

28 MULTIPLE WIRE DISTRIBUTOR

DESCRIPTION AND PRINCIPLES OF OPERATION

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1. GENERAL

1.01 This section provides description and principles of operation for the 28 multiple wire distributor (five-level only). For information concerning assembly and disassembly, refer to the parts bulletin. For information pertaining to adjustments, lubrication, or wiring, refer to the appropriate section.

1.02 References in the text (in various sections) to "early design" and "late design" refer to Mark I and Mark II multiple wire distributor units. The Mark I unit has a double coil clutch trip magnet and one auxiliary contact. The Mark II unit has a single coil clutch trip magnet and two auxiliary contacts.

2. DESCRIPTION

2.01 The 28 multiple wire distributor is an electromechanical unit which transmits sequential, start-stop telegraphic signals from a parallel (multiwire) input. Under an external control, such as a pushbutton or stunt box, it transmits control characters when these are

set up externally by coding the distributor contacts. It may also be used to translate continuous parallel (multiwire) intelligence into sequential, start-stop signals for transmission, or for use with receiving equipment. Provision is made for mounting the unit on various equipment including ASR, KSR, RO, and self-contained sets (Figure 1).

2.02 The unit consists essentially of a common distributor assembly and an appropriate mounting bracket and cable assembly for each different installation. The common distributor assembly contains a clutch assembly with a cam sleeve. The cam sleeve actuates the contact levers which control the opening and closing of the contacts that generate the sequential, start-stop telegraphic signal. The common distributor assembly also contains a clutch trip magnet assembly. The magnet assembly consists of a magnet coil assembly mounted on an angle bracket which is, in turn, mounted on a larger bracket. An armature bail and shaft mechanism are mounted on the angle bracket. The clutch trip and reset mechanism are mounted on the larger bracket.

2.03 Eight cams (seven on early design units) operate contact levers, and contacts transmit one or more control characters, such as the letter "V", in answer-back and push-button calling. The cams for late design units (Mark II) are from left to right (clutch on left): 1, 2, 3, 4, 5, stop, auxiliary B, auxiliary A. Early design units have only one auxiliary contact. A cable connector assembly furnishes the electrical connections from external sources to the contacts and clutch trip magnets.

2.04 Applicable modification kits used in conjunction with the unit consist of gear trains which transmit the required torque to rotate the cam sleeve and clutch assembly. The gear trains also make the necessary connection with the drive gear of the associated equipment. Mounting brackets provide the proper mounting for the distributor assembly. Cables, terminals, and terminal mounting hardware are included where applicable.

