

37 TELETYPEWRITER RECEIVE-ONLY (RO) STATION ARRANGEMENT
NONSWITCHED POINT-TO-POINT PRIVATE LINE SERVICE

DESCRIPTION AND OPERATION

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having EIA (Electronics Industries Association) Standard RS-232-C interfacing. Messages are received at the speed of 150 words per minute.

1.04 References to left or right, top or bottom, front or rear, etc, apply to the terminal in its normal position as viewed by the operator in front of the terminal.

2. STATION FEATURES

2.01 The standard 37 RO TTY station for nonswitched point-to-point private line service provides the following major features:

- (a) Direct communications link between two stations.
- (b) Automatic disconnect by idle line timer.

1. GENERAL

1.01 This section provides a description of the features and operating characteristics of the Model 37 Receive-Only (RO) Teletypewriter (TTY) station for nonswitched point-to-point private line service (Figure 1). For more detailed information on the sets and components comprising the station, refer to the section reference listing in Part 5.

1.02 The standard 37 RO TTY station includes a 37 RO Set, and either Data Auxiliary Set 820D or the 1A data station, Single Channel Arrangement (SCA).

1.03 The 37 RO TTY is a heavy duty set that functions with the ASCII (American National Standard Code for Information Interchange) and operates with a data set



Figure 1 - Model 37 RO TTY Station

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- (c) Receives at the speed of 150 words per minute with a 10-unit code.
- (d) Receives all 128 ASCII characters — prints 94 graphics including upper and lower case alphabet.
- (e) Low paper alarm indication.
- (f) Friction feed roll paper.
- (g) Seventy-two characters on a line (10 per inch) — craftsman adjustable for shorter lengths.
- (h) Manual paper feed-out.
- (i) Manual carriage return.
- (j) Print position indicator.
- (k) Print position scale.
- (l) On-line backspace.

2.02 The standard 37 RO TTY station for nonswitched point-to-point private line service may be arranged with optional features to meet varying requirements. These optional features include:

- (a) Two-color printing controlled on-line — red printing on the two-character sequence ESC 3 and black printing on the two-character sequence ESC 4.
- (b) Forward half line feed on the two-character sequence ESC 9.
- (c) Reverse half line feed on the two-character sequence ESC 8.
- (d) Reverse line feed on the two-character sequence ESC 7.
- (e) Form feed paper with marginal perforations (sprocket feed).
- (f) Horizontal tabulation for friction feed and sprocket feed units on the HT character.
- (g) On-line horizontal tabulation for friction feed and sprocket feed units, on the two-character sequence ESC 1 to set tabulator stops, and the two-character sequence ESC 2 to clear tabulator stops.

- (h) Vertical tabulation for friction feed and sprocket feed units on the VT character.
- (i) On-line vertical tabulation for friction feed and sprocket feed units, on the two-character sequence ESC 5 to set tabulator stops, and the two-character sequence ESC 6 to clear tabulator stops.
- (j) Form advance for friction feed and sprocket feed units on FF character.
- (k) Print additional graphics of the ASCII up to the total 128.
- (l) NEW LINE feature providing the combined functions of carriage return and line space in a single key.

3. STATION ARRANGEMENT

COMPONENTS

3.01 The standard and alternate components used in the 37 RO TTY station for nonswitched point-to-point private line service are listed in Table A.

3.02 A brief description of the major components of the 37 RO TTY station is included in the following paragraphs. Refer to the appropriate description sections listed in Part 5 for more detailed descriptions of the components:

- (a) **Typing Unit:** The typing unit (Figure 2) is an electromechanical device that receives electrical data serially by means of a magnet-type selector. It converts the data into printed characters using a typebox positioned by an aggregate motion mechanism. All 128 ASCII characters may be printed. Normally, however, the component is arranged to print 94 graphic, numeric, and alpha characters. A function box is included for character and character sequence recognition. The component may have either friction or sprocket feed capability and may be equipped with optional features such as horizontal and vertical tabulation.
- (b) **Base:** The base provides mounting facilities for the typing unit, motor unit, and intermediate gear assembly.
- (c) **Control Panel:** Located on the front of the typing unit cover and pan, the control panel (Figure 5) provides a set of six

TABLE A
STATION COMPONENTS

STANDARD COMPONENT	ALTERNATE COMPONENT
Typing Unit (friction feed)	Typing Unit (sprocket feed) Variety of Typeboxes
Teletypewriter Base	—
Typing Unit Cover and Pan	—
Teletypewriter Table (double compartment)	Single compartment table in standard or shallow depths providing no facilities for mounting the data auxiliary set.
Motor Unit	—
Electrical Service Unit (including control panel and circuit card sets)	—
Data Auxiliary Set equipped with the 108A, 108C, 108D, 108E, 109A or 109C Data Set.	1A data station — Single Channel Arrangements (SCA).

