

37 ANSWER-BACK UNIT

DESCRIPTION AND PRINCIPLES OF OPERATION

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1. GENERAL

1.01 This section provides the description and principles of operation for the 37 answer-back unit (Figure 1), and is reissued to incorporate engineering changes. Since this is a general revision, marginal arrows ordinarily used to indicate changes and additions have been omitted. For information concerning adjustments and lubrication, refer to Sections 574-325-700 and 574-325-701.

1.02 The function of the answer-back unit is to generate a precoded message usually a station identification sequence of 20 characters or less. Each character can include up to eight levels of binary information and can accommodate applications using 5-, 6-, or 8-level codes.

1.03 The answer-back unit is provided with a code drum for encoding the desired character sequence. The code drum has frangible tines which can be easily removed for establishing marking bits in required code level positions. Depending upon the length of an answer-back message, the answer-back unit can generate one, two, or three identical messages per revolution of the code drum.

1.04 The answer-back unit is designed to work with an electrical service unit that contains a transmitting distributor and associated send control circuits. For information concerning the circuit description on the answer-back circuit card and the operation with the electrical service unit, refer to the description and operation for the 37 electrical service unit, Section 574-322-101 and the section concerning the WDP (wiring diagram package) for an appropriate set.

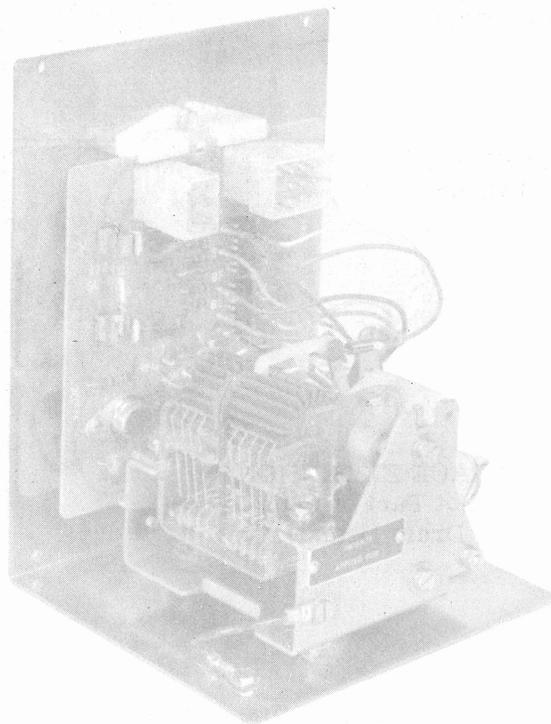


Figure 1 - Answer-Back Unit

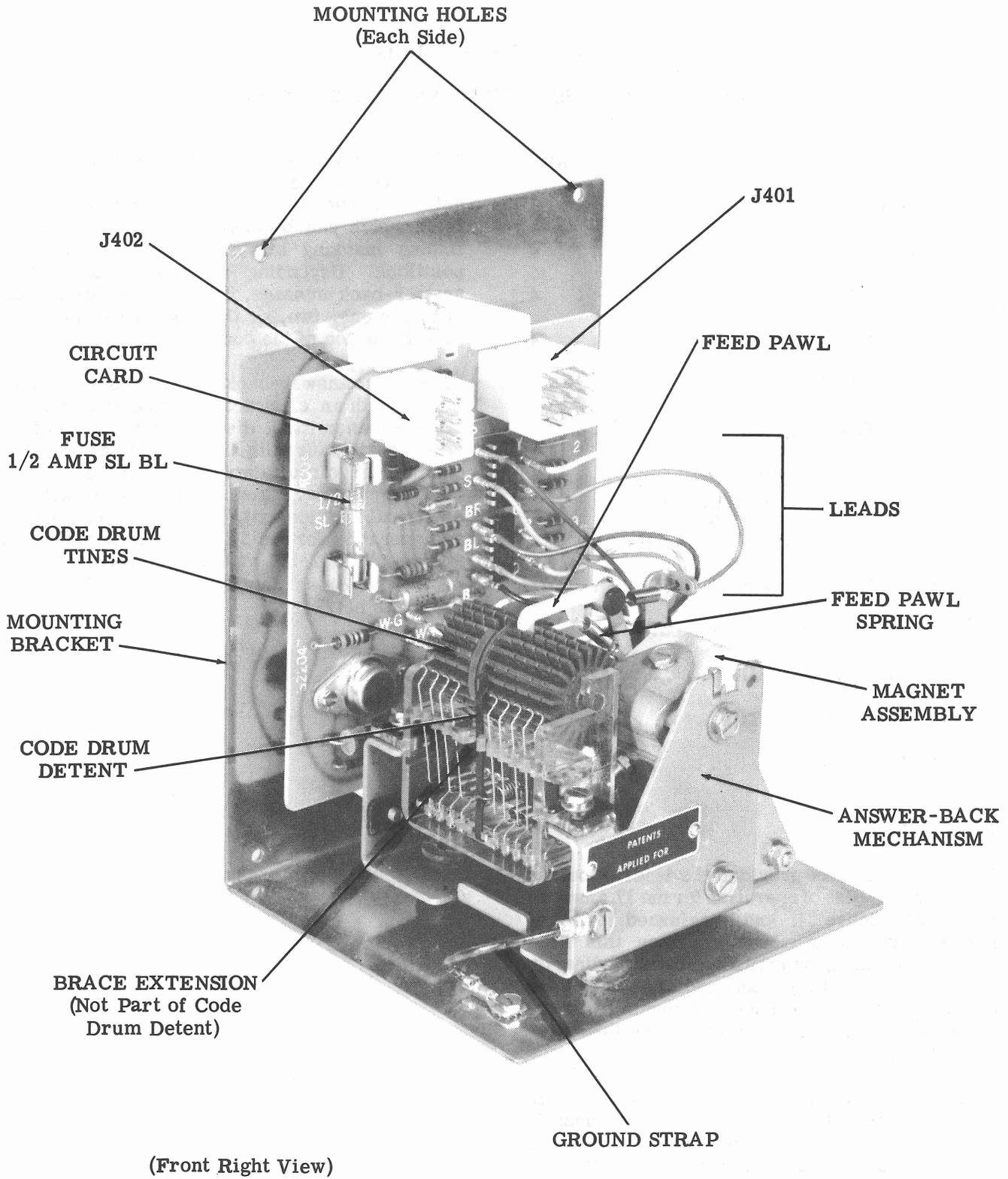


Figure 2 - Answer-Back Unit

LEADS

- Provides electrical interface with the circuit card. Extends circuit to feed magnet, off-normal switch, and contact assembly.

FEED MECHANISM

- Advances code drum one step upon completion of each input pulse.

CONTACT ASSEMBLY

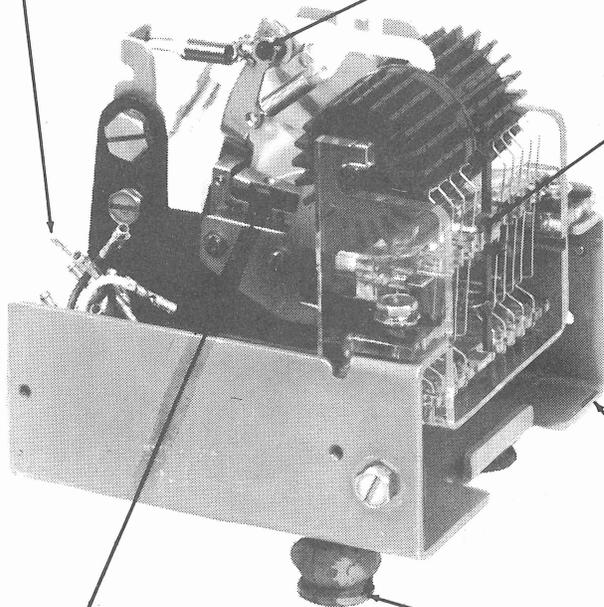
- Character generator. Will accommodate up to eight levels of binary information.
- Can be encoded with messages up to 20 characters in length. Depending upon message length, can be encoded with 1, 2, or 3 messages per drum revolution.
- Has brace to hold wire contacts and dent away from code drum to facilitate code drum removal.