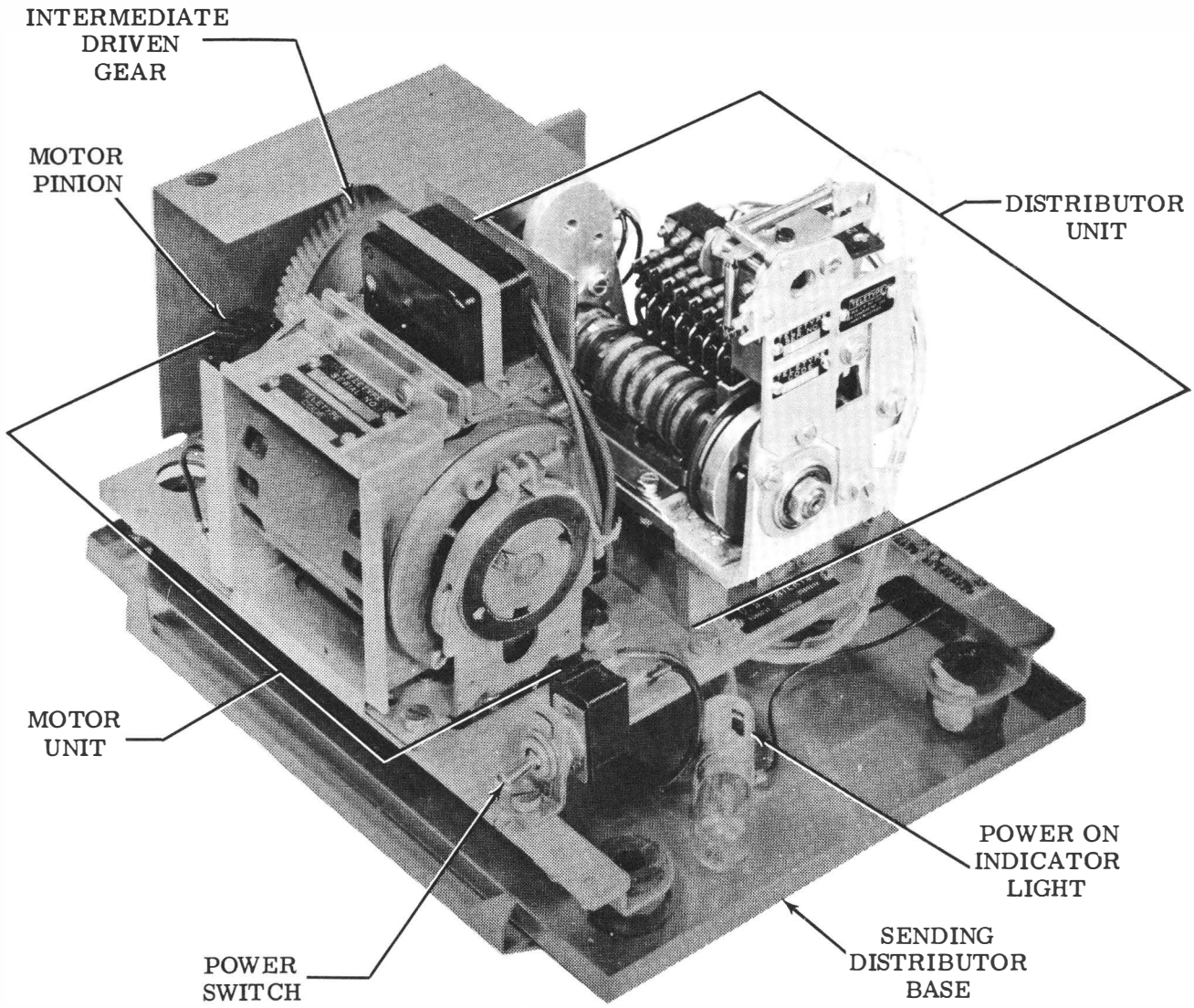


Figure 1 - Typical Application for Multiple Wire Distributor Unit

2.05 For information about adjustments and lubrication pertaining to the base and motor units, refer to the appropriate sections entitled "28 and 35 Base for Receiving Selector and Multiple Wire Distributor" and "Motor Unit."

TECHNICAL DATA

A. Dimensions

- Width - 5 inches
- Depth - 4 inches
- Height - 6 inches (4 inches in early design units)
- Weight - 3-1/2 pounds

B. Clutch Trip Magnet Rating

- DC - 165 milliamps at 48 volts (100 ohm current limiting resistor required)
- 100 milliamps at 120 volts (1000 ohm current limiting resistor required)
- AC - 120 volts

C. Signaling

- Input - Parallel (multiwire)
- Output - Start-stop, sequential
- Current - 0.020 or 0.060 ampere

D. Speed

<u>Operations Per Minute</u>	<u>Words Per Minute</u>
368	60
460	75
600	100

3. PRINCIPLES OF OPERATION

SIGNALING CODE

3.01 The multiple wire distributor puts information out in the form of a binary permutation code (Figure 2). The information, ie, characters, numerals, etc, are represented by combinations of binary intelligence levels, each of which may be in one of two states, ie, on-off, mark-space, etc. These states are represented in the tape by perforations or lack of perforations. The total number of permutations available in a given code is equal to two to the n power (2ⁿ) where n is the number of levels. In a five-level code the number of permutations is two raised to the fifth power or 32.

3.02 The code (as used by this equipment) is expressed in electrical form only. Each level of the code combinations consists of either a current condition (referred to as a marking pulse) or a no-current condition (spacing pulse). The intelligence elements are preceded by a start element (always spacing) and are followed by a stop element (always marking). The start and stop elements provide means for mechanical synchronization between the multiple wire distributor and the receiving set. Both early and late models of the multiple wire distributor use a 7.42 unit transmission pattern. Figure 2 illustrates the 7.42 pattern and the character arrangements for the standard five-level code.

MAIN SHAFT MOTION

3.03 In the text that follows, it is assumed that the unit is mounted on an appropriate base and that it is receiving motion from a motor unit through the intermediate drive mechanism (Figure 1). It is also assumed that some type of parallel input is applied to the unit and that a means, such as a pushbutton, is available for tripping the cam clutch assembly. The unit is in its idle condition, and is under power with the cam clutch disengaged.

3.04 The main shaft receives its motive power from a gear mounted on the right side plate. The main shaft rotates continuously as long as the unit is under power.

