

37 RECEIVE-ONLY TYPING REPERFORATOR (ROTR) SET

DESCRIPTION AND OPERATION

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		1. GENERAL
		1.01 This section provides the description and operational procedures for the 37 Receive-Only Typing Reperforator (ROTR) Set (Figure 1). It is reissued to include the ROTR used for No. 1 ESS-ADF (ADNET), 85A2, 86A2, and 86B2 Selective Calling Service. Marginal arrows are used to indicate changes or additions.

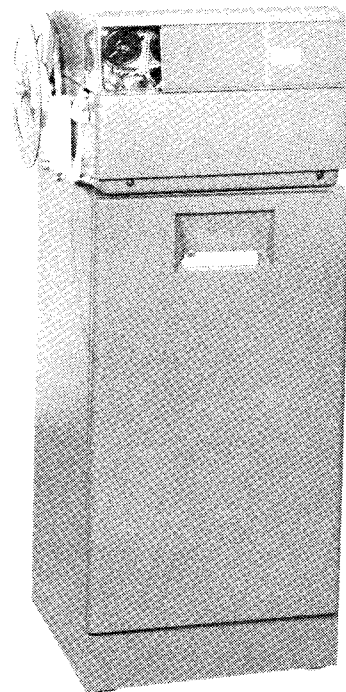


Figure 1 - 37 Receive-Only Typing Reperforator Set

1.02 The 37 Receive-Only Typing Reperforator Set is an electromechanical apparatus for receiving and recording on paper tape, messages transmitted over various transmission facilities, such as telegraph lines, telephone networks, and radio channels. The messages are received in the form of coded (teletypewriter) electrical signals, and recorded on tape as fully-perforated code holes and also as printed characters. Operation of the set is at speeds up to 150 words per minute. The set uses a seven-level signal, plus a parity signal. This is compatible with ASCII (American National Standard Code for Information Interchange).

1.03 On most ROTR sets the graphic characters are printed in black ink; all information received is perforated onto the tape. Printing and perforating occur simultaneously, but the character is printed six and one-half positions behind the corresponding perforations.

1.04 ROTR sets are available to meet varying installation and operational requirements. With minor changes the set is suitable for several types of various services.

2. COMPONENTS

2.01 The component complement of a Model 37 ROTR Set varies with the installation. It usually consists of the following major parts:

- Typing Reperforator
- Motor Unit
- Intermediate Drive Assembly (150 wpm)
- Electrical Service Unit
- Base
- Cover
- Table

TYPING REPERFORATOR

2.02 This unit is a combination punch and tape printer (Figure 2). The electrical impulses (serial start-stop) are received from the signal line and converted into parallel mechanical action by the selector mechanism. The incoming character signal causes a series of mechanical actions which push the appropriate punch pins through the tape. The type wheel is also positioned for the appropriate character; the print