MOUNTING BRACKET

- Accepts shock mounts and provides mounting facilities for feed mechanism and contact assembly.

SHOCK MOUNTS

- Isolates mechanism to prevent transmission of vibration to mounting base.



(Left Front View)

OFF-NORMAL SWITCH

- Operates when code drum is advanced from home position. During answer-back cycle: normally-closed contact is opened to provide a message available indication, blocks the subsequent start pulses and places the stepping magnet under control of present character commands.

Figure 3 - Answer-Back Mechanism

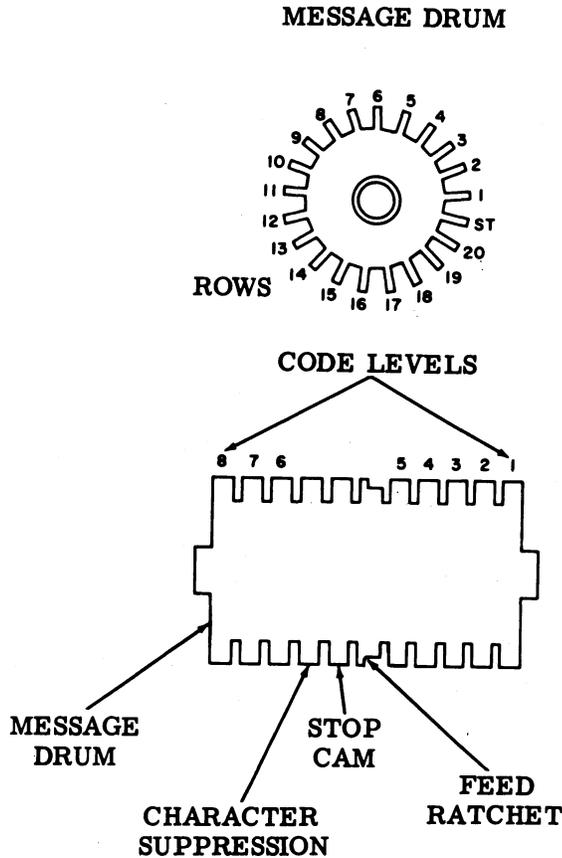


Figure 4 - Answer-Back Code Drum

2. DESCRIPTION

2.01 The answer-back unit is an electromechanical device with an associated control circuit card. The major components are shown in Figure 2 and the mechanisms are described in Figure 3.