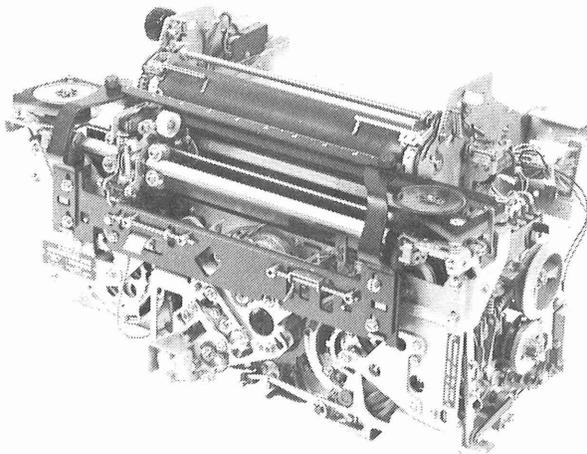


Figure 2 - Typing Unit

nonlocking pushbuttons (keys) and two mechanical pushbuttons designated PAPER ADVANCE and LOCAL RETURN. The operation of the control panel pushbuttons is described in Table B.

(d) Motor Unit: The synchronous-type motor unit provides the power for operating the typing unit.

(e) Typing Unit Cover and Pan: This component includes copylights and provides housing for the typing unit, motor unit, and control panel.

(f) Electrical Service Unit: Control of the typing unit is provided by the electrical service unit (Figure 3). The logic is contained on circuit cards. A power supply, ac outlets, electronic signal regenerator, etc, are included.

TABLE B
CONTROLS DESCRIPTION

CONTROL	FUNCTION
OFF LINE	Depression of the OFF LINE pushbutton lights its associated lamp and places the terminal in the local or off-line mode. A second operation of the pushbutton extinguishes the lamp and returns the terminal to the on-line mode.
RECEIVE	This lamp lights to indicate that the terminal has attained slave status by having automatically sent ACK in response to a received ENQ.
OUT OF SERVICE	Depression of the OUT OF SERVICE pushbutton lights the associated lamp and places the terminal in a "do not answer" mode. Operation of the pushbutton during a message turns the motors off immediately. Optionally, the Out-of-Service condition may be deferred until the message is completed. When the Out-of-Service condition is in effect, neither ENQ nor ACK is detected or generated.
CARRIER FAIL	This lamp lights to indicate loss of received carrier or line current detected by the data set. The terminal with the CARRIER FAIL condition is switched into the contention mode. When carrier returns, the sending terminal must reinitiate call establishment procedures. Loss of carrier at the receiving terminal turns off the RECEIVE lamp and stops reception. When carrier returns, the terminal will again receive a message, even though the RECEIVE lamp is still off.
ALARM	This lamp lights to indicate a low-paper condition on printers equipped with a paper supply roll or a paper-out condition on printers equipped with forms. The paper alarm condition prevents an answer to the ENQ character.
INTRPT (Interrupt)	When momentarily depressed, this pushbutton causes a timed (380 to 750 millisecond) spacing signal to be sent on-line. The interrupt provides the slave station with the ability to halt transmission from the master station. A detected interrupt switches both the master and the slave terminals into the contention mode. If the distant terminal is in an alarm mode, each depression of the INTRPT pushbutton causes one ring of the bell at the distant terminal, alerting the remote operator that the terminal requires attention.

(g) Teletypewriter Tables: The standard table has two compartments and accommodates all station components. Two single compartment tables which differ primarily in overall depth dimension, are optionally available. The data sets are

mounted external to the single compartment tables.

(h) Data Auxiliary Set: The 820D Data Auxiliary Set is equipped with the 108A, 108C, 108D, 108E, 109A or 109C

Data Set. The 820D Data Auxiliary Set (Figure 4) functions as an interface between the teletypewriter terminal and the 108A, 108C or 109A Data Sets.