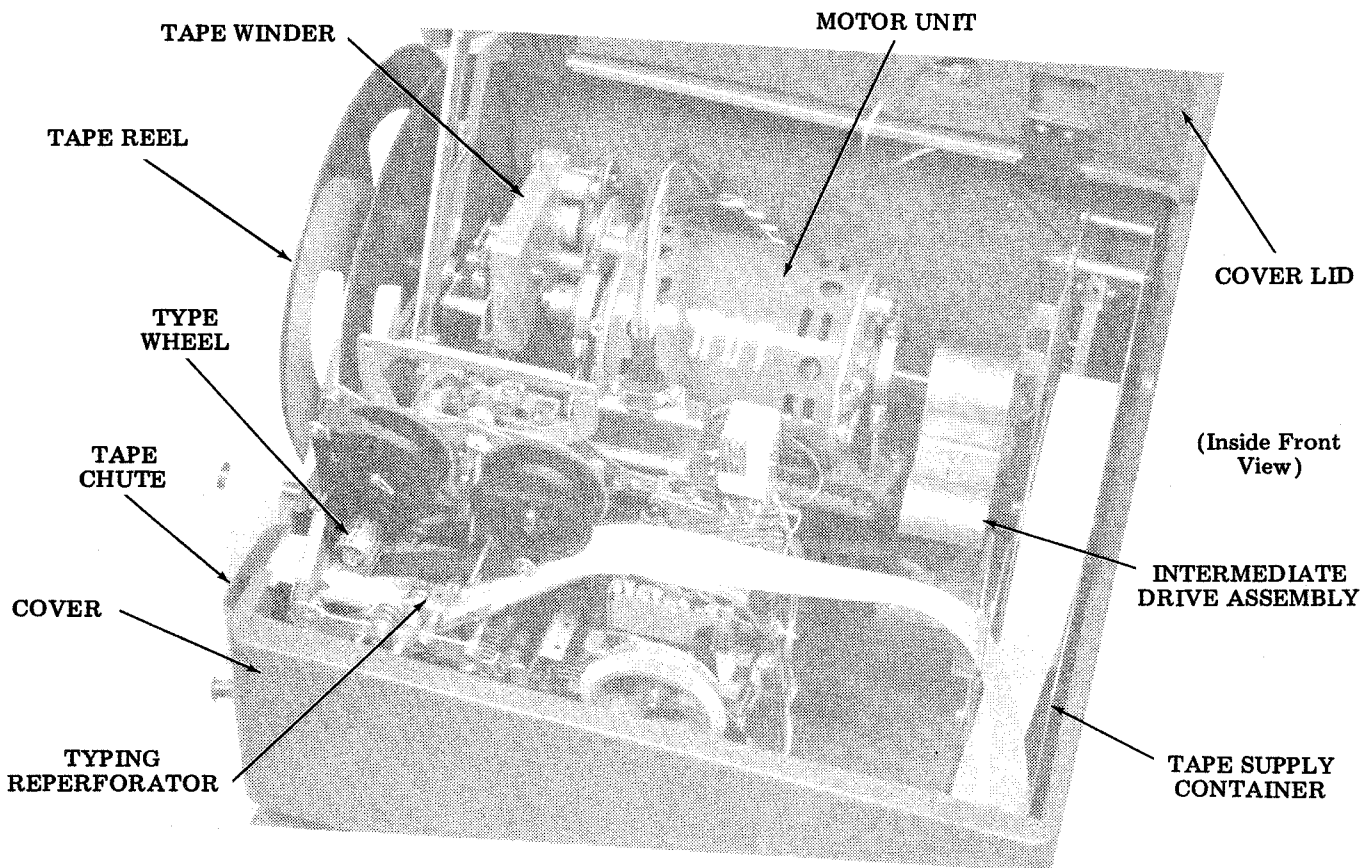


Figure 2 - 37 ROTR With Cover Open

hammer is tripped and the character is printed on the tape. Punching precedes typing by six and one-half positions. (Feed holes are punched between the third and fourth code levels.)

MOTOR UNIT

2.03 The motor unit furnishes the motive power for the typing reperforator, and for a tape winder mechanism if used (Figure 2). The motor unit is a complete assembly, consisting of a 1/20 hp synchronous motor which operates from 115-volt $\pm 10\%$ ac, 60 Hz $\pm 0.75\%$ frequency.

INTERMEDIATE DRIVE ASSEMBLY (150 WPM)

2.04 The intermediate drive shaft rotates at exactly twice the reperforator speed, with the change in speed made through the sprockets (Figure 2). The transfer of power from the intermediate drive assembly to the reperforator is by means of a toothed belt.

ELECTRICAL SERVICE UNIT

2.05 The electrical service unit is used for the interconnection and mounting of various electrical components and assemblies. The ESU provides a power supply, four circuit cards with associated wiring, and interface cables for the punch, motor, control panel, and station controller (data set).

BASE

2.06 The base provides resilient shock mountings for the typing reperforator, motor unit, intermediate drive assembly, and tape winder (Figure 3). Mounting facilities allow modifications to the typing reperforator. Wiring methods permit easy component removal.