CIRCUIT CARD

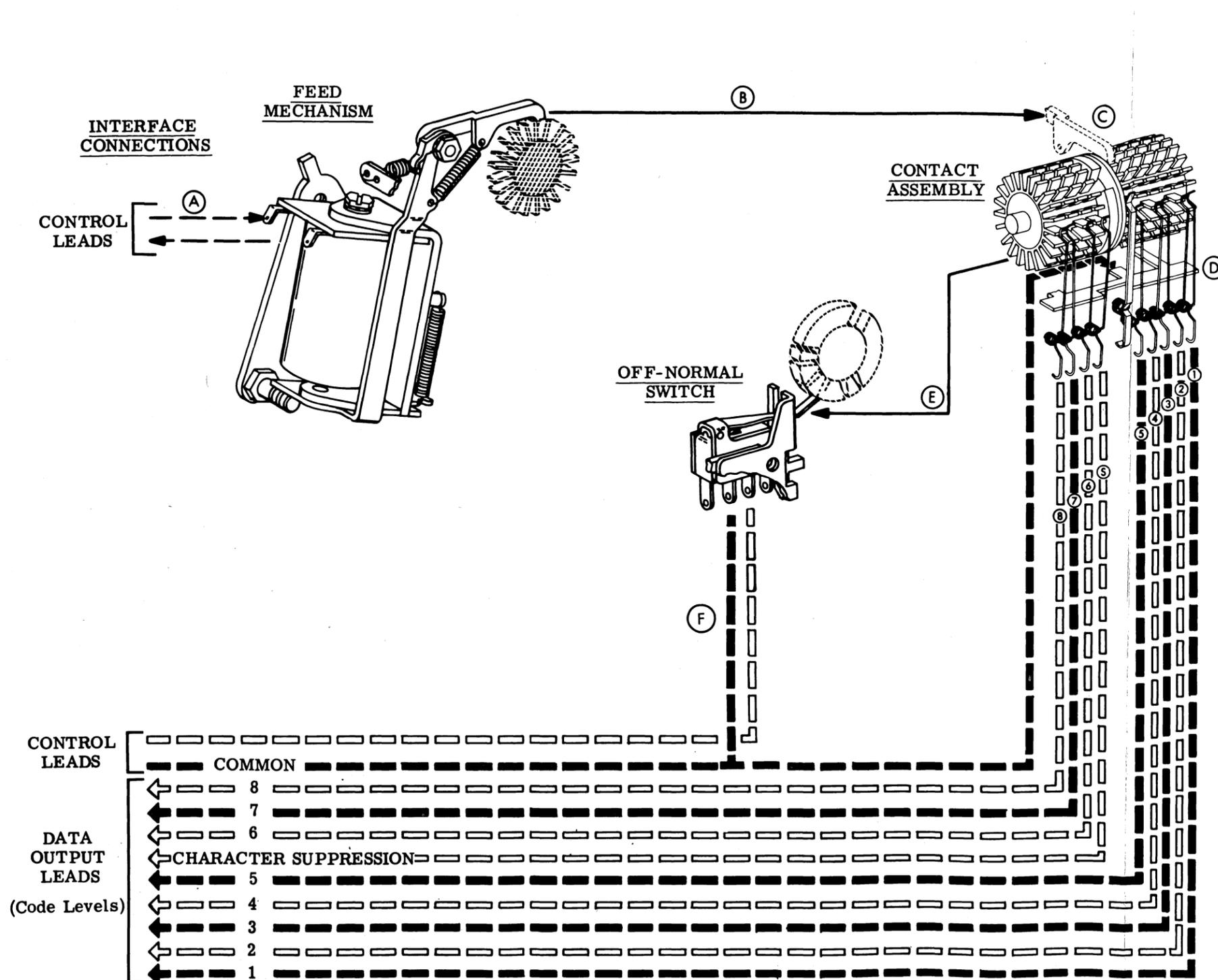
2.02 The circuit card for answer-back unit has a parallel signal output. This circuit card provides control for the mechanical answer-back and contains eight gates, control logic, and a driver for the stepping magnet. The distributor in the electrical service unit converts the parallel signal to serial form.

2.03 The character rate or words per minute is established by the on-line distributor through the send control circuit. The pulse from the send control circuit triggers the driver circuit which causes the stepping magnet to advance the code drum one position for each pulse received.

2.04 The baud rate (bits per second) and the start signals associated with serial transmission are established by the distributor. The send control circuit coordinates the serial transmission for a continuous sequence of characters.

MECHANICAL ASSEMBLY

2.05 The mechanical assembly consists of a stepping magnet, feed mechanism, contact block assembly, and off-normal switch assembly. Associated framing, brackets, springs, and wires comprise the remaining elements for the assembly. The contact block assembly consists of contact block, common bar, brace detent, code drum, and contact wires. The brace is provided on the contact assembly to facilitate the removal and replacement of the code drum. The



LEGEND

- Electrical Code (Spacing)
- Electrical Code (Marking)
- Mechanical Motion
- Electrical Control

OPERATION

- (A) Pulse magnet momentarily.
- (B) Advance feed pawl as magnet energizes. Retract feed pawl as magnet de-energizes.
- (C) As feed pawl retracts, detent code drum into next character position.
- (D) Arrange wire contacts in spacing or marking positions by means of code drum tines. (Character "U" of ASCII* arranged in code drum.)
- (E) Depress arm during answer-back cycle.
- (F) The normally-closed contact is open as long as arm is depressed. When open, the off-normal switch provides a Message Available indication to the terminal, disables start pulses and places the stepping magnet under control of the Present Character signal.

