28 AND 35 ANSWER-BACK UNIT

DESCRIPTION AND OPERATION

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1. DESCRIPTION

1.01 This section is reissued to add coverage of the 5- and 8-level answer-back unit. Since this reissue is of a general nature, marginal arrows have been omitted.

1.02 The answer-back unit is an electromechanical device designed to transmit a predetermined message of not more than 21 characters. The desired message is precoded on the answer-back drum and is transmitted upon receipt of a request signal. The operational speed of the unit may be fixed at 60, 66, 75, or 100 words per minute by installing the proper gear set.

1.03 It may be mounted, with or without a cover, on any flat surface or on a cabinet, rack, or shelf (Figures 1 and 2). Although it is ordinarily used in conjunction with other teletypewriter equipment, it is mechanically independent of any other equipment. Only electrical connections for power and control circuits are required. In addition, the answer-back mechanism (Figures 3 and 4) may be mounted in a 35 Automatic Send-Receive (ASR), Keyboard Send-Receive (KSR), or Receive-Only (RO) Teletypewriter Set.

1.04 Variations of the answer-back unit are available for distributing either a 5-level, 7.42, or 7.5 unit code or an 8-level, 11.0 unit code. The 5-level answer-back unit has provisions in the code drum, contact wires, and internal wiring for adapting the answer-back mechanism to an 8-level code. Conversion can be accomplished by changing the distributor disc and making the proper wiring connections.

1.05 Mounting facilities, relay pull-up contacts, and internal wiring are included with the answer-back mechanism for field installation of a nonrepeat relay. The nonrepeat relay is utilized in cases where the duration of the trip pulse is longer than the answer-back cycle. The nonrepeat relay de-energizes the trip magnet at the instant the motor hold and relay pull-up contacts are closed.

1.06 The answer-back unit consists of the cover, base, answer-back mechanism motor, terminal block, fuse, fuse-holder, and capacitor.

COVER

1.07 The cover is sprayed on the inner surface with vibration damping material. In addition, pads are attached to the inner surface for absorbing noise from the operating mechanism. The left end of the cover is louvered to admit air for reducing the operating temperature of the unit.

BASE

1.08 The base provides mounting facilities for the terminal block, fuse, fuse-holder, capacitor, motor, answer-back mechanism, and cover. A pad is attached to the underside of

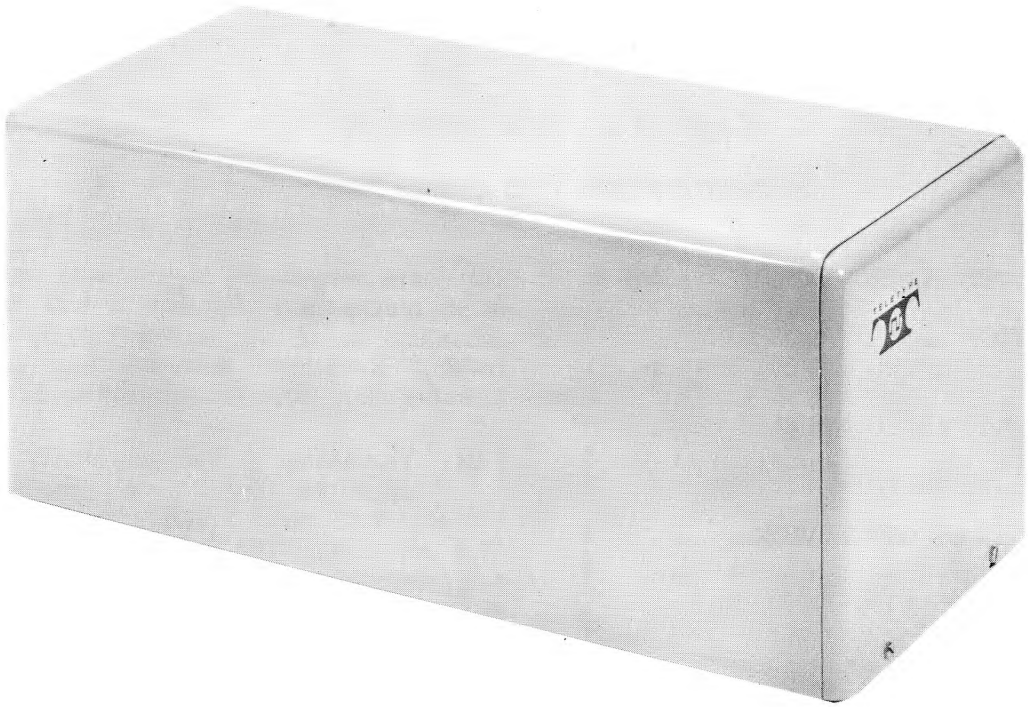

Figure 1 - Answer-Back Unit (With Cover)