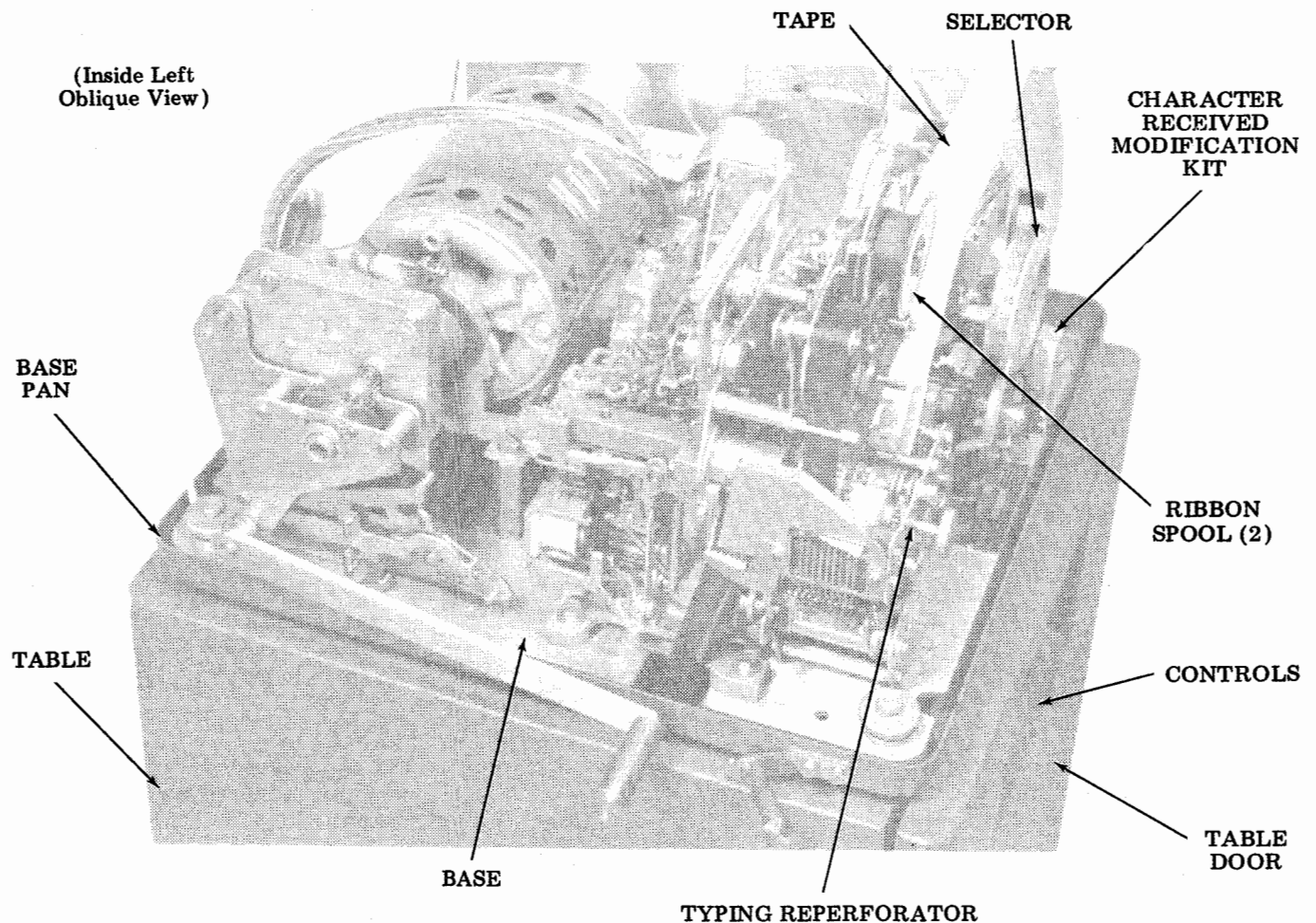


Figure 3 - 37 ROTR With Cover Open to Show Components and Base

COVER

2.07 The cover provides a protective dust and noise-reducing enclosure. It encloses the motor unit and base parts of the ROTR set. The cover is fastened to the base pan and does not touch the base plate at any point. The base pan portion of the cover holds a tape container with low-tape contacts. A tape emission slot provides for discharge of tape through the tape chute. (The tape chute provides approximately 1-3/4 inch leader at the front of a message tape, Figure 2.) Openings at the rear of the cover are for cables from the electrical service unit or other circuitry. A circuit designation card can be mounted inside the cover under a transparent projection of the front plate.