3.05 The clutch trip magnet mechanism controls the starting and stopping of the cam clutch assembly. From an idling condition in which the magnet is de-energized, clutch disengaged and start-stop contact closed, power is applied to the clutch magnet. When the magnet is energized, the armature is attracted and the armature bail disengages the latched trip lever. As the trip lever is moved by its spring, it disengages the clutch shoe release lever (Figure 5). This permits the clutch to engage and rotate the cam sleeve. The clutch assembly and the cam sleeve rotate continuously as long as the clutch magnets are energized.

3.06 When the clutch magnet circuit is opened, the armature and bail assembly are returned to their original position by the armature spring. As the clutch assembly completes its revolution, the reset cam operates the reset lever to return the trip lever to its original position. There it is latched by the armature bail assembly, and acts to block the clutch shoe

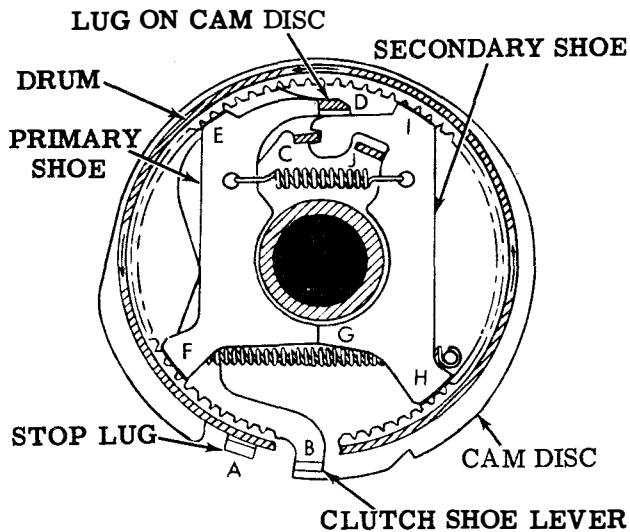


Figure 3 - Clutch, Engaged

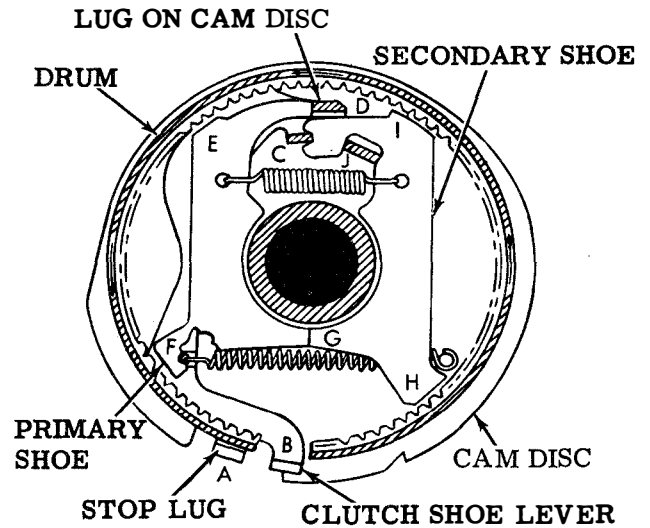


Figure 4 - Clutch, Disengaged

release lever (Figure 5). As the clutch assembly and the attached cam sleeve come to rest, the latch lever drops into a notch on the clutch disc assembly to hold the clutch disengaged until the clutch magnet is again energized.

3.07 Clutch engagement (Figure 3) is accomplished by releasing the lower end of the clutch shoe lever B. The upper end of the clutch shoe lever pivots about its ear C which bears against the upper end of the secondary shoe and moves its ear D and the upper end of the primary shoe toward the left until the shoe makes contact with the drum at point E. As the clutch drum turns counterclockwise, it drives the primary shoe downward so that it again makes contact with the drum, this time at point F. There, the combined forces acting on the primary shoe cause it to push against the secondary shoe at point G. The lower end of the shoe then bears against the drum at point H. The revolving drum acts to drive this shoe upward so that it again makes contact at point I. The forces involved are multiplied at each of the preceding steps. The aggregate force is applied through the shoes to the lug J on the clutch cam disc, and the disc and attached cam sleeve turn in unison with the drum.

3.08 Disengagement (Figure 4) is effected when the lower end of shoe lever B strikes the trip lever. Lug A and the lower end of the shoe lever are brought together and the

upper end of the lever B pivots about its ear C and allows its other ear D to move toward the right. The upper spring then pulls the two shoes together and away from the drum. The latch lever seats in the indent in the cam disc and the cam is held in its stop position until the clutch is again engaged. As the clutch completes its revolution, a reset cam, by means of a reset lever, returns the trip lever to its latched position.