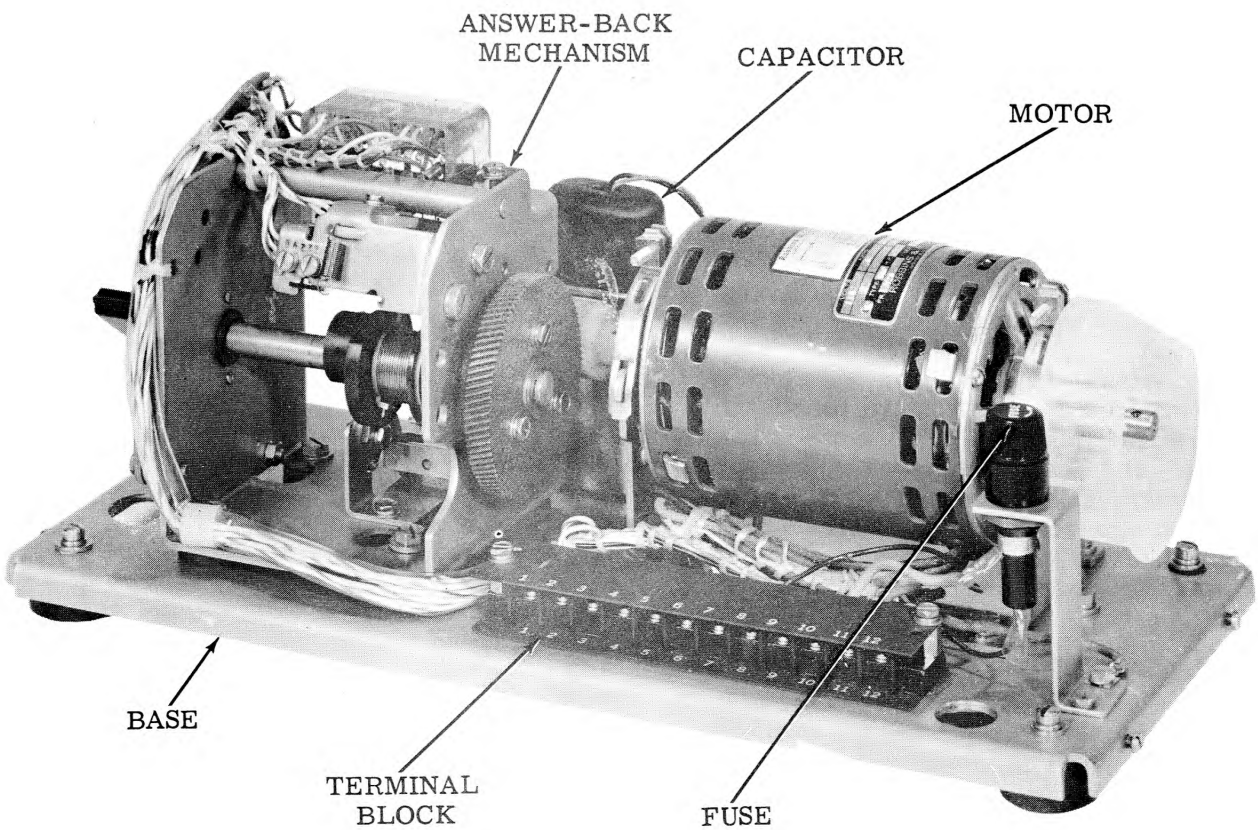

Figure 2 - Answer-Back Unit (Without Cover)

the base to reduce vibration. Four rubber feet support the base.

1.09 The internal wiring harness is attached to the terminal block for external signal, control, and power connections. The block has 12 terminals.