TABLE

2.08 The reperforator table supports the set and provides mounting facilities for a control panel, an electrical service unit, and a chad container assembly (Figure 4). A front access door houses the control panel, and provides an easy opening for servicing the electrical service unit and emptying the chad container. The chad container holds the chad from three, 8-inch diameter rolls of standard 1-inch wide, 8-level tape which has been 50% perforated.

3. VARIABLE FEATURES

3.01 The 37 ROTR Set (depending upon station requirements) can be modified with the following modification kits:

- Character Received Mechanism
- Two-Color Printing Mechanism
- Last Character Visibility Mechanism
- Print Suppression Mechanism
- Tape Backspace Mechanism
- Manual Interfering Tape Feed-Out Mechanism
- Tape Feed-Out Magnet Operated Mechanism
- Buzzer Alarm

CHARACTER RECEIVED MECHANISM

3.02 To indicate selector rotation for each character received, the character received mechanism has a set of contacts which close and open on every selector cycle (Figure 3). The closure of the contacts during the selector cycle verifies the selector rotation. An interchangeable character received modification kit (interchangeable option) provides a contact break instead of a contact make when a different type of detection circuit is incorporated into the set.

TWO-COLOR PRINTING MECHANISM

3.03 The two-color printing mechanism prints in black 64 primary graphic characters. Lower case characters and/or functions are printed in red. Energizing the solenoid causes the retraction lever to pull the ribbon carrier towards the rear, putting the red section in position for printing.

LAST CHARACTER VISIBILITY MECHANISM

3.04 This mechanism pulls the type wheel and ribbon out of the way, allowing the operator to view the last character printed on the tape. When the ROTR unit is in the stop position, an external switch is used to apply current to the mechanism's solenoid through the inhibit contacts.

PRINT SUPPRESSION MECHANISM

3.05 The print suppression mechanism prevents printing on certain characters, such as functions and/or lower case characters. If the set is not equipped with the print suppression mechanism, the control characters will be printed as their complementing characters (figures), and the lower case characters will be printed as upper case characters.

TAPE BACKSPACE MECHANISM

3.06 The tape backspace mechanism can backspace up to twelve characters. Control is governed from a switch on the control panel.

MANUAL INTERFERING TAPE FEED-OUT MECHANISM

3.07 This mechanism provides a means to add a "delete" leader or "delete" spacer to the tape.

TAPE FEED-OUT MAGNET OPERATED MECHANISM

3.08 The basic tape feed-out mechanism is the interfering type. When current is applied to its magnet by an external source, it feeds out a nonmetered amount of tape, perforated with the "delete" code. To provide automatic operation of both metered tape feed-out and noninterfering tape feed-out, the mechanism can be modified with the addition of a slide storage mechanism with an external circuit.