CONTACT MECHANISM

3.09 The contact arrangement (Figure 5) in late model units consists of eight contacts (seven contacts on early design units), each of which has a contact lever and cam associated with it. Five of these contacts are for the intelligence elements of the signaling code, one is for the start-stop element, and two are for the auxiliary contacts (one auxiliary contact on early design units).

3.10 Each time the clutch is tripped, the cam sleeve rotates one complete revolution, and its individual cams actuate their respective contact levers in sequence. These contact levers control the opening and closing of the contacts for measured intervals of time. Operation of the distributor contacts generates a sequential start-stop signal pattern corresponding to the code combinations from the external multiwire source.

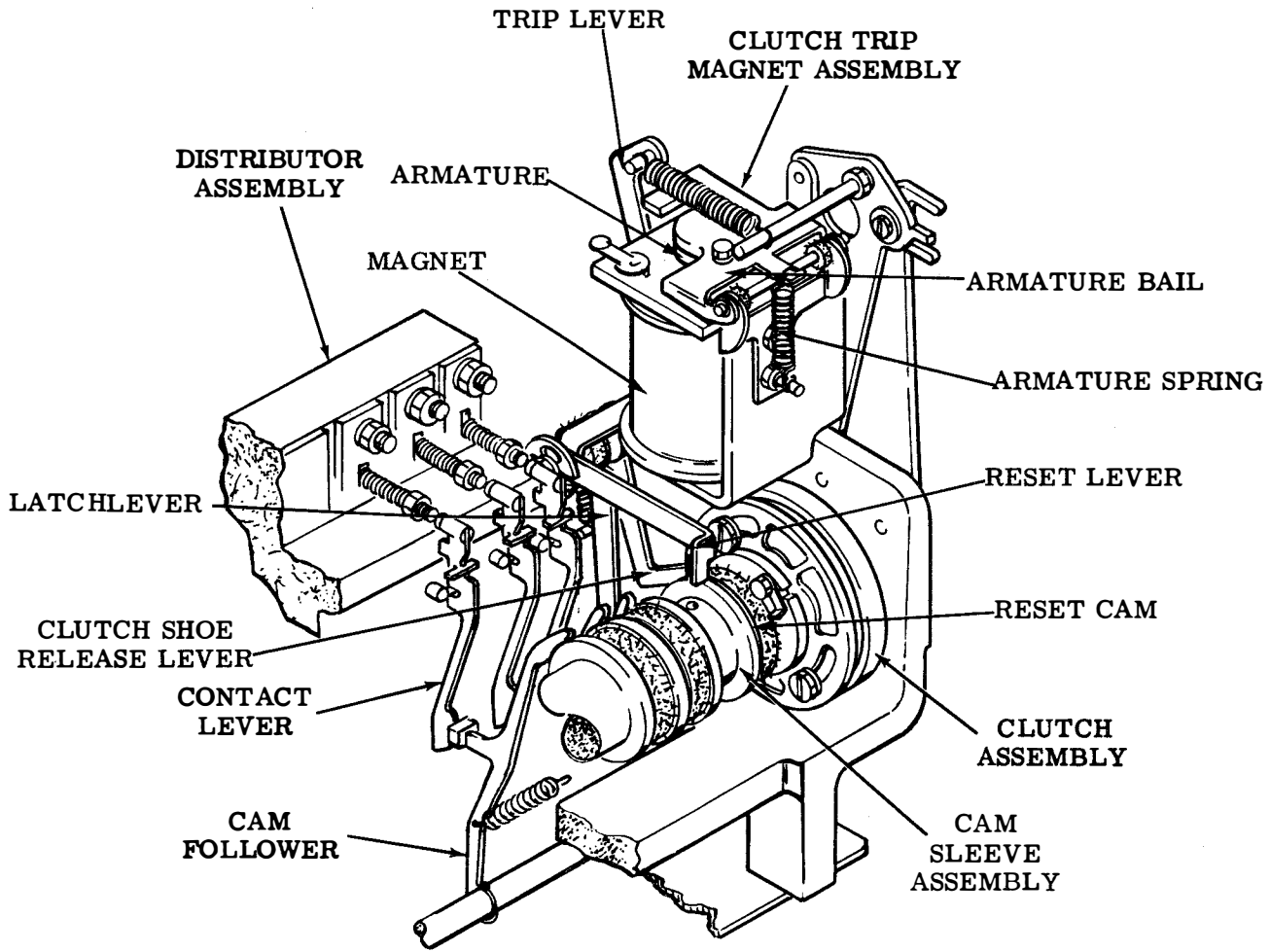


Figure 5 - Multiple Wire Distributor