ANSWER-BACK MECHANISM

1.10 The answer-back mechanism may be mounted in the answer-back unit, or a 35 ASR, KSR, or RO Teletypewriter Set. The basic answer-back mechanism shown in Figures 3 and 4, consists of the following parts or subassemblies: trip magnet, code drum, main shaft, feed assembly, contact block, and distributor. The subassemblies are interconnected mechanically and/or electrically to perform all functions incidental to automatic message transmission. In addition, a double set of electrical contacts is provided for motor hold and relay pull-up operations. The motor hold contacts are required for applications where intermittent operation of the motor is both possible and desirable. The relay pull-up contacts apply to the application discussed in Paragraph 1.05.

MOTOR

1.11 A synchronous motor, rated at 1/100 hp and 1800 rpm for 115 ± 10 per cent volts ac operation, is used to drive the answer-back mechanism. The motor is equipped with two windings, a run winding and a capacitor winding for permanent split-phase capacitor operation. The capacitor is encased in metal and has a paper and oil dielectric. A time delay fuse is provided to open the power circuit if the motor is stalled.

GENERAL OPERATION

1.12 Briefly, the parts or subassemblies are interconnected to perform the following functions. An incoming pulse energizes the trip magnet whose armature is deflected to free the code drum, permit the clutch to engage the main shaft, and close a set of contacts. With the main shaft in rotation, the code drum is advanced to the first character position by the feed assembly. The individual contact wires for each code level are automatically set by the precoded character on the answer-back drum. Selected contact wires (marking) touch the common terminal on the contact block for subsequent translation into serial code. Signal power from the terminal block is applied to

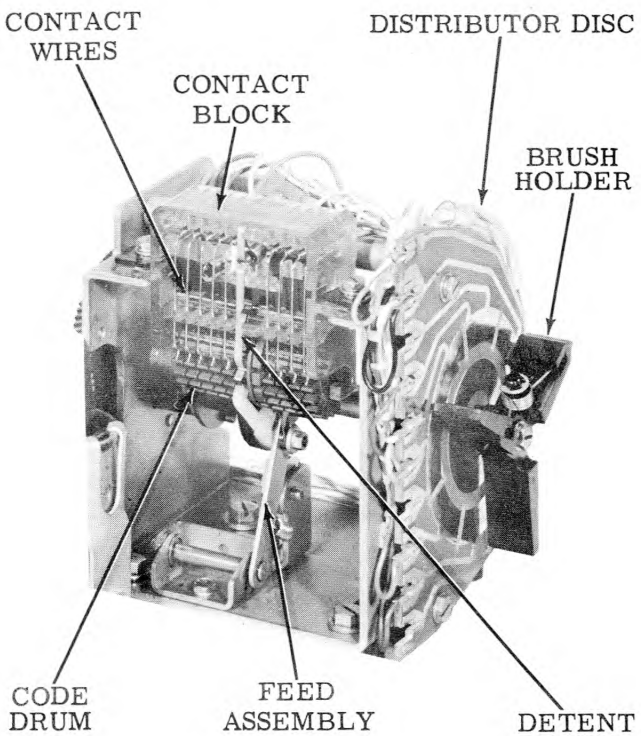

Figure 3 - Answer-Back Mechanism (Rear View)

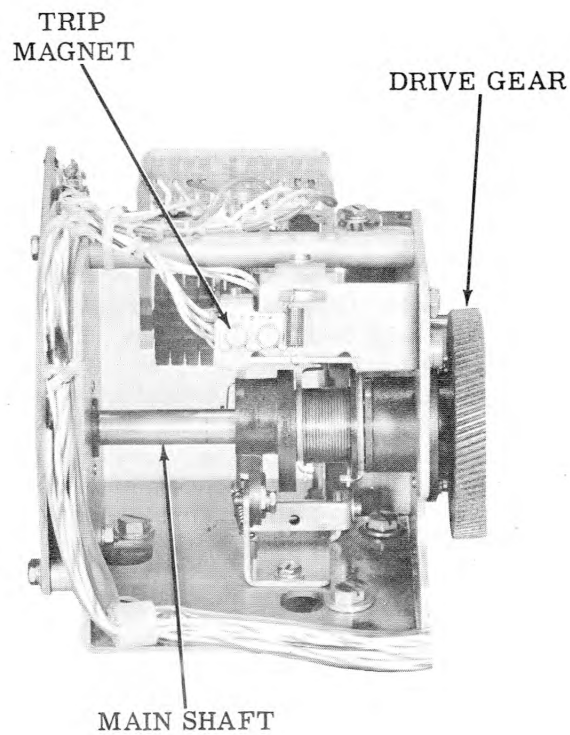

Figure 4 - Answer-Back Mechanism (Front View)

each code level on the contact block through the solid ring on the distributor disc. Each contact wire is sensed as the outer brush on the distributor sweeps its respective distributor segment. All operations necessary for one character transmission, are performed during a single rotation of the main shaft.

