NAVELEX 0967-LP-615-3010

TECHNICAL MANUAL

OPERATION AND MAINTENANCE INSTRUCTIONS WITH PARTS LIST

TRANSMITTER DISTRIBUTOR SETS MODEL 28

Manufactured by
Teletype Corporation

Manual Prepared by
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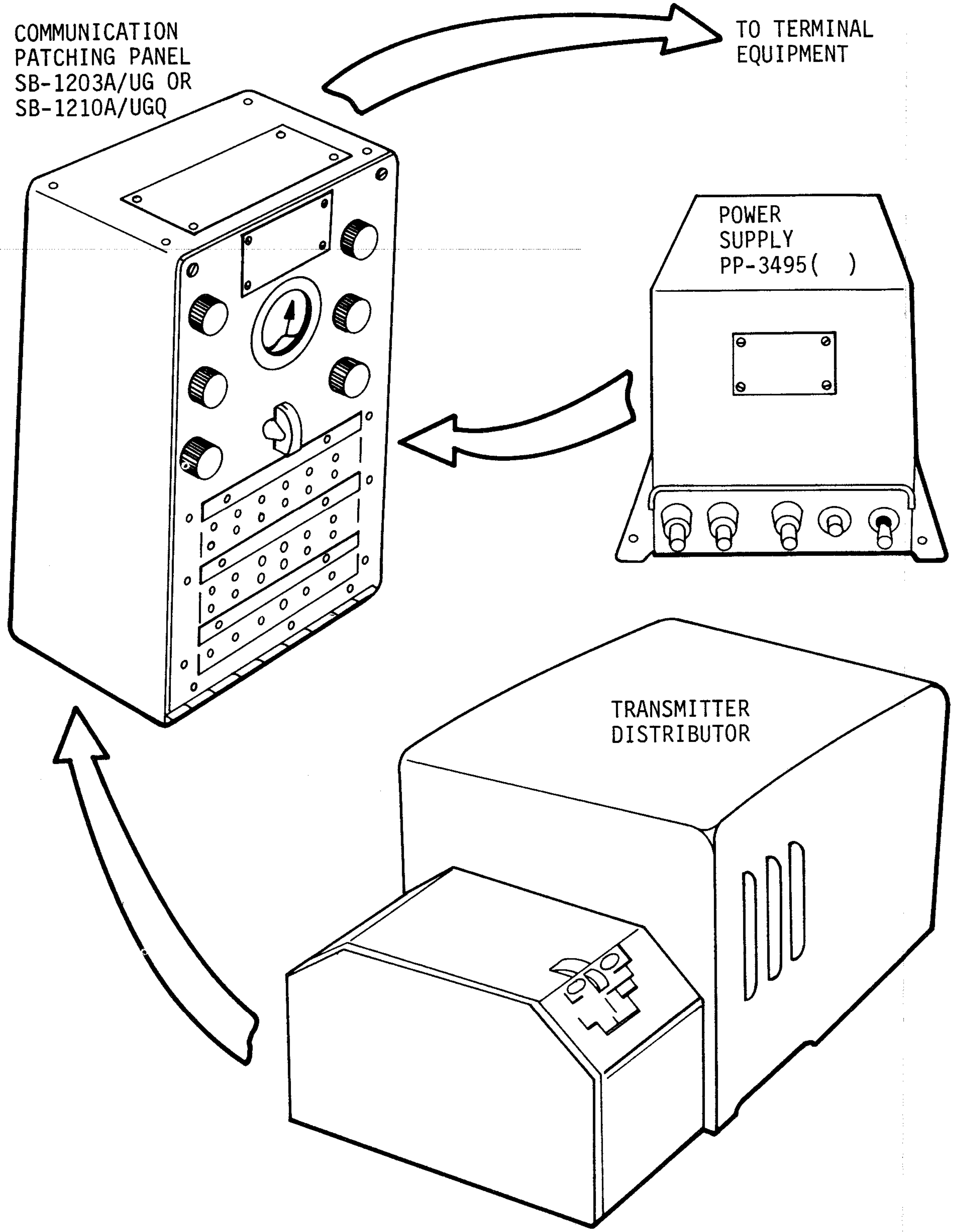


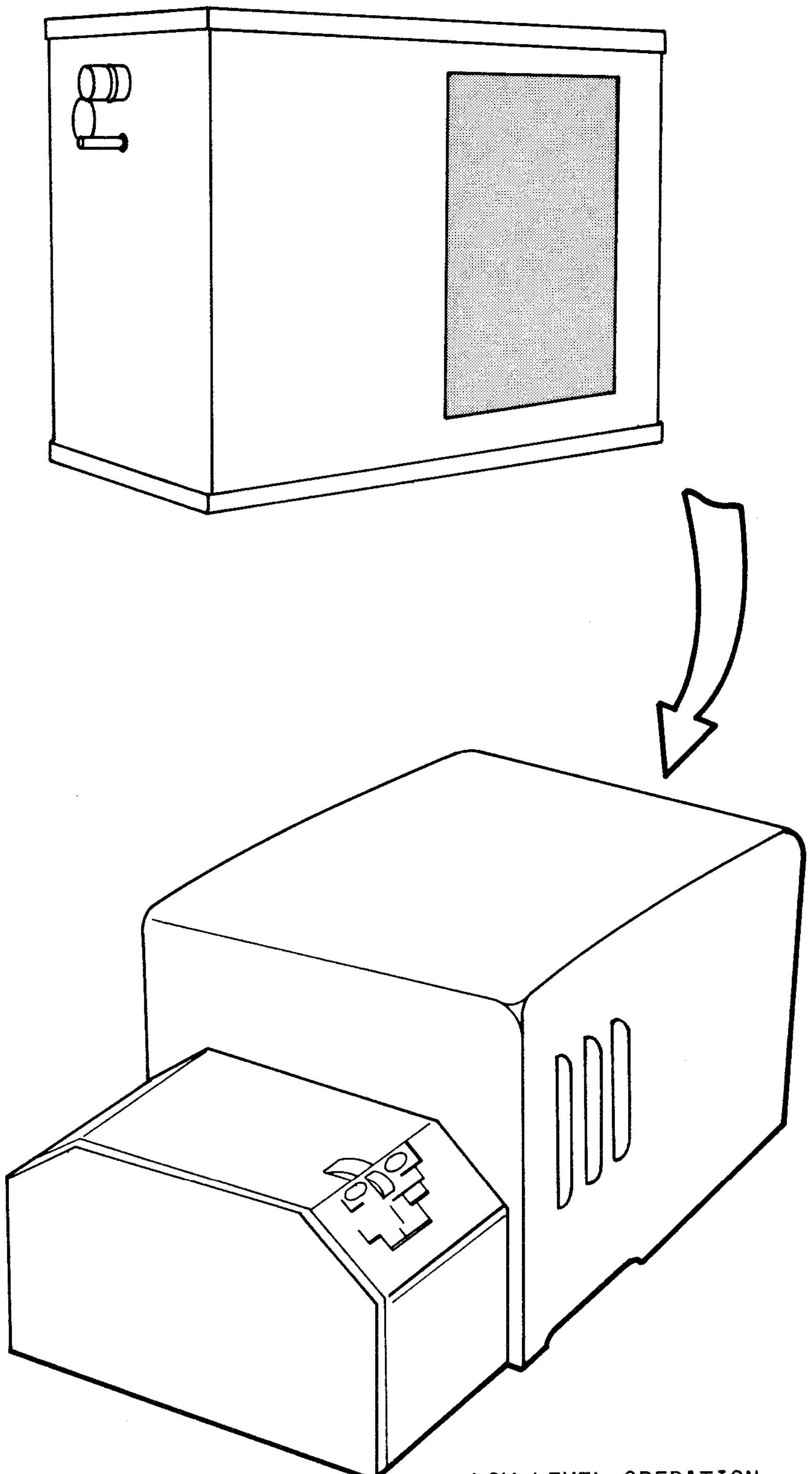


Figure 1-1. Transmitter Distributor Set Model 28

CHAPTER 1
GENERAL INFORMATION AND SAFETY PRECAUTIONS

1-1. SAFETY PRECAUTIONS. To stress the importance of employing proper safety techniques while performing maintenance procedures on the equipment involved, the user of this manual is directed to thoroughly familiarize himself with the safety precautions described in Chapter 4, paragraph 4-4.

1-2. INTRODUCTION. This manual provides information and instructions for installation, operation, and maintenance of Transmitter Distributor (TD) Sets Model 28 (figure 1-1). Maintenance information provided for the TD sets includes instructions for testing, performing preventive maintenance and adjustments, troubleshooting, and repairing. A parts list is also included.

1-3. EQUIPMENT DESCRIPTION. The TD Set Model 28 is an electromechanical device used to send code combinations perforated in tape and translate these combinations into electrical impulses in the form of a Baudot code signal.

a. General. When connected by radio or wire telegraph channels with teletype equipment in other ships or stations, the TD set originates signal transmission. It is a send only mechanism not equipped to sense the electrical characteristics of incoming messages on the signal line.

(1) Transmission of signals from the TD set to a distant station is accomplished electrically by use of a five-unit, stop-start permutation code. Depending on the transmitting cam sleeve used, the transmission pattern may be either 7.00 units or 7.42 units. The nominal operating speed for 7.42 is 368 operations per minute (opm) corresponding to 60 words per minute (wpm). By changing gears which are available as optional components, the operating speeds can be increased to 460 opm (75 wpm) or 600 opm (100 wpm).

(2) Each TD set is equipped with a control switch for turning off the set without disconnecting it from the signal circuit. Most sets are equipped with an automatic line shunting switch which closes the loop signal circuit when the TD is removed from its base.

(3) Each TD set is provided with a three-position switch by means of which the set is made to read tape, stop reading tape, or free the feed-wheel to permit feeding tape under the tape wheel into the tape guide without raising the lid.

(4) Power is brought into each set to the motor or motor unit through a power switch. The motor or motor unit drives the TD unit through an intermediate gear assembly.

(5) The message signals are read from a tape which is either fully perforated or chadless and then transmitted by either a 0.020 ampere or a 0.060 ampere dc line current to external receivers.

b. High-Level and Low-Level. This manual covers both high-level and low-level configurations of TD sets. High-level sets are used in applications wherein radio frequency interference (RFI) does not present a problem. Low-level sets have RFI suppression incorporated. One of the rfi suppression features is the use of a low-level signaling code from which the term low-level is derived. The low-level signaling code is the +6 volts (mark) and -6 volts (space) polar code levels versus that of the 0.060 ampere (mark) and 0.0 ampere (space) neutral code levels used in the high-level sets. High-level TD equipment is described in paragraph 1-3.1 and low-level TD equipment is described in paragraph 1-3.2.

1-3.1 EQUIPMENT DESCRIPTION (HIGH-LEVEL). A typical TD set Model 28 consists of a base, TD unit, a motor or motor unit, and a cover. TD sets may be either single contact or multicontact sets. Single contact sets may be either regular size or miniaturized (figures 1-2 and 1-3). The multicontact set (figure 1-4) is regular size only. The regular size set (figure 1-5) has a regular size only. The miniature set (figure 1-6) has a smaller base and cover designed for use with a small motor.

a. Single Contact Sets. The TD units used in the two single contact sets (regular size, and miniature size) are identical as to function and configuration. The single contact mechanism is actuated once for each level of the code combination by a distributing cam sleeve. The code combinations sensed in the message tape are mechanically transferred to the single contact signal generator where they are translated into electrical impulses and transmitted sequentially to the signal line. The TD unit used in these sets may be equipped with code reading contacts for multiwire (simultaneous) output as an optional feature. By use of these contacts, which are actuated by the individual transfer levers, the tape message is electrically transmitted by parallel wires to external receivers for monitoring purposes or page copy. This is done simultaneously with transmission through the single contact signal generator.

b. Single Contact Regular Size Set. The regular size single contact TD set (figure 1-5) consists of a base, a motor unit, TD unit and a cover. The base extends a full length of the set, and is equipped with an intermediate gear assembly and vibration mounts. It serves as a mounting for a TD unit, and a standard size Model 28 motor unit which may be either a 115-volt, 60-Hertz, ac synchronous, or a 115-volt, 60-Hertz, series governed. A slip-over type cover encloses the motor unit and that portion of the base not occupied by the TD unit. A U-shaped front panel covers three sides of the TD unit. This panel snaps into position. It is easily removed for access to the mechanism of the TD unit.

c. Single Contact Miniaturized Set. The miniaturized set has been so characterized because of its compactness (figure 1-6). The smallness in size is accomplished through design of the base and cover, and by use of a compact 23 millihorsepower synchronous motor. This set performs the same function as

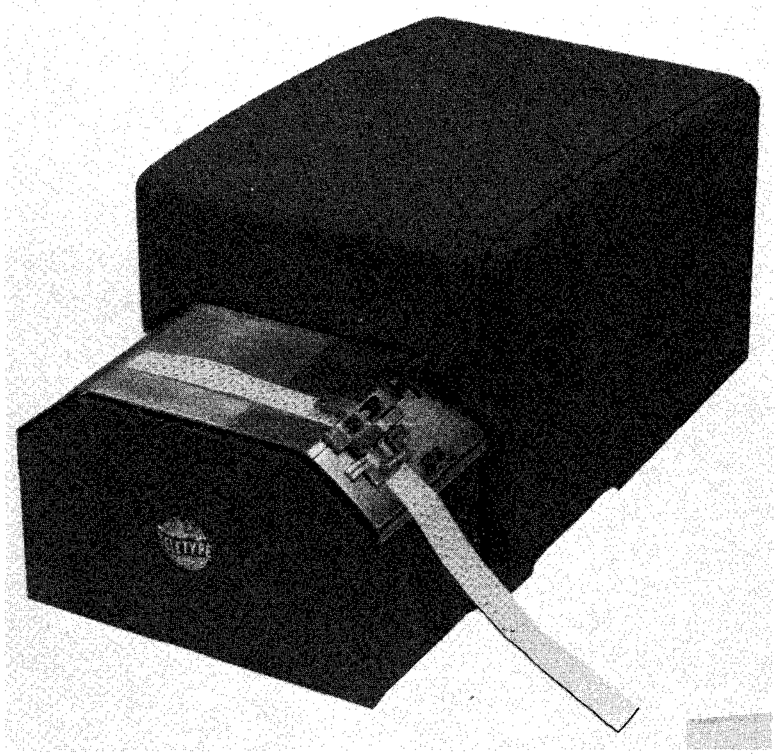


Figure 1-2. Transmitter Distributor Set Model 28 - Regular Size, Single Contact

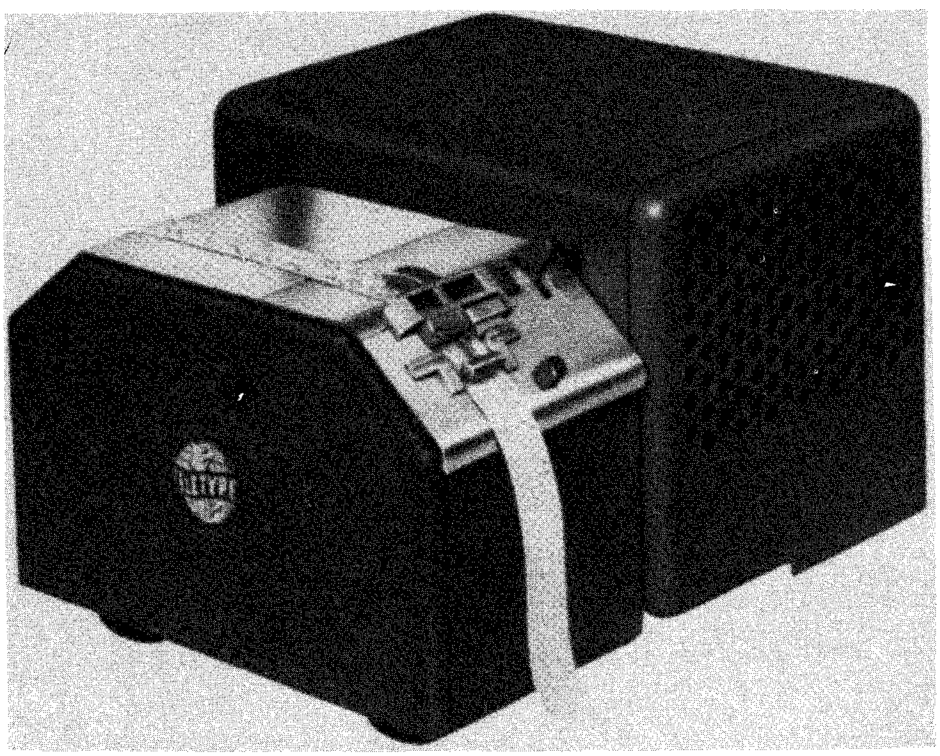


Figure 1-3. Transmitter Distributor Set Model 28 - Miniaturized, Single Contact

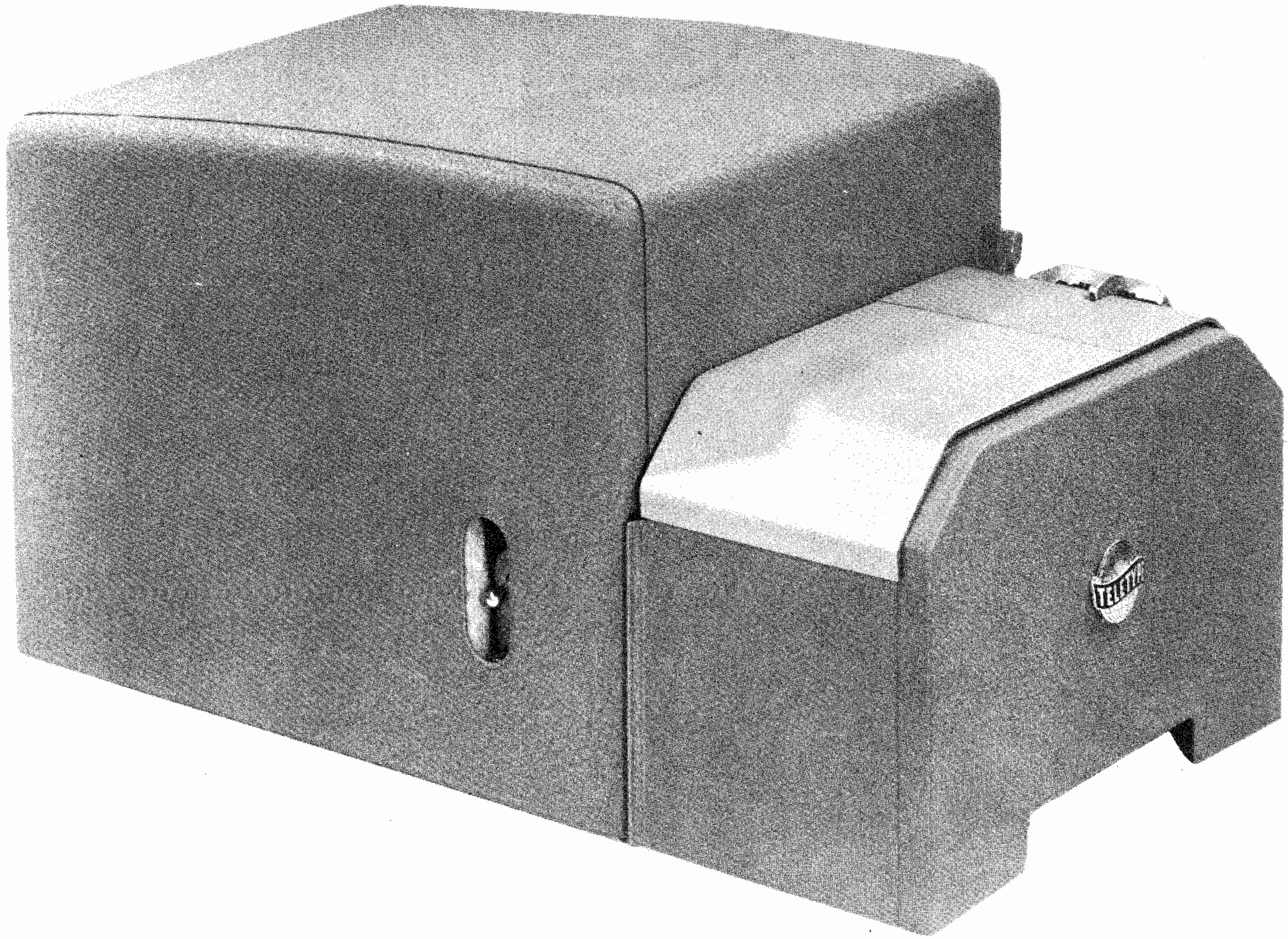


Figure 1-4. Transmitter Distributor Set Model 28 - Regular Size, Multicontact

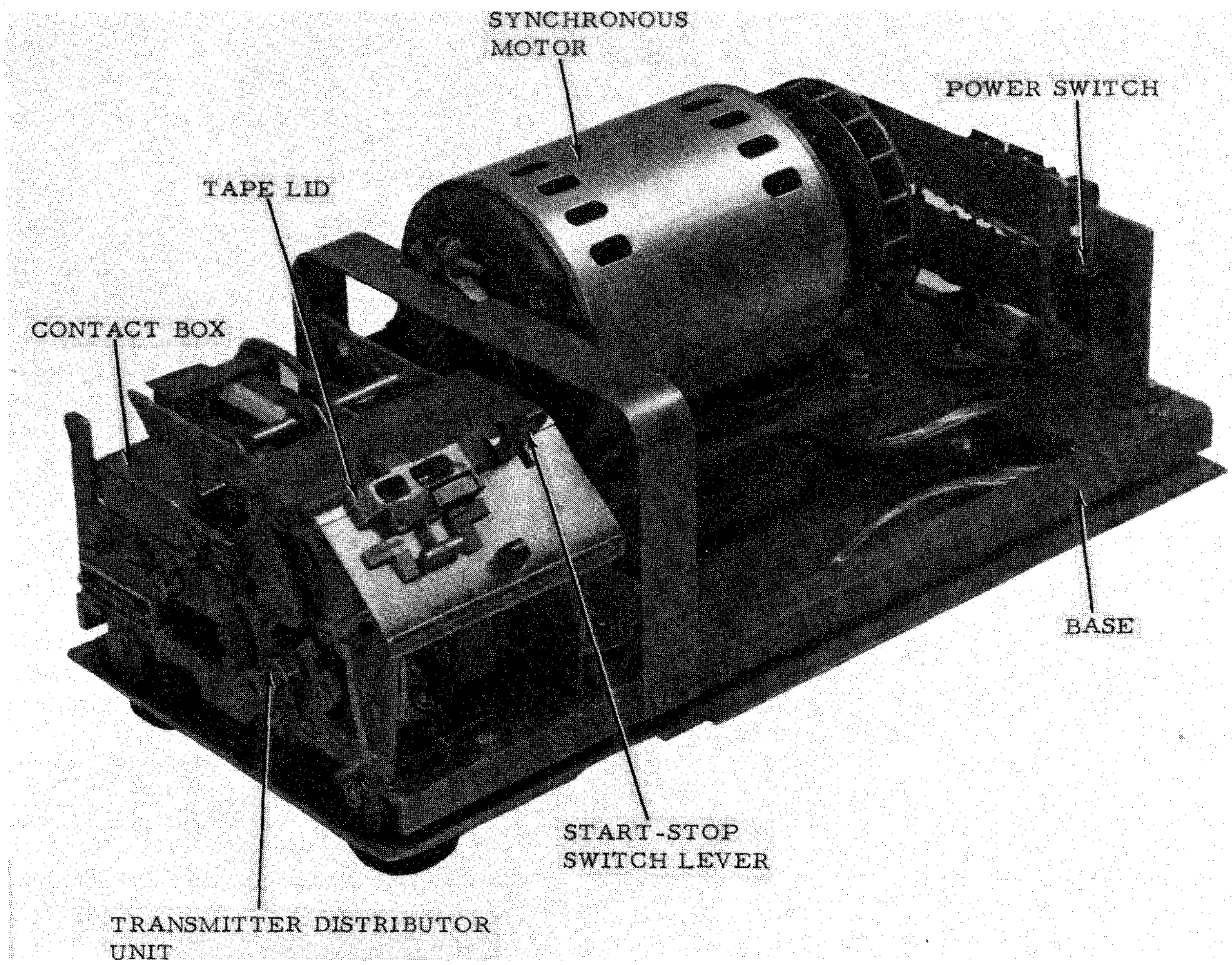


Figure 1-5. Transmitter Distributor Set Model 28 - Regular Size (Cover, Cover Plate, and Panel Removed)

the regular size set; yet it occupies less space by about five inches in depth. The cover is the slip-over type which houses the remaining portion of the set other than the TD unit. The U-shaped front panel is the same as that for the regular size set.

d. Multicontact Set. The multicontact TD set (figure 1-7) is approximately two inches wider and two inches deeper than the single contact set. It is driven by a full size Model 28 motor unit which may be either synchronous or governed. The function of this set is somewhat different from that of the single contact set. The sensing and distributing mechanisms are capable of being actuated independently of each other either locally or from a remote source, or they may be actuated in conjunction with each other as a straight-through TD. The wiring terminates at two 24-point connectors located at the rear of the base to provide external control, and the output or input of multiwire transmission. The versatility of the multicontact set makes it possible to transmit the tape message by parallel wire to an external receiver for message verification, or error detection. Likewise, it is possible to return parallel wire input to the distributing portion of the set for sequential transmission.

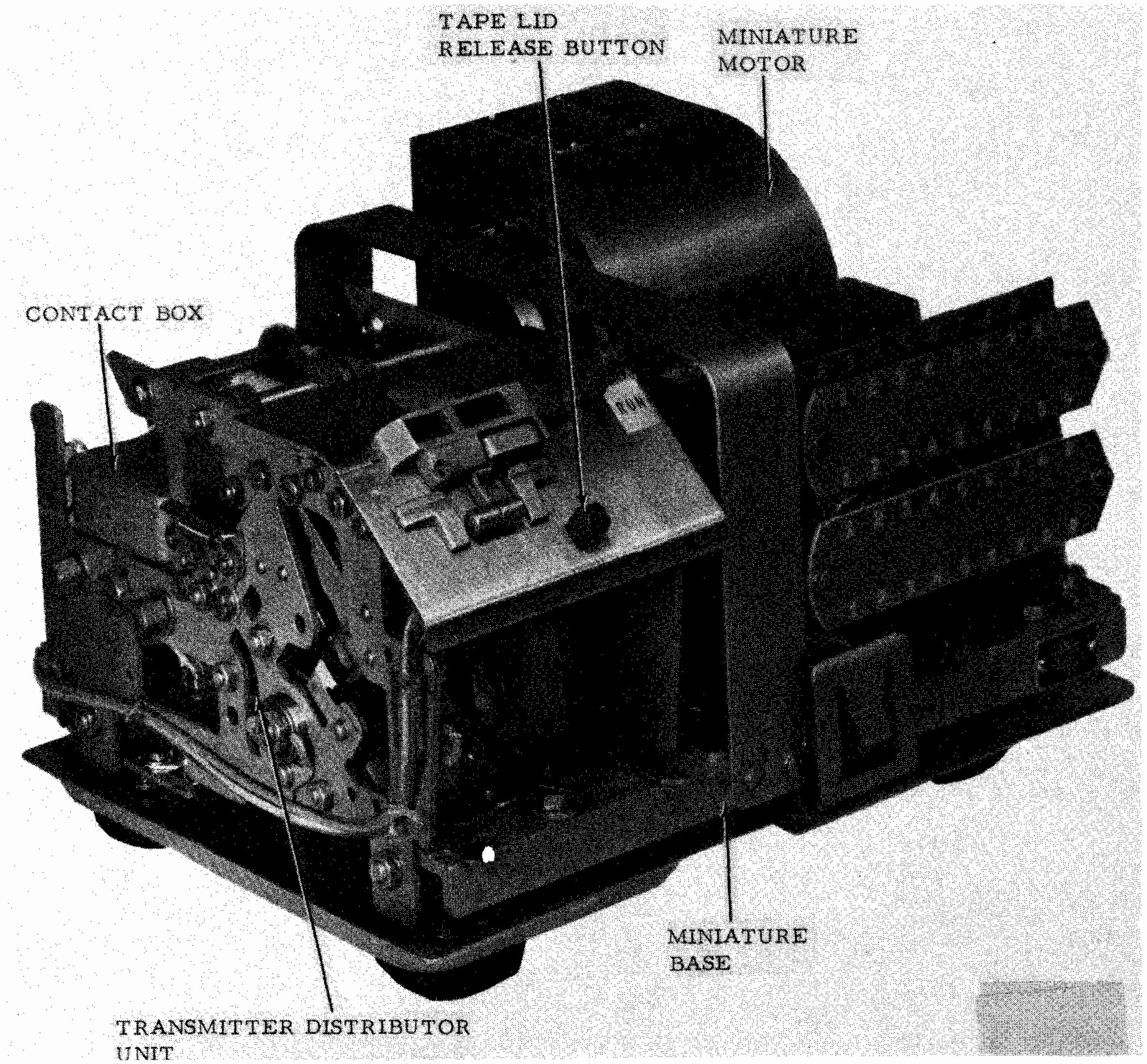


Figure 1-6. Transmitter Distributor Set Model 28 - Miniaturized (Cover, Cover Plate, and Front Panel Removed)

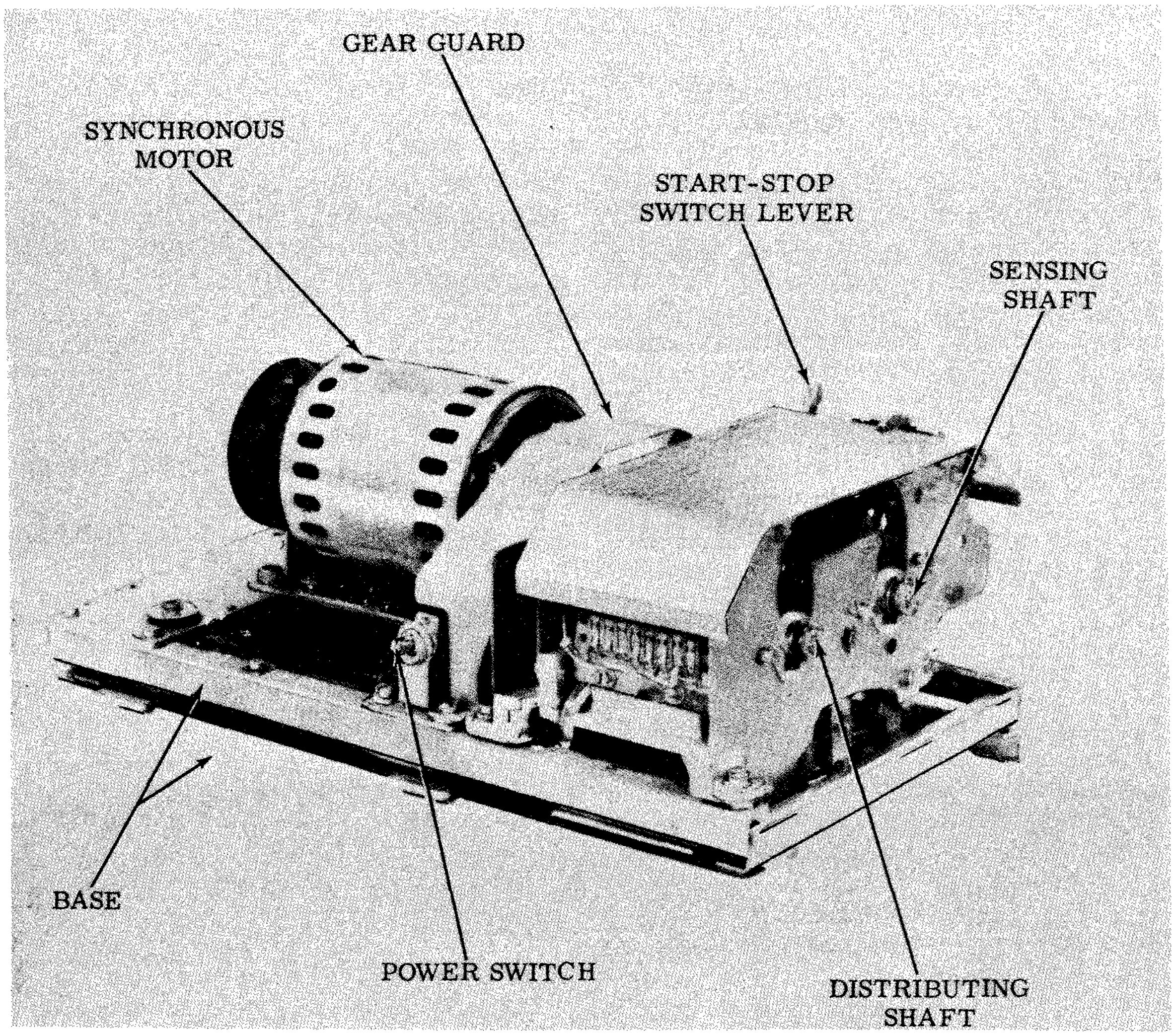


Figure 1-7. Transmitter Distributor Set Model 28 - Regular Size, Multicontact (Cover Removed)

Auxiliary contacts are provided in the set, and operate from the sensing cam sleeve for controlling external circuits. An auxiliary contact is provided at the distributor cam sleeve for controlling the clutch on the sensing shaft. An index mark is provided seven characters ahead of the sensing pins for aligning the starting point of the message tape. The spring biased tape lid may be raised for inserting message tape by depressing a plastic tape lid release plunger. Transmission of tape may be stopped by operating the start-stop switch lever, by raising the tape lid, or allowing tape to run out. When the tape lid is raised or when tape runs out, the tape-out sensing pin rises and breaks a circuit to the sensing clutch magnet through its contact.

e. Transmitter Distributor Bases. The transmitter distributor base provides mounting facilities for the single mounting and multiple mounting TD sets. The bases described and illustrated are typical of some of the many possible variations. Of the four types of bases described, two are designed as mountings for single unit TD sets: one as a single-contact single-shaft TD unit and another as a slightly larger multicontact TD unit. A third base, identified as a miniaturized model, is used for mounting a single-contact TD unit and a miniaturized motor. A fourth base, identified as a multiple base, is designed for mounting three TD units. Each base serves also as a mounting for a motor or motor unit in addition to the TD unit.

(1) Single Contact Single Mounting Base. The base for the single contact TD (regular size) consists of two angle iron rails with cross plates that form a framework. The framework is fastened to a subbase (or oil pan on some models) by means of three vibration mounts which serve to reduce vibration (figure 1-8). Brackets are provided for mounting terminal blocks on which electrical connections are made. A guard is mounted above the location of the gears for protection. A multiple connector is mounted at the left front of the base for interconnection with a mating connector on the TD unit. A line shunting switch is provided on most bases adjacent to the multiple connector for keeping the line circuit closed when the TD unit is removed from the base. This switch is actuated by an adjusting screw on the TD unit. When the TD unit is placed on the base, the line circuit includes the TD before the line shunting switch opens. Terminal blocks and a power switch are mounted on brackets at the rear of the base where electrical connections are made. The base provides a rigid mounting support for the TD unit and a motor unit (figure 1-9). An intermediate gear assembly is mounted between the motor unit position and the TD unit position. The intermediate gear assembly transfers motion from the motor to the TD. The speed is determined by the set of drive gears used on the motor shaft and its mating gear on the intermediate gear assembly.

(2) Multicontact Single Mounting Base. This multicontact TD base is similar to the base previously described. The frame structure is built in two pieces. The top structure serves as a mounting for a motor unit and the TD unit (figure 1-10). The bottom structure serves as a mounting for the top structure. Two 24-point connectors are mounted at the rear of the bottom structure for electrical connection to external apparatus. Two 24-point mating connectors are mounted to the rear of the top structure as a terminal for internal electrical connections. The top structure may be moved forward to disconnect all electrical connections or backward to connect them (figure 1-11). A power switch is mounted to a bracket on the left side and is accessible through the cover. Electrical connections between the base and the TD unit are made through a cable or cables with a multiple connector or connectors, which mate with connectors mounted on the TD unit. The interconnection varies somewhat with different models. Other internal connections are made at terminal blocks under the motor unit position.

(3) Miniature Base. This base is designated miniature because of its compactness (figure 1-12). The mounting facilities for a

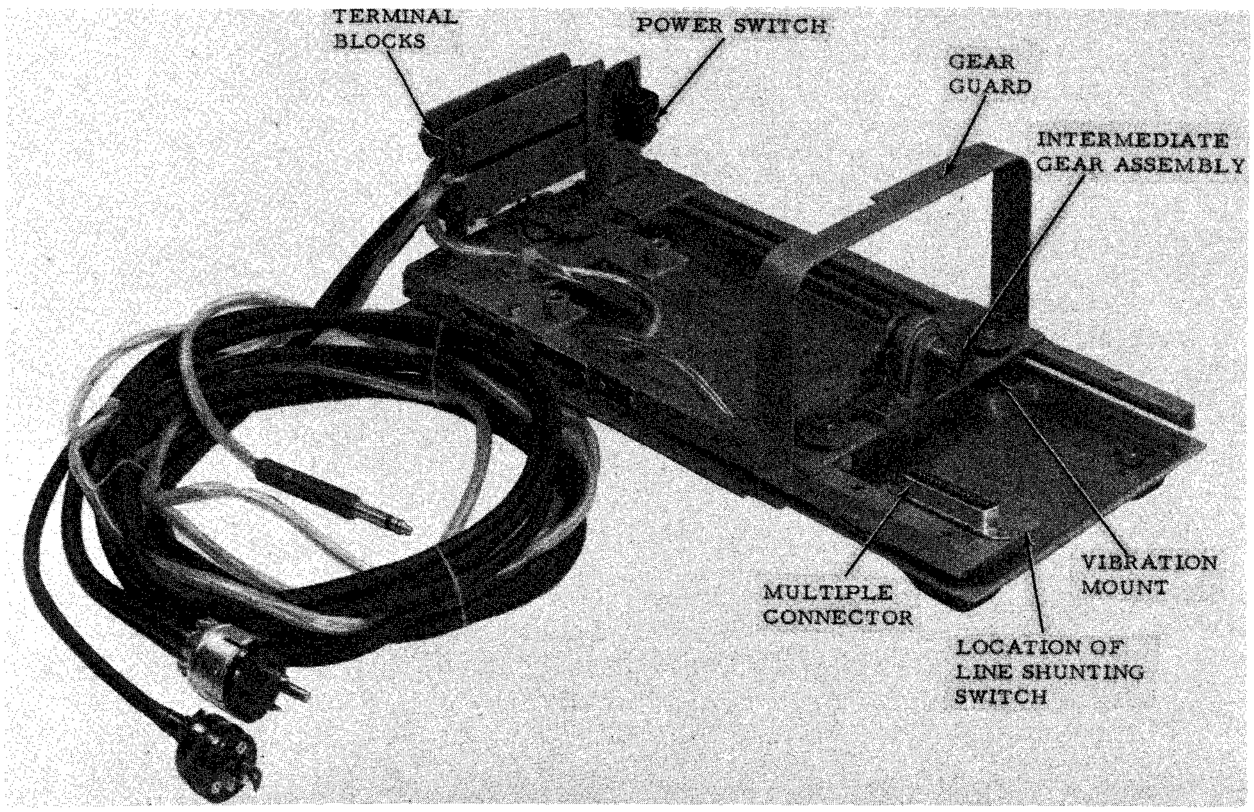


Figure 1-8. Transmitter Distributor Base - Single Contact, Single Mounting

miniaturized TD base are virtually the same as those for the single contact TD base. However, this base is much shorter and lighter since the motor used on it is small and requires very little space for mounting. Brackets with terminal blocks are provided at the right rear part of the base for making electrical connections, both external and internal. A cable connects these terminal blocks to the multiple connector which mates with the TD unit connector and the line shunting switch. The frame structure is fastened to a metal pan through three vibration mounts which absorb vibration from the motor and the TD unit. Four rubber feet are mounted under the pan to prevent the set from marring the surface on which it sits. A power switch is mounted on a bracket at the rear of the base and is accessible through the rear of the cover.

(4) Multiple Mounting Bases. The multiple mounting base is designed as a mounting for three TD units, a motor unit, drive shafting, and gears. There are two types of these bases, each with provisions for changing the driving speed of its associated TD units. One type is designed as a mounting for three single contact TD units (figures 1-13 and 1-14). The other type is designed as a mounting for three multicontact TD units (figures 1-15 and 1-16).

(a) Base for Three Single Contact Transmitter Distributor Units. The base, which serves as a mounting for three single contact TD units,

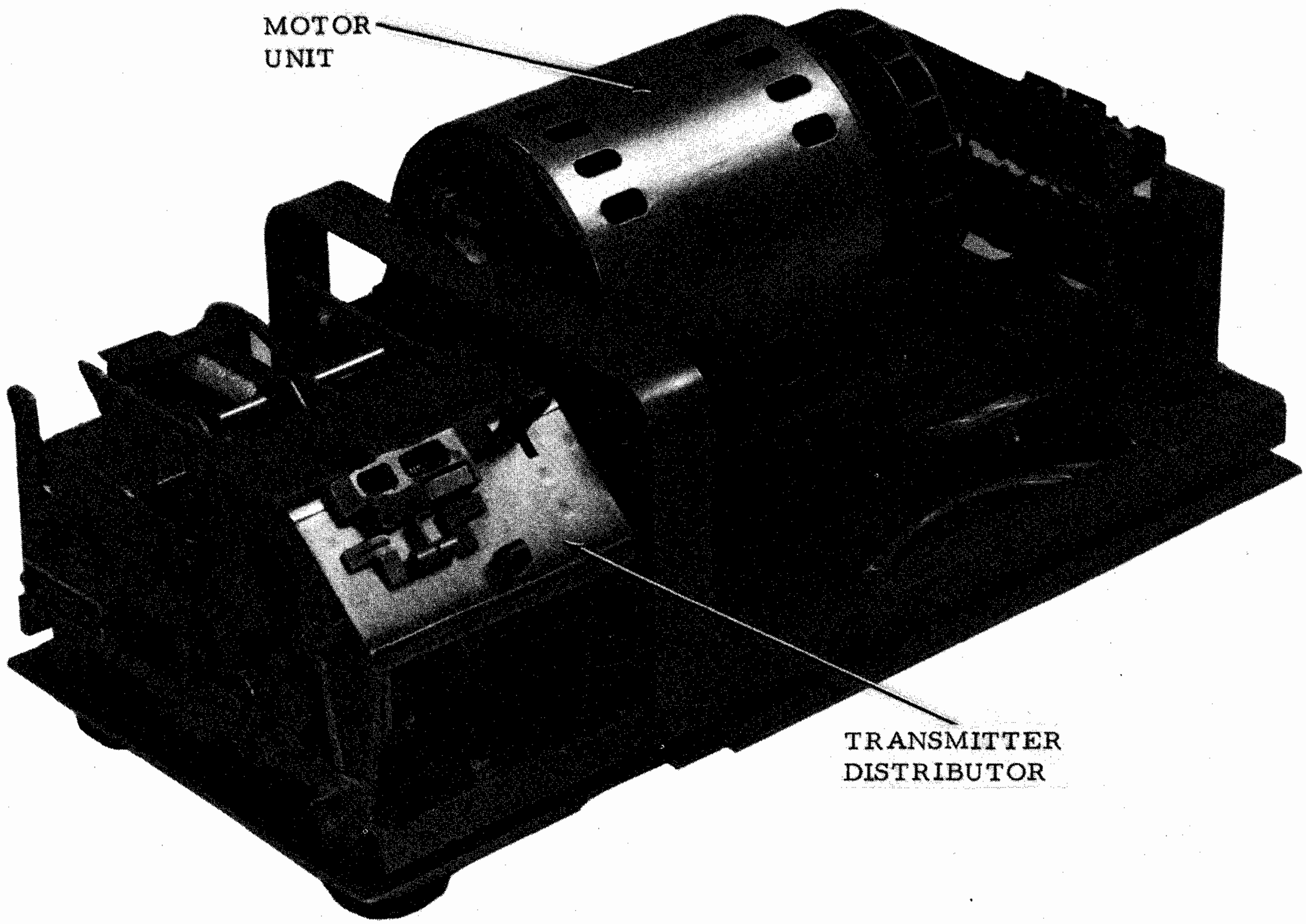


Figure 1-9. Transmitter Distributor Base - Single Contact, Single Mounting (Transmitter Distributor and Motor Unit in Place)

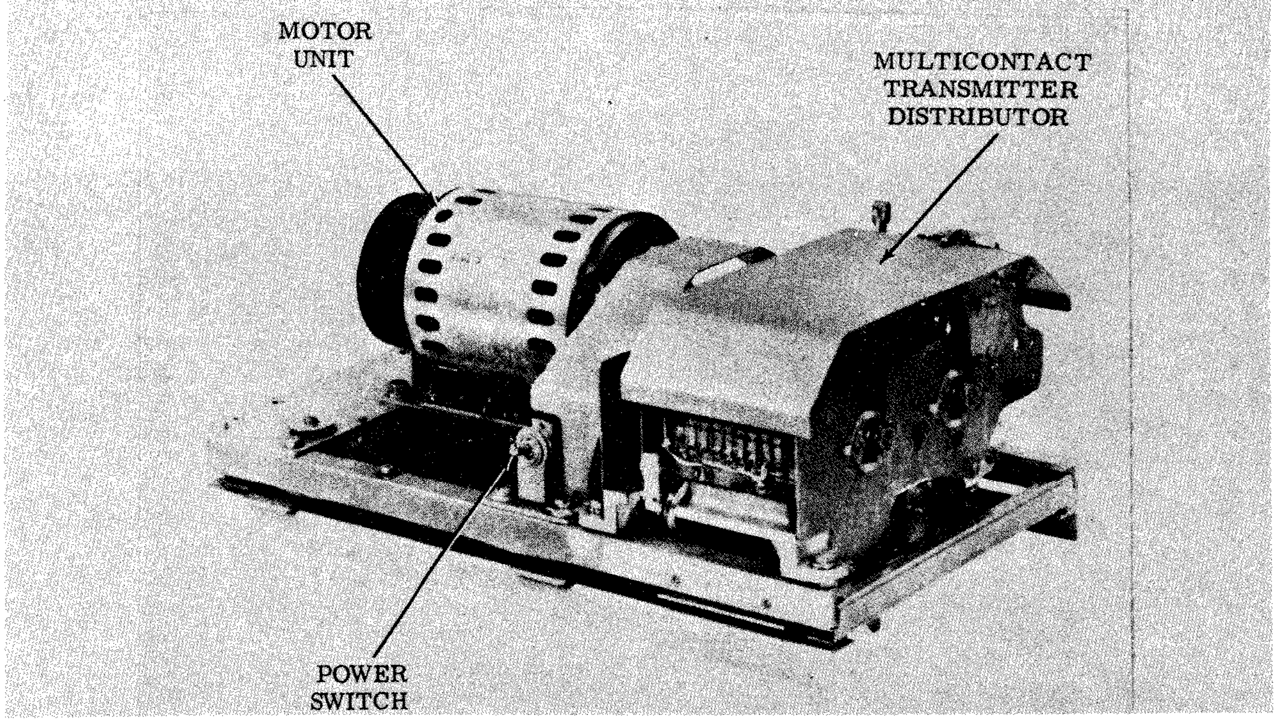


Figure 1-10. Transmitter Distributor Base - Multicontact, Single Mounting (Transmitter Distributor and Motor Unit in Place)

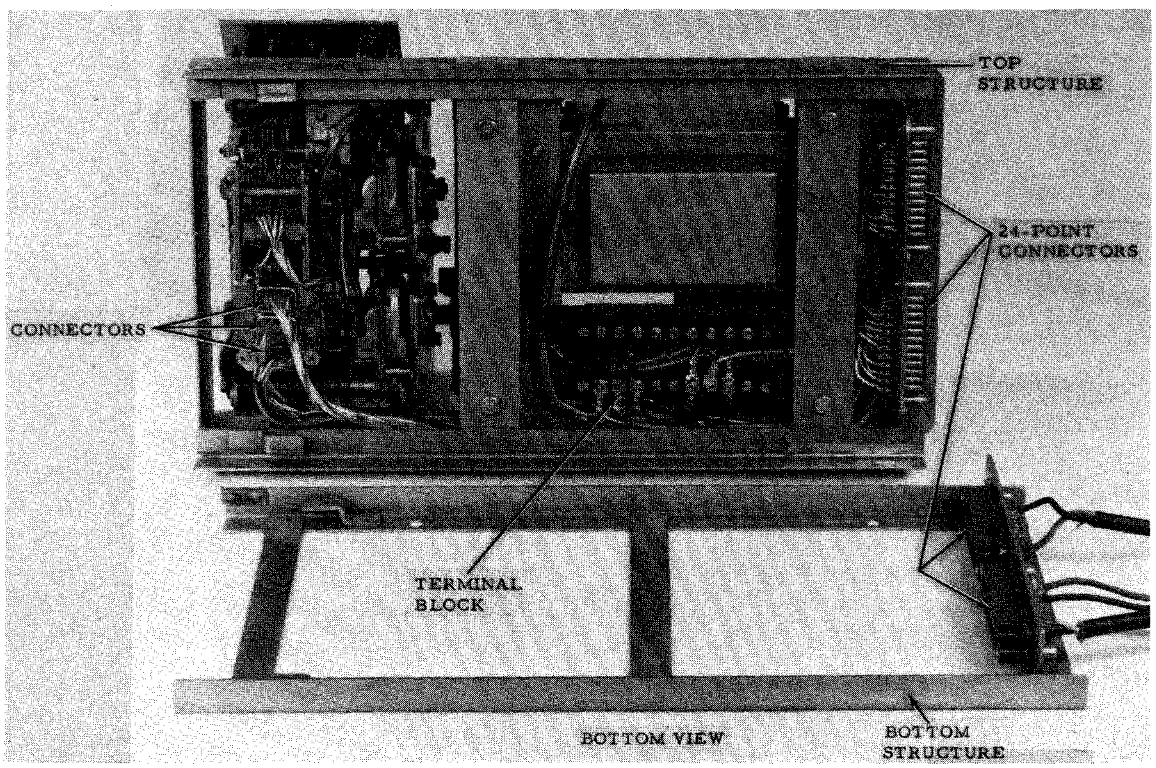


Figure 1-11. Transmitter Distributor Base - Multicontact, Single Mounting Structural View (Transmitter Distributor and Motor Unit in Place)

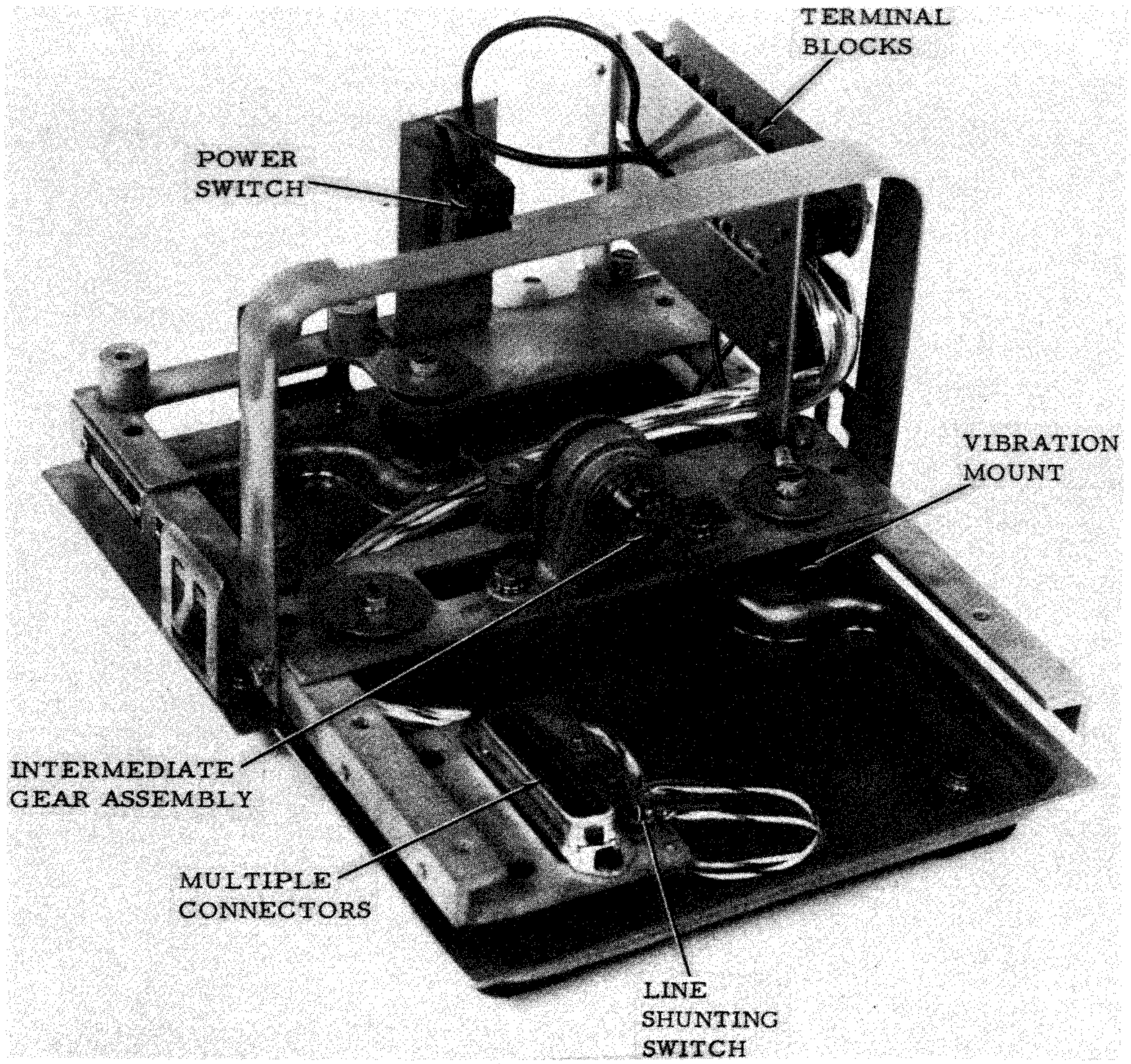


Figure 1-12. Transmitter Distributor Base - Miniaturized

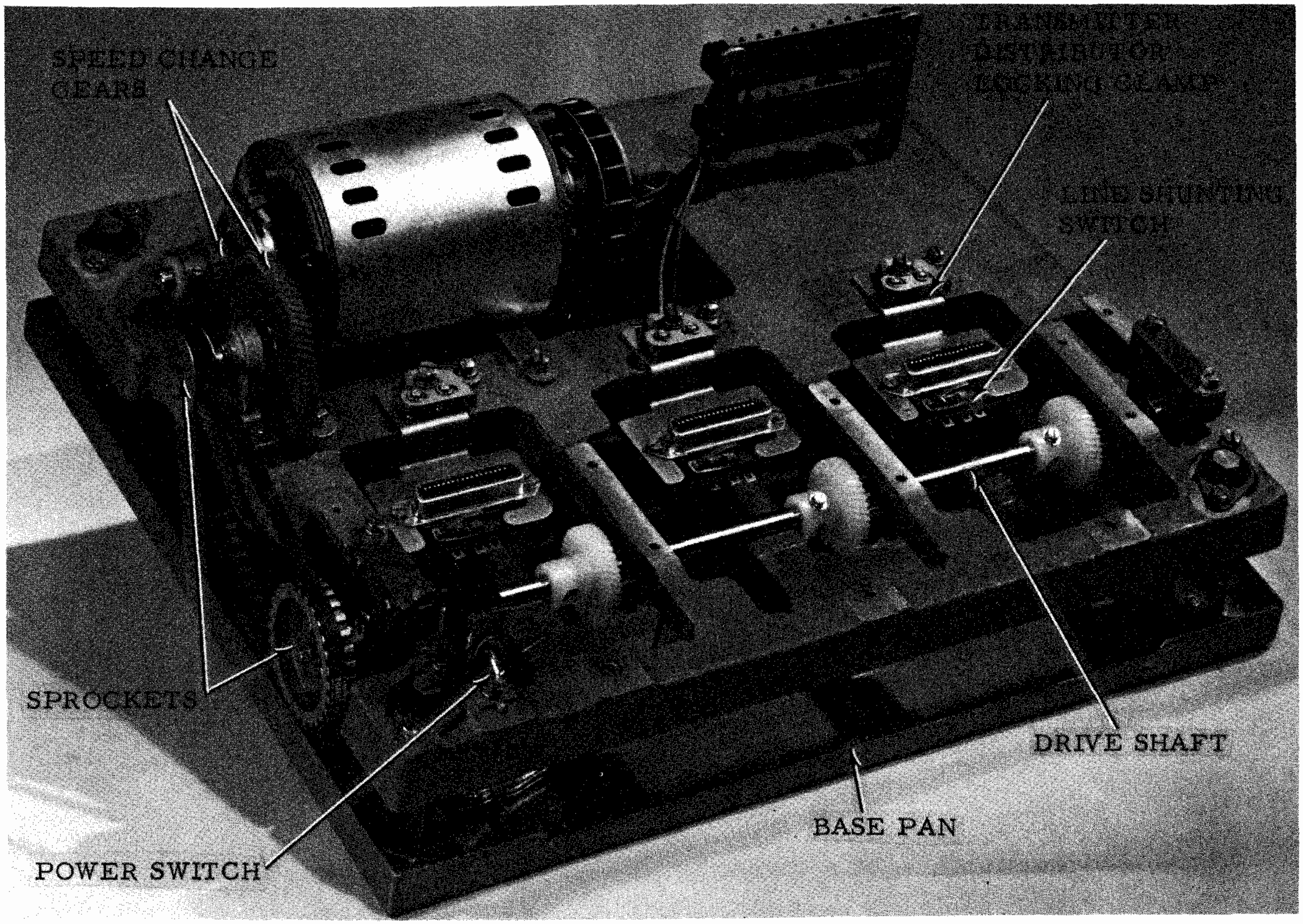


Figure 1-13. Transmitter Distributor Base - Single Contact, Multiple Mounting (Common Speed)

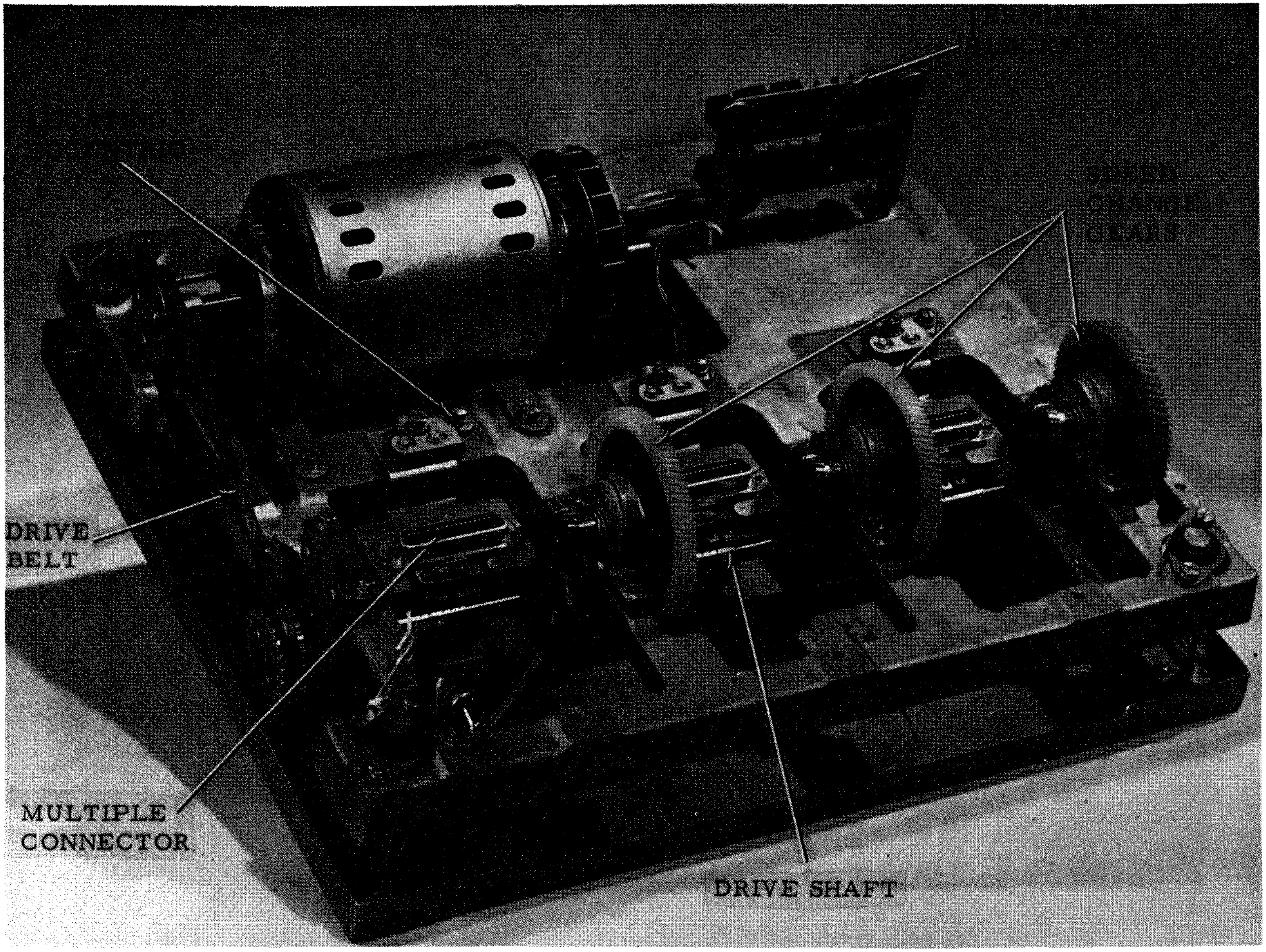


Figure 1-14. Transmitter Distributor Base - Single Contact, Multiple Mounting (Variable Speed)

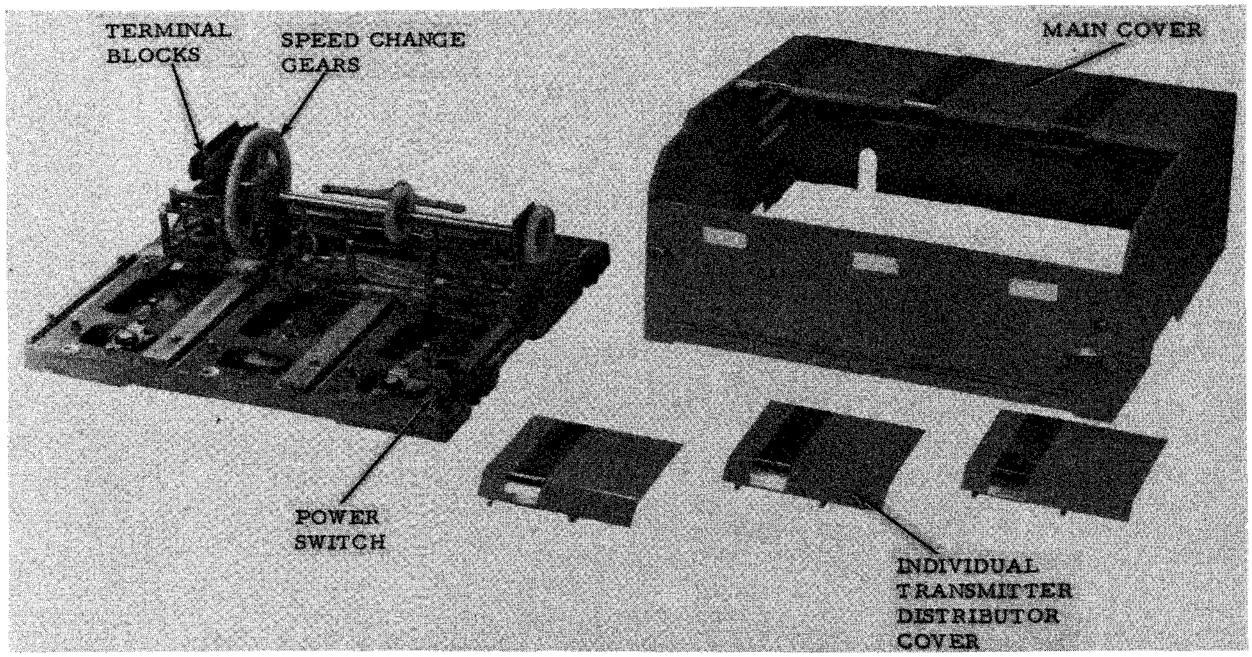


Figure 1-15. Transmitter Distributor Base - Multicontact, Multiple Mounting (Common Speed)

is a one piece aluminum casting mounted by vibration mounts and brackets to a base pan. Brackets with terminal blocks are provided at the right rear portion of the base. These terminal blocks serve as a connecting point between external and internal electrical connections. Electrical cables lead from the terminal blocks to a multiple connector and a line shunting switch at each of the three TD unit positions. Other cables lead to the motor and to a power switch located on a bracket at the front of the base. A locking clamp is provided for locking each TD unit in position on the base. A locating eccentric is also provided on the base as a means of fixing the adjustment position of the TD unit. A drive shaft across the front of the base is driven by the motor through a belt and a set of sprockets. Some bases have the speed change gears between the motor pinion and an intermediate gear assembly (figure 1-13). With this arrangement, the three gears on the drive shaft are the same size and drive all three TD units at the same speed. Other bases have speed change gears at each TD unit (figure 1-14). With this arrangement, each TD unit may be driven at 60, 75, or 100 words per minute by changing its intermediate gears.

(b) <u>Base for Three Multicontact Transmitter Distributor Units</u>. The multiple mounting bases for the multicontact TD units also serve as a mounting for three TD units, a motor unit, drive shafting with gears, and electrical connections. Some of these bases are constructed of aluminum casting (figure 1-15); others are constructed of steel plates (figure 1-16). A drive shaft traverses the base near its center portion and drives the TD units, either directly or

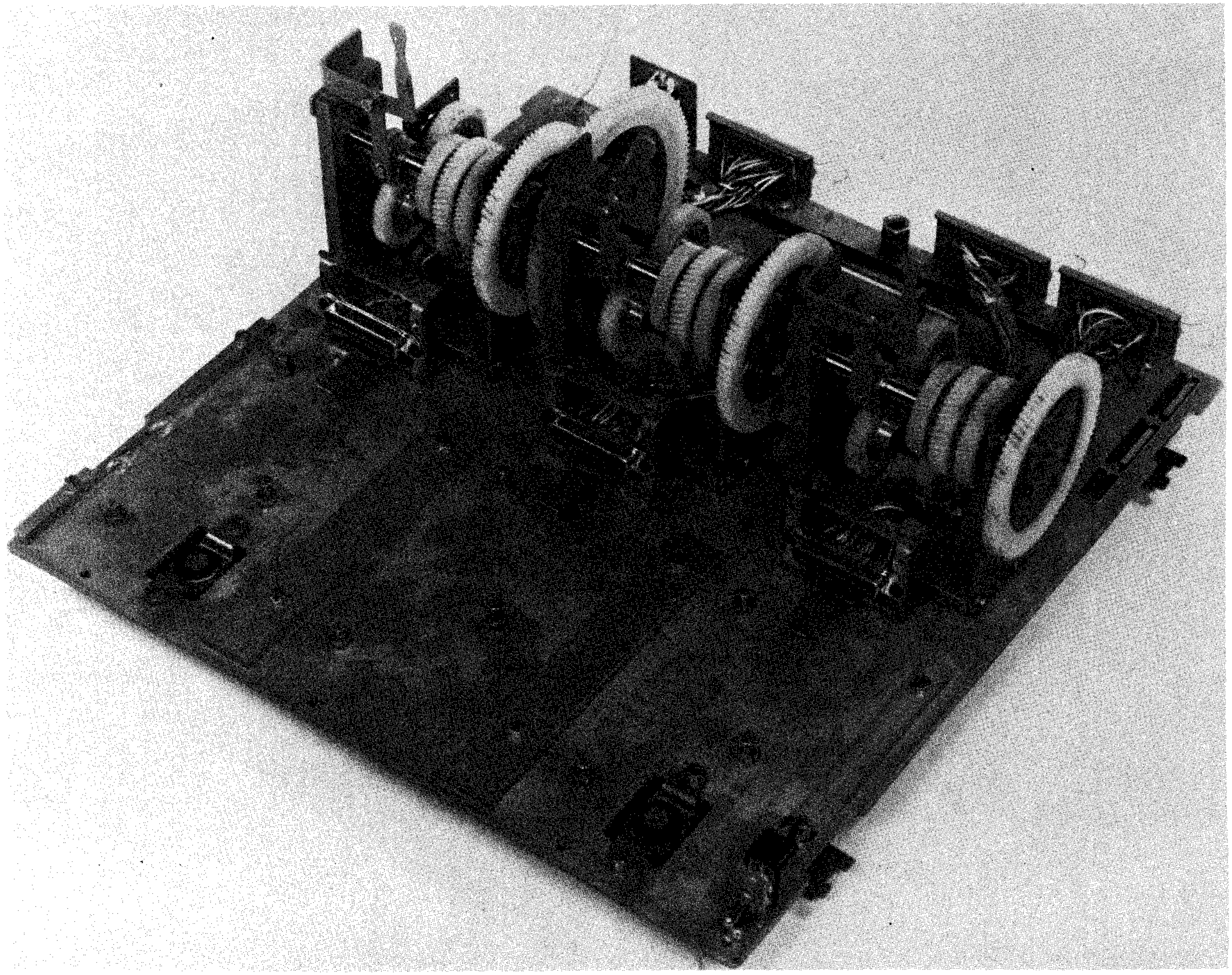


Figure 1-16. Transmitter Distributor Base - Multicontact, Multiple Mounting (Variable Speed)

through a gear shift assembly. Where the shaft drives the TD unit directly, the speed changes are made between the motor pinion and the intermediate gear (figure 1-15). Where the gear shifts are used, the speed of any one of the TD units may be changed irrespective of others by shifting the gears (figure 1-16). Internal electrical connections vary with the different models. Some are made on terminal blocks at the left rear portion of the base; others are made by multiple connectors at the rear of the base. Connection with most TD units is made by multiple connectors at the rear of the unit. Some models make connection by a loose end cable with multiple connector which mates with a connector underneath the TD.

f. Motor Units. The motor units that provide electromechanical rotating motion for operating various TD sets are of two basic types: synchronous and series governed. Both types are self-contained motor units with characteristics adaptable for use with standard power sources.

(1) The synchronous motor units (figures 1-17, 1-18, and 1-19) consist of a motor, mounting arrangement, and required starting and protective devices. They are available in miniature (25 millihorsepower), standard and heavy duty ratings. They must be operated from a standard, single-phase, regulated power source.

(2) The series governed type motor units (figure 1-20) in standard and heavy-duty horsepower ratings and may be operated from regulated or unregulated standard single-phase power sources or direct current.

g. Covers. In general, the covers for the TDs are of simple slip-over design. The covering for single mounted TDs consists of two parts. One is a slip-over cover for the motor unit, terminal blocks, and intermediate gear assembly; and the other is a U-shaped panel which encloses three sides of the TD. The covering for the multiple mounting sets consists of four parts. One is a slip-over cover for the motor unit, gearing, and terminal blocks; and the other three are cover plates for the individual TDs (figure 1-15). The front side of the larger cover is hinged so that it may be opened for access to the front of the TDs.

1-3.2 EQUIPMENT DESCRIPTION (LOW-LEVEL). Low-level TD sets differ from high-level TD sets in that RFI suppression features have been incorporated in several of the low-level components. The following paragraphs describe the RFI suppression features and point out the areas of difference between high-level and low-level equipment.

a. RFI Suppression. RFI suppression as applied to TD sets is accomplished by means of shielding and wave shaping a low-level electrical telegraph signal throughout the equipment. The installations vary with each set, but produce the same results of ensuring signal line privacy.

(1) Signaling. The code is transmitted by means of a ±6-volt polar signal through a network of shielded cables to the shielded container of an electrical service assembly. A

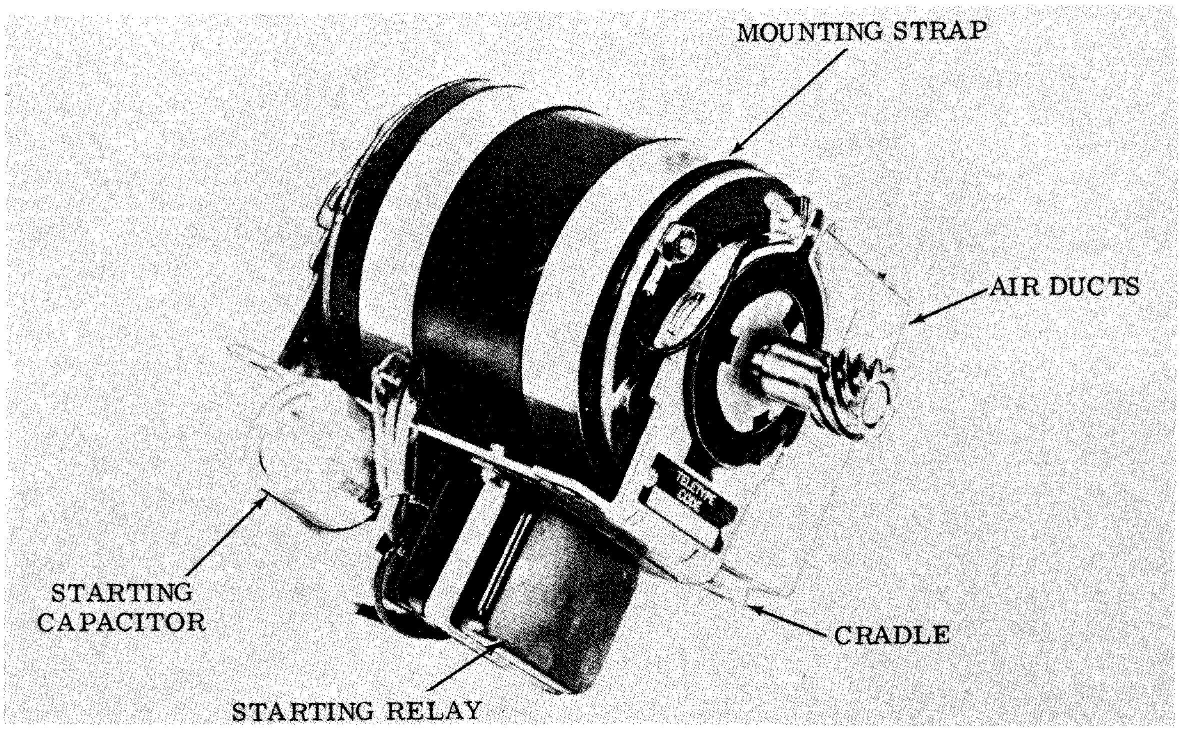


Figure 1-17. Typical Miniature Synchronous Motor Unit

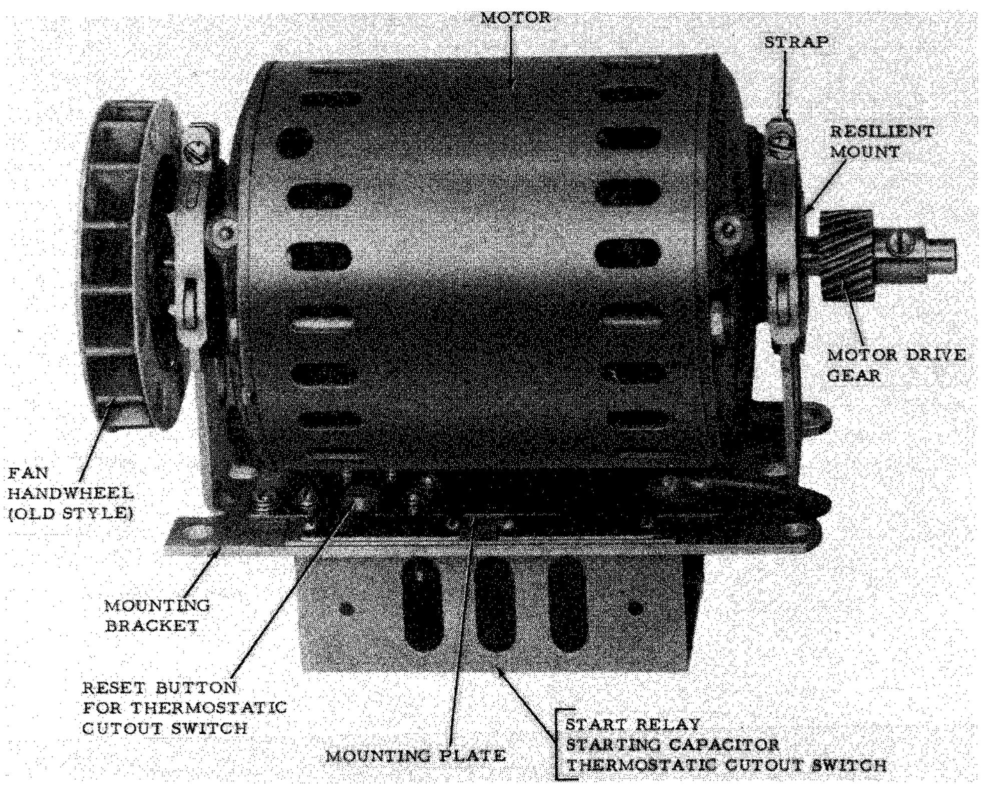


Figure 1-18. Typical Standard or Heavy Duty Synchronouss Motor Unit

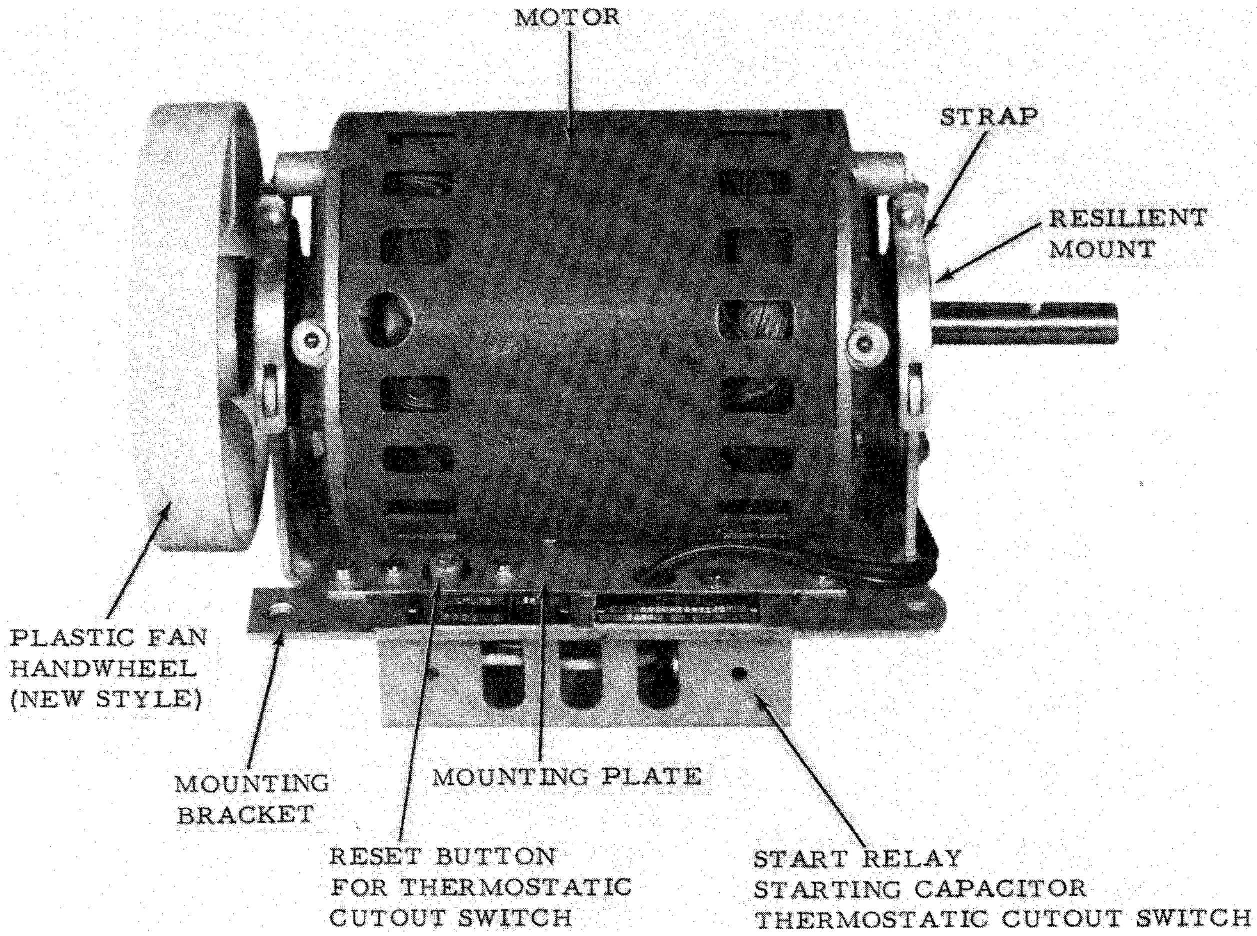


Figure 1-19. Typical Standard or Heavy Duty Synchronous Motor Unit With New-Style Plastic Handwheel

+6-volt signal is mark; a -6-volt signal is space.

(2) Electrical Service Assembly (ESA). The ESA is an electrically shielded container in which shielded cables terminate. It also serves as a housing for certain components such as plug-in clutch magnet driver circuit cards, keyer circuit cards, and power supply circuit cards. Electrical service assemblies which house low-level keyers (LLK) have double shielded containers and double shielded cables with appropriate connectors for LLK connections to external equipment.

(3) Cabling. The shielded cabling varies with each set according to need. Each component unit of a set is equipped with sufficient shielding, in the form of metallic enclosures and shielded cables, to suppress signal radiation. All signal generators and magnet assemblies in the signal circuitry are shielded by means of metal containers attached to their respective cables. Interconnecting cables join the component units to the ESA by means of metal connectors which screw together for a tight shielded connection.

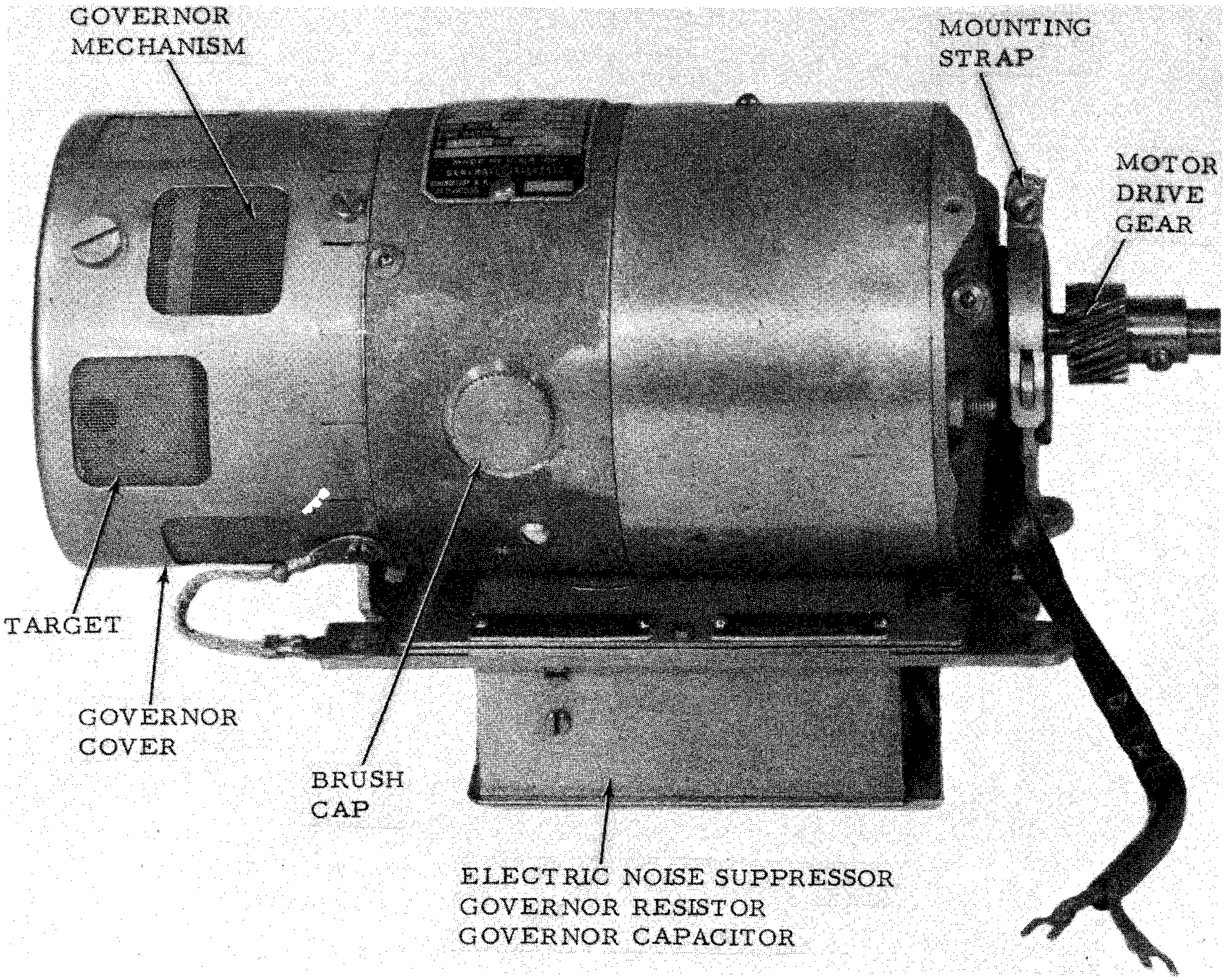


Figure 1-20. Typical Series (Governed) Motor Unit

b. RFI Transmitter Distributor Unit. The RFI application for low-level TD units consists of a double shielded contact box, a contact assembly, a filter card assembly, and a double shielded signal line cable with receptacle (figure 1-21).