*United States of America Standard Code for Information Interchange

Note: Signal line circuits shown during contact sensing period, ie, voltage applied.

Figure 5 - Answer-Back Operation

brace, when deflected downward, will hold the detent and contact wires away from the code drum.

CODE DRUM

2.06 The answer-back drum is coded by removing a tine for a marking signal and leaving a tine for a spacing signal. In addition to eight code levels the code drum contains three control levels (Figure 4): character suppression, stop cam, and feed ratchet. The character suppression tines are removed for unused rows in each message cycle. The stop cam controls the number message cycles desired. When a stop cam tine is removed the off-normal switch contacts return to the normal closed position, which removes the message available and stops the message cycle.

2.07 Coding instructions are found in the adjustment section for the answer-back unit (1.01) or the set installation sections.

OPERATING LIMITS

A. Physical Characteristics

- Weight 2-1/2 pounds
- Height 6-5/8 inches
- Width 4-7/8 inches
- Depth 4-1/2 inches

B. Message Characteristics

Signal Output parallel

Character Rate

- Characters per Second 0-15
- Words per Minute 0-150
- Maximum Bits per Character 8
(will accommodate 5-, 6-, 7-, or 8-level codes)

Messages

- Per Revolution of Code Drum . . . 1, 2, or 3
- Corresponding Lengths 20, 9, or 6
Characters
(each stop or home position is unused, ie, all tines are left in)

C. Circuits

Stepping Magnet

- Voltage +12 and -12 \pm 10% volts dc
- Maximum Current 1.2 milliamperes

Data Outputs

- MARK — high (5.0 to +6.6 volts dc)
- SPACE — low (0 to +.5 volts dc)
- Suppress — low (0 to +.5 volts dc)

Circuit Card

Size — 4 inches by 4-1/2 inches

Code Contacts

Type — Gold-plated wire contacts and common bar

Note: In order to achieve maximum life from contact wires, current should not be switched by code reading contacts.

D. Environment

Ambient Temperature

- Minimum 32 ° F
- Maximum 158 ° F

Relative Humidity

- Minimum 1%
- Maximum 90%

3. PRINCIPLES OF OPERATION

ANSWER-BACK MECHANISM

3.01 The operation of the answer-back unit is started when the stepping magnet receives a pulse from the driver circuit (Figure 5). The current rise energizes stepping magnet which, in turn, attracts armature. The armature and attached feed bail (Figure 6), when pivoted, places feed pawl in position to index code drum. Upon electrical release of stepping