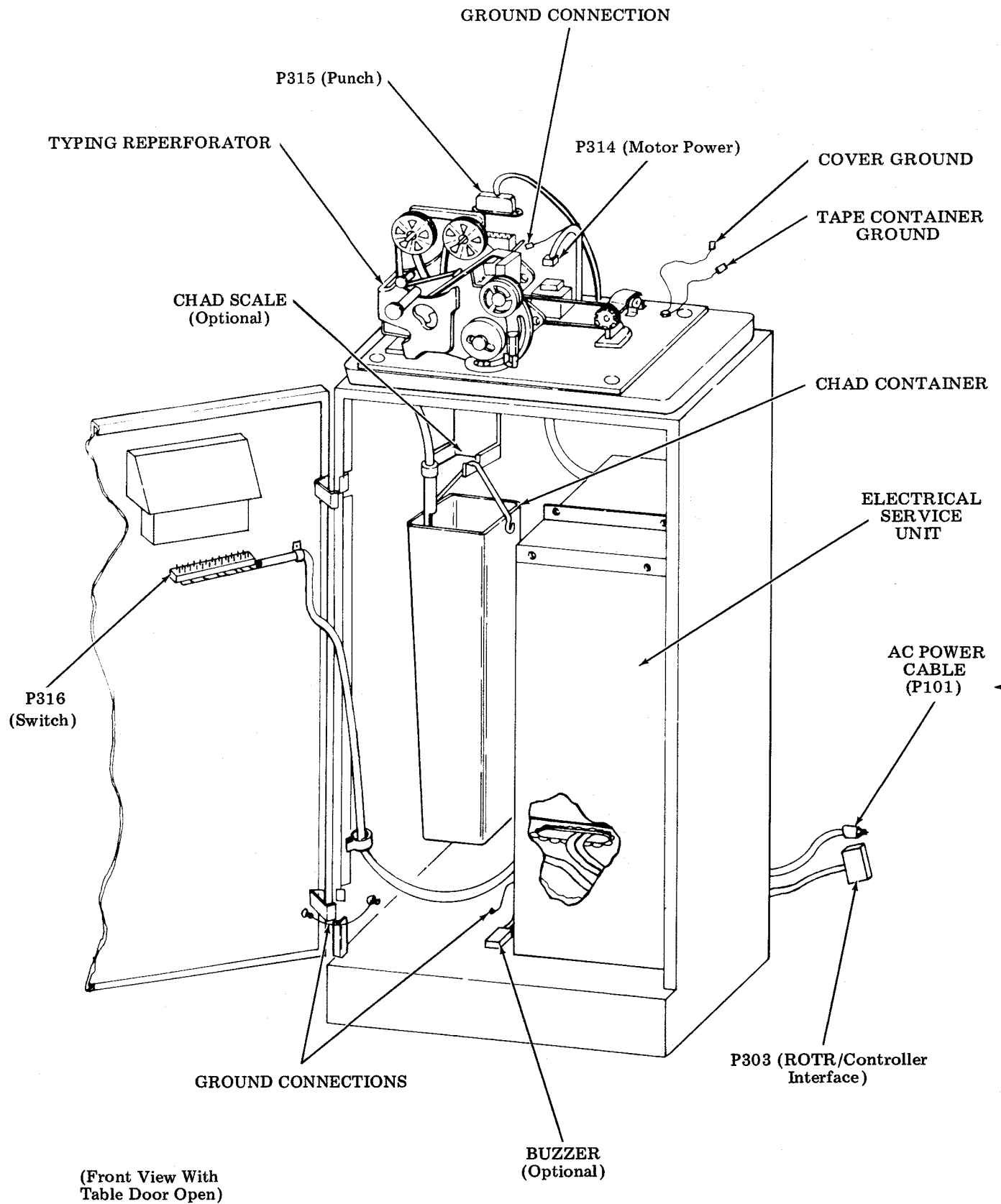


Figure 4 - Wiring Connections

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4. OPERATION

4.01 ROTR sets are used in multipoint, private line applications. The ROTR is a primary receiving device, used in conjunction with its appropriate station controller. The ROTR responds only when selected to receive, and the power switch on the electrical service unit is in the NORMAL position. Turning the power switch to the OFF position turns off the ROTR. Turning the power switch to the MAINT ON position turns on the motor without the need for signals from the station controller.

Private Line Features

4.02 Receiving Device Interface: Contains a motor control relay driver and a selector magnet driver.

4.03 Signal Regenerator Device (with bit timer): Contains an EIA input amplifier to receive the serial data from the data set; the output is an undistorted signal at logic voltage levels. Vertical parity is checked and a lamp driver turns "ON" whenever a character with "ODD" parity is received. Refer to Section 574-330-100 for information concerning the typing reperforator.

4.04 ROTR Control Device: Provides a low-tape alarm, and tape feed-out control with motor control. It also contains a print suppression magnet driver, which may alternately be used to drive other punch magnets for various options (jumper wires must be installed). The tape alarm may be delayed until the end of a message (motor switched "OFF") by changing the strap connections.