1.13 Viewing the code drum with the greater number of radial code tines to the left, there are six numbered (code) levels, feed ratchet, stop control cam, suppression level, and three numbered (code) levels.

1.14 The code drum is designed to function with systems employing 5- or 8-level signal codes. It has 21 rows of code tines and may be coded for one, two, or three cycle operation with message lengths not exceeding 21, 10, and 7 characters, respectively. For applications where the first character is suppressed, the message length is necessarily reduced by one character. The text of the message is further reduced by the number of functions which are peculiar to each system application.

1.15 The contact block, secured to the top rear of the main mounting bracket, contains nine contact wires with provisions for individual cable connections. The common terminal for selected contact wires is located approximately midway between the top and bottom of the contact wires. The detent for limiting the code drum advance to single steps is attached to the contact block.

1.16 The distributor includes a printed circuit with two conducting rings, and a brush holder with two brushes. One conducting ring is solid for applying current. The other ring is segmented with a conducting lead from each segment. The brush holder is fastened to the main shaft. It contains two carbon brushes which are held in place and connected to each other by a spring. One brush rides the solid ring and the other rides the segmented ring.

2. PRINCIPLES OF OPERATION

2.01 The answer-back unit is a self-contained electromechanical device, used for the transmission of a precoded message. The answer-back cycle is actuated when the unit is pulsed by an external request signal.

2.02 Electrical cabling which provides all wiring paths for the power, control, and signal lines is attached to the terminal block on the unit. Mechanical motion for the answer-back mechanism is transmitted through a set of speed change gears. The transmitting speed is determined by the speed change gears. Gear sets are available for operating the answer-back unit at 60, 66, 75, or 100 words per minute. When the motor is running, the answer-back mechanism is held in an idle condition by the disengaged spring clutch on the main shaft.

2.03 The base, fuse, capacitor, and cover are passive components. However, the answer-back mechanism is the principle electromechanical component and is discussed in greater detail in the following paragraphs.

2.04 The answer-back mechanism consists of a trip magnet, main shaft, feed assembly, code drum, contact block, and distributor. An incoming pulse energizes the trip magnet whose armature is deflected to free the code drum, permit the clutch to engage the main shaft, and close a set of contacts. With the main shaft in rotation, the code drum is advanced to the first character position by the feed assembly. The individual contact wires for each code level are automatically set by the precoded character on the code drum. Selected contact wires (marking) touch the common terminal on the contact block for subsequent translation into serial code. Signal power from the terminal block is applied to each code level on the contact block through the solid ring on the distributor disc. Each contact wire is sensed as the outer brush on the distributor sweeps its respective distributor segment. All operations necessary for one character transmission are performed during a single rotation of the main shaft.

TRIP MAGNET

2.05 The trip magnet is attached to the main mounting bracket of the answer-back mechanism as shown in Figure 5. The trip magnet consists of a yoke, magnet core, armature with spring, and electrical contact pile-up. The armature is held away from the magnet core by a spring connecting the rear edge of the armature to the yoke.

2.06 When an incoming pulse energizes the magnet, the attracted armature allows three simultaneous actions to take place. The