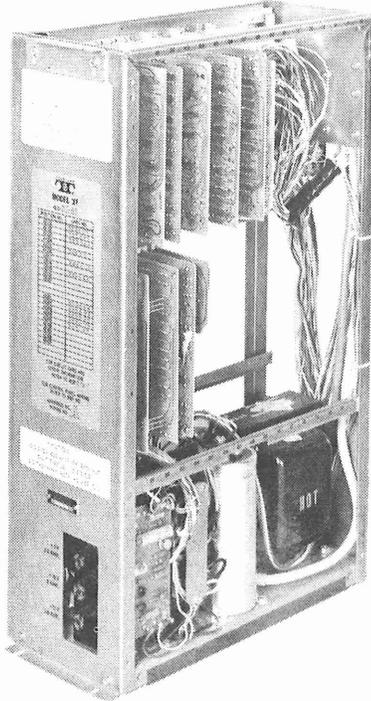


Figure 3 - Electrical Service Unit

- (1) The 108A, 108C, 108D, and 108E are alternating current type Data Sets which employ frequency shift modulation for data transmission. Since the frequency assignments of the send and receive circuits are fixed, data sets of the same type cannot communicate with each other. Data Sets 108A, 108C, 108D, and 108E are intended to work with each other for station-to-station service.
 - (2) The 109A and 109E Data Sets are direct current type data sets designed only for half-duplex operation in short-haul station-to-station circuits. It operates with another 109A or 109E Data Set in a closed dc loop in station-to-station operation.
- (i) Data Station: The 1A data station is a solid state, frequency-shift-keyed, serial, full duplex channel terminal. The

frequency assignments depend on choice of component circuit cards. It is intended to work with another 1A data station for station-to-station service.

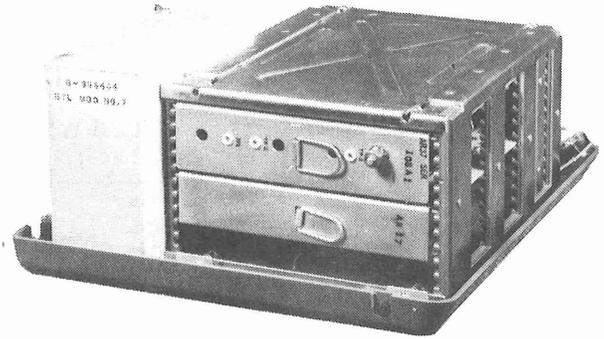


Figure 4 - Data Auxiliary Set 820D

OPERATING CONTROLS

- 3.03 The controls necessary for operating the 37 RO TTY station are located on the control panel (Figure 5).
- 3.04 Table B lists the operating controls and describes their functions.
- 3.05 Data Sets 108A, 108C, 108D, and 108E contain a test button accessible by the operator. This button conditions the data set for loop-back testing and is only operated upon direction of the Telephone Company.

INTERFACE

- 3.06 The teletypewriter interface consists of defined leads, listed in Table C, which conform to EIA Standard RS-232-C.

POWER REQUIREMENTS

- 3.07 The 37 RO TTY station requires a 117 volt ± 10 percent, 60 Hz ac power source, and is rated at 300 watts power consumption, depending on features. In the station idle mode (motors off), the data set remains energized.

LOCAL RETURN	OFF LINE	RECEIVE	OUT OF SERVICE	CARRIER FAIL	ALARM	INTRPT	PAPER ADVANCE
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Figure 5 - Typical Control Panel Arrangement

TABLE C

TELETYPEWRITER AND DATA SET INTERFACE LEADS

DESIGNATION	P303 PIN NO.	NAME	PURPOSE
AA	1	Protective Ground	Connects ac power service ground to the equipment chassis. It is electrically isolated from signal ground.
AB	7	Signal Ground	Provides a common return path for all data signals.
BA	2	Transmitted Data	Carries outgoing data when the set is on-line.
BB	3	Received Data	Carries incoming data when the set is on-line.
CF	8	Data Carrier Detector	Provides an indication that data carrier is being received.

4. OPERATION

LOCAL OPERATION

4.01 The RO set is placed in the local mode by depression of the OFF LINE pushbutton on the control panel. The lighted pushbutton signifies local operation has been selected. A second operation of the pushbutton extinguishes the lamp and turns off the motor.

4.02 A RO set is placed in the local mode to attend to the set for paper replacement. In the local mode it is inhibited from responding

with an affirmative reply of ACK to another set's bid for master status.