4.05 Channel Control Device: Provides the interface control logic for the data set or station controller used in conjunction with Model 37 terminal. To obtain options, strap connections must be added to circuit card. The channel control signals are as follows:

- Data Set Ready (DSR)
- Data Terminal Ready (DTR)
- Selected to Receive (STR)

Control sequences will vary depending upon specific service. An example of a control sequence is as follows:

DATA SET

M37 ROTR

- | | | |
|----|------------------|-----------------|
| 1. | DTR — "ON" | DTR — "ON" |
| 2. | DSR — "ON" | ROTR Motor On |
| 3. | STR — "ON" | Receive Lamp On |
| 4. | Message Received | Tape Punched |
| 5. | DSR — "OFF" | ROTR Motor Off |

Note: DTR remains on unless tape alarm or out of service condition occurs.

5. TECHNICAL DATA

Voltage Levels

5.01 All interface signal levels on the data set interface connector P303 are:

- (a) Low = -3.0 to -25.0 volts dc
- (b) High = +3.0 to +25.0 volts dc

5.02 Logic level signals between the circuit cards are as follows:

- (a) Low = 0.0 to +0.5 volt dc
- (b) High = +3.2 to +5.5 volts dc

Power Requirements

5.03 The electrical service unit must be provided with 115-volt $\pm 10\%$ ac, 60 Hz $\pm 0.75\%$ frequency. The power consumption of the ESU is less than 50 volt-amperes, but additional power is required for the punch motor (approximately 300 volt-amperes total average load).

5.04 The three-position switch for control of primary power operates as follows: Normal (up position), Off (center position), and On (down position). Four fuses (Figure 5) are used to protect primary and secondary circuits. There are two convenience outlets for maintenance use (100 watts maximum).

Wiring Description (Figure 4)

5.05 The circuits in the ESU are divided into four functional subunits, arranged on individual circuit cards: channel control, signal regenerator, ROTR control, and receiving device.

5.06 Interface cables are provided for the following:

- P101 — power cord for ac input, 8 feet
- P303 — station controller or data set with 25-pin poke-home (EIA standard RS-232-C) connector 7-1/2 feet

- P314 — motor interface with 9-pin connector 2-1/2 feet
- P315 — punch interface with 50-pin poke-home connector 3 feet
- P316 — control panel interface with connector for one 6-button key and lamp switch 3-1/2 feet
- P103-J103 — Power supply interface (internal) with 12-pin connection.

100 wpm (option) — Each character consists of eleven equal bits: a start pulse (always spacing); seven intelligence bits; an eighth bit for parity; and a two bit stop pulse (always marking).

Output of Selector Magnet Driver — 0.500 amperes

Environmental Requirements

Temperature Ranges —

This equipment is intended to be operated in a room environment within the temperature range of 40°F to 110°F. Serious damage to it could result if this range is exceeded. In this connection, particular caution should be exercised in using acoustical or other enclosures.

Ambient Storage

Temperature Range . . . -40°F to +150°F
 Ambient Relative Humidity Range 0% to 95%

Tape Characteristics

Width 1 inch
 Perforation Fully perforated
 Character Count 10 per inch
 Printing Between feed holes

Set Dimensions (approximately)

Set Height (cover closed) 35-1/2 inches
 Set Height (cover open) 46-1/2 inches
 Table Width 13-1/2 inches
 Table Depth 13-1/2 inches
 Table Height 25-1/2 inches
 Base Width 13-1/2 inches
 Reel Width (from side of unit) 2-1/2 inches
 Set Weight 90 pounds

6. ROTR SETS FOR NO. 1 ESS-ADF (ADNET), 85A2, 86A2, AND 86B2 SELECTIVE CALLING SERVICE

6.01 The 37 ROTR Sets used in a No. 1 ESS-ADF (ADNET), 85A2, 86A2, or 86B2 Selective Calling Service include a special electrical service unit and related components which permit it to operate as a terminate only (primary) receiver or as an auxiliary receiver. As a primary receiver for 85A2 service, the set must be equipped with a Data Auxiliary Set (DAS) 804R7 (attendant set) and for 86A2 and 86B2 service