(1) Contact Box. The RFI signal generator contact box is composed of an inner metallic box completely enclosed by an outer metallic box. They are physically fastened together with insulating material to provide electrical isolation.

(2) Contact Assembly. The contact assembly is provided with gold-plated contacts to permit low voltage operation. It is electrically insulated from the inner box.

(3) Filter Card Assembly. The filter card assembly is a network of three resistors and a capacitor mounted on a circuit board. It is mounted on the contact assembly within the inner box. When used in conjunction with associated shielded cables, power supplies, and keyer, the filter provides a low-level interface and RFI suppression.

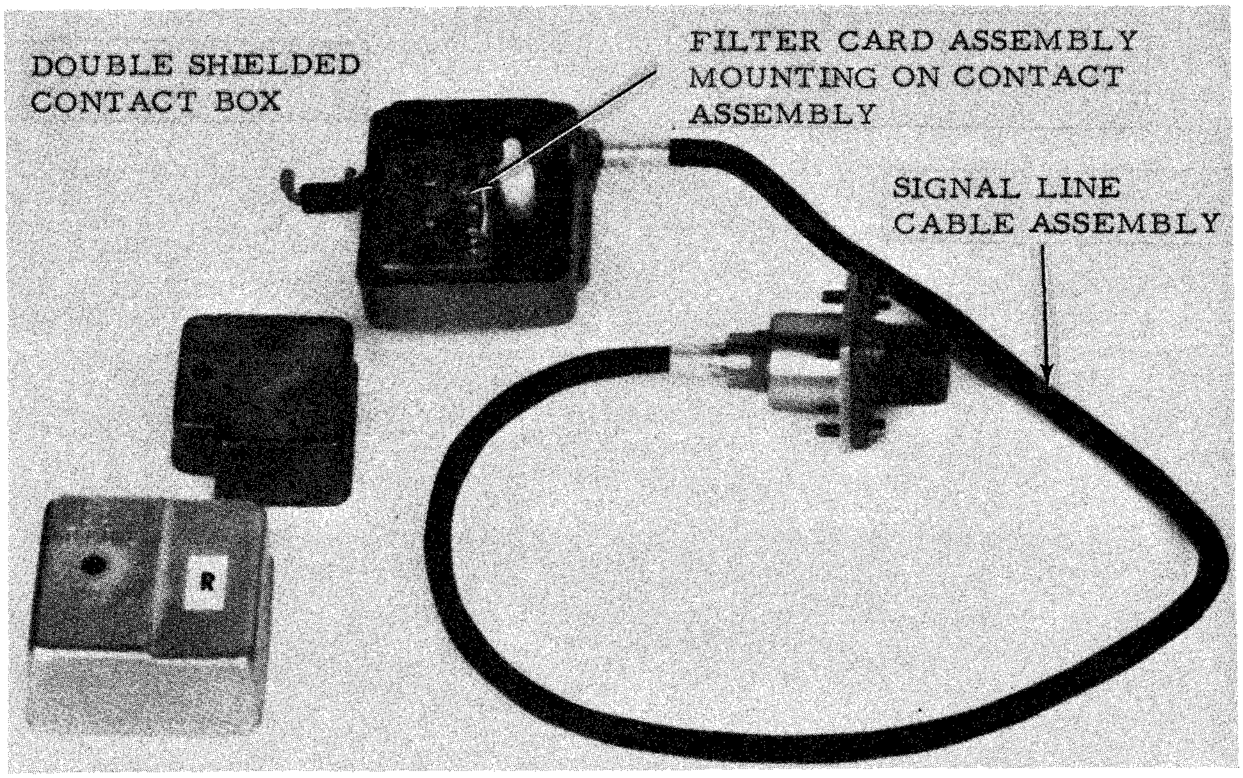


Figure 1-21. RFI Signal Generator Contact Box Assembly

(4) Signal Line Cable Assembly. A double shielded cable assembly is provided to electrically connect the contact box to a three-pin electrical receptacle. The shielded cable is composed of three electrical conductors encircled by braided inner and outer shields. Two of the three internal wires are electrically insulated and transfer the telegraphic signals to associated equipment. The remaining wire is bare and electrically connected to the inner contact box, inner braid shield, and cable receptacle. The inner and outer braided shields are electrically separated from each other and the wires by flexible solid dielectric. The inner braid is electrically connected to the inner contact box and the outer braid is electrically connected to the outer contact box. The cable assembly provides RFI suppression when used with associated RFI equipment.

c. Transmitter Distributor Base. The high-level TD base description in paragraph 1-3.1e is also applicable to the low-level base.

d. Covers. The high-level cover description in paragraph 1-3.1g is also applicable to the low-level cover.

1-4. RELATIONSHIP OF UNITS. Figure 1-1 shows the relationship between a TD set and external interfacing equipment. The communication patching panel (SB-1203A/UG or

SB-1210A/UGQ) is for shipboard use to facilitate interconnection and transfer of teletypewriter equipment and various types of terminal equipment. Refer to NAVSHIPS 0967-LP-874-1010. The power supply (PP-3495( )) is used as a dc loop current power supply for operation of the TD sets. Refer to NAVSHIPS 0967-LP-425-1010. For low-level TD operation, an ESA is used instead of the loop current power supply.

1-5. REFERENCE DATA. Reference data pertinent to TD Model 28 sets, both high- and low-level, are provided in Table 1-1.

1-6. EQUIPMENT SUPPLIED. The matrix, provided in table 1-2, lists the family of TD Model 28 equipment by official Navy nomenclature versus Teletype Corporation code numbers for major assemblies comprising each configuration.

1-7. EQUIPMENT REQUIRED BUT NOT SUPPLIED. Table 1-3 lists tools and test equipment not supplied but required for maintenance and troubleshooting procedures.

Table 1-1. Reference Data

Nomenclature:	Transmitter distributor Refer to table 1-2 for official nomenclatures)
Manufacturer:	Teletype Corporation, Skokie, Illinois
Operating Characteristics:	
Code	5-Level (Baudot)
Operating Speeds	Various speeds up to 100 wpm. Speed varied by making external gear changes.
Tape	Chadless or fully perforated.
Motor Power	From external motor unit.
Ambient operating temperature	40°F to 110°F (Temperature rise should not be in excess of +40°C (72°F) above ambient)
Electrical Characteristics:	
Clutch Trip Magnet Control Circuit	Operates from following external sources: (a) 115 vdc ±10%, 60 Hertz (b) 120 vdc ±10%, with suitable external resistance. (c) 50 vdc ±10%, with suitable external resistance.
Signal current	0.060 or 0.020 on-off direct current applied at signal generator from an external source.
Single contact and multicontact sets ac motor power requirements.	
Input voltage	115 vac ±10%

Table 1-1. Reference Data - Continued

Phase	Single
Frequency	60 Hertz ±0.75%
Input current, starting	9.0 amp
Running current, full load	1.85 amp
Power input	90 watts
Power factor, full load	38.5%
Heat dissipation	50 watts
Horsepower rating	1/20
Miniaturized set ac motor power requirements.	
Input voltage	115 vac ±10%
Phase	Single
Frequency	60 Hertz ±0.75%
Input current, starting	5.0 amp
Running current, full load	1.25 amp
Power input	65 watts
Power factor, full load	55%
Heat dissipation	43.7 watts
Horsepower rating	25 millihorsepower
ESA 0.5 Ampere Power Supply Requirements	
Input	100 to 130 vac, 45 to 66 Hertz. Nominal Power: 55 watts at 115 vac for 25 watts output.

Table 1-1. Reference Data - Continued

Output	(a) +47 to +53 vdc at 0.5 amp max.		
	(b) +6.6 to +7.8 vdc at 0.018 amp max.		
Operating Temperature	+40° to 110°F with cooling fan in cabinet.		
Fusing	(a) ac -- 0.8 amp slow-blowing (TP162360).		
	(b) dc -- 0.5 amp fast-blowing (TP131807).		
<u>Physical Characteristics</u>			
Approximate dimensions (inches)	Height	Width	Depth
Single contact (regular)	7	7-1/2	14-1/2
Single contact (miniaturized)	6	7-1/2	9-1/2
Multicontact	6	9	16
Approximate weight (pounds)			
Single contact (regular)	26-1/2		
Single contact (miniaturized)	15		
Multicontact	26		

Table 1-2. Equipment Matrix - High-Level and Low-Level TD Sets

			COVERS		TRANSMITTER DISTRIBUTORS								BASES						ESA							MOTORS					GEARSETS								
NAVY DESIGNATION		WDP NO.					TT-311/UG	TT-502/UG		TT-496/UG	TT-602/UG									PS(PCB)	CMD(PCB)	LLK(PCB)	TUNING FORK	TABLE	DOLLY	PD-17A/U	PD-18A/U	PD-77A/UG	PD-105/UG	PD-111/UG									OPERATIONAL GEARSET
MANUFACTURERS DESIGNATION			LXDC205BR	LXDC201BR	LXD1	LXD4	LXD11	LXD29	LXD30	LXD31	LXD37	LXD38	LXDB1	LXDB3	LXDB4	LXDB9	LXDB19	LXBD20	TP326792	321290	321991	303142	TP104986	LT200BR	TP173861	LMU3	LMU41	LMU39	LMU38	LMU19	TP156658	TP156659	TP156728	TP173559	TP173595	TP173598	TP305534	TP305536	TP161358
FIGURE NUMBER					5-1	5-2	5-3	5-3	5-2	5-4	5-10	5-10	5-5	5-6	5-6	5-7	5-8	5-11	5-12 5-13	5-16	5-15	5-14				5-9 SHEET 1	5-9 SHEET 2	5-9 SHEET 2	5-9 SHEET 1	5-9 SHEET 1									
HIGH LEVEL / STANDARD SIZE	AN/UGA-7		X							X						X							X	X	X		X								X	X			
HIGH LEVEL / STANDARD SIZE	AN/UGC-66		X				X									X							X	X	X			X							X	X			
HIGH LEVEL / STANDARD SIZE	TT-187/UG		X		X								X													X					X	X	X						
HIGH LEVEL / STANDARD SIZE	TT-273/UG		X		X								X										X				X				X	X	X						
HIGH LEVEL / STANDARD SIZE	TT-273A/UG		X						X					X															X								X	X	
HIGH LEVEL / STANDARD SIZE	TT-533/UG		X				X									X							X				X							X	X	X			
HIGH LEVEL / MINIATURIZED SIZE	TT-187A/UG			X		X									X															X	X	X	X						X
HIGH LEVEL / MINIATURIZED SIZE	TT-187B/UG			X			X								X															X				X	X	X			
HIGH LEVEL / MINIATURIZED SIZE	TT-187C/UG			X					X						X															X	X	X	X						
HIGH LEVEL / MINIATURIZED SIZE	TT-187D/UG			X			X								X															X				X	X	X			
HIGH LEVEL / MINIATURIZED SIZE	TT-187E/UG			X				X									X													X									
LOW LEVEL (MINIATURIZED)	TT-570/UG 28RFT5000B/XXX/AAS/BR	0058		X							X							X	X	X	X	X								X					X				
LOW LEVEL (MINIATURIZED)	TT-603/UG 28RFT5000A/XXX/AAB/BR	0058		X								X						X	X	X	X	X								X		X							

Table 1-3. Equipment Required But Not Supplied

Category	Recommended Equipment	Alternate	Equipment Test Parameters	Application
Telegraph Signal Analyzer	Test Set, Telegraph TS-2616/UGC	Equivalent	Measures timing distortion in start/stop and synchronous data telegraph signals. Refer to NAVSHIPS 0969-125-8010.	Maintenance, Trouble-shooting
Volt-ohm-millia-meter	Multimeter AN/USM-311	Equivalent	AC voltage - 115, 5.6 vac DC voltages - 120, 7.5, 1.5 vdc Direct Current - 60 mA, 70 uA Resistance - Continuity measurements	Maintenance, Trouble-shooting
Tools	Teletype Repair Kit TK-188/U	Equivalent		Maintenance, Repair

CHAPTER 2
OPERATION

2-1. INTRODUCTION. This Chapter describes the operation of Transmitter Distributor (TD) sets Model 28 from a maintenance standpoint. Operation of a TD set when installed as part of a system is covered in the appropriate system manual.

2-2. CONTROLS AND INDICATORS. TD set controls and indicators are shown in figure 2-1 and briefly described in table 2-1.

2-3. OPERATING PROCEDURES. Procedures for operating the TD sets are provided in table 2-2. If abnormal indications are encountered, refer to Chapter 5 for troubleshooting information.

NOTE

If set is a low-level configuration, the proper switch on the associated electrical service assembly (ESA) must be set to the appropriate position for turn-on and turn-off.

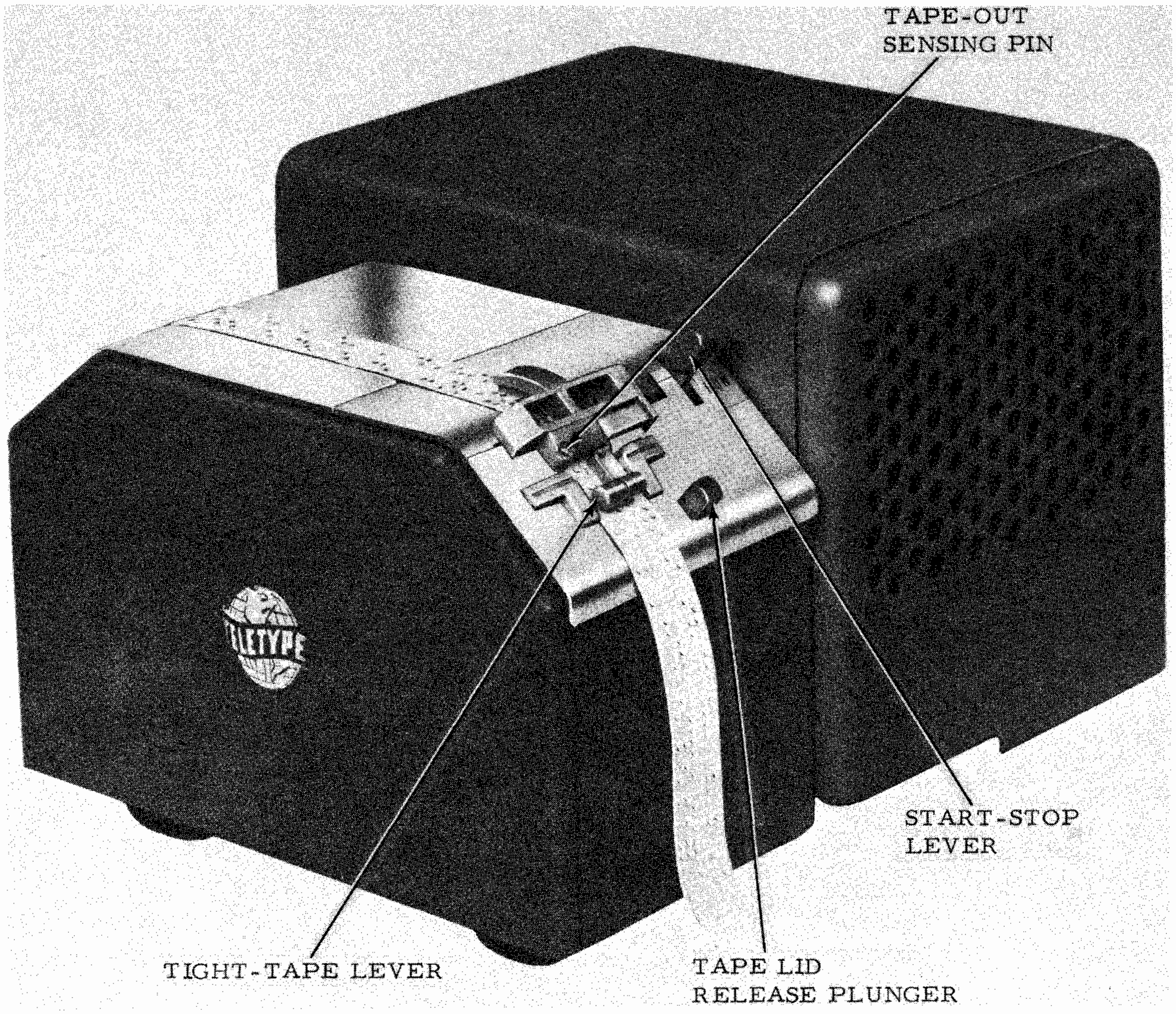


Figure 2-1. TD Set Controls and Indicators

Table 2-1. TD Control and Indicator Functions

Control/Indicator	Function
MANUAL	
Power switch	Applies primary ac power to motor unit. (See figures 1-5 and 1-6) Refer to paragraph 3-2.1a for additional power distribution information.
Tape lid release plunger	When pressed, causes spring-loaded tape lid to snap open.
Start-stop lever	Controls TD operation.
FREE position	Clutch magnet de-energized; tape feed wheel rotates freely, allowing tape to be properly positioned in tape feed mechanism.
RUN position	Clutch magnet energized; tape transmitted through tape feed mechanism.
STOP position	Clutch magnet de-energized; tape transmission stops.
Motor overload reset button	Resets motor unit thermal overload switch. (See figure 1-18.)
AUTOMATIC	
Tight-tape lever	Stops tape transmission if tape lid is lifted due to taut or tangled tape.
Tape-out sensing pin	Stops tape feed mechanism when tape runs out.

Table 2-2. Operating Procedures

Step	Action	Normal Indication
1.	Turn-On. To turn on TD set, proceed as follows:	
	a. Ensure primary ac power source is connected to TD set and is energized.	
	b. Ensure start-stop switch is set to STOP.	
	c. Set power switch to on (up) position.	Motor starts running and drives intermediate gear train and TD unit drive gear quietly and without excessive vibration. NOTE In the event of an obstruction in the mechanism or an overload, the thermal overload switch will interrupt the motor circuit. To reset, allow the switch to cool approximately five minutes; then depress the red button located beneath the left side of the motor.
	d. Remove TD set from signal line by external signal line shunting or by disconnecting signal leads.	
	e. Press tape lid release plunger and insert a perforated tape in place under tape lid.	
	f. Set start-stop switch to FREE position.	Tape moves freely through free-wheeling tape feed mechanism.
	g. Latch tape lid in operating position.	

Table 2-2. Operating Procedures - Continued

Step	Action	Normal Indication
h.	Set start-stop switch to RUN.	Tape feeds through reading head steadily without tearing feed holes or code holes. TD stops automatically when tape has passed the tape out sensing pin. NOTE There are no alarms or indicators on the equipment. Transmission is automatically interrupted in the event of taut or tangled tape or when there is no tape in the reading head. Transmission will resume automatically when the condition is remedied.
2.	Turn-Off. To turn off TD set, proceed as follows: as follows:	
a.	Set start-stop switch to STOP.	
b.	Press tape lid release plunger and remove tape.	
c.	Set TD set power switch to off (down) position.	Motor stops running.

CHAPTER 3
FUNCTIONAL DESCRIPTION

3-1. INTRODUCTION. This Chapter provides a functional description of Transmitter Distributor (TD) Sets Model 28 presented in a three-level format. The first-level discussion is an overall functional description. The second-level discussion is a detailed functional description supported by a functional block diagram. The third-level discussion provides detailed descriptions of electrical circuits and mechanical assemblies. Electrical circuit discussions are supported by schematic and wiring diagrams included in Chapter 5, Troubleshooting.

3-2. OVERALL FUNCTIONAL DESCRIPTION. High-level TD sets are discussed in paragraph 3-2.1 and low-level TD sets are discussed in paragraph 3-2.2.

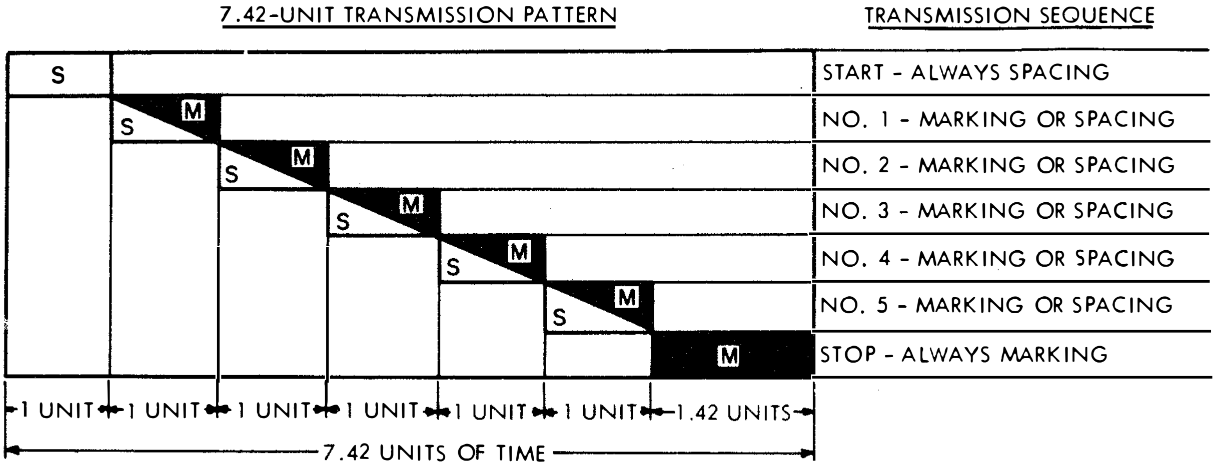
3-2.1 OVERALL FUNCTIONAL DESCRIPTION (HIGH-LEVEL). Functions of high-level TD sets are discussed in the following paragraphs.

a. General. TD equipment is for transmission of messages only. Coded representations of alphabetical and numerical symbols and teletypewriter functions are read from pre-punched tape and converted into electrical signal intelligence for connecting two or more ships or stations equipped with compatible units. Operation of the sets is fully automatic when tape is properly installed in the reading head, the main power switch is in ON position, and the start-stop switch is in RUN position.

(1) The signals transmitted by TDs are of the neutral type (open and close) direct current, 7.42 unit start-stop pattern, with a nominal speed of 368-operations per minute (opm). Gearing changes can adapt the equipment to 460 or 600 opm, with equivalent word speeds of 60, 75 or 100-words per minute (wpm). The equipment will operate on either 0.060 or 0.020 ampere signal current, externally supplied.

(2) TDs are powered by self contained ac synchronous motors. The motors require a power supply of 115 volts ac (plus or minus 10 percent), 60 Hertz, single phase alternating current. To avoid loss in receiving margin with this type of motor, the frequency regulation must be within plus or minus one-half cycle. Governed motors and motors operating on direct current are available for Transmitter Distributor TT-187/UG only but are not furnished with the set.

b. Signaling Code. TD sets operate on the principle of electro-mechanical conversion of message characters, equivalent to alphabetical or numerical characters or standard teletypewriter functions (figure 3-1). Teletypewriter equipment utilizes the Baudot code, a five-unit start-stop signaling code in which each character or function is represented by a combination of current and no-current time intervals. In a neutral teletype circuit, intervals during which current flows in the signal circuit are referred to as "marking"



FIGURES	–	?	:	$	3	!	&		8	'	(	)	.	,	9	Ø	1	4	Δ	5	7	;	2	/	6	"	≀	<	≡	■	∀	∧
LETTERS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	BLANK	C.R	L.F.	SPACE	LTR.	FIG.
1	●	●		●	●	●				●	●						●		●		●		●	●	●	●					●	●
2	●		●				●		●	●	●	●				●	●	●			●	●	●						●		●	●
FEED HOLES	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
3			●			●		●	●		●		●	●		●	●		●		●	●		●	●					●	●	
4		●	●	●		●	●			●	●		●	●	●			●				●		●				●			●	●
5		●					●	●				●	●		●	●	●			●		●	●	●	●	●					●	●

Figure 3-1. Signaling Code

elements, and intervals during which no current flows as "spacing" elements. Every combination includes five elements that carry the intelligence, each of which may be either marking or spacing.

(1) The intelligence elements are preceded by a start element (always marking) which is 1.42 times as long as each of the other elements. Thus, each combination consists of 7.42 units of time (referred to as a 7.42 unit transmission pattern). The start and stop elements provide for mechanical synchronization between the transmitting and receiving equipment. A graphic illustration of the marking and spacing elements in each sequence may be found in figure 3-2, Code Representation of the Letters "R" and "Y". All five elements are marking in the letters code. The blank code is comprised of five spacing elements.

(2) Some telegraph systems employ a 7.00 unit transmission pattern in which the stop element is equal to each of the other elements. Interoperation between 7.42 and 7.00 apparatus is satisfactory providing the operating speeds selected yield identical pulse lengths. (See table 3-1.) The signaling frequency is expressed in dot cycles per second. One cycle consists of one current pulse followed by a no-current pulse. The equipment speed in baud is equal to twice the frequency. Speed in words per minute is roughly equivalent to

Table 3-1. Interoperation of 7.42 and 7.00 Transmission Pattern

Transmission Pattern	Operations Per Minute	Baud	Pulse Length (Seconds)	Frequency (Cycles Per Second)	Characters Per Second	Words Per Minute
7.50	360	45.5	0.022	22.75	6.1	60.6
7.42	368	45.5	0.022	22.75	6.0	60.0
7.00	390	45.5	0.022	22.75	6.5	65.0
7.50	400	50.0	0.020	25.0	6.7	66.6
7.42	404	50.0	0.020	25.0	6.7	67.3
7.00	428	50.0	0.020	25.0	7.1	71.4
7.42	460	56.9	0.0175	28.45	7.7	75.0
7.50	600	75.0	0.0133	37.5	10.0	100.0
7.42	600	74.2	0.0135	37.1	10.0	100.0
7.00	636	74.2	0.0135	37.1	10.6	106.0

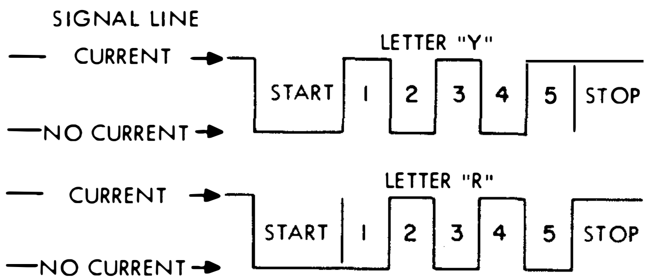


Figure 3-2. Code Representations of the Letters "R" and "Y"

one-sixth the operations per minute.

(3) The TD uses a single camshaft to start, and sequentially perform, the functions of sensing the intelligence stored in a perforated tape. An electrical contact is linked to certain mechanisms to translate the intelligence sensed into pulses of current (marking) and no current (spacing). The unit accepts either chadless or fully perforated tape (figure 3-3).

c. Functions. The basic operation of the TD is to mechanically sense perforated tape and transfer the information to the signal generator, which performs the actual signal transmission (figure 3-4).

(1) The TD can be thought of as having two basic functions. The transmitter (tape reader) senses or reads the punched code combinations in the tape and transfers this data mechanically to the distributor. The distributor (signal generator) converts the parallel signal from the transmitter into sequential, start-stop signals for distribution on line.

(2) The signal generator assembly includes a contact toggle assembly, a drive link, a cover, and an eccentric for adjusting the signal contacts. The signal contacts may be made of either tungsten or gold-plated tungsten.

NOTE

Gold-plated contacts may be used for both standard applications (including those with data sets) and special low-level applications. However, once used for standard application, they may not be suitable for special low-level application.

(3) The following operating mechanisms of the TD are contained between three parallel plates:

(a) The tape sensing mechanism which consists of a bank of sensing pins, each with its corresponding transfer lever and latchlever (figures 3-4 and 3-5).

(b) The main shaft assembly, (figures 3-4 and 3-5) which is centrally located in the lower portion of the unit, has the outer race of each ball bearing clamped to the respective front and rear plates. The main shaft assembly consists of multiple cams,

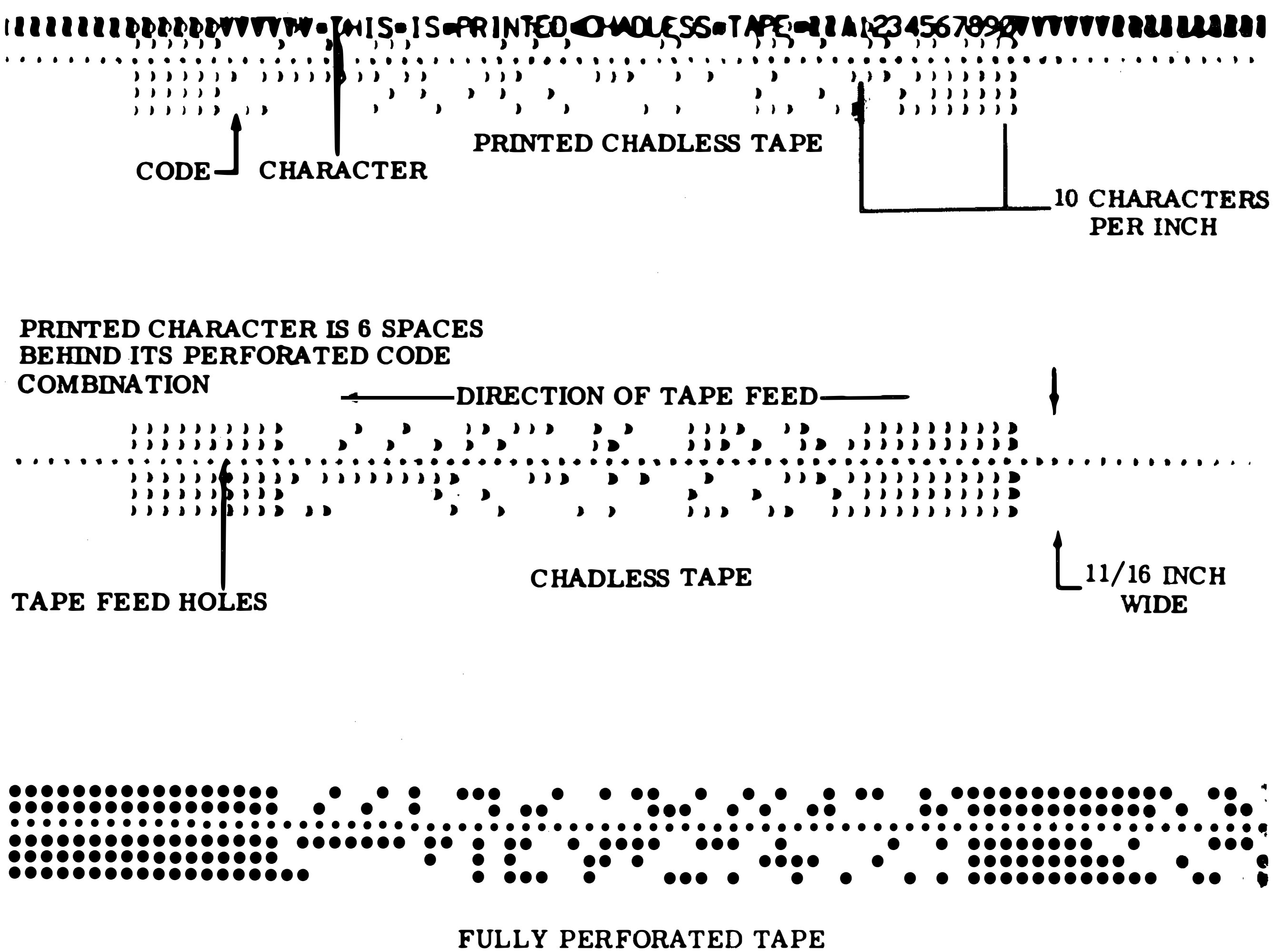


Figure 3-3. Standard 5-Level Perforated Tapes

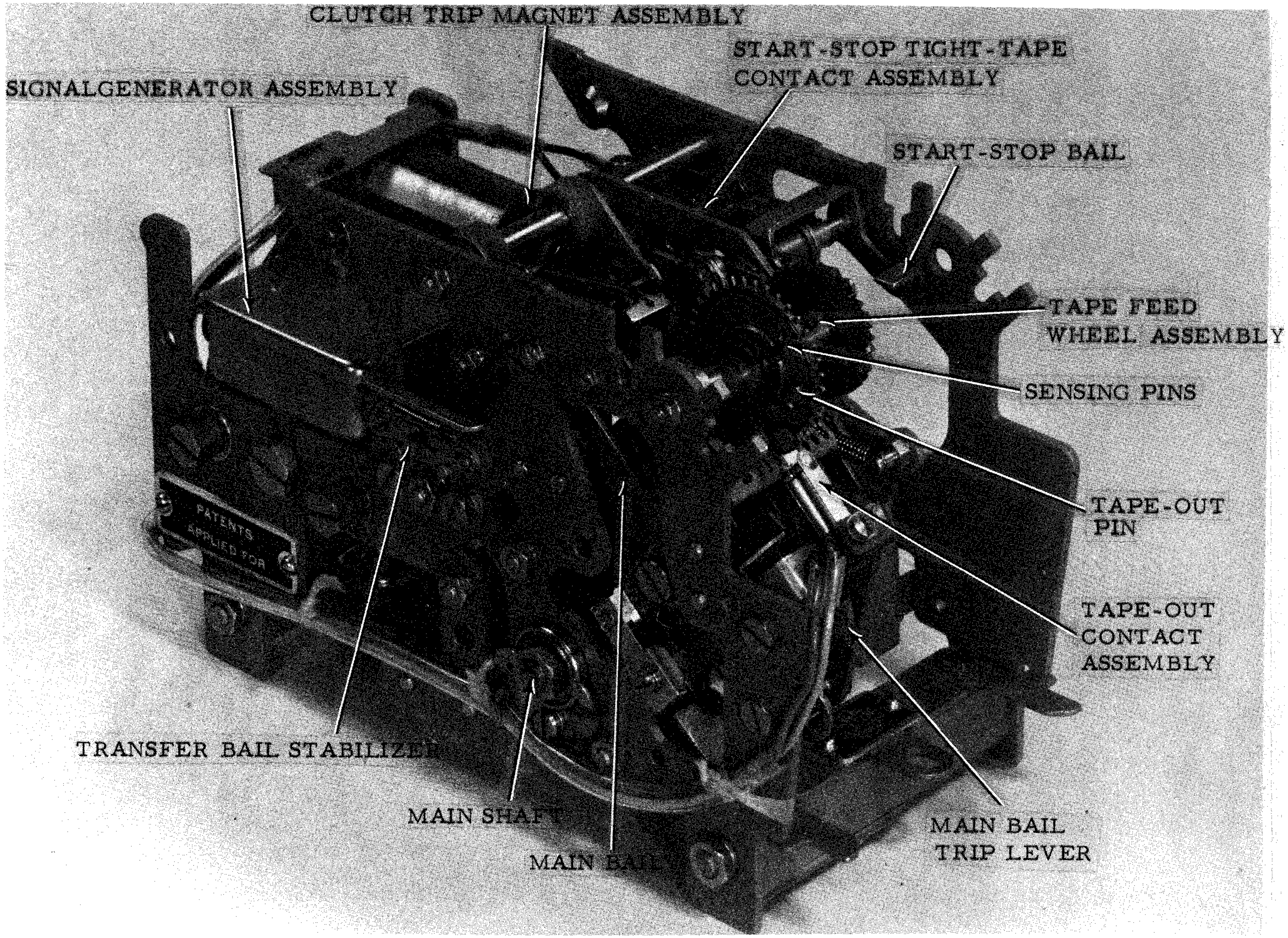


Figure 3-4. Transmitter Distributor Unit (Cover Plate, Top Plate and Tape Guideplate Removed)

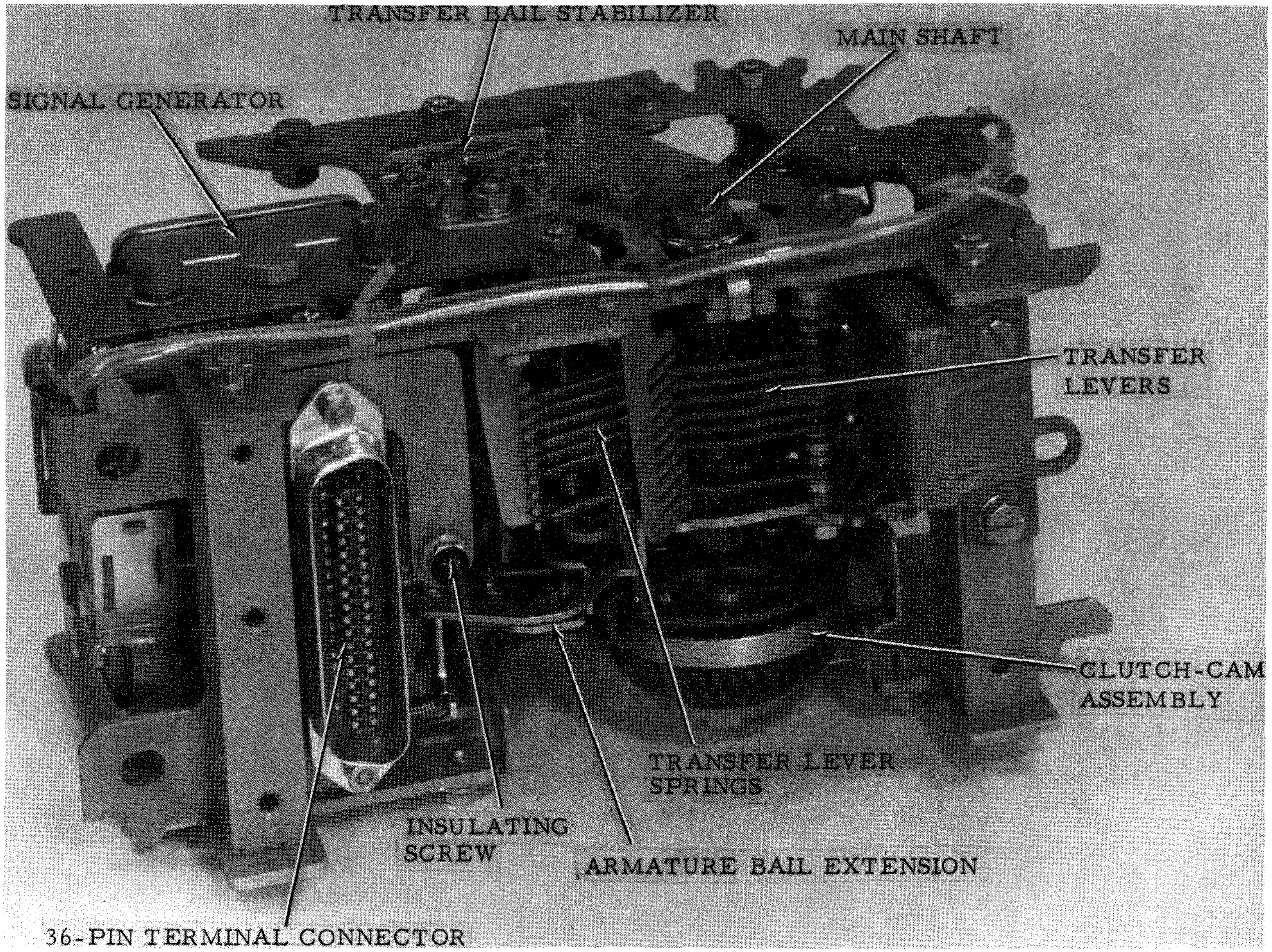


Figure 3-5. Transmitter Distributor Unit - Bottom View

eccentrics, and a clutch. Motor power to the shaft is obtained from an external source and is controlled by the clutch and the clutch trip magnet assembly.

(c) A tape feed mechanism that accommodates either chadless or fully perforated tape.

(d) A tape-out pin (figure 3-4), located to the right of the sensing pins, stops transmission if there is no tape in the sensing head (figure 3-6).

(e) A quick disconnect 36-pin terminal or plug which aligns with its mate on a base, facilitates making electrical connections (figure 3-5).

(f) A nylon insulating screw is mounted on the connector bracket and adjusted to align with, and actuate the "Line Shunt Switch" on the associated base (figure 3-5).

(4) The tape lid has the following components:

(a) A three-position control lever for manual control of the unit. The lever positions are FREE, STOP, and RUN.

(b) A pair of adjustable guides (figure 3-6) for aligning and locating 11/16- or 7/8-inch wide tape over the feedwheel. An index line is scored in the tape guides 0.600 inch (6 characters) ahead

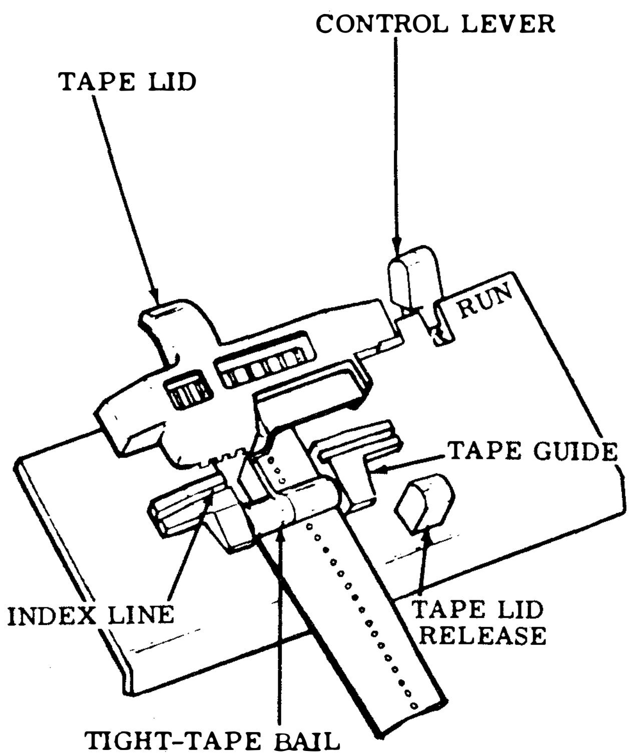


Figure 3-6. Tape Guideplate

of the sensing pins to aid in aligning the tape.

(c) A tight-tape device on the tape lid stops transmission if the tape becomes taut or tangled.

(d) A spring-loaded tape lid (figure 3-6) that snaps open when the red tape lid release plunger is depressed.

3-2.2. OVERALL FUNCTIONAL DESCRIPTION (LOW-LEVEL). The high-level TD discussion in paragraph 3-2.1 is also applicable to low-level equipment. Low-level TD operation is accomplished by incorporating a radio frequency interference (RFI) suppressed signal generator contact box assembly and an electrical service assembly (ESA). The ESA permits use of a low-level signaling code on the signaling lines (+6 volts mark and -6 volts space). The low-level signaling code along with the shielded contact box assembly, which uses gold-plated contacts, suppresses spurious radiations of communications intelligence thus assuring signal line privacy.

3-3. DETAILED FUNCTIONAL DESCRIPTION. The following paragraphs, used in conjunction with the TD functional block diagram (figure 3-7), describe the operation of the TD mechanical assemblies in detail. Discussions are applicable to both high-level and low-level TD sets unless otherwise noted. Electrical circuits are discussed in paragraph 3-4.

a. TD Action. The operating cycle starts with the transmitter distributor in the idle signal line condition, the drive motor running, tape in the unit, and the external portions of the transmitter distributor circuits complete. Moving the control lever (figures 3-6 and and 3-8) to the RUN position, energizes the clutch trip magnet by completing the circuit through the start-stop and tight-tape contact assembly. Thus, the contact closes to complete the clutch trip magnet circuit, energizes the magnet, and pulls the armature up. The armature bail extension (figure 3-9) cams the main bail latchlever about its pivot post to release the main bail.

(1) The clutch trip bail is reset by an eccentric on the main bail. The eccentric rides in the slot of the clutch trip bail. When the eccentric on the spring biases main bail cams the clutch trip bail, the trip bail, in turn, moves the clutch trip lever (figure 3-9) away from its latch. When the main bail is released, the clutch trip bail is also released by the interconnection. The main bail swings up drawn by the main bail spring and causes two actions to occur.

(2) First, the main bail raises the feed pawl (figure 3-10) one tooth on the feedwheel ratchet. Secondly, the main bail permits the sensing pins to rise to read the perforations in the tape. If any of the sensing pins sense a perforation in the tape they extend upward through the perforations until stopped by the spacer on the main bail, and in extending upward rotate their associated transfer levers up.

(3) In rotating upward, the transfer lever extensions are brought above the line of action of the blade on the locking bail. If any of the sensing pins do not sense a

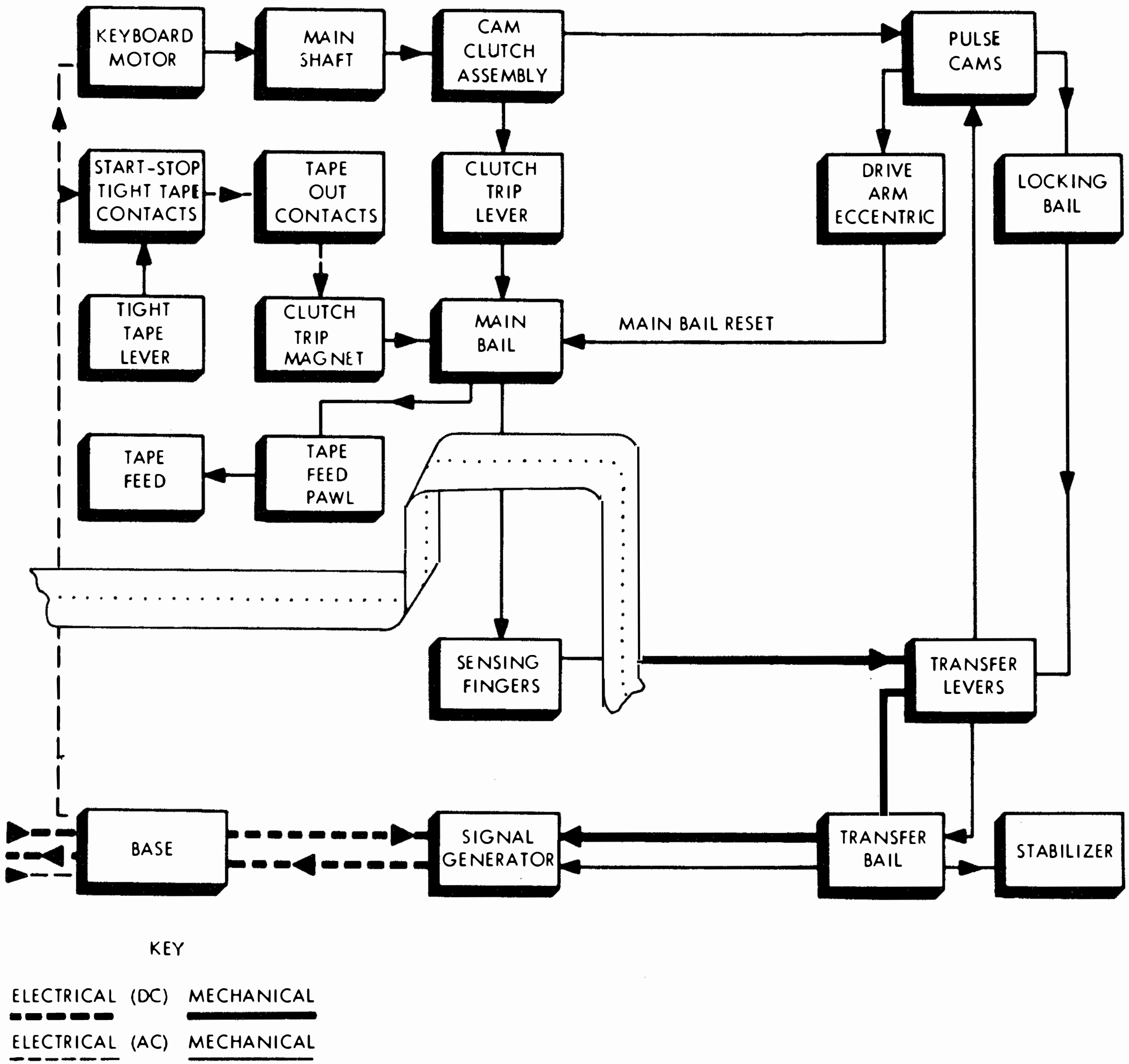


Figure 3-7. TD Functional Block Diagram

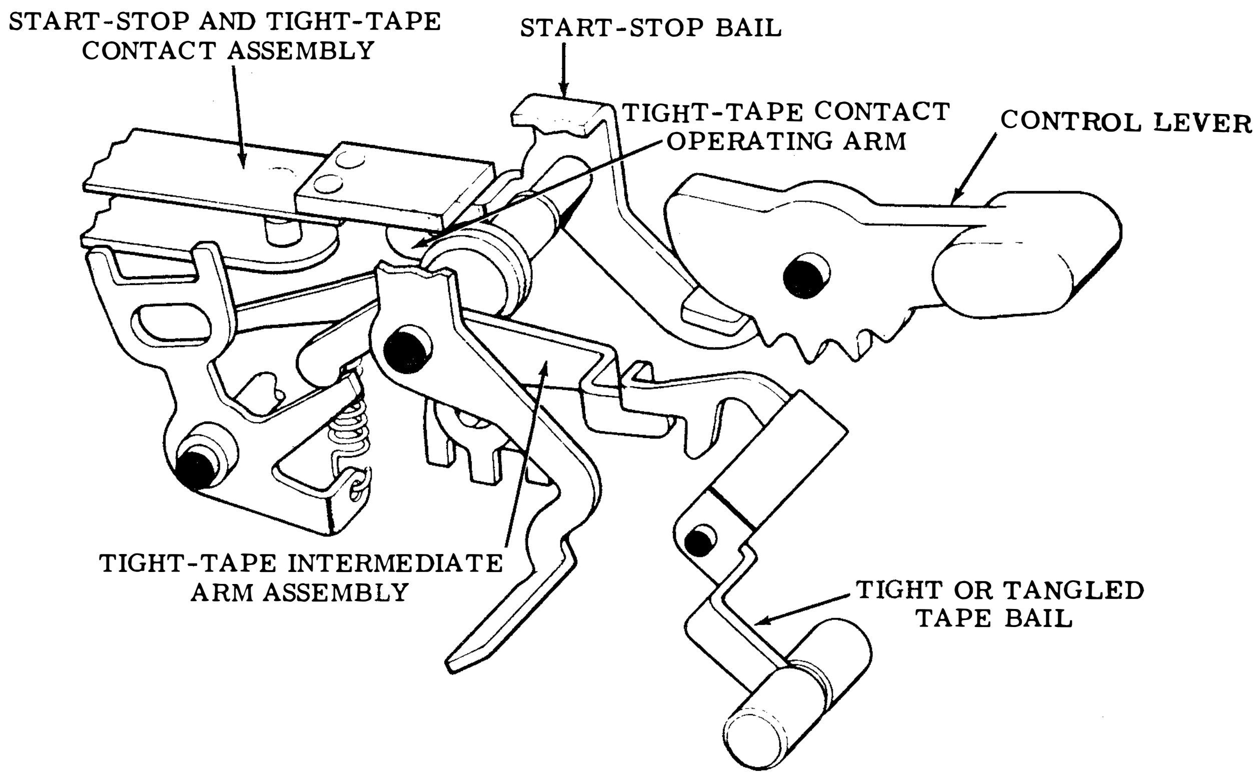


Figure 3-8. Start-Stop and Tight-Tape Switch Mechanisms

perforation in the tape, the associated transfer levers remain stationary. The extensions on these transfer levers remain below the line of action of the locking blade on the locking bail (figure 3-11).

(4) During the movement of the main bail, the clutch trip bail pivots on its axis and pushes the clutch trip lever away from the shoe release lever to engage the clutch and start the camshaft rotating (figure 3-9).

(5) As the camshaft continues its rotation, the high part of the locking bail cam moves away from the locking bail and permits the locking bail to be pulled up by its spring. In its upward travel, the locking blade of the bail is positioned between the lower extension of the selected transfer levers and locks them into position (figure 3-11).

(6) Further rotation of the main shaft moves the lobe of the start cam into position so it cams its respective transfer lever. Since the start transfer lever has no sensing pin, the lever is always in the spacing position. The start transfer lever upper finger hocks the upper side of the transfer bail and causes it to pivot clockwise. The transfer bail extension (figure 3-12) moves the signal generator drive link causing the toggle to open the marking contact and close the spacing contact in the signal generator contact assembly. The extension, in moving to the spacing position,

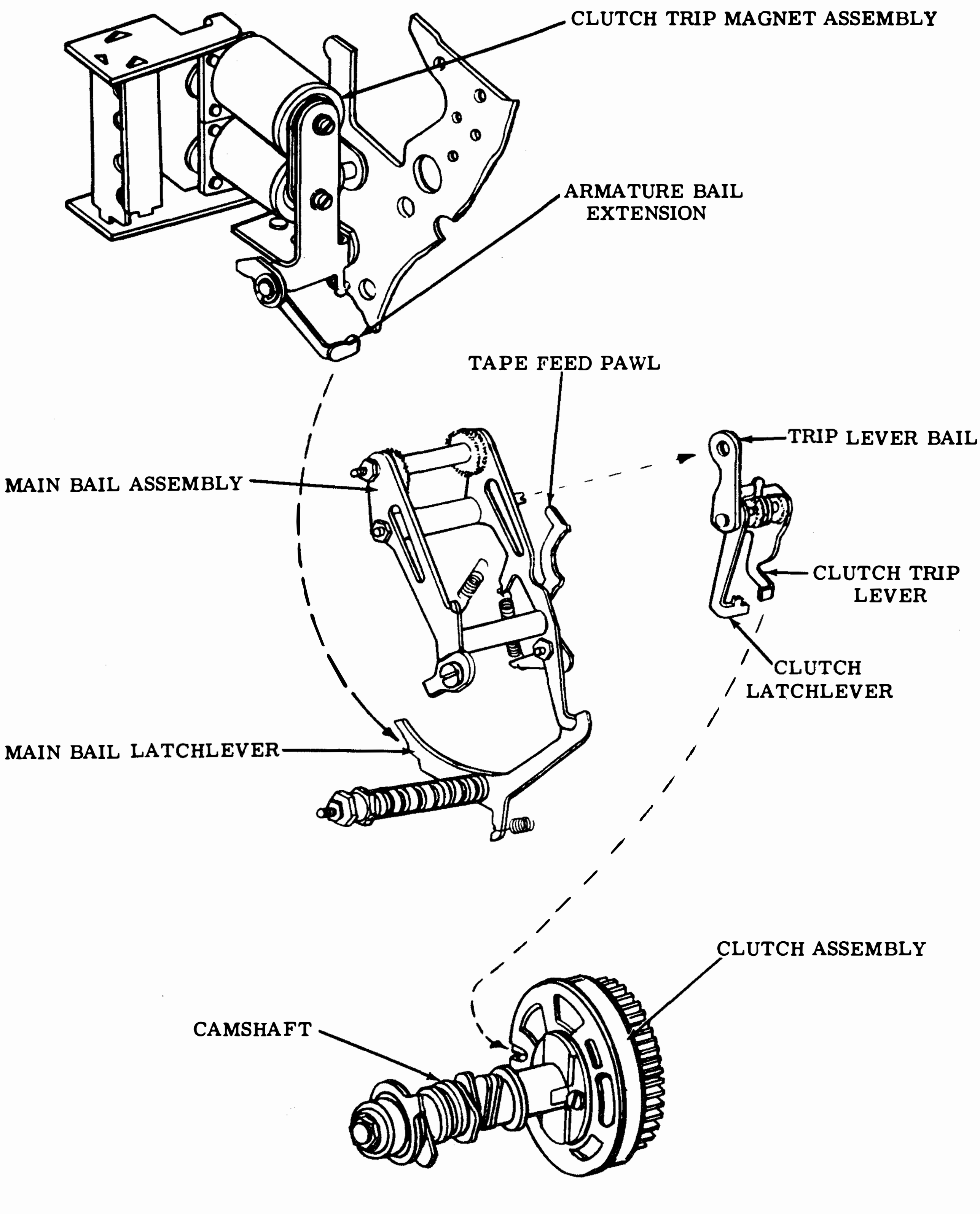


Figure 3-9. Function Control Mechanism

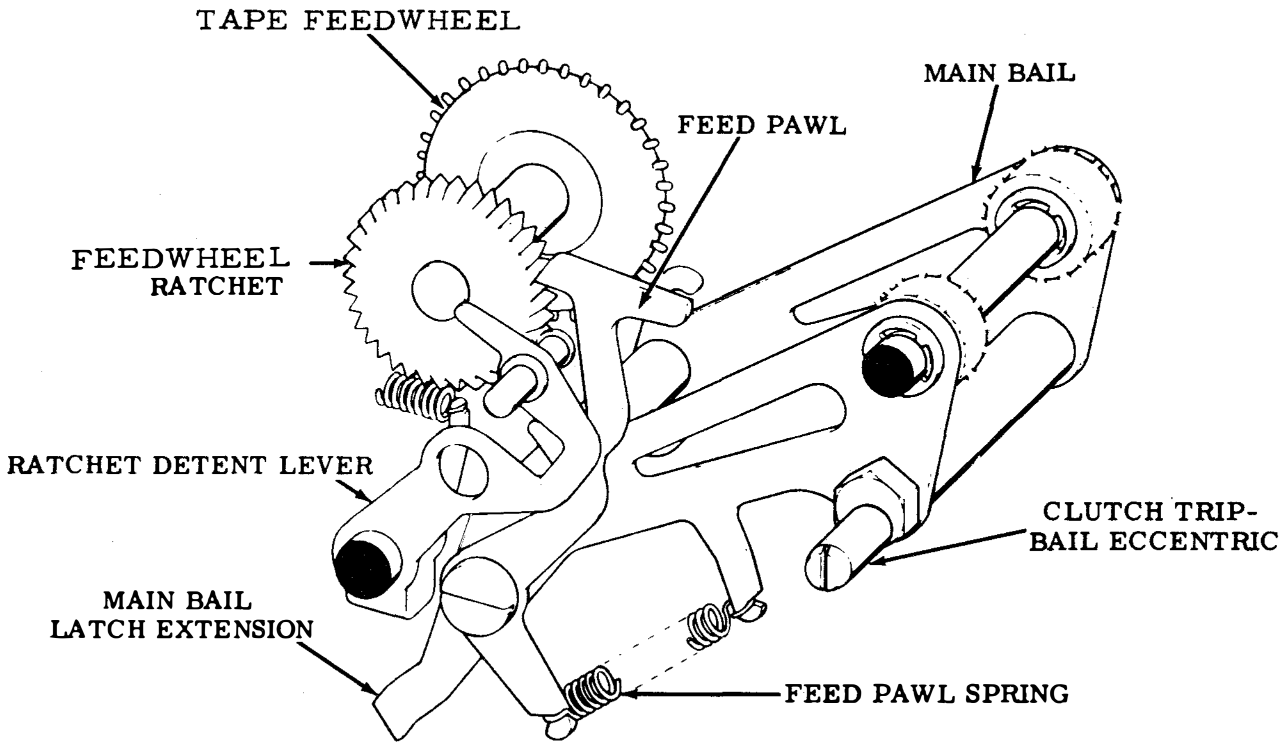


Figure 3-10. Tape Feed Mechanism - Rear View

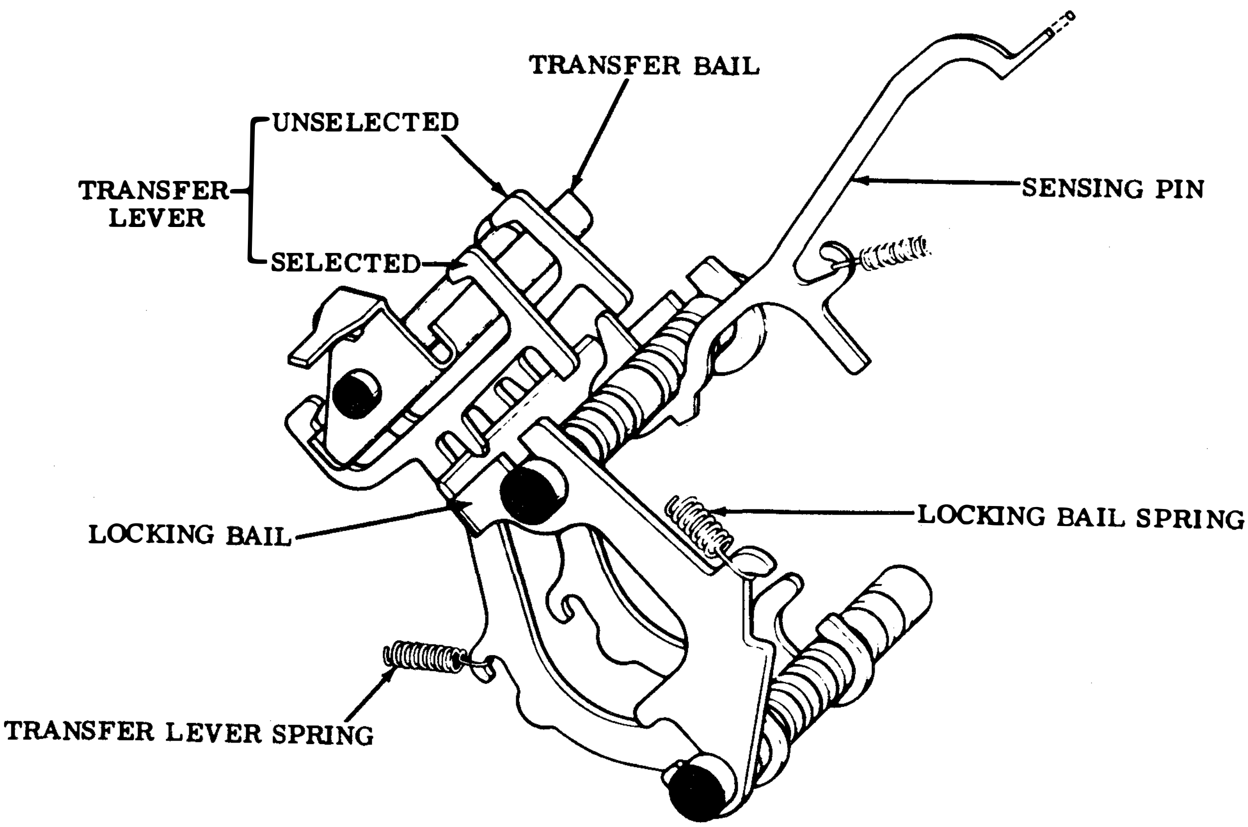


Figure 3-11. Locking Bail and Transfer Lever Mechanisms

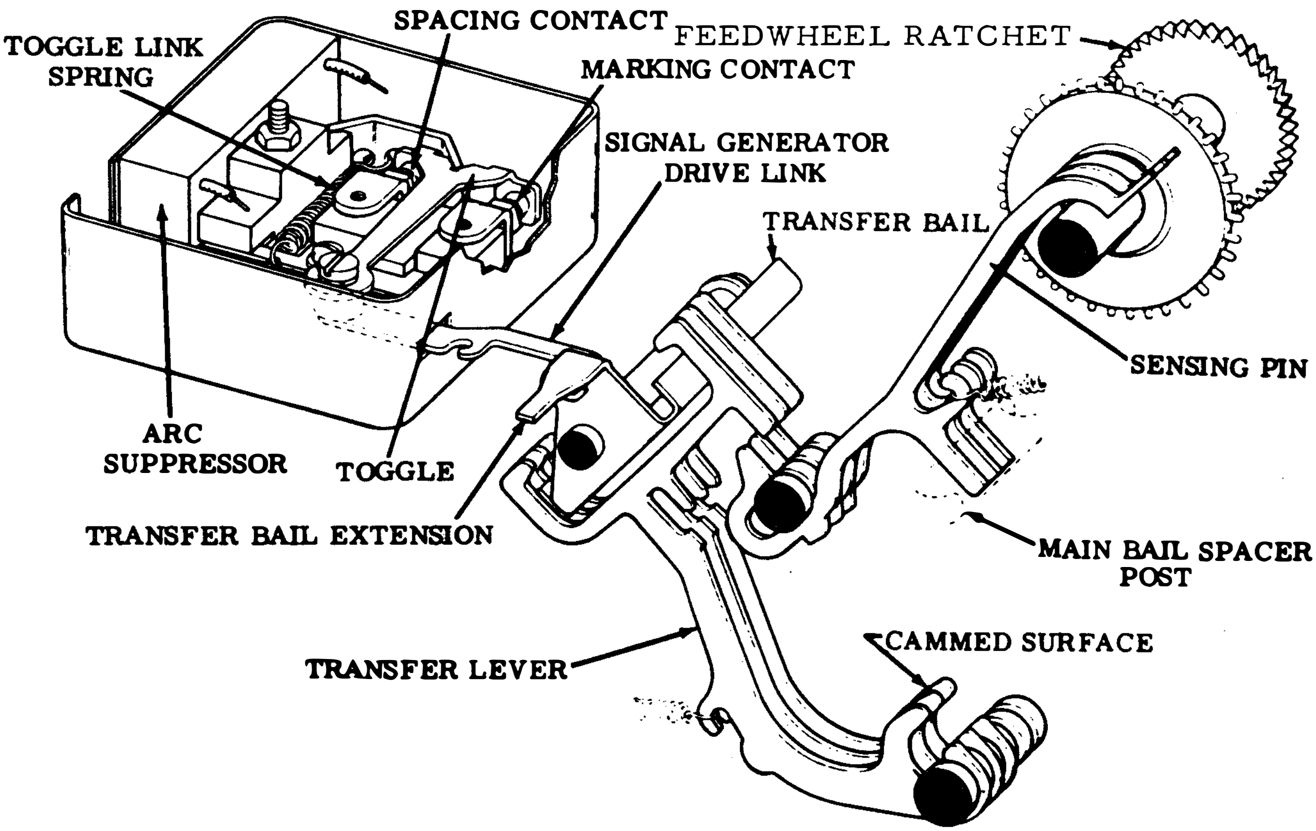


Figure 3-12. Transfer Lever and Signal Generator Mechanisms

forces the marking latch on the stabilizer (figure 3-13) out of its way and continues its travel far enough to let the spacing latch fall into the latching position simulating a detent action.

(7) The shaft continues its rotation until the cam for the first pulse (figure 3-14) cams its transfer lever. Depending on the position of the transfer lever finger, upper or lower, the transfer bail (figure 3-15) is rotated if the pulse to be transmitted is not the same as the preceding pulse. If the preceding pulse is the same, no action occurs because the bail has previously been rotated. However, if the preceding pulse is different, the extension on the transfer bail moves the drive link and causes the toggle to open the closed contact and close the open contact. The extension also forces its way past the latch and continues its way until the opposite latch on the stabilizer can fall into position.

(8) The action of the cams for the second, third, fourth, and fifth pulses follow the action of the first pulse in order and repeat the same action as described for the first pulse (figure 3-14).

(9) The cam for the stop pulse follows that of the fifth pulse and the train of action is the same as that of the first pulse except that the stop pulse has no sensing pin, and its transfer lever is blocked. Thus, its lower finger

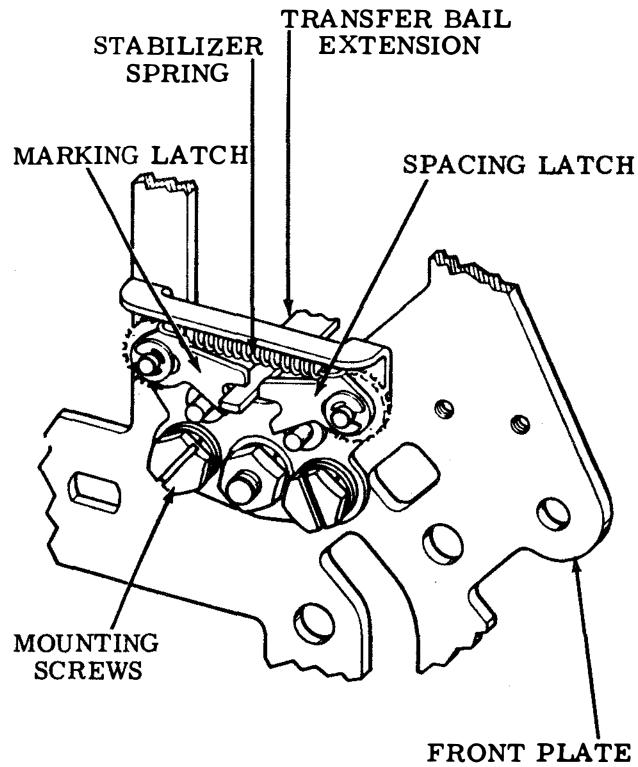


Figure 3-13. Transfer Bail Stabilizer

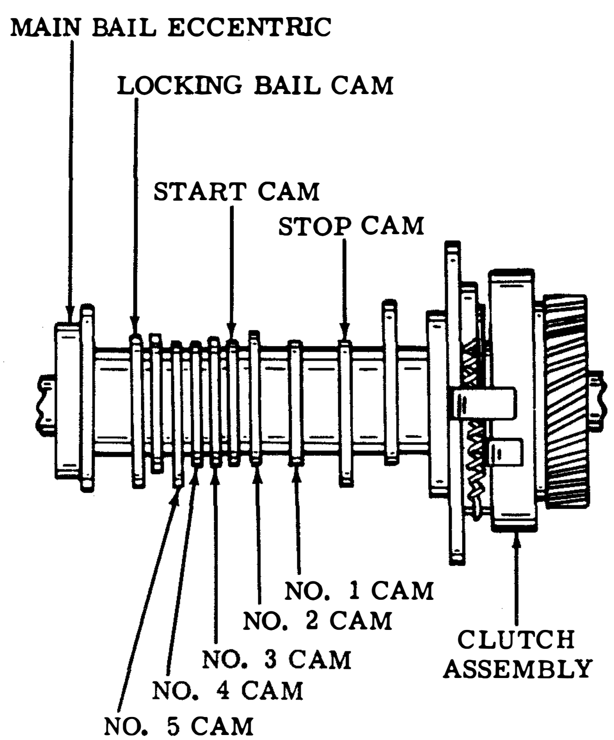


Figure 3-14. Clutch Camshaft Assembly

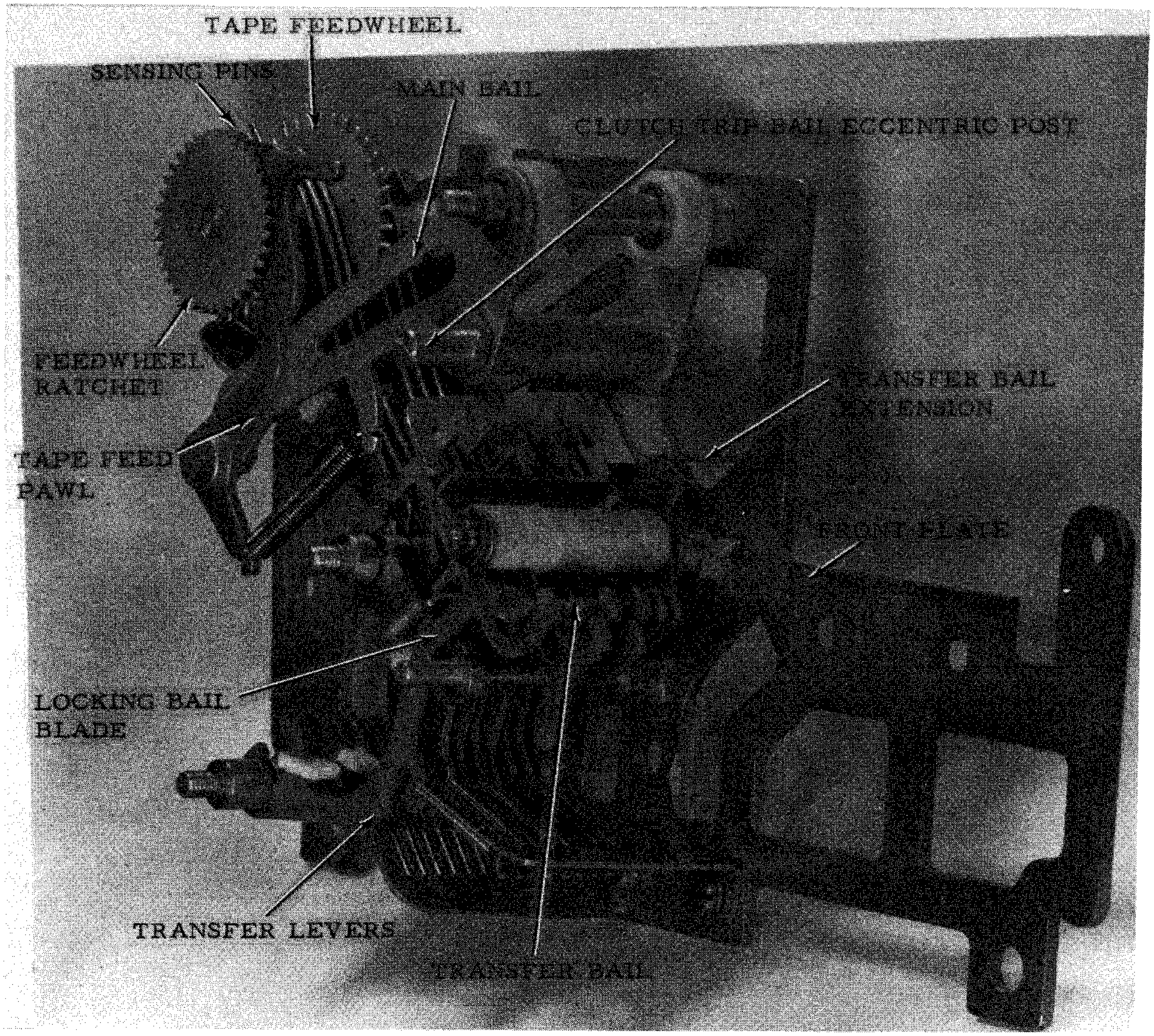


Figure 3-15. Front Plate Assembly - Rear View

always hooks the transfer bail causing a marking pulse on the completion of each character.

(10) The tape feed pawl (figure 3-16) advances the tape feed ratchet one tooth against the action of the ratchet detent roller. The tape feed ratchet is part of the tape feedwheel. The tape feedwheel advances the tape one character. The ratchet detent roller bears between two teeth on the ratchet and serves to hold the feed-wheel and tape in position during the sensing portion of the operating cycle.

(11) Since the clutch trip bail does not latch, the drive arm moves again to its upper position. In so doing, repetition occurs when the main bail swings up, and the main shaft starts to rotate until the unit runs out of tape.

b. Stopping the Action The code sensing pins cannot differentiate between a no tape condition and perforations; therefore, the unit operates as if five perforations were sensed and goes through the actions previously described. However, if the tape-out sensing pin senses that there is no tape in the unit, the tape-out pin moves upward, lifting the swinger pad of the tape-out contact assembly and opens the clutch trip magnet circuit.

(1) Since the tape out contacts are in series with the start-stop and tight-tape contacts, the clutch trip magnet becomes de-energized and releases its armature. This action permits the armature extension to pivot out of its blocking position and allows the main bail latchlever to be moved by its spring (figure 3-9).

(2) As the main bail is latched, the clutch trip lever blocks the clutch shoe lever. When the clutch shoe lever is blocked the inertia of the mechanism causes the clutch to rotate far enough to permit the clutch latch to fall into the notch on the clutch cam disc.

c. Clutch Operation. Clutch functions are discussed in the following paragraphs.

(1) Clutch Engaged. The clutch is engaged (figure 3-17) by releasing the low end of lever B. The upper end of lever B 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 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 secondary shoe then bears against the drum at point H. The revolving drum acts to drive this shoe upward so that it again makes contact with the drum at point I. Since the forces involved are multiplied at each suceeding step, the final force developed at point I is very great. This force is applied to the lug J on the clutch cam disc causing it to turn in step with the drum. The cam disc on the clutch, connected to the camshaft, imparts a rotary motion to the cam assembly.

(2) Clutch Disengaged. The clutch is disengaged (figure 3-18) by

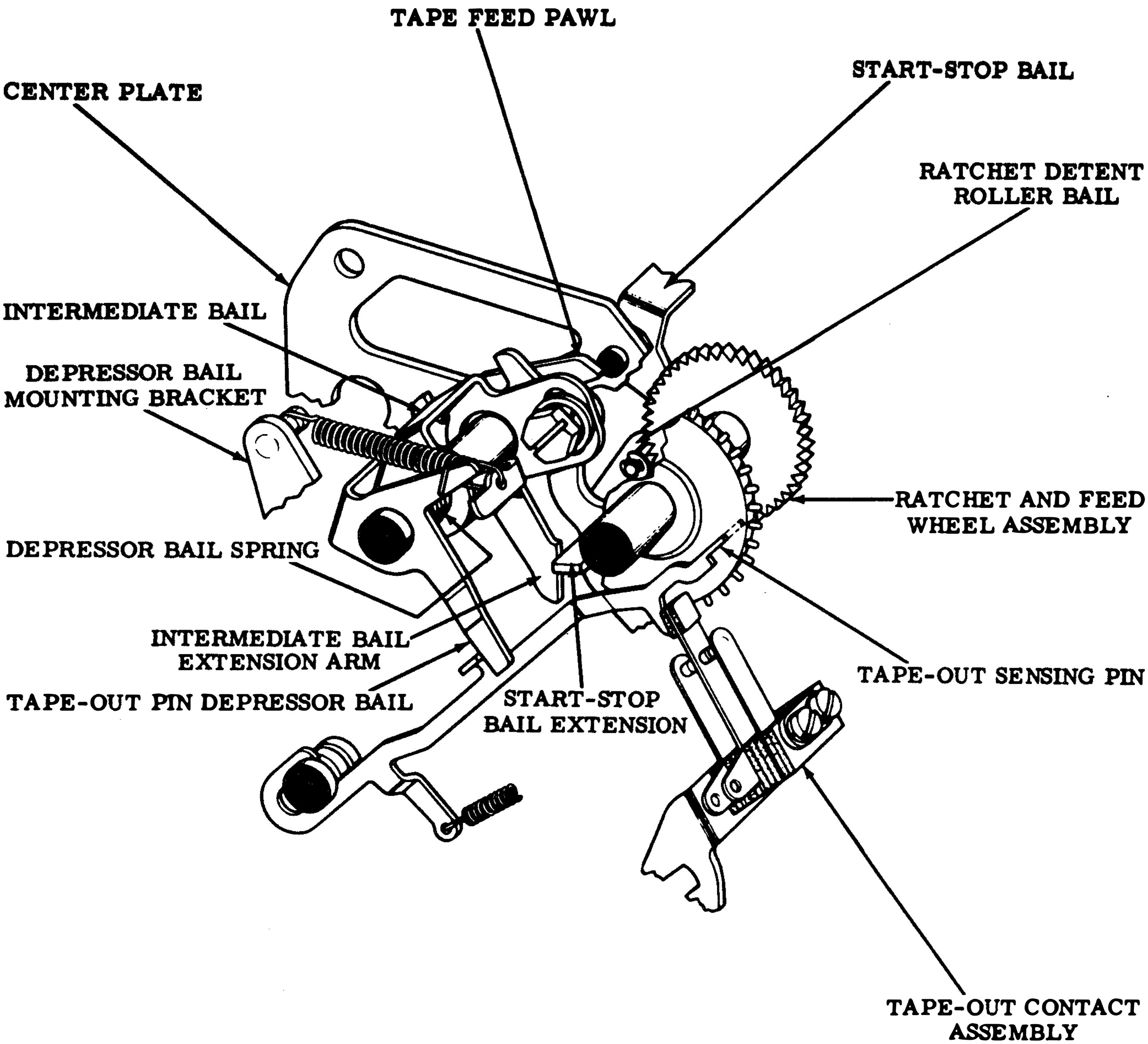


Figure 3-16. Freewheeling and Tape-Out Mechanisms

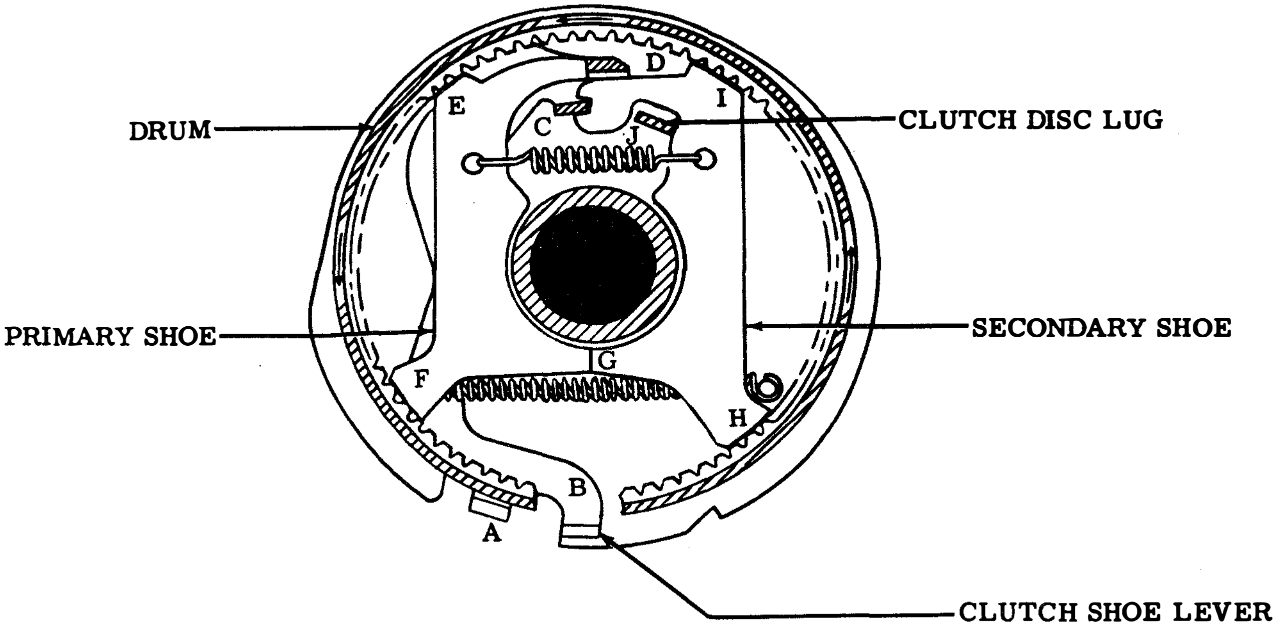


Figure 3-17. Clutch Engaged

bringing together lug A on the clutch cam disc and the lower end of the clutch shoe lever B. The upper end of 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.

d. Tape Lid Operation. Functions of the tape lid are discussed in the following paragraphs.