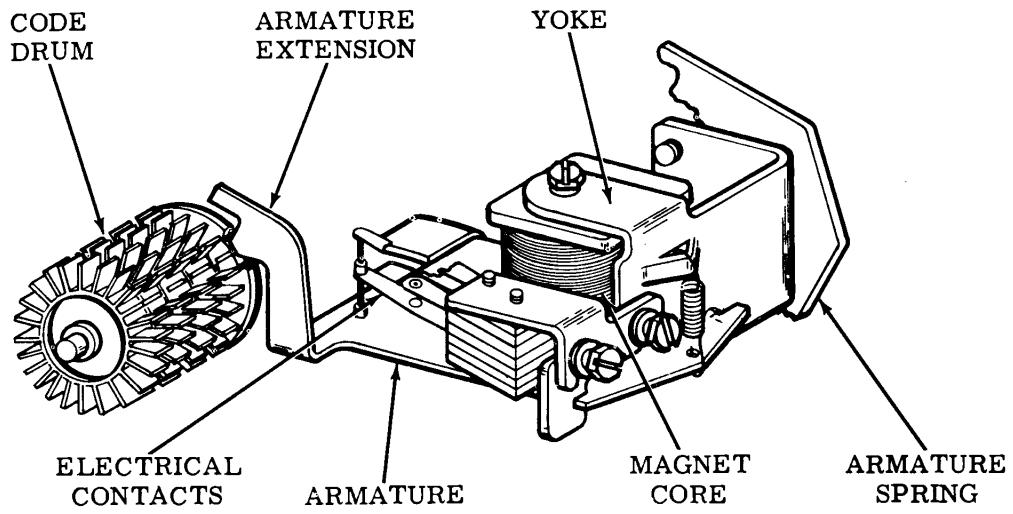

Figure 5 - Trip Magnet

armature extension is extracted from the code drum stop cam; the front edge of the armature permits the clutch release and shaft stop levers to engage the clutch; and the top face of the armature closes a set of electrical contacts. After the incoming pulse has diminished, the armature is physically supported by either mechanical elements on the main shaft or the stop cam on the code drum.

2.07 If the energizing pulse terminates before the code drum is advanced, the released clutch lever supports the armature. The feed takes place within 35 degrees rotation of the main shaft. Then the high part of the code drum stop cam supports the armature extension. When the last character to be distributed appears on the code drum, the motor hold cam, mounted on the main shaft, supports the bottom face of the armature. After distribution of the last character, the motor hold cam allows the armature to fall; the armature extension drops into the opening of the code drum stop cam. As the main shaft continues to rotate, the clutch release lever engages the front edge of the armature, releasing the clutch. Approximately 30 degrees later, the shaft stop lever is engaged to stop the main shaft in a predetermined position.

MAIN SHAFT

2.08 The main shaft delivers rotational motion for advancing the code drum by means of the feed assembly. It also provides rotational motion for distributing the parallel coded inputs from the contact block. The major elements on the main shaft are the drive gear, spring clutch, and motor hold and feed cam. The distributor brush holder is fastened to the opposite end of the main shaft. The drive end of the main shaft is shown in Figure 6.

SPRING CLUTCH

2.09 The main shaft is separated from the drive gear and clutch sleeve assembly by the spring clutch. See Figure 7. If the trip magnet armature is in the up or run position, the spring clutch engages the rotating clutch sleeve with the main shaft drum. When the armature falls into the stop position, the clutch release lever is engaged first, releasing the clutch, and approximately 30 degrees later, the shaft stop lever is engaged to stop the main shaft in a predetermined position.

2.10 The spring clutch consists of a clutch sleeve, clutch release lever and clutch release lever bearing, retractile spring, shaft stop lever, and shaft drum. One end of the retractile spring is keyed to the shaft stop lever and the other end is keyed to the clutch release lever. The shaft stop lever is secured to the shaft drum which is keyed to the main shaft. The clutch release lever turns freely on the clutch sleeve by means of the clutch release lever bearing. The gear and clutch sleeve assembly, bearing on the main shaft, extends to a plane midway under the retractile spring. The shaft drum, keyed to the main shaft, extends from the clutch sleeve to the shaft stop lever.