LINE OPERATION

A. Establishment Procedure

4.03 Operating the OFF LINE pushbutton to extinguish the lamp places the terminal in the on-line idle mode. The RO terminal can not be placed in the RECEIVE mode by a distant

terminal if any of the following conditions exist within the RO terminal.

OUT OF SERVICE	CARRIER FAIL
ALARM	OFF LINE

These conditions inhibit the terminal from responding to another terminal with the affirmative reply of ACK. If the RO terminal has an alarm, out-of-service, or off-line condition, the bidding terminal has the provision to ring the bell at the RO terminal by the operation of the INTRPT pushbutton. Every operation of the INTRPT pushbutton at the bidding terminal generates one ring of the bell to alert the RO operator.

4.04 Approximately 1-1/2 seconds after the motor turns on in the bidding station, it generates an ENQ wake-up character on-line. The spacing bits of the ENQ character start the motor of the RO terminal, providing none of the inhibiting conditions listed above exist within the RO terminal.

4.05 If the RO terminal already has its motor running, it responds to a received ENQ character by sending an ACK reply to the bidding terminal. If the motor was off in the RO terminal, a second operation of the ORIG pushbutton at the bidding terminal is necessary to elicit a response from the RO terminal. An ACK reply from the RO station to the bidding station immediately switches the RO station into the receive mode, lighting the RECEIVE lamp.

4.06 Upon receipt of the affirmative reply ACK, the bidding station assumes master status (SEND light on), and then proceeds to message transmission.

B. Message Transmission

4.07 Message transmission is accomplished by the master terminal after the previously described establishment procedure. Since this is a RO terminal, messages are only sent from the remote terminal to the RO terminal, without provision for replies.

4.08 The RO terminal may stop the sending terminal by generating an interrupt signal. Depression of the INTRPT pushbutton on the RO terminal generates a timed signal which, when detected at the sender, stops the transmission and switches the terminals into the contention mode. The distant terminal must again follow the establishment procedure to proceed with the message.

C. Termination Procedure

4.09 The terminate function is initiated manually by operation of the CLEAR pushbutton on the distant terminal. This action automatically causes a DLE-EOT (Data Link Escape followed by End of Transmission) character sequence to be generated on-line. The printer stunt box contact in each terminal detects this sequence, and turns the motors off after negating the master/slave relationship that existed during the last transmission.

4.10 An optionally available termination procedure negates the master/slave relationship when EOT is sent and received, and returns both terminals to contention. The motors remain on, but the SEND light of the remote sending terminal and the RECEIVE light of the RO terminal turn off. If establishment procedures are not initiated before a predetermined time period has elapsed, the idle line timer turns the motors off.

4.11 Operation of the CLEAR pushbutton on the distant terminal when the terminals are in the contention mode turns the terminal motors off without generating a DLE-EOT character sequence on-line.

4.12 A two to twenty minute idle line timer operates in parallel with the CLEAR pushbutton on the distant terminal. The timer is craftsman adjustable in four steps with normal time outs occurring at 2, 5, 10, and 20 minutes. At idle line turn-off, the DLE-EOT character sequence is generated on-line if the terminal is in the master or slave status. If the terminal is in contention at the idle line time out, the motors turn off but the DLE-EOT character sequence is not generated.

5. REFERENCES

5.01 The following sectionalized literature pertains to the Model 37 RO stations for nonswitched point-to-point private line service.

<u>TITLE</u>	<u>NUMBER</u>
<u>RO STATION</u>	
Installation	591-803-101
<u>MOTOR UNIT</u>	
Description and Principles of Operation	570-220-100

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<u>TITLE</u>	<u>NUMBER</u>	<u>TITLE</u>	<u>NUMBER</u>
<u>TYPING UNIT</u>		<u>DATA SETS</u>	
Description and Principles of Operation	574-320-101	Description and Operation (108A- and 108C-Type)	591-023-101
<u>TYPING UNIT COVER AND PAN</u>		Description and Operation (108D- and 108E-Type)	591-028-100
Description and Operation	574-326-101	Description and Operation (109A-Type)	591-024-101
<u>TABLE</u>		Description and Operation (109E-Type)	591-036-100
Description and Operation	574-323-101	Description and Operation (1A Data Station)	591-813-101
<u>ELECTRICAL SERVICE UNIT</u>		<u>TYPING UNIT BASE</u>	
Description and Operation	574-322-101	Description and Operation, Adjustments and Lubrication	574-331-100