CIRCUIT CARDS

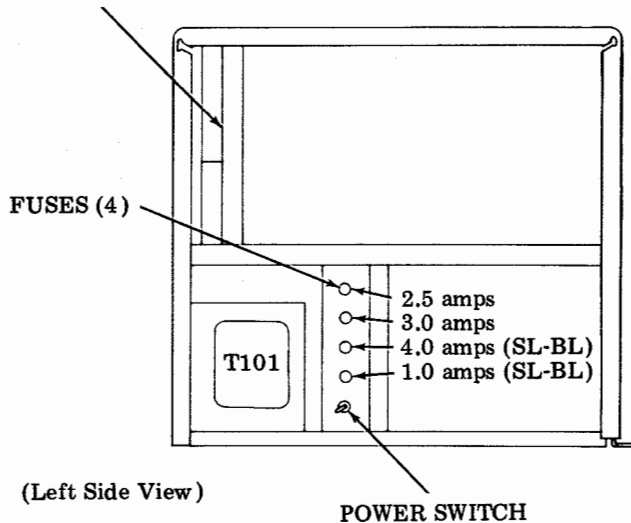


Figure 5 - Electrical Service Unit - Showing Location of Fuses

5.07 An example of interface leads on a P303 connector are as follows:

Leads	Pin No.	Function
(AA)	1	Protective Ground
(BA)	2	—
(BB)	3	Received Data
(CC)	6	Data Set Ready
(AB)	7	Signal Ground
—	19	Selected to Receive
(CD)	20	Data Terminal Ready

Signals

Codes — 7-level, plus a parity signal; this is compatible with the ASCII code.

Characteristics — 150 wpm — Each character consists of ten equal bits: a start pulse (always spacing); seven intelligence bits; an eighth bit for parity; and a one bit stop pulse (always marking).

with a DAS804R3 attendant set. As an auxiliary receiver, the set comes equipped with a control panel in place of the attendant set. The typing reperforator is equipped with the character received contact mechanism which provides the station controller with an indication of received characters. The non-interfering metered tape feed-out mechanism is required.

OPERATION

6.02 A terminate only ROTR used as a primary receiver is interfaced, through appropriate cabling, to a controller 820 type data auxiliary set and data auxiliary set 804 type attendant set. In this application the ROTR is controlled by the data auxiliary set, and is the only receiver of the station. The attendant set indicators and controls are identified in Table A and Table B. The tape out and tape feed-out indications, as well as the character received indication, are passed on to the station controller.

6.03 When used as an auxiliary receiver, the ROTR is connected by cable to a primary RO or ASR. The auxiliary ROTR motor is started whenever the primary receiver is selected, but its receiving mechanism is blinded and must be unblinded by manual operation of the AUX RCVR pushbutton or automatically by stunt box operation from the primary receiver to receive the message signals that follow. The tape

out and tape feed-out indications are not passed to the controller from the auxiliary receiver, but the character received indication is passed to the controller.

6.04 The only indicators or controls on the control panel for the auxiliary receiver are the TAPE ALARM lamp and TAPE FEED pushbutton. The TAPE ALARM lamp lights when the tape supply runs low and the TAPE FEED pushbutton provides a tape feed-out from the reperforator.

6.05 In all applications the power switch on the electrical service unit has three positions designated NORM, OFF and ON. When the switch is operated to the NORM position, the motor start relay is under control of the station controller. The ON switch position turns on the set motor for test purposes without a motor start signal from the controller.

TECHNICAL DATA

Voltage Levels

6.06 All logic level signals between circuit cards, and from circuit cards to data set (P303 connector) are as follows:

- (a) Low = 0.0 to +0.5 volts dc
- (b) High = +3.2 to +5.5 volts dc

TABLE A

804R3 ATTENDANT SET CONTROLS — 37 ROTR PRIMARY RECEIVER FOR
86A2 OR 86B2 SERVICE

DESIGNATION	FUNCTION
MSG REC	Message Reception Alarm — lights when switcher interrupts delivery of message or at negative roll-call response or carrier fail.
ERROR	Lights when a character with parity error is received or when the controller clock is out of sync with incoming data.
TAPE LOW	Lights when tape supply needs replenishing. Can be reset only after tape supply has been replenished.
AUD OFF	Lights when pushbutton is depressed to indicate disabling of audible alarm.
REC	Lamp lights when station is selected as a receiver.