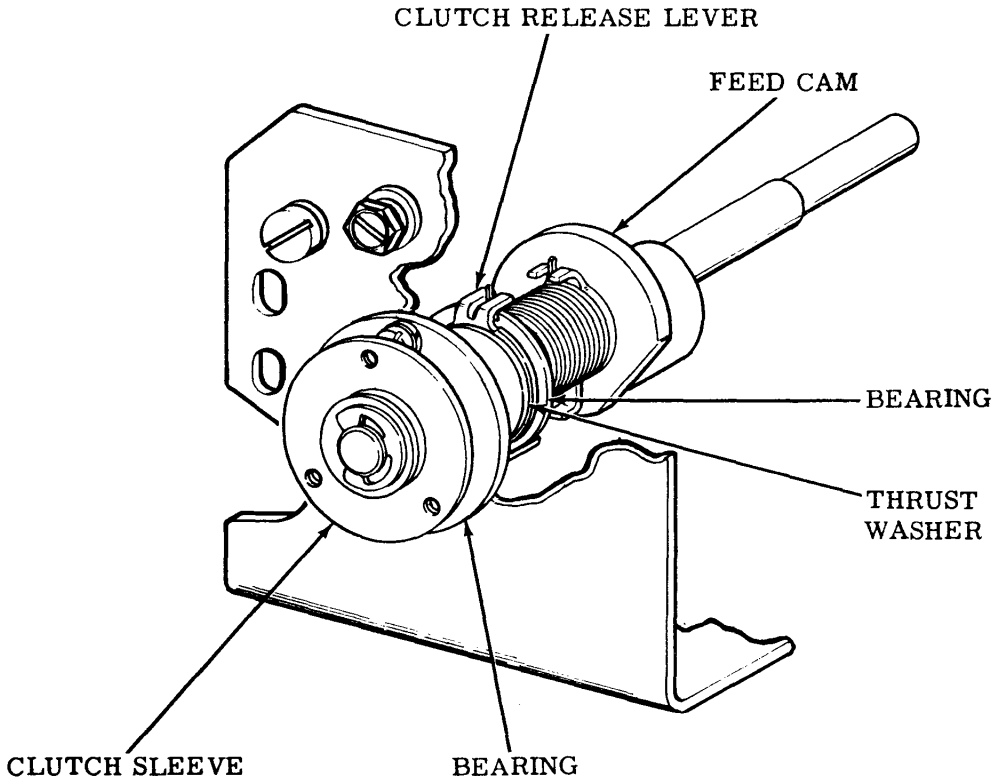

Figure 6 - Main Shaft

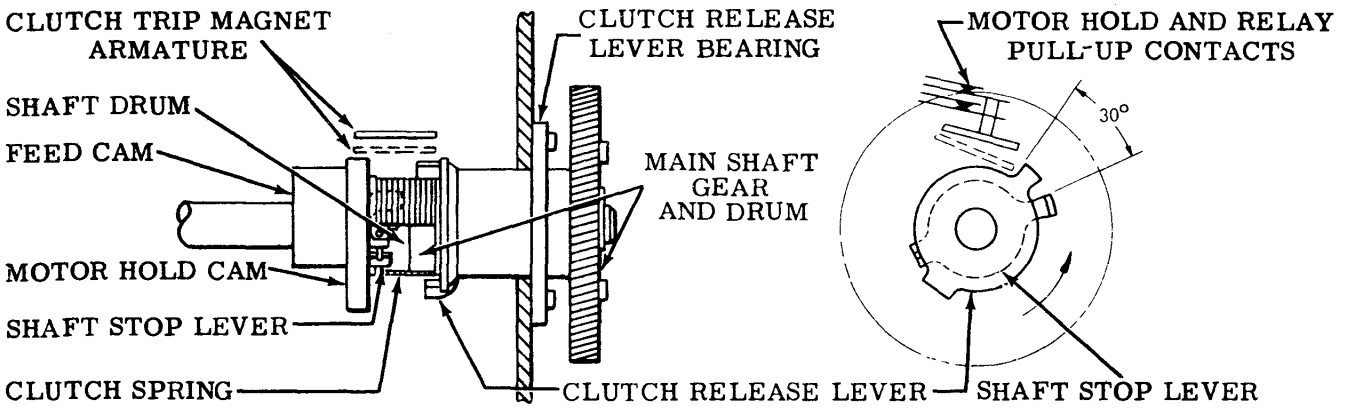

Figure 7 - Spring Clutch

2.11 The retractile spring is mounted over the clutch sleeve and shaft drum with a slight interference fit. When unstressed, the tangs or ends of the spring are approximately 30 degrees apart. As the tangs are forced into alignment, the inside diameter of the spring increases, thereby disengaging the inside surface of the spring from the outside surfaces of the clutch sleeve and shaft drum.

FEED MECHANISM

2.12 The feed mechanism is attached to the base of the main mounting bracket and consists of a feed lever bracket, feed bail, and feed pawl. The mechanism is shown in Figure 8.

