ pushbutton shall no longer cause the display to advance. To reinitiate the sequence, depress in order, the LB and CLEAR pushbuttons, and then depress the READ pushbutton three times.
26	Continuously depress the LB pushbutton.  <b>Requirement:</b> The DATA WORDS RECEIVED display shall advance each time the pushbutton is depressed.
27	Set the RESPONSE REPLY switch to the down position.
28	Depress the LB pushbutton four times.
29	Using one of the test cables provided with the set, connect the CONNECT TO J1 jack to the CONNECT TO J2 jack. These jacks are located on the rear of the test set.
30	Depress the SEND pushbutton.  <b>Requirement:</b> The UBR and UDI indicator lamps shall blink.
31	Depress the READ pushbutton.  <b>Requirement:</b> The READ and UGE indicator lamps shall blink.
32	Set the BUSY switch to the up and then down position.  <b>Requirement:</b> The UNE indicator lamp shall blink.
33	Depress the SEND pushbutton.
34	Set the STATION ADDRESS thumbwheel switches to the 00 000 position.
35	Depress the READ pushbutton <i>twice</i> .  <b>Requirement:</b> No RECEIVED WORD indicator lamps shall light.
36	Repeat Steps 34 and 35 for each line of Table A.  <b>Requirement:</b> The appropriate RECEIVE WORD indicator lamp shall light per Table A.
37	Set the I/O ADDRESS thumbwheel switch to the 1 position.

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**CHART 1 (Cont)**


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STEP	PROCEDURE
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TABLE A

STATION ADDRESS SWITCH		LIGHTED RECEIVED WORD LAMP
00	000	NONE
01	000	3
02	000	4
04	000	5
10	000	6
20	000	7
40	000	8
00	000	NONE

38 Depress the READ pushbutton *twice*.

**Requirement:** RECEIVED WORD indicator lamp number 16 shall light.

39 Repeat the procedure in Steps 37 and 38 for each line of Table B.

**Requirement:** The appropriate RECEIVE WORD indicator shall light per Table B.

TABLE B

I/O ADDRESS SWITCH	LIGHTED RECEIVED WORD LAMP
0	NONE
1	16
2	15
4	14
8	13
0	NONE

CHART 1 (Cont)

STEP	PROCEDURE
40	Set the MANUAL CENTRAL/AUTOMATED CENTRAL switch to the AUTOMATED CENTRAL position.
41	Set the STATION ADDRESS thumbwheel switches to the 00 000 position.
42	Depress the READ pushbutton <i>twice</i> .  <b>Requirement:</b> No RECEIVED WORD indicator lamps shall light.
43	Repeat the procedure in Steps 41 and 42 for each line of Table C.  <b>Requirement:</b> The appropriate RECEIVE WORD lamp(s) shall light per Table C.

TABLE C

STATION ADDRESS SWITCH		LIGHTED RECEIVE WORD LAMP(s)
00	000	NONE
00	001	3
00	002	4
00	004	5
00	008	6
00	016	7
00	032	8
00	064	9
00	128	10
00	256	11
00	511	3 through 11

- 44 Set the STATION ADDRESS thumbwheel switches to the 00 000 position.
- 45 Set the MANUAL CENTRAL/AUTOMATED CENTRAL switch to the MANUAL CENTRAL position.
- 46 Set the CONTINUE switch to the up position.

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 CHART 1 (Cont)
 

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STEP	PROCEDURE
47	Depress the READ pushbutton <i>twice</i> .
	<b>Requirement:</b> RECEIVED WORD indicator lamp number 11 shall light.
48	Set the CONTINUE switch to the down position.
49	Set the IMMEDIATE REPLY switch to the up position.
50	Depress the READ pushbutton <i>twice</i> .
	<b>Requirement:</b> RECEIVE WORD indicator lamp number 11 shall extinguish, and number 12 shall light.
51	Set the IMMEDIATE REPLY switch to the down position.
52	Depress the READ pushbutton <i>twice</i> .
	<b>Requirement:</b> All RECEIVED WORD indicator lamps shall be off.
53	Set the DATA PATTERN switch to the A position.
54	Set the DISPLAY switch to the A position.
55	Depress, in order, the SEND pushbutton <i>once</i> and the LB pushbutton <i>once</i> .
56	Depress, in order, the CLEAR pushbutton <i>once</i> and the READ pushbutton <i>once</i> .
	<b>Requirement:</b> All even-numbered RECEIVE WORD indicator lamps shall light.
57	Depress, in order, the LB pushbutton <i>once</i> and the READ pushbutton <i>once</i> .
	<b>Requirement:</b> All odd-numbered RECEIVE WORD indicator lamps shall light.
58	Depress the CLEAR pushbutton.
59	Set the DATA PATTERN switch to position B.
60	Depress, in order, the SEND pushbutton <i>once</i> and the LB pushbutton <i>once</i> .
61	Depress the READ pushbutton <i>twice</i> .
	<b>Requirement:</b> All even-numbered RECEIVE WORD indicator lamps shall light.
62	Depress the CLEAR pushbutton.
63	Set the DISPLAY switch to position B.

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**CHART 1 (Cont)**


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**STEP****PROCEDURE**

64 Depress the SEND pushbutton *once*.

65 Depress the LB pushbutton *twice*.

66 Depress the READ pushbutton *twice*.

**Requirement:** All odd-numbered RECEIVED WORD indicator lamps shall light.

67 Set the TEST switch to the down position.

68 Disconnect the test cable from the CONNECT TO J1 jack.

69 Momentarily ground (pins 26 through 50) each of the following pins on the CONNECT TO J1 jack:

PIN	INDICATOR LAMP
21	UNL
23	UTE

**Requirement:** The appropriate indicator lamp shall light.

70 Ground pin 17 on the CONNECT TO J1 jack.

**Requirement:** The RECEIVED ERROR indicator lamp shall extinguish.

71 Remove the test cable.

72 Using the 12 VOLTS DC scale of the KS-14510,L1 VOM, connect the negative lead to pin 26 of the CONNECT TO J1 jack and the positive lead to pin 25 of the CONNECT TO J2 jack.

**Requirement:** The VOM shall indicate  $0 \pm 1$  Vdc.

73 Set the INSANE switch to the up position.

**Requirement:** The VOM shall indicate  $5 \pm 1$  Vdc.

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**5. REFERENCES**

**5.01** The following Bell System Practices contain additional information pertinent to the RCU test set.

**SECTION**

**TITLE**

201-644-504

Troubleshooting Procedures—Alarm Reporting Remote

**SECTION**

**TITLE**

103-117-101

E-Telemetry Station Test Set—Description