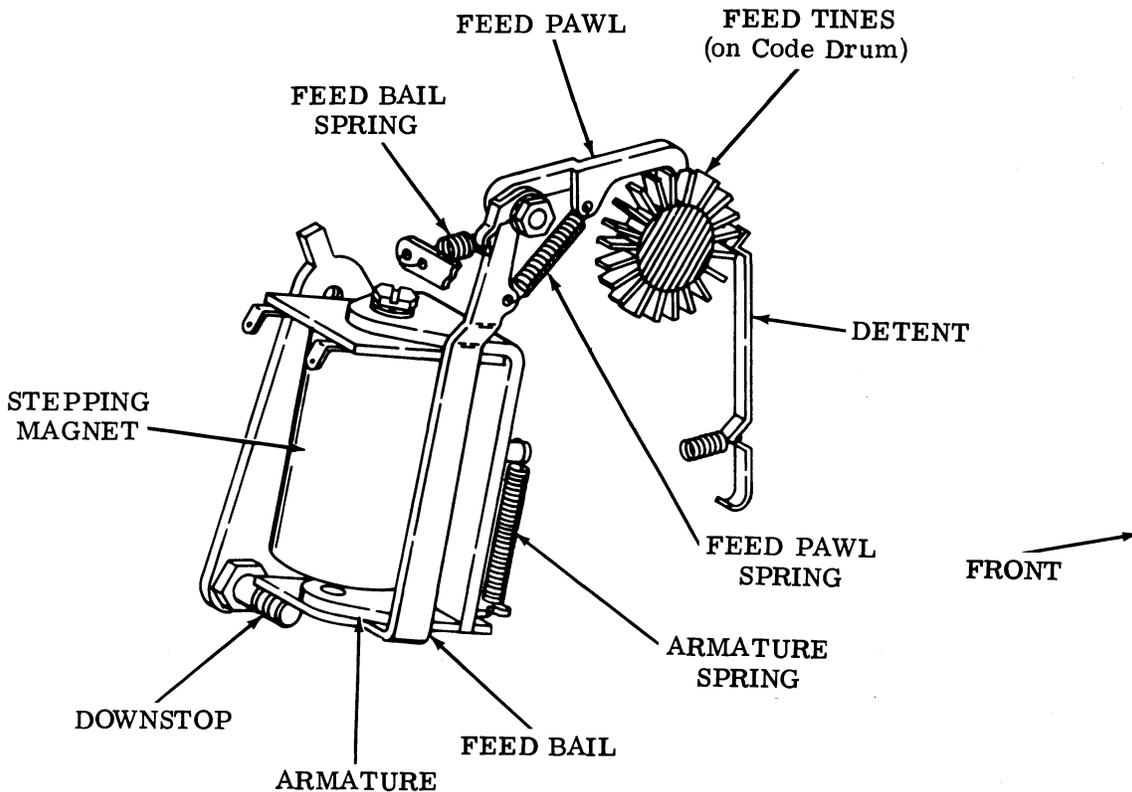


Figure 6 - Feed Mechanism

magnet, the drum is advanced by the rearward movement of feed pawl and is fixed in position by the detent. When the code drum is advanced out of home position the following sequence occurs.

- (1) The contact wires of contact assembly (3.04) sense the first character to be transmitted.
- (2) The off-normal switch actuator is cammed out of the recess in code drum; opening the normally closed contact of the switch.

3.02 The off-normal switch, when operated, maintains feed pulses from the driver circuit to the stepping magnet. The operational sequence continues until the code drum reaches the home position.

3.03 In the home position, the off-normal switch actuator rises in the recess of stop cam. This action closes the contacts in the

off-normal switch and prevents further operation of the answer-back unit.

CONTACT ASSEMBLY

3.04 The contact assembly (Figure 7) requires that the code drum be detented or moved off the home position to send one character per row on the drum. The code drum provides the removable tines to be sensed externally.

3.05 The operation of the contact wires are controlled by each row on the drum and provides parallel signal output. Contact wire springs hold the contact wires toward the code drum. For a spacing bit, the contact wire is held away from the common bar by the code drum tine. When the tine is removed, the contact wire falls against the common bar to provide a marking bit.

3.06 All unused character positions except the first (home position) are suppressed by removing the suppression level tines at these positions.