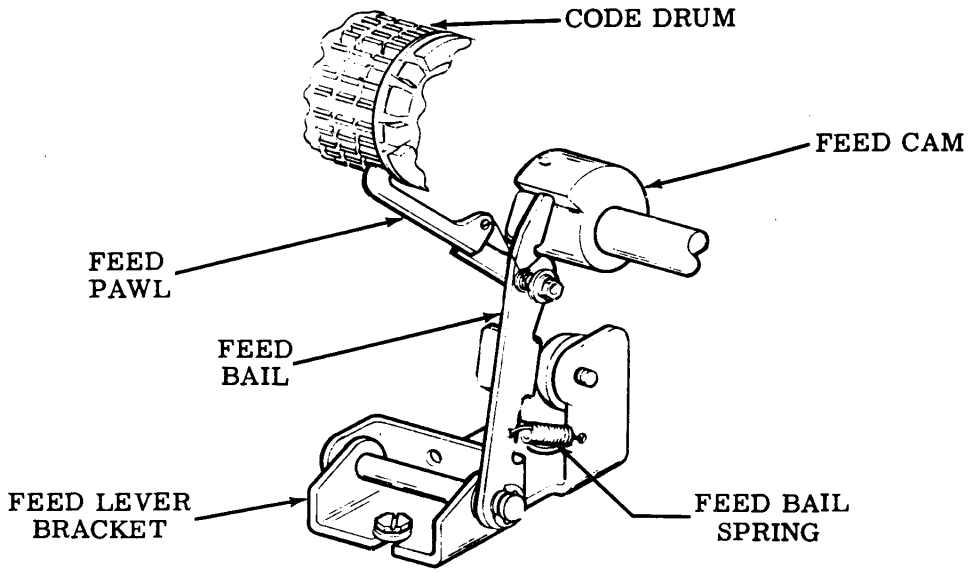

Figure 8 - Feed Mechanism

2.13 At 15 degrees rotation of the main shaft, the feed bail is pulled off the high part of the feed cam by the feed bail spring. Simultaneously, the feed pawl advances the code drum. The code drum is then detented so that the contact wires on the contact block are sensing the first character to be distributed. The feed cycle occurs within an interval of 20 degrees rotation of the main shaft.

CONTACT BLOCK

2.14 The contact block contains nine contact wires with provisions for cable connections, a detent spring, and a common terminal. The code drum is inserted in the slots formed by the contact block extensions. See Figure 3. The common terminal for selected contact wires is located approximately midway between the top and bottom of the contact wires. The contact wires are aligned to follow their respective tines on the code drum.

2.15 Wherever a plastic tine is removed from the code drum, the respective contact wire falls into its slot to meet the common terminal. All effective contact wires representing one coded character, are simultaneously preset at each step of the code drum. Signal current is routed from the terminal block and is sequentially applied to each contact wire through the distributor. The output from the common terminal on the contact block is transmitted over the line as a serial start-stop code.

DISTRIBUTOR

2.16 The distributor consists of a distributor disc and distributor brush holder with brushes. Each effective contact wire on the contact block is connected to its respective segmented level on the distributor disc. The distributor is shown in Figure 3. Signal current is transferred from the inner solid ring to the outer segmented ring through the distributor brushes. The electrical transfer occurs through the torsion spring connecting the set of brushes. The spring serves a double purpose, ie, applies mechanical pressure and provides electrical continuity between the brushes.

3. TECHNICAL DATA

A. Dimensions and Weight

3.01 The external dimensions and weight of the unit are:

(1) Height - 6 inches

(2) Width - 6 inches

(3) Length - 13-1/4 inches

(4) Weight - 13 pounds

B. Transmission Codes

3.02 Data is transmitted by the 5-level answer-back unit in the 7.42 or 7.5 unit code. One start bit, five intelligence bits, and a stop pulse 1.42 or 1.5 bits in length make up the code. The 8-level answer-back unit transmits data in the 11.0 unit code. One start bit, eight intelligence bits, and a stop pulse 2 bits in length make up the code. The 5-level unit may be converted to 8-level operation as previously discussed in Paragraph 1.04.

C. Speeds

3.03 The speed of the answer-back unit is determined by the speed change gears. Gear sets are available in both 5- and 8-level operation for the following speeds shown.

LEVEL	UNIT CODE	SPEED WORDS PER MINUTE	GEAR SET
5	7.42	60 100	TP305047 TP305048
5	7.5	60 66 75 100	TP194808 TP199096 TP194809 TP194815
8	11.0	100	TP194815

D. Electrical Requirements

3.04 Power input to the unit is 110 volts ac ± 10 per cent or 48 volts dc ± 10 per cent. The power input circuit is protected by a (slow-blow) 0.80 ampere fuse. Maximum current draw is 100 amperes with either power source. All power, control, and signal lines terminate in a 12-point screw-type terminal block.