TABLE A

804R3 ATTENDANT SET CONTROLS — 37 ROTR PRIMARY RECEIVER FOR
86A2 OR 86B2 SERVICE (Continued)

DESIGNATION	FUNCTION
TAPE FEED	Provides manual tape feedout.
CALL	Flashes momentarily as the station is called. Remains lighted at a call-in if terminal is not ready to receive.
OUT OF SVC	When depressed, marks receiving terminal not ready, so that station cannot be selected as a receiver. OUT OF SVC pushbutton operated while station is selected, will not interfere with normal operation; it will take effect only after station subsequently becomes unselected.

TABLE B

804R7 ATTENDANT SET CONTROLS — 37 ROTR PRIMARY RECEIVER FOR
85A2 SERVICE

DESIGNATION	FUNCTION
SEL	Lights when the station is selected to receive. Lights momentarily when the station is not ready to receive and its station controller detects its call-in code.
OUT OF SVC	When depressed, marks receiving terminal not ready, so that station cannot be selected as a receiver. OUT OF SVC pushbutton operated while station is selected, will not interfere with normal operation; it will take effect only after station subsequently becomes unselected.
TAPE	Lights when tape supply needs replenishing. Can be reset only after tape supply has been replenished.
MSG ERROR	Lights when the last message improperly-received response, (CAN), is to be given on the next call-in.
AUD OFF	Lights when pushbutton is depressed to indicate disabling of audible alarm.
TAPE FEED	Provides manual tape feedout.

6.07 All DTL (Diode Transistor Logic) level signals from the data auxiliary set to the teletypewriter set (P303 connector) are as follows:

- (a) Low = -0.7 to +0.95 volts dc
- (b) High = +2.0 to +8.0 volts dc
(Current limited to 10 ma maximum)

6.08 The Receive Data level signal from the data auxiliary set to the teletypewriter set (pin 43, P303 connector) is as follows:

- (a) Low = +0.5 to -25.0 volts dc
- (b) High = +3.0 to +25.0 volts dc

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Wiring Description (See Figure 4)

6.09 The circuits in the ESU are divided into two functional subunits, arranged on individual circuit cards, ROTR control, and receiving device.

6.10 Interface cables provided for the following:

- P101 — power cord for ac input, 8 feet
- P303 — data auxiliary set with 50-pin micro-ribbon connector, 8-1/2 feet
- P314 — motor interface with 9-pin connector, 2-1/2 feet
- P315 — punch interface with 50-pin poke-home connector, 3 feet
- P103-J103 — power supply interface with 12-pin connector (internal)
- P316 — control panel connector and cable (optional)

6.11 An example of interface leads on the P303 connector for ROTR use is as follows:

<u>Pin No.</u>	<u>Function</u>
1, 2, 3	Circuit Ground
11	Manual Tape Feed-Out Control
14	Character Detected
16	Send Data (unused)
24	Motor Control
25	Automatic Tape Feed-Out Control
27	Tape Feed-Out in Process
30	Reader Status (unused)
31	Low Tape
33	Mode (unused)
34	Mode (unused)
37	RT Tape (unused)
42	Mode (unused)
43	Receive Data
50	Frame Ground

REFERENCES

<u>TITLE</u>	<u>NUMBER</u>
<u>TYPING REPERFORATOR</u>	
Description and Operation	574-330-100

<u>BASE</u>	
Description and Operation, Adjustments and Lubrication	574-331-101

<u>COVER</u>	
Description and Operation, Adjustments and Lubrication	574-326-102

<u>TABLE</u>	
Description, Adjustments and Lubrication	574-323-102

<u>ELECTRICAL SERVICE UNIT</u>	
Description and Operation	574-322-104

<u>STATIONS</u>	
85A2 Data Selective Calling Service — 150 wpm Operation Description and Operation	581-131-100
86A2 Data Selective Calling Service — 150 wpm Operation Description and Operation	581-136-101
86B2 Data Selective Calling Service — 150 wpm Operation Description and Operation	581-136-103