(1) Opening. When the tape lid release plunger (figure 3-19) is pressed, the shaft portion of the plunger presses against the tape lid plunger bail extension causing the bail to pivot. The bail, in pivoting, moves its latching extension from under the tape lid latching post to swing down under action of its spring. Since the latching post is mounted on the tape lid behind the pivot point and below the tape guideplate, it causes the main part of the tape lid to swing upward (open) when the post swings downward.

(2) Closing. The tape lid is manually closed by pressing it down against the tape guideplate. As the tape lid is closed, the latching post swings up and cams the latching extension out of its way until it passes the end of the extension which then is pulled under the post, by spring action, latching the post and tape lid.

e. Control Lever. Control lever functions are discussed in the following paragraphs.

(1) RUN Position. To start transmission, the transmitter distributor unit must be in an idle signal line condition, the drive motor running, tape in the unit, and the external portions of the transmitter distributor circuits

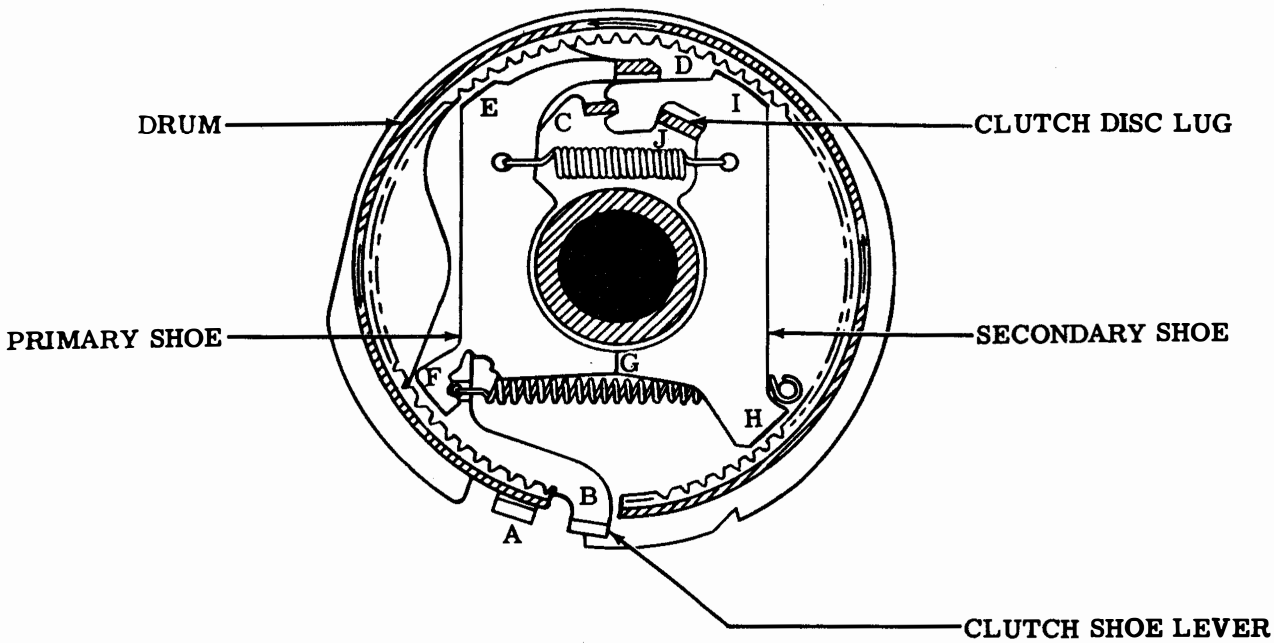


Figure 3-18. Clutch Disengaged

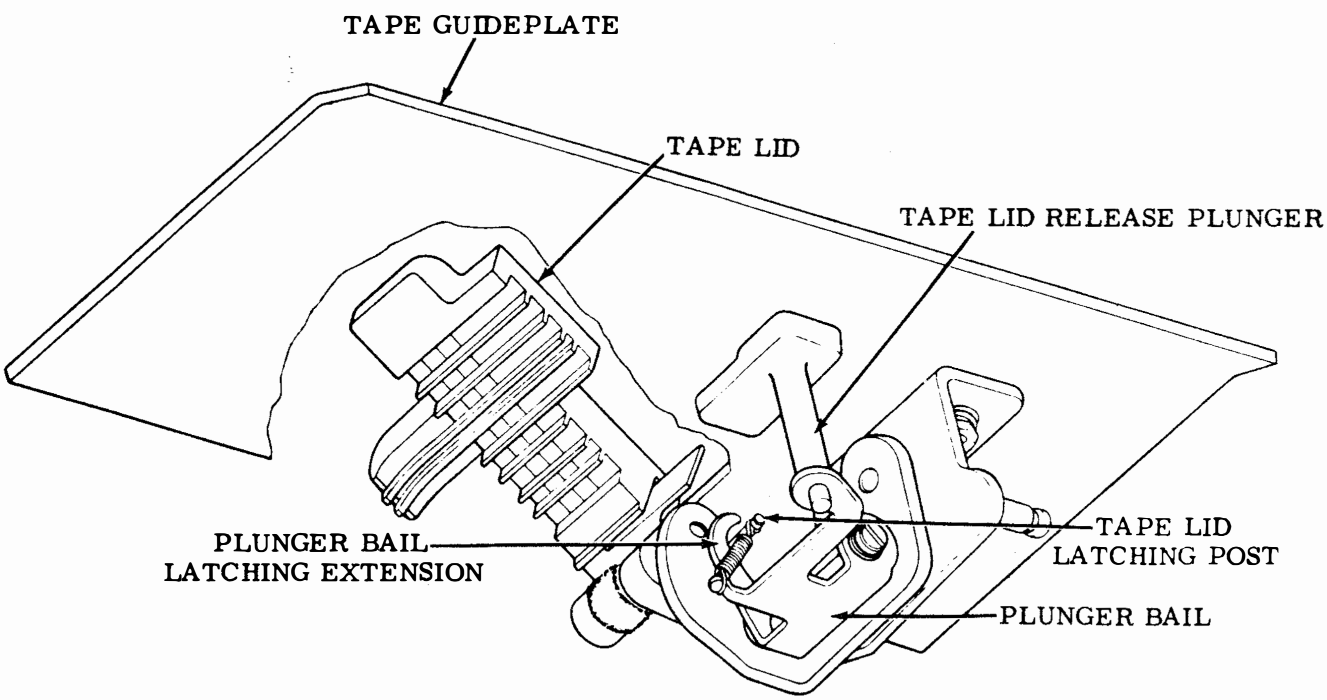


Figure 3-19. Tape Lid Mechanism - Bottom View

complete. Moving the control lever to the RUN position, energizes the clutch trip magnet by completing the circuit through the start-stop and tight-tape contact assembly. Thus, the contact closes to complete the clutch trip magnet circuit, energizes the magnet, and pulls the armature up. The armature bail extension then cams the main bail latchlever about its pivot post to release the main bail.

(2) <u>STOP Position</u>. When the control lever is pushed to its center or STOP position, the cam surface of the lever cams the start-stop lever bail causing the bail to pivot. As the bail pivots, its extension cams the swinger pad upward on the start-stop contact assembly opening the contacts. This action breaks the circuit to the clutch magnet assembly causing the armature to drop to its unattracted (unenergized) position.

(3) <u>FREE Position</u>. When the control lever is placed in the FREE position, ie, freewheeling position, the cam surface of the lever cams the start-stop lever bail causing the bail to pivot. As the bail pivots, its extension cams the swinger pad on the start-stop assembly upward, opening the contacts and braking the circuit to the clutch magnet assembly. The start-stop lever pushes the feed pawl and the ratchet detent roller away from the feed ratchet allowing the feedwheel to rotate freely. The start-stop lever extension also cams the intermediate bail extension arm which rotates the intermediate bail. The intermediate bail, in rotating, allows the spring-loaded tape-out pin depressor bail to follow. The depressor bail with its mechanism is mounted on a bracket attached to the front plate. The result of this camming action is the depressing of the tape-out sensing pin to a flush or below flush position relative to the tape guideplate. The position of the tape-out sensing pin allows free passage of the tape under the tape lid (figure 3-6).

f. <u>Tape Conditions</u>. Tape condition sensing functions are discussed in the following paragraphs.

(1) <u>Tight or Tangled Tape</u>. A tight or tangled tape raises the tight-tape bail arm (figures 3-6 and 3-8). The bail pivots and its extension cams the tight-tape intermediate arm assembly to which the tight tape arm is attached. When the arm assembly is cammed, the associated tight-tape arm lifts the swinger on the start-stop, tight-tape contact assembly up, opening the clutch trip magnet circuit, causing transmission to stop.

(2) <u>Tape-Out Sensing Pin</u>. The tape-out sensing pin (figure 3-16) is to the right and slightly forward of the five aligned tape sensing pins. When the tape-out sensing pin is in a depressed postion, the circuit is closed, and the unit transmits. Thus, with tape in the unit and the tape lid down, the tape holds the tape-out pin in a depressed position and the circuit is complete. When no tape is present, the tape-out sensing pin thrusts up into a hole provided in the tape lid. The rising of the pin opens the tape-out assembly contacts, which opens the clutch magnet circuit, and transmission stops.

3-4. ELECTRICAL CIRCUITS. TD electrical circuits are shown in schematics and wiring diagrams included in Chapter 5, Troubleshooting.

3-4.1 ELECTRICAL CIRCUITS (HIGH-LEVEL). The TD has two electrical circuits, the clutch trip magnet (control) circuit and the signal circuit. The clutch trip magnet circuit consists of the clutch trip magnet coils which are in series with the tape-out, start-stop, and tight-tape contact assemblies. The signal circuit consists of the transmitter signal generator contacts wired to provide neutral operation.

a. Control Circuit. The tight-tape, tape-out, and manual control mechanisms operate contact assemblies which are in series with the clutch trip magnet assembly. Actuation of any one of these devices opens the clutch trip magnet circuit, causing the clutch to become disengaged, and the transmitter to go into an idle line condition.

NOTE

Overload protection must be provided externally to the unit.

b. Signal Circuit. The signal code transmitted is a five-level start-stop neutral code consisting of current and no-current intervals or pulses. A marking pulse is a measured interval of time during which current flow is permitted through the closure of a contact. A spacing pulse is a measured interval of time during which the current flow is interrupted through the opening of a contact. The start and stop pulses are necessary to keep the receiving apparatus synchronized with the transmitter. The signal contacts in the signal generator operate efficiently at a signal line current of:

60 milliamperes ±10% dc
20 milliamperes ±10% dc

3-4.2 ELECTRICAL CIRCUITS (LOW-LEVEL). High-level discussions in paragraph 3-4.1 are also applicable to low-level operation except a low-level signaling code of +6-volts dc (mark) and -6-volts dc (space) is used for low-level. An electrical service assembly, discussed in paragraph 3-5, is required for low-level operation.

3-5. ELECTRICAL SERVICE ASSEMBLY (ESA). ESAs are metal shielded containers which vary in configuration for different applications. They are used as a housing for electronic components which serve to suppress radio frequency interference and provide low-level transmission of telegraph signals.

a. General. The TP326792 ESA used in conjunction with low-level transimtter distributors is table mounted and includes a 0.5 ampere power supply circuit card, a low-level keyer (LLK) circuit card, and a clutch magnet driver (CMD) circuit card. A typical table mounted ESA is shown in figure 3-20. Refer to ESA schematic and wiring diagrams in Chapter 5.

(1) ESAs differ from one another primarily because of the number of circuit board connectors (figure 3-21) which are provided for the associated keyers and drivers. Another difference is the mounting design; some are designed for table mounting, some for rack

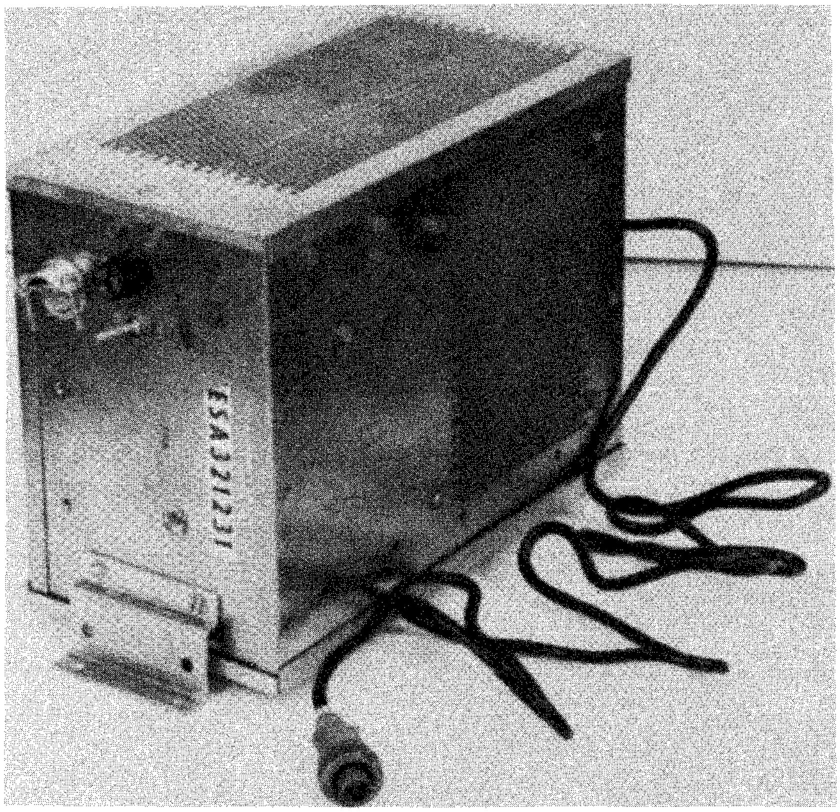


Figure 3-20. Typical ESA for Table Mounting - Double Box Construction

mounting, and others are designed for cabinet mounting.

(2) ESAs which house LLK circuit cards (figure 3-22) require double-shielded box construction (figure 3-23, 2 sheets). An inner aluminum box functions as an electrostatic shield and is electrically isolated from an outer box which serves as a magnetic shield. CMD circuit cards do not require a double box construction. Single box construction is adequate for the CMD and serves as a combined electrostatic-magnetic shield.

(3) The inner box contains a mounting plate with printed circuit board connectors to accommodate a power supply printed circuit board assembly and the required number of CMD and LLK circuit cards. A screw terminal strip is provided for connecting the signal line. The power supply rectifier filter capacitor is also located in the inner box.

(4) The outer box contains the inner box, a power supply transformer, power line filter, and a screw terminal block for ac power connections. A power switch and fuse are located on one side of the outer box.

(5) The power supply transformer and rectifier filter capacitor form an assembly capable of meeting the power supply requirements specified in table 1-1 when used in conjunction with a power supply card.

b. Power Supply (0.5 Ampere) TP321290. The 0.5 ampere power supply circuit card is shown in figure 3-24 and

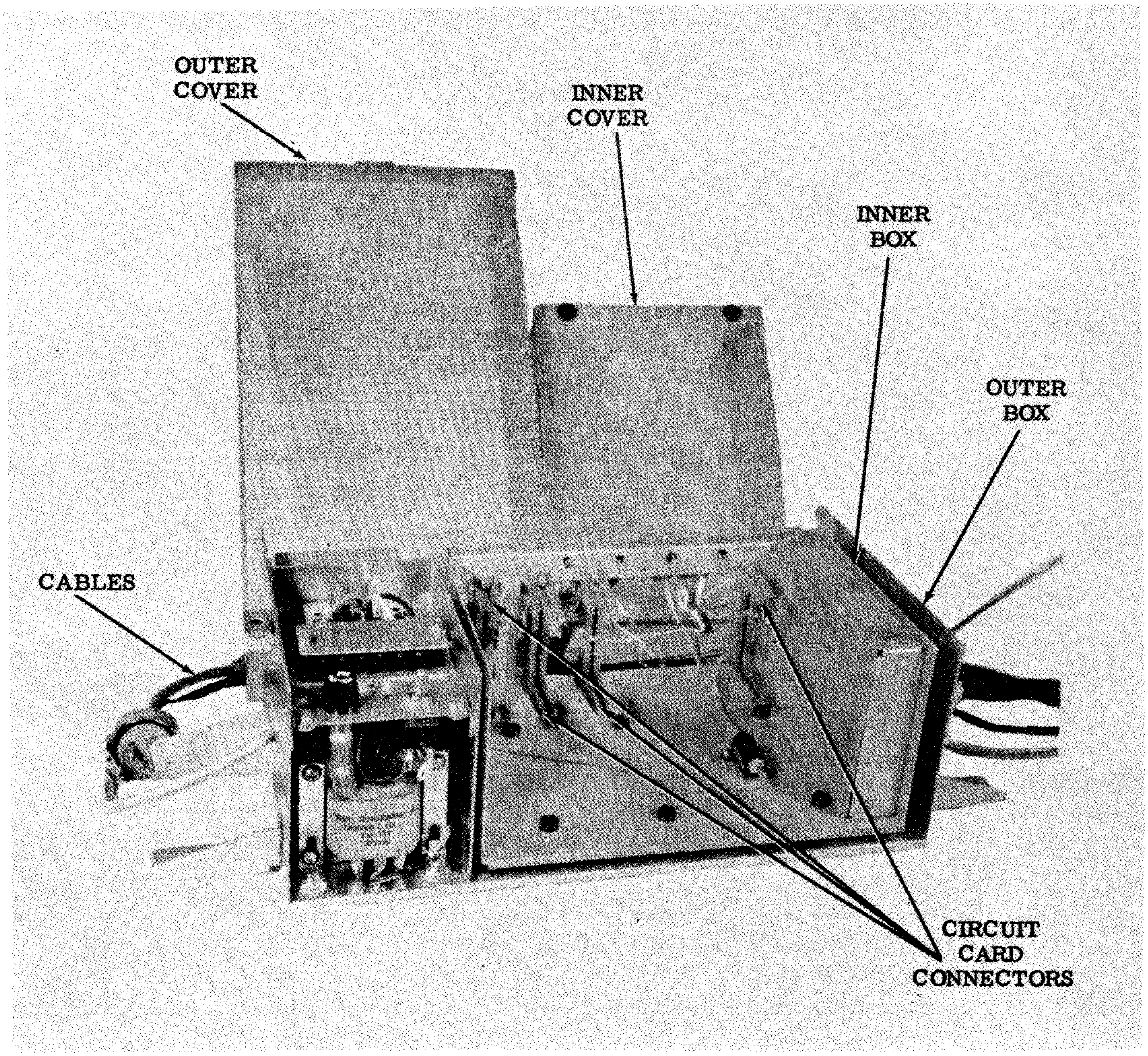


Figure 3-21. ESA Showing Circuit Card Connectors

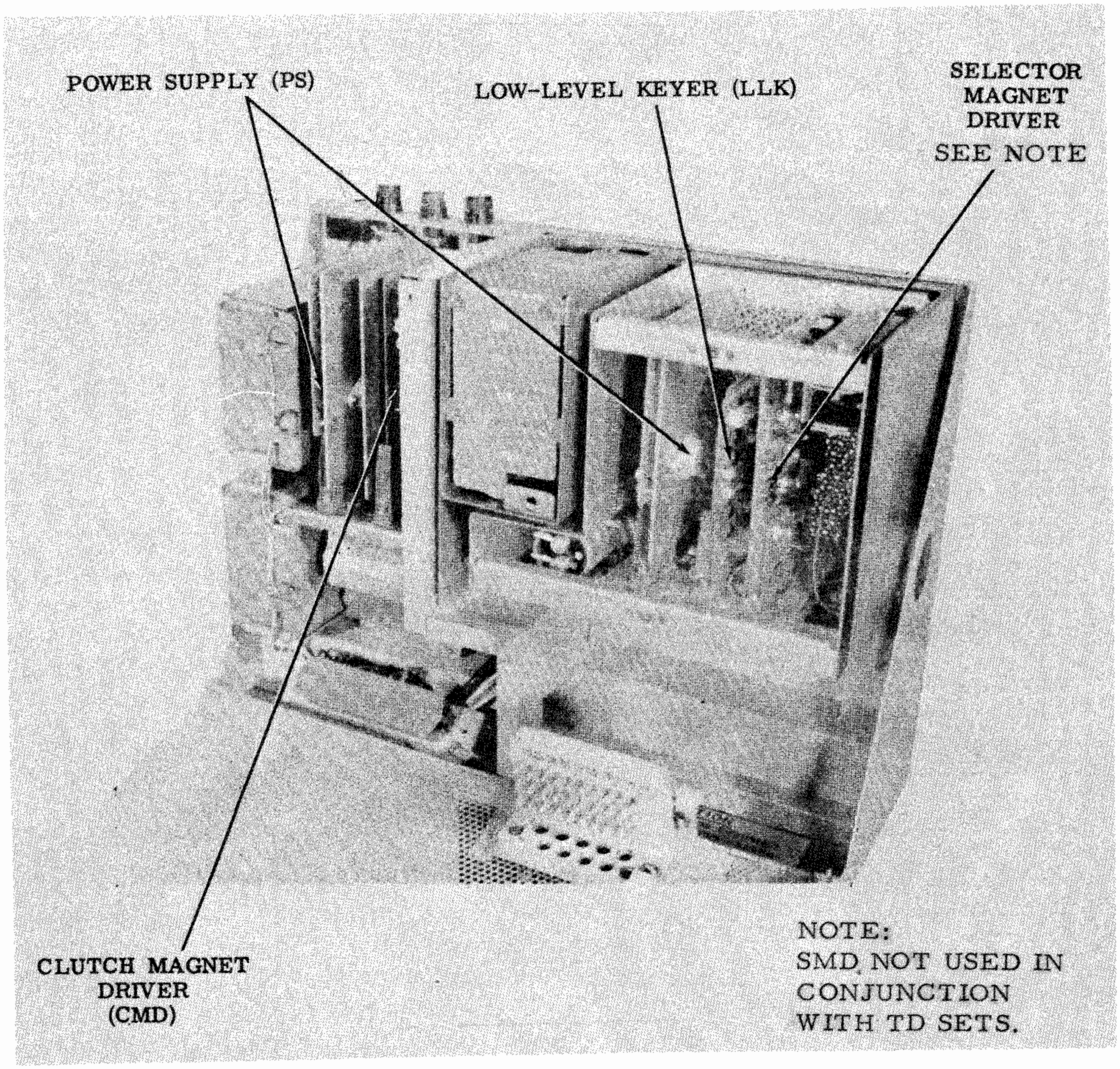


Figure 3-22. ESA Showing Typical Circuit Cards

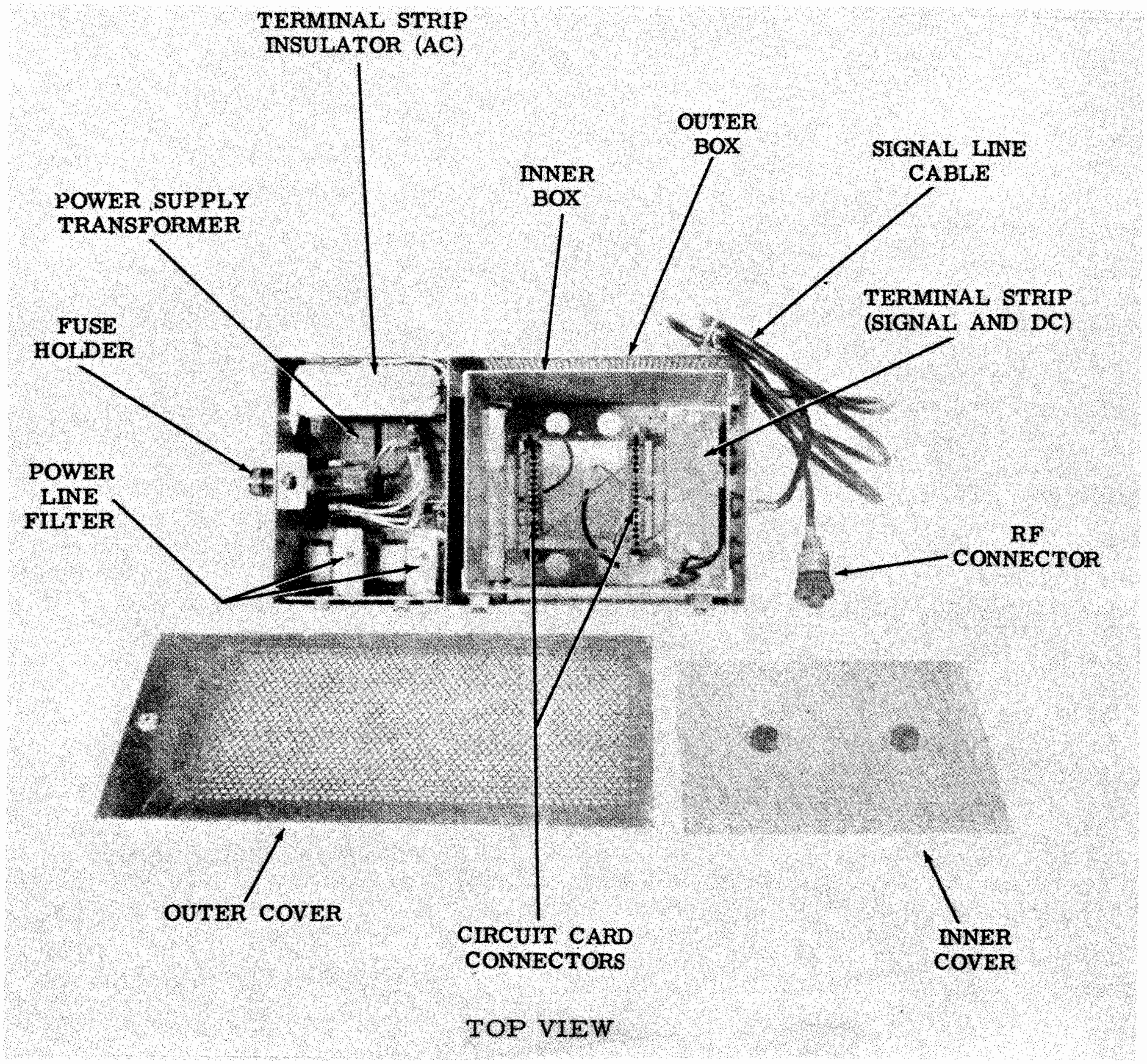


Figure 3-23. Typical Parts of an ESA - Double Box Construction (Sheet 1 of 2)

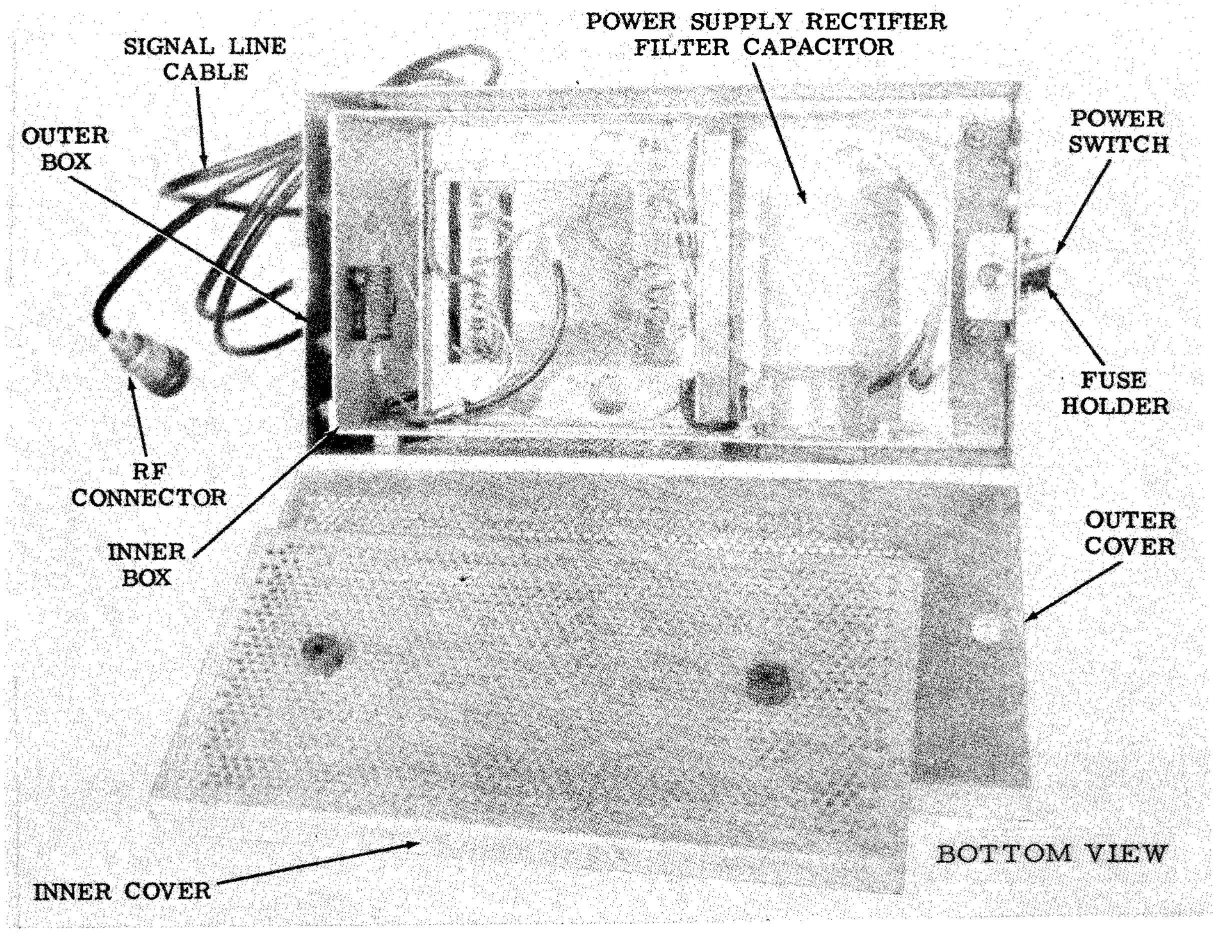


Figure 3-23. Typical Parts of an ESA - Double Box Construction (Sheet 2 of 2)

principles of operation discussed in the following paragraphs. Refer to schematic diagram (figure 5-16).

(1) Power supply transformer T1, diodes CR1, CR3, and power supply rectifier filter capacitor C8 form a full-wave rectifier to obtain a minimum of 58 volts unregulated dc.

(2) Transistor Q1 and Q2 form a two-stage series voltage regulating element. Both transistors are always conducting, and the base-emitter drop of each transistor is approximately 0.7 volt. The voltage drop across R2 is negligible. (Resistor R2 is used in conjunction with capacitor C5 for RFI noise suppression.) In effect, then, the emitter of Q1 is clamped to the same potential as the reference diode combination CR7 and CR12, ie, the dc output of Q1 is nominally 47 volts. The difference between the Q1 dc output and the unregulated dc appears across the collector-emitter junction of Q1.

(3) Transistor Q2 is a gain stage for Q1. Resistor R1 limits the current that divides between the CR7-CR12 reference diodes and the base of Q2. The base current of Q1 or the collector current of Q2 is equal to the base current of Q2

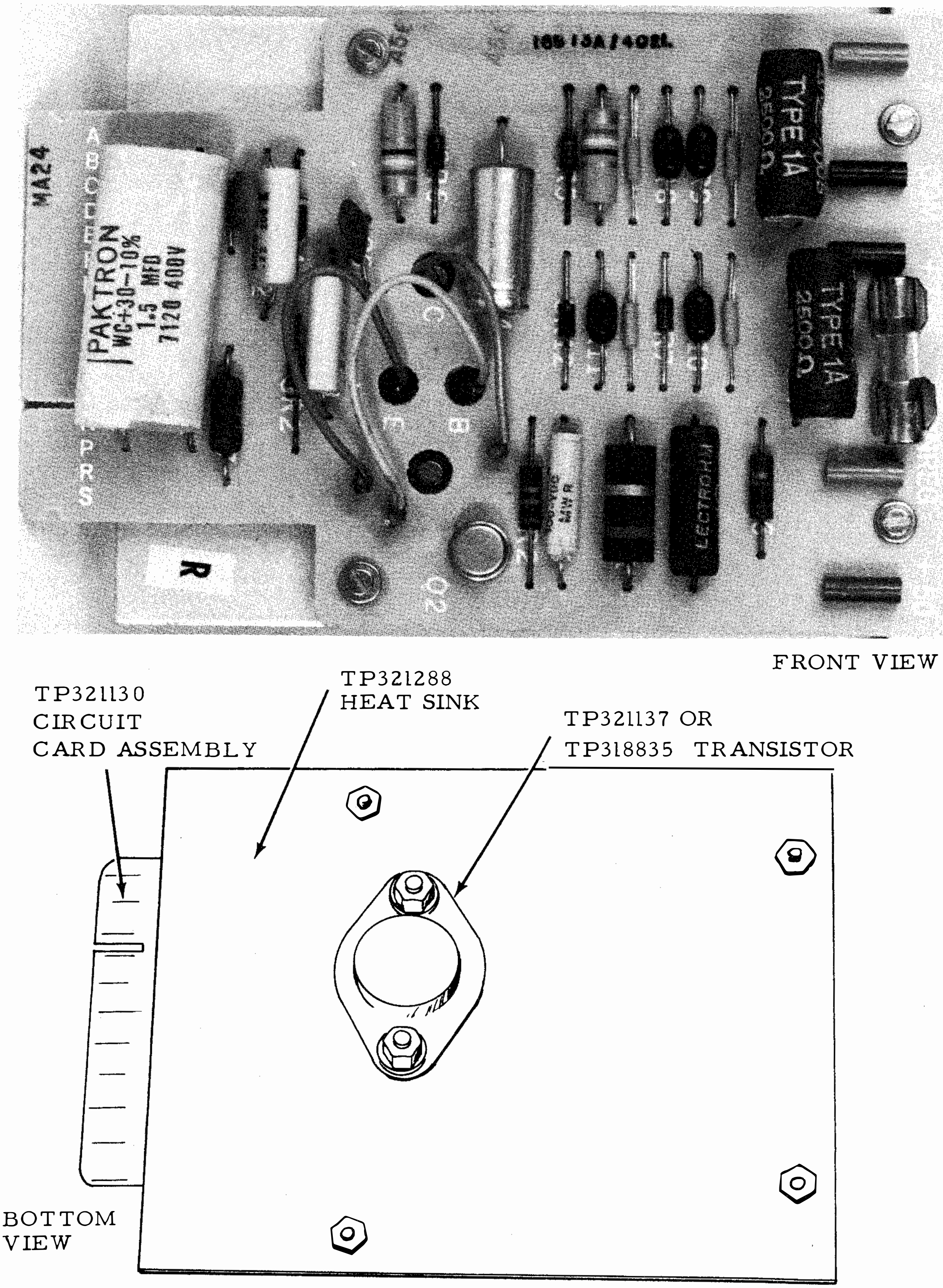


Figure 3-24. Power Supply (0.5 Ampere) TP321290

multiplied by the dc current gain (HFE) of Q2.

(4) Resistor R7 acts as a bleeder and assures that Q1 and Q2 will conduct even when no load is connected across the output terminals. Without R7 and no load connected, the output would rise to the same value as the unregulated dc. However, minimum load of 0.150 ampere must also be applied to maintain the +53 volts dc regulation limit.

(5) The +7 volts dc output is obtained by dropping the unregulated dc voltage through resistor R4 to supply the zener reference diode CR6 which is connected across the output.

(6) Resistor R5 and zener diode CR5 provide a -7 volts dc output in a manner similar to that described in paragraph 3-5.b(5). However, a fullwave rectifier consisting of rectifier diodes CR2 and CR4 and capacitor C4 is required to obtain the negative unregulated potential with respect to the circuit common.

(7) Capacitors C1, C2, and C3 suppress RFI noise transients which occur due to recififier switching. Capacitors C6 and C7 and inductors L3 and L4 suppress zener diode noise.

(8) The transformer shields and a low-pass filter consisting of L1, L2, C9, C10, C11, and C12 provide noise isolation between power line and power supply.

(9) The ESAs are normally wired so that one 25 ohms (25-watt) resistor is connected across the collector-emitter of Q1 when each associated CMD is inserted in its connector to reduce power dissipation in Q1. (This is equivalent to paralleling Q1 with 250 ohms for each 0.150 ampere, approximately, of load current.)

(10) Fuse F102 limits the output current to a total of 0.5 ampere.

c. <u>Low-Level Keyer (LLK) TP303142</u>. The low-level keyers (figure 3-25) are circuit card assemblies approximately 2-1/4 by 4-1/2 inches. They are designed to plug into a 15-pin connector that is wired into the electrical service assembly where it becomes an integral component for the suppression of RFI. The TP303142 LLK, used in conjunction with the TP321268 filter card assembly, is intended for use with the TP323646 signal generator (one contact) assemblies. This LLK is adaptable to various types of Model 28 type equipment when used with the applicable ESA and is designed to operate from one set of contacts. Two signal generator outputs (filter card outputs), however, may be paralleled to drive one signal line from either of two signal generators. Each keyer is designed to operate into a high resistance load. An external power source, mounted in the associated electrical assembly, is required to operate the keyers.

d. <u>LLK Technical Data</u>. All low-level keyer features for the TP303142 given in the following paragraphs assume the use of the TP321268 filter card assembly.

(1) Maximum unloaded power consumption of each keyer is less than 50 millwatts.

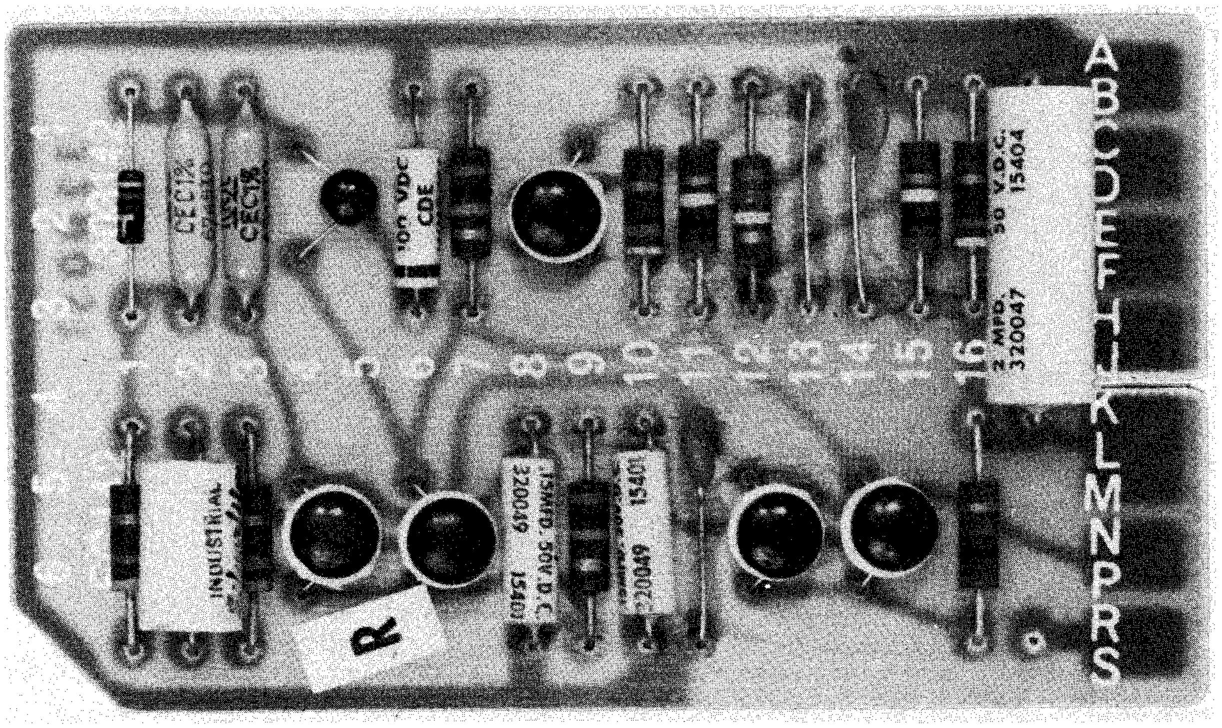


Figure 3-25. Low-Level Keyer TP303142

(2) The output of the TP303142 keyer is +6.0 volts dc ±1.0 volt corresponding to the marking state and -6.0 volts dc ±1.0 volt corresponding to the spacing state.

(3) The marking and spacing output voltage should be balanced to within 10 percent of each other.

(4) The TP303142 keyer operates from the spacing contacts (mark contact open, space contact closed) of the TP323646 signal generator assembly.

(5) The outputs from two TP321268 filter card assemblies may be paralleled for parallel operation of either of two transmitters.

(6) The nominal output impedance is 100 ohms.

(7) The keyers operate at bit rates up to 75 baud.

(8) Maximum short circuit output current is 60 milliamperes.

(9) The TP303142 keyer operates into a load resistance of 500 ohms minimum.

(10) The keyer and TP321268 filter card assembly operate in a maximum free-air ambient temperature of 70 degrees Centigrade (158 degrees Fahrenheit). Storage temperature should not exceed 85 degrees Centigrade (185 degrees Fahrenheit).

(11) The TP303142 keyer operates from a power source delivering ±7.2 volts dc ±0.6 volt. Maximum unloaded power consumption is less than 50 milliwatts.

(a) The mark and space symmetry at zero volt (output waveform) is adjustable by means of the signal generator position adjustment for the TP303142 keyer.

(b) The keyer is intended for use on signal lines less than 1000 feet in length. However, operation is possible with line lengths up to 5000 feet.

e. <u>LLK TP303142 Principles of Operation</u>. The TP303142 low-level keyer is a neutral to polar converter which, by means of passive and active filtering, shapes the output waveform. Refer to schematic diagram (figure 5-14).

(1) In the marking state the signal generator contact is open and Q1 conducts to a level established by resistors R1, R2, and R11. Transistor Q1 conducts sufficient current to saturate the collector of Q2 which rises to slightly less than the positive supply voltage. With Q2 conducting, Q4 and Q6 also conduct. Transistor Q4 base current (equal to the total output load current divided by the product of Q4 and Q6 gains) is small and consequently the voltage drops across R6, R10, and R7 are insignificant. Transfer Q6 base current (equal to total output load current divided by the gain of Q6) is also small resulting in an insignificant voltage drop across R8. Thus, the output voltage is the power supply voltage minus the sum of Q2 voltage with collector-emitter saturated, Q4 base-emitter voltage and Q6 base-emitter voltage. The drop across R9 for normal output loads is insignificant.

(2) In the spacing state the signal generator contact is closed. In this state R1 is shunted by the series combination of R13, R14, and R15 thus reducing Q1 base voltage below the emitter voltage established by the voltage divider R3, R11. With the emitter being at a higher potential than the base, Q1 is turned off. With Q1 off, Q2 is off and its collector voltage approaches the negative supply voltage. In this state Q3 and Q5 conduct. For the same reasons as in the marking state, the output voltage is primarily a function of Q3 base-emitter voltage and Q5 base-emitter voltage. Diode CR1 is added to compensate the unsymmetrical properties associated with the second stage.

(3) During transitions, the nonsymmetric low-pass contact filter prefilters the input to the keyer. In addition, common mode effects due to the unbalanced strap capacitance of the contact assembly, are reduced. Capacitors C1 and C6 limit the high frequency response of stages 1 and 2 thus providing additional shaping.

(4) Stage 3 (Q4 and Q3) is a low-pass active filter. By means of C2 charging and discharging through the feedback network, consisting of R6, R10, R7, and C2, the rise and fall times are lengthened to produce an acceptable spectrum (from RFI standpoint). Capacitors C3, C4, and C5 provide additional shaping by bypassing undesirable frequency components generated in Q3, Q4, Q5, and Q6. C7 is a radio frequency bypass capacitor to decouple the power supply.

f. <u>Clutch Magnet Driver (CMD) TP321991</u>. The following paragraphs describe the TP321991 clutch magnet driver circuit cards and outline the electrical theory when installed (plugged) into a shielded electrical service assembly containing the proper power supply and filter assemblies.

(1) The CMD (figure 3-26) is a solid state, direct coupled amplifier built as a plug-in circuit card assembly approximately 2-1/2 and 4-1/4 inches. It requires an external power source. All connections are made through a 15-pin circuit card connector. The CMD output drives a Model 28 type transmitting clutch upon receipt of a low-level input pulse. It is to be used with the proper associated equipment and is not for general use.

(2) CMDs are adaptable to various Model 28 type equipment sets through the use of associated modification kits. Each CMD (one or more) is part of, or associated with, some ESA. The number of CMDs used depends on the number of clutch magnets used in the set.

g. <u>CMD TP321991 Technical Data</u>. The CMDs receive low-level signals (+6 volts dc clutch coil energized, -6 volts dc coil de-energized, nominal) and operate a Model 28 type clutch.

(1) The TP321991 CMD is designed for use with 256M or 252M coils, depending on the type of transmitting equipment used. The output current during the energized state for the CMD is:

252M Coil (single coil for LK/LAKs) 107 to 132 milliamper

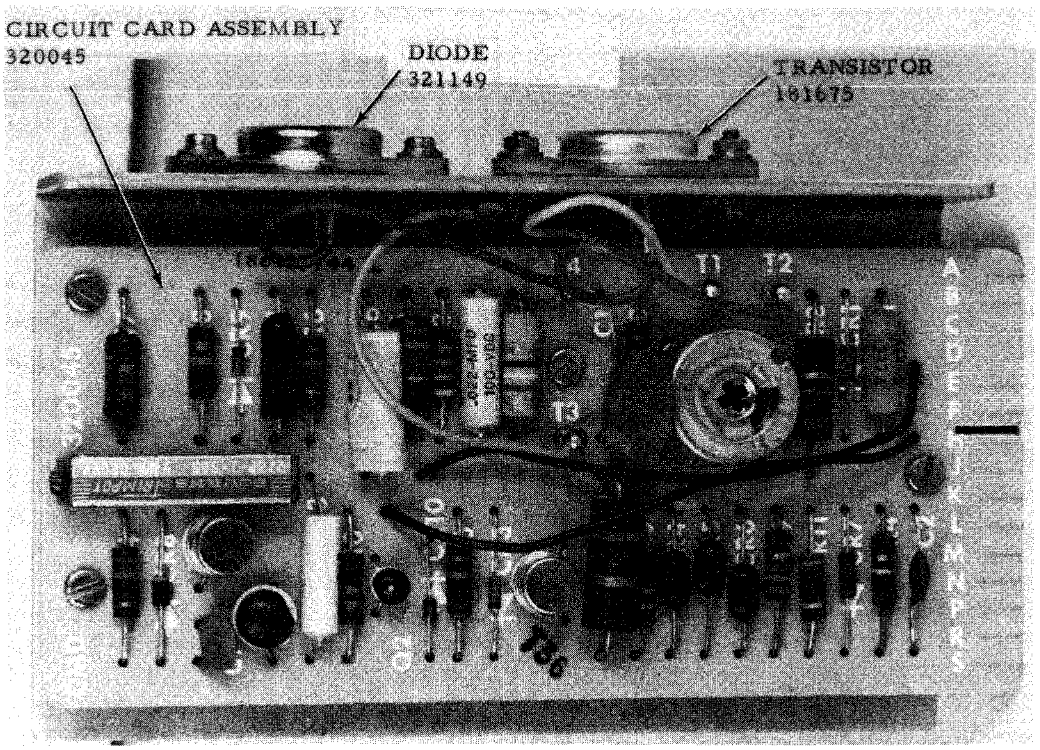


Figure 3-26. Clutch Magnet Driver TP321991 for Low-Level Operation

256M Coils (two coils in series for LXDs) 124 to 156 milliamperes.

278M Coil (single coil for photoelectric distributor clutch) 36 to 56 milliamperes.

(Use two TP323354 cores for LXD coils).

(2) Operation is considered satisfactory when the incoming synchronous pulse complies with the following requirements:

(a) Minimum sync pulse duration = 20 milliseconds.

(b) Maximum sync pulse duration = 40 milliseconds or 2 bit lengths, whichever is longer.

(c) Minimum sync pulse period = 110 percent of transmitter character length.

NOTE

When operating an LK or LAK at the maximum pulsing rate (minimum period), the machine may not respond to each synchronous pulse when in the REPEAT mode.

(3) Under the conditons of (2)(c) above, start pulse delay should be between 15 and 35 milliseconds. (Delay is measured from zero volt of the positive going input synchronous pulse signal to the beginning of the start pulse at the signal generator contacts. If the TP321268 filter card assembly and TP303142 keyer are used, a nominal 6 milliseconds must be added to the delay to account for delay in the keyer.)

(4) The TP321991 clutch magnet driver assumes the energized state with positive input voltages not greater than +0.5 volt dc and the de-energized state with negative voltages not greater than -0.5 volt dc.

(5) The energized and de-energized switching levels are adjustable to within 10 percent of each other.

(6) The TP321991 clutch magnet driver should have a minimum input resistance of 50,000 ohms.

(7) The maximum input capacitance is 2500 picofarads.

(8) The CMD provides a spacing (de-energized) output when the input line is open.

(9) The clutch magnet driver operates in a free air ambient temperature range of 0 degrees to 65 degrees Centigrade (150 degrees Fahrenheit). Storage temperature should not exceed 85 degrees Centigrade (185 degrees Fahrenheit).

(10) The TP321991 clutch magnet driver operates from a power supply delivering +47 to +53 volts dc.

(11) Power consumption under any combination of power source, environmental, and component conditions is 13 watts maximum.

(12) The TP321991 CMD is intended for use on clock lines less than 1000 feet in length. However, operation is possible with line lengths up to 5000 feet.

(13) The TP321991 CMD, when used with associated power supplies, is intended for use with interfaces conforming to the following requirements:

(a) Fed. Std. 222 Section 3102b

(b) MIL-STD 188B.

h. CMD TP321991 Principles of Operation. CMD TP321991 is basically a direct coupled amplifier providing a current gain of approximately 80 decibels. (Refer to schematic diagram figure 5-15.) The first two stages (Q1 and Q2) provide the necessary gain to drive a Schmitt trigger (Q3 and Q4). Q5 and CR2 comprise a power regulator stage which provides the power supply with a constant load.

(1) In the marking state, with a positive voltage with respect to common, applied to the input side of the Q1 base resistor R5, Q1 conducts, which in turn saturates Q2. In this condition, the sum of the voltage drops around the loop R14, Q2 collector-emitter and Q3 base-emitter is in a condition to reverse bias the base-emitter junction of Q3 and thus cut off Q3 collector current. The Q4 base current increases the voltage drop across R15 in order to satisfy loop conditions established by the power regulator voltage, R14, CR8, and Q4 base-emitter voltage. The Q4 base current is sufficient to saturate the collector. In this condition, load current is determined primarily by the load resistance, R17, and the power regulator otuput voltage.

(2) In the spacing state, with a negative input voltage, Q1 is cut off with reverse base-emitter bias established by the reverse transient protection diode CR3. With Q1 off, Q2 does not conduct. Consequently, to satisfy loop conditons established by R13, Q3 base-emitter, R14, and the requlator voltage, Q3 conducts to raise the voltage across R13. Base current is sufficieint to saturate the Q3 collector. The Q3 collector-emitter voltage is less than CR8 voltage, which in turn reverse biases the base-emitter junction of Q4. With the latter junction reverse biased, the Q4 collector is cut off.

(3) The collector circuit at Q2 has been interrupted and brought out to the connector contacts at the bottom of the card. This circuit must be completed externally or Q3 cannot be turned off and the magnet coils are held de-energized. The circuit thus affords a degree of local magnet control.

(4) Because of the difference in magnitude of Q3 and Q4 load currents, the drop across R14 will be greater in the marking state than in the spacing state. This means that input voltage to the third state (Q2 VCE) necessary to change the state of Q3 will be different depending on the previous state. Specifically, a larger Q2 collector-emitter voltage is required to turn on Q3 than to turn off Q3. This hysteresis, peculiar to Schmitt triggers, enables positive driver input signals to energize the load coil and negative going input signals to de-energize the load coil.

(5) Resistor R6 and potentiometer R7 serve to bias Q1 and set the center of the

switching interval. Emitter resistor R8 assists to gain stabilization. R11 and R9 form a voltage divider to bias CR4, CR5, and CR6. These diodes exhibit temperature characteristics such that together with R8, effective temperature compensation is obtained to stabilize the switching level of the driver. CR7 establishes a voltage reference for the first stage to ensure switching level stability. When a low resistance transmitter (about 100 ohms) is used to key the driver, R4 has little significance on the operation of the circuit. However, when the input resistance is extremely high, R4 applies sufficient bias to Q1 to cut off. This operation will maintain the terminal equipment in the idle state when the input line is open circuited.

(6) In the power regulator, CR1 and the base-emitter junction of Q5 establish a voltage reference for R1 and R2 which determines the current drain of the unit. As the driver demands less power from the regulator, such as being in the de-energized state, the excess current (excess over energized current) is shunted through zener diode CR2. This operation maintains a relatively constant load for the external power supply. R2 is adjusted to set minimum CR2 current for voltage regulation.

(7) Coil L1 and capacitor C1 serve to reduce noise generated by zener diode CR2.

(8) Capacitors C3 and C6 provide negative feedback to reduce transient generation in the driver. C5 and C7 are radio frequency bypass capacitors to eliminate any parasitic oscillations that may cccur during high speed switching.

(9) Diode CR9, C4 and R16 form a transient limiting network to protect Q4 from excessive reverse transient present when switching inductive loads.

CHAPTER 4
SCHEDULED MAINTENANCE

4-1. INTRODUCTION. This Chapter contains preventive maintenance and performance test procedures for transmitter distributor (TD) sets Model 28 and TD mounting bases, to be accomplished on a scheduled basis. The purpose of scheduled maintenance is to anticipate and eliminate potential trouble sources in an effort to minimize interruptions to service. Recommended preventive maintenance actions are tabulated in a scheduled maintenance action index along with suggested intervals of performance and references to paragraphs containing specific instructions for performing maintenance actions. The scheduled maintenance actions in this manual are cancelled when the Planned Maintenance System (PMS) is implemented for this equipment aboard your ship or station.

4-2. SCHEDULED MAINTENANCE ACTION INDEX. Table 4-1 lists scheduled maintenance actions to be performed on TD sets. The Periodicity column indicates the interval and sequence of maintenance action performance. D denotes daily, W denotes weekly, M denotes monthly, Q denotes quarterly, and R denotes as required. The Maintenance Action column briefly describes the maintenance action to be performed. The Reference column lists the paragraph describing the maintenance action in further detail.

4-3. EQUIPMENT AND MATERIALS REQUIRED. The following equipment and materials are required to accomplish preventive maintenance and performance test procedures included in this Chapter.

a. Clean, lint-free cloths.

b. Cleaning solvent: Trichloroethane O-T-620

c. Lubricants: Oil, MIL-L-17672 Grease, MIL-G-23827

d. Test equipment and tools listed in table 4-1.

4-4. SAFETY PRECAUTIONS. The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

a. Keep Away From Live Circuits. Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with the primary power applied. Under certain conditions, dangerous potentials may exist when the power control is in the off position due to charges retained by capacitors. To avoid casualties, always remove power and discharge and ground a circuit before touching it.

b. Do Not Service Or Adjust Alone. Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

Table 4-1. Scheduled Maintenance Action Index

Periodicity	Maintenance Action	Reference
M (Or after 150 hours of operation)	Inspect TD	4-5a
M (Or after 150 hours of operation)	Lubricate TD	4-5b
Q or R	Conduct performance tests.	4-8

c. Resuscitation. Personnel working with or near high voltage should be familiar with modern methods of resuscitation. Such information may be obtained from the Bureau of Medicine and Surgery.

4-5. PREVENTIVE MAINTENANCE PROCEDURES. The following paragraphs contain scheduled preventive maintenance procedures referenced in table 4-1.

a. Monthly Inspection. Inspect TD monthly, or after 150 hours of operation, as follows:

(1) Remove cover.

(2) Inspect mechanism for presence of a red, powdery substance which indicates lack of lubrication.

(3) Examine TD for damaged parts and replace if necessary.

b. Monthly Lubrication. If lack of lubrication is indicated, lubricate TD in accordance with instructions provided in paragraphs 4-6 and 4-7.

4-6. TRANSMITTER DISTRIBUTOR LUBRICATION. The following paragraphs provide TD lubrication instructions and specify lubrication intervals (table 4-2) which depend on the speed of operation. Lubrication methods for a typical unit, the 5-level TD (single contact), are presented in lubrication figures located at the end of this chapter and indexed in table 4-3. The lubrication figures consist of photographs and line drawings. Photographs show the general area to be lubricated. Callouts on the photographs refer to line drawings indicating each specific mechanism to be lubricated and method of lubrication.

CAUTION

The TD unit is shipped with oil reservoir empty. Remove coverplate for access and fill oil reservoir.

a. References to front, rear, left, right, etc., in the lubrication charts, apply to the unit as viewed by the operator facing the unit.

b. Lubricate the TD unit just prior to placing it in service or prior to storage. After a few weeks of service, relubricate to make certain that all specified points have received lubricant. Thereafter, use the lubrication intervals specified in table 4-2.

CAUTION

Disconnect power before applying any lubricant.

c. Apply MIL-L-17672 oil wherever the use of oil is indicated. Apply MIL-G-23827 grease on all surfaces wherever indicated. The following symbols apply to the specific lubrication instructions indicated in the line drawings.

Symbol		Meaning
O	-	Apply MIL-L-17672 oil (01 - apply one drop of oil, 02 - apply two drops of oil, etc.)
G	-	Apply MIL-G-23827 grease

Table 4-2. Lubrication Intervals - Transmitter Distributor and Transmitter Distributor Mounting Bases

Operating Speed (wpm)	Lubrication Interval
60 wpm	3000 hours or 1 year*
75 wpm	2400 hours or 9 months*
100 wpm	1500 hours or 6 months*

*Whichever occurs first.

Table 4-3. Transmitter Distributor Lubrication Chart Index

Figure	Title	Page No.
4-4	Transmitter Distributor	4-21
4-5	Tape Guideplate	4-22
4-6	Signal Contact Assembly	4-23
4-7	Clutch Trip Assembly	4-24
4-8	Main Shaft, Oil Reservoir, and Centerplate Assembly	4-25
4-9	Main Shaft	4-26
4-10	Oil Reservoir	4-26
4-11	Centerplate Assembly	4-27
4-12	Front Plate Assembly, Sensing and Feed Mechanism, and Transfer Mechanism	4-28
4-13	Front Plate Assembly	4-29
4-14	Sensing and Feed Assembly	4-29
4-15	Transfer Mechanism	4-30

Table 4-3. Transmitter Distributor Lubrication Chart Index - Continued

SAT - Saturate with MIL-L-17672 oil (felt washers, oilers, etc.)

d. Lubricate the TD unit thoroughly, but avoid over-lubrication which allows oil to drip or grease to be thrown on other parts. Exercise special care to prevent lubricant from getting between armature and pole faces. Keep all electrical contacts free from oil or grease.

e. The following general instructions supplement the specific lubricating points illustrated in the charts.

(1) Apply one drop of MIL-L-17672 oil to all spring hooks.

(2) Apply a light film of MIL-L-17672 oil to all cam surfaces.

(3) Apply a coat of MIL-G-23827 grease to all gears.

(a) Saturate all felt washers, oilers, etc.

(4) Apply MIL-L-17672 oil to all pivot points.

(5) Apply MIL-L-17672 oil to all sliding surfaces.

f. To obtain access to lubrication points refer to figure 4-1 and observe the following instructions.

(1) Removing Cover Plate: lift left end of plate to release the detent fasteners; then slide cover plate toward the left. Replace cover in the reverse order.

(2) Removing Top Plate: loosen the front and rear mounting screws. Lift top plate upward.

(3) Removing Tape Guideplate: loosen the tape guideplate mounting screws. Lift the tape guideplate.

(4) Removing Transmitter Distributor Assembly: remove the screws which attach the unit to the base, and lift unit up to disengage the gears. Disconnect electrical plug.

4 7. TRANSMITTER DISTRIBUTOR MOUNTING-BASE LUBRICATION. The following paragraphs provide lubrication instructions for transmitter distributor Model 28 bases, both single mounting and double mounting. Lubrication intervals, which depend on the speed of operation, are provided in table 4-2. Lubrication methods for the base are presented in lubrication figures located at the end of this chapter and indexed in table 4-4. The lubrication figures consist of photographs and line drawings. Photographs show the general area to be lubricated. Callouts on the photographs refer to line drawings indicating each specific mechanism to be lubricated and method of lubrication.

a. References in the lubrication charts made to left or right, top or bottom, and front or rear, apply to the mechanism in its normal operating position as viewed by the operator facing the unit.

b. Lubricate the transmitter bases as directed in these paragraphs and the lubrication charts, which indicate points to be lubricated and the kind of lubricant.

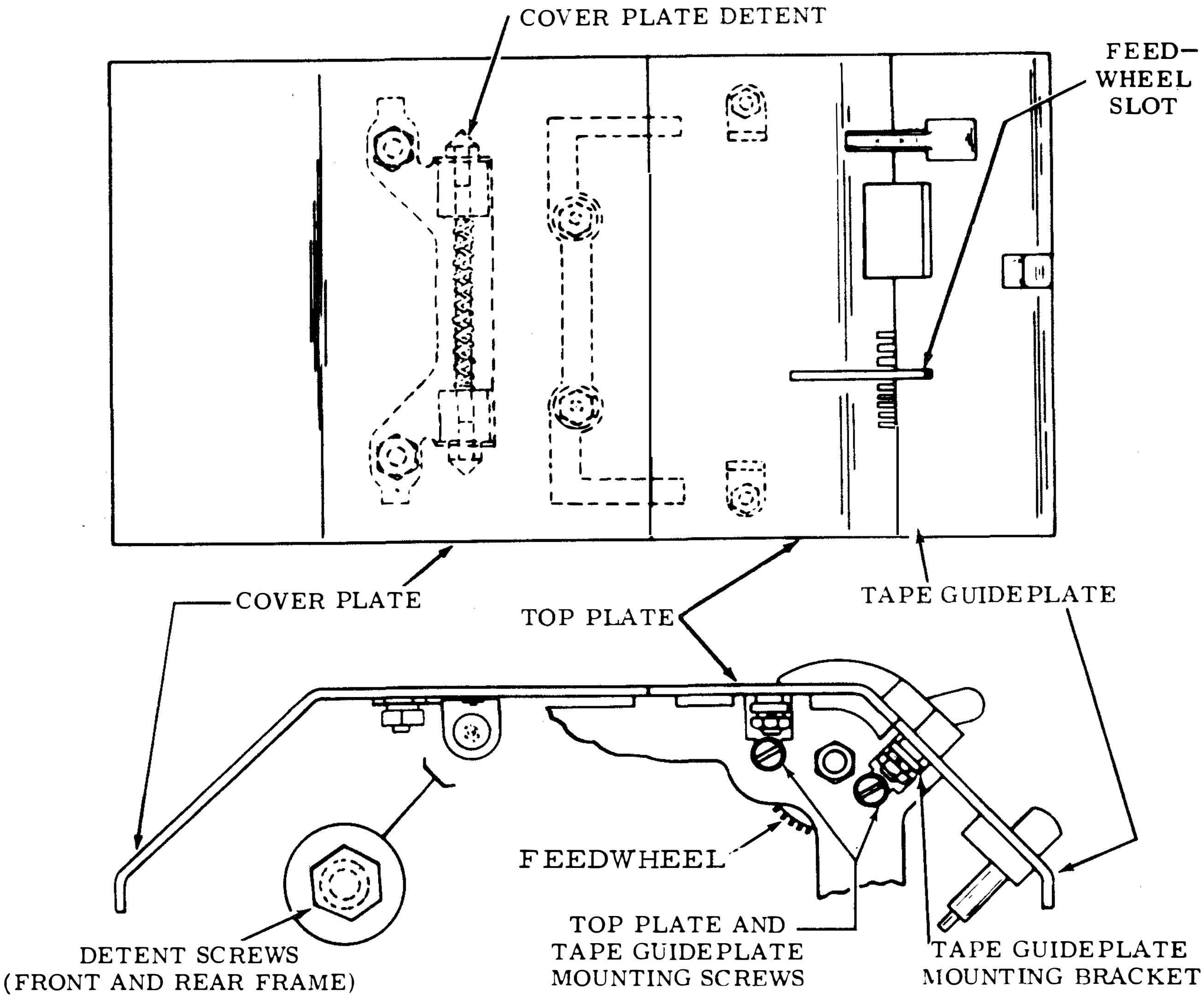


Figure 4-1. Transmitter Distributor Plate Removal Details

c. Use MIL-G-23827 grease on all surfaces where grease (G) is indicated.

CAUTION

Use special care to prevent oil or grease from getting between electrical contacts.

d. Apply a thick film of grease to all gears. Lubricate the base gears and their associated gears just prior to placing them in service. After a few weeks in service, relubricate to assure adequate lubrication. Thereafter, use the lubrication intervals specified in table 4-2.

4-8. SCHEDULED PERFORMANCE TESTS. Performance tests, scheduled in table 4-1, consist of mechanical checks, described in paragraph 4-8.a, and operational tests described in paragraph 4-8.b.

a. Mechanical Checks. The following mechanical checks

Table 4-4. Transmitter Distributor Base Lubrication Chart Index are to be performed quarterly or as required.

WARNING

Disconnect power from unit. Failure to comply can cause serious injury.

(1) Signal Generator Contact Clearance. Check signal generator contact clearance as follows:

(a) Refer to figure 6-30.

(b) Remove cover from contact box.

(c) Move detent toggle against its spacing stop; measure gap using feeler gauge.

(d) Move detent toggle against the marking stop; measure gap using feeler gauge.

(e) Measurements in steps (c) and (d) should be equal; if not, perform adjustment procedure described in paragraph 6-3.1h(1).

(2) Clutch Shoe Lever Clearance. Check clutch shoe lever clearance as follows:

(a) Refer to figure 6-3.

(b) Disengage clutch and measure gap using feeler gauge. Note reading.

(c) Trip clutch and rotate it until clutch shoe lever is positioned toward bottom of unit.

(d) Align head of clutch drum mounting screw with stop lug.

(e) Manually compress shoe lever against stop lug and allow to snap apart. Measure gap using feeler gauge; subtract reading from that noted in step (b). Record the difference.

(f) Difference recorded in step (e) should be from 0.055 inch to 0.085 inch. If not, perform adjustment procedure described in paragraph 6-3.1a(3).

(3) Sensing Finger Spring Tension. Check sensing finger spring tension as follows:

(a) Refer to figure 6-16.

(b) Place TD unit in upright position with sensing fingers in their uppermost limits, and rub-out deleter bail (if present) held away from sensing finger.

(c) Using spring scale measure pressure required to move each sensing finger flush with tape guide plate.

(d) Reading on spring scale should be 3 to 5 ounces if chadless tape is used and 2 to 3 ounces if fully perforated tape is used. If not, perform adjustment procedure described in prargraph 6-3.1d(2).

(4) Clutch Shoe Lever Spring Tension. Measure clutch shoe lever spring tension as follows:

(a) Refer to figure 6-1.

(b) Hold cam disc to prevent it turning with clutch engaged.

(c) Hold spring scale at tangent to clutch.

(d) Using spring scale, measure force required to hold shoe lever in contact with stop lug. Record reading.

(e) Reading recorded in step (d) should be from 15 to 20 ounces. If not, perform adjustment procedure described in paragraph 6-3.1a(1).

(5) Feedwheel Detent. Check feedwheel detent as follows:

(a) Refer to figure 6-25.

(b) Raise tape lid.

(c) Position sensing fingers down and high part of detent eccentric toward the right.

(d) Place a "letters" perforated tape between tape guides with play in tape, taken slightly toward the right.

(e) The tip of each sensing finger should be centrally located in the code holes. If not, perform adjustment procedure described in paragraph 6-3.1f(6).

b. Operational Tests. Operational tests for high-level TD sets are discussed below in paragraph 4-8.b(1) and for low-level TD sets in paragraph 4-8.b(2).

(1) Operational Tests High-Level). Figure 4-2 shows test setup required to perform high-level TD test procedures described in table 4-5. If abnormal indications are encountered during a test, refer to Troubleshooting Index, table 5-1, in Chapter 5. Prior to conducting the tests, perform the following initial control settings on the TS-2616/UGM test set shown in figure 4-2.

TS-2616/UGM

a. AC POWER switch to off (down) position.

b. PEAK RESET switch to AUTO.

c. RATE-BAUDS switch to 74.2.

d. CODE LEVEL switch to 5.

e. DISTORTION SELECT switch to PEAK-TOTAL.

f. TRANSITION SELECT switch to ALL.

g. INPUT POLARITY switch to either + or - to cause meter to deflect to right.

h. INPUT SELECT switch to NEUTRAL 60.

i. INPUT FILTER switch to IN.

(2) Operational Tests (Low-Level). Figure 4-3 shows test setup required to perform low-level test procedures described in table 4-6. If abnormal indications are encountered during a test, refer to Troubleshooting Index, table 5-1, in Chapter 5. Prior to conducting the tests, perform the initial control settings on the TS-2616/UGM test set as described in paragraph 4-8.b(1).

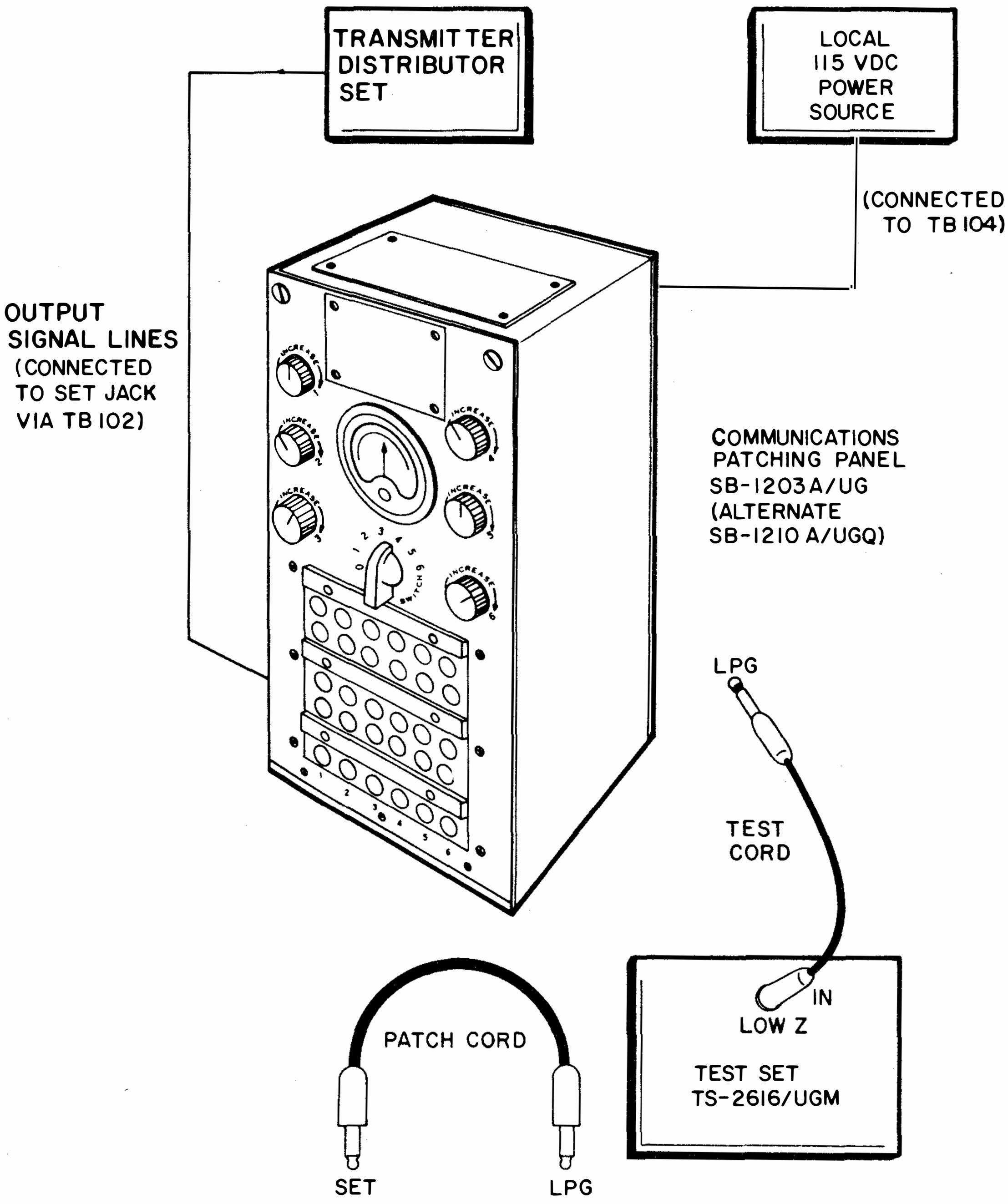


Figure 4-2. TD Test Setup (High-Level)

Table 4-5. TD Operational Test Procedures (High-Level)

Step	Action	Normal Indication	Reference Table 5-1
1.	Preliminary. a. Ensure TS-2616/UGM test set controls are set as indicated in paragraph 4-8.b(1). b. Ensure main power switch on TD is set to off (down) position. c. Refer to figure 4-2. d. Ensure TD and local 115 vdc power source are correctly connected to patching panel. (Refer to NAVSHIPS 0967-874-1010, formerly NAVSHIPS 95718.) e. Plug TD, test set, and local 115 vdc power source power cords into 115 vac outlets. f. Set power switches on test set and local 115 vdc power source to on position.		

Table 4-5. TD Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
2.	Motor Checks. Check for proper operation of motor as follows:		
	a. Set TD main power switch to on (up) position.	Motor starts running.	Item 1
	b. Determine that motor is not running too slow or too fast.	Motor runs at correct (normal) speed.	Item 2
3.	Drive Check. Check for proper main shaft drive as follows:		
	a. Observe that main shaft is rotating properly.	Power is transferred to main shaft through intermediate gear assembly.	Item 3
4.	Tape Lid Checks. Check for proper operation of tape lid as follows:		
	a. Press tape lid button.	Tape lid opens.	Item 4
	b. Insert perforated test tape.	Feedwheel engages feed holes in tape.	Item 5

Table 4-5. TD Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
	c. Press tape lid to closed position.	Tape lid closes properly.	Item 4
5.	<u>FREE, RUN, STOP Mode Checks</u>. Check TD operation with start-stop, lever in each position, as follows:		
	a. Set start-stop switch to FREE position.		
	b. Position test tape beneath closed tape lid.	Tape can be positioned freely and does not bind.	Item 6
	c. Patch output of TD to local monitoring typing unit and then to input of test set TS-2616/UGM.		
	d. Set start-stop lever to RUN and observe the following:		
	(1) Clutch operation.	Clutch trips	Item 7
	(2) Signal output quality.	Signal Transmission to Local monitoring equipment and test set is not garbled or distorted.	Item 8, Item 9

Table 4-5. TD Operational Test Procedures (High-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
	(3) Transmission.	Transmission does not stop.	Item 10
e.	Lift tape slightly at right of tape guide to elevate tight-tape bail.	Transmission stops.	Item 11
f.	Press tape lid button or feed torn end of tape through reading head.	Transmission stops.	Item 12
g.	Set start-stop lever to OFF position.	Transmission stops	Item 13

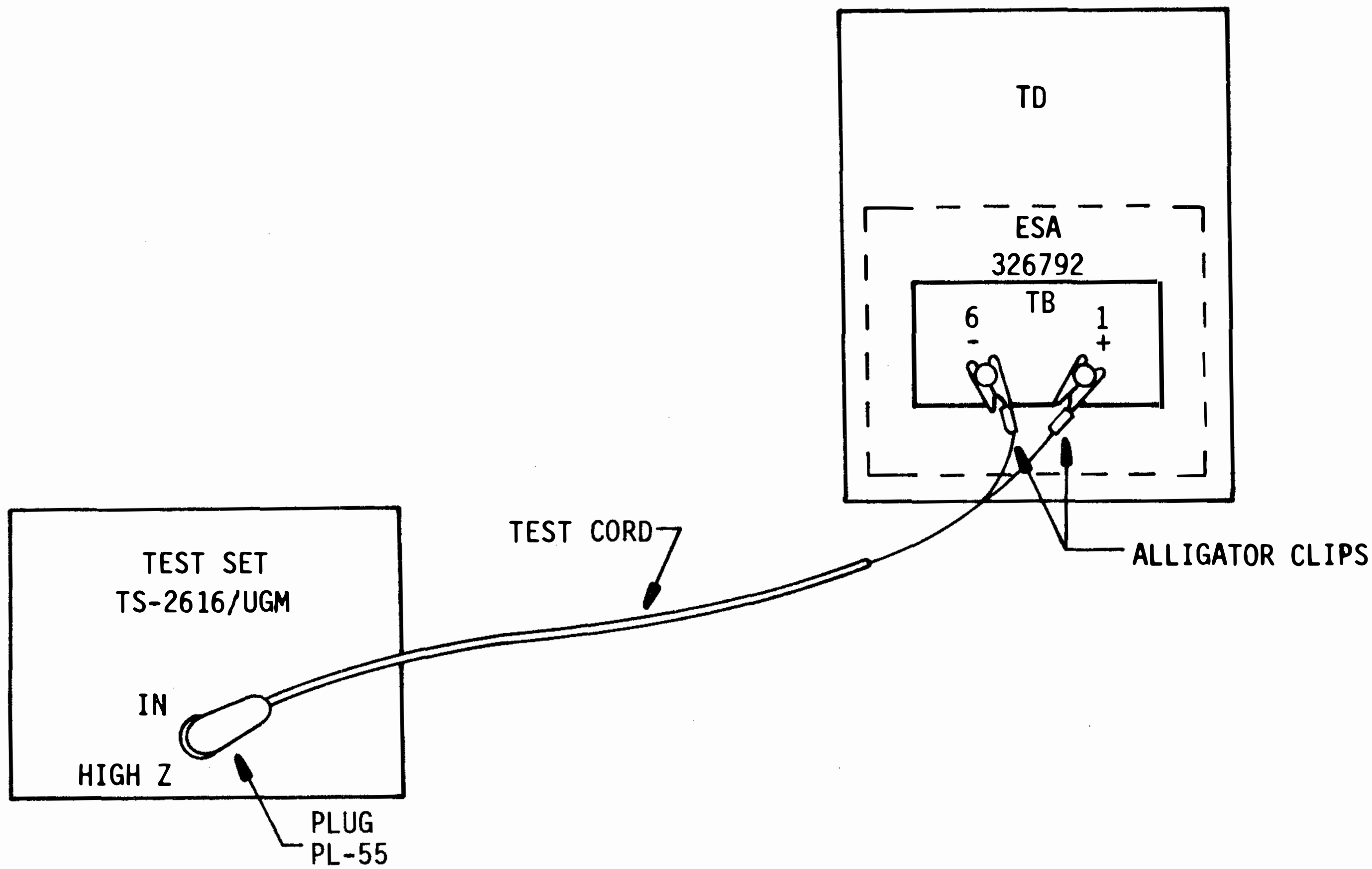


Figure 4-3. TD Test Setup (Low-Level)

Table 4-6. TD Operational Test Procedures (Low-Level)

Step	Action	Normal Indication	Reference Table 5-1
1.	<u>Preliminary</u>.		
	a. Ensure TS-2616/UGM test set controls are set as indicated in paragraph 4-8.b(1).		
	b. Ensure main power switch on TD is set to off (down) position.		
	c. Refer to figure 4-3.		
	d. Plug TD, test set, and ESA power cords into 115 vac outlets.		
	e. Set power switches on TD, test set, and ESA to on position.		
2.	<u>Motor Checks</u>. Check for proper operation of motor as follows:		
	a. Set TD main power switch to on (up) position.	Motor starts running.	Item 1
	b. Determine that motor is not running too fast. slow or too	Motor runs at correct (normal) speed.	Item 2

Table 4-6. TD Operational Test Procedures (Low-Level) - Continued

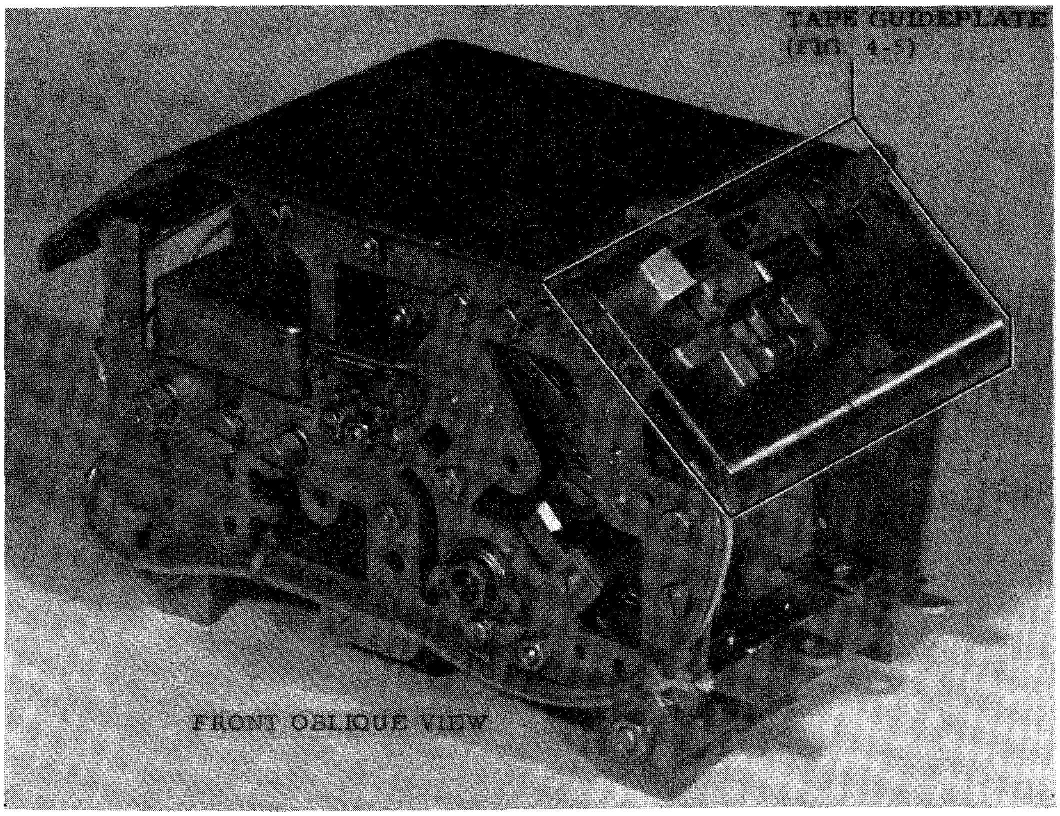
Step	Action	Normal Indication	Reference Table 5-1
3.	Drive Check. Check for proper main shaft drive as follows:		
	a. Observe that main shaft is rotating properly.	Power is transferred to main shaft through intermediate gear assembly.	Item 3
4.	Tape Lid Checks. Check for proper operation of tape lid as follows:		
	a. Press tape lid button.	Tape lid opens.	Item 4
	b. Insert perforated test tape.	Feedwheel engages feed holes in tape.	Item 5
	c. Press tape lid to closed position.	Tape lid closes properly.	Item 4
5.	FREE, RUN, STOP Mode Checks. Check TD operation with start-stop, lever in each position, as follows:		
	a. Set start-stop switch to FREE position.		

Table 4-6. TD Operational Test Procedures (Low-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
	b. Position test tape beneath closed tape lid.	Tape can be positioned freely and does not bind.	Item 6
	c. Patch output of TD to local monitoring typing unit and then to input of test set TS-2616/UGM.		
	d. Set start-stop lever to RUN and observe the following:		
	(1) Clutch operation.	Clutch trips	Item 7
	(2) Signal output quality.	Signal Transmission to Local monitoring equipment and test set is not garbled or distorted.	Item 8, Item 9
	(3) Transmission.	Transmission does not stop.	Item 10
	e. Lift tape slightly at right of tape guide to elevate tight tape bail.	Transmission stops.	Item 11

Table 4-6. TD Operational Test Procedures (Low-Level) - Continued

Step	Action	Normal Indication	Reference Table 5-1
	f. Press tape lid button or feed torn end of tape through reading head.	Transmission stops.	Item 12
	g. Set start-stop lever to OFF position.	Transmission stops	Item 13



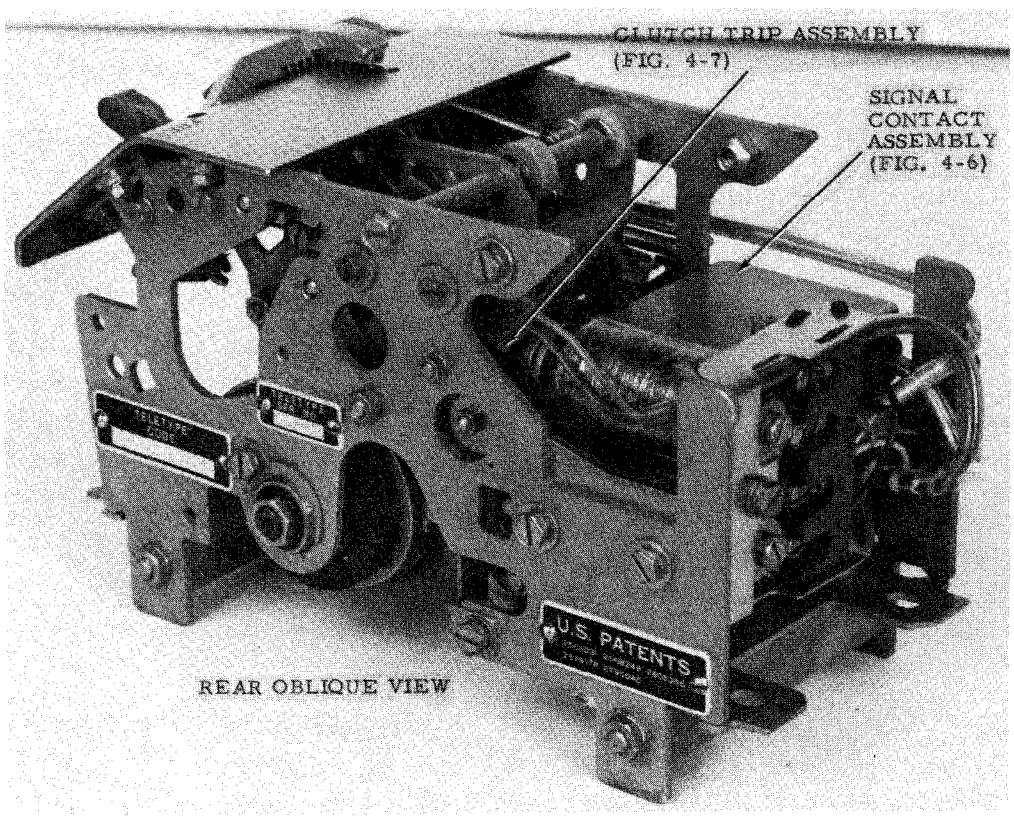


Figure 4-4. Transmitter Distributor

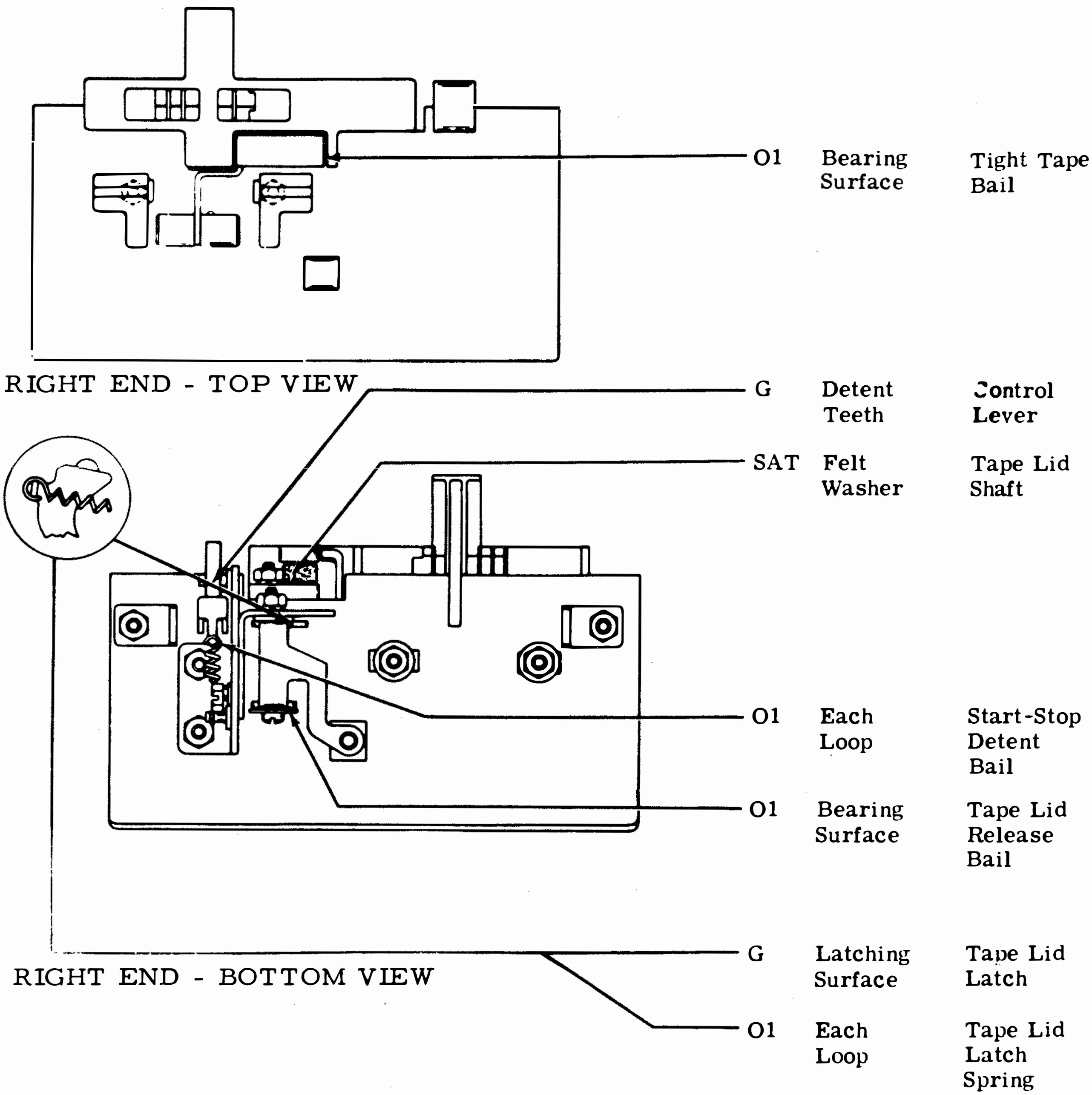
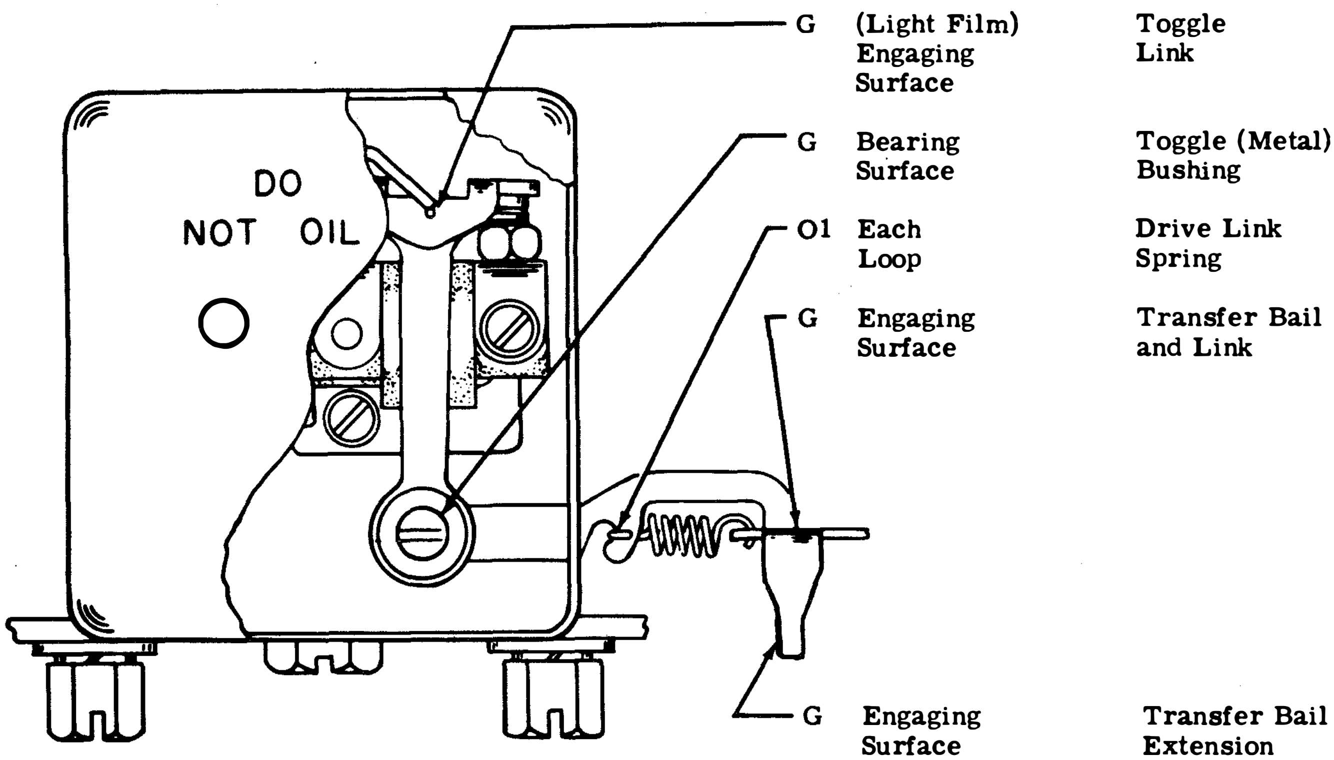


Figure 4-5. Tape Guideplate



TOP VIEW - COVER PLATE REMOVED

Figure 4-6. Signal Contact Assembly

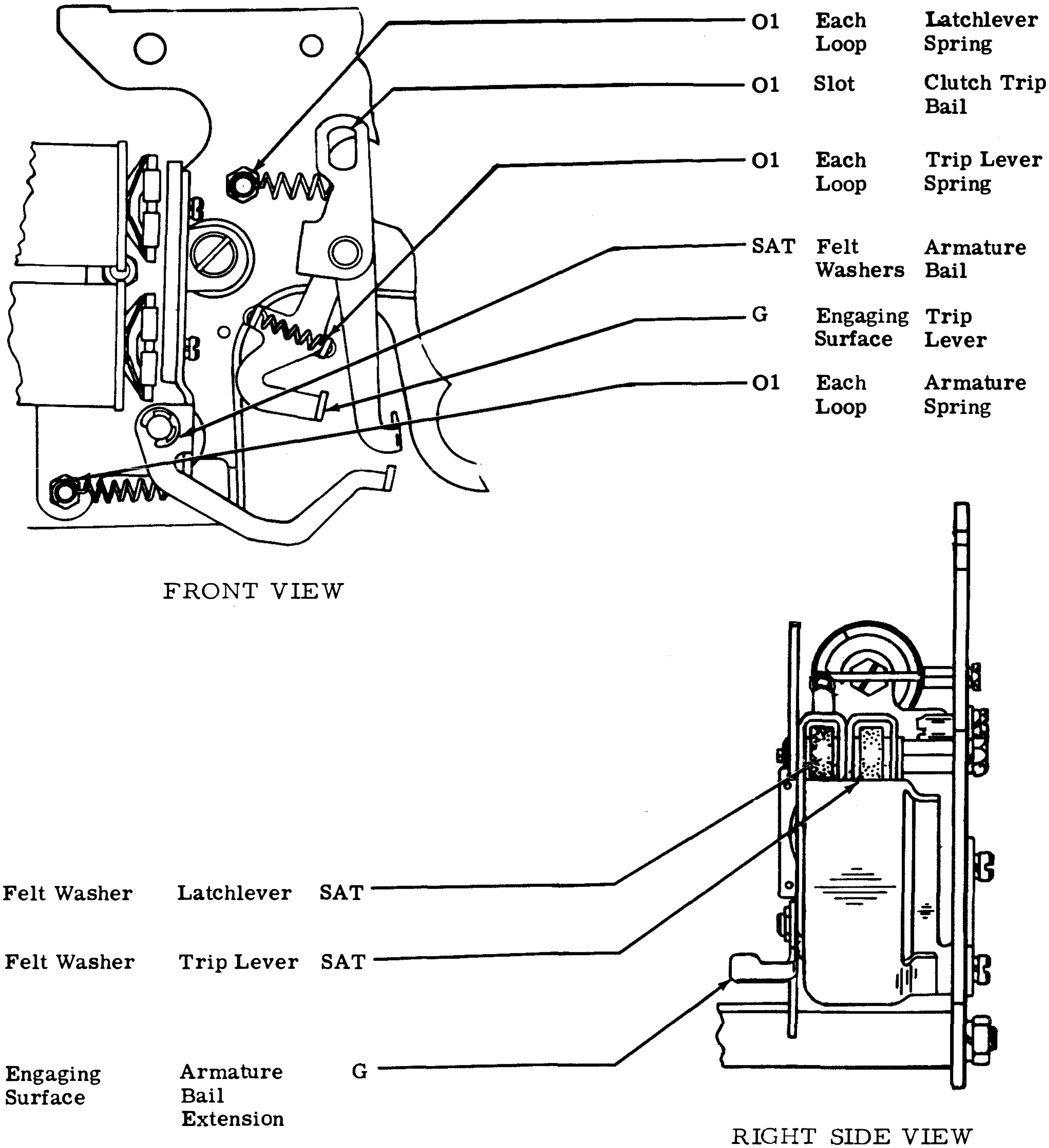


Figure 4-7. Cltuch Trip Assembly

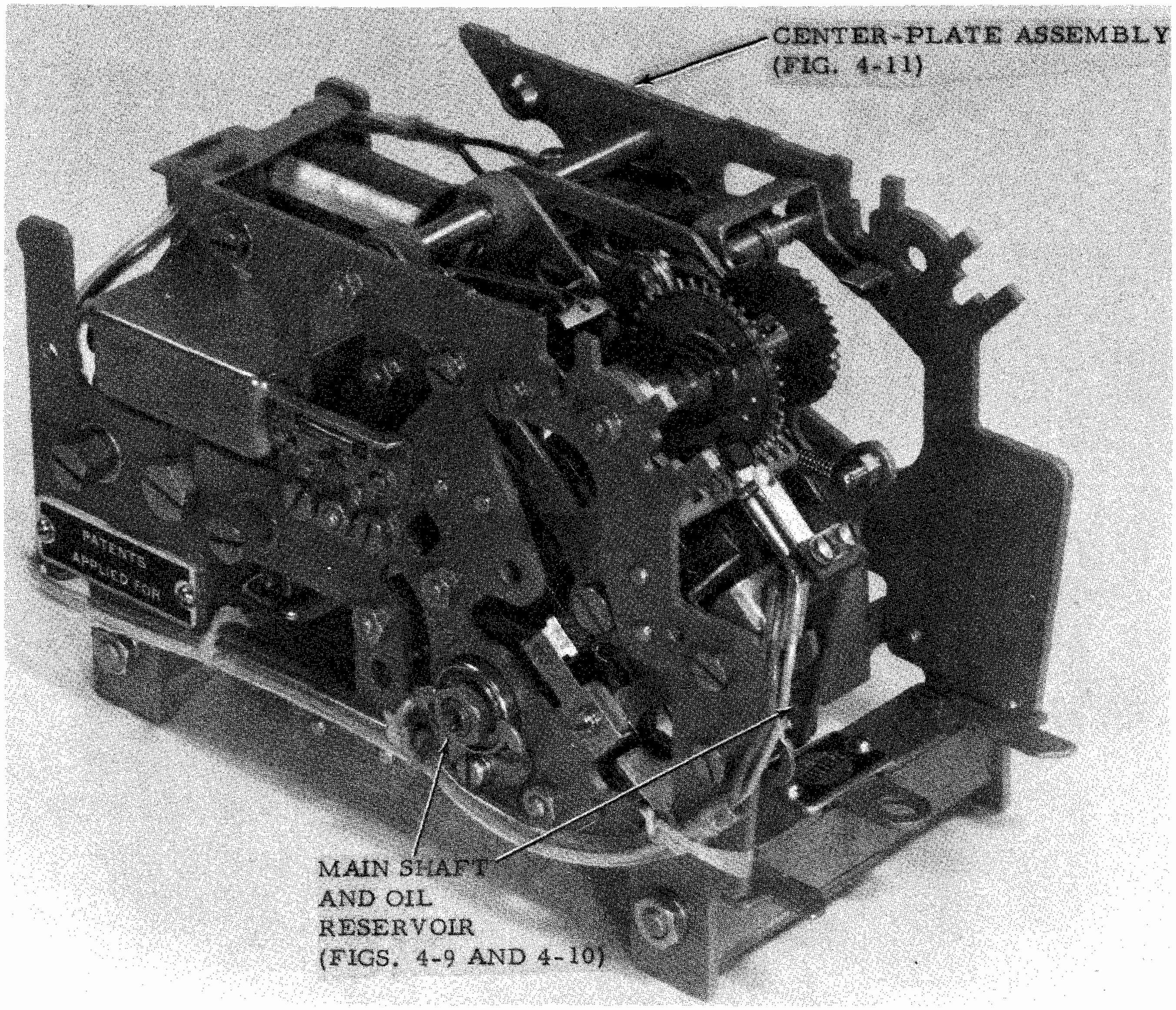


Figure 4-8. Main Shaft, Oil Reservoir, and Center Plate Assembly

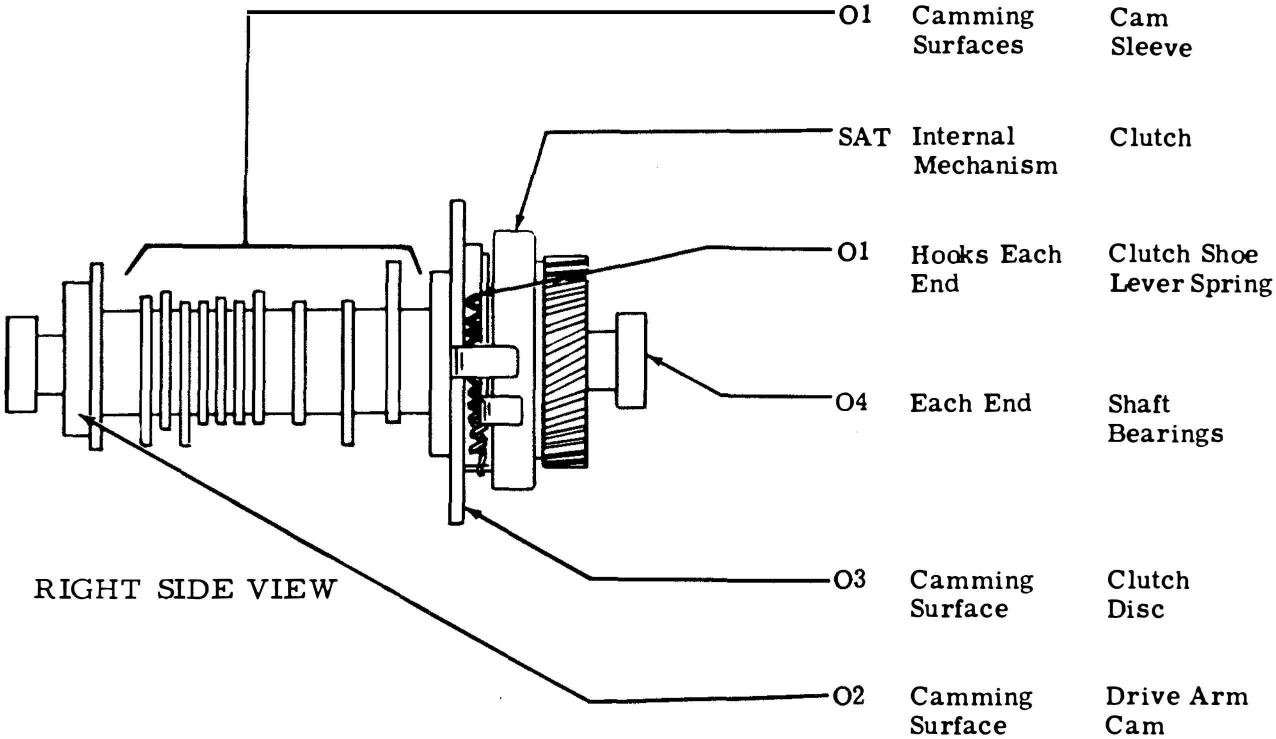


Figure 4-9. Main Shaft

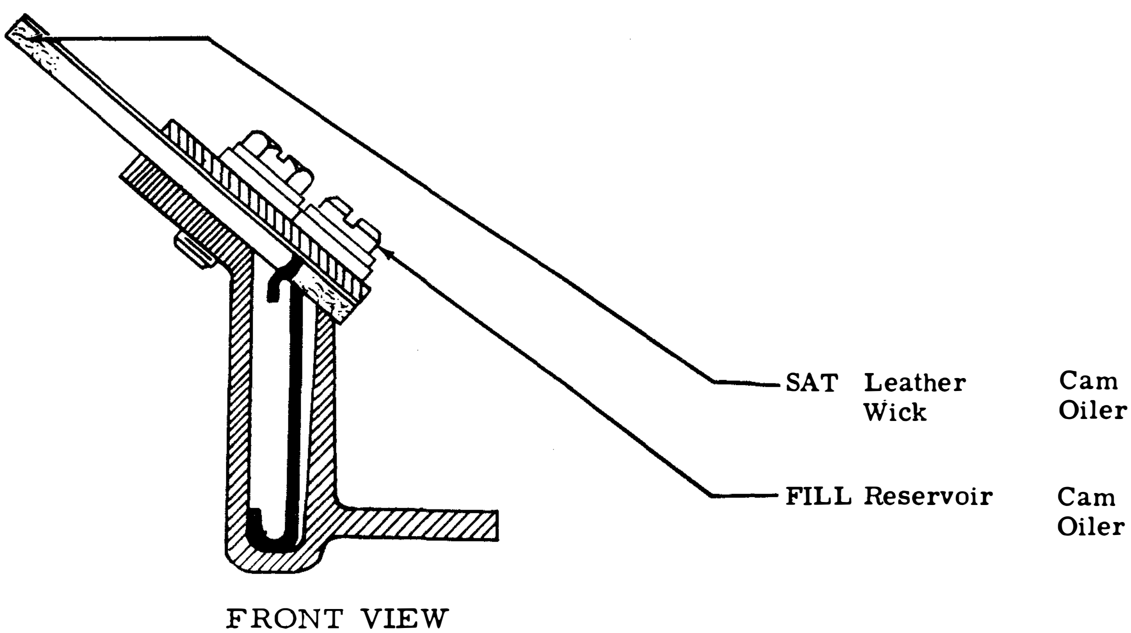
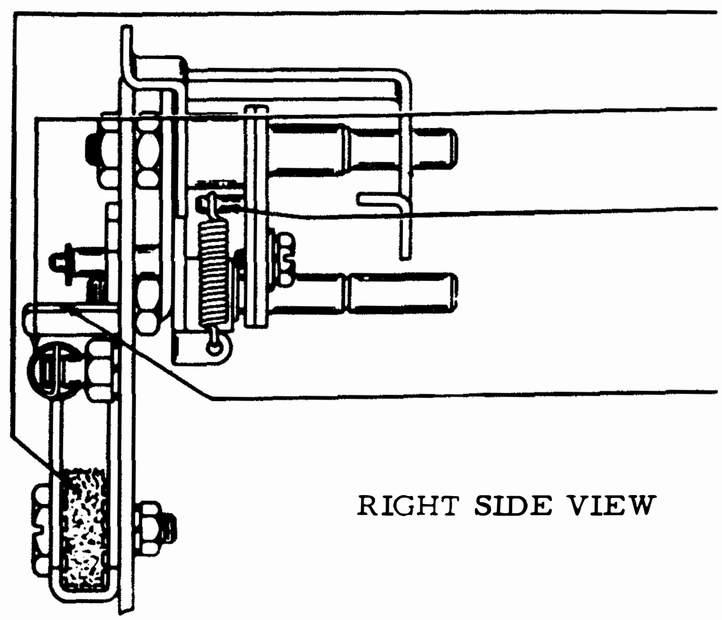
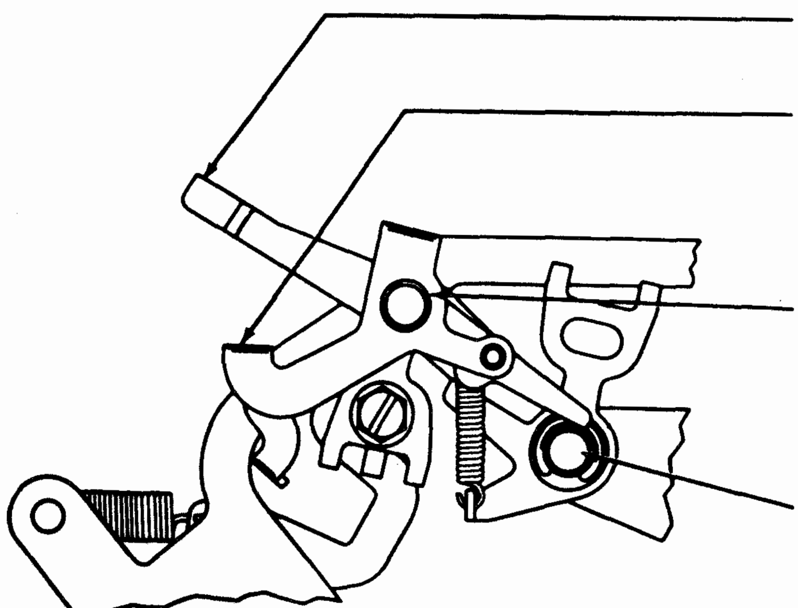


Figure 4-10. Oil Reservoir



SAT	Felt Washer	Ratchet Detent Bail
O1	Both Loops	Detent Bail Spring
O1	Both Loops	Tight Tape Arm Spring
G	Engaging Surface	Start-Stop Bail Extension

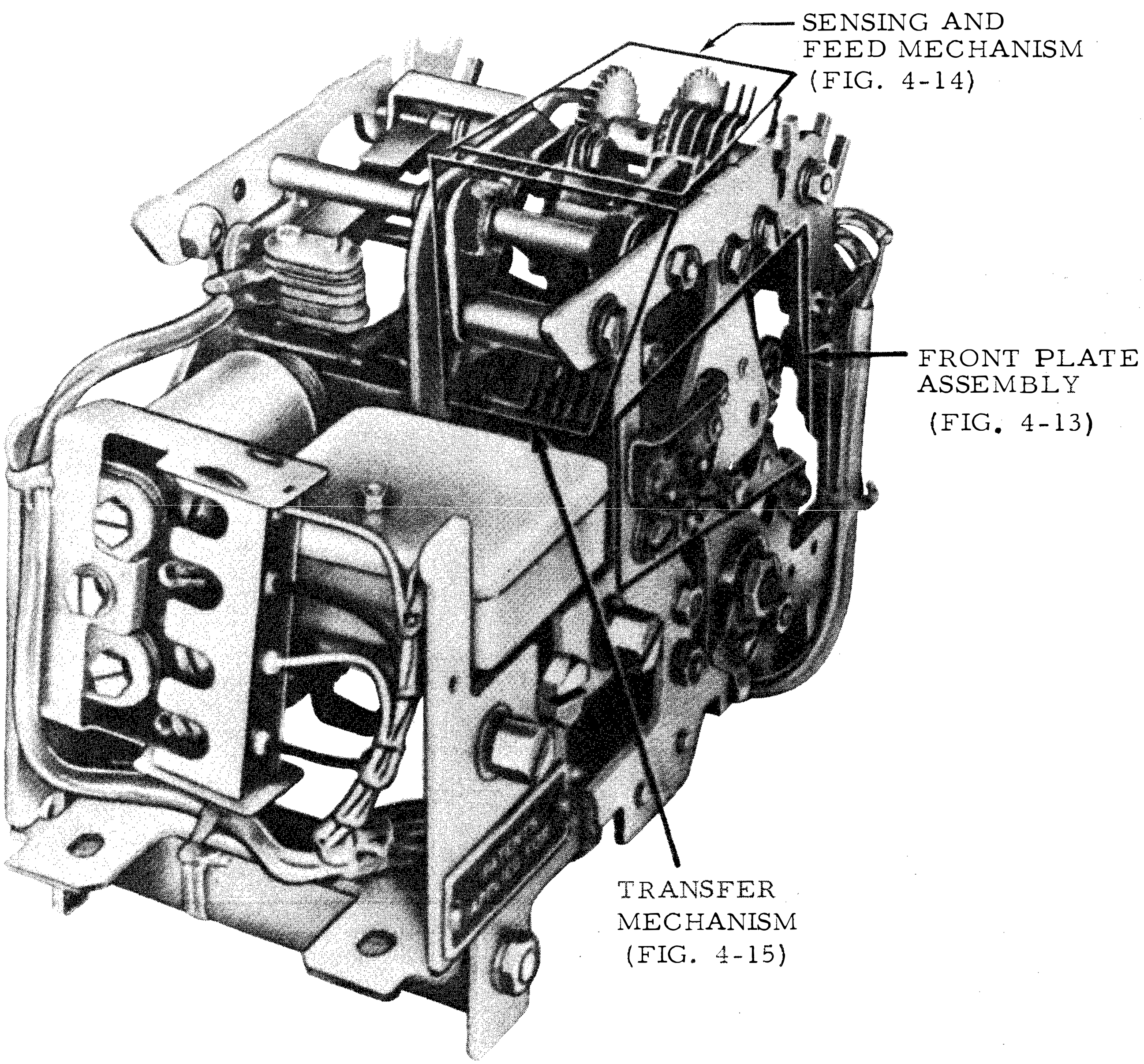
RIGHT SIDE VIEW



G	Engaging Surface	Tight Tape Arm
G	Engaging Surface	Start-Stop Bail
O1	Bearing Surface	Start-Stop Bail
O1	Bearing Surface	Yield Arm

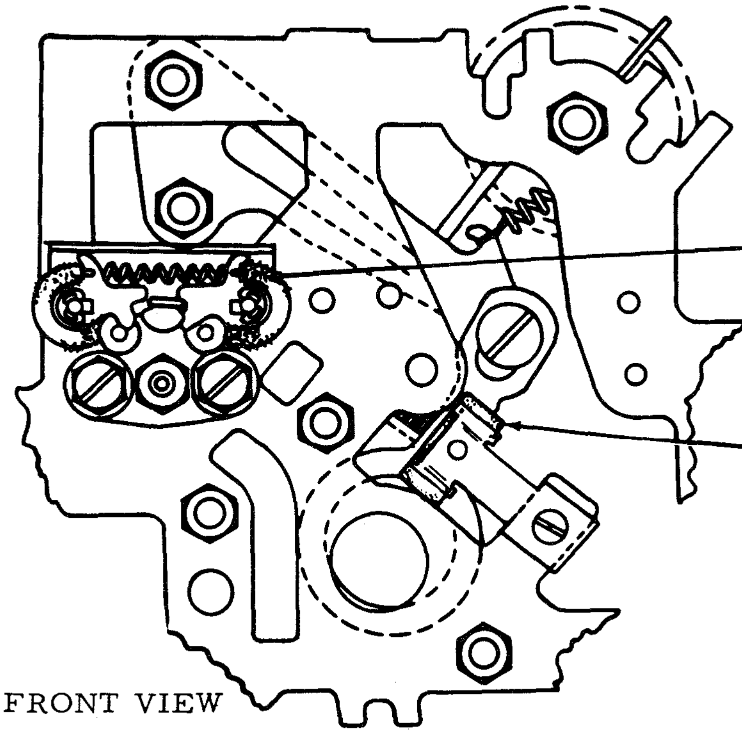
REAR VIEW

Figure 4-11. Center Plate Assembly



REAR OBLIQUE VIEW

Figure 4-12. Front Plate Assembly, Sensing and Feed Mechanism, and Transfer Mechanism



SAT	Felt Wick	Stabilizer Latch
SAT	Leather Wick	Drive Arm Oiler

Figure 4-13. Front Plate Assembly

Shaft	Feedwheel	O3
Felt Wicks	Feedwheel Bearing	SAT
Felt Wicks	Sensing Pins	SAT
Sliding Surface	Sensing Pin Guide Post	O6
Sliding Surface	Locking Bail	O2
Both Loops	Locking Bail Spring	O2

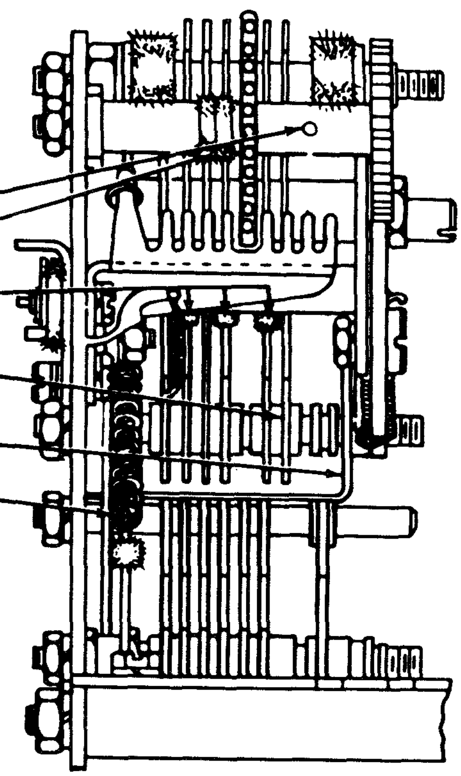
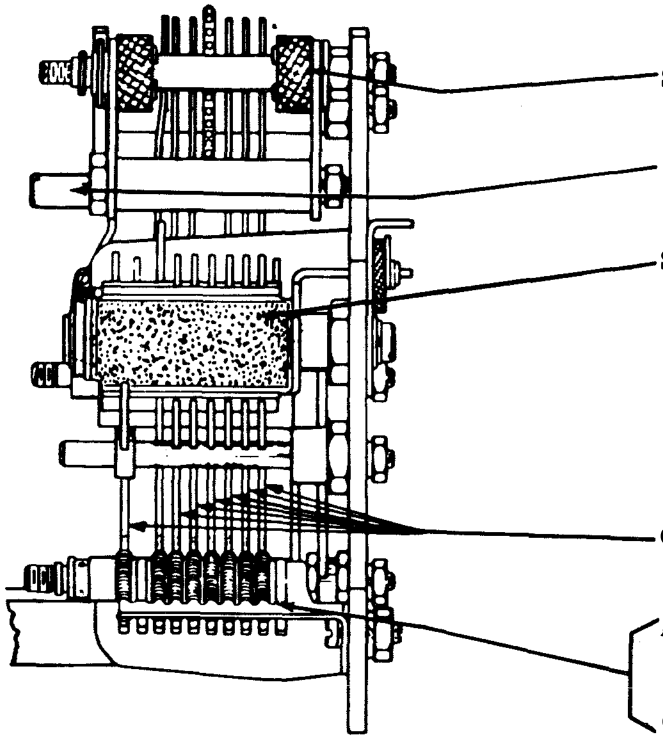
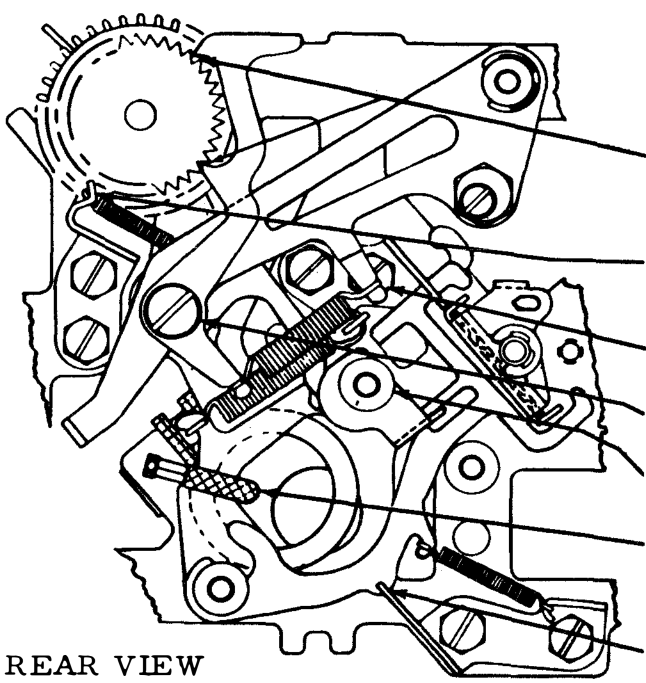


Figure 4-14. Sensing and Feed Assembly



SAT	Each Felt Washer	Main Bail Pivots
G	Sliding Surface	Bail Drive Post
SAT	Leather Pad	Transfer Bail
O1	Sliding Surfaces	Transfer Levers
O1	Each Loop	Transfer Lever Springs
O1	Each Loop	Locking Bail Spring

BOTTOM VIEW



O1	Teeth	Feed Pawl and Ratchet Wheel
O1	Each Loop	Transfer Lever Springs
O1	Each Loop	Feed Pawl Spring
O1	Sliding Surface	Feed Pawl Pivot
O1	Engaging Surface	Locking Bail
SAT	Felt Washer	Locking Bail
O1	Sliding Surface	Transfer Levers

REAR VIEW

Figure 4-15. Transfer Mechanism

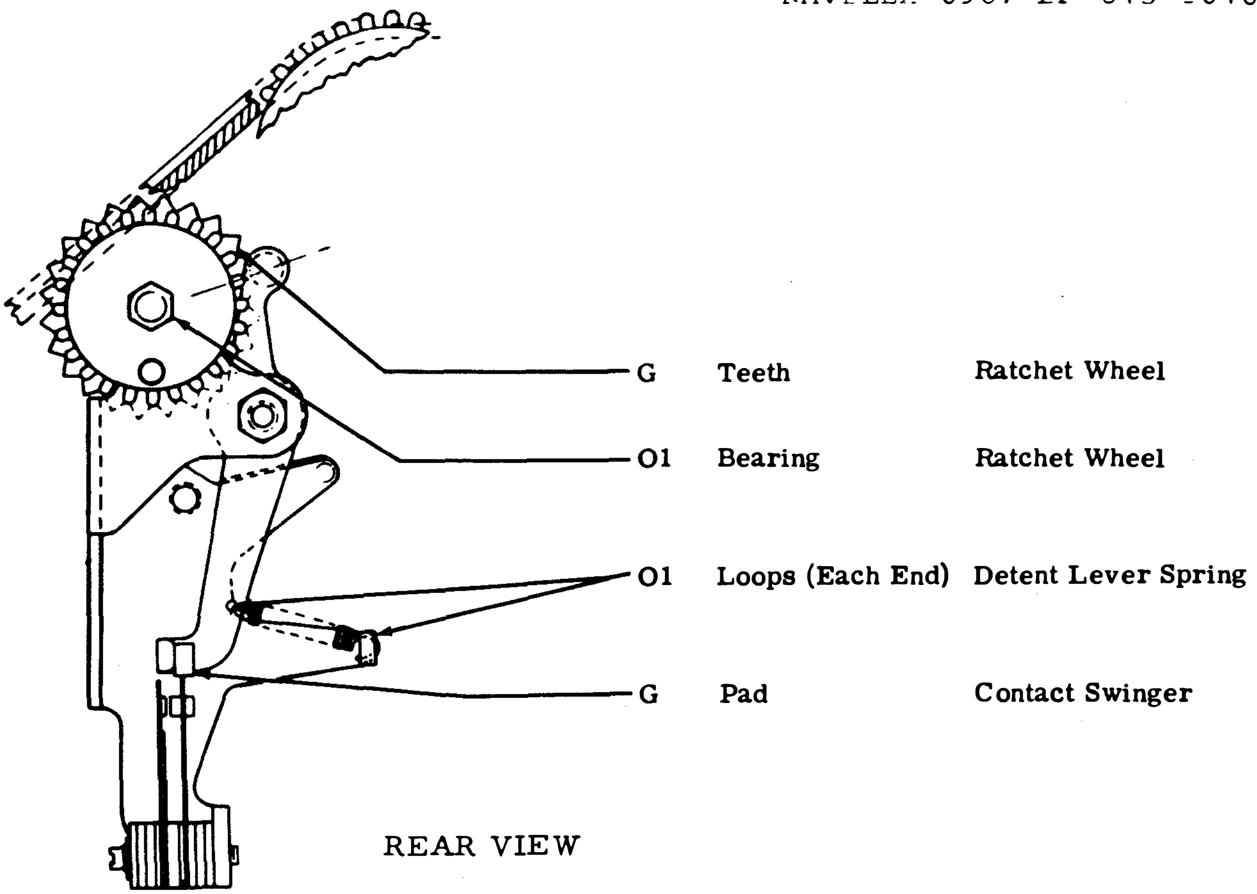


Figure 4-16. Tape Feed Assurance Mechanism (Variable Features)

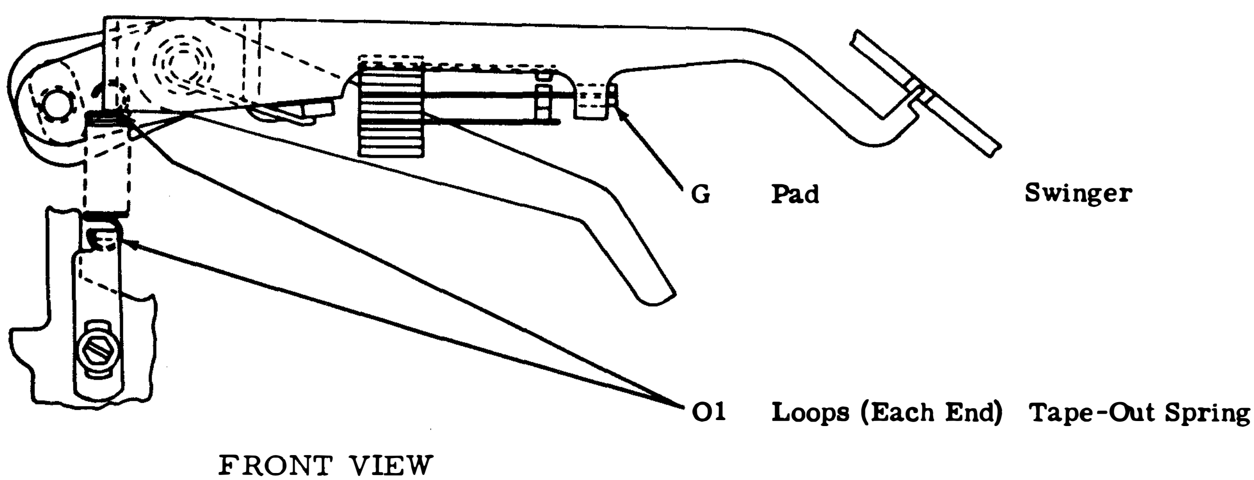


Figure 4-17. Tape-Out Sensing Mechanism (Variable Features)

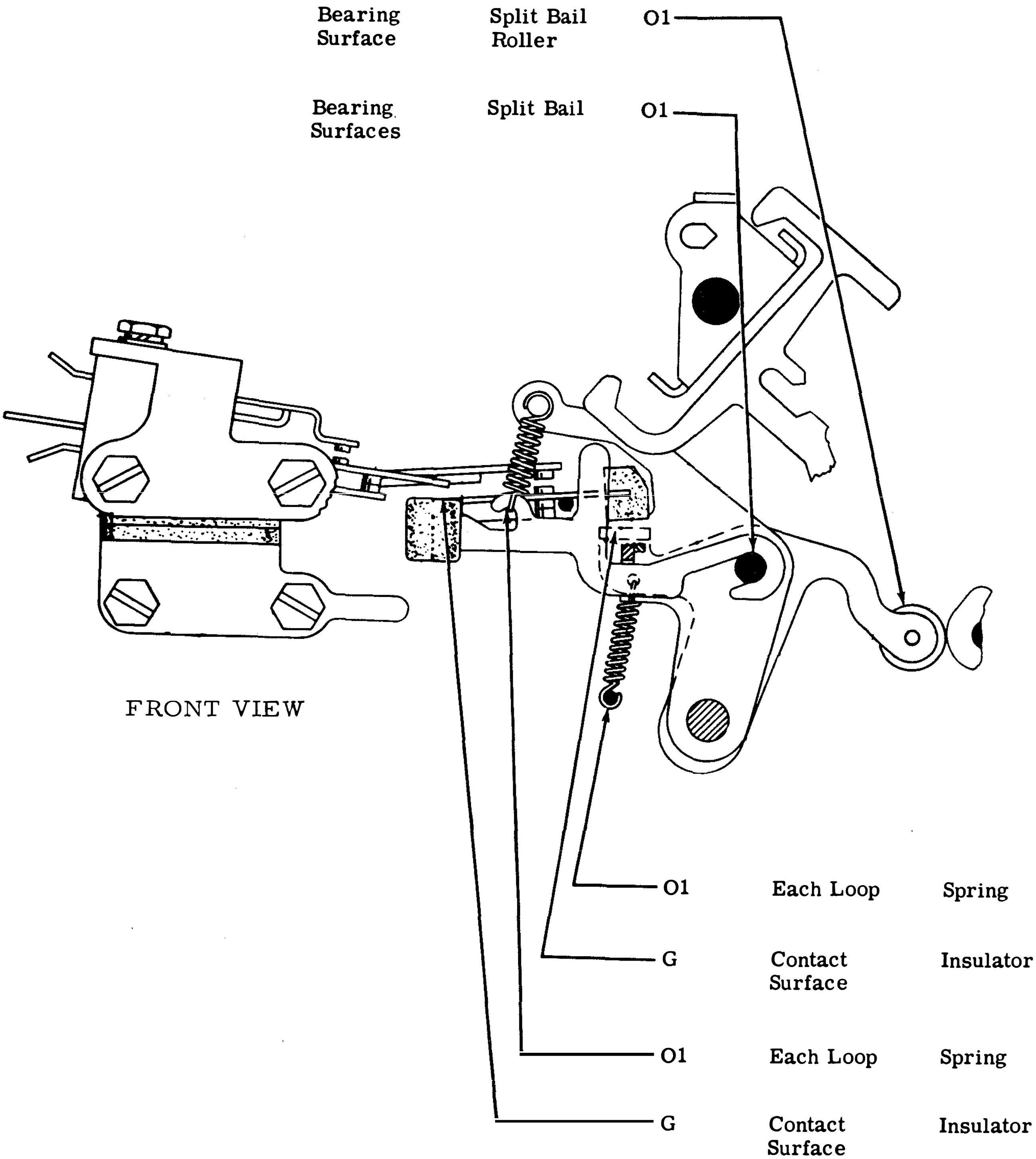


Figure 4-18. Code Reading Contacts (Variable Features)

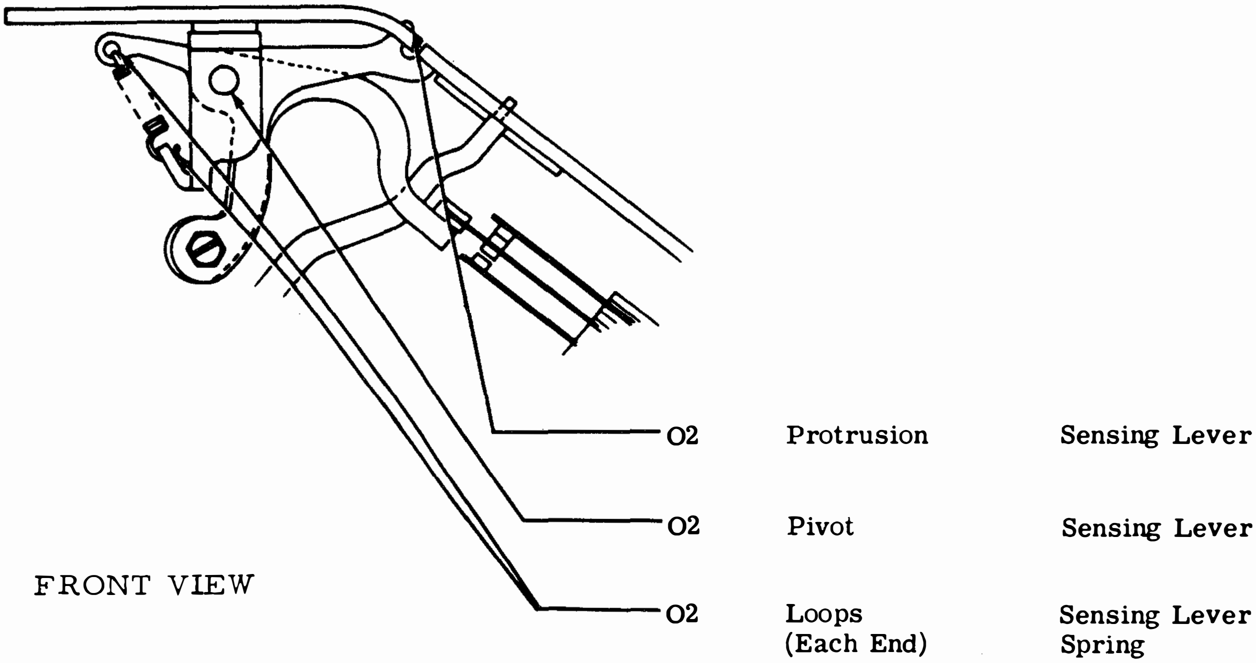


Figure 4-19. Tape Lid Sensing Lever (Variable Features)

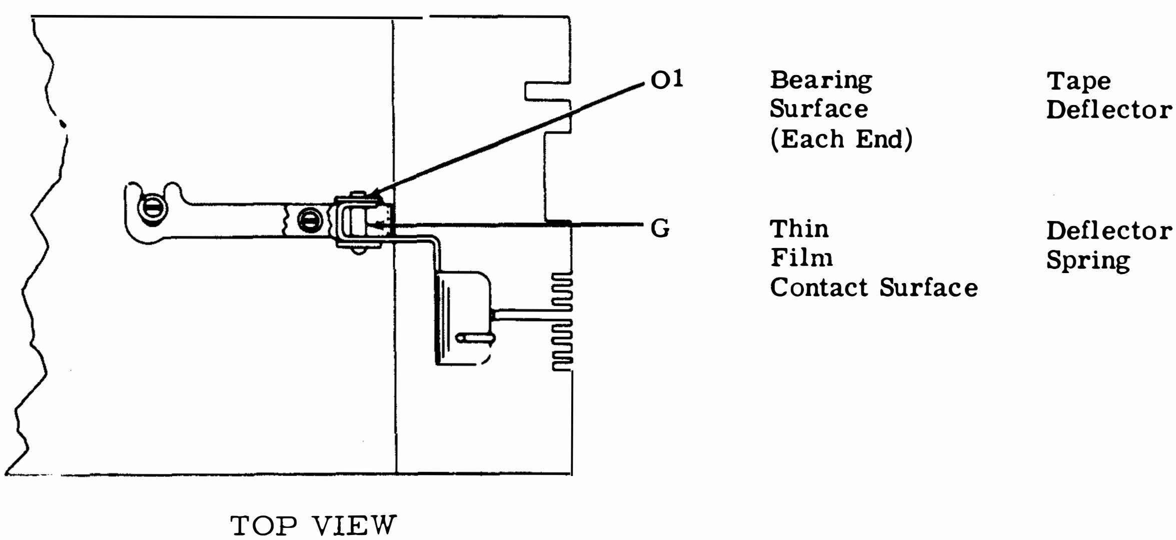
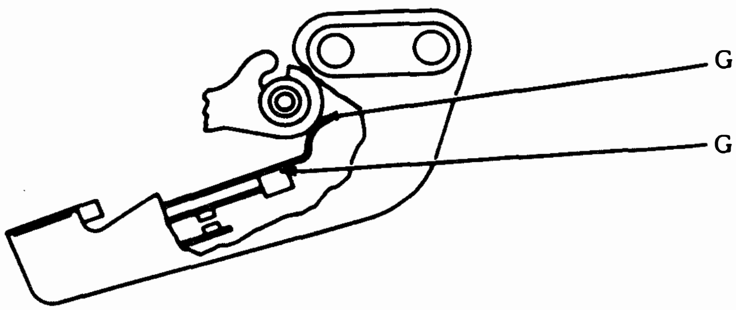


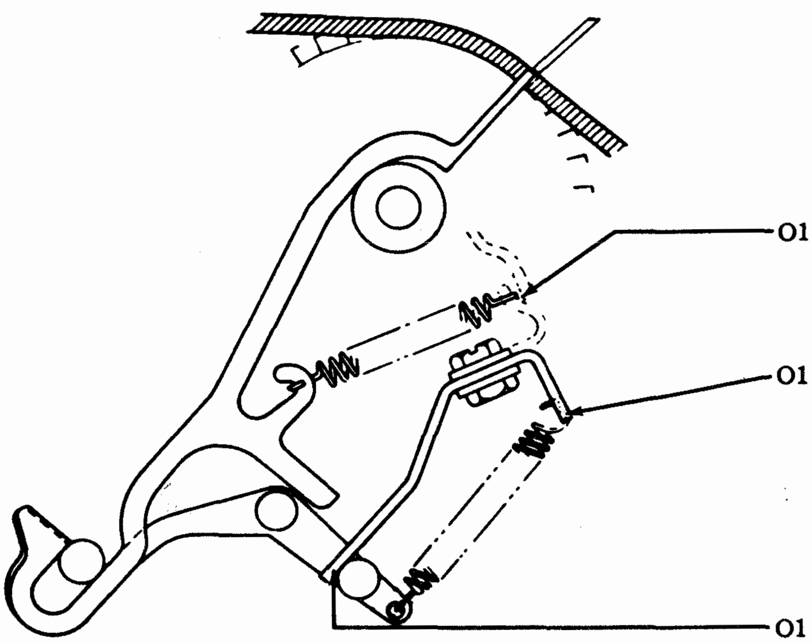
Figure 4-20. Tape Deflector (Variable Features)



G	Engaging Surface	Contact Lever
G	Engaging Surface	Contact Insulator

FRONT OBLIQUE VIEW

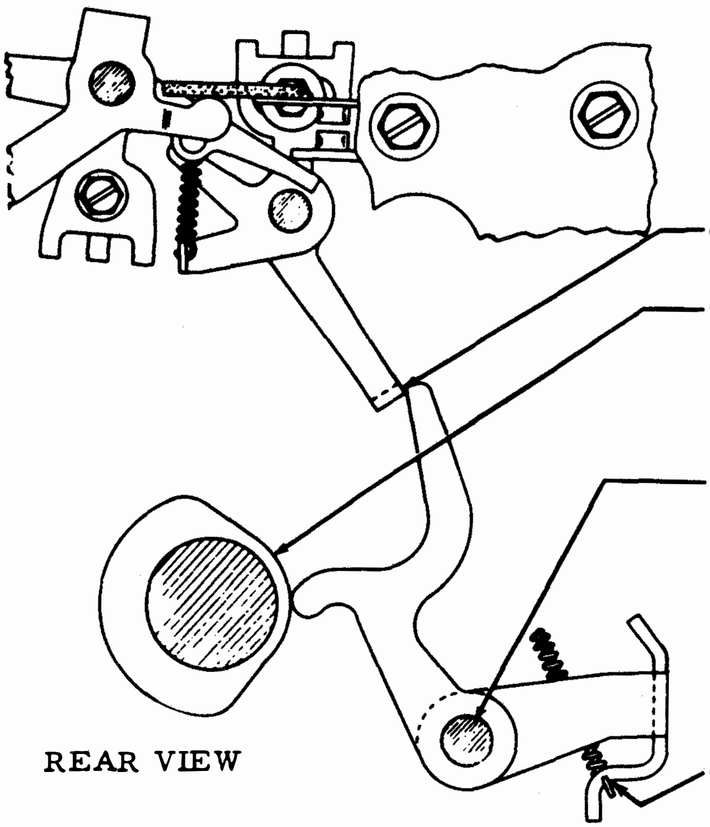
Figure 4-21. Start-Stop Pulse Contact (Variable Features)



O1	Each Loop	Spring
O1	Each Loop	Spring
O1	Engaging Surface	Deflector Bail Guide

FRONT VIEW

Figure 4-22. Rub-Out Deleter (Variable Features)



G	Engaging Surface	Timing Arm
G	Light Film	Timing Cam
O2	Bearing Surface	Timing Bail
O1	Each Loop	Spring

Figure 4-23. Transmitter Stop Mechanism (Variable Features)

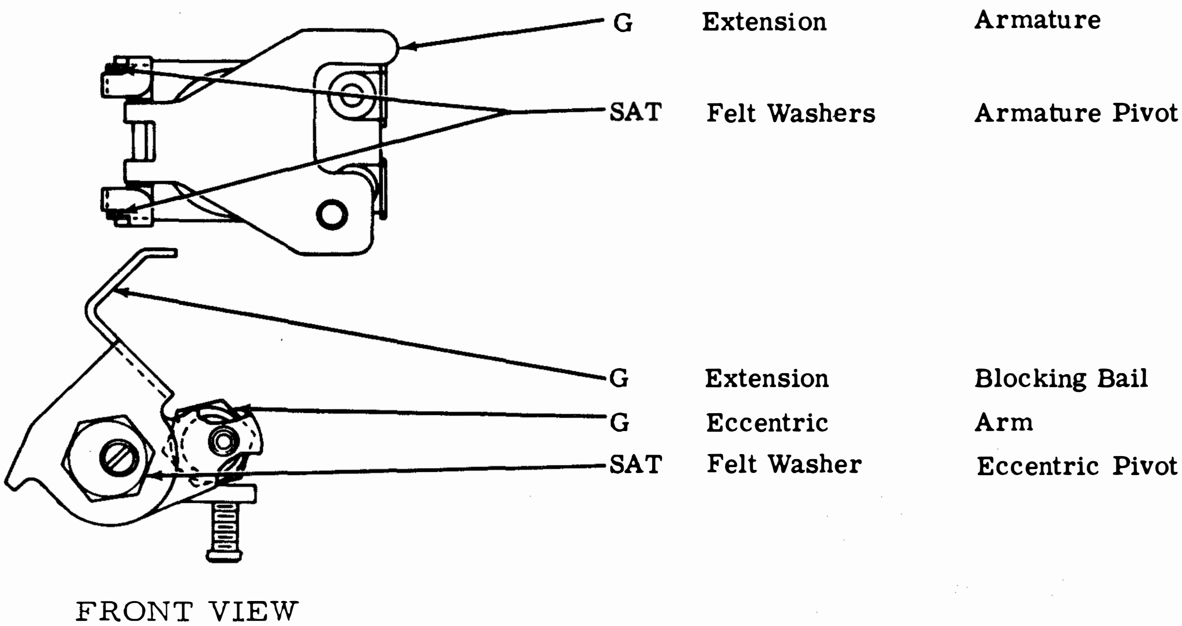


Figure 4-24. Tape-Withhold Mechanism (Variable Features)

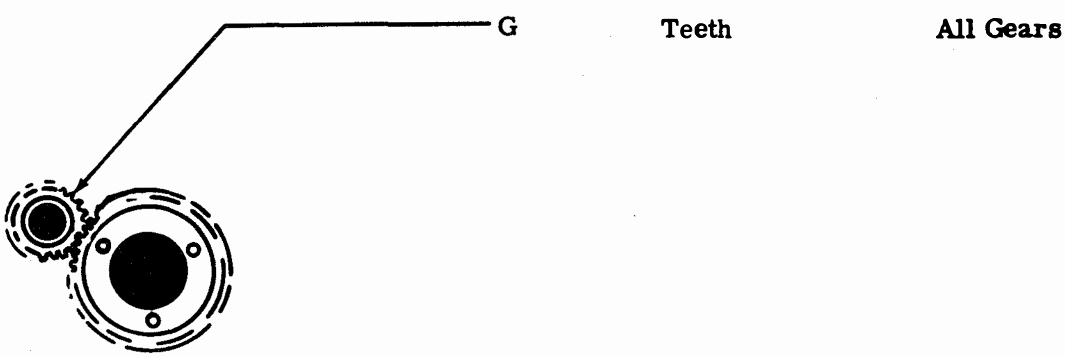


Figure 4-25. All Gears (Variable Features)

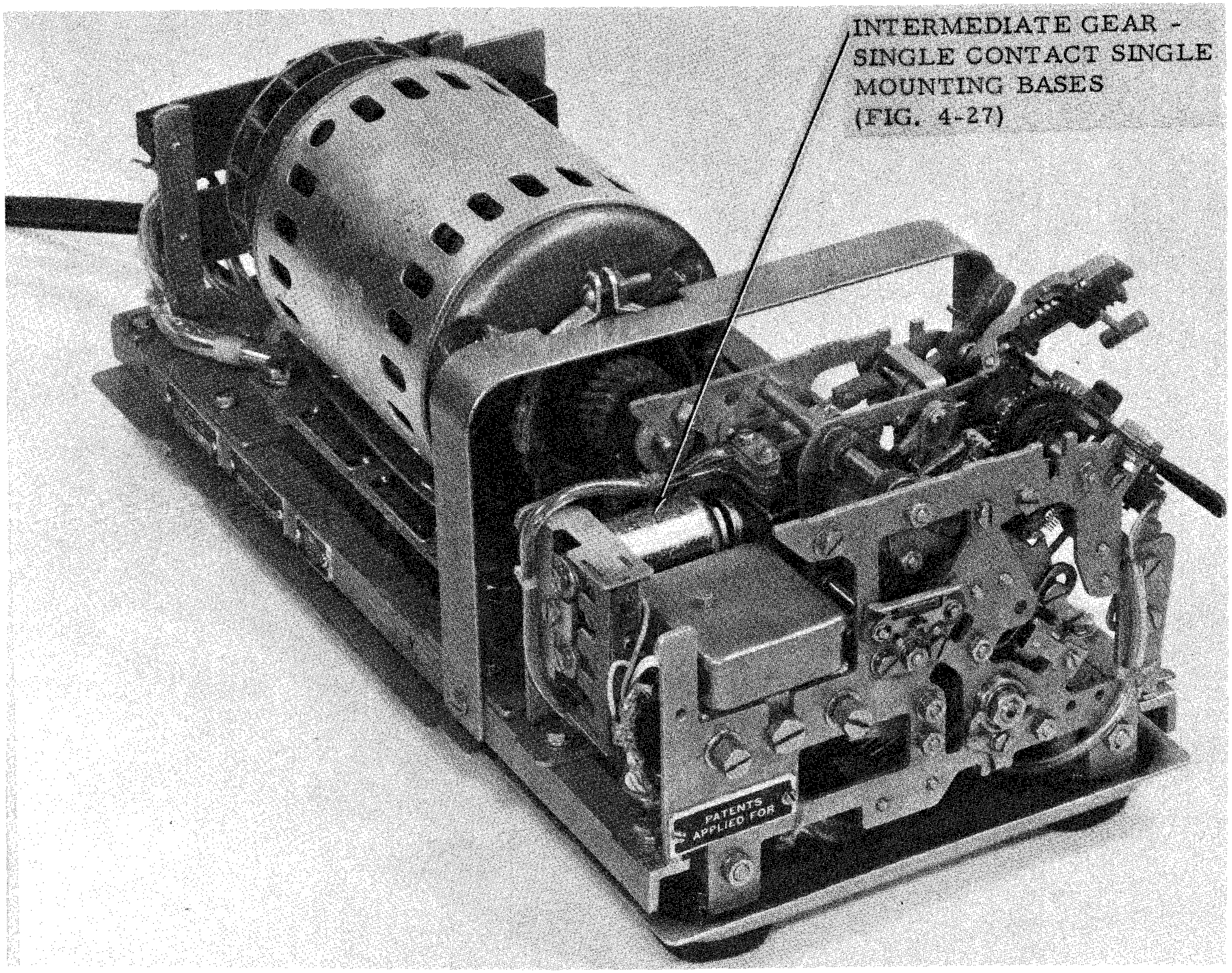


Figure 4-26. Single Contact Single Mounting Bases

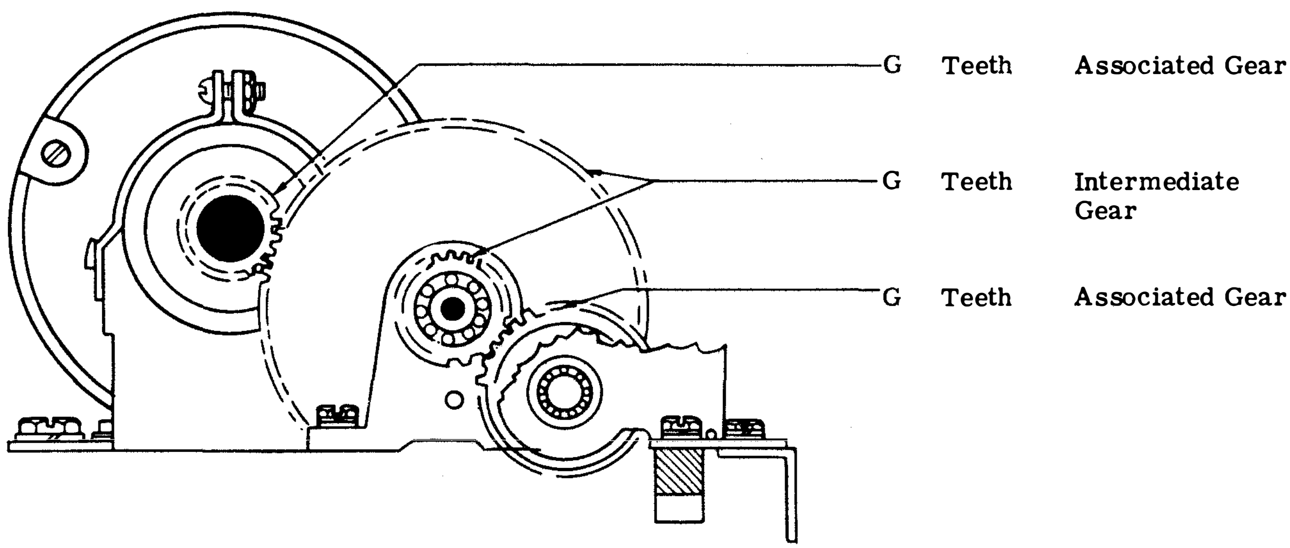


Figure 4-27. Intermediate Gear - Single Contact Single Mounting Bases

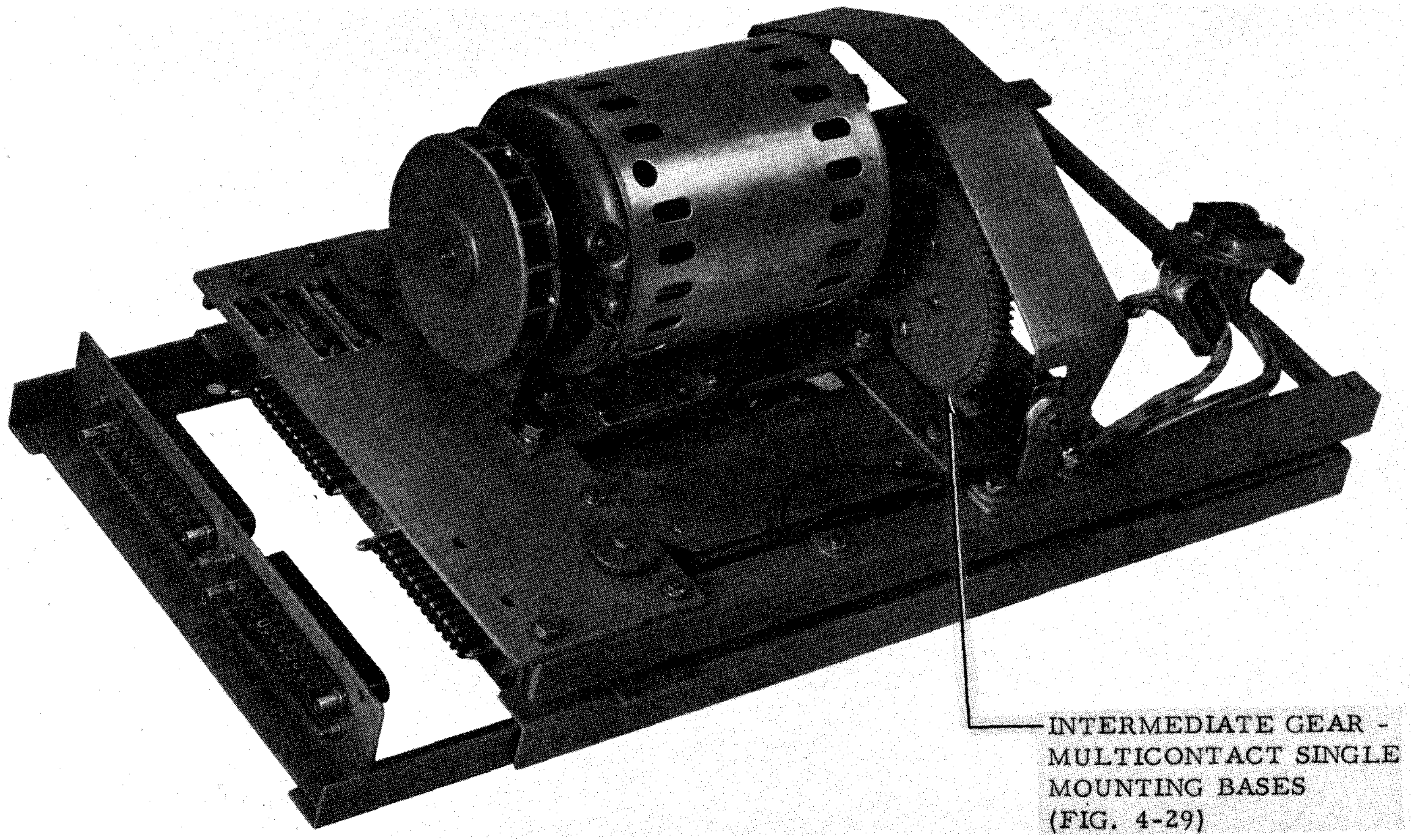


Figure 4-28. Multicontact Single Mounting Bases

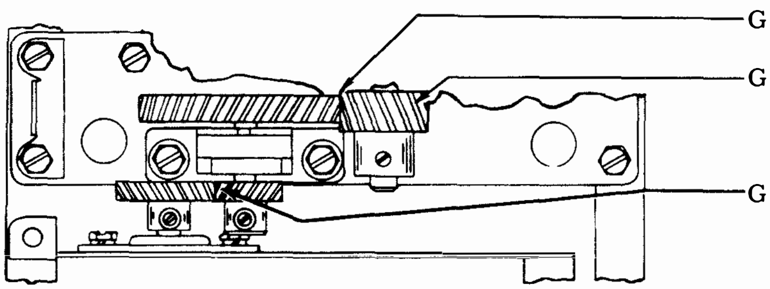


Figure 4-29. Intermediate Gear - Multicontact Single Mounting Bases

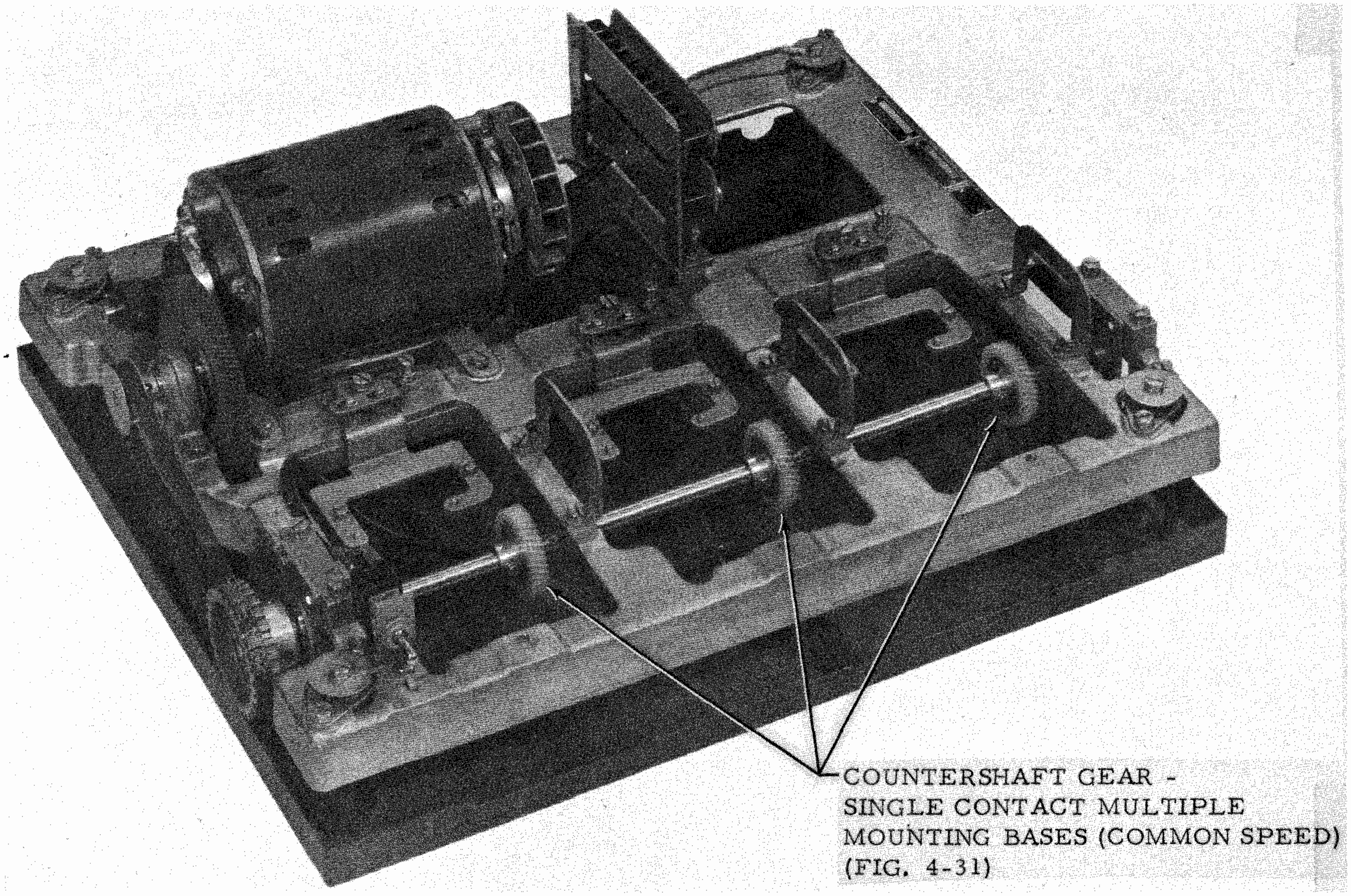


Figure 4-30. Single Contact Multiple Mounting Bases
(Common Speed)

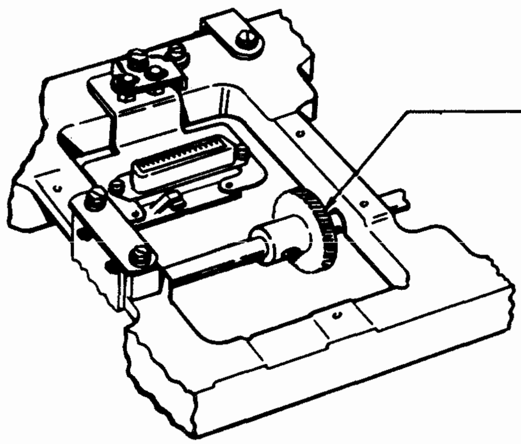


Figure 4-31. Countershaft Gear - Single Contact Multiple Mounting Bases (Common Speed)

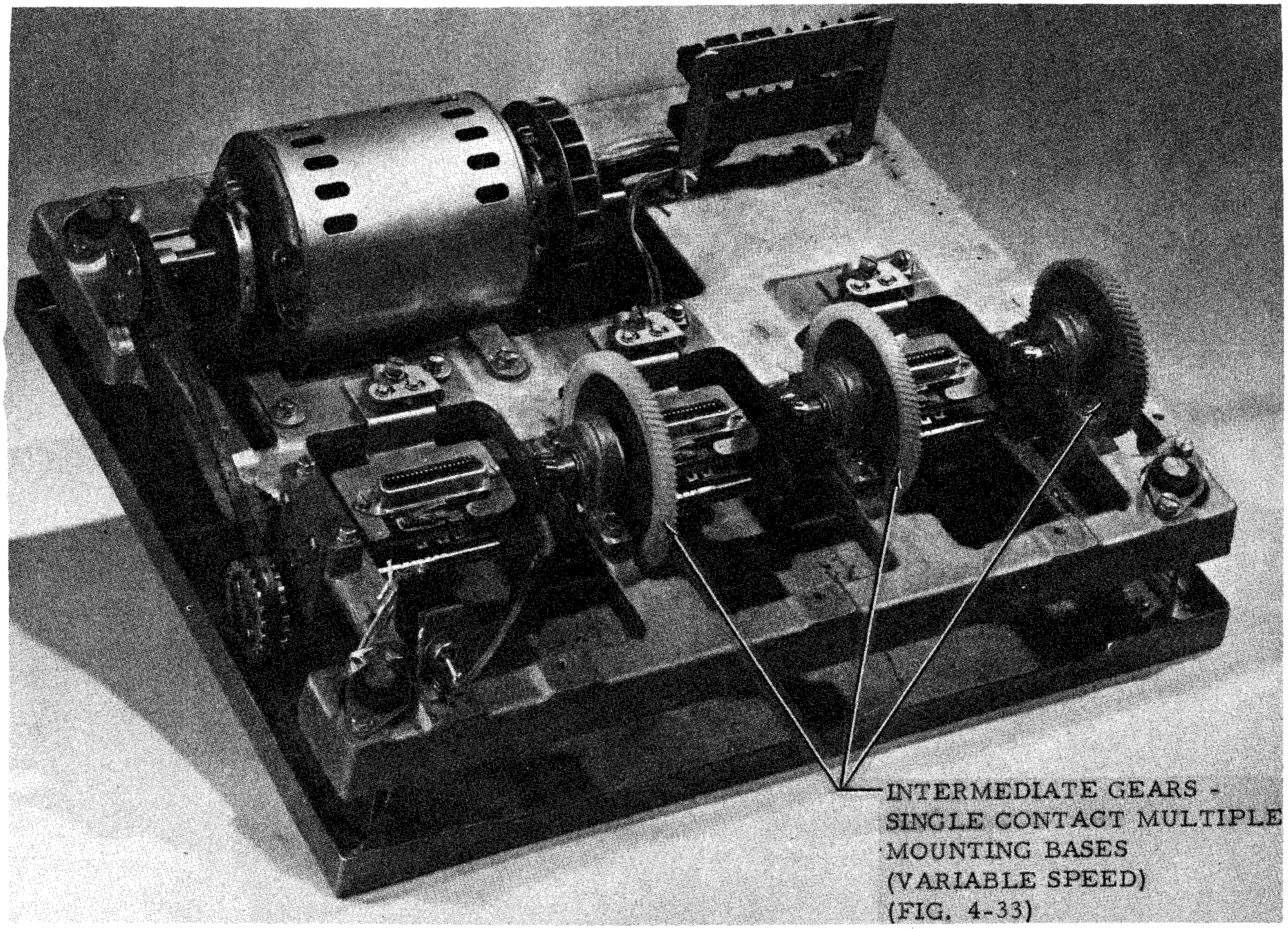


Figure 4-32. Single Contact Multiple Mounting Bases (Variable Speed)

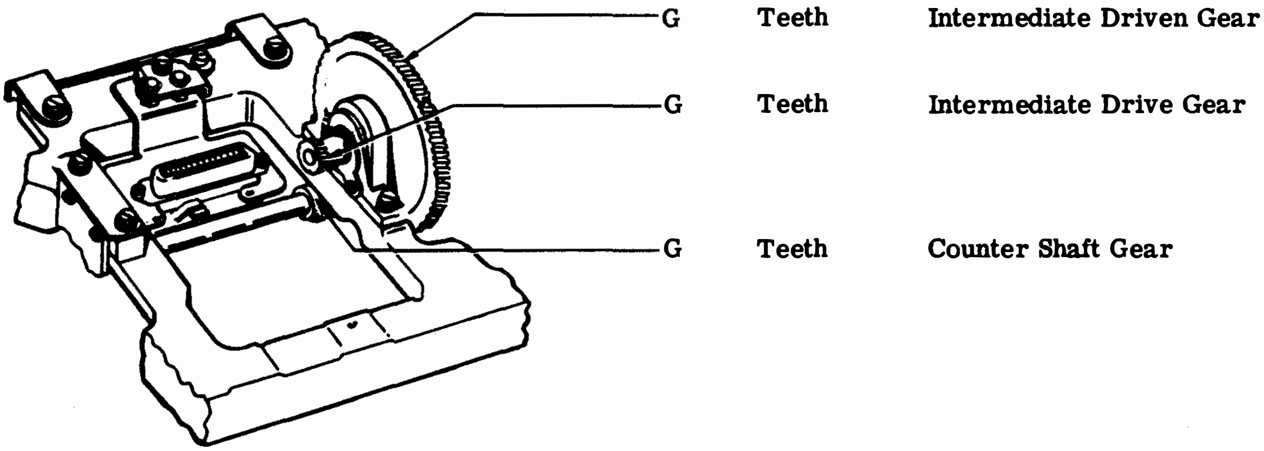


Figure 4-33. Intermediate Gears - Single Contact Multiple Mounting Bases (Variable Speed)

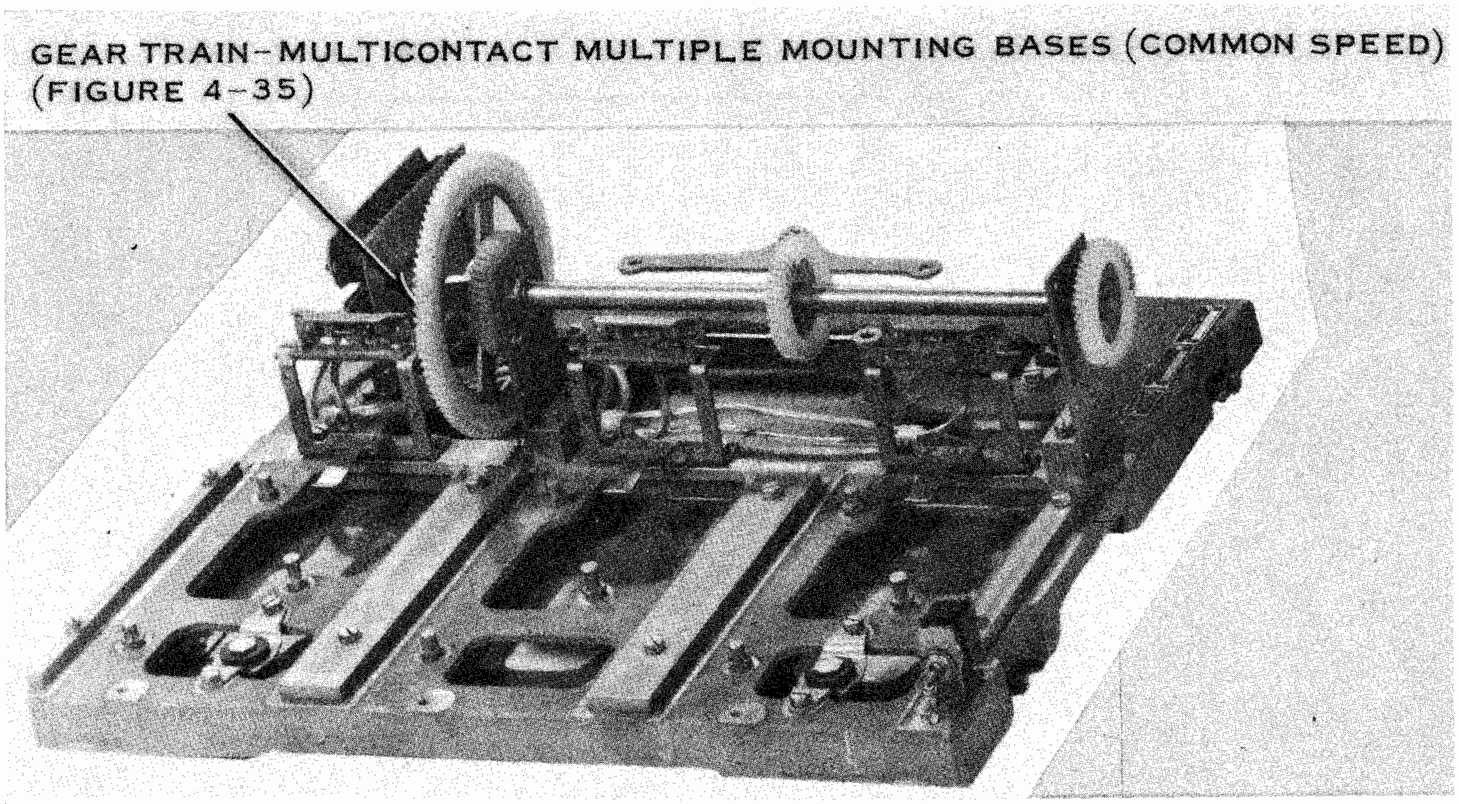


Figure 4-34. Multicontact Multiple Mounting Bases (Common Speed)

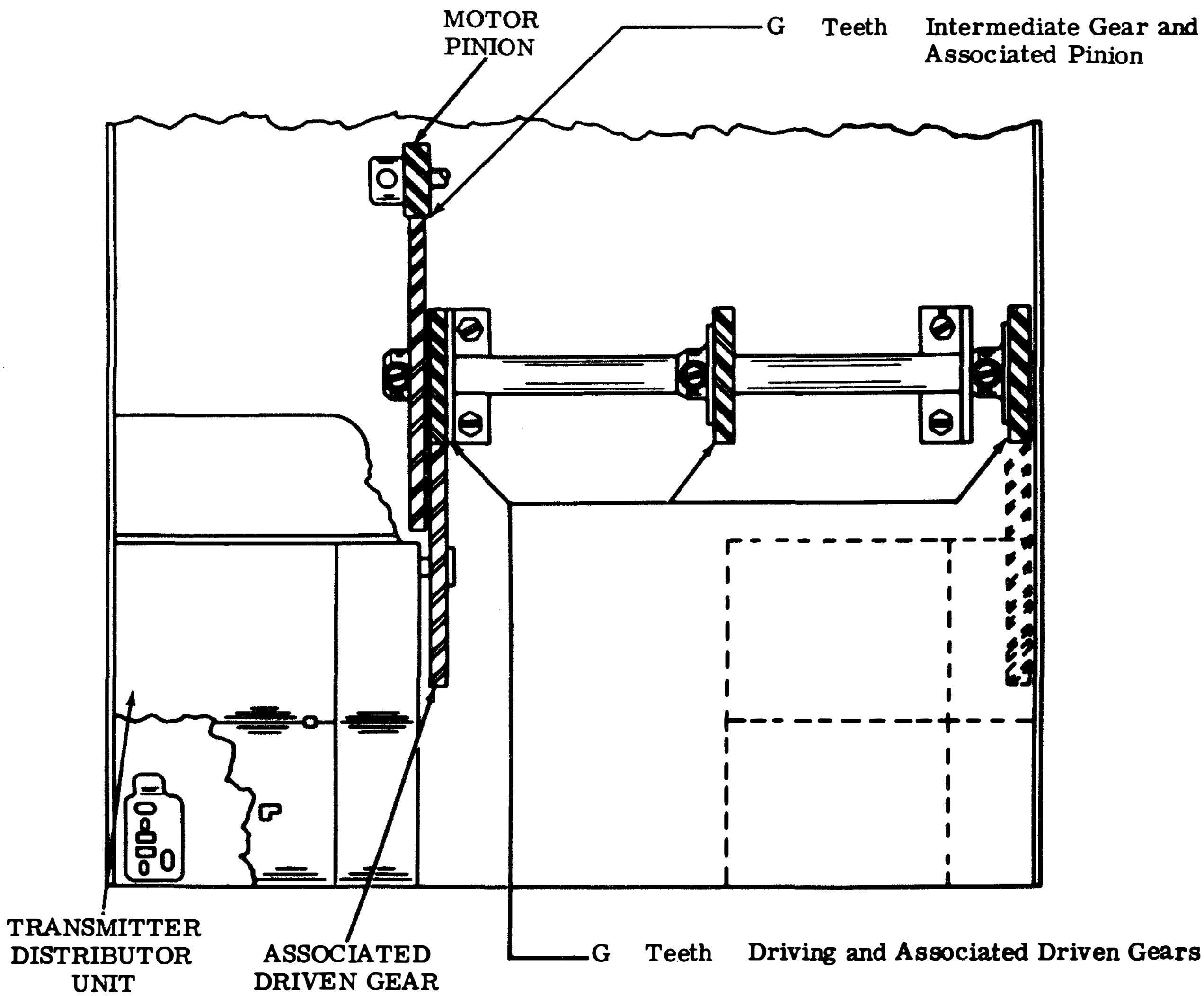


Figure 4-35. Gear Train - Multicontact Multiple Mounting Bases (Common Speed)

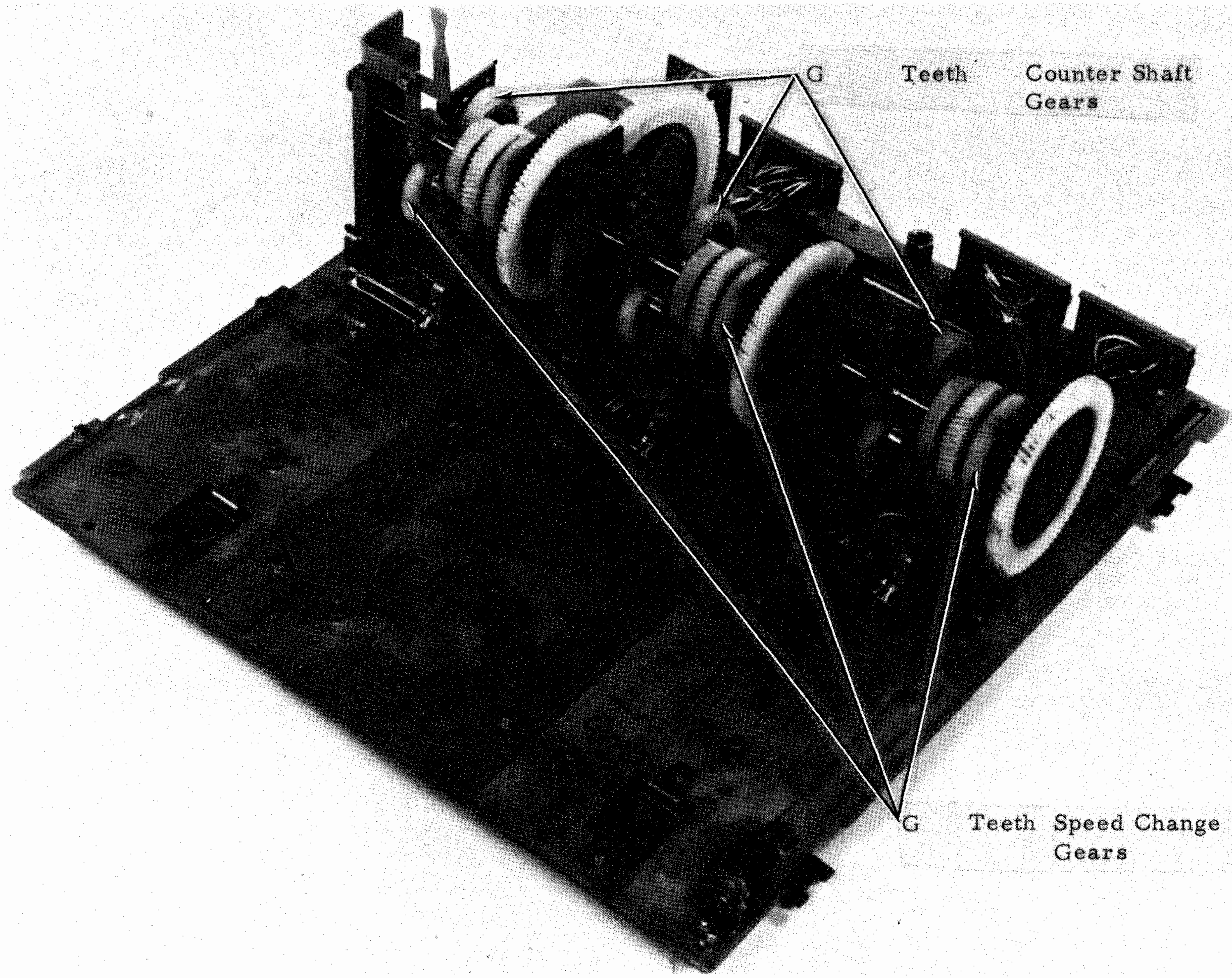


Figure 4-36. Drive Gears and Speed Change Gears - Multicontact Multiple Mounting Bases (Variable Speed)

CHAPTER 5
TROUBLESHOOTING

5-1. INTRODUCTION. This Chapter provides information required to isolate a malfunction in transmitter distributor (TD) sets to a misadjusted mechanism or a defective component. Troubleshooting is based on the results of operational tests described in paragraph 4-8.b of Chapter 4. Wiring and schematic diagrams are presented at the end of this chapter for use in troubleshooting.

5-2. TROUBLESHOOTING PROCEDURES. Troubleshooting procedures for high- and low-level TD teletypewriter equipment are provided in paragraphs 5-2.1 and 5-2.2. The high-level procedures contained in paragraph 5-2.1 are also applicable to low-level equipment. The procedures contained in paragraph 5-2.2 are applicable to low-level equipment only.

5-2.1 TROUBLESHOOTING PROCEDURES (HIGH-LEVEL). The following paragraphs provide procedures for use in troubleshooting high-level TD teletypewriter equipment.

a. Troubleshooting Index. The troubleshooting index, table 5-1, contains the items referenced in tables 4-5 and 4-6, operational test procedures. If an abnormal indication is encountered, the technician is directed to a fault isolation paragraph.

b. Lamp, Fuse, and Semiconductor Index. Table 5-2 provides a list of lamps and fuses used in the high-level TD sets. These active components constitute the most probable cause of failure.

c. Fault Isolation Procedures. The following paragraphs provide fault isolation procedures referenced in table 5-1.

(1) If motor does not start when main power switch is ON, proceed as follows:

(a) Check condition of external power supply, including external fuses. Check power connections. Refer to wiring diagrams at the end of this Chapter.

(b) Check main power switch for mechanical failure. Check connection to switch terminals. Short switch terminals to check electrical condition of switch. Refer to wiring diagrams at the end of this Chapter.

(c) Check for open thermal cutout switch at the rear of the motor mounting bracket. If the red switch button is raised, rotate the motor manually and check mechanical linkages in the intermediate gear mechanism for an obstruction. Depress the switch button. If the cutout operates shortly after the thermal switch has been reset, allow the motor to cool for five minutes and check for the cause of overheating before resetting.

(2) If motor runs at incorrect speed check power line frequency (60 $\pm$ 0.5 Hertz).

(3) If there is no power to main drive shaft, check adjustment of intermediate gear

Table 5-1. Troubleshooting Index

Item	Test/Step	Symptom	Fault Isolation Paragraph
1	2a	Motor does not start	5-2.1c(1)
2	2b	Motor runs at incorrect speed	5-2.1c(2)
3	3a	No power to main shaft	5-2.1c(3)
4	4a,c	Tape lid fails to open or close	5-2.1c(4)
5	4b	Feedwheel does not engage feed holes	5-2.1c(5)
6	5b	Tape binds	5-2.1c(6)
7	5d(1)	Clutch does not trip	5-2.1c(7)
8	5d(2)	Faulty signal transmission	5-2.1c(8)
9	5d(2)	Garbled transmission	5-2.1c(9)
10	5d(3)	Transmission stops	5-2.1c(10)
11	5e	Transmission does not stop when input tape is lifted	5-2.1c(11)
12	5f	Transmission does not stop when tape lid button is pressed or when torn end of tape is fed through reading head	5-2.1c(12)
13	5g	Transmission does not stop when start-stop switch is set to OFF position.	5-2.1c(13)

Table 5-2. Lamp, Fuse, and Semiconductor Index

Qty	Name, Type Part Number	Function Location	Energizing Voltage
1	Fuse, 2.5A Slo-Blo	Electrical circuit protection, Transmitter Distributor Base	---
2	Triac	Electrical circuit protection, LMU35 motor unit	---

assembly (paragraphs 6-4.1a(1) thru (3)).

(4) If tape lid fails to open when red tape lid button is pressed or fails to close when pressed down, check for missing springs in tape lid latch mechanism and mechanical linkage; then check tape lid adjustment (paragraphs 6-3.1b(1) thru (5)).

(5) If feedwheel does not engage feed holes, check tape guide adjustment (paragraph 6-3.1b(2)).

(6) If tape binds, proceed as follows:

(a) Check start-stop switch assembly (paragraphs 6-3.1e(1) through (5)).

(b) Main bail (paragraph 6-3.1f(4).

(c) Transfer bail stabilizer (paragraph 6-3.1g(3).

(7) If clutch does not trip, check tight tape bail on front of tape guide. If tight or twisted tape has elevated the lever, correct the obstruction in the tape completely before resuming transmission attempt.

(8) If signal transmission is faulty, proceed as follows:

(a) Check for dirty or unadjusted normally open start-stop tight tape switch contacts and tape out contacts. Burnish contacts and readjust as necessary.

(b) Check mechanical linkages of transfer lever, stabilizer, and toggle (paragraphs 6-3.1g(1) and (3)). Adjust as necessary.

(9) If transmission is garbled, proceed as follows:

(a) Ensure clear closed condition of external signal circuit.

(b) Check code perforations of input tape to be sure garbling is not on input.

(c) Check orientation of sensing pins in tape code holes (paragraph 6-3.1f(5)). If adjustment is required, it must be preceded by adjustment of tape guideplate (paragraph 6-3.1b(6)).

(d) Check mechanical linkages of transmitter mechanism for binding in sensing fingers sequence of operations to transfer bail stabilizer. Check out the particular code element linkage responsible for garbling, if possible.

(e) Check contact box adjustments (paragraphs 6-3.1i(1) thru (3)).

(f) Check for leakage in signal box capacitor.

(10) If transmission stops check main bail mechanism (paragraph 6-3.1f(4) and main bail trip lever (paragraph 6-3.1f(3)).

(11) If transmission does not stop when input tape is lifted slightly at right of tape guide, proceed as follows:

(a) Check tight tape intermediate arm linkage (paragraphs 6-3.1e(4) and (5)).

(b) Check for binds in mechanical linkage of tape-out sensing pin (paragraphs 6-3.1d(4)).

(12) If transmission does not stop when tape lid button is depressed, or when torn end of tape is fed through reading head, proceed as follows:

(a) Check mechanical linkage of tape-out sensing pin (paragraph 6-3.1d(4) and (6)) and tape-out switch (paragraph 6-3.1d(3)).

(b) Check for sticking or poorly adjusted normally closed contacts in the tape-out switch. Burnish contacts and readjust (paragraph 6-3.1d(1)).

(13) If transmission does not stop when start-stop switch is set to OFF position, check start-stop tight tape switch assembly (paragraphs 6-3.1e(1) or (3)).

d. Maintenance Schematic and Wiring Diagrams. Schematic and wiring diagrams are provided at the end of this chapter as aids to troubleshooting and maintenance of the TD sets. An index of the schematic and wiring diagrams for high level equipment is provided in table 5-3.

5-2.2 TROUBLESHOOTING PROCEDURES (LOW-LEVEL). The following paragraphs provide troubleshooting procedures for checking some of the difficulties that may be encountered in the operation of electrical service assemblies (ESAs) and their associated components. For troubleshooting mechanical failures refer to the high-level equipment troubleshooting procedures in paragraph 5-2.1, which are also applicable to low-level equipment.

a. Wiring and Schematic Diagrams. Wiring and schematic diagrams for use in troubleshooting low-level equipment are shown in figures at the end of this Chapter. An index of these diagrams is provided in table 5-4.

b. Lamp, Fuse, and Semiconductor Index. Refer to table 5-2 for a list of lamps and fuses used in both high-level and low-level TD sets. Additional fuses, and semiconductors found in low-level assemblies are listed in bills of materials which are included in figures at the end of this Chapter. These active components are identified because they constitute the most probable cause of failure.

c. ESA General Troubleshooting Instructions. The following paragraphs provide general instructions for use when troubleshooting TD ESAs.

(1) Since the ESA encloses and is dependent on other component circuits for its operation, the field troubleshooting and repair for these components also are included in the procedures. Refer to the applicable wiring diagrams at the end of this Chapter which are referenced in table 5-4, for circuit tracing and identification of components. The diagrams are identified with their associated assemblies in the equipment matrix provided in table 1-2 of Chapter 1, which also indicates the figure number.

(2) Before attempting to repair a power supply fault, the technician should familiarize himself with

Table 5-3. Index of High-Level Schematic and Wiring Diagrams for Troubleshooting

Table 5-4. Index of Low-Level Schematic and Wiring Diagrams for Troubleshooting the power supply card and ESA wiring. Refer to the circuit description in Chapter 3. Refer also to the wiring diagrams for each transmitter distributor set as identified in table 1-2 of Chapter 1. The wiring diagrams are those provided at the end of this Chapter and indexed in table 5-4.

(3) Troubleshooting for an ESA is required only to repair the power supply or to correct wiring defects in case of loose, broken, or faulty wiring. Wiring can be checked by following the different circuits on the appropriate wiring diagram, point-to-point and comparing with the actual equipment wiring.

d. Power Supply Troubleshooting Procedures. If trouble should develop, it may be found by performing the checks outlined in the troubleshooting procedures in table 5-5 using a multimeter. The following instructions are applicable when troubleshooting power supply circuit cards.

(1) Colored test point jacks are provided on top of the power supply circuit card to accept standard meter probes.

(2) When a fault in the power supply is suspected but not obvious, disconnect all power from the ESA. Remove all low-level keyer (LLK) and clutch magnet driver (CMD) circuit cards. Apply 100 to 130 volts ac power to the ESA and proceed with the troubleshooting procedure as outlined in table 5-5.

WARNING

Be extremely careful with capacitors; they may be charged. A severe electrical shock may be received from a capacitor or leads connected to the power supply while it is in operation.

(3) In following the procedure outlined in table 5-5 perform step 1. If a normal response is received, proceed to step 2. If an abnormal response is received, repair or replace card. After this procedure, return to step 1. Next, perform step 2 and on in the same manner.

(4) If this troubleshooting fails to reveal the difficulty, check for loose or cold solder connections, or a broken or misplaced wire in the ESA. Recheck all wiring as indicated in paragraph 5-2.2c(1).

(5) Continually blowing fuses indicate a shorted component or components. Disconnect power, remove the circuit card assembly and make continuity checks between circuit card connector terminals B and N, N and H, and B and H. A zero or near zero reading on the one ohm scale of a multimeter indicates a short; disregard any other reading. Also check continuity between the power transistor case and its heat sink; the power transistor must be electrically isolated from the heat sink with mica insulators. If the board assembly checks satisfactorily, examine the power line filter, power transformer, and rectifier filter capacitor for a shorted condition. (These components are located within the electrical service assembly.)

Table 5-5. Power Supply Troubleshooting Procedures (0.5 Ampere Card)

Step	Action	Probe Position	Normal Response	Abnormal Response and Procedure
1	Check voltage from -7 test jack.	COM -7	Meter reading should be: -6.6 vdc (min) -7.8 vdc (Max)	RESPONSE: Meter reading of zero volt.
				PROBABLE CAUSE: CR5 shorted or R5 open.
			If normal, proceed to Step 2.	PROCEDURE: Remove power supply card and repair or replace.
				Recheck Step 1.
				RESPONSE: Meter reading of +57 to +90 vdc.
				PROBABLE CAUSE: CR5 open.
				PROCEDURE: Remove power supply card and repair or replace.
				Recheck Step 1.
2	Check voltage from +7 test jack.	COM +7	Meter reading should be: +6.6 vdc (Min) +7.8 vdc (Max)	RESPONSE: Meter reading of zero volt.
				PROBABLE CAUSE: CR6 shorted or R4 open.
			If normal, proceed to Step 3	PROCEDURE: Remove power supply card and repair or replace.
				Recheck Step 1.
				RESPONSE: Meter reading of +57 to 90 vdc.
				PROBABLE CAUSE: CR6 open.
				PROCEDURE: Remove power supply card and repair or replace.

Table 5-5. Power Supply Troubleshooting Procedures (0.5 Ampere Card) - Continued

Step	Action	Probe Position	Normal Response	Abnormal Response and Procedure
				Recheck Step 1.
3	Check voltage from UNREG. test jack.	COM UNREG.	Meter reading should be: +57 vdc (Min) +90 vdc (Max)	RESPONSE: Meter reading of zero volt.
				PROBABLE CAUSE: Loose or blown fuse.
			If normal, proceed to Step 4.	PROCEDURE: Remove power supply card and replace fuse.
				Proceed to Step 5.
				RESPONSE: Meter reading indicates voltage which is too low.
				PROBABLE CAUSE: CR1 and/or CR4 open or shorted. C8 defective. T1 and power line filter defective.
				PROCEDURE: Remove power supply card or defective parts and repair or replace.
				Recheck Step 1.
4	Check voltage from +50 test Jack.	COM +50	Meter reading should be: +47 vdc (Min) +53 vdc (Max)	RESPONSE: Meter reading of zero volt.
				PROBABLE CAUSE: Q1 and/or Q2 open.
			If normal, end test.	PROCEDURE: Remove power supply card and repair or replace.
				Recheck Step 1.

Table 5-5. Power Supply Troubleshooting Procedures (0.5 Ampere Card) - Continued

Step	Action	Probe Position	Normal Response	Abnormal Response and Procedure
				RESPONSE: Meter reading of more than zero volt but less than +47 vdc. PROBABLE CAUSE: Too many shorting straps across CR8, CR9, CR10, and CR11. PROCEDURE: Remove power supply card and remove straps, as necessary to increase voltage. Replace card. Recheck Step 1. RESPONSE: Meter reading of +57 to +90 vdc. PROBABLE CAUSE: Q1 and/or Q2 shorted. PROCEDURE: Remove power supply card and repair or replace. Recheck Step 1.
5	Check voltage from UNREG. test jack.	COM UNREG.	Meter reading should be: +57 vdc (Min) +90 vdc (Max)	RESPONSE: Meter reading of zero volt. PROBABLE CAUSE: Repeated fuse blowing.

Table 5-5. Power Supply Troubleshooting Procedures (0.5 Ampere Card) - Continued

Step	Action	Probe Position	Normal Response	Abnormal Response and Procedure
			Return to Step 4.	PROCEDURE: Disconnect power and remove power supply card. Make continuity checks between card terminals B and N, N and H, B and H. A zero or near zero reading on the 1-ohm scale of a multimeter indicates a short. Check continuity between Q1 case and its heat sink (Q1 must be electrically isolated from heat sink with mica insulators). If the power supply card checks satisfactorily, check power line filter T1 and C8 for shorted condition. Repair or replace card. Recheck Step 1. RESPONSE: Meter reading indicates voltage which is too low. PROBABLE CAUSE: CR1 and/or CR4 open or shorted. C8 defective. T1 and power line filter defective. PROCEDURE: Remove power supply card or defective parts and repair or replace. Recheck Step 1.

(6) Failure to detect the fault using the methods described above normally indicates a loose or cold solder connection, broken or misplaced wire in the service assembly. Check all wiring according to appropraite wiring diagrams.

e. Low-Level Keyer (LLK) Troubleshooting Procedures. Table 5-6 provides information for use as a guide when troubleshooting the LLK. The following recommendations also are applicable when troubleshooting LLKs.

NOTE

The TP303142 low-level keyer is a circuit card assembly that needs only to be plugged into a properly keyed 15-pin receptacle which is wired into an appropriate ESA.

(1) It is recommended that any damaged keyer card be replaced in the field and maintained in a repair center. The repair center should have equipment capable of simulating normal operating conditions.

(2) It is also recommended that the keyer and associated filter cards (if any) be radio frequency interference (RFI) suppression tested after servicing and prior to final installation. Failures from this standpoint are not necessarily recognized by monitoring a typical communications operation.

f. Clutch Magnet Driver (CMD) Troubleshooting Procedures. Table 5-7 provides information for use as a guide when troubleshooting the CMD. The following recommendations also are applicable when troubleshooting CMDs.

NOTE

The CMD is a circuit card assembly that needs only to be plugged into a properly keyed 15-pin receptacle which is wired into an appropriate ESA.

(1) It is recommended that any damaged CMD unit be replaced in the field and maintained in a repair center. The repair center should have equipment capable of simulating normal operating conditions.

(2) It is also recommended that the CMD be RFI suppression tested after repair and prior to final installation. Failures from this standpoint are not necessarily recognized by monitoring a typical communications operation.

Table 5-6. Low-Level Keyer Troubleshooting Guide

Symptom	Probable Cause
(a) Circuit always marking	(1) Q1 and/or Q2 shorted (2) Excessive signal generator contact resistance
(b) Circuit always spacing	Q1 and/or Q2 open
(c) Mark - space bits detectable but will not go positive on mark	Q4 and/or Q6 open
(d) Mark - space bits detectable but will not go negative on space	Q3 and/or Q5 open

Table 5-7. Clutch Magnet Driver Troubleshooting Guide

Symptom		Probable Cause	
(a)	Switching levels out of tolerance	(1)	Improper adjustment of R7
		(2)	Q1 low gain
		(3)	CR7 defective or out of tolerance
(b)	Circuit always marking	(1)	Q3 open
		(2)	Q1, Q2, or Q4 collector-emitter shorted
(c)	Circuit always spacing	(1)	Q1, Q2, or Q4 open
		(2)	Q3 collector-emitter shorted
		(3)	CR8 open
(d)	Output current too high	(1)	CR2 open
		(2)	R17 cut of tolerance
(e)	Output current too low	(1)	R2 improperly adjusted or defective
		(2)	R17 out of tolerance
(f)	Transient suppressor network ineffective	(1)	CR9 open
		(2)	R16 open
		(3)	C4 open

NO	NOTES
1	WIRING LEGEND: A—1—W-BL: A = DISTANT TERMINATING AREA; 1 = DISTANT TERMINAL DESIGNATION; W-BL = WIRE COLOR CODE
2.	COLOR CODE BK—BLACK W-BK—WHITE—BLACK BR—BROWN W-BR—WHITE—BROWN R—RED W—R—WHITE-RED O—ORANGE W—O—WHITE-ORANGE Y—YELLOW W—Y—WHITE-YELLOW G—GREEN W—G—WHITE-GREEN BL—BLUE W-BL—WHITE-BLUE P—PURPLE W—P—WHITE-PURPLE W—WHITE W—S—WHITE-SLATE S—SLATE
3.	UNIT WIRED FOR 115 VOLTS AC OR DC POWER INPUT.
4.	CONNECTOR VIEWED FROM SOLDER TERMINAL ENDS.
5.	ALL CONTACTS SHOWN IN UNOPERATED POSITION.
6.	SPARE TERMINAL OF F-12 RESERVED FOR POLAR OPERATION OF TRANSMITTER DISTRIBUTOR SIGNAL GENERATOR. TIE W-Y LEAD BACK ALONG CABLE ASSEMBLY FROM SIGNAL GENERATOR.
7.	DISCONNECT ONE TERMINAL WHEN TESTING SIGNAL GENERATOR.
8.	THE NUMBERS ENCASED BY PARENTHESES ARE USED FOR REFERENCE AND ARE NOT NECESSARILY SHOWN ON THE PARTS.
9	TO PLACE THE CLUTCH TRIP MAGNET ASSEMBLY AND THE TWO CONTACT ASSEMBLIES IN SERIES, CONNECT THE TWO 151827 TERMINAL STRAPS TO TERMINALS 2 & 3 AND TERMINALS 4 & 5. CONNECT THE TWO BLACK STRAPS OF THE CABLE ASSEMBLY TO TERMINALS 1 & (17) AND TERMINALS 6 & (18).
10	115 V ±10% AC POWER TO BE USED ON CLUTCH TRIP MAGNET ASSEMBLY CIRCUIT. (256 M COIL ASSEMBLIES) FOR DC OPERATION ADD SUFFICIENT EXTERNAL RESISTANCE TO LIMIT CURRENT TO 100 M.A.

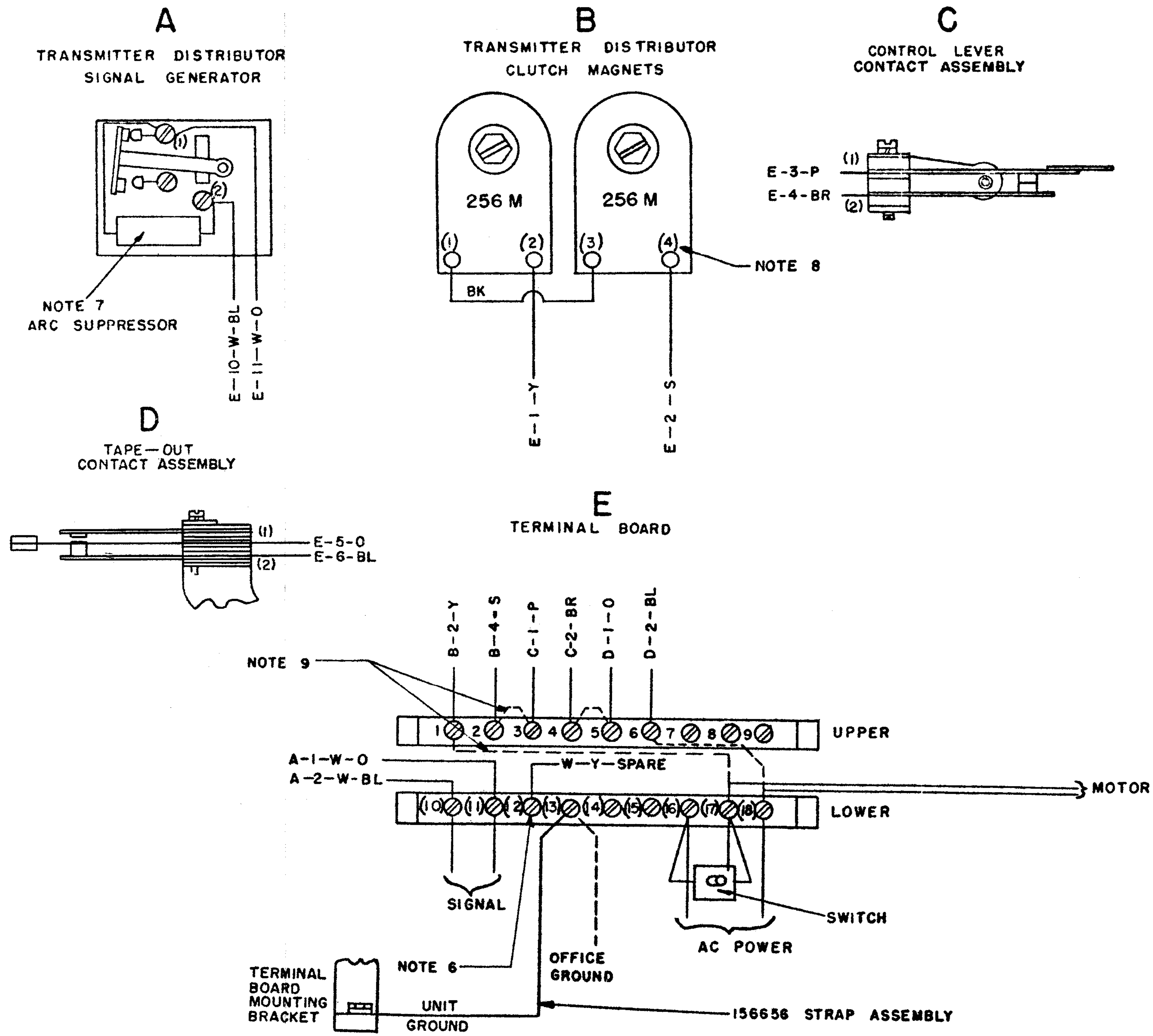


Figure 5-1. Transmitter Distributor Unit LXD1 Wiring Diagram

NO	NOTES
1	WIRING LEGEND: DISTANT TERMINATING AREA; DISTANT TERMINATING DESIGNATION; A-1-W; WIRE COLOR CODE
2.	COLOR CODE: BK-BLACK, BR-BROWN, W-WHITE, O-ORANGE, G-GREEN, BL-BLUE, R-RED, P-PURPLE, Y-YELLOW, S-SLATE
3.	CONNECTORS VIEWED FROM SOLDER TERMINAL ENDS.
4.	ALL CONTACTS SHOWN IN UNOPERATED POSITION.
5.	DISCONNECT ONE ARC SUPPRESSOR LEAD WHEN STROBING SIGNAL GENERATOR.
6.	THE NUMBERS ENCLOSED BY PARENTHESES ARE USED FOR REFERENCE AND ARE NOT NECESSARILY SHOWN ON THE PARTS.
7.	115V AC ± 10% POWER TO BE USED ON CLUTCH TRIP MAGNET ASSEMBLY CIRCUIT (256 M COIL ASSEMBLIES). IF DC IS USED, CURRENT MUST BE LIMITED TO 100 MA BY AN EXTERNAL RESISTANCE (COIL RESISTANCE=74 EACH). FOR 120V DC ± 10% POWER, AN EXTERNAL RESISTANCE OF 1000 IS REQUIRED. FOR 60V DC ± 10% POWER, AN EXTERNAL RESISTANCE OF 360 IS REQUIRED.
8.	TERMINAL NO.21 ON CONNECTOR H IS RESERVED FOR POLAR SIGNAL.
9.	STRAP WITH #22 GAUGE WIRE AS INDICATED.
10.	FOR LXD6 SEE WIRING DIAGRAMS 3292WD & 3294WD FOR WIRING OF HORIZONTAL TAB WHEN USED WITH ASR SET.
11.	WHEN THE LXD9 IS IN THE STOP (IDLE) CONDITION, THE SPACING(S) SIDE OF THE MULTIPLE WIRE OUTPUT CONTACTS ARE CLOSED.
12.	ARC SUPPRESSOR IS OMITTED ON THE LXD602.
13.	W-Y WIRE FROM D-3 TO H-21 FURNISHED WITH LXD13.
14.	OMIT ARC SUPPRESSOR FROM LXD18.
15.	W-P WIRE FROM C-3 TO H-14 FURNISHED WITH LXD19.
16.	TOGGLE STRAP - LXD20 ONLY.
17.	THE TAPE WITHHOLD MAGNET IS TO BE USED WITH 115V DC ±10% WITH AN 1100 OHM SERIES RESISTANCE OR WITH 48V DC ±10% WITH NO EXTERNAL RESISTANCE. COIL RESISTANCE= 872 OHMS ±10%. ON ASR INSTALLATION ROUTE CABLE UNDER BASE ALONG LEFT SIDE OF CABINET TO "C" TERMINAL STRIP AND SECURE TO CABINET.
18.	LXD30 IS EQUIPPED WITH 262M MAGNET COIL ASSEMBLIES (210 OHMS EACH) STRAPPED FOR 115V AC NON-PULSING OPERATION. FOR 60MA, 115V DC PULSED OPERATION, ADD EXTERNAL RESISTANCE AND CHANGE CONNECTIONS AS FOLLOWS:
19.	AREA E-UNNUMBERED TERMINALS ON MULTIPLE WIRE OUTPUT CONTACT ASSEMBLY ARE NOT PRESENT ON OLDER ASSEMBLIES AND ARE NOT USED.

CONNECTIONS REMOVED	CONNECTION ADDED
A2-A3 A1-A4	A1-A3

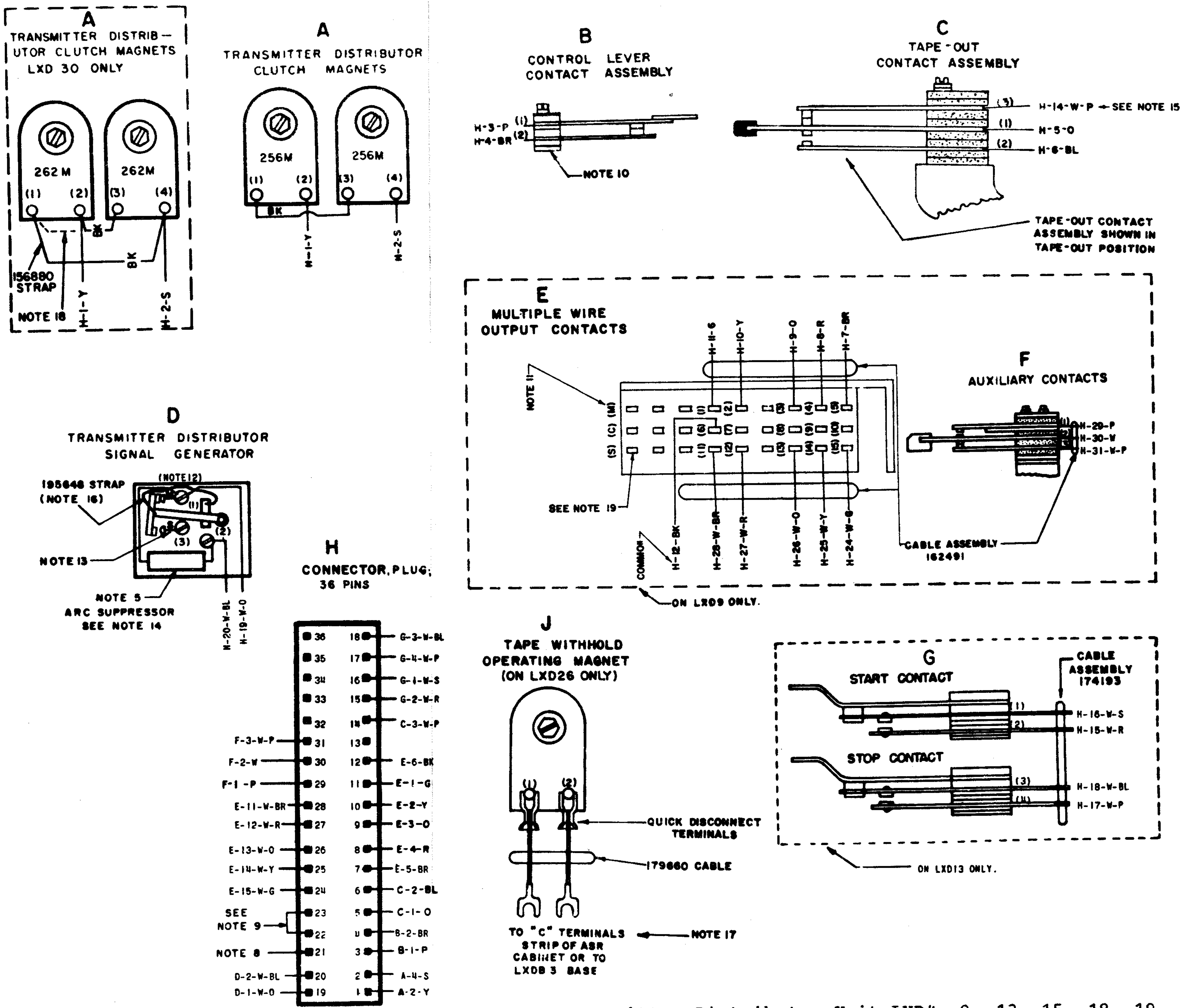
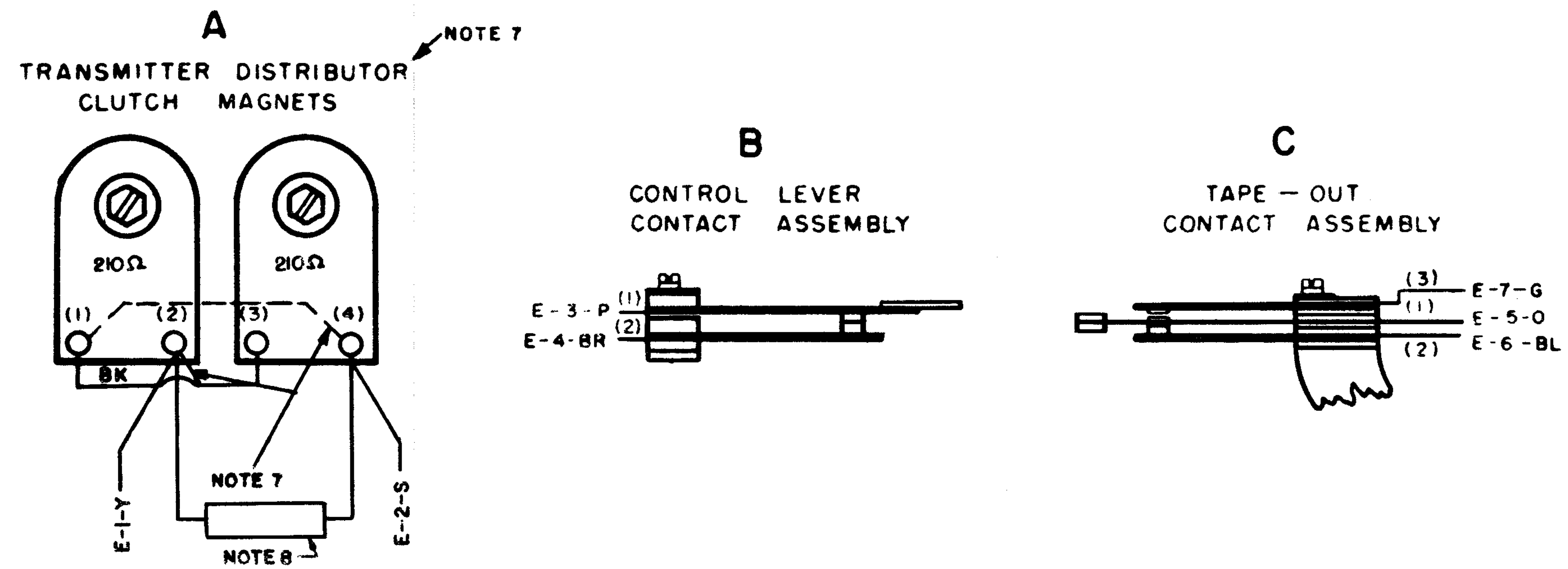
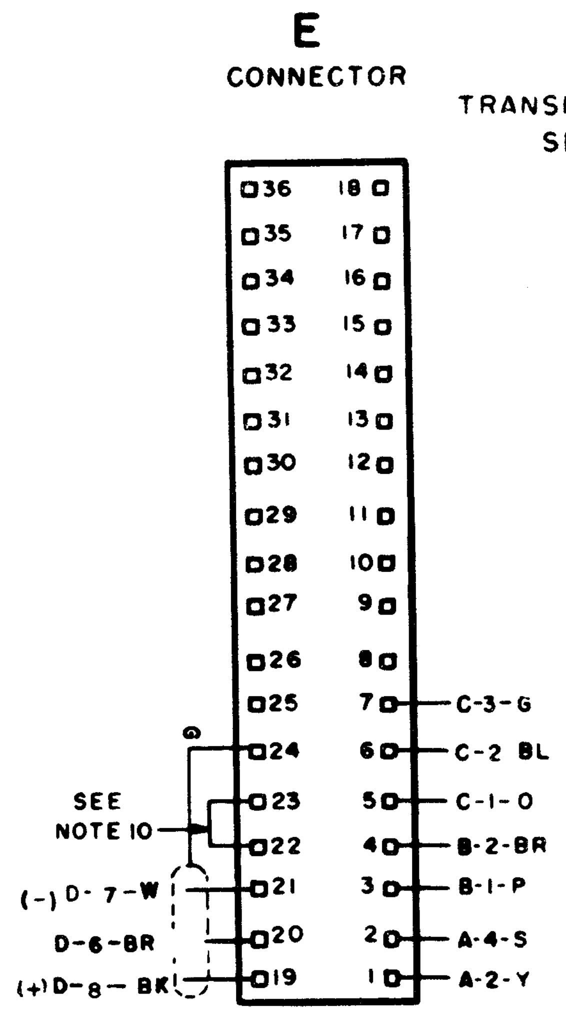


Figure 5-2. Transmitter Distributor Unit LXD4, 9, 13, 15, 18, 19, 20, 26, 601, 602, 800, 802, 30, 41 Wiring Diagram

NOTES:	
1.	WIRING LEGEND: A - I - W DISTANT TERMINATING AREA DISTANT TERMINAL DESIGNATION WIRING COLOR CODE
2.	COLOR CODE: BK - BLACK BR - BROWN R - RED O - ORANGE Y - YELLOW G - GREEN BL - BLUE P - PURPLE S - SLATE W - WHITE W-BK - WHITE-BLACK W-BR - WHITE-BROWN W-R - WHITE-RED W-O - WHITE-ORANGE W-Y - WHITE-YELLOW W-G - WHITE-GREEN W-BL - WHITE-BLUE W-P - WHITE-PURPLE W-S - WHITE-SLATE
3.	CONNECTORS VIEWED FROM SOLDER TERMINAL ENDS
4.	ALL CONTACTS SHOWN IN UNOPERATED POSITION.
5.	ASSOCIATED CABLES: 173440 CABLE ASSEMBLY (LXD 11) 307288 CABLE ASSEMBLY (LXD 29,35)
6.	THE NUMBERS ENCLOSED BY PARENTHESES ARE USED FOR REFERENCE AND ARE NOT MARKED ON THE PARTS.
7.	UNIT EQUIPPED WITH 262 COIL ASSEMBLY (RESISTANCE 210Ω EACH). THE OPERATING CURRENT MUST BE 50 MA. 120 V DC FOR EXTERNAL PULSING. FOR 110V AC. NON-PULSING OPERATION, RELOCATE STRAP ON TERMINAL (1) TO TERMINAL (2). ADD STRAP BETWEEN TERMINALS (1) AND (4) FOR PARALLEL OPERATION OF MAGNETS.
8.	178535 SPARK SUPPRESSOR ASSEMBLY (153631 NETWORK) USED ON LXD 29 ONLY.
9	TERMINAL NO. 21 ON CONNECTOR E IS RESERVED FOR POLAR SIGNAL.
10.	STRAP WITH 22 GAUGE WIRE AS INDICATED.
11.	FOR PROPER R.F. FILTERING POLARITY OF FILTERS MUST BE MAINTAINED WHEN 174422 FILTER IS USED. UNIT AS FURNISHED IS WIRED FOR "MARKING" CONTACT POSITIVE (+) "SPACING" CONTACT NEGATIVE (-). TO REVERSE POLARITY OF CONTACTS SO THAT THE "MARKING" CONTACT IS NEGATIVE (-) AND "SPACING" POSITIVE (+) MAKE THE FOLLOWING CONNECTIONS IN CONTACT BOX ASSEMBLY. 1. MOVE BLACK LEAD OF BOTTOM FILTER FROM "MARKING" CONTACT TO "SPACING" CONTACT. 2. MOVE GREEN LEAD OF TOP FILTER FROM "SPACING" CONTACT TO "MARKING" CONTACT. POLARITY MAY BE DISREGARDED WHEN UNITS ARE FURNISHED WITH 174421 FILTER. COLOR CODING OF FILTER LEADS DOES NOT APPLY TO 174421 FILTER.





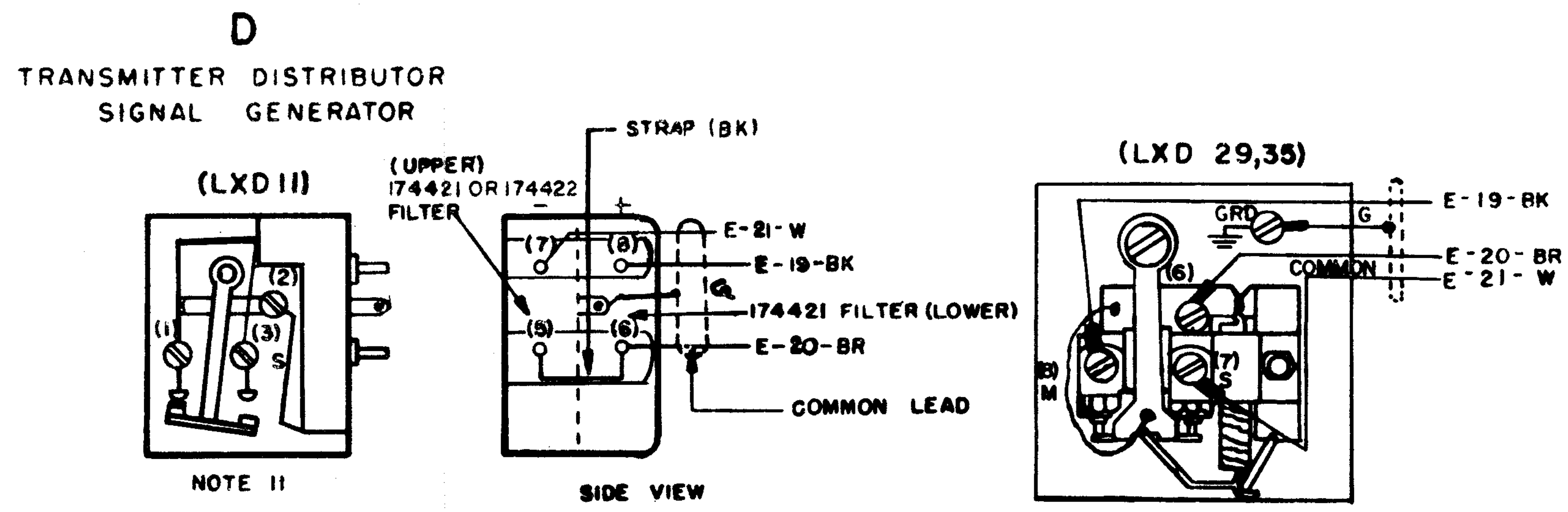


Figure 5-3. Transmitter Distributor Unit LXD11, 29, 35 Wiring Diagram

NO.	NOTES
1.	WIRING LEGEND: DISTANT TERMINATING AREA DISTANT TERMINATING DESIGNATION A-1-W WIRING COLOR CODE
2.	COLOR CODE: BK - BLACK R - RED BL - BLUE P - PURPLE BR - BROWN Y - YELLOW O - ORANGE G - GREEN W - WHITE S - SLATE
3.	CONNECTORS VIEWED FROM SOLDER TERMINAL ENDS.
4.	ALL CONTACTS SHOWN IN UNOPERATED POSITION.
5.	ASSOCIATED CABLES: 173440 CABLE ASSEMBLY
6.	THE NUMBERS ENCLOSED BY PARENTHESES ARE USED FOR REFERENCE AND ARE NOT NECESSARILY SHOWN ON THE PARTS.
7.	UNIT EQUIPPED WITH 262 COIL ASSEMBLY (RESISTANCE 210Ω EACH) THE OPERATING CURRENT MUST BE 50 MA 120 V DC FOR EXTERNAL PULSING. FOR 110 AC NON-PULSING OPERATION. RELOCATE STRAP ON TERMINAL (1) TO TERMINAL (2). ADD STRAP BETWEEN TERMINALS (1) AND (4) FOR PARALLEL OPERATION OF MAGNETS.
8.	TERMINAL NO. 21 ON CONNECTOR E IS RESERVED FOR POLAR SIGNAL.
9.	STRAP WITH NO. 22 GAUGE WIRE AS INDICATED
10.	FOR PROPER R.F. FILTERING USING EARLY STYLE 174421 AND 174422 FILTERS POLARITY OF FILTERS MUST BE MAINTAINED. WIRING SHOWN IS FOR MARKING CONTACT NEGATIVE. FOR MARKING CONTACT POSITIVE MAKE THE FOLLOWING CHANGES: A. MOVE GREEN LEAD OF TOP FILTER FROM MARKING CONTACT TO SPACING CONTACT. B. MOVE BLACK LEAD OF BOTTOM FILTER FROM SPACING CONTACT TO MARKING CONTACT. LATE STYLE 174421 FILTER IS NOT POLARIZED AND IS USED IN BOTH UPPER AND LOWER POSITIONS. BOTH LEADS OF FILTER ARE BLACK.

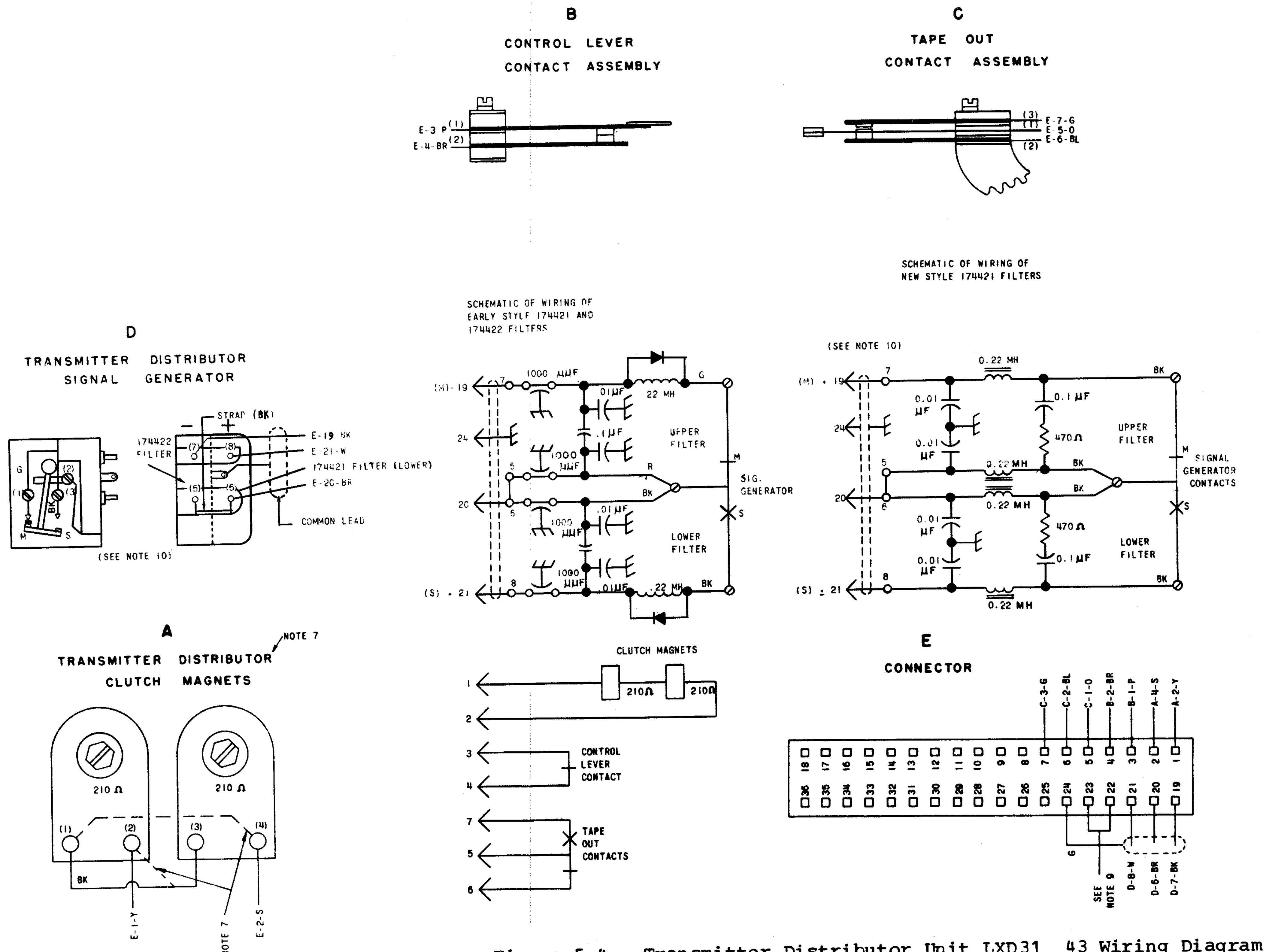
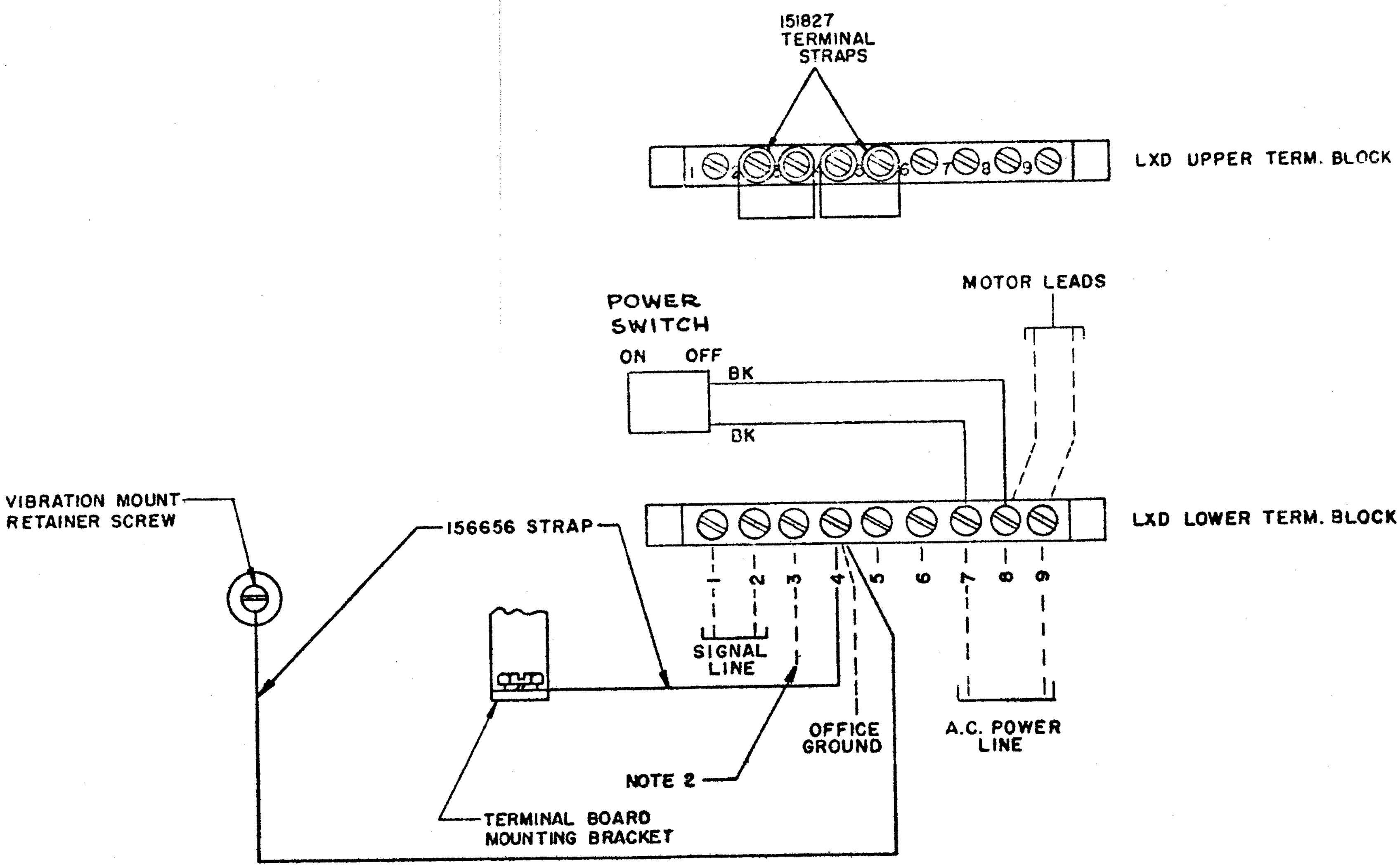


Figure 5-4. Transmitter Distributor Unit LXD31 43 Wiring Diagram



NOTES	
1	WIRE COLOR CODE: BK - BLACK
2	TERMINAL NO. 3 AVAILABLE FOR POLAR OPERATION.
3	NUMBERS 1 TO 9 SHOWN ON THE LOWER TERMINAL BLOCK CORRESPOND TO NUMBERS (10) TO (18) RESPECTIVELY ON WIRING DIAGRAM 3342 WD.
4	DOTTED LINES NOT PART OF THE BASE UNIT.

Figure 5-5. Transmitter Distributor Base LXDB1 Wiring Diagram

NO.	NOTES
1.	WIRING LEGEND: DISTANT TERMINATING AREA; DISTANT TERMINATING DESIGNATION; A-1-W; WIRE COLOR CODE
2.	COLOR CODE: BK-BLACK, BL-BLUE, G-GREEN, Y-YELLOW, S-SLATE, BR-BROWN, R-RED, P-PURPLE, O-ORANGE, W-WHITE
3.	UNIT WIRED FOR 115 VOLTS AC OR DC POWER INPUT.
4.	CONNECTOR VIEWED FROM SOLDER TERMINAL ENDS.
5.	TERMINAL E-3 RESERVED FOR POLAR OPERATION. W-Y LEAD CONNECTED FROM E-3 TO H-21.
6.	THE NUMBERS ENCLOSED BY PARENTHESES ARE NOT NECESSARILY SHOWN ON THE PARTS.
7.	115V AC ± 10% POWER TO BE USED ON CLUTCH TRIP MAGNET ASSEMBLY CIRCUIT (256 M COIL ASSEMBLIES). IF DC IS USED CURRENT MUST BE LIMITED TO 100 MA BY AN EXTERNAL RESISTANCE (COIL RESISTANCE = 74Ω EACH). FOR 120V DC ± 10% POWER, AN EXTERNAL RESISTANCE OF 1000Ω IS REQUIRED FOR 50V DC ± 10% POWER, AN EXTERNAL RESISTANCE OF 350Ω IS REQUIRED.
8.	WITH THE TWO 151827 TERMINAL STRAPS CONNECTED AS SHOWN (TERMINALS 2 & 3 AND TERMINALS 4 & 5) THE CLUTCH MAGNET ASSEMBLY, THE TAPE-OUT CONTACT ASSEMBLY, AND THE CONTROL LEVER CONTACT ASSEMBLY (ALL ON THE ASSOCIATED TRANSMITTER DISTRIBUTOR) WILL BE WIRED IN SERIES.
9.	MOTOR IS NOT PART OF BASE.

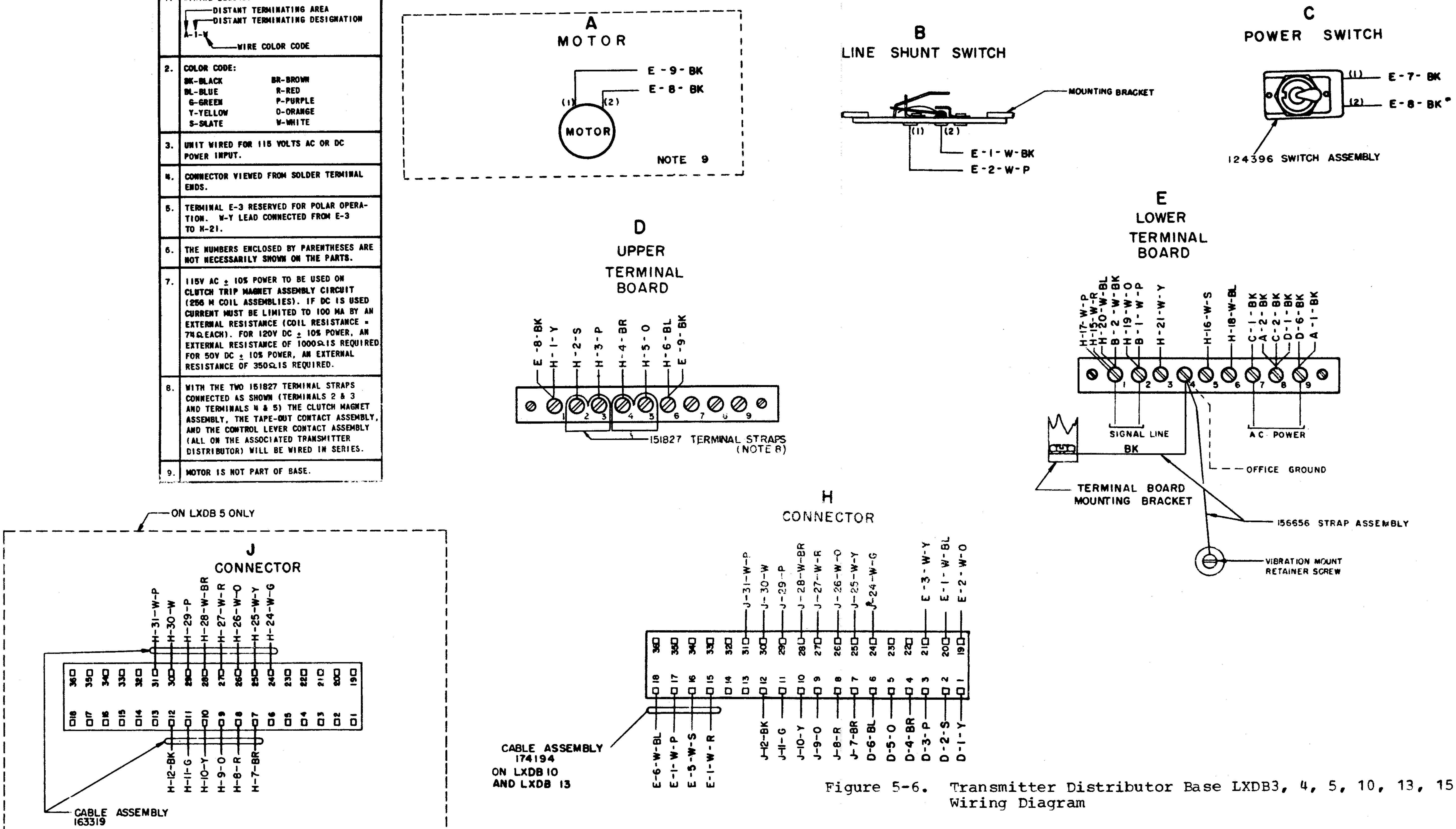


Figure 5-6. Transmitter Distributor Base LXDB3, 4, 5, 10, 13, 15 Wiring Diagram

	NOTES:
1.	WIRING LEGEND: A-1-W — DISTANT TERMINATING AREA; DISTANT TERMINAL DESIGNATION; WIRING COLOR CODE
2.	COLOR CODE: BK BLACK, W-BK WHITE BLACK; BR BROWN, W-BR " BROWN; R RED, W-R " RED; O ORANGE, W-O " ORANGE; Y YELLOW, W-Y " YELLOW; G GREEN, W-G " GREEN; BL BLUE, W-BL " BLUE; P PURPLE, W-P " PURPLE; W WHITE; S SLATE, W-S " SLATE
3.	CONNECTOR VIEWED FROM SOLDER TERMINAL ENDS.
4.	THE NUMBERS ENCLOSED IN PARENTHESES ARE USED FOR REFERENCE AND ARE NOT NECESSARILY SHOWN ON THE PARTS.
5.	WITH THE TWO 151827 TERMINAL STRAPS CONNECTED AS SHOWN (TERMINAL 2 & 3 AND TERMINALS 4 & 5) THE CLUTCH MAGNET ASSEMBLY, THE TAPE-OUT CONTACT ASSEMBLY, AND THE CONTROL LEVER CONTACT ASSEMBLY (ALL ON THE ASSOCIATED TRANSMITTER DISTRIBUTOR) WILL BE WIRED IN SERIES.
6.	ASTERISK (*) ITEMS INDICATE 18 GA. WIRE
7	THE MOTOR IS NOT A PART OF THE LXDB9 UNIT.
8.	(1) BK & (2) BK (4 ENDS) OF CABLE 173935 IN THE AREA OF THE UPPER AND LOWER TERMINAL BLOCK ARE NOT USED ON LXDB9. TIE BACK AND INSULATE TERMINAL ENDS.

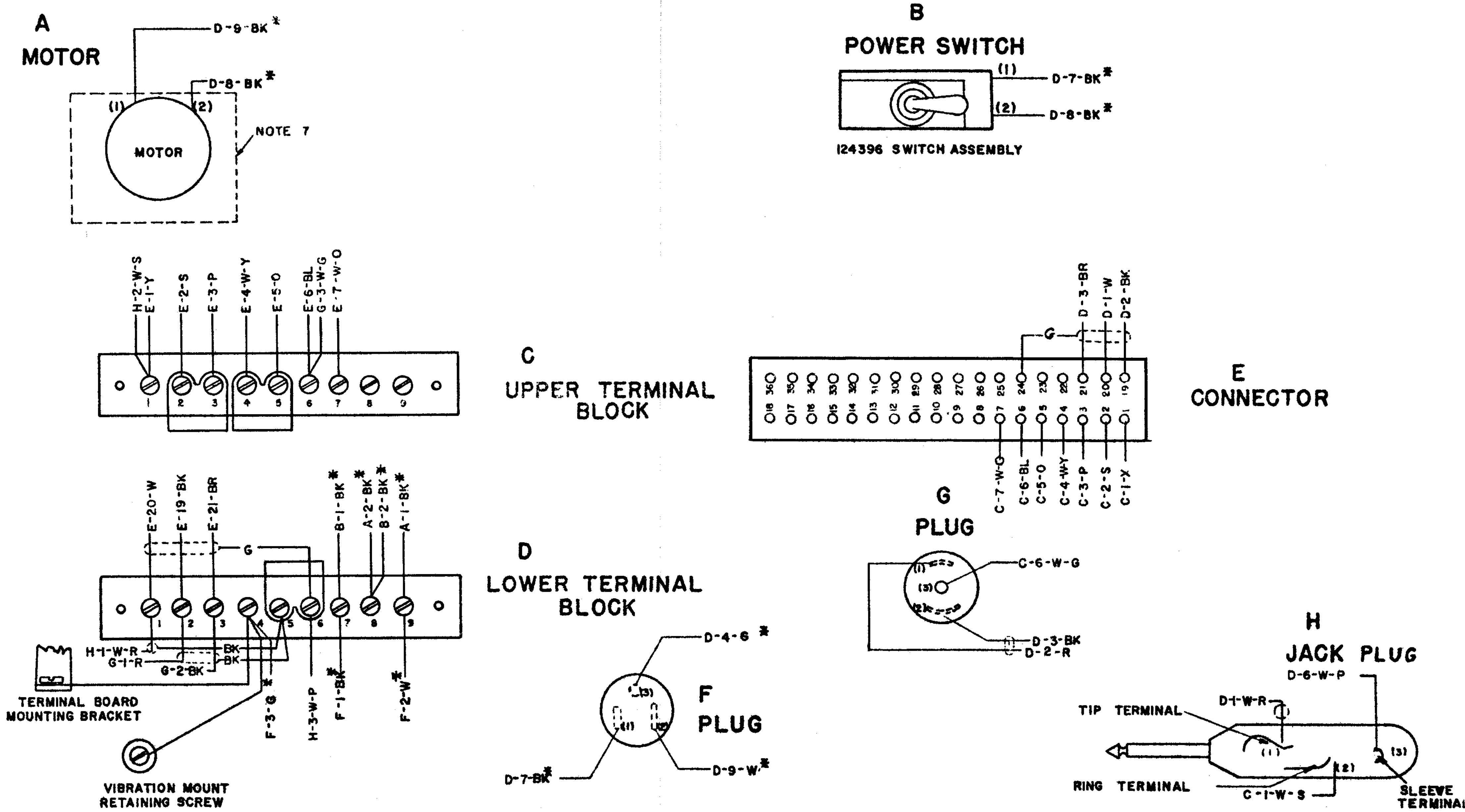


Figure 5-7. Transmitter Distributor Base LXDB9 Wiring Diagram

NO.	NOTES
1.	WIRING LEGEND: DISTANT TERMINATING AREA DISTANT TERMINATING DESIGNATION A-1-W WIRE COLOR CODE
2.	COLOR CODE: BK-BLACK BR-BROWN R-RED O-ORANGE Y-YELLOW G-GREEN BL-BLUE P-PURPLE W-WHITE S-SLATE
3.	UNIT WIRED FOR 115 VOLTS AC POWER INPUT.
4.	CONNECTOR VIEWED FROM SOLDER TERMINAL ENDS.
5.	INDICATES SHIELDING
6.	THE NUMBERS ENCLOSED BY PARENTHESIS ARE USED FOR REFERENCE AND ARE NOT SHOWN ON THE PARTS.
7.	WITH THE TWO 151827 TERMINAL STRAPS CONNECTED AS SHOWN (TERMINALS 2 & 3 AND TERMINALS 4 & 5) THE CLUTCH MAGNET ASSEM., THE TAPE-OUT CONTACT ASSEM., AND THE CONTROL LEVER CONT. ASSEM. (ALL ON THE ASSOCIATED TRANSMITTER DIST.) WILL BE WIRED IN SERIES.
8	REFERENCE SPECIFICATION FOR TELETYPE CORPORATION EMPLOYEES ONLY 6820S

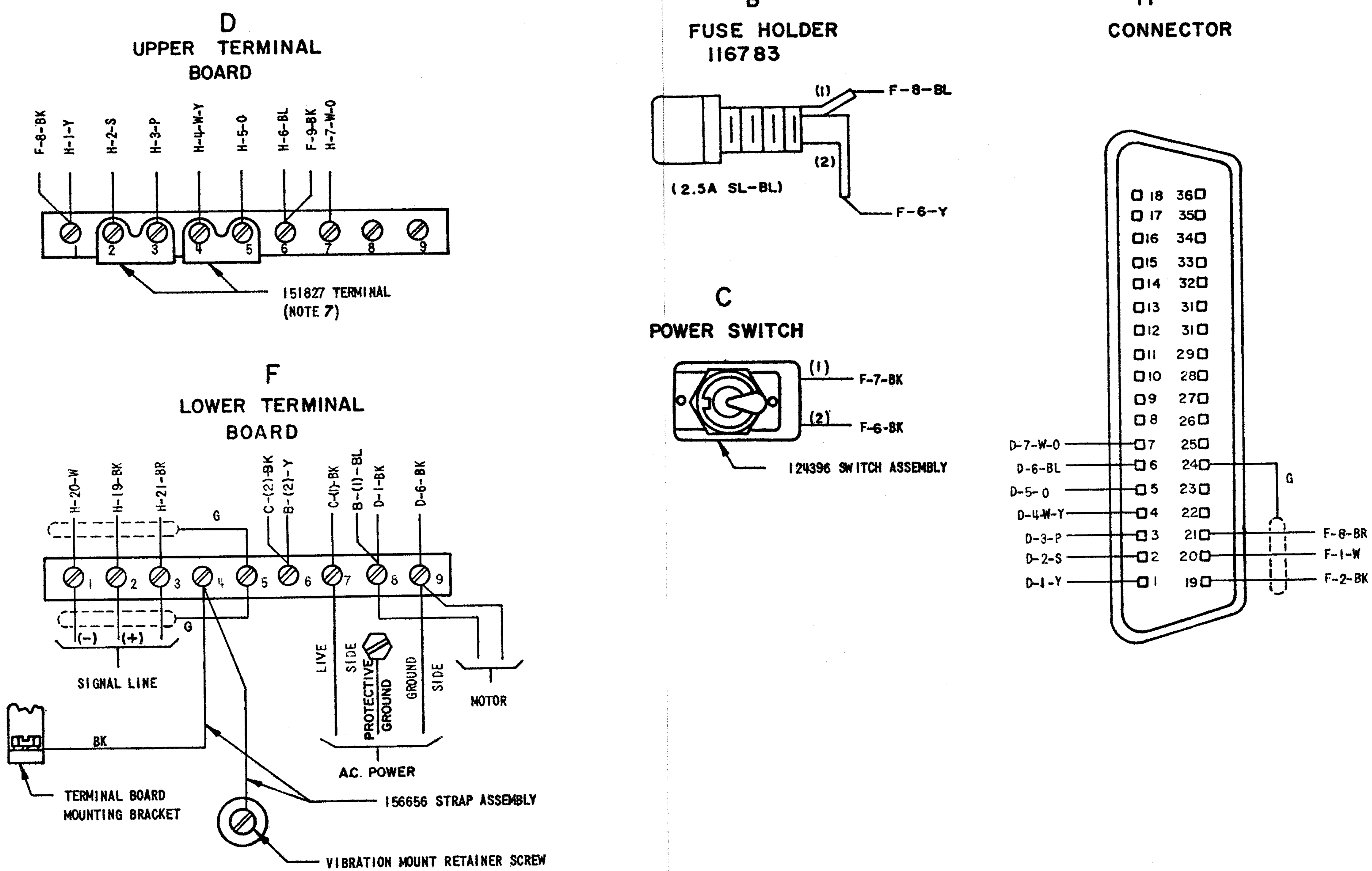
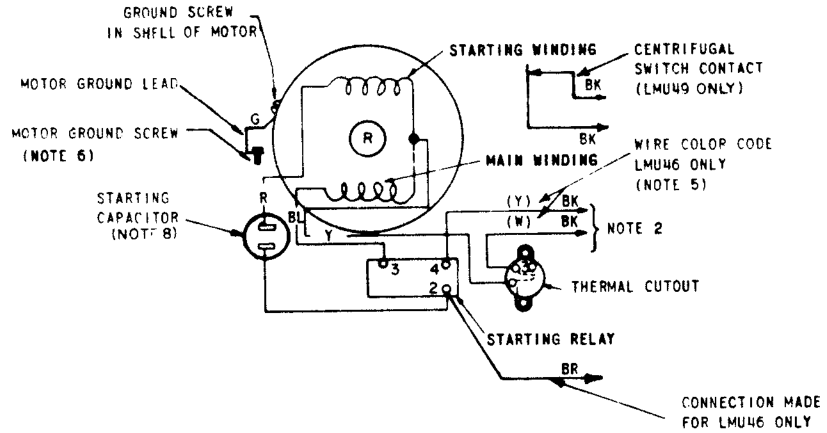


Figure 5-8. Transmitter Distributor Base LXDB19 Wiring Diagram

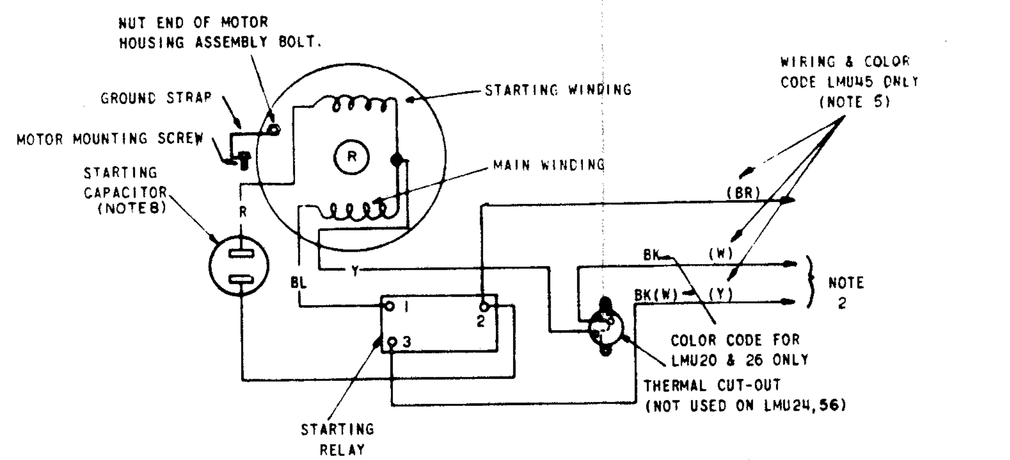
SYNCHRONOUS MOTOR UNITS

NOTE:
REVISION INFORMATION MUST ALSO
BE REFLECTED ON THE ISSUE
CONTROL RECORD, WHICH IS A
PART OF THIS DRAWING

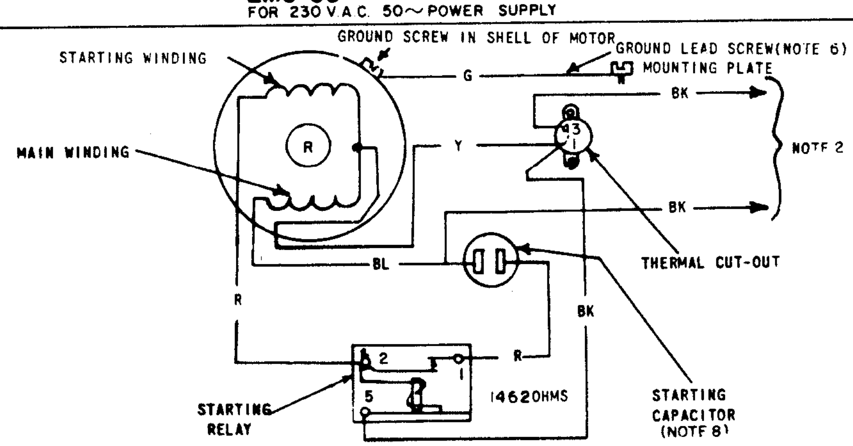
NO.	NOTES	
1.	SYNCHRONOUS MOTOR OPERATES ON REGULATED FREQUENCY (± 0.75%) MAXIMUM AC ONLY.	
2.	CONNECT EITHER WIRE TO DESIGNATED TERMINALS OF UNIT TERMINAL BLOCK, PER WIRING DIAGRAM OF ASSOCIATED UNIT	
3	MOTOR LEADS OF SAME COLOR ARE INTERCHANGEABLE.	
5	EXTERNAL NOISE SUPPRESSION NETWORK CONSISTING OF 100 OHM, 1/2 WATT RESISTOR IN SERIES WITH 0.25 MFD 1K V CAPACITOR CONNECTED ACROSS YELLOW AND BROWN WIRES. (FOR LMU45, 46)	
6	MOTOR GROUND LEAD (GREEN) TERMINAL MUST BE FASTENED TO MOUNTING CRADLE OF MOTOR UNDER A SEPARATE GROUND SCREW ONLY. A SCREW USED FOR ANOTHER PURPOSE CANNOT BE USED FOR GROUNDING (UNDERWRITERS LABORATORIES REQUIREMENT).	
7.	WIRE COLOR CODE: BK - BLACK BL - BLUE BR - BROWN P - PURPLE W - WHITE	R - RED O - ORANGE Y - YELLOW S - SLATE G - GREEN
8	LMU	STARTING CAPACITOR VALUE
	3,15,21,30,33, 36,37,38,42, 46,49,51,52	43 – 48 MFD
	11, 12	170 – 226 MFD
	35	64-77 MFD
	55	15–18 MFD
	19,20,24,26, 31,45,56	88 – 108 MFD
	50,	161 – 193 MFD



LMU 3,11,12,15,21,30,37,42,46,49
FOR USE WITH 115V.A.C. 60~POWER SUPPLY
LMU 33, 36,38, 51,52
FOR 115V.AC 50~POWER SUPPLY.
LMU 55
FOR 230 V.A.C. 50~POWER SUPPLY



LMU 19,20,24,26,31,45,56
FOR USE WITH 115V AC 60~POWER SUPPLY ONLY



LMU 50,
FOR USE WITH 115V AC 50~POWER SUPPLY ONLY

LMU 35

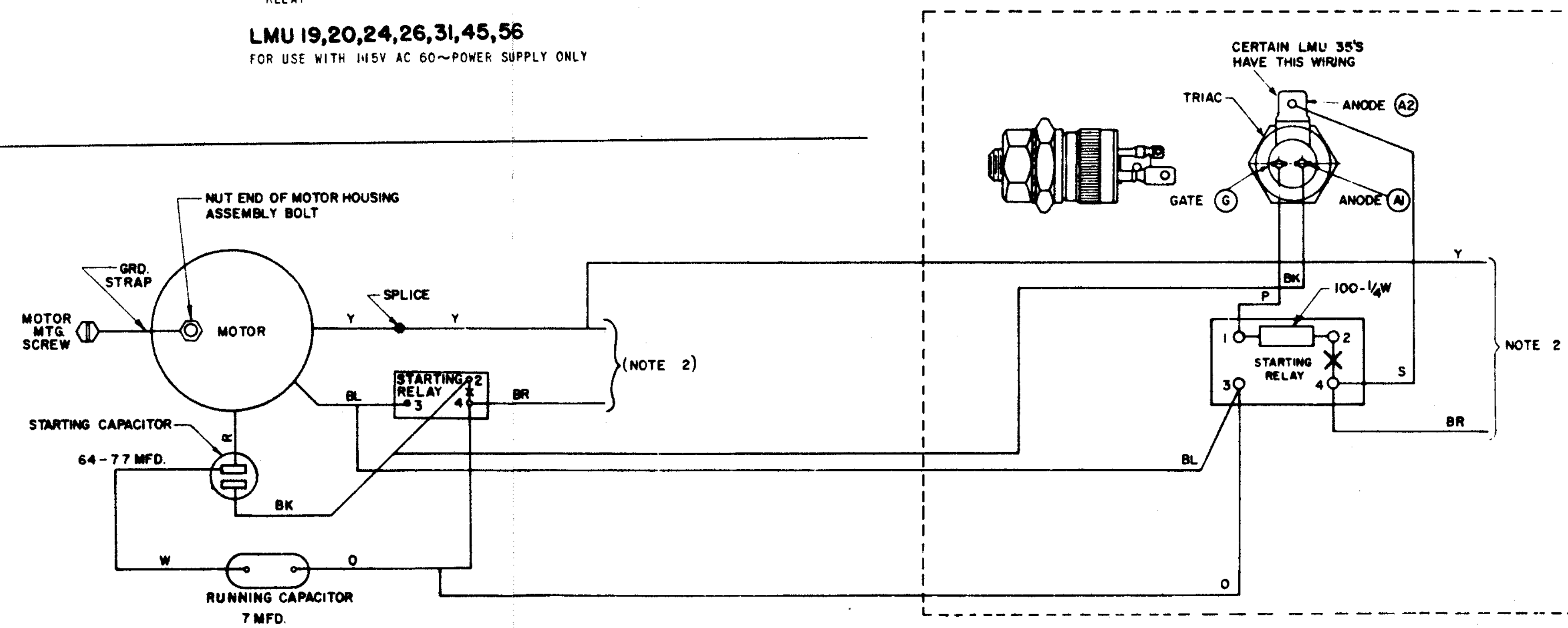


Figure 5-9. Motor Units Wiring Diagram (Sheet 1 of 2)

SERIES GOVERNED MOTOR UNITS

NO.	NOTES
1.	A. AC SERIES MOTOR UNITS OPERATE ON UN-REGULATED AC POWER. B. ASSOCIATED LESU MUST BE EQUIPPED WITH CAPACITOR-RESISTOR ASSEMBLY FOR DC OPERATION OF GOVERNED MOTORS.
2.	CONNECT EITHER WIRE TO DESIGNATED TERMINALS OF UNIT TERMINAL BLOCK, PER WIRING DIAGRAM OF ASSOCIATED UNIT.
3.	MOTOR LEADS OF SAME COLOR ARE INTER-CHANGEABLE.
4.	MOTOR LEADS ARE ENCLOSED IN APPROXIMATLY 10" LONG COPPER SHIELDING & FASTENED TO MOTOR AND CONTROL PARTS COMPARTMENT. (FOR LMU28).
5.	LMU4, 10, AND 14 MOTOR UNITS (UNIVERSAL SERIES GOVERNED) CONTAIN TWO 500 OHM RESISTORS WIRED IN PARALLEL EQUIVALENT TO 250 OHMS. LMU4 MOTOR UNIT SUPERSEDED BY LMU41 MOTOR UNIT. LMU10 MOTOR UNIT SUPERSEDED BY LMU47 MOTOR UNIT. LMU14 MOTOR UNIT SUPERSEDED BY LMU39 MOTOR UNIT.
6.	WIRE COLOR CODE: BK - BLACK R - RED BL - BLUE O - ORANGE BR - BROWN Y - YELLOW P - PURPLE S - SLATE W - WHITE G - GREEN

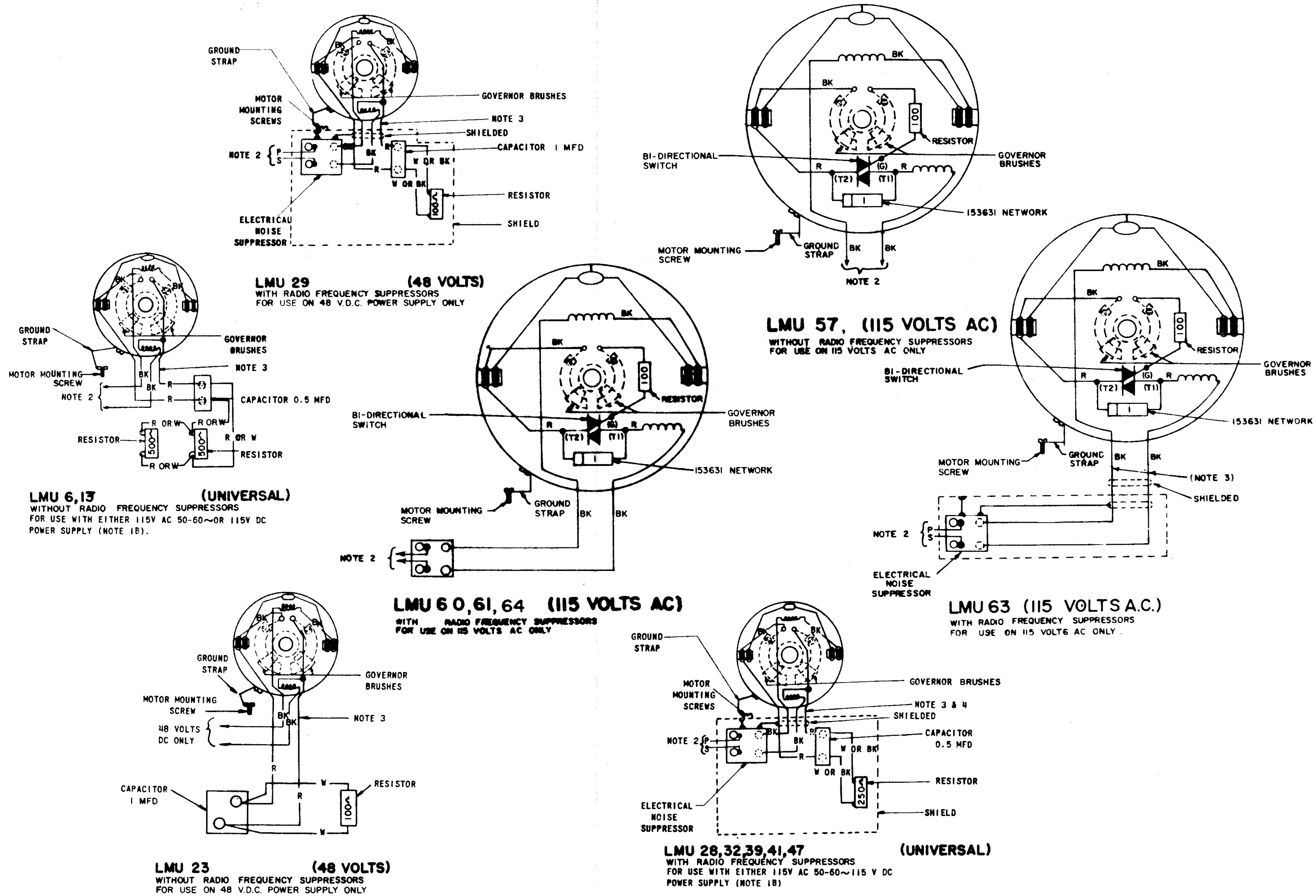


Figure 5-9. Motor Units Wiring Diagram (Sheet 2 of 2)

NOTES:	
1	WIRING LEGEND: A-1-W A = DISTANT TERMINATING AREA 1 = DISTANT TERMINAL DESIGNATION W = WIRING COLOR CODE
2	COLOR CODE: BK - BLACK, BR - BROWN, R - RED, O - ORANGE, Y - YELLOW, G - GREEN, BL - BLUE, P - PURPLE, S - SLATE, W - WHITE W-BK - WHITE-BLACK, W-BR - WHITE-BROWN, W-R - WHITE-RED, W-O - WHITE-ORANGE, W-Y - WHITE-YELLOW, W-G - WHITE-GREEN, W-BL - WHITE-BLUE, W-P - WHITE-PURPLE, W-S - WHITE-SLATE
3	CONNECTORS VIEWED FROM SOLDER TERMINAL ENDS
4	ALL CONTACTS SHOWN IN UNOPERATED POSITION.
5	ASSOCIATED CABLES: 324681 CABLE ASSEMBLY TRANS. - DIST.
6	THE NUMBERS ENCLOSED BY PARENTHESES ARE USED FOR REFERENCE AND ARE NOT MARKED ON THE PARTS.
7	STRAP WITH 22 GAUGE WIRE AS INDICATED.
8	FOR SCHEMATIC WIRING REFER TO 8313 WD WIRING DIAGRAM.

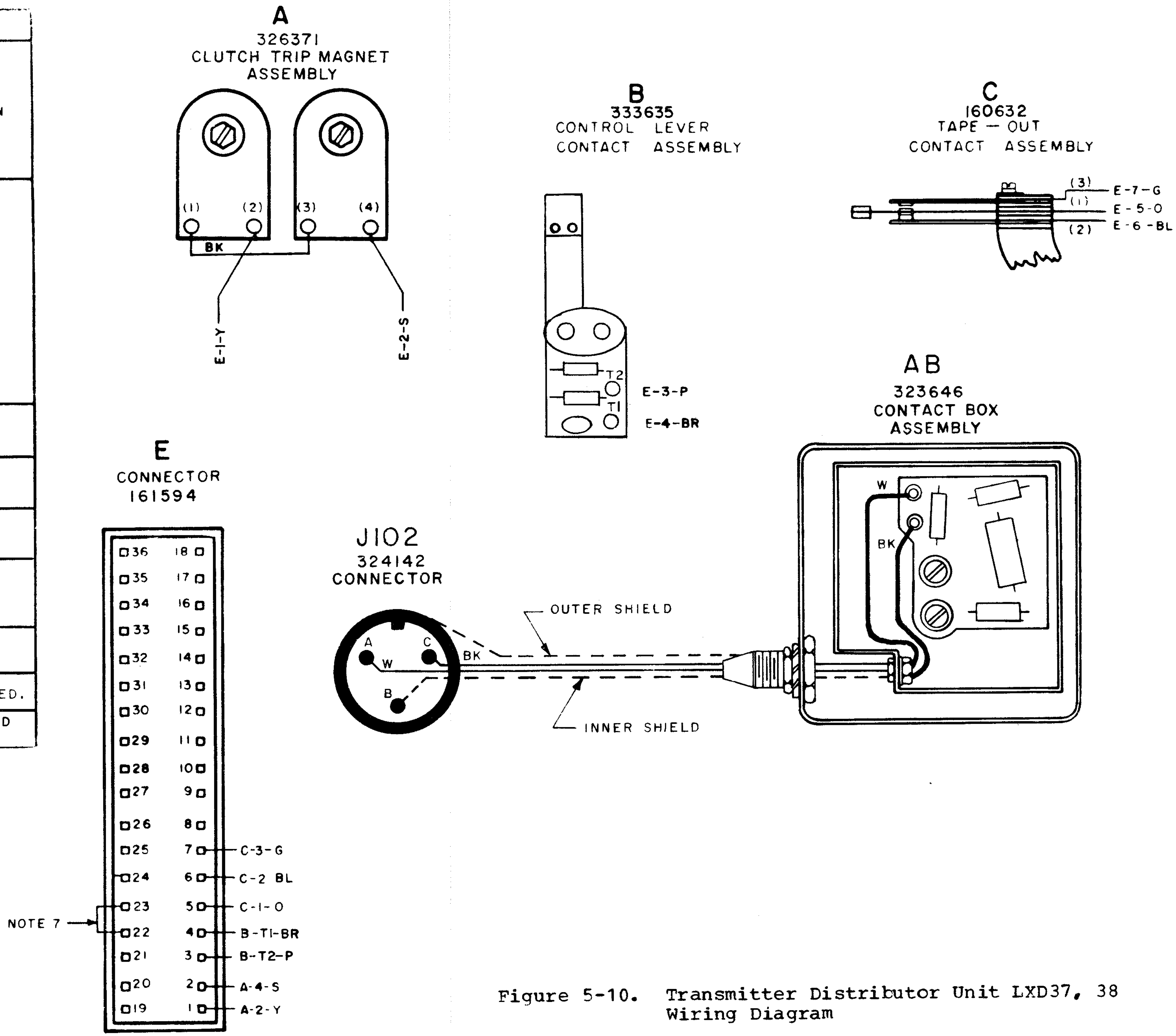
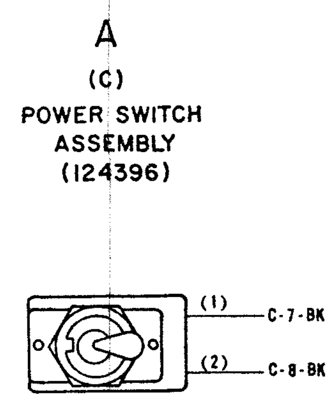
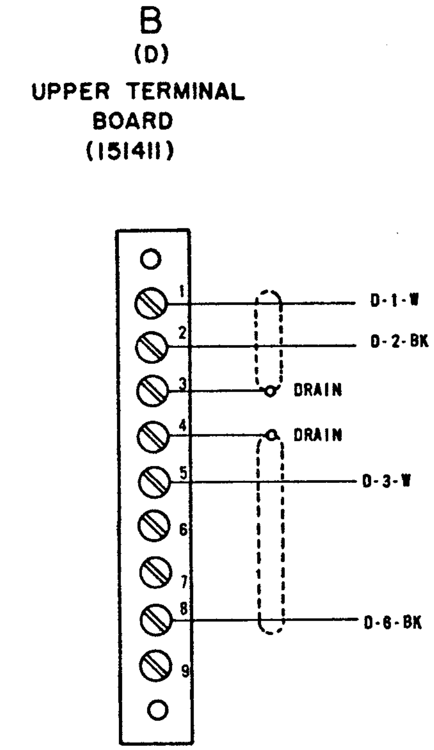
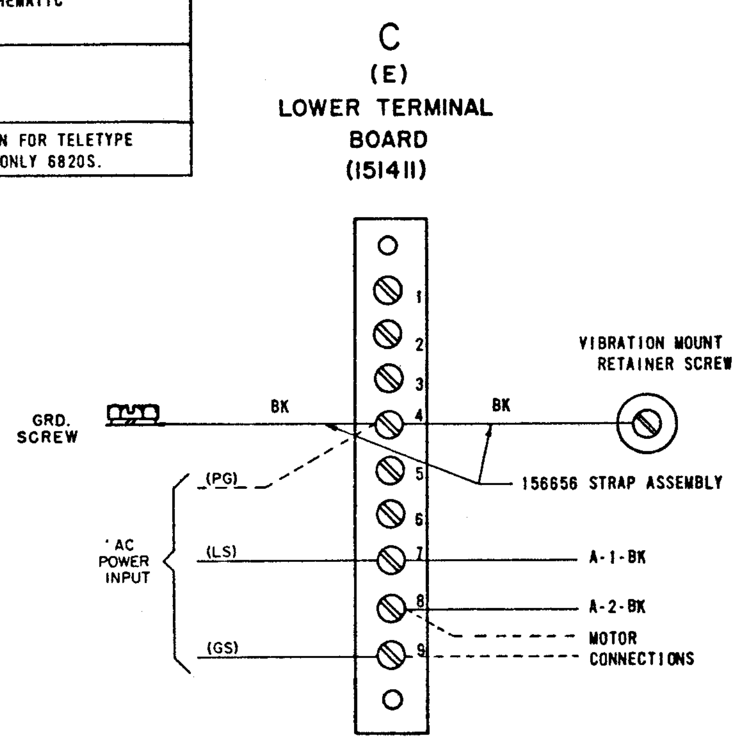


Figure 5-10. Transmitter Distributor Unit LXD37, 38 Wiring Diagram

NO	NOTES
1.	WIRING LEGEND: DISTANT TERMINATING AREA DISTANT TERMINATING DESIGNATION A-1-W WIRE COLOR CODE
2.	COLOR CODE: BK - BLACK BR - BROWN BL - BLUE R - RED G - GREEN P - PURPLE Y - YELLOW O - ORANGE S - SLATE W - WHITE
3.	UNIT WIRED FOR 115 VOLTS AC OR DC POWER INPUT.
4.	CONNECTOR VIEWED FROM SOLDER TERMINAL ENDS.
5.	TERMINAL DESIGNATION ENCLOSED IN PARENTHESIS ARE FOR REFERENCE AND ARE NOT MARKED ON COMPONENT.
6.	—×— INDICATES TO TAPE END TERMINATING POINT
7.	INDICATES SINGLE SHIELDING
8.	REFER TO 8100WD FOR SCHEMATIC DIAGRAM.
9.	ASSOCIATED CABLES: 327287
10	REFERENCE SPECIFICATION FOR TELETYPE CORPORATION EMPLOYEES ONLY 6820S.







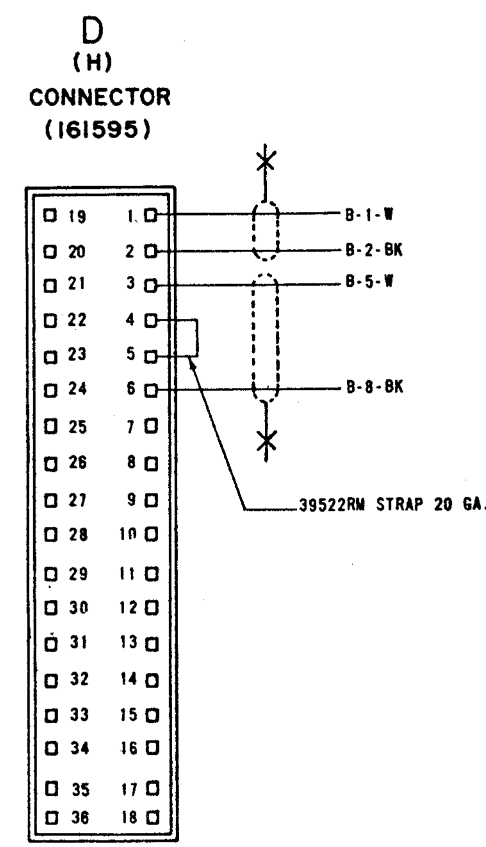


Figure 5-11. Transmitter Distributor Base LXDB20 Wiring Diagram

NO.	NOTES
1.	ALL RESISTORS 1/2 WATT. RESISTANCE VALUES IN OHMS. CAPACITANCE VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
2.	INDICATES FEMALE TERMINAL INDICATES MALE TERMINAL
3.	INDICATES SINGLE SHIELDING INDICATES DOUBLE SHIELDING
4.	SL-BL INDICATES SLOW-BLOWING.
5	INDICATES CIRCUIT COMMON
6.	WIRING LEGEND: DISTANT TERMINATING AREA DISTANT TERMINATING DESIGNATION A-1-W WIRE COLOR CODE
7	TERMINAL DESIGNATIONS ENCLOSED IN PARENTHESIS ARE FOR REFERENCE AND ARE NOT MARKED ON COMPONENT.
8.	ASSOCIATED DIAGRAMS: 8099WD WIRING DIAGRAM LXDB 20 8309WD WIRING DIAGRAM LXD 37
9.	8 OHMS (MAX) PRIMARY RESISTANCE 10 OHMS (MAX.) SECONDARY RESISTANCE TO CENTER TAP.
10.	WHEN PULSED OPERATION OF AN LXD IS NOT USED TERMINALS TD-6 AND TD-1 SHOULD BE STRAPPED.
11.	COLOR CODE: BK - BLACK R - RED BR - BROWN P - PURPLE BL - BLUE W - WHITE G - GREEN Y - YELLOW O - ORANGE S - SLATE
12.	TC BOARD IS MOUNTED WITH NO.6 CLOSEST TO FUSE. TD BOARD HAS NO. 1 CLOSEST TO FILTER CHOKES.
13.	CONNECTOR SHOULD BE MOUNTED WITH S AT CAPACITOR MOUNTING SIDE. PC SHOULD BE MOUNTED CLOSEST TO TRANSFORMER AND KB SHOULD BE MOUNTED IN THE CENTER. POLARIZING KEYS SHOULD BE INSERTED BETWEEN H AND F OF CA, BETWEEN J AND K OF KB AND BETWEEN M AND N OF PC.
14.	------INDICATES OUTER SHIELD AND - - - - INDICATES INNER SHIELD
15.	ALL VOLTAGES DC UNLESS OTHERWISE SPECIFIED.
16.	WHEN IT IS DESIRED TO USE EXTERNAL BATTERY REMOVE TAPE AND TIE THESE LEADS. APPLY + BATTERY (6.6 TO 7.8V) TO TD-6 AND − BATTERY (6.6 TO 7.8V) TO TD-5. IF ±6V IS SUPPLIED THE KEYER OUTPUT WILL DROP TO ± 4.5V.
17.	INNER SHIELD GROUND NUT ON CONNECTOR MOUNTING
18.	DR - INDICATES DRAIN WIRE.
19.	ASSOCIATED CABLE ASSEMBLIES - 324154.
20.	ALL SURFACE WIRE 24 AWG GREEN, 31784RM, UNLESS OTHERWISE SPECIFIED ALL STRAPPING WIRE 24 AWG BARE, 39603RM. USE SLEEVING WHERE REQUIRED.
21.	THESE CABLES CONNECT TO THE LXD TERM. BLOCK WHEN SET IS ASSEMBLED.
22.	CUSTOMER MAY CONNECT TC-5 TO GROUND IF REQUIRED.

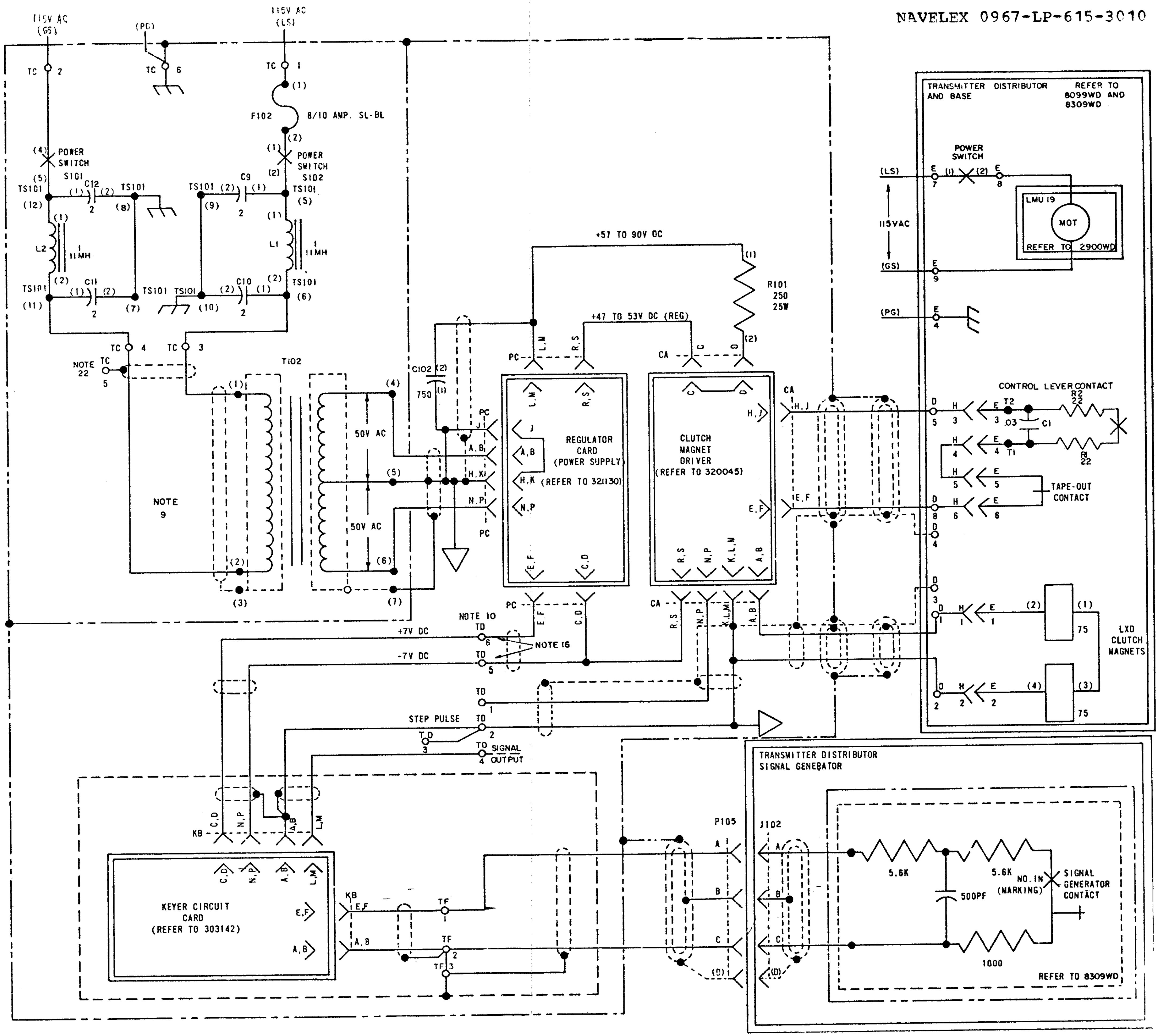


Figure 5-12. Electrical Service Assembly 326792 Schematic Diagram

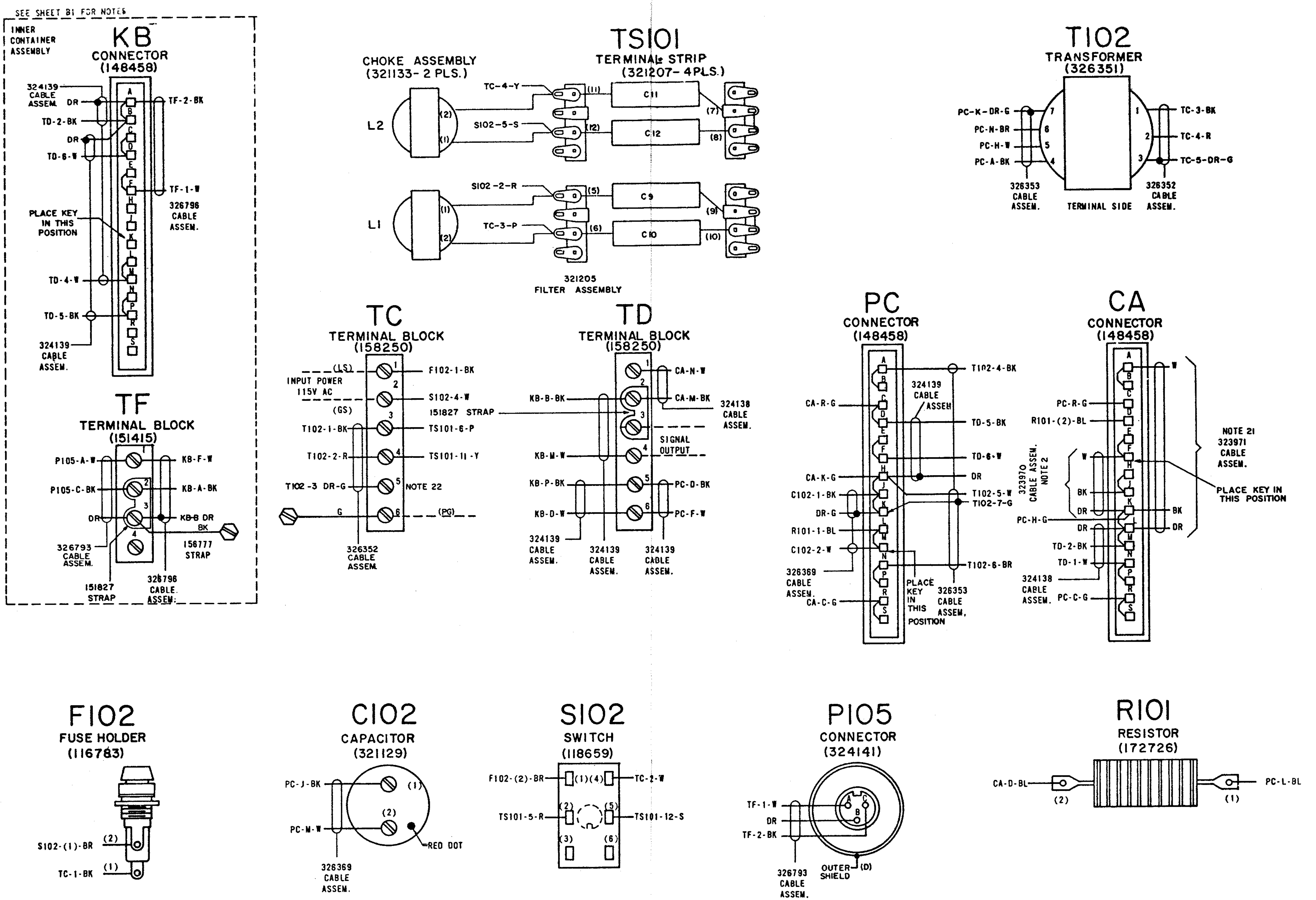
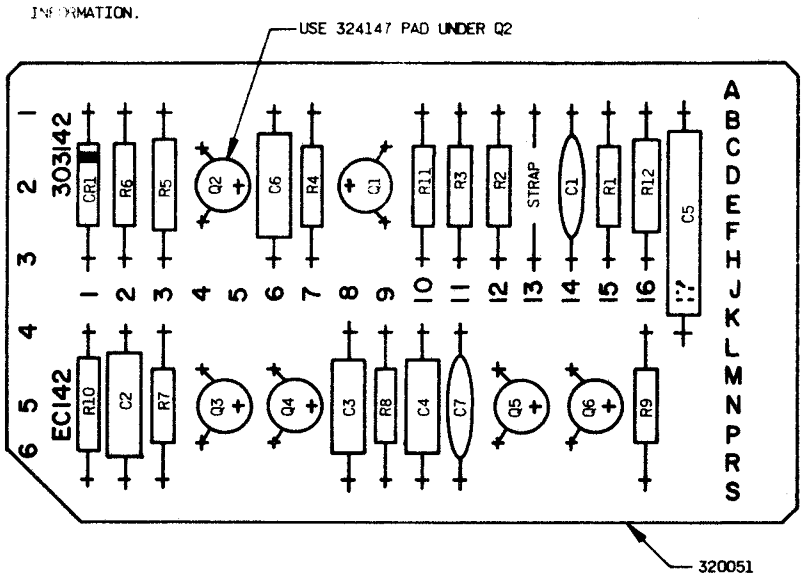
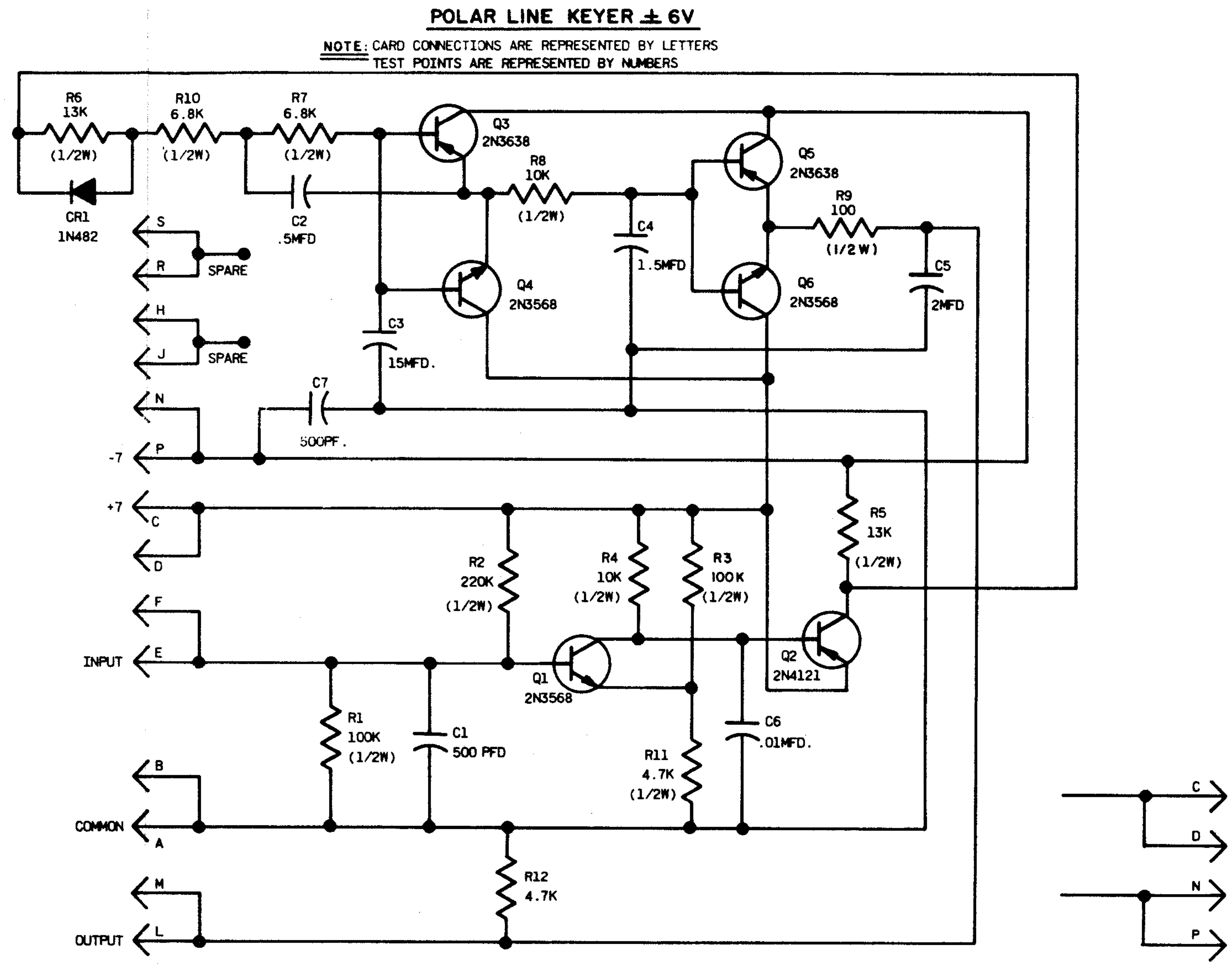


Figure 5-13. Electrical Service Assembly 326792 Wiring Diagram

REF DESIG.	FAR. NO REQ.	QTY.	DESCRIPTION	FUNCTION
R1	116720	2	RESISTOR 100K 5% 1/2W	RC FILTER
R2	118178	1	RESISTOR 220K 5% 1/2W	Q1 BASE BIAS
R3			RESISTOR SAME AS R1	Q1 EMITTER BIAS
R4	129854	2	RESISTOR 10K 5% 1/2W	Q1 COLLECTOR BIAS
R5	321204	2	RESISTOR 13K 1% 1/2W	Q2 COLLECTOR BIAS
R6			RESISTOR SAME AS R5	RC BIAS EQUALIZER
R7	118147	2	RESISTOR 6.8K 5% 1/2W	Q3,4 BASE BIAS
R8			RESISTOR SAME AS R4	Q5,6 BASE BIAS
R9	137438	1	RESISTOR 100 Ω 5% 1/2W	RC FILTER
R10			RESISTOR SAME AS R7	Q3,4 BASE BIAS
R11	118146	2	RESISTOR 4.7K 5% 1/2W	Q1 EMITTER BIAS
R12			RESISTOR SAME AS R11	OUTPUT LOAD
CR1	181619	1	DIODE 1N482	R6 SHUNT SWITCH
C1	321157	2	CAPACITOR 500 PFD	INPUT FILTER
C2	320048	1	CAPACITOR .5 MFD.	ACTIVE FILTER FEEDBACK
C3	320049	2	CAPACITOR .15 MFD.	ACTIVE FILTER INTEGRATOR
C4			CAPACITOR SAME AS C3	RC FILTER INTEGRATOR
C5	320047	1	CAPACITOR 2 MFD	RC FILTER INTEGRATOR
Q1	315930	3	TRANSISTOR, 2N3568	1st AMPLIFIER
Q2	324144	1	TRANSISTOR 2N4121	2nd AMPLIFIER
Q3	315931	2	TRANSISTOR 2N3638	ACTIVE COMPLIMENTARY FILTER
Q4			TRANSISTOR SAME AS Q1	ACTIVE COMPLIMENTARY FILTER
Q5			TRANSISTOR SAME AS Q3	COMPLIMENTARY SYMMETRY EMITTER
Q6			TRANSISTOR SAME AS Q1	FOLLOWER AMPLIFIER
C6	181618	1	CAPACITOR .01MFD	RC FILTER
C7			CAPACITOR SAME AS C1	RF BY PASS
EC	320051	1	BOARD, ETCHED CIRCUIT	
		1	STRAP, BARE 24 AWG.	
	324147	1	PAD, TRANSISTOR	
	144495	5	PAD, TRANSISTOR	

NOTE: MANUFACTURE PER MR2001
REFER TO 5016WD FOR MARKING INFORMATION.





ALPHA NUMERIC CONVERSION CHART		
STAMPING ON CIRCUIT BOARD	NUMERICAL CONVERSION FOR 15 PT. CARDS WHEN USED WITH 36 PT. CONNECTOR: WHEN INSERTED IN UPPER HALF OF CONNECTOR	WHEN INSERTED IN LOWER HALF OF CONNECTOR
A	1	22
B	2	23
C	3	24
D	4	25
E	5	26
F	6	27
H	7	28
J	8	29
K	9	30
L	10	31
M	11	32
N	12	33
P	13	34
R	14	35
S	15	36

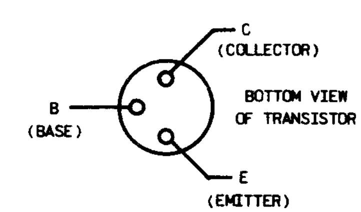


Figure 5-14. Low-Level Keyer 303142 (Polar Line Keyer) Schematic Diagram

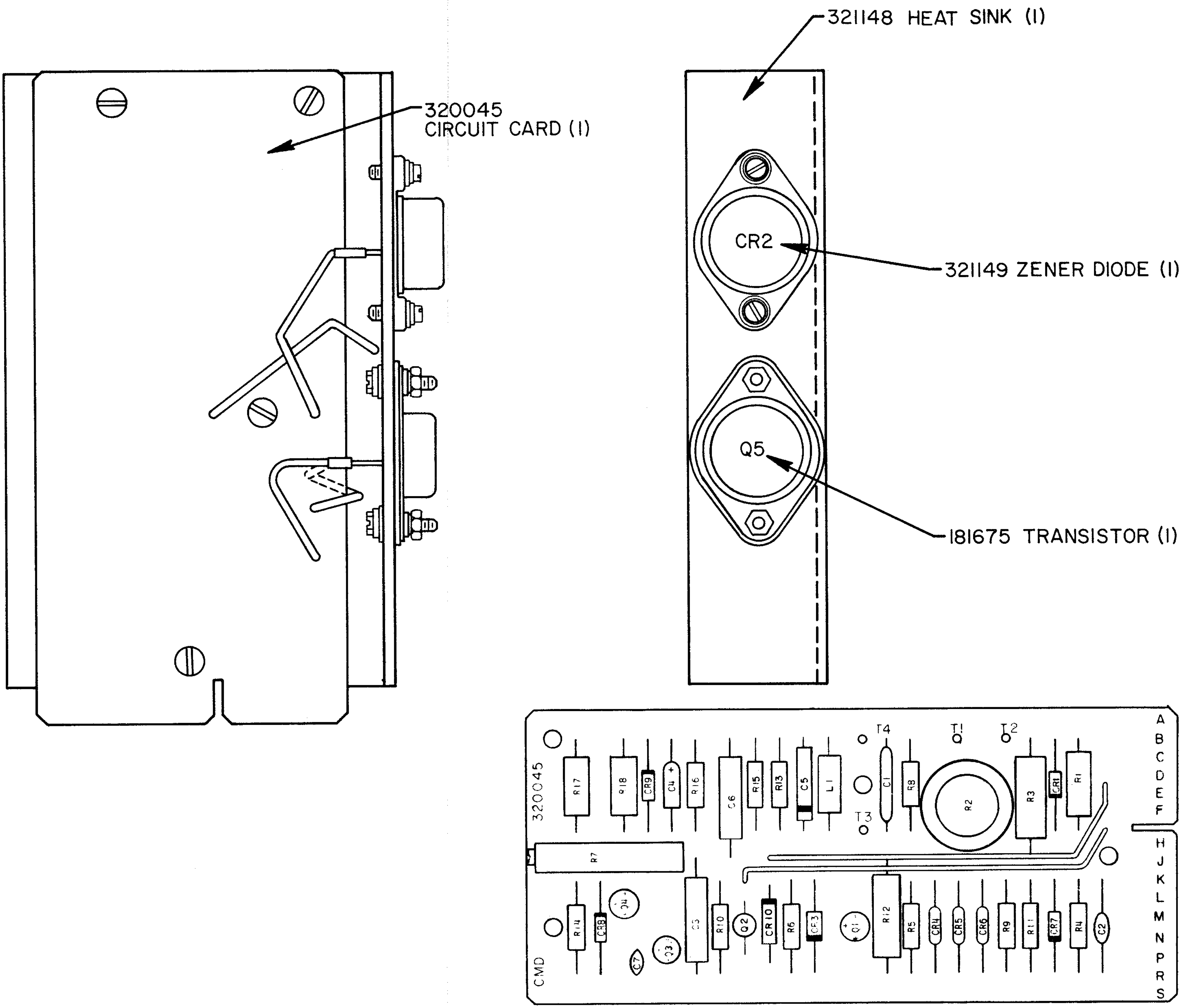


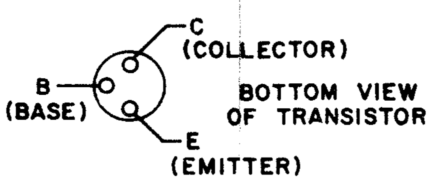
Figure 5-15. Clutch Magnet Driver 321991 Schematic Diagram (Sheet 1 of 2)

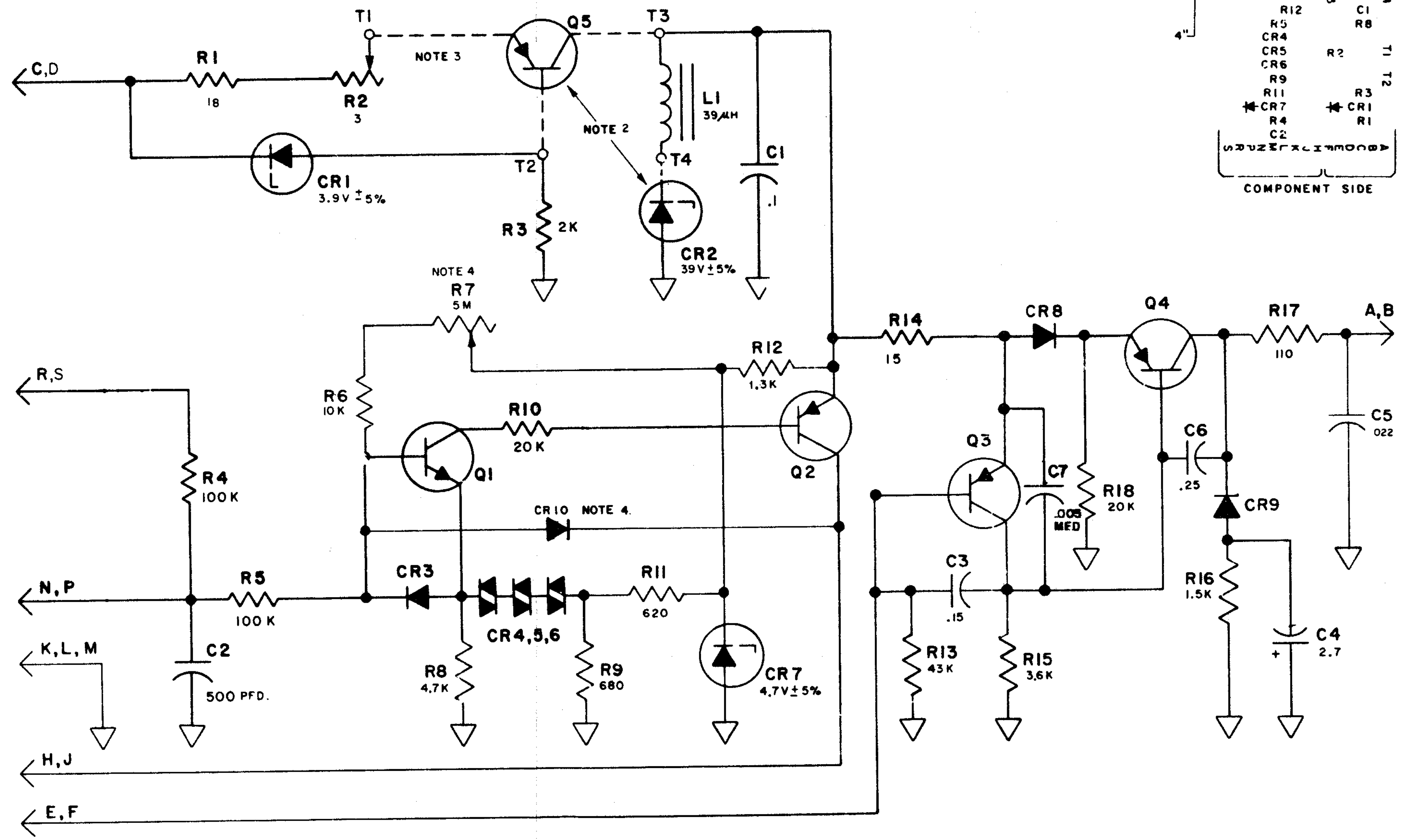
USED ON 321991

NO B/M

ASSEMBLY, CIRUIT CARD (CMD)				
REF. DESIG.	TELETYPE PART NO.	TOTAL QTY.	NAME AND DESCRIPTION	LOCATING FUNCTION
R1	327793	1	RESISTOR, 18 OHM 3 W, ±1%	REG. CURRENT LIMITER
R2	182773	1	POTENTIOMETER, 3 OHM, 2.5W	REG. CURRENT ADJ.
R3	321155	1	RESISTOR, 2K, 2W, 5%	CR1 CURRENT LIMITER
R4	118720	1	RESISTOR, 100K, 1/2 W, 5%	Q1 OPEN LINE BIAS
R5	118720	1	RESISTOR, 100K, 1/2W, 5%	INPUT RESISTOR
R6	129854	1	RESISTOR, 10K, 1/2W	Q1 BIAS
R7	321160	1	POTENTIOMETER, 5M	Q1 BIAS
R8	118146	1	RESISTOR, 4.7K, 1/2W, 5%	Q EMITTER RES.
R9	129850	1	RESISTOR, 680 OHM, 1/2W, 5%	VOLTAGE DIVIDER
R10	321258	1	RESISTOR, 20K, 1/2W, 5%	Q1 LOAD RES.
R11	137604	1	RESISTOR, 620 OHM, 1/2W, 5%	VOLTAGE DIVIDER
R12	321292	1	RESISTOR, 1.3K, 2W, 5%	CR7 CURRENT LIMITE
R13	139143	1	RESISTOR, 43K, 1/2W, 5%	Q2 LOAD RES.
R14	321259	1	RESISTOR, 15 OHM, 1/2W, 5%	Q3 EMITTER RES.
R15	165178	1	RESISTOR, 3.6K, 1 W, 5%	Q3 LOAD RES.
R16	137442	1	RESISTOR, 1.5K, 1/2W, 5%	C4 BLEEDER RES.
R17	321151	1	RESISTOR, 110 OHM, 3W, 1%	COIL CURRENT LIMITER
R18	321258	1	RESISTOR, 20K, 1/2W, 5%	CR8 BIAS RES.
C1	321158	1	CAPACITOR, .1 MFD.	R.F. BY-PASS CAP
C2	321157	1	CAPACITOR, 500 PFD.	R.F. BY-PASS CAP
C3	171829	1	CAPACITOR, .15 MFD.	Q3 FEEDBACK CAP
C4	321264	1	CAPACITOR, 50V, 2.7 MFD.	TRANSIENT SUPP.
C5	178860	1	CAPACITOR, 100V, .022 MFD.	R.F. BY-PASS
C6	171587	1	CAPACITOR, 200V, .25 MFD.	Q4 FEEDBACK CAP.
C7	171583	1	CAPACITOR, .003 MFD	R.F. BY-PASS CAP.
L1	321159	1	CHOKE, 390 μH	R.F. CHOKE
CR1	321161	1	DIODE, 1N748A, 3.9V ± 5%	REG. VOLT. REF.
CR3	321154	1	DIODE, 1N457A	Q1 BASE PROT.
CR4	178844	1	VARISTOR, 100-A	TEMP. COMP.
CR5	178844	1	VARISTOR, 100-A	TEMP. COMP.
CR6	178844	1	VARISTOR, 100-A	TEMP. COMP.
CR7	181667	1	DIODE, 1N750A, 4.7V ± 5%	TEMP. COMP. REF.
CR8	177611	1	DIODE, 1N382	Q4 EMITTER DIODE
CR9	321154	1	DIODE, 1N457A	TRANSIENT SUPP.
CR10 (NOTE 4)	321154	1	DIODE, 1N457A	SHORT PROT.
Q1	321166	1	TRANSISTOR, 2N1893	D.C. AMP.
Q2	324144	1	TRANSISTOR, 2N4121	D.C. AMP.
Q3	321165	1	TRANSISTOR,	D.C. AMP.
Q4	321261	1	TRANSISTOR, 2N4036	D.C. AMP.
	324147	1	PAD, TRANSISTOR	Q2
	144495	3	PAD, TRANSISTOR	Q1, Q3, Q4
	321299	1	CIRCUIT BOARD, ETCHED	
	321171	2	LEAD (BK)	
T1-T4	137471	4	LUG, TERMINAL	

NO.	NOTES
1.	ALL RESISTORS 1/2 WATT, ALL RESISTANCE VALUES IN OHMS AND ALL CAPACITANCE VALUES IN MFD. UNLESS OTHERWISE SPECIFIED.
2.	Q5 (181675) AND CR2 (321149) ARE MOUNTED TO 321148 HEAT SINK. SEE CMD ASSEMBLY 321991.
3.	R2 IS ADJUSTED FOR 15 MA IN CR2 WITH INPUT MARKING (+6) AND OUTPUT CONNECTED TO A 150 OHM RESISTOR (5W)
4.	R7 IS ADJUSTED FOR SYMMETRICAL SWITCHING ABOUT ZERO.
5.	PINS A,B — 140 MA TO COILS PINS R,S — -6V DC PINS C,D — +47 TO 53V DC POWER PINS E,F,H,J — CONTROL CONTACT PROVISION PINS N,P — MS 188B SIGNAL INPUT PINS K,L,M — COMMON (ALL INPUTS AND OUTPUTS REFERRED TO COMMON)
6.	S-NUMBER 61,263 S





NOTES
1. THIS VIEW MAY BE USED AS 1 TO 1 MASTER FOR ART WORK.
2. ALL CHARACTERS TO BE .125 HIGH AND PRINTED WITH WHITE ENAMEL.
3. ALL PRINTED CHARACTERS TO BE LOCATED ±.031 FROM POSITION SHOWN IN VIEW.
4. CR 10 ADDED FOR SHORT CIRCUIT PROTECTION.

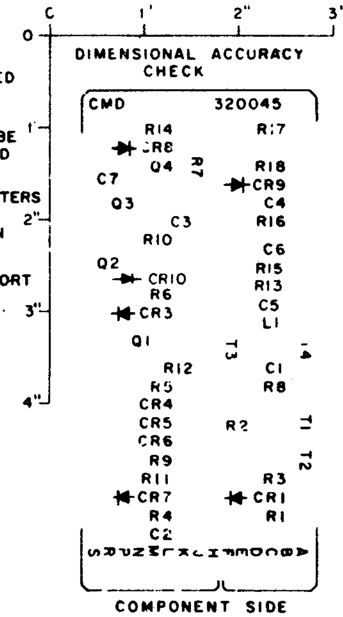
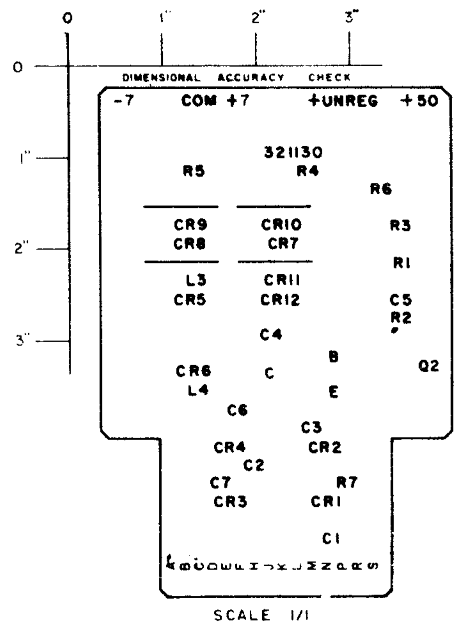


Figure 5-15. Clutch Magnet Driver 321991 Schematic Diagram (Sheet 2 of 2)

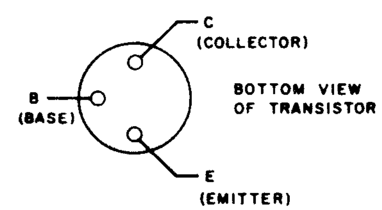
CIRCUIT BOARD ASSEMBLY, POWER SUPPLY (47-53V.D.C. .5AMP. MAX.)				
REF. DESIGN.	PART NO.	TOTAL QTY.	NAME AND DESCRIPTION	FUNCTION
C1	312284	1	CAPACITOR, 1.5 MFD 400V	RF FILTER
C2,3	171585	2	CAPACITOR, .22MFD 200V	RF FILTER
C4	171831	1	CAPACITOR, 10MFD 150V	RECTIFIER FILTER
C5	178860	1	CAPACITOR, .022MFD 100V	RF FILTER
C6,7	312385	2	CAPACITOR, .1MFD 10V	RF FILTER
R1	198937	1	RESISTOR, 2.7K 2W	
R2	182180	2	RESISTOR, 200 OHM 1/2W	
R3	171533	1	RESISTOR 4 OHM 5W	
R4,5	311664	2	RESISTOR, 2.5K 8W	DROPPING
R6			SAME AS R2	RF FILTER
R7	305298	1	RESISTOR, 3.3K 3W	BLEEDER
CR1-4	182520	4	DIODE (1N4383)	RECTIFIER
CR5,6	327794	2	DIODE, ZENER (7.2V)	REFERENCE
CR7	321286	2	DIODE, ZENER (1N4749A)	REFERENCE
CR8-11	178844	4	VARISTOR (W.E. 100A)	REFERENCE
CR12			SAME AS CR7	REFERENCE
L3,4	321159	2	INDUCTOR 39 uH	RF FILTER
Q2	321145	1	TRANSISTOR (2N2270)	GAIN
FC1,2	311068	2	FUSE CLIP	
F102	131807	1	FUSE .5 AMP.	
TP1	320042	1	JACK, TEST (SLATE)	
TP2	320041	1	JACK, TEST (GREEN)	
TP3	320039	1	JACK, TEST (BLACK)	
TP4	320040	1	JACK, TEST (ORANGE)	
TP5	320038	1	JACK, TEST (RED)	
P1-3	137471	3	TERMINAL POST	CONNECTOR
	321140	1	CIRCUIT CARD	
S1-S4	336470	4		
1	151637	2	SCREW 4-40	
2	151880	2	NUT 4-40	
3	110743	2	LOCK WASHER	
4	125011	2	FLAT WASHER	

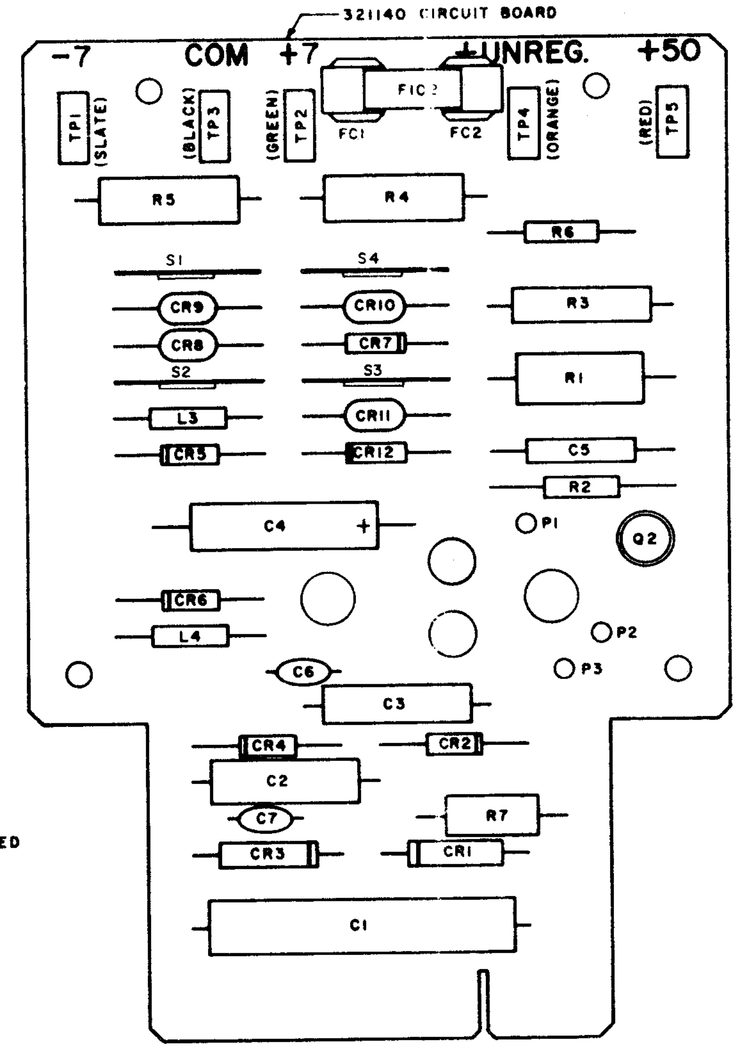
CIRCUIT DESCRIPTION (SEE SHEET 2)

DIODES CR1 AND CR3 FORM A RECTIFIER WITH ASSOCIATED TRANSFORMER (321123) T1 AND CAPACITOR C8 (321129) TO OBTAIN A MINIMUM +58V DC UNREGULATED. Q1 IS AN EMITTER FOLLOWER VOLTAGE REGULATING ELEMENT WHICH ABSORBS THE VOLTAGE DIFFERENCE BETWEEN THE UNREGULATED DC AND THE CONSTANT +50V DC REFERENCE ESTABLISHED BY DIODES CR7-CR12. Q2 PROVIDES GAIN FOR Q1. DIODES CR3,CR4, TRANSFORMER T1 AND CAPACITOR C4 FORM A FULL WAVE RECTIFIER TO OBTAIN NEGATIVE UNREGULATED DC. R4 AND CR6, R5 AND CR5 FORM BASIC SHUNT REGULATORS TO OBTAIN +7 AND -7V DC.



SCALE 1/1





1) TELETYPE REFERENCE ONLY: SPECIFICATION 61,267S
2) SEE SHEET 2 FOR SCHEMATIC WIRING
3) ALL CHARACTERS TO BE .125 HIGH AND PRINTED WITH WHITE ENAMAL.
4) ALL PRINTED CHARACTERS TO BE LOCATED ±.031 FROM NOMINAL POSITION.

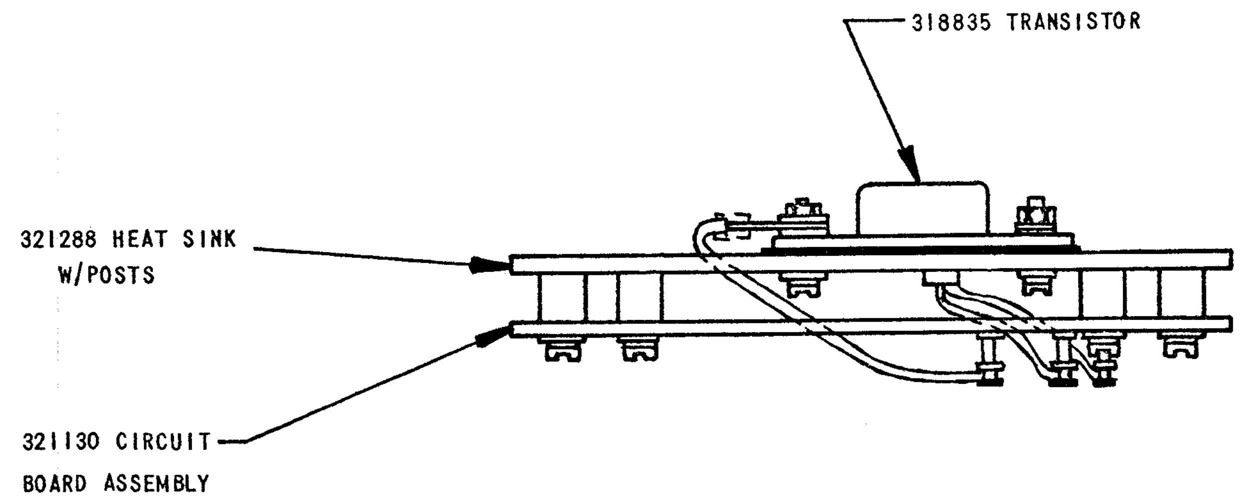


Figure 5-16. Power Supply 321290 (0.5 Ampere) Schematic Diagram (Sheet 1 of 2)

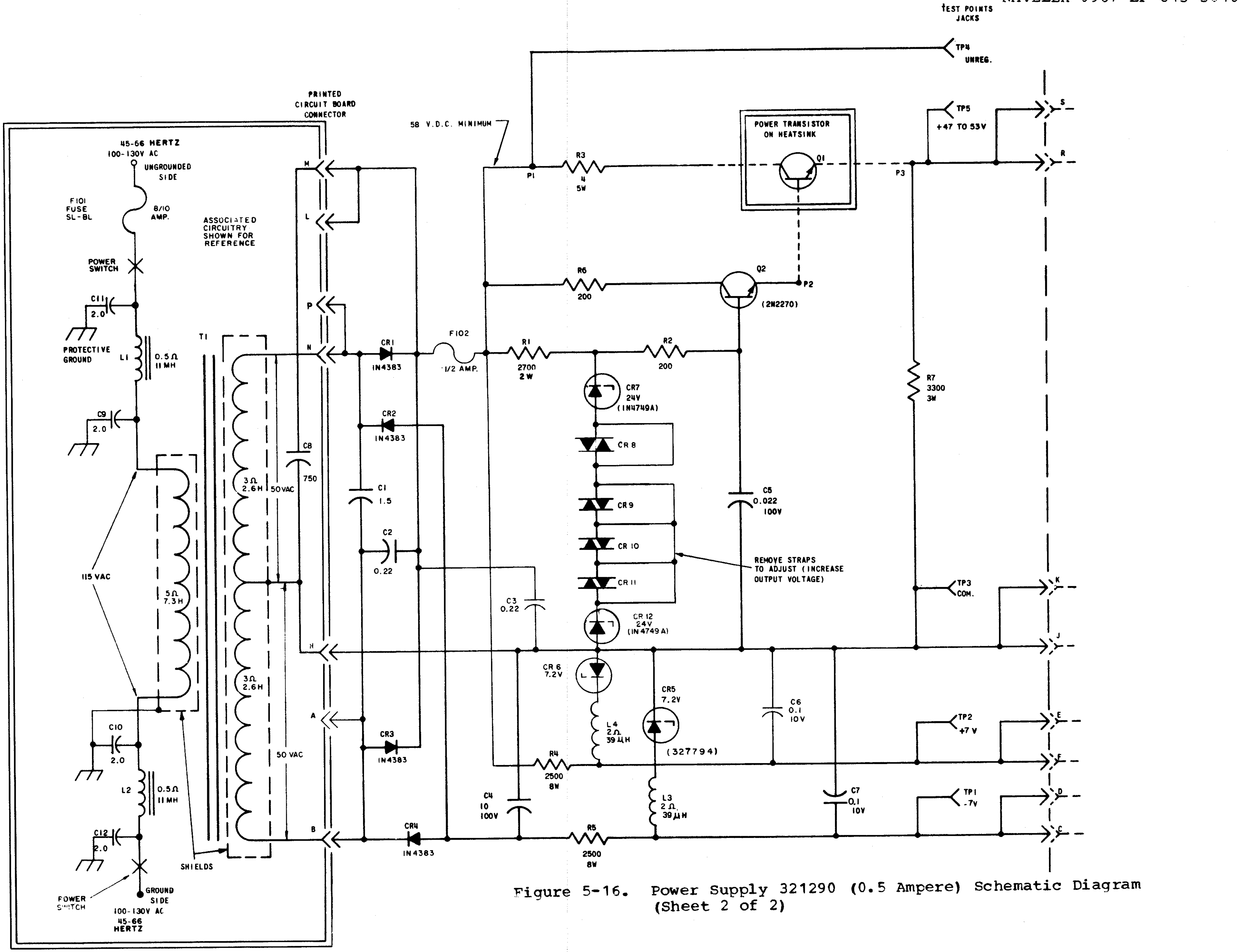
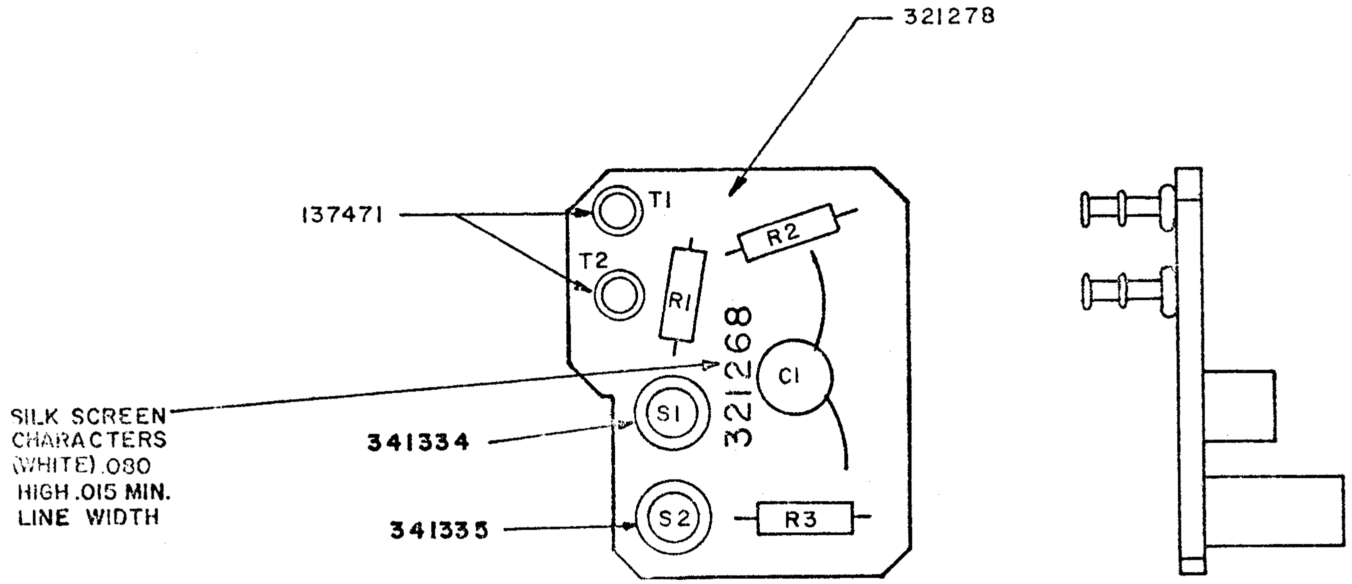
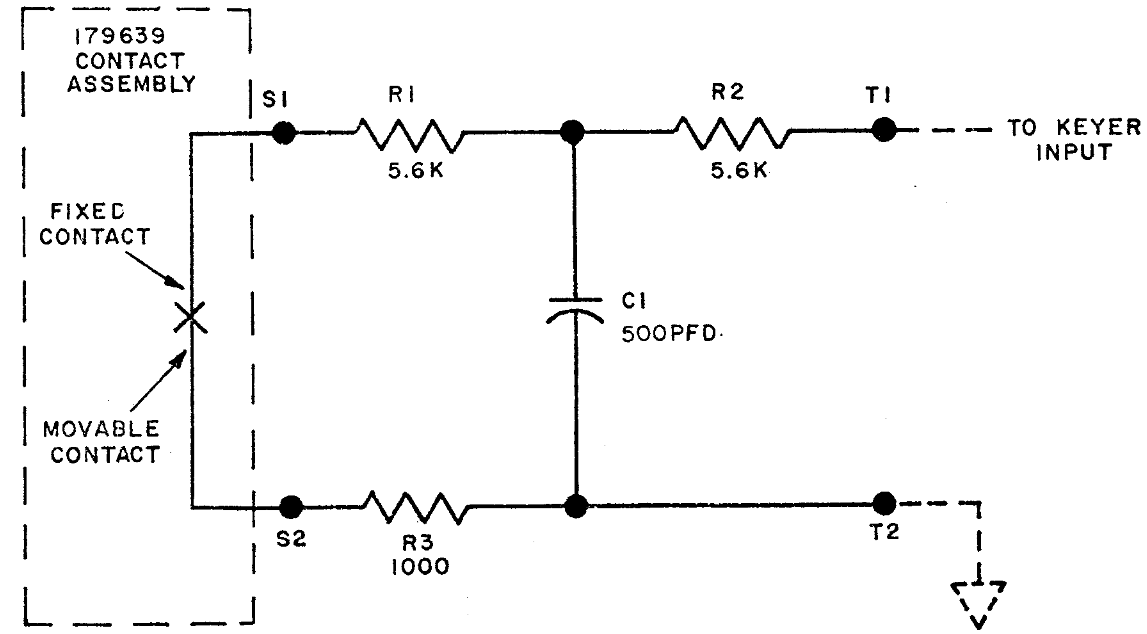


Figure 5-16. Power Supply 321290 (0.5 Ampere) Schematic Diagram (Sheet 2 of 2)



REF. DESIGN	TELETYPE PART NO.	TOTAL QTY.	NAME AND DESCRIPTION	LOCATING FUNCTION
R1	315960	2	RESISTOR, 5.6K 1/4 WATT	RC FILTER
R2	"		SAME AS R1	"
R3	321213	1	RESISTOR, 1000 Ω 1/4 WATT	"
C1	321157	1	CAPACITOR, 500 PFD	"
T1	137471	2	TERMINAL, SOLDER	
T2	"		"	
S1	341334	1	STUD, CONNECTOR	
S2	341335	1	"	
321278	321278	1	BOARD, ETCHED CIRCUIT	



NOTE:

DASHED LINES INDICATE EXTERNAL CIRCUITRY.

Figure 5-17. Filter Card Assembly 321268 Schematic Diagram

CHAPTER 6
CORRECTIVE MAINTENANCE

6-1. INTRODUCTION. This Chapter provides information regarding adjustment and repair of Transmitter Distributor Sets Model 28. The Chapter is divided into five sections as follows:

a. Section I - provides adjustment procedures for basic units.

b. Section II - provides additional adjustment procedures required for variable features of basic units.

c. Section III - provides adjustment procedures for basic units (earlier designs) that differ from those in Section I.

d. Section IV - provides repair information in the form of disassembly and reassembly procedures.

6-2. GENERAL. Adjustment procedures provided in this Chapter are those required to be performed as a result of an abnormal indication in a periodic mechanical check (Chapter 4), to correct a fault discovered during troubleshooting (Chapter 5), or to be performed after reassembly (section IV of this Chapter).

SECTION I - ADJUSTMENTS (BASIC UNITS)

6-3. TRANSMITTER DISTRIBUTOR UNIT. Adjustments for the Transmitter Distributor Unit high-level units are described in paragraph 6-3.1. Low-level adjustments are described in paragraph 6-3.2.

NOTE

When the adjustment procedure calls for the clutch to be disengaged, the clutch shoe lever must be fully latched between its trip lever and latchlever so that the clutch shoes release their tension on the clutch drum. When engaged, the clutch shoe lever is unlatched and the clutch shoes are wedged firmly against the clutch drum. When the main shaft is rotated by hand, the clutch does not fully disengaged upon reaching its stop position. In order to relieve the drag on the clutch and permit the main shaft to rotate freely, apply pressure on a lug of the clutch disc with a screwdriver to cause it to engage its latchlever and thus disengage the internal expansion clutch shoes from the clutch drum.

NOTE

Remove transmitter distributor unit from its base before making adjustments

6-3.1 TRANSMITTER DISTRIBUTOR UNIT (HIGH-LEVEL).

a. <u>Clutch Mechanism Adjustments</u>. Perform clutch mechanism adjustments in accordance with the following paragraphs.

(1) <u>Clutch Shoe Lever Spring</u>. Adjust clutch shoe lever spring as follows:

NOTE

This adjustment is made at the factory. It should be disturbed only if the requirement is not met.

(a) Refer to figure 6-1.

(b) Engage clutch and hold cam disc to prevent turning.

(c) Attach spring scale hook as shown in figure 6-1.

(d) Force required to move shoe lever contact with stop lug should be between 15 and 20 ounces. If set is equipped with tape slack mechanism, force required to move shoe lever in contact with stop lug should be 9 to 11 ounces.

(e) If scale reading exceeds specified limits, install new spring.

(2) <u>Clutch Shoe Spring</u>. Adjust clutch shoe spring as follows:

NOTE

This adjustment is made at the factory. It should be disturbed only if the requirement is not met.

(a) Refer to figure 6-2.

(b) Remove clutch from main shaft.

(c) Remove clutch drum.

(d) Attach spring scale hook as shown in figure.

(e) Force required to start primary shoe moving away from secondary shoe at point of contact should be between 3 and 5 ounces.

(f) If scale reading exceeds specified limits, install new spring.

(g) Replace clutch drum.

(h) Install clutch on main shaft.

(3) <u>Clutch Shoe Lever</u>. Adjust clutch shoe lever as follows:

(a) Refer to figure 6-3.

(b) Trip transmitter distributor clutch.

(c) Pull shoe lever opposite stop-lug with force of 32 ounces.

(d) Release force slowly to engage clutch shoes.

(e) Measure and note clearance between clutch shoe lever and stop-lug.

(f) Disengage clutch.

(g) Pull shoe lever opposite stop-lug with force of 32 ounces.

(h) Release force slowly.

(i) Measure and note clearance between shoe lever and stop-lug.

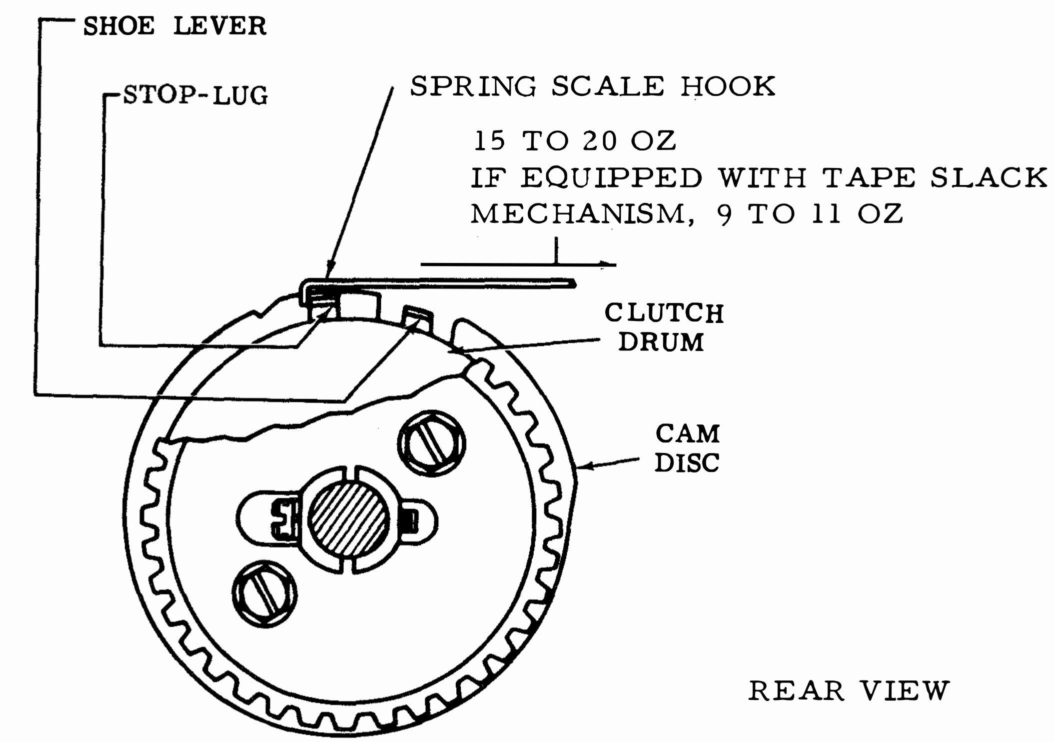


Figure 6-1. Clutch Shoe Lever Spring

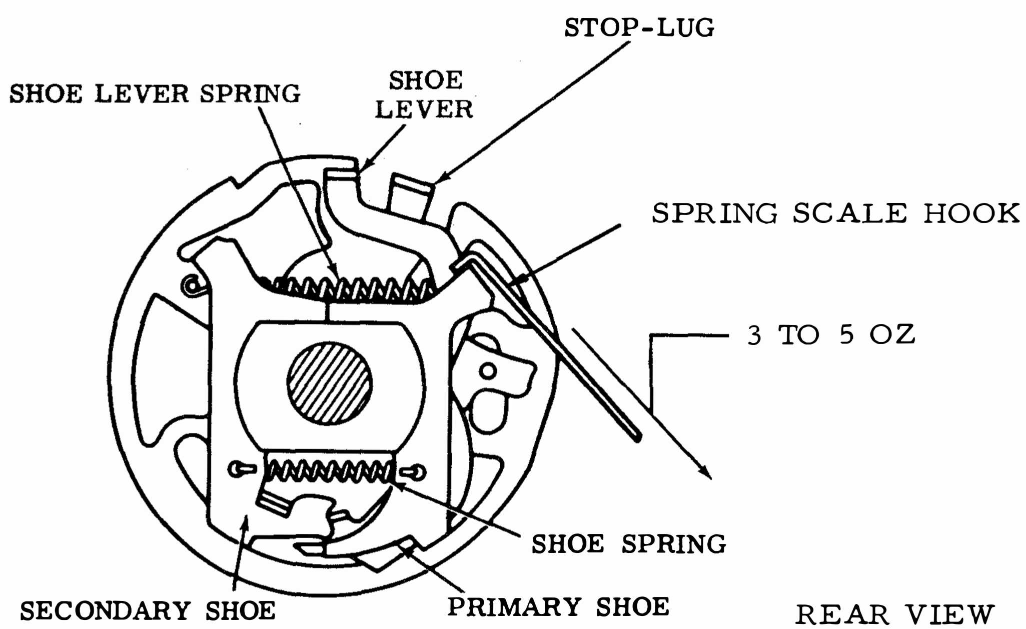


Figure 6-2. Clutch Shoe Spring

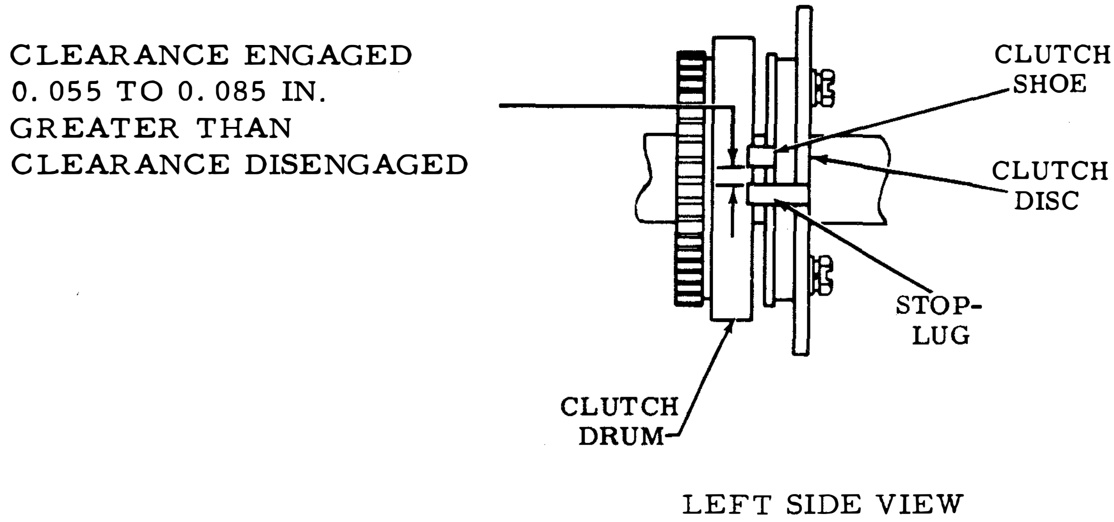


Figure 6-3. Clutch Shoe Lever

(j) Subtract clearance obtained in step (i) from clearance obtained in step (e).

(k) If difference exceeds specified limits, loosen clutch disc clamp screws.

(l) Place wrench over stop lug and move disc.

(m) Repeat steps (b) through (l) until difference is within specified limits.

(n) Tighten clutch disc clamp screws.

(4) Clutch Trip Lever. Adjust clutch trip lever as follows:

(a) Refer to figure 6-4.

(b) Trip transmitter distributor clutch.

(c) Place main bail in highest position and rotate clutch until stop-lug is opposite trip lever.

(d) Take up play in trip bail to maximize clearance between stop-lug and trip lever. Clearance should be between 0.012 and 0.025 inch.

(e) Take up play in trip bail to minimize clearance between stop lug and trip lever. There should be some clearance.

(f) If clearance in either step (d) or step (e) exceeds specified limits, loosen clamp nut to the point of friction tightness and rotate trip bail eccentric post.

(g) Repeat step (d).

(h) Tighten clamp nut.

(5) Clutch Trip Lever Spring. Adjust clutch trip lever spring as follows:

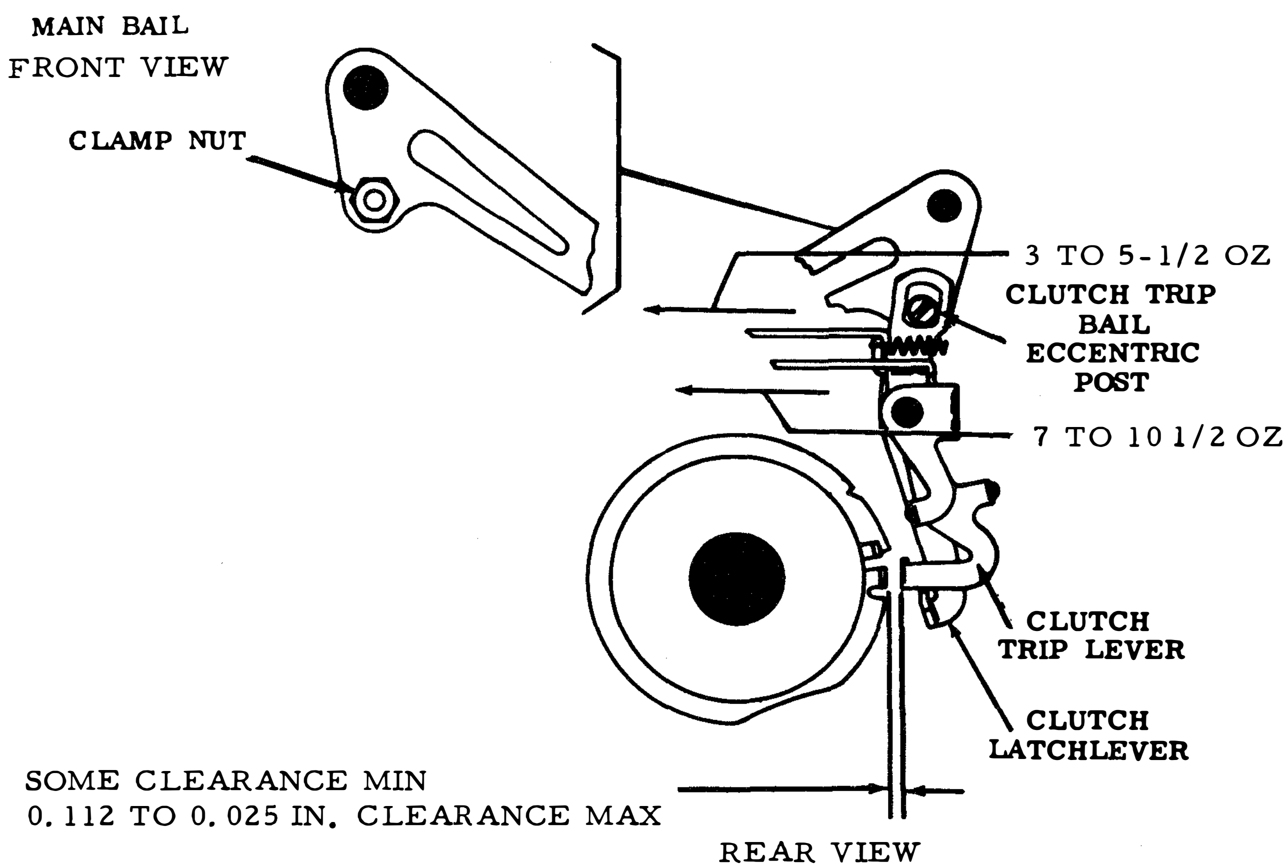


Figure 6-4. Clutch Trip Lever, Clutch Trip Lever Spring, and Clutch Latchlever Spring

(a) Refer to figure 6-4.

(b) Engage clutch.

(c) Attach spring scale hook to clutch trip lever.

(d) Force required to start clutch trip lever moving should be between 7 and 10-1/2 ounces.

(e) If scale reading exceeds specified limits, install new spring.

(6) <u>Clutch Latch-Lever Spring</u>.

(a) Refer to figure 6-4.

(b) Trip clutch and rotate shaft until latchlever is on low part of disc.

(c) Attach spring scale hook to clutch latchlever.

(d) Force required to start clutch latch-lever moving should be between 3 and 5-1/2 ounces.

(e) If scale reading exceeds specified limits, install new spring.

(7) Clutch Magnet Assembly (Preliminary). Adjust clutch magnet assembly (preliminary) as follows:

(a) Refer to figure 6-5.

(b) Hold armature in energized position.

(c) Take up play to maximize clearance. Armature should contact top core face and there should be some clearance not exceeding 0.004 inch between bottom core face and armature at point of least clearance. In sets with tape shoe and tape feed assurance mechanisms there should be between 0.004 and 0.007 inch clearance.

(d) If clearances exceed specified limits, remove magnet bracket mounting screws and magnet assembly from unit. Loosen two screws on bottom of magnet assembly and position mounting hinge to obtain clearances specified in step (c).

(e) Tighten screws.

(f) Refer to figure 6-6.

(g) Reinstall magnet assembly in unit and reinstall magnet bracket mounting screws.

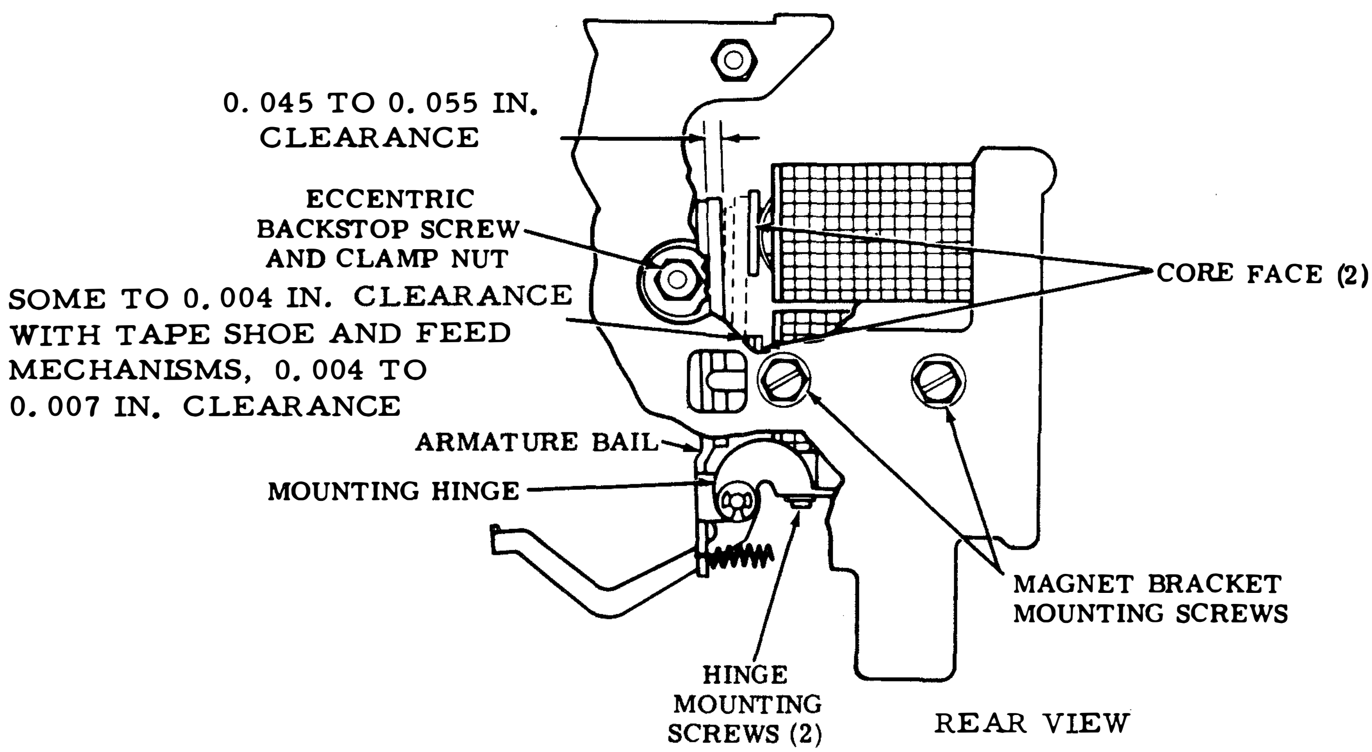


Figure 6-5. Clutch Magnet Assembly (Preliminary) (Core Clearance and Armature Bail Clearance)

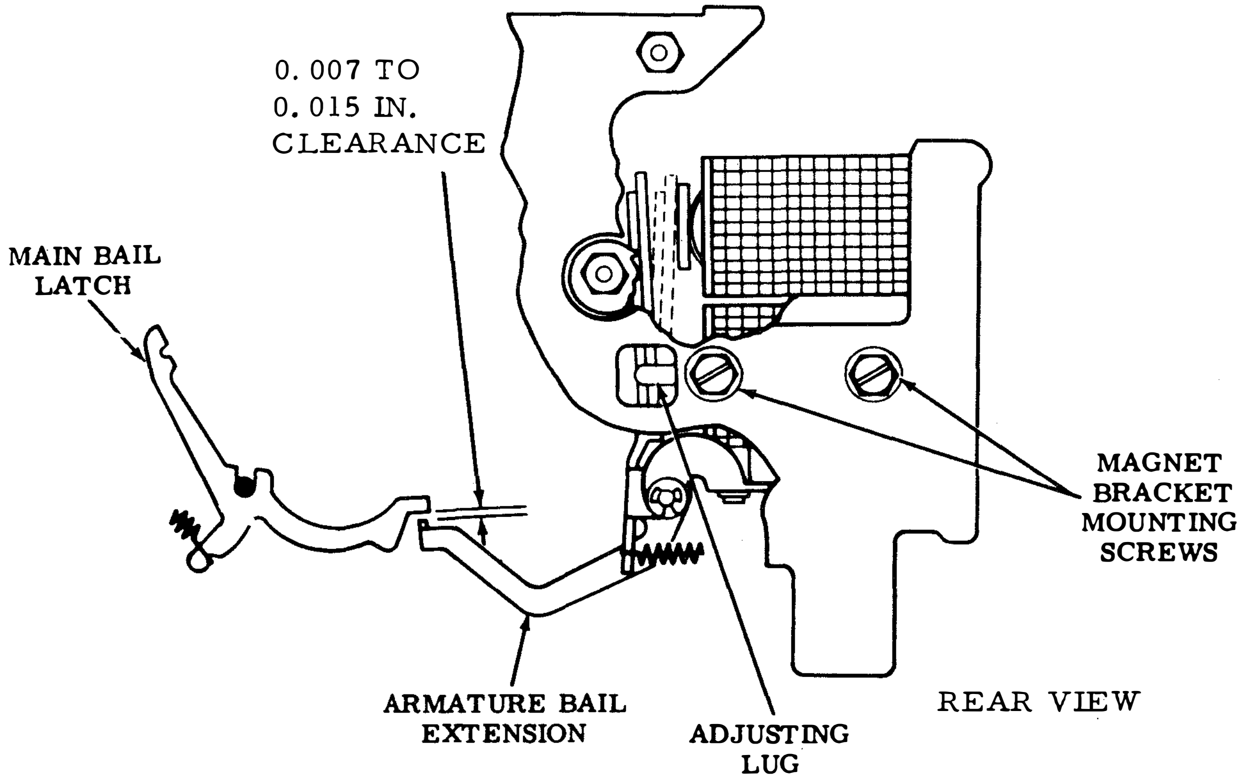


Figure 6-6. Clutch Magnet Assembly (Preliminary) (Main Bail Clearance)

(h) Disengage clutch.

(i) Measure clearance between end of armature bail extension and main bail latch. Clearance should be between 0.007 and 0.015 inch.

(j) If clearance exceeds specified limits, loosen magnet bracket mounting screws to the point of friction tightness.

(k) Move bracket to its lowermost position. Then position bracket by means of adjusting lug on bracket which is visible through hole in rear plate. When specified clearance is obtained, tighten mounting screws.

NOTE

The adjustment in step (b) through (o) may be considered final unless ac power is used. A check should be made to ensure chatter is minimized. If chatter is excessive, adjustments in steps (b) through (o) should be repeated.

(l) Energize clutch magnet.

(m) Ensure there is some clearance between vertical surfaces of main bail and its latchlever.

(n) If there is no clearance, loosen magnet bracket mounting screws to the point of friction tightness.

(o) Move bracket to its lowermost position. Then position bracket by means of adjusting lug on bracket which is visible through hole in rear plate.

(p) De-energize clutch magnet.

(q) Tighten magnet bracket mounting screws.

(8) Main Bail Latch Spring. Adjust main bail latch spring as follows:

(a) Refer to figure 6-7.

(b) Invert unit and release main bail latch.

(c) Apply spring scale push rod to main bail latch as shown in figure.

(d) Force required to start main bail latch moving should be between 3/4 ounce and 2 ounces.

(e) If scale reading exceeds specified limits, install new spring.

(9) Armature Bail Spring. Adjust armature bail spring as follows:

(a) Refer to figure 6-7.

(b) Place armature in de-energized position.

(c) Hold main bail latchlever away from armature bail extension.

(d) Apply spring scale hook to armature as shown in figure.

(e) Force required to start bail moving should be between 3-3/4 and 4-3/4 ounces. For sets with tape shoe and tape feed assurance mechanisms, force should be 1 to 2 ounces.

(f) If scale reading exceeds specified limits, install new spring.

b. Tape Lid Adjustments. Perform tape lid adjustments in accordance with the following paragraphs.

(1) Tape Lid. Adjust tape lid as follows:

(a) Refer to figure 6-8.

(b) Remove top plate and tape guideplate.

NOTE

Lubricate prior to adjustment. Refer to lubrication instructions in Chapter 4.

(c) Hold tape lid against notch in tape guideplate.

(d) Ensure feedwheel groove is aligned with slot in tape guideplate and tape-out pin holes.

(e) Measure clearance between tape lid and pivot shoulder. There should be some clearance not exceeding 0.010 inch.

(f) If clearance exceeds specified

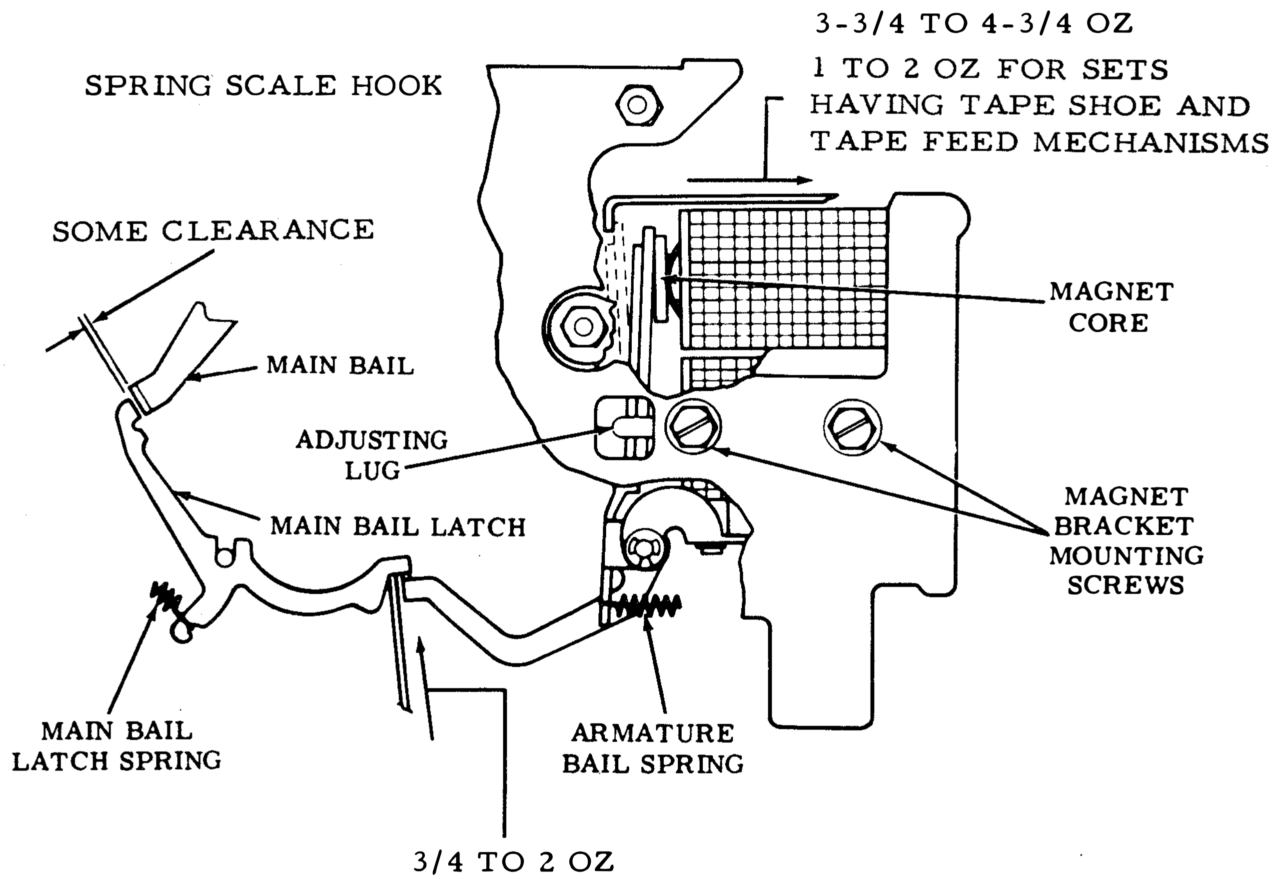


Figure 6-7. Clutch Magnet Assembly (Preliminary) (Latchlever Clearance)

limits, loosen bracket mounting nuts.

NOTE

Use one of the following three gauges in making the adjustment:

For 5-level tape, use TP156743

For 6-level tape, use TP170311 (In-line feed hole)

For 6-level tape, use TP173503 (Advance feed hole)

(g) Insert tip of appropriate gauge through slot in tape guideplate and into feedwheel groove.

(h) Position bracket to obtain specified clearance.

(i) Tighten bracket mounting nuts.

(j) Position tape lid so that its front bearing surface touches tape guideplate.

(k) Measure clearance between indicated fin and tape guideplate. Clearance

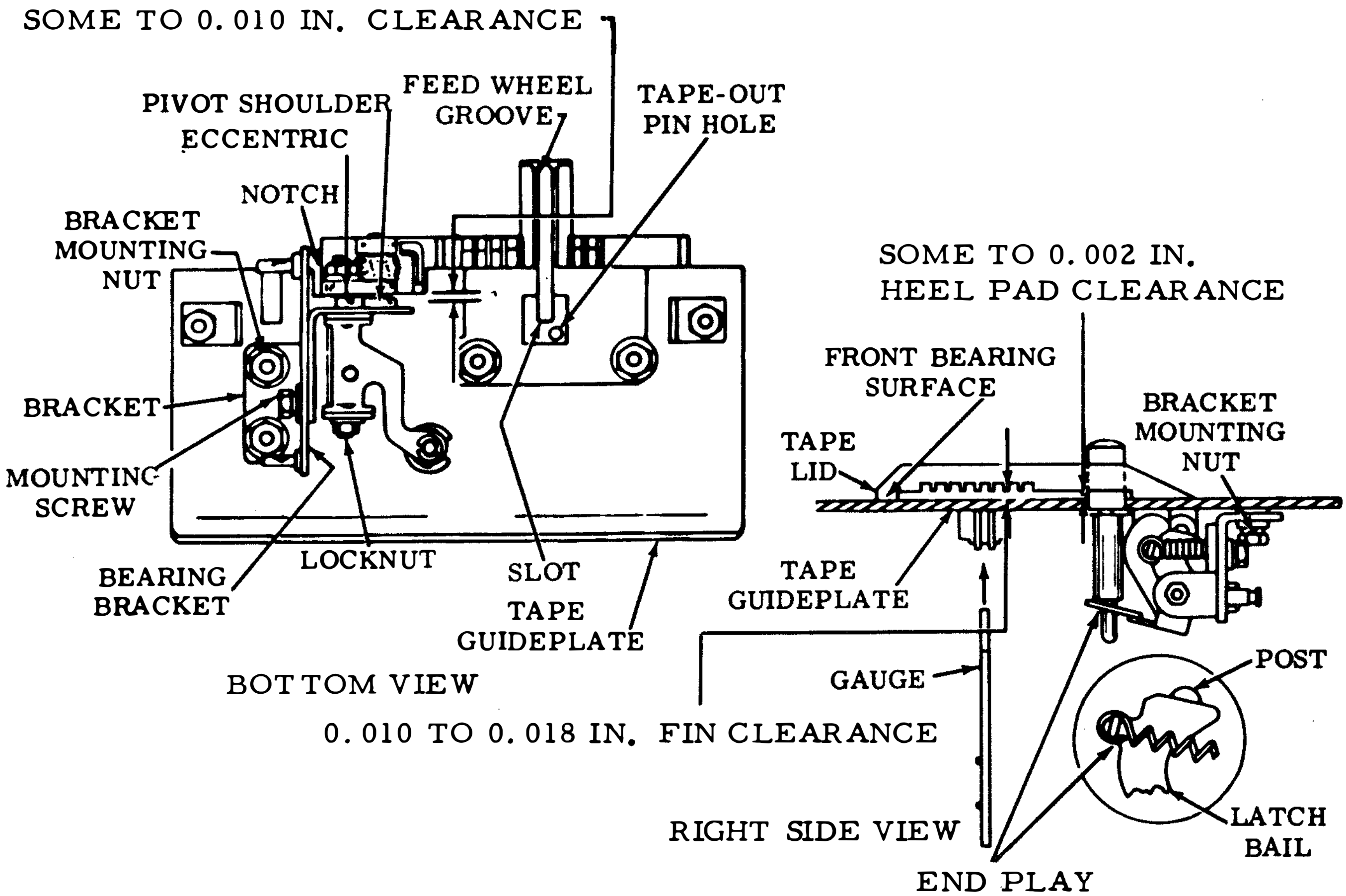


Figure 6-8. Tape Lid

should be between 0.010 and 0.018.

(l) If clearance exceeds specified limits, loosen bracket mounting screws. While pressing tape lid against tape guideplate, position bearing bracket to obtain clearance specified in step (k). Repeat step (c) through (e).

(m) If clearance between indicated fin and tape guideplate cannot be brought within limits specified in step (k), position bearing bracket so its mounting screws are located in centers of holes in bracket. Then repeat steps (c) through (l).

NOTF

When tape guideplate and top plate are assembled together with reader, tape lid may touch top plate and clearance different from that specified in step (k) can be expected. However, with tape lid closed, the minimum allowable clearance between tape guideplate and heel pad is 0.002 inch.

(n) Latch tape lid against tap guideplate.

(o) Ensure release plunger has some end play.

(p) If there is no end play, loosen locknut.

(q) Raise tape lid and rotate high part of eccentric toward bearing bracket.

(r) Close tape lid and continue rotating high part of eccentric toward bearing bracket until latch bail just falls under flat on post.

(s) Recheck operation of latch bail by depressing release plunger with tape lid held down.

(2) Tape Guide. Adjust tape guide as follows:

(a) Refer to figure 6-9.

(b) Unlatch tape lid and position gauge as illustrated in figure.

(c) There should be some clearance not exceeding 0.003 inch between gauge and each tape guide.

(d) Ensure edge of wear plate is flush with edge of tape guideplate.

(e) Ensure tape does not ride up sides of tape guides.

(f) If requirements of steps (c), (d), and (e) are not met, loosen mounting nuts.

(g) Position wear plate until it overhangs tape guideplate.

(h) Push gauge down until two studs on gauge butt against tape guideplate so as to position edge of wear plate flush with edge of tape guideplate.

(i) Hold gauge and wear plate and position each tape guide to obtain clearance specified in step (c).

(j) Tighten mounting nuts.

NOTE

Tape guides may touch gauge, but should not bind against gauge when it is removed.

(3) Start-Stop Detent Bail Spring. Adjust start-stop detent as follows:

(a) Refer to figure 6-10.

(b) Place control lever in run position.

(c) Apply spring scale push rod to detent bail as shown in figure.

(d) Force required to start detent bail moving away from control lever should be between 14 and 22 ounces.

(e) If scale reading exceeds specified limits, install new spring.

(4) Tape Lid Release Plunger Spring. Adjust tape lid release plunger spring as follows:

(a) Refer to figure 6-11.

(b) Unlatch tape lid.

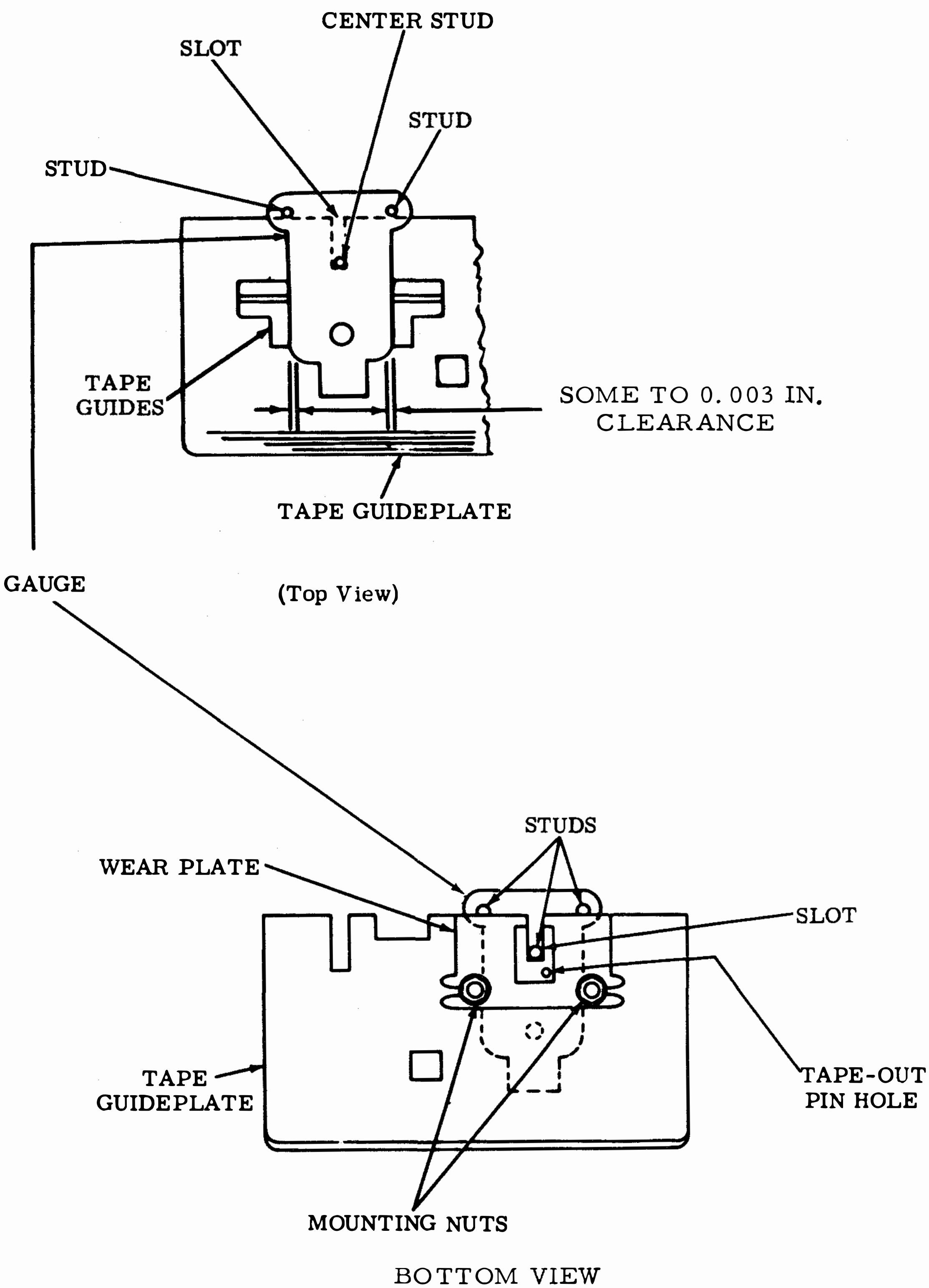


Figure 6-9. Tape Guide

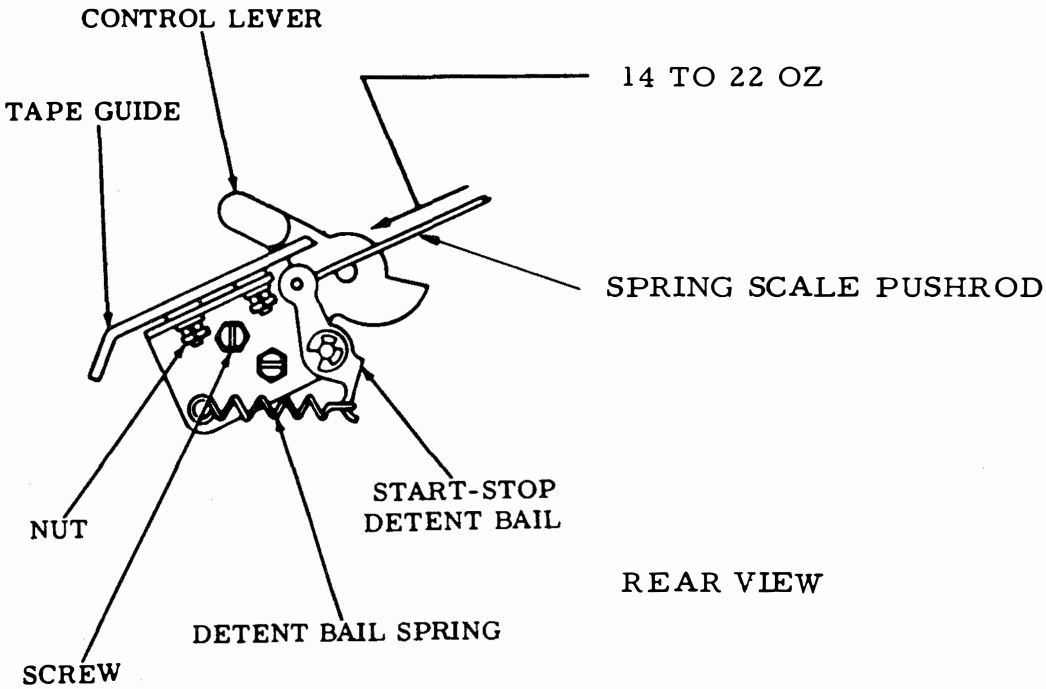


Figure 6-10. Start-Stop Detent Bail Spring

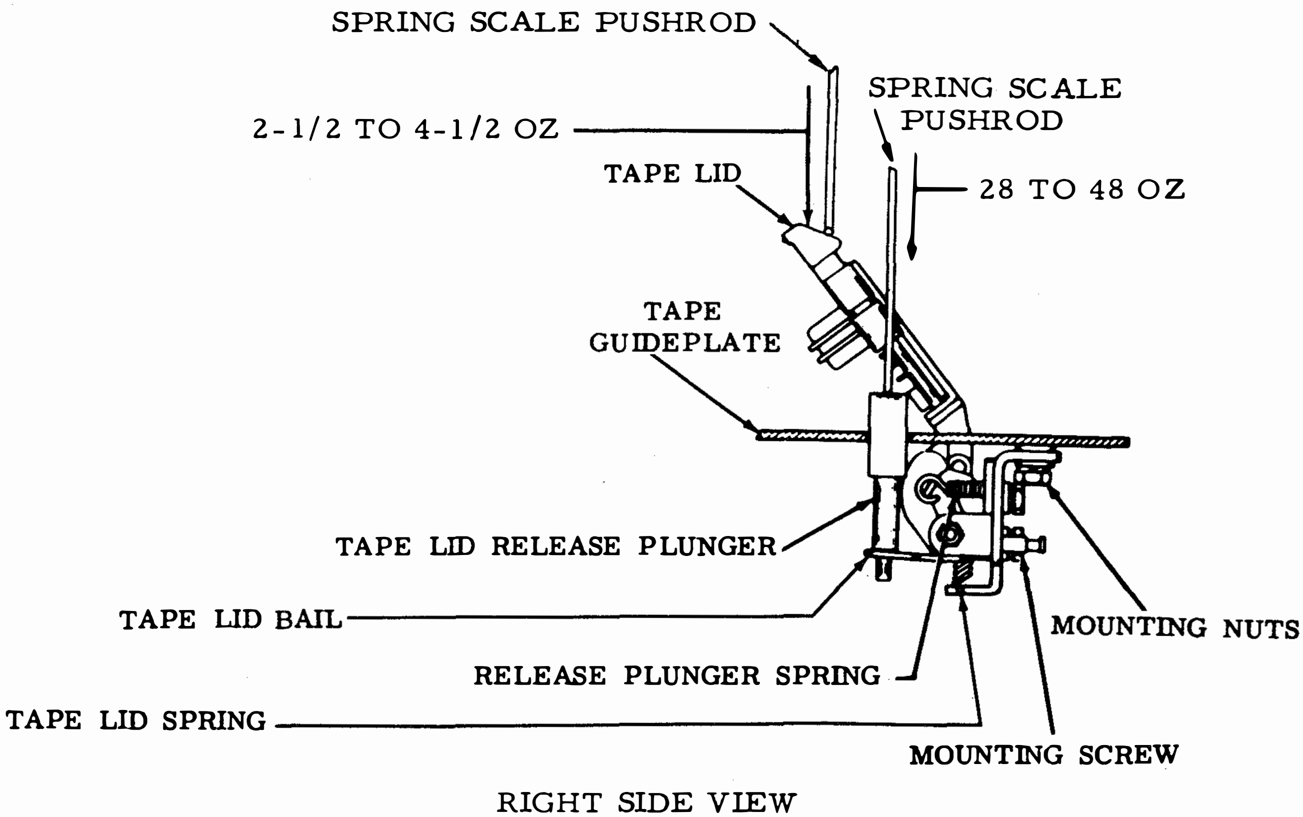


Figure 6-11. Tape Lid Release Plunger Spring and Tape Lid Spring

(c) Place tape guideplate in a horizontal position and hold it there.

(d) Apply spring scale pushrod to tape lid release plunger as shown in figure.

(e) Force required to start tape lid bail moving away from control lever should be between 48 and 28 ounces.

(f) If scale reading exceeds specified limits, install new spring.

(5) Tape Lid Spring. Adjust tape lid spring as follows:

(a) Refer to figure 6-11.

(b) Hold release plunger in fully depressed position.

(c) Hold tape guideplate in horizontal position.

(d) Apply spring scale pushrod to tape lid as shown in figure.

(e) Force required to move open end of tape lid against tape guideplate should be between 2-1/2 and 4-1/2 ounces.

(f) If scale reading exceeds specified limits, install new spring.

(6) Tape Guideplate. Adjust tape guideplate as follows:

(a) Refer to figure 6-12.

NOTE

To prevent damage to tape-out pin, place stop arm in its lowest position and hold control lever bail extension from feedwheel ratchet.

(b) Ensure feedwheel post does not interfer with mounting brackets of top plate and tape guideplate.

(c) If any interference is evident, loosen clamp nut.

(d) Rotate feed-wheel post to eliminate interference.

(e) Ensure tape guideplate rests firmly against a minimum of three of four projections on side plates.

(f) To adjust, rotate unit clutch to its stop position.

(g) Trip clutch to put sensing pins in their highest positions.

(h) Unlatch tape lid and place control lever to run postion.

(i) Loosen mounting screws and mounting nuts to point of friction tightness.

(j) Position tape guideplate on reader so guideplate rests firmly against a minimum of three of four projections on side plates.

(k) Place tape-out pin in hole in tape guideplate.

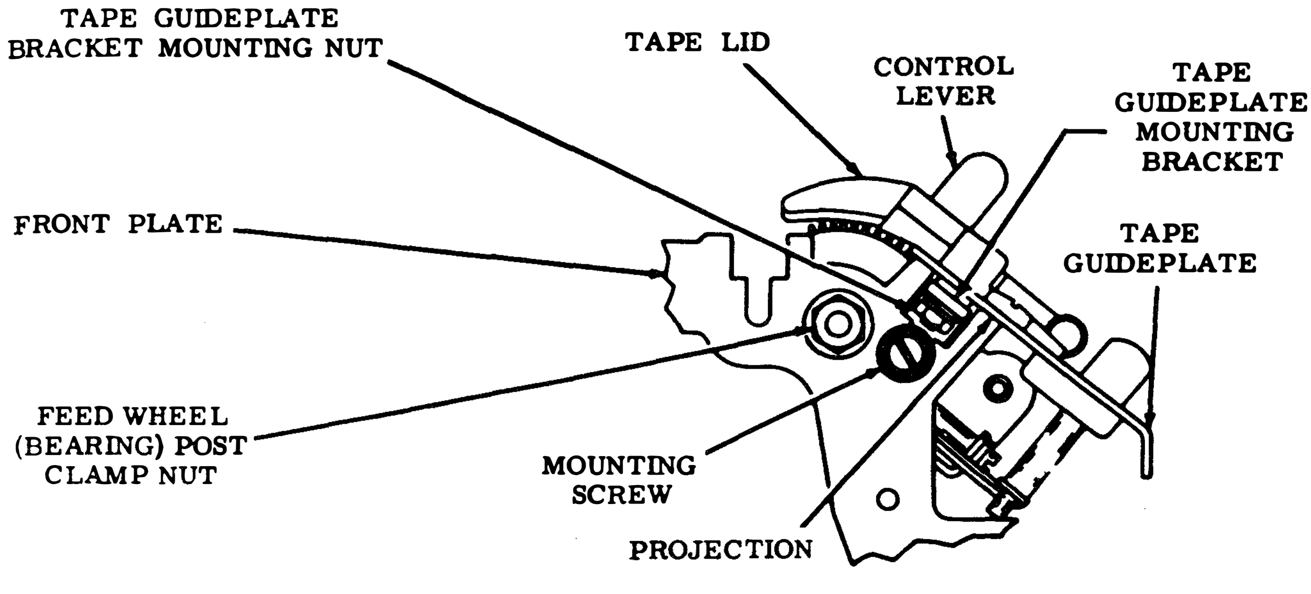


Figure 6-12. Tape Guideplate

(l) Tighten mounting screws. Do not tighten mounting nuts.

(m) Ensure edge of tape guideplate projects over side plates by equal amounts as gauged by eye.

(n) To adjust, position tape guideplate.

NOTE

Tight-tape bail extension must be under top plate.

(o) Do not tighten mounting nuts until after performing top plate adjustment of 6-3.1c(1).

c. Top and Cover Plates Adjustments. Perform top and cover plates adjustments in accordance with the following paragraphs.

(1) Top Plate. Adjust top plate as follows:

(a) Refer to figure 6-13.

(b) Remove cover plate and unlatch tape lid.

(c) Ensure cover plate top surface is flush with or 0.003 inch maximum below tape guideplate top surface along width of tape lid when top plate is resting on a minimum of five of six projections on side plates.

(d) If adjustment is necessary, loosen mounting screws and mountings nuts to point of friction tightness.

(e) Position top plate to meet specified limits in step (c).

(f) Tighten mounting screws.

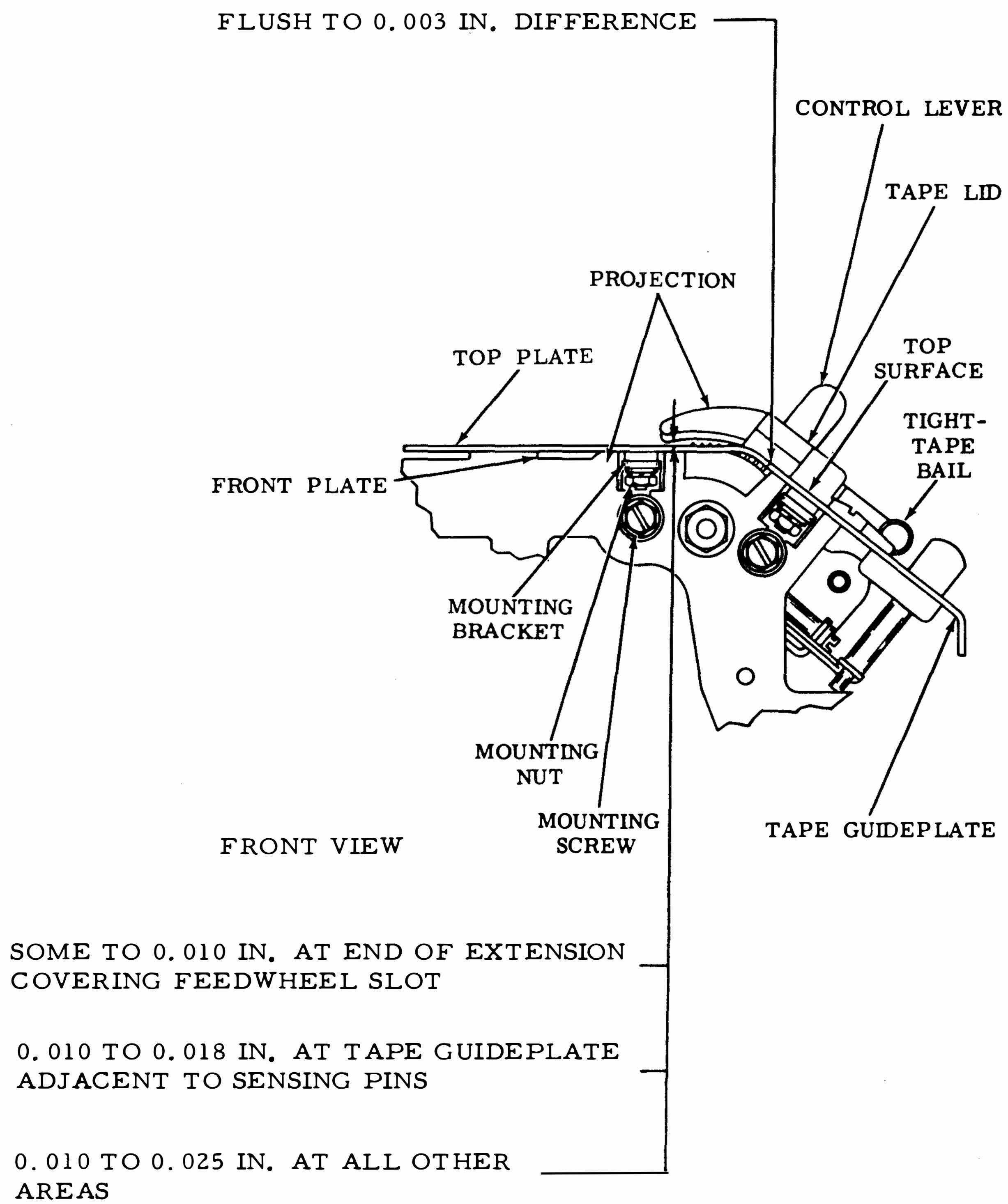


Figure 6-13. Top Plate

NOTE

Mounting nuts loosened in step (d) will be tightened after step (j) below.

(g) Tighten tape guideplate mounting nuts left friction tight during tape guideplate adjustment of 6-3.1b(6)(1).

(h) Ensure feed-wheel slot is aligned with tape guideplate slot so feed wheel rotates freely when control lever is in free position.

(i) If adjustment is necessary, move top plate toward either side plate.

(j) Tighten mounting nuts left friction tight as noted after step (f).

(k) Latch tape lid.

(l) Take up play toward tape guideplate.

(m) Measure clearance between tape lid projection and top plate at the following points.

1. At end of extension covering feedwheel slot, 0.010 inch minimum.

2. At tape guideplate adjacent to sensing pins, between 0.010 and 0.018 inch.

3. At all other areas, between 0.010 and 0.025 inch.

(n) If clearance in step (m) exceeds specified limits, loosen tape lid bearing bracket mounting screws and position tape lid.

(o) Repeat tape lid adjustment steps (a) through (k) in paragraph 6-3.1b(1).

(2) Cover Plate. Adjust cover plate as follows:

(a) Refer to figure 6-14.

(b) Ensure the following conditions:

1. Right edge of cover plate holds flush against left edge of top plate by the cover plate detents.

2. Cover plate rests against at least three of the four projections (front and rear plate).

3. Front edge of cover plate aligns with top plate.

(c) If all conditions specified in step (b) are not met, loosen detenting nut clamp screw to point of friction tightness (front end and rear plate).

(d) Move clamp screws to their extreme lower right position, then tighten clampscrews.

(e) Loosen detent bracket and spring plate mounting nuts.

(f) Place cover on unit and position horizontally to meet conditions specified in step (b).

(g) Retighten mounting nuts.

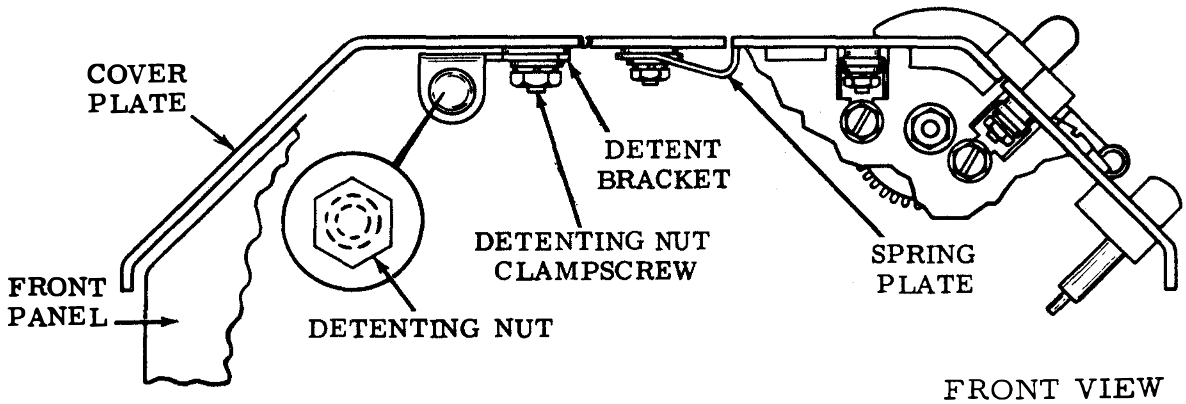


Figure 6-14. Cover Plate

(3) Cover Plate Detent Spring. Adjust cover plate detent spring as follows:

(a) Refer to figure 6-15.

(b) Apply spring scale pushrod to center of one detent.

(c) Force required to start plunger moving should be between 28 and 48 ounces.

(d) If scale reading exceeds specified limits, install new spring.

d. Tape-Out Switch Assembly Adjustments. Perform tape-out switch assembly adjustments in accordance with the following paragraphs.

(1) Tape Out Contact Assembly. Adjust tape-out contact assembly as follows:

(a) Refer to figure 6-16.

(b) Loosen spring bracket and move it downward until tape-out pin extension no longer touches insulation on contact swinger.

(c) Measure gap between normally-open contacts. Gap should be between 0.008 and 0.015 inch.

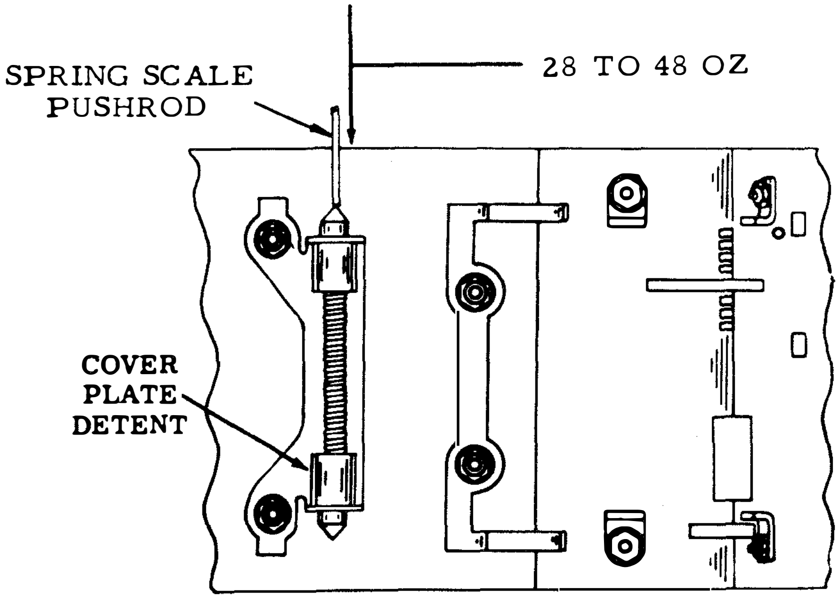
(d) Apply gram scale to insulation on contact swinger.

(e) Force required to separate normally-closed contacts should be between 8 and 15 grams.

(f) If contact gap or contact swinger tension exceeds limits specified in step (e) or step (e), unhook tape-out pin spring, remove bracket screws and remove contact assembly from unit. Form contact swinger using TP110445 spring bender.

(g) Replace contact assembly with swinger over tape-out pin extension.

(h) Place spring bracket shoulder bushing



BOTTOM VIEW

Figure 6-15. Cover Plate Detent Spring

on upper hole and washer on lower mounting hole.

(i) Install tape-out pin spring.

(2) Tape-Out Sensing Pin Spring. Ajdust tape-out sensing pin sring as follows:

(a) Refer to figure 6-16.

(b) Place control lever in run position.

(c) Apply gram scale to tape-out pin.

(d) Force required to move tape-out pin to a position flush with tape guideplate should be between 38 and 45 grams.

(e) If scale reading exceeds specified limits, loosen lower bracket mounting screw and position spring bracket to obtain specified reading.

(f) Tighten bracket mounting screw.

(3) Tape-Out Contact Bracket. Adjust tape-out contact bracket as follows:

(a) Refer to figure 6-16.

(b) Insert tape under lid to hold tape-out pin down.

(c) Measure clearance between tape-out pin upper extension and underside of insulation on swinger contact. Clearance should be between 0.006 and 0.020 inch.

(d) If clearance exceeds specified limits, loosen bracket mounting screws and adjust bracket to obtain specified clearance.

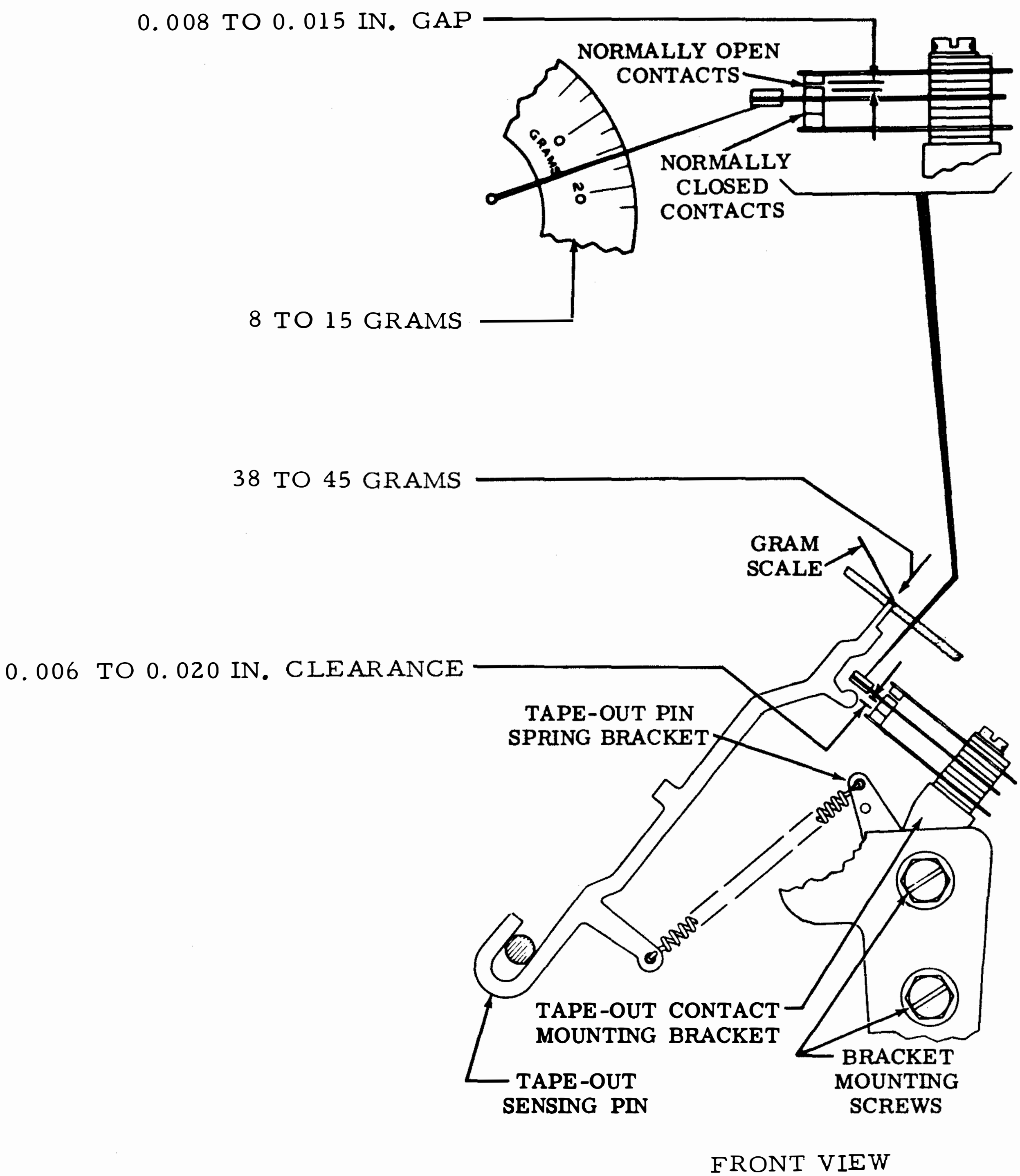


Figure 6-16. Tape-Out Contact Assembly, Tape-Out Sensing Pin Spring, and Tape-Out Contact Bracket

(e) Tighten bracket mounting screws.

(4) Tape-Out Sensing Pin. Adjust tape-out sensing pin as follows:

(a) Refer to figure 6-17.

(b) Place control lever in stop position.

(c) Top of pin should be flush to 0.010 inch maximum below top surface of tape guideplate.

(d) If adjustment is required, loosen stop arm clamp screw to point of friction tightness.

(e) Position stop arm to meet requirement of step (c).

(f) Tighten stop arm clamp screw.

(g) Place control lever in run position.

(h) Clearance between tape-out pin depressor bail and tape-out sensing pin extension should be 0.055 inch minimum.

(i) If clearance exceeds specified limit, loosen tape-out bail clamp screw and position extension arm to obtain specified clearance between tape-out pin depressor bail and tape-out sensing pin extension.

(j) Tighten clamp screw.

(k) Repeat step (b) and step (c).

(5) Depressor Bail Torsion Spring. Adjust depressor bail torsion spring as follows:

(a) Refer to figure 6-17.

(b) Place control lever in stop position.

(c) Unhook one end of intermediate tape-out bail spring.

(d) Apply spring scale pushrod to intermediate tape-out bail as shown in figure.

(e) Force required to start tape-out bail moving away from tape-out pin depressor bail should be between 2-3/4 and 5-1/2 ounces.

(f) If scale reading exceeds specified limits, install new spring.

(6) Intermediate Tape-Out Bail Spring. Adjust intermediate tape-out bail spring as follows:

(a) Refer to figure 6-17.

(b) Place control lever in run position.

(c) Unhook intermediate tape-out bail spring at post end.

(d) Attach spring scale hook to free end of spring.

(e) Force required to extend spring to its installed length should be between 3 and 5 ounces.

(f) If scale reading exceeds specified limits, install new spring.

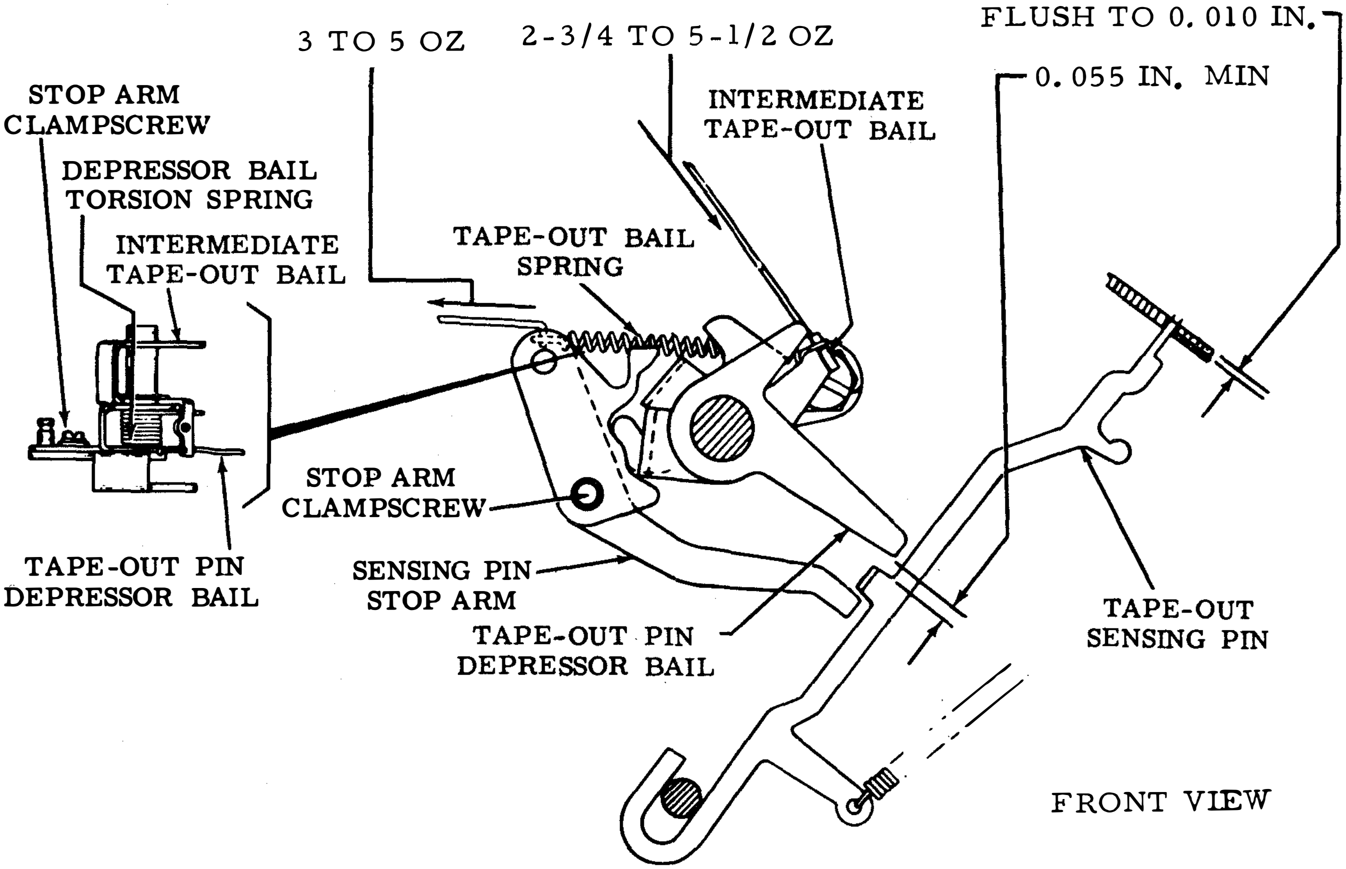


Figure 6-17. Tape-Out Sensing Pin, Depressor Bail Torsion Spring, and Intermediate Tape-Out Bail Spring

(7) Tape-Out Sensing Pin (For Units Equipped with Tape Lid Sensing Lever). Adjust tape-out sensing pin as follows:

(a) Refer to figure 6-18.

(b) Manually hold tape-out pin against stop arm.

(c) Top of pin should be flush to 0.010 inch maximum below top surface of guideplate.

(d) If adjustment is required, loosen adjusting screw.

(e) Position stop arm to meet requirement of step (c).

(f) Tighten adjusting screw.

e. Start-Stop Switch Assembly and Tight-Tape Mechanism Adjustments. Perform start-stop switch assembly and tight tape mechanism adjustments in accordance with the following paragraphs.

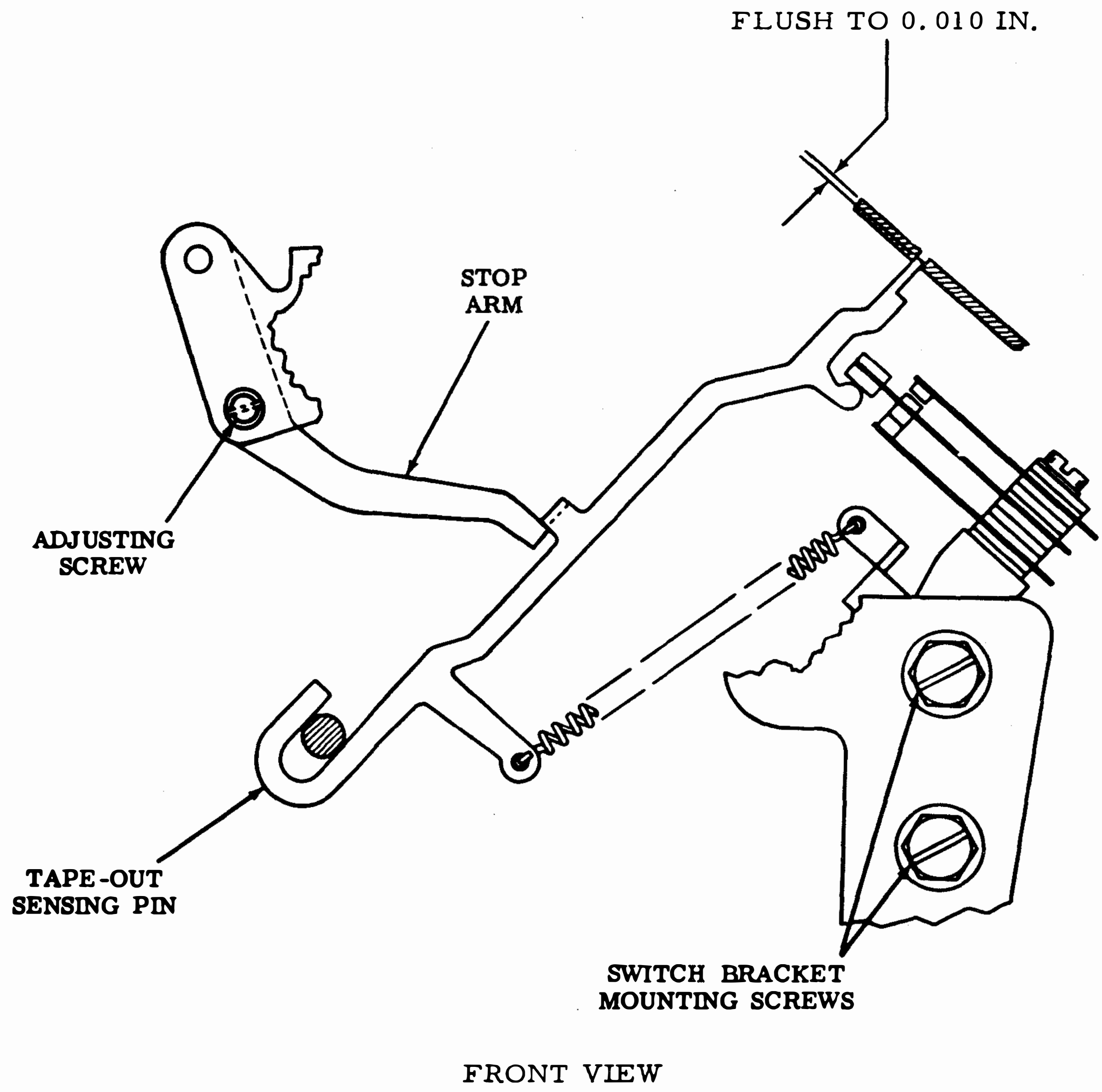


Figure 6-18. Tape-Out Sensing Pin (For Units Equipped With Tape Lid Sensing Lever)

(1) Start-Stop Switch Bracket. Adjust start-stop switch bracket as follows:

(a) Refer to figure 6-19.

(b) Place control lever in run position.

(c) Disengage clutch.

(d) Measure clearance between start-stop bail extension and insulator on start-stop switch swinger. Clearance should be between 0.006 and 0.015 inch.

(e) If clearance exceeds specified limits, loosen switch bracket mounting screws.

(f) Position switch bracket to meet requirements.

(g) Tighten bracket mounting screws.

(h) Ensure start-stop bail extension and contact arm fully engage insulated portion of start-stop switch swinger.

(i) If necessary, loosen mounting screws and position start-stop switch swinger to obtain engagement.

(j) Tighten mounting screws.

(2) Tight-Tape Start-Stop Contact Spring. Adjust tight-tape start-stop contact spring as follows:

(a) Refer to figure 6-19.

(b) Place control lever in run position.

(c) Attach spring scale hook to contact spring as shown in figure.

(d) Force required to separate contacts should be between 3 and 4 ounces.

(e) If scale reading exceeds specified limits, use TP110445 bending tool to bend contact spring to obtain specified contact spring tension. Repeat paragraph 6-3.1e(1) steps (e), (f), and (g).

(3) Start-Stop Switch Bracket (For Units Equipped with Tape Lid Sensing Lever). Adjust start-stop switch bracket as follows:

(a) Refer to figure 6-20.

(b) Position intermediate tight-tape arm to center of its adjusting range with contact arm.

(c) Ensure that tight-tape start-stop contacts remain closed when tight-tape bail is raised 0.045 inch and open as bail is raised to 0.075 inch.

(d) To adjust, loosen tight-tape intermediate arm clamp screw.

(e) Position pry point midway in contact operating arm adjusting slot.

(f) Tighten clamp screw.

(g) Loosen switch bracket screws to point of friction tightness.

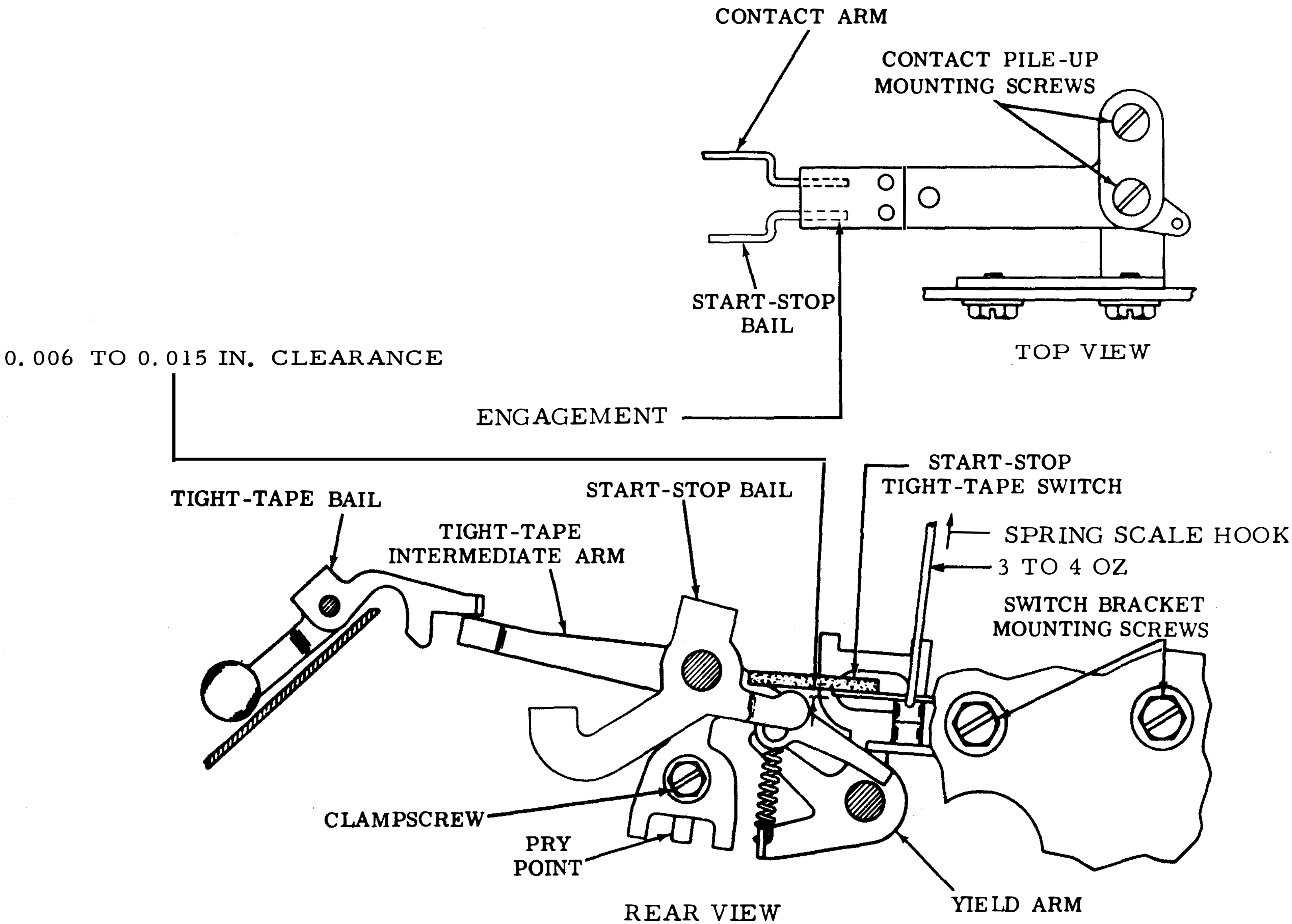
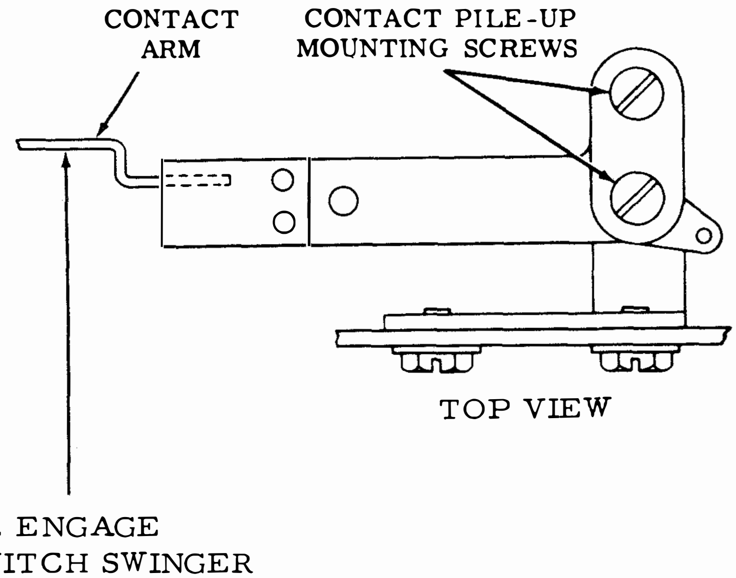


Figure 6-19. Start-Stop Switch Bracket and Tight-Tape Start-Stop Contact Sensing



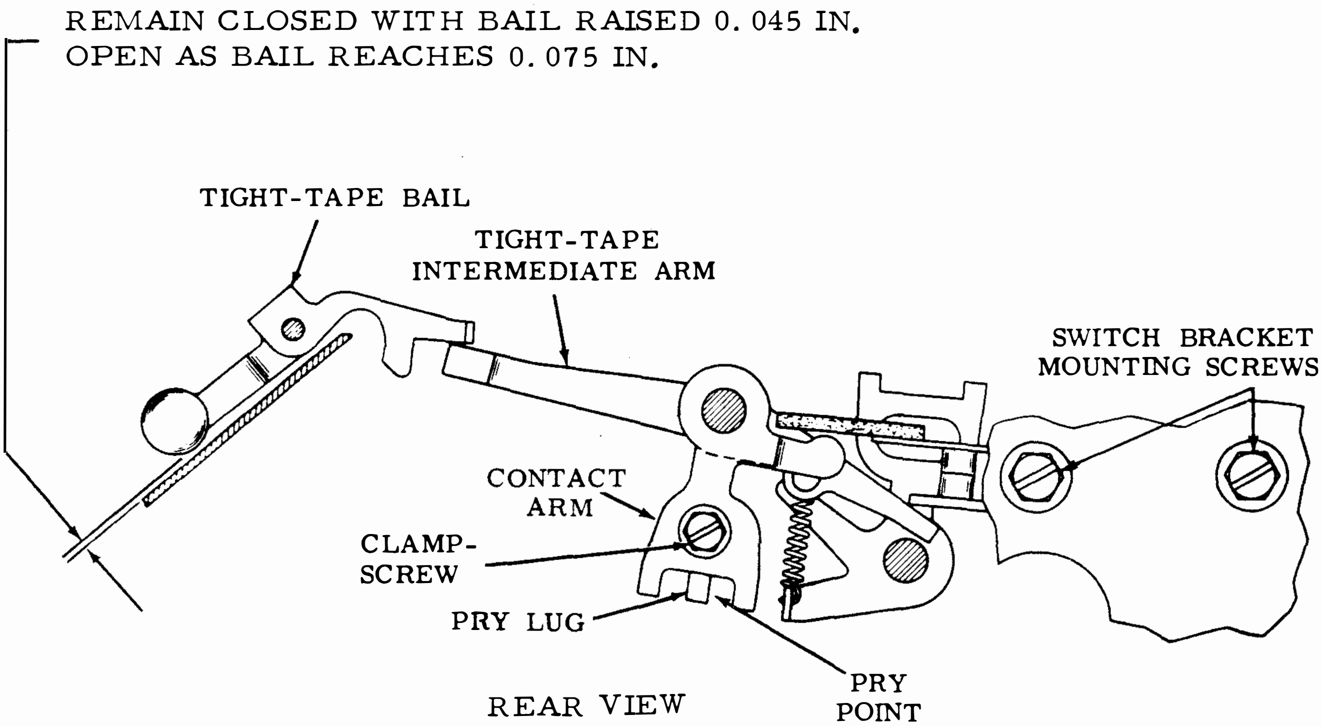


Figure 6-20. Start-Stop Switch Bracket (for Units Equipped with Tape Lid Sensing Lever)

(h) Position contact pileup to obtain condition specified in step (c).

(i) Tighten switch bracket screws.

(j) Ensure contact arm fully engages insulated part of switch swinger.

(k) If necessary, loosen contact pileup mounting screws and position contact pileup mounting bracket.

(l) Tighten mounting screws.

(4) Tight-Tape Intermediate Arm. Adjust tight-tape intermediate arm as follows:

(a) Refer to figure 6-21.

(b) Place control lever in run position.

(c) Ensure that tight-tape start-stop contacts remain closed when tight-tape bail is raised 0.045 inch from tape guideplate and open as bail is raised to 0.075 inch.

(d) To adjust, loosen clamp screw and position tight-tape intermediate arm using pry points.

(e) Tighten clamp screw.

(5) Tight-Tape Intermediate Arm Spring. Adjust tight-tape intermediate arm spring as follows:

(a) Refer to figure 6-21.

(b) Place control lever in run position.

(c) Attach gram scale to yield arm as shown in figure.

(d) Force required to start yield arm moving should be between 20 and 40 grams.

(e) If scale reading exceeds specified limits, install new spring.

f. Feedwheel Mechanism Adjustments. Perform feedwheel mechanism adjustments in accordance with the following paragraphs.

(1) Main Bail Spring. Adjust main bail spring as follows:

(a) Refer to figure 6-22.

(b) Remove top plate.

(c) Disengage clutch.

(d) Place unit upside down on bench.

(e) Unhook main bail spring from main bail.

(f) Attach spring scale hook to main bail as shown in figure.

(g) Force required to extend spring to its installed length should be between 6 and 10 ounces.

(h) If spring scale reading exceeds specified limits, install new spring.

(2) Feed Ratchet Detent Spring. Adjust feed ratchet detent spring as follows:

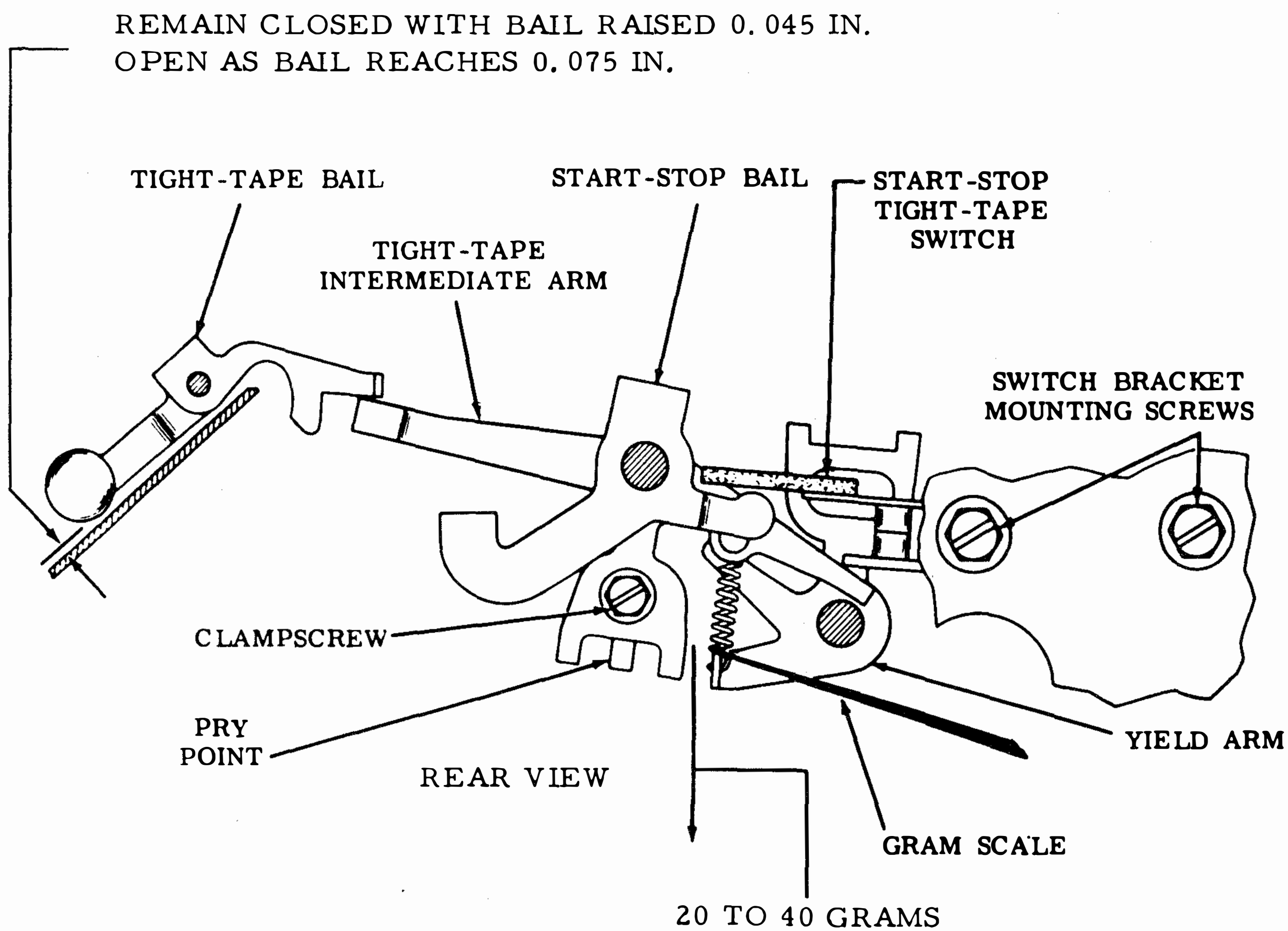


Figure 6-21. Tight-Tape Intermediate Arm and Tight-Tape Arm Spring

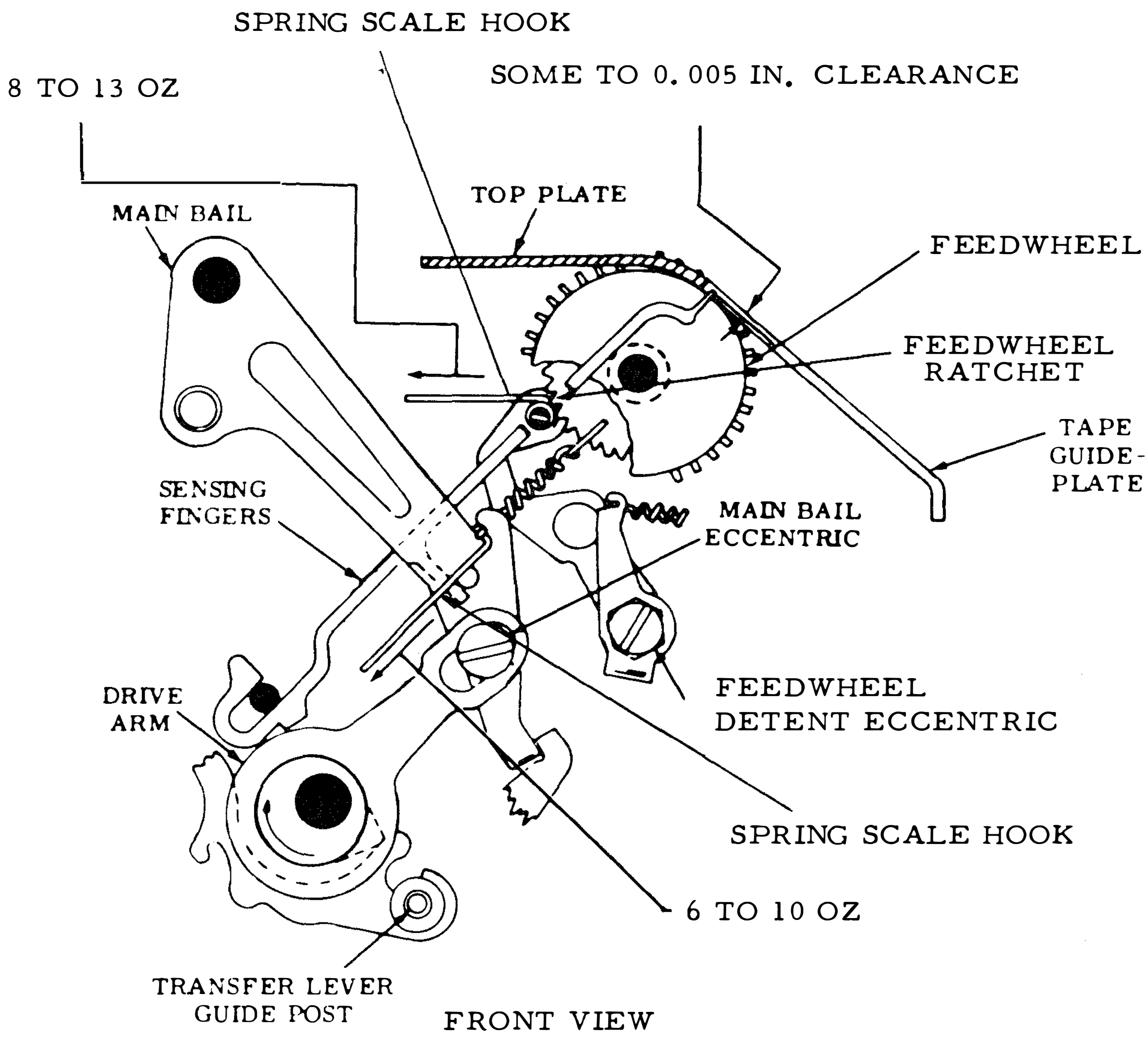


Figure 6-22. Main Bail Spring, Feed Ratchet Detent Spring and Main Bail Trip Lever

(a) Refer to figure 6-22.

(b) Rotate main shaft to stop position.

(c) Hold feed pawl away from its ratchet.

(d) Attach spring scale hook as shown in figure.

(e) Force required to start roller spring away from ratchet should be between 8 and 13 ounces.

(f) If scale reading exceeds specified limits, install new spring.

(3) Main Bail Trip Lever. Adjust main bail trip lever as follows:

(a) Refer to figure 6-22.

(b) Install top plate on unit.

(c) Place unit in stop position.

(d) Measure clearance between tip of highest sensing pin and top surface of tape guideplate. Clearance should be between 0.000 and 0.005 inch.

(e) If clearance exceeds specified limits, disengage clutch and loosen front and rear transfer lever guide eccentric post locknuts.

(f) Position highest point of eccentric post (indicated by dot on end of post) to left and rotate post so its eccentric positions trip lever.

(g) Tighten locknuts.

(4) Main Bail. Adjust main bail as follows:

(a) Refer to figure 6-23.

(b) Place main bail in lowest position.

(c) Measure horizontal clearance between main bail arm and main bail latchlever. There should be some clearance not exceeding 0.015 inch.

(d) If clearance exceeds specified limits, loosen nut on eccentric screw.

(e) Turn main bail eccentric screw so high part is to right.

(f) Position main bail eccentric screw to obtain specified clearance.

(g) Repeat check of main bail trip lever, paragraph 6-3.1f(3) and readjust, if necessary.

(5) Sensing Pin Spring. Adjust sensing pin spring as follows:

(a) Refer to figure 6-24.

(b) Open tape lid and disengage unit clutch.

(c) Hold armature in energized positions.

(d) Hold rubout deleter bail (if present) away from sensing pins.

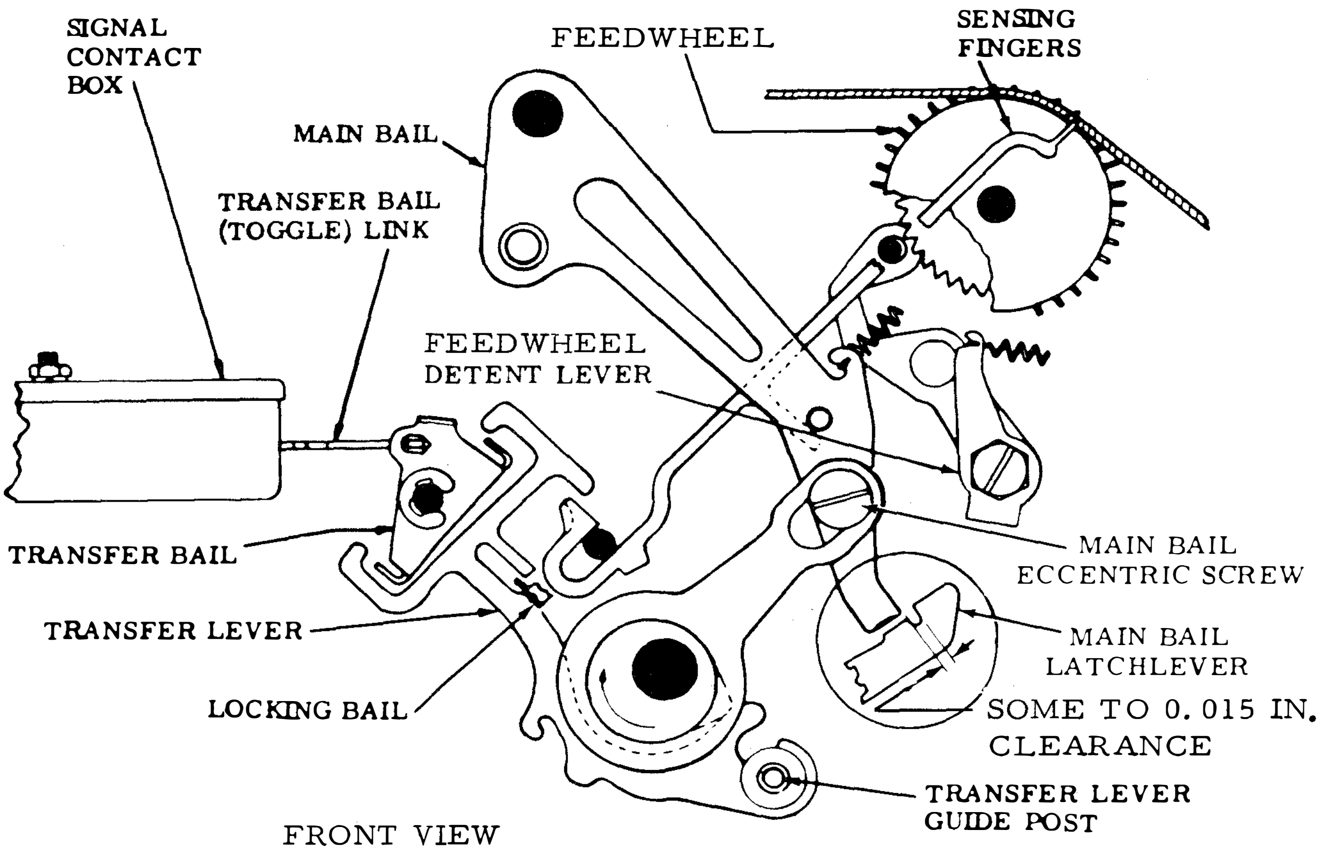


Figure 6-23. Main Bail

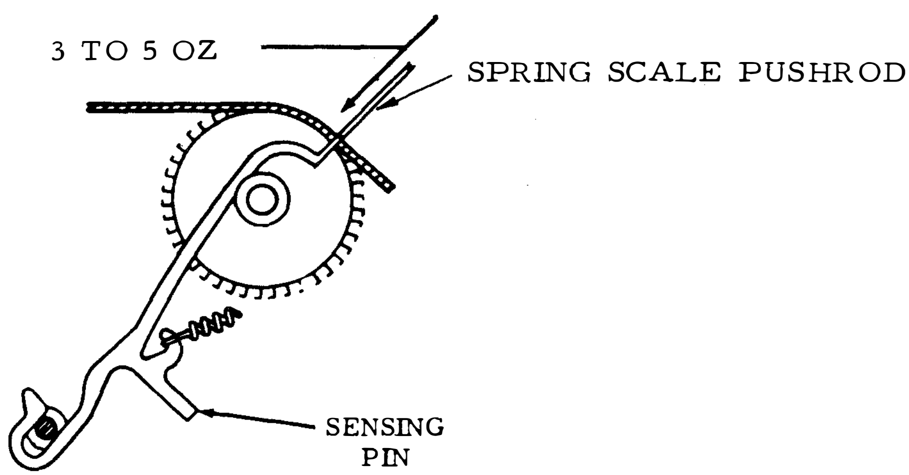


Figure 6-24. Sensing Pin Spring

(e) Apply spring scale pushrod to each sensing pin in turn.

(f) Force required to move each sensing pin flush with surface of tape guideplate should be between 3 and 5 ounces.

(g) If scale reading for any pin exceeds specified limits, install new spring.

(6) Feedwheel Detent. Adjust feedwheel detent as follows:

(a) Refer to figure 6-25.

(b) Open tape lid.

(c) Disengage unit clutch to place sensing pins in their lowest positions.

(d) Move high part of feedwheel ratchet detent eccentric toward right.

(e) Punch an all marking code combination on a new piece of tape. Place tape on feedwheel and over sensing pins.

(f) Lightly take up play in tape toward right.

(g) Ensure tip of each pin in centrally located in its code hole.

(h) To adjust, loosen feedwheel ratchet detent eccentric to point of friction tightness and hold feed pawl away from feed wheel ratchet.

(i) Rotate feedwheel detent ratchet eccentric, keeping high part of eccentric toward right.

NOTE

When unit is used to read chadless tape, sensing pins should be made to favor trailing edge of code holes.

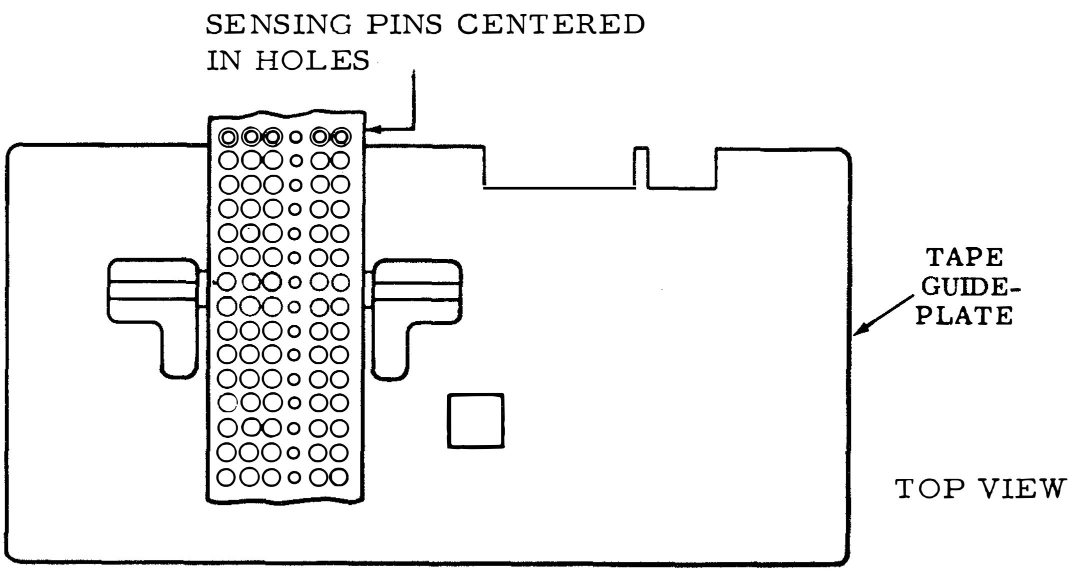


Figure 6-25. Feedwheel Detent

(7) Feed Pawl. Adjust feed pawl as follows:

(a) Refer to figure 6-26.

(b) Remove top plate.

(c) With high part of feed pawl eccentric toward right (left for units equipped with tape withhold mechanism) as viewed from rear plate, disengage clutch to place sensing pins in their lowest positions.

(d) Measure clearance between feed pawl and ratchet tooth just engaged. There should be some clearance not exceeding 0.003 inch.

(e) If clearance exceeds specified limits, loosen feed pawl eccentric locknut and position feed pawl eccentric. Repeat steps (c) and (d) at four positions on feedwheel ratchet spaced approximately 90 degrees apart.

(f) Tighten locknut.

(8) Feed Pawl Spring. Adjust feed pawl spring as follows:

(a) Refer to figure 6-26.

(b) Rotate unit clutch to stop position.

(c) Attach spring scale hook as shown in figure.

(d) Force required to start pawl moving should be between 2 and 3-1/2 ounces.

(e) If scale reading exceeds specified limits, install new spring.

g. Transfer Mechanism Adjustments. Perform transfer mechanism adjustments in accordance with the following paragraphs.

(1) Transfer Lever Spring. Adjust transfer lever spring as follows:

(a) Refer to figure 6-27.

(b) Disengage unit clutch.

(c) Apply spring scale pushrod to each transfer lever in turn as shown in figure.

(d) Force required to start each transfer lever spring moving should be between 1/2 and 1-1/2 ounces.

(e) If scale reading for any spring exceeds specified limits, install new spring.

(2) Locking Bail Spring. Adjust locking bail spring as follows:

(a) Refer to figure 6-28.

(b) Attach spring scale hook to locking bail as shown in figure.

(c) Force required to extend locking bail spring to its installed length should be between 10 and 14 ounces.

(d) If scale reading exceeds specified limits, install new spring.

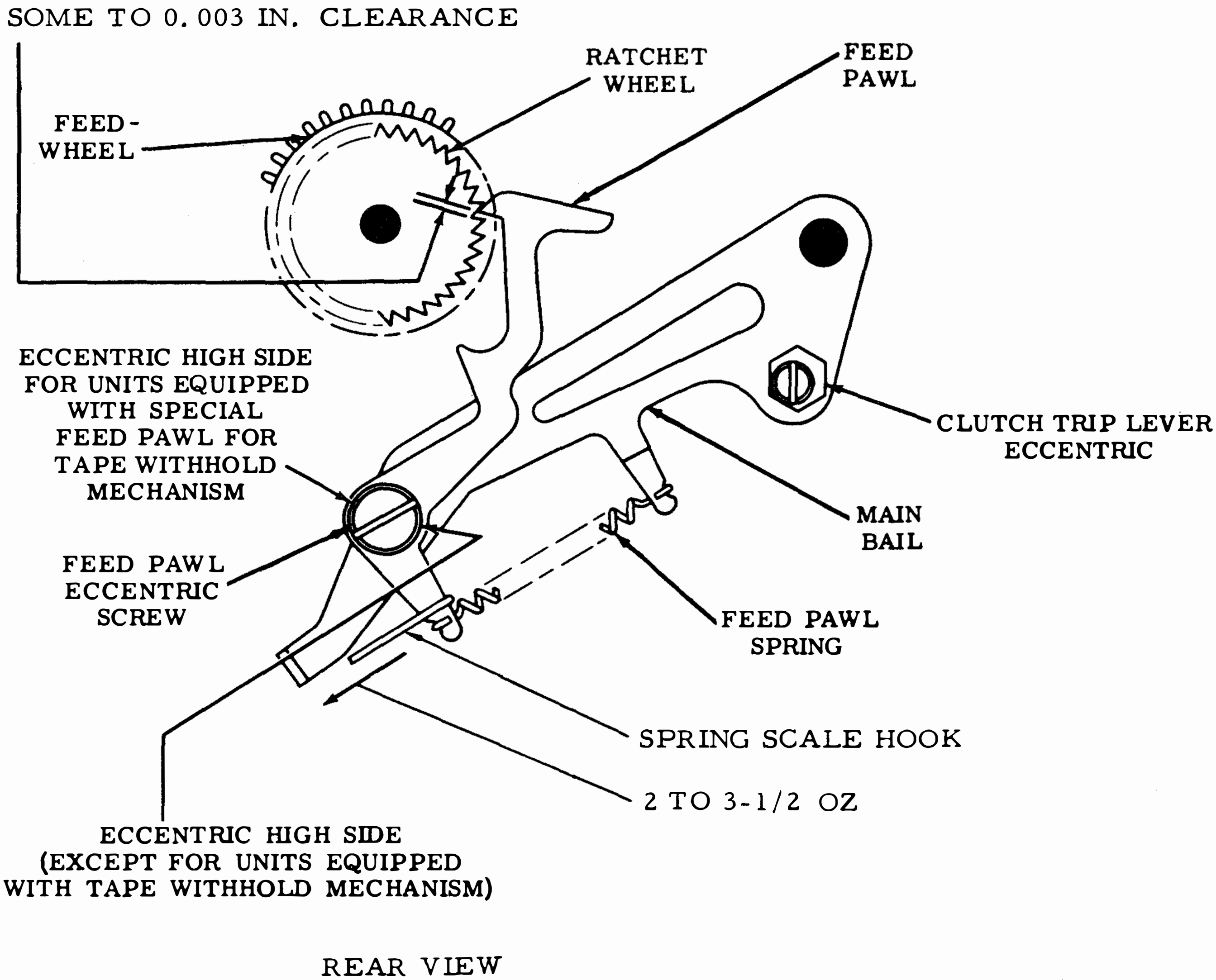


Figure 6-26. Feed Pawl and Feed Pawl Spring

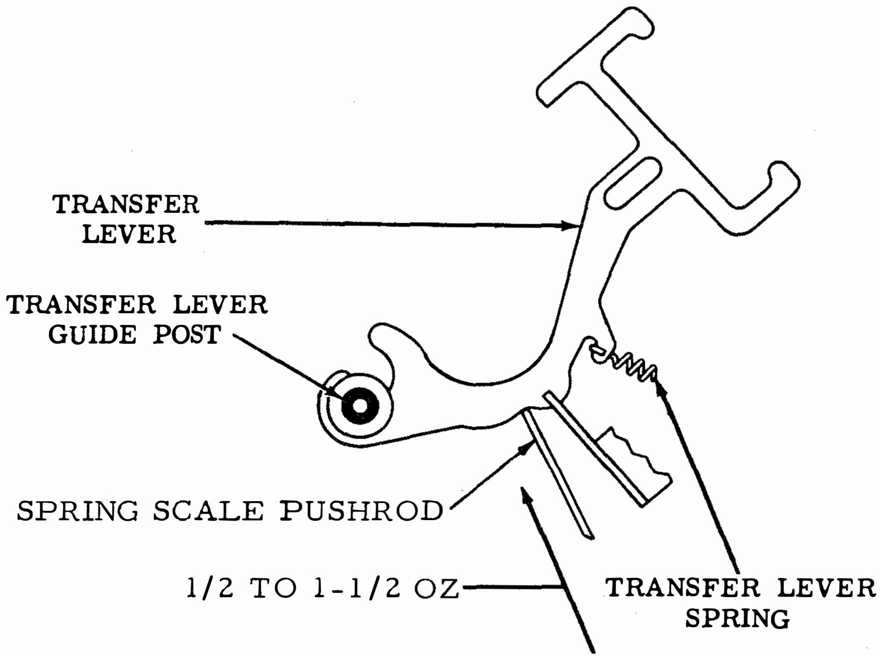


Figure 6-27. Transfer Lever Spring

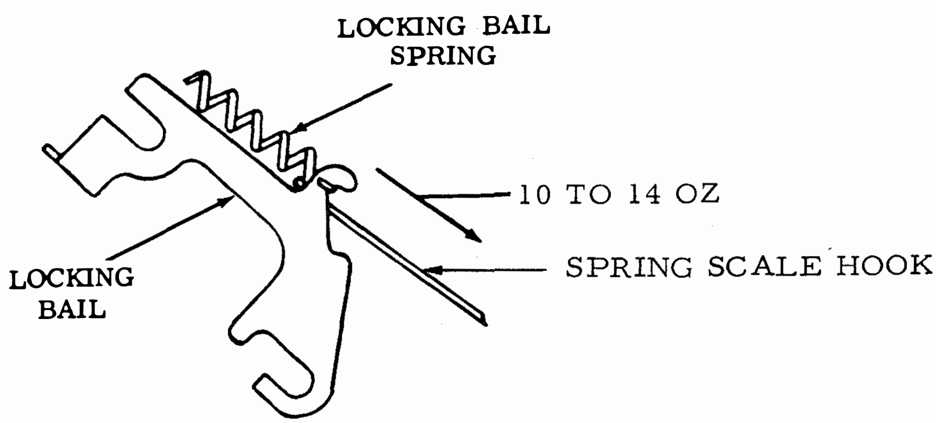


Figure 6-28. Locking Bail Spring

(3) Transfer Bail Stabilizer. Adjust transfer bail stabilizer as follows:

(a) Refer to figure 6-29.

(b) Select a LETTERS combination.

(c) Rotate main shaft until number three transfer lever is on high part of its cam.

(d) Measure and note clearance between side of transfer bail extension and marking latch.

(e) Select BLANK combination.

(f) Rotate main shaft until number three transfer lever is on high part of its cam.

(g) Measure and note clearance between side of transfer bail extension and spacing latch.

(h) By subtracting, find the difference between clearances noted in steps (d) and (g). Difference should not exceed 0.002 inch.

(i) If difference exceeds specified limits, loosen stabilizer assembly mounting screws to point of friction tightness.

(j) Position assembly to equalize clearances.

(k) Tighten assembly mounting screws.

(4) Stabilizer Spring. Adjust stabilizer spring as follows:

(a) Refer to figure 6-29.

(b) Rotate clutch to stop position.

(c) Attach spring scale hook to marking latch as shown in figure.

(d) Force required to start stabilizer latch moving should be between 2-1/2 and 5 ounces.

(e) If scale reading exceeds specified limits, install new spring.

NOTE

Latches should drop in place as other transfer levers cam the transfer bail.

h. Signal Contacts Adjustments. Perform signal contacts adjustments in accordance with the following paragraphs.

(1) Signal Contact Clearance. Adjust signal contact clearance as follows:

(a) Refer to figure 6-30.

(b) Remove cover plate and signal contact box cover.

(c) Engage unit clutch and rotate main shaft slowly until spacing contact is fully open.

(d) Measure and note spacing contact gap.

(e) Continue rotating main shaft until marking contact is fully open.

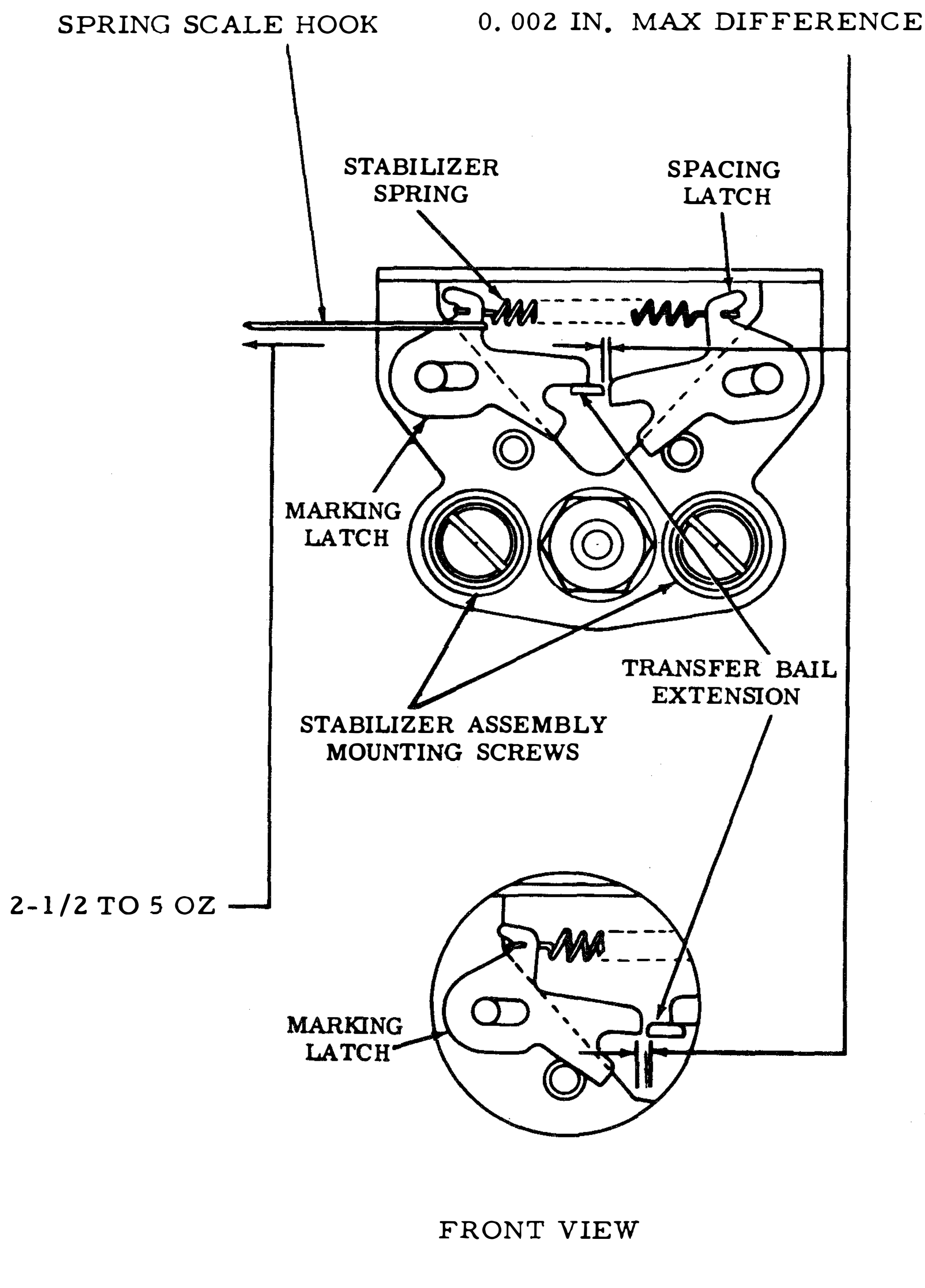


Figure 6-29. Transfer Bail Stabilizer and Stabilizer Spring

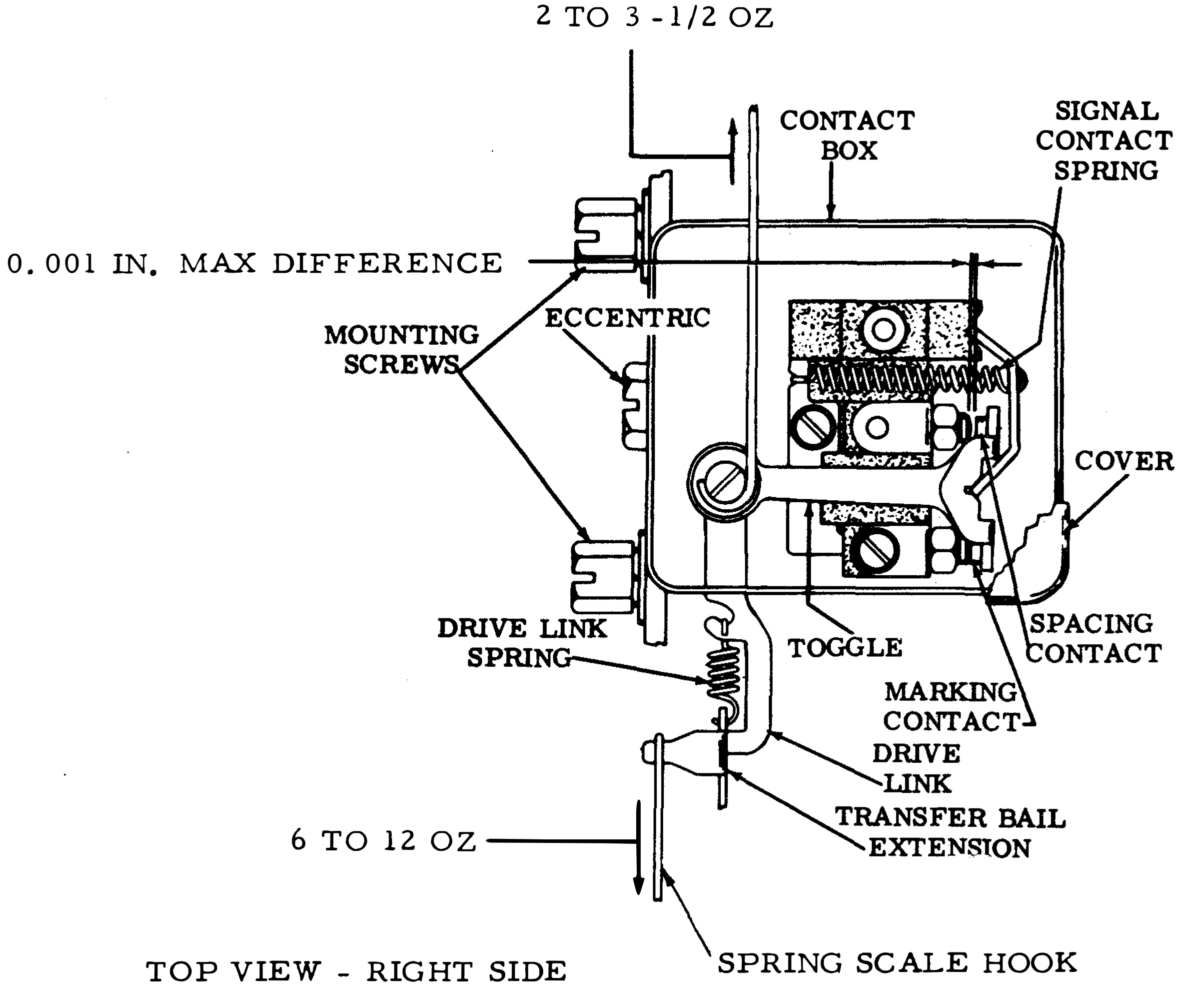


Figure 6-30. Signal Contact Clearance, Drive Link Spring, and Signal Contact Spring

(f) Measure and note marking contact gap.

(g) By subtracting, find the difference between spacing gap noted in step (d) and marking gap noted in step (f). Difference should not exceed 0.001 inch.

(h) If difference exceeds specified limit, loosen mounting screws.

(i) Use eccentric to position contact box to equalize spacing and marking gap.

(j) Tighten mounting screws.

CAUTION

If contacts are gold plated, clean them by partially drawing a strip of TP107162 twill jean between them.

NOTE

Before operating, refine signal contact clearance adjustment as described in Signal Contacts-Electrical, paragraph 6-3.1h(4).

(2) Drive Link Spring. Adjust drive link spring as follows:

(a) Refer to figure 6-30.

(b) Trip clutch and rotate shaft to stop position.

(c) Unhook stabilizer spring and move latches away from transfer bail extension.

(d) Hold toggle firmly against spacing contact.

(e) Attach spring scale hook to drive link as shown in figure.

(f) Force required to start transfer bail extension moving should be between 6 and 12 ounces.

(g) If scale reading exceeds specified limits, install new spring.

(h) Reconnect stabilizer spring.

(3) Signal Contact Spring. Adjust signal contact spring as follows:

(a) Refer to figure 6-30.

(b) Place transmitter in stop position.

(c) Remove contact box cover and unhook drive link end of toggle drive link spring.

(d) Move transfer bail toward right (spacing) position so both toggle contacts are closed.

(e) Hook an 8-ounce spring scale over pivot screw and pull horizontally to left.

(f) Force required to open left-hand contact should be between 2 and 3-1/2 ounces.

(g) If scale reading exceeds specified limits, install new spring.

(h) Reconnect drive link end of toggle drive link spring.

(4) Signal Contacts - Electrical. Adjust signal contacts as follows:

(a) Refer to figure 6-31.

(b) Use strobing adjustment procedure to check and adjust signal contacts electrically and refine mechanical adjustments for transmitter distributor unit. Use same procedure for checking both marking and spacing pulses for both 5-level and 6-level and all unit codes. Data appropriate to each level and unit code is tabulated in Table 6-1, 6-2, and 6-3. Use data from appropriate table to make marking and spacing pulses for all units.

NOTE

Gold plated signal contacts should not be electrically adjusted unless there is an intermediate device available which, when keyed by signal contacts, will interrupt the current to the stroboscopic test set. The

Table 6-1. Pulse Data - Five-Level Units, 7.00 Unit Code

Pulse	Marking		Spacing	
Range	*Nominal	Tolerance	*Nominal	Tolerance
Stop Pulse	36 (Stop) to 142 (Stop)	Begin ±5 Div End ±1/2 Div	36 (Stop) to 142 (Start)	Begin ±6 Div End ±1/2 Div
Start Pulse	142 (Stop) to 6 (One)	Begin ±5 Div End ±5 Div	142 (Stop) to 6 (One)	Begin ±6 Div End -5, +6 Div
Pulse 1	6 (One) to 12 (Two)	Begin ±5 Div End ±5 Div	6 (One) to 12 (Two)	Begin ±6 Div End -5, +6 Div
Pulse 2	12 (Two) to 18 (Three)	Begin ±5 Div End ±5 Div	12 (Two) to 18 (Three)	Begin ±6 Div End -5, +6 Div
Pulse 3	18 (Three) to 24 (Four)	Begin ±5 Div End ±5 Div	18 (Three) to 24 (Four)	Begin ±6 Div End -5, +6 Div
Pulse 4	24 (Four) 30 (Five)	Begin ±5 Div End ±5 Div	24 (four) 30 (Five)	Begin ±6 Div End -5, +6 Div
Pulse 5	30 (Five) to 36 (Stop)	Begin ±5 Div End ±5 Div	30 (Five) to 36 (Stop)	Begin ±6 Div End -6, +6 Div
Allowable Break Width	1 Div	Must fall within pulse tolerance	1 Div	Mult fall within pulse tolerance

*Ranges specified apply only for test sets (DXD) having a 7.42 unit code scale.

Table 6-2. Pulse Data - Five-Level Units, 7.42 Unit Code

Pulse	Marking		Spacing	
Range	*Nominal	Tolerance	*Nominal	Tolerance
Stop Pulse	0 (Stop) to 0 (Start)	Begin ±5 Div End ±1/2 Div	0 (Stop) to 0 (Start)	Begin ±6 Div End ±1/2 Div
Start Pulse	0 (Start) to 0 (One)	Begin ±5 Vid End ±5 Div	0 (Start) to 0 (One)	Begin ±6 Div End ±6 Div
Pulse 1	0 (One) to 0 (Two)	Begin ±5 Div End ±5 Div	0 (One) to 0 (Two)	Begin ±6 Div End -5, +6 Div
Pulse 2	0 (Two) to 0 (Three)	Begin ±5 Div End ±5 Div	0 (Two) to 0 (Three)	Begin ±6 Div End -5, +6 Div
Pulse 3	0 (Three) to 0 (Four)	Begin ±5 Div End ±5 Div	0 (Three) to 0 (Four)	Begin ±6 Div End -5, +6 Div
Pulse 4	0 (Four) to 0 (Five)	Begin ±5 Div End ±5 Div	0 (Four) to 0 (Five)	Begin ±6 Div End -5, +6 Div
Pulse 5	0 (Five) to 0 (Stop)	Begin ±5 Div End ±5 Div	0 (Five) to 0 (Stop)	Begin ±6 Div End -5, +6 Div
Allowable Break Width	±1 Div	Must fall within tolerance limits	±1 Div	Must fall within tolerance limits

*Ranges specified apply only for test sets (DXD) having a 7.42 unit code scale.

Table 6-3. Pulse Data - Six-Level Units, 8.50 Unit Code

Pulse	Marking		Spacing	
Range	*Nominal	Tolerance	*Nominal	Tolerance
Stop Pulse	0 (Stop) to 0 (Start)	Begin ±7 Div End ±1/2 Div	0 (Stop) to 0 (Start)	Begin ±8 Div End ±1/2 Div
Start Pulse	0 (Start) to 0 (One)	Begin ±7 Div End ±7 Div	0 (Start) to 0 (One)	Begin ±8 Div End ±8 Div
Pulse 1	0 (One) to 0 (Two)	Begin ±7 Div End ±7 Div	0 (One) to 0 (Two)	Begin ±8 Div End ±8 Div
Pulse 2	0 (Two) to 0 (Three)	Begin ±7 Div End ±7 Div	0 (Two) to 0 (Three)	Begin ±8 Div End ±8 Div
Pulse 3	0 (Three) to 0 (Four)	Begin ±7 Div End ±7 Div	0 (Three) to 0 (Four)	Begin ±8 Div End ±8 Div
Pulse 4	0 (Four) to 0 (Five)	Begin ±7 Div End ±7 Div	0 (Four) to 0 (Five)	Begin ±8 Div End ±8 Div
Pulse 5	0 (Five) to 0 (Six)	Begin ±7 Div End ±7 Div	0 (Five) to 0 (Six)	Begin ±8 Div End ±8 Div
Pulse 6	0 (Six) to 0 (Stop)	Begin ±7 Div End ±7 Div	0 (Six) to 0 (Stop)	Begin ±8 Div End ±8 Div
Allowable Break Width	1 Div	Must lie within tolerance limits	1 Div	Must lie within tolerance limits

*Ranges specified apply only for test sets (DXD) having a 7.42 unit code scale.

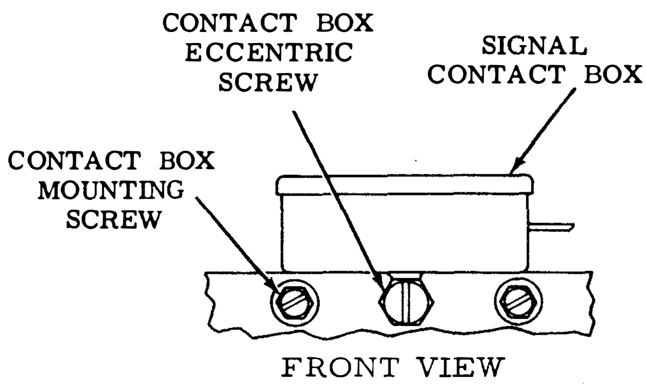


Figure 6-31. Signal Contacts - Electrical

intermediate device must be capable of being keyed by a 3- to 20-volt change in voltage at a current not in excess of 20 milliampere. The standard stroboscopic test set operating voltage must not be applied directly to the signal contacts because of the possibility of damaging the gold plating on the contacts thus impairing their operating efficiency in low-level application.

(c) Following is a general adjustment procedure for adjusting marking pulse. Data appropriate to a 5-level, 7.42 unit code from table 6-2 is included parenthetically as an example.

1. Plug a signal distortion set having the appropriate scale (7.42) into signal line so marking contacts of transmitter distributor unit under test will interrupt the current to stroboscopic lamp in DXD.

2. Have tranmitter distributor unit transmitting "Y" or "R" continuously, and test set and transmitter distributor unit operating at same speed (100 wpm).

3. Rotate test scale to align 0-scale mark of START segment (end of STOP segment) with end of stop pulse image indicated by the rotating strobe light.

NOTE

End of stop pulse image should not vary more than one division in either direction when scale is positioned so variation is centered about 0-scale mark of START segment.

4. Check position of each pulse against position tabulated. Each pulse should be in its designated segment on test scale within specified tolerance figure (15 divisions).

NOTE

Each marking code pulse may have one break, provided the break is not longer than allowable break width (1 division) specified and the break comes within the tolerance range (5 divisions) and end of pulse.

5. To adjust, loosen two contact box mounting screws to point of friction tightness. Refer to figure 6-29.

6. Rotate eccentric of contact box mounting bracket to right or left until requirements above are met.

7. Tighten mounting screws and recheck adjustment.

NOTE

If signal requirements cannot be met, refine transmitter distributor gear backlash adjustment, paragraph 6-3.1i(1),(2) and transfer bail stabilizer adjustment, paragraph 6-3.1g(3).

(d) The general adjustment procedure for adjusting spacing pulse is identical to that outlined for marking pulse. Tolerances may differ. Refer to appropriate table for pulse data when making adjustment.

i. Basic Gear Adjustment. Perform basic gear adjustment in accordance with the following paragraphs.

(1) Intermediate Gear.

NOTE

Prior to starting this adjustment, ensure that both motor unit and transmitter distributor unit are properly positioned on base.

(a) Refer to figure 6-32.

(b) Ensure amount of backlash between intermediate driving gear and transmitter distributor unit gear is barely perceptible.

(c) If adjustment is necessary, loosen three mounting screws which hold transmitter distributor unit to its base.

(d) Position transmitter distributor unit to obtain barely perceptible backlash.

(e) Tighten mounting screws.

(2) Transimtter Distributor Gear Backlash. Adjust transmitter distributor gear backlash as follows:

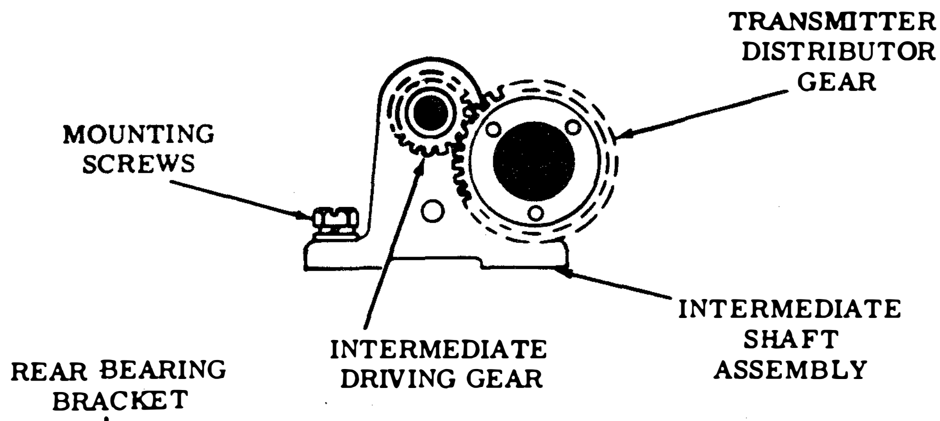
(a) Refer to figure 6-32.

(b) Ensure amount of backlash between drive gear and transmitter distributor unit distributor gear is barely perceptible.

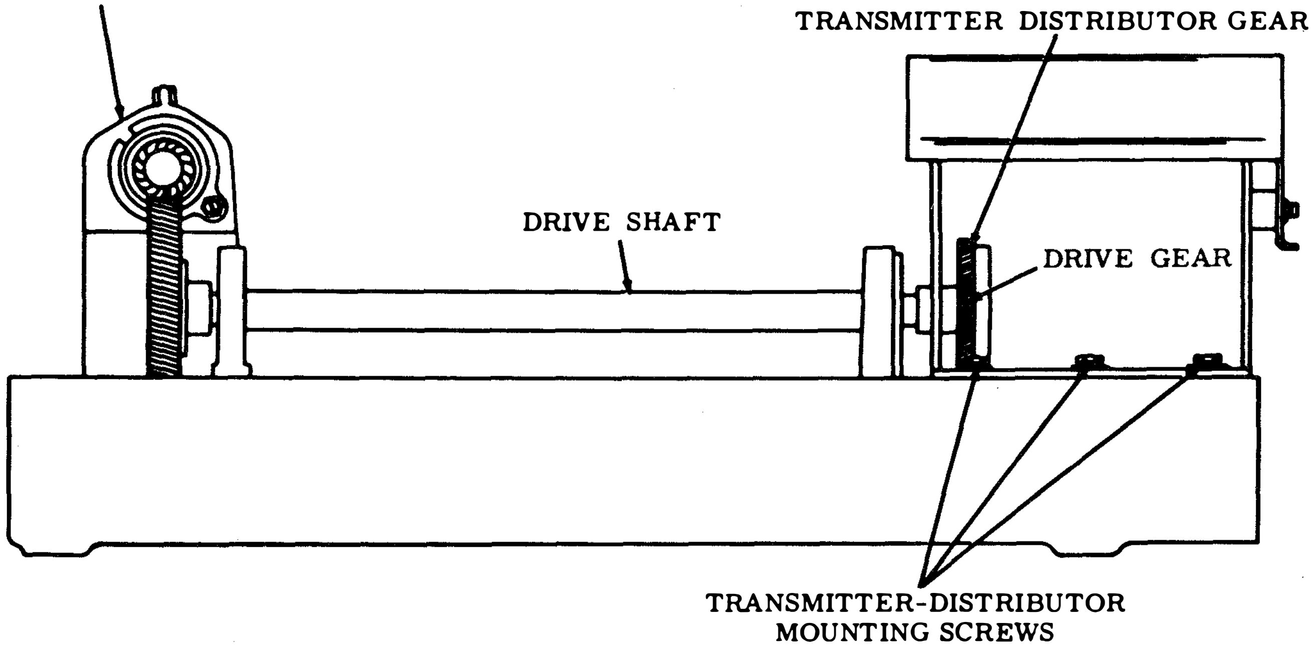
(c) If adjustment is necessary, loosen three mounting screws which hold transmitter distributor unit to its base.

(d) Position transmitter distributor unit to obtain barely perceptible backlash.

(e) Tighten mounting screws.



LEFT SIDE VIEW



LEFT SIDE VIEW

Figure 6-32. Intermediate Gear - Transmitter Distributor Gear Backlash

6-3.2 TRANSMITTER DISTRIBUTOR UNIT (LOW-LEVEL). The adjustments for the high-level transmitter distributor unit are also applicable to the low level transmitter distributor unit.

6-4. TRANSMITTER DISTRIBUTOR BASE. Adjustments for the transmitter distributor high-level base are described in paragraph 6-4.1. Low-level base adjustments are described in paragraph 6-4.2.

6-4.1 TRANSMITTER DISTRIBUTOR BASE (HIGH-LEVEL)

a. Single Contact Single Mounting Base Adjustments. Perform single contact single mounting base adjustments in accordance with the following paragraphs.

(1) Transmitter Distributor Gear. Adjust transmitter distributor gear as follows:

(a) Refer to figure 6-33.

(b) Ensure there is a barely perceptible amount of backlash between intermediate driving gear and transmitter distributor gear.

(c) If there is no backlash or backlash is excessive, loosen three transmitter distributor unit mounting screws and position transmitter distributor unit to obtain barely perceptible backlash.

(d) Tighten three mounting screws.

(2) Intermediate Shaft Assembly (Regular Size Base). Adjust intermediate shaft assembly as follows:

(a) Refer to figure 6-33.

(b) Ensure there is a perceptible amount of backlash between motor pinion and intermediate driven gear.

(c) If there is no backlash or backlash is excessive, loosen intermediate gear assembly mounting screws and position intermediate gear assembly.

(d) Tighten mounting screws.

(3) Intermediate Shaft Assembly (Miniature Base). Adjust intermediate shaft assembly as follows:

(a) Refer to figure 6-33.

(b) Measure clearance between motor pinion and intermediate driven gear at point of least backlash. Clearance should be between 0.015 and 0.020 inch.

(c) If clearance exceeds specified limits, loosen intermediate gear mounting screws and position intermediate gear assembly.

(d) Tighten mounting screws.

(4) Line Shunt Switch. Adjust line shunt switch as follows:

NOTE

This adjustment is applicable to all single contact bases.

(a) Refer to figure 6-34.

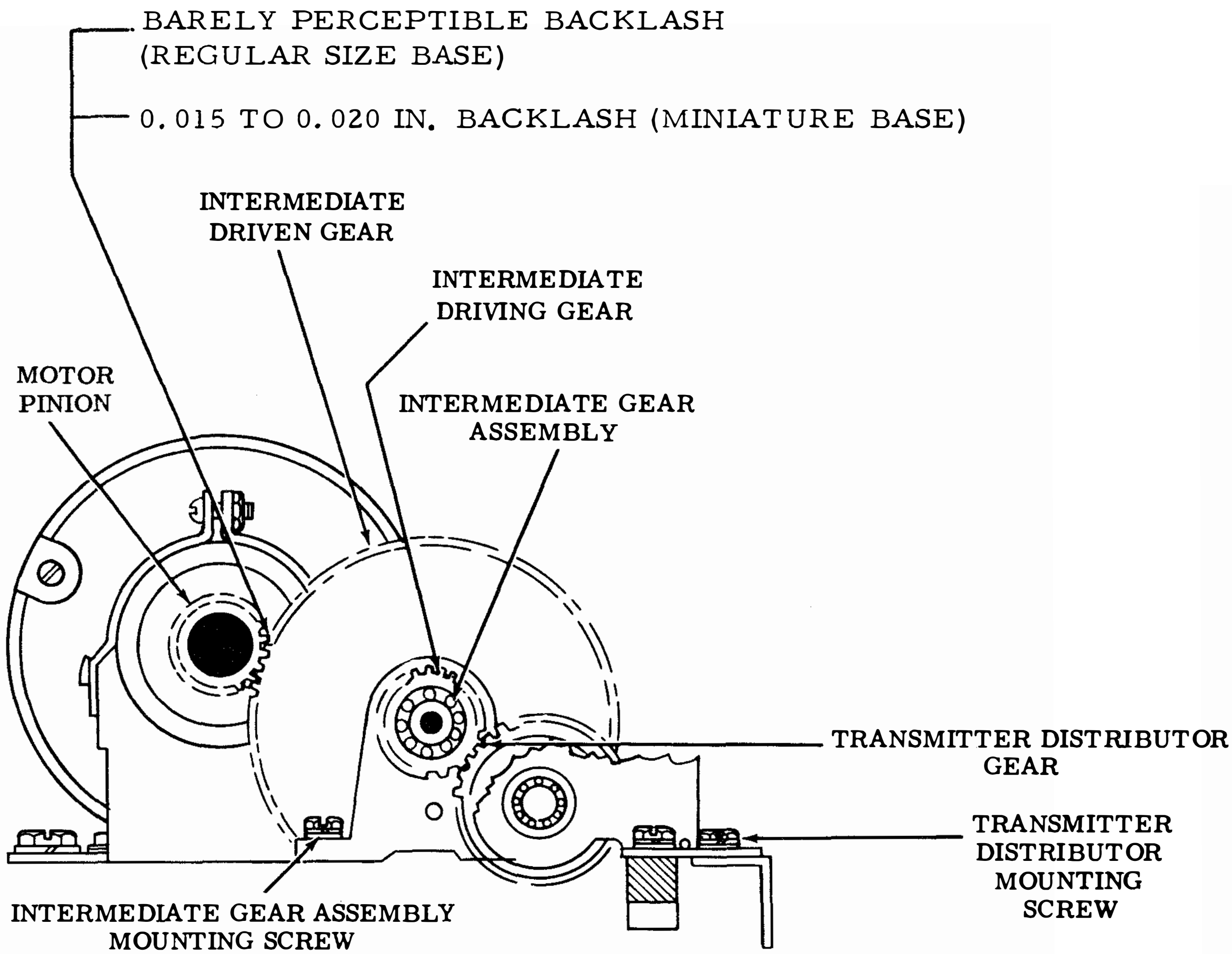


Figure 6-33. Transmitter Distributor Gear and Intermediate Shaft Assembly

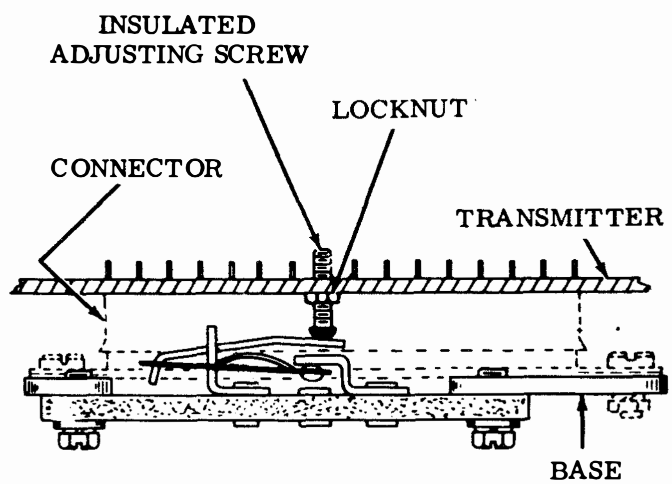


Figure 6-34. Line Shunt Switch

(b) Place a transmitter distributor unit in position on the base and ensure line shunt switch contacts open.

(c) Remove transmitter distributor unit from base and ensure line shunt switch contacts close before transmitter distributor unit connector has completed one-half of its disconnect travel.

(d) If line shunt switch contacts do not open or close as specified in (b) or (c), loosen white nylon locknut on adjusting screw at bottom of transmitter distributor unit and adjust screw to open contacts when transmitter distributor unit is correctly positioned.

(e) Tighten white nylon locknut on adjusting screw.

b. Single Contact Multiple Mounting Base (Common Speed) Adjustments. Perform single contact multiple mounting base (common speed) adjustments in accordance with the following paragraphs.

(1) Belt Tension. Adjust belt tension as follows:

(a) Refer to figure 6-35.

(b) Place straight edge across top of two sprockets.

(c) Apply spring scale pushrod to belt midway between two sprockets and push down with force of 5 ounces; measure belt deflection. Deflection should be approximately 1/4 inch.

(d) If belt deflection is not as specified in (c), loosen two screws which hold intermediate shaft bracket.

(e) Position intermediate shaft bracket to obtain specified belt deflection.

(f) Tighten two screws which secure intermediate shaft bracket.

(g) If positioning of shaft bracket was necessary in order to obtain specified belt deflection, adjust motor pinion - intermediate gear backlash as described in paragraph 6-4.1b(2).

(2) Motor Pinion - Intermediate Gear Backlash. Adjust motor pinion - intermediate gear backlash as follows:

(a) Refer to figure 6-35.

(b) Ensure backlash between motor pinion and intermediate gear at point of minimum clearance is barely perceptible.

(c) If there is no backlash or if backlash is excessive, loosen four motor mounting brackets and eccentric locking screw at rear motor mounting bracket.

(d) Position motor to obtain backlash that is barely perceptible.

(e) Tighten eccentric locking screw and four motor mounting bracket screws.

(3) Transmitter Distributor Unit Positioning. Adjust transmitter distributor unit positioning as follows:

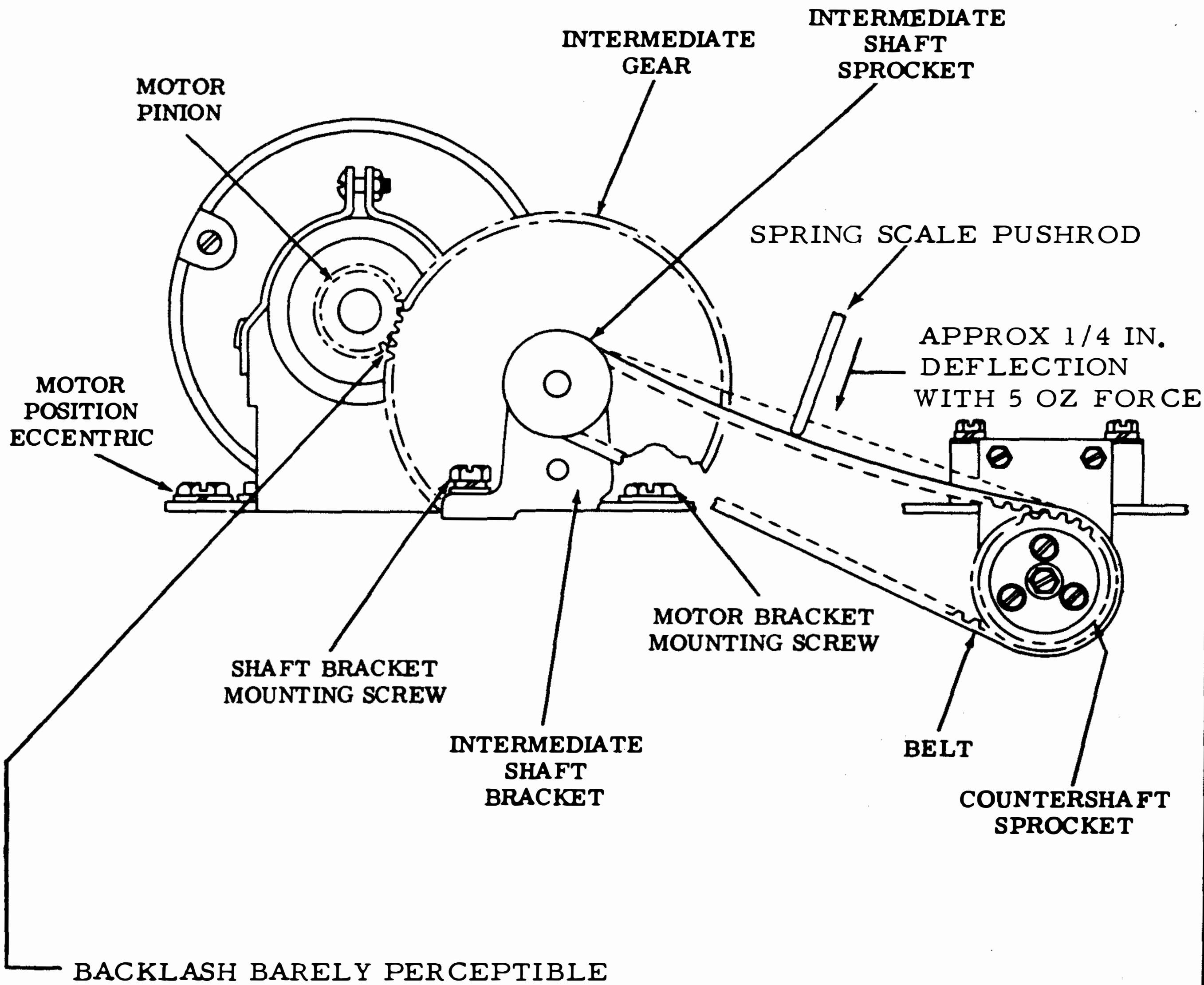


Figure 6-35. Belt Tension (Common Speed) and Motor Pinion - Intermediate Gear Backlash

(a) Refer to figure 6-36.

(b) Ensure backlash between transmitter distributor gear and countershaft gear at point of minimum clearance is barely perceptible.

(c) If there is no backlash or if backlash is excessive, loosen positioning eccentric locking screw and move locking device to left.

(d) Place transmitter distributor unit successively in each of the three mounting positions.

(e) While transmitter distributor unit is in each position, engage transmitter distributor unit connector with mating connector on base and mesh transmitter distributor gear with countershaft gear. Hold transmitter distributor unit against its positioning eccentric and adjust positioning eccentric to obtain specified backlash; then tighten eccentric locking screw.

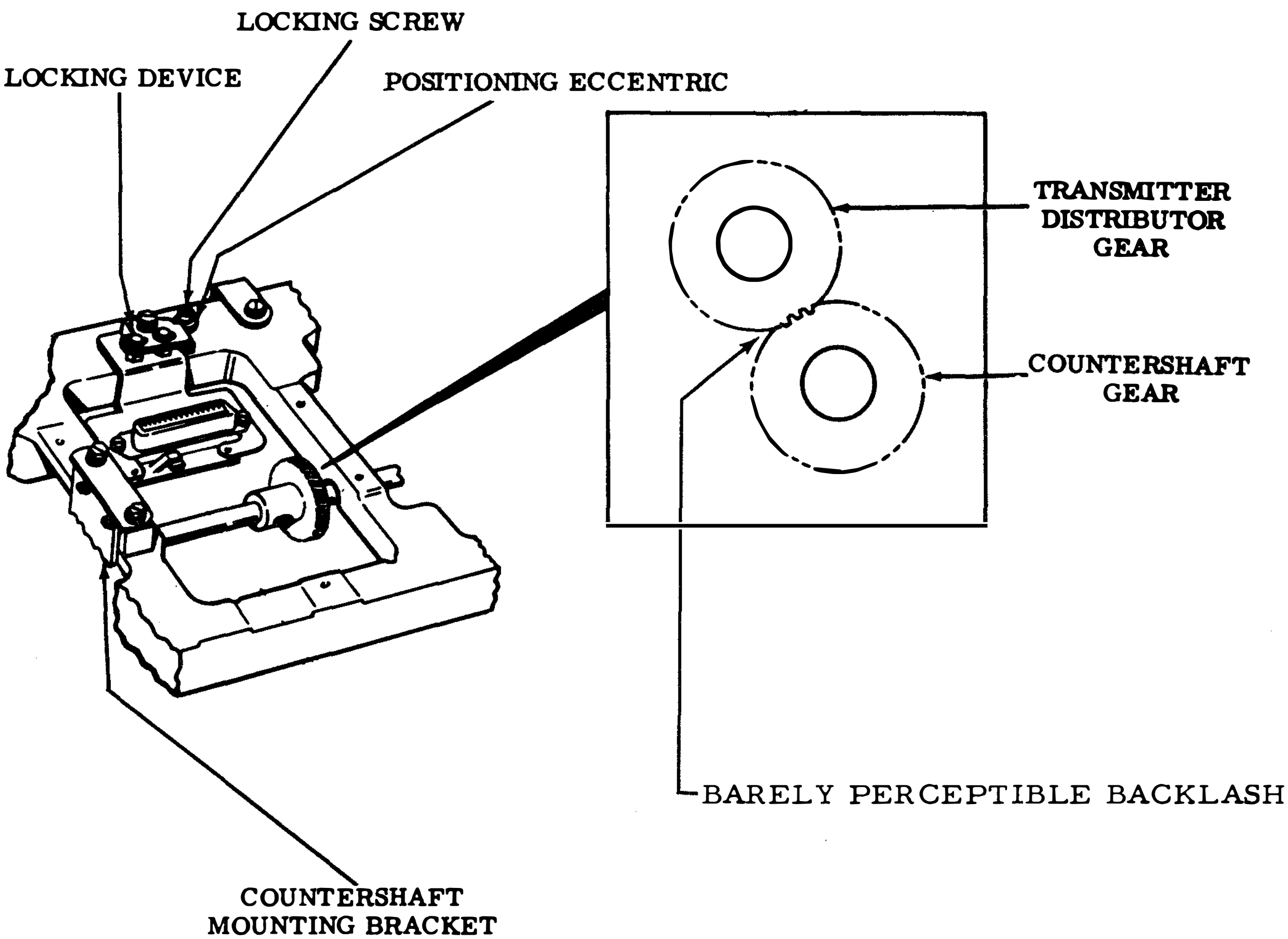


Figure 6-36. Transmitter Distributor Unit Positioning (Common Speed)

NOTE

If there is not sufficient range in a positioning eccentric to permit a proper backlash adjustment, it will be necessary to reposition the countershaft assembly. Remove all transmitter distributor units. Loosen the two screws in the right and left countershaft mounting brackets. Move the countershaft assembly forward or to the rear as required, and keep the bracket assemblies parallel so as not to bind or place a strain on the countershaft. Tighten the bracket mounting screws. Repeat adjustments of paragraphs 6-4.1b(1) and 6-4.1b(2).

c. Single Contact Multiple Mounting Base (Variable Speed) Adjustments. Perform single contact multiple mounting base (variable speed) adjustments in accordance with the following paragraphs.

(1) Belt Tension. Adjust belt tension as follows:

(a) Pefer to figure 6-37.

(b) Place straight edge across top of two sprockets.

(c) Apply spring scale pushrod to belt midway between two sprockets and push down with a force of 5 ounces; measure belt deflection. Deflection should be approximately 3/8 inch.

(d) If belt deflection is not as specified in (c), loosen four motor mounting bracket screws and motor position eccentric locking screws.

(e) Position eccentric on rear motor mount bracket to obtain specified belt deflection.

(f) Tighten locking screw and motor mounting screws.

(2) Intermediate Gear - Countershaft Gear Backlash. Adjust intermediate gear - countershaft gear backlash as follows:

(a) Refer to figure 6-38.

(b) Ensure backlash between intermediate gear and countershaft gear at point of minimum clearance is barely perceptible.

(c) If there is no backlash or backlash is excessive, loosen two intermediate shaft bracket mounting screws and position bracket to obtain barely perceptible backlash.

(d) Tighten two intermediate shaft bracket mounting screws.

(3) Transmitter Distributor Unit Positioning. Adjust transmitter distributor unit positioning as follows:

(a) Refer to figure 6-39.

(b) Ensure backlash between transmitter distributor gear and its associated intermedaite gear at point of minimum clearance is barely perceptible.

(c) If there is no backlash or backlash is excessive, loosen positioning eccentric locking screw and move locking device to left.

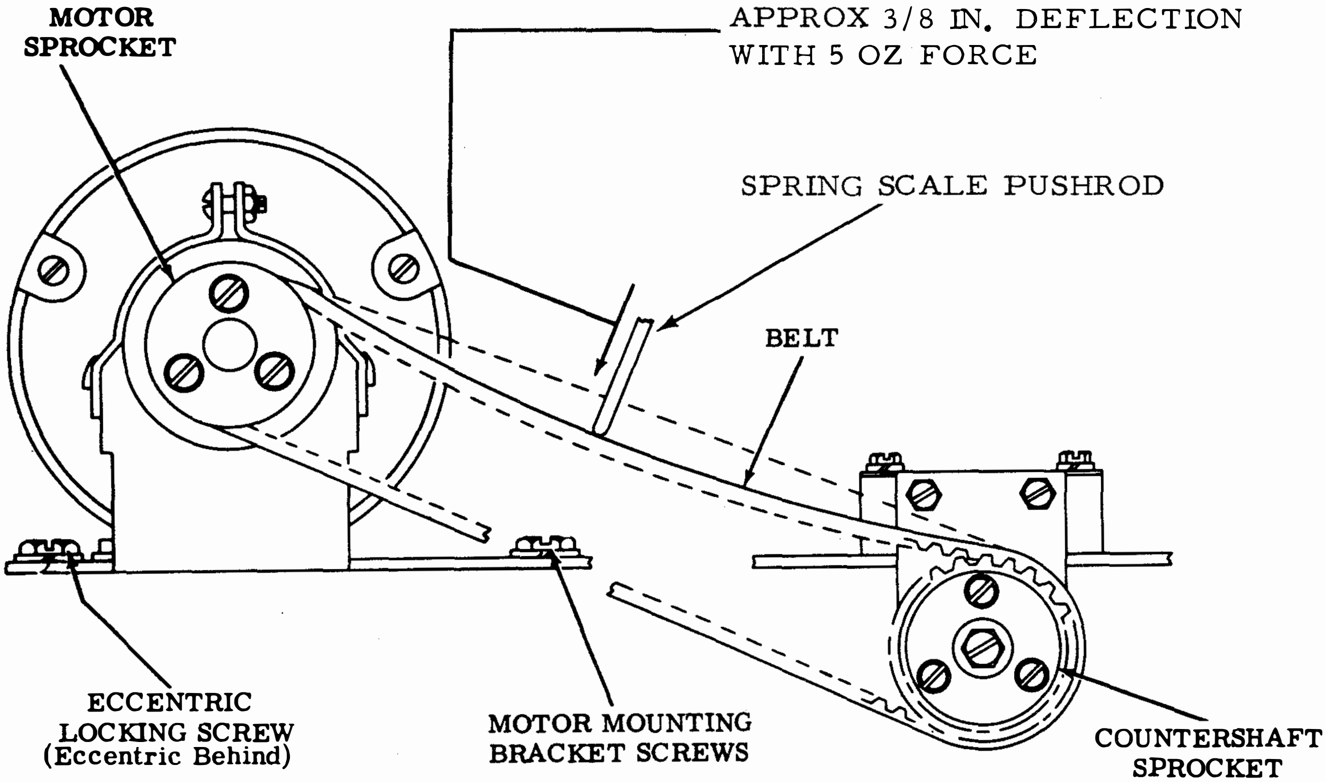


Figure 6-37. Belt Tension (Variable Speed)

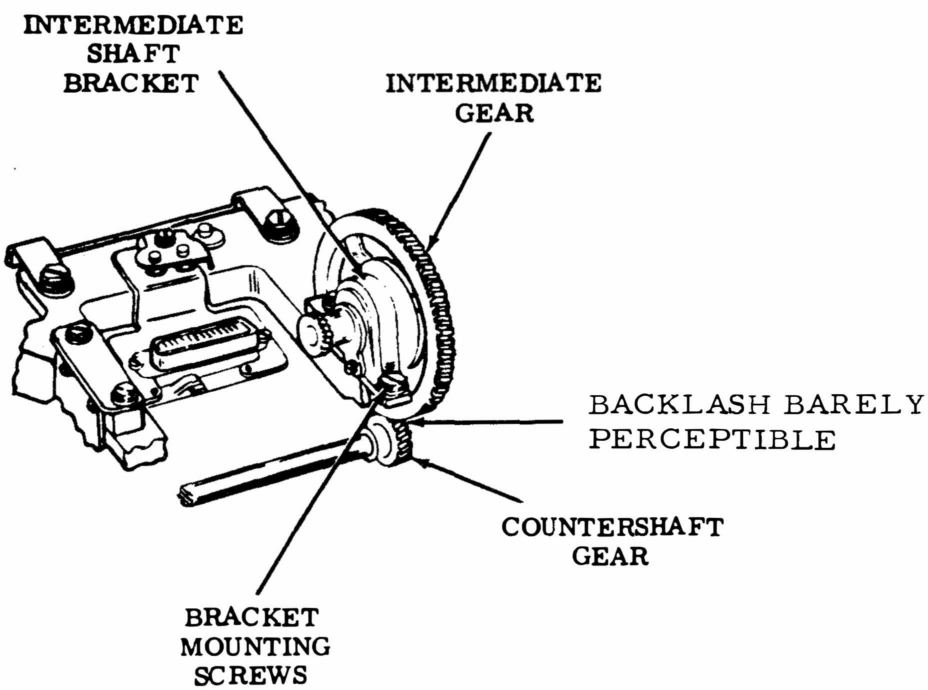


Figure 6-38. Intermediate Gear - Countershaft Gear Backlash

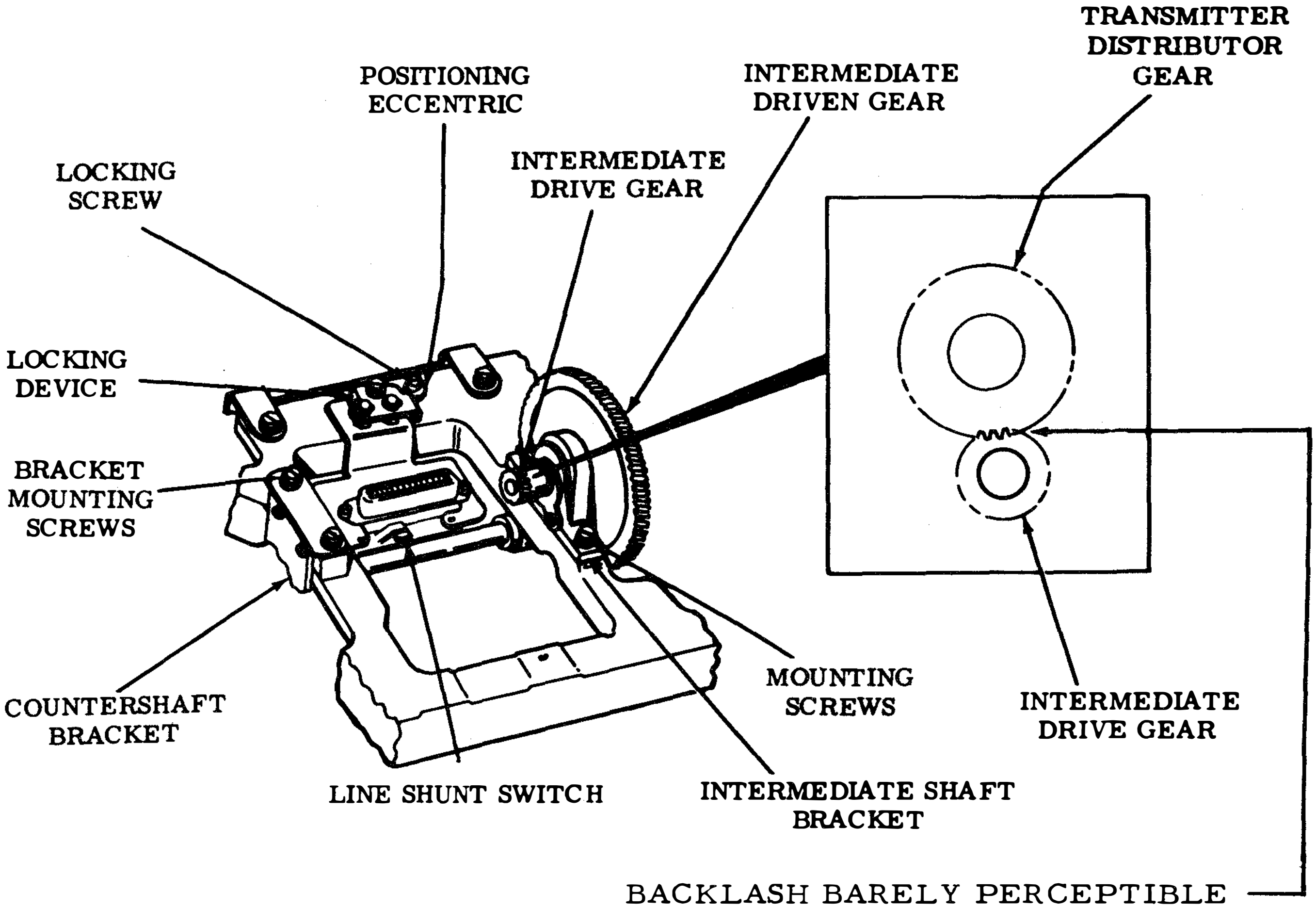


Figure 6-39. Transmitter Distributor Unit Positioning (Variable Speed)

(d) Place transmitter distributor unit successively in each of the three mounting positions.

(e) While transmitter distributor unit is in each position, engage transmitter distributor unit connector with mating connector on base and mesh transmitter distributor gear with intermediate gear. Hold transmitter distributor unit against its positioning eccentric and adjust positioning eccentric to obtain specified backlash; then tighten eccentric locking screw.

NOTE

If there is not sufficient range in a positioning eccentric to permit a proper backlash adjustment, it will be necessary to reposition the countershaft assembly. Remove all transmitter distributor units. Loosen the two screws in the right and left intermediate shaft brackets, and the two screws in each countershaft bracket. Move the countershaft assembly forward or to the rear as required, keeping the bracket assemblies parallel so as not to bind or place a strain on the countershaft. Tighten the countershaft bracket mounting screws. Repeat adjustments of paragraphs 6-4.1c(1) and 6-4.1c(2).

d. Multicontact Single Mounting Bases Adjustments. Perform multicontact single mounting bases adjustments in accordance with the following paragraphs.

(1) Intermediate Gear Assembly. Adjust intermediate gear assembly as follows:

(a) Refer to figure 6-40.

(b) Measure clearance between distributor shaft driving gear and intermediate gear bracket bearing clamp. Clearance should be a minimum of 0.010 inch.

(c) If clearance exceeds specified limit, loosen driving gear mounting screw and position driving gear to obtain specified clearance.

(d) Tighten driving gear mounting screw.

(e) Ensure there is some clearance between distributor shaft driven gear and intermediate gear bracket bearing clamp.

(f) Measure clearance between distributor shaft driving and driven gears. There should be some clearance not exceeding 0.003 inch.

(g) Ensure intermediate gear housing is parallel to base.

(h) If any requirement in steps (e), (f), or (g) are not met, loosen intermediate gear bracket mounting screws and position the gear bracket to obtain the specified requirement.

(i) Tighten bracket mounting screws.

(2) Motor Pinion. Adjust motor pinion as follows:

(a) Refer to figure 6-40.

(b) Measure backlash between motor pinion gear and intermediate gear. There should be some backlash not exceeding 0.003 inch.

(c) Ensure motor is parallel to base.

(d) If requirements of steps (b) or (c) are not met, loosen motor mounting screws and position motor.

(e) Tighten mounting screws. Rotate shaft and repeat steps (b) and (c).

(3) Line Shunt Switch TP160370. Adjust line shunt switch (TP160370) as follows:

(a) Refer to figure 6-41.

(b) Remove unit from subbase.

(c) Ensure shunt switch contacts are closed.

(d) Measure clearance between engaging surface of switch plunger and its mounting bracket. Clearance should be between 49/64 and 51/64 inch.

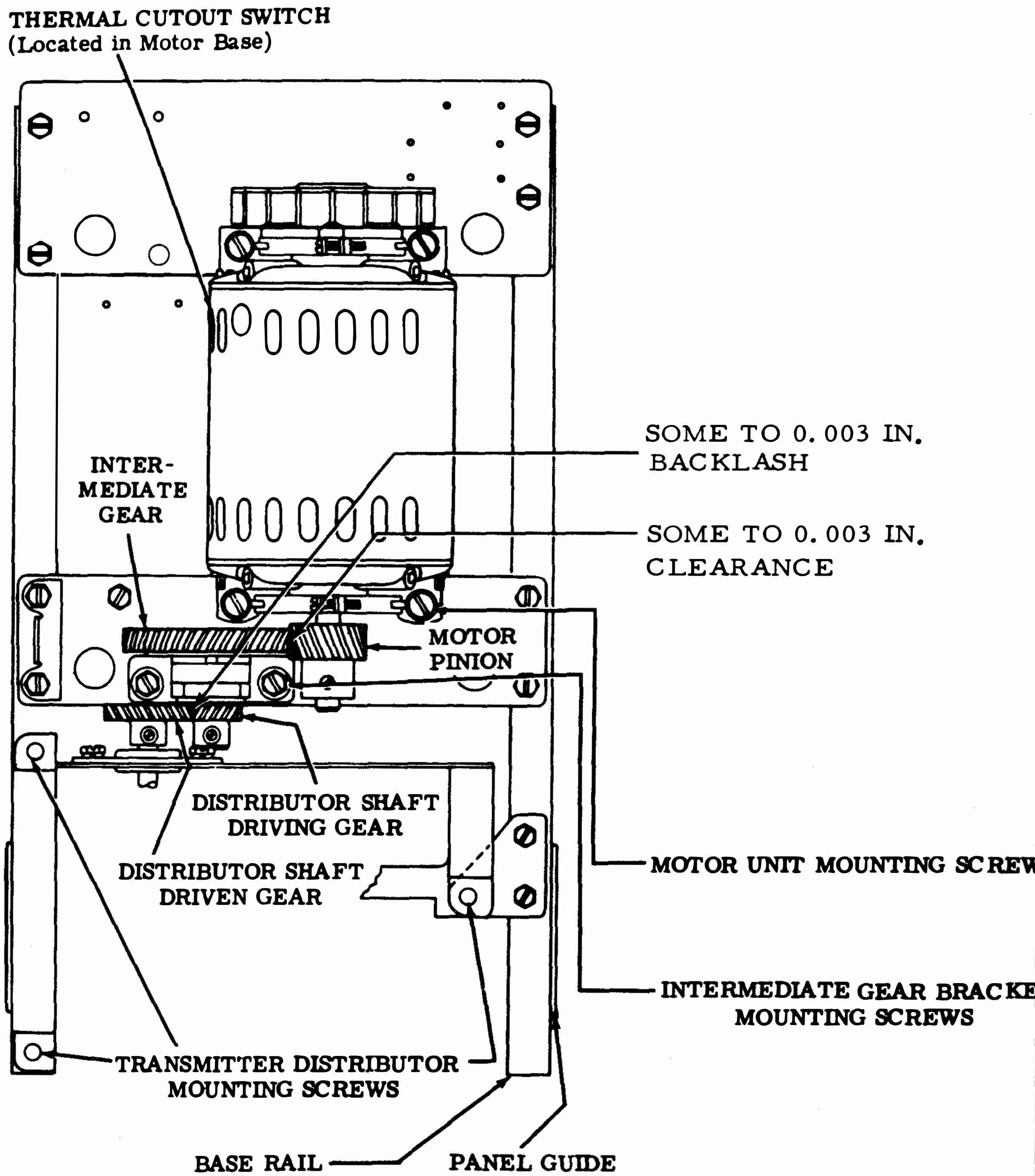


Figure 6-40. Intermediate Gear Assembly and Motor Pinion

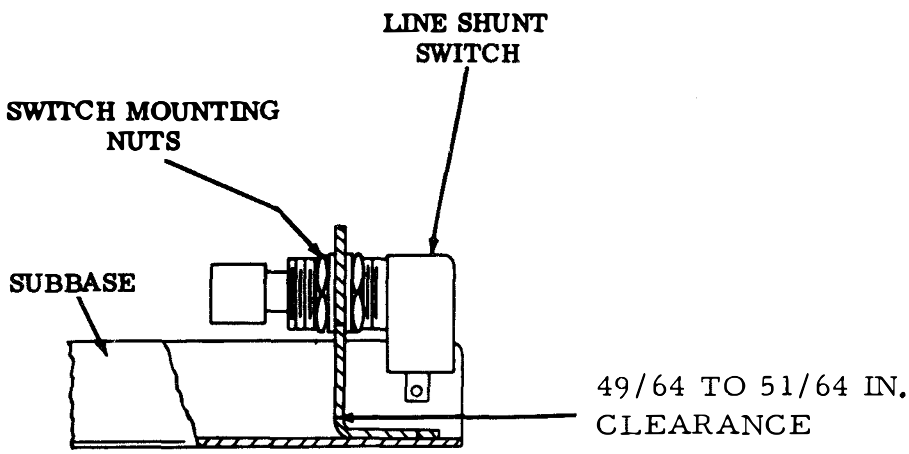


Figure 6-41. Line Shunt Switch TP160370

(e) If clearance exceeds specified limits, loosen switch mounting nuts and position switch to obtain specified clearance.

(f) Tighten mounting nuts.

(g) Mount unit on subbase.

(4) Line Shunt Switch TP172847. Adjust line switch switch TP172847 as follows:

(a) Refer to figure 6-42.

(b) Ensure line shunt switch contacts are open when transmitter distributor left rear mounting screw is tightened and close when mounting screw is loosened.

(c) If switch contacts do not open and close as specified, turn left rear mounting screw clockwise one-half turn. Loosen switch mounting screws to point of friction tightness.

(d) Position switch actuator against left rear transmitter mounting screw until line shunt switch contacts just close (switch actuator should be approximately horizontal).

(e) Tighten switch mounting screws and repeat step (b).

e. Multicontact Multiple Mounting Base (Common Speed) Adjustments. Perform multicontact multiple mounting base (common speed) adjustments in accordance with the following paragraphs.

(1) Motor Pinion. Adjust motor pinion as follows:

(a) Refer to figure 6-43.

(b) Ensure backlash between pinion and intermediate gear is barely perceptible through one complete revolution of intermediate gear.

(c) If at any point during revolution of intermediate gear there is no

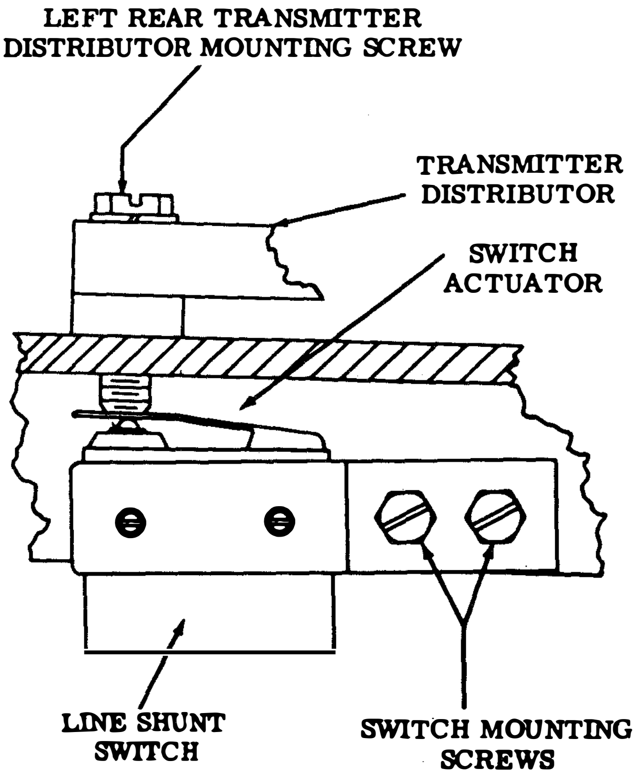


Figure 6-42. Line Shunt Switch TP172847

backlash or backlash is excessive, loosen adjusting stud locknuts and turn adjusting stud as necessary to obtain specified backlash.

(d) Tighten locknuts.

(2) <u>Countershaft</u>. Adjust countershaft as follows:

(a) Refer to figure 6-44.

(b) Ensure backlash between countershaft driving gear and its associated transmitter distributor driven gear at point of least clearance is barely perceptible.

(c) If there is no backlash or backlash is excessive, perform the adjustments of steps (d) through (f).

(d) Loosen locating plate mounting screws to point of friction tightness and position plate at center of its adjustment range.

(e) Insert transmitter distributor unit (with cradle) into left mounting position on base and position locating plate to obtain specified backlash. Tighten locating plate mounting screws.

(f) Remove transmitter distributor unit from left mounting position and place it in right mounting position. Loosen mounting screws on countershaft pedestals and position right end of

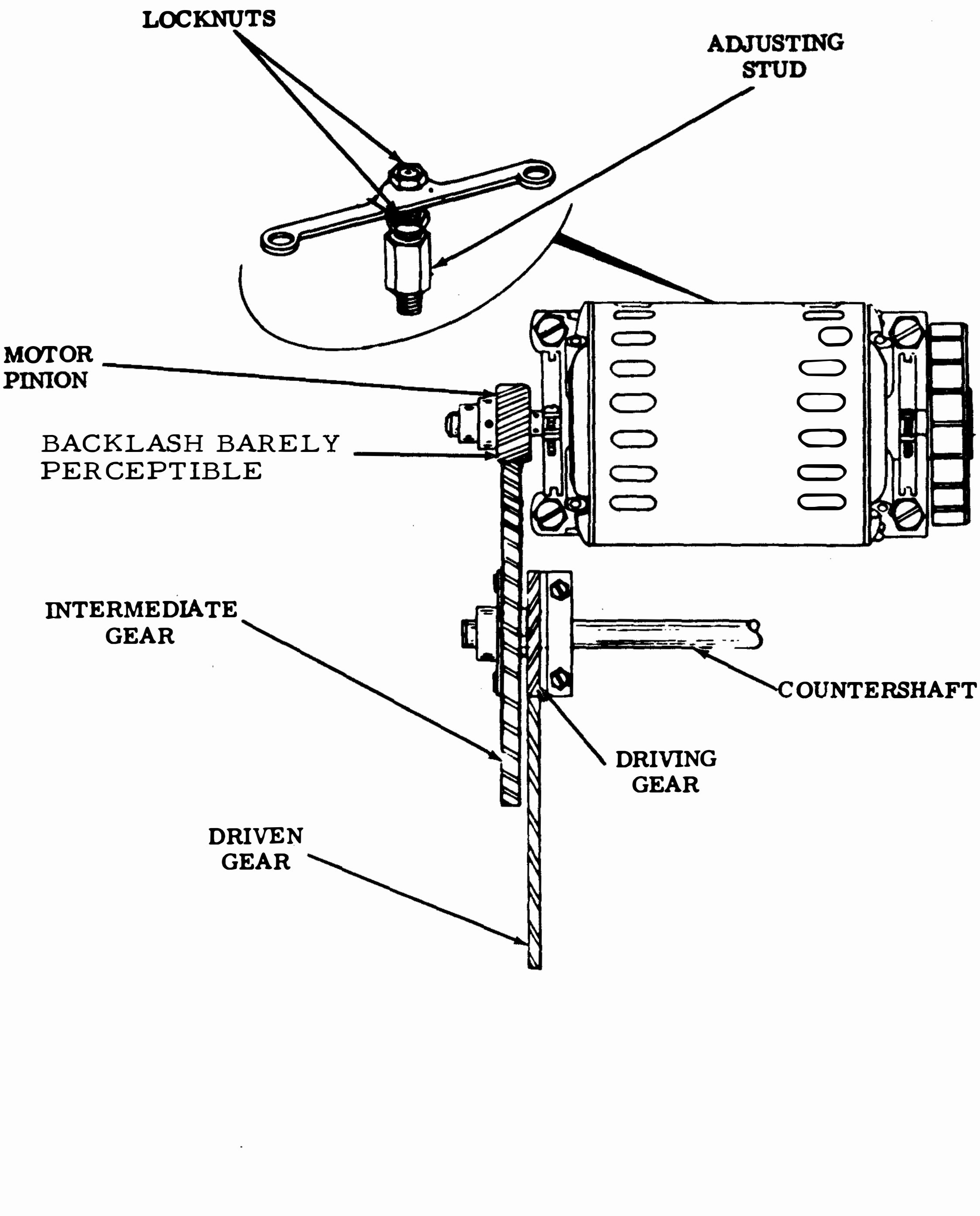


Figure 6-43. Motor Pinion