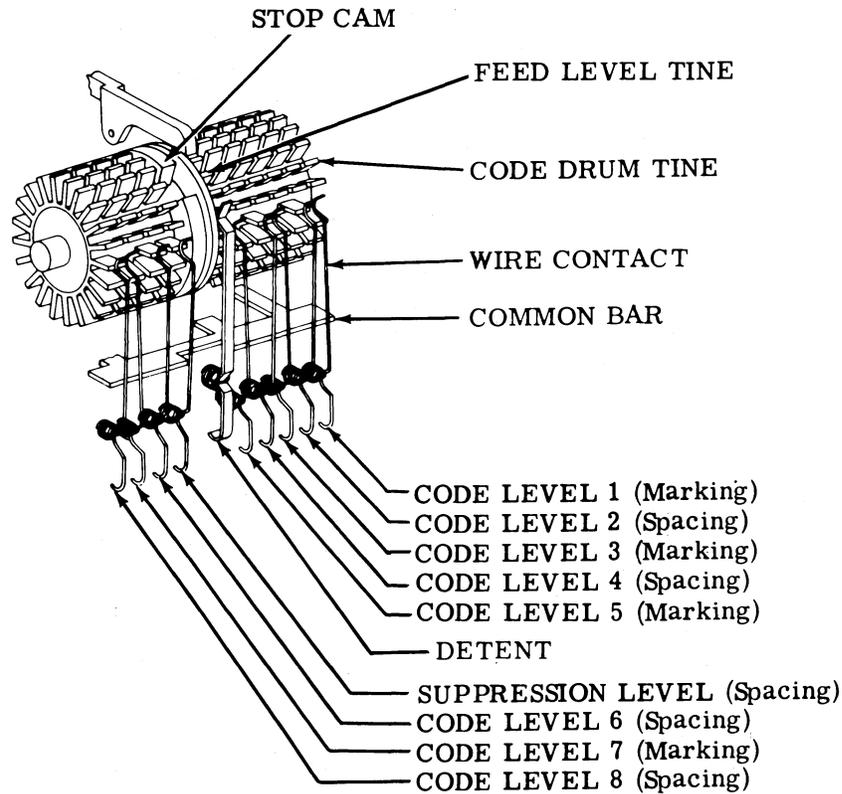


Figure 7 - Contact Assembly

OFF-NORMAL SWITCH

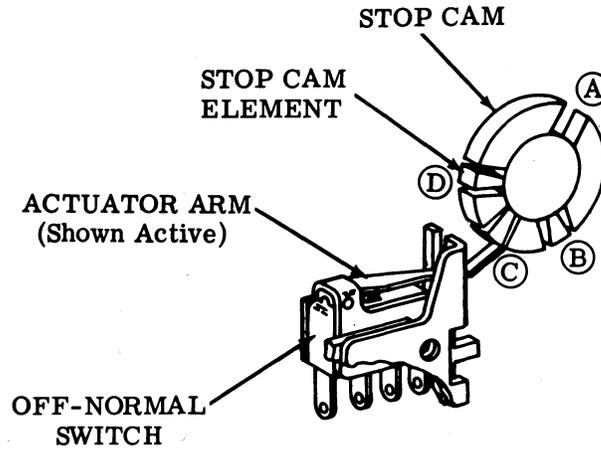
3.07 The off-normal switch (Figure 8) establishes the home (stop) position of the answer-back cycle. By removing the appropriate stop cam elements, the off-normal switch will provide 1-, 2-, or 3-cycle operation.

3.08 The off-normal switch is operated by the stop cam after an initial pulse to the stepping magnet. When open, the normally closed contacts block subsequent start signals

and place control of the stepping magnet under the present character signals from the send control card. The line distributor card prevents an additional transmitting device from sending during the answer-back cycle.

CIRCUIT CARD

3.09 The electronic circuit for the answer-back (Figure 2) provides a filter network and a NAND gate. This circuit combination provides a clock pulse to drive a flip-flop circuit that starts the drive circuitry consisting of three



| REMOVE STOP CAM ELEMENT | FOR | WITH |
|--|----------|----------------|
| (A) | 1 Cycle | 20 Characters* |
| (A) (C) | 2 Cycles | 9 Characters* |
| (A) (B) (D) | 3 Cycles | 6 Characters* |
| *All times remain at first or home position. | | |

Figure 8 - Off-Normal Switch

transistors. The output of drive circuit causes the armature of the stepping magnet to be pulled up and then released to move the answer-back drum one position. This sequence occurs for each start command and every present character input. After the code drum has moved one position, an off-normal switch operates, presenting the message available signal to the send control. The message available signal remains on for the entire message and conditions the send control to give priority over a send request from the keyboard or tape reader.

3.10 The answer-back electronic circuit contains eight gates in addition to the stepping magnet driver circuit. After the start signal has advanced the drum one position, the reading and advancing of the drum will occur when a present character command is received from the send control. The eight data bits will be transferred in parallel form to the on-line distributor to be serialized and transmitted to the send control. The data bits are converted to EIA signals and sent to the data set and transmitted on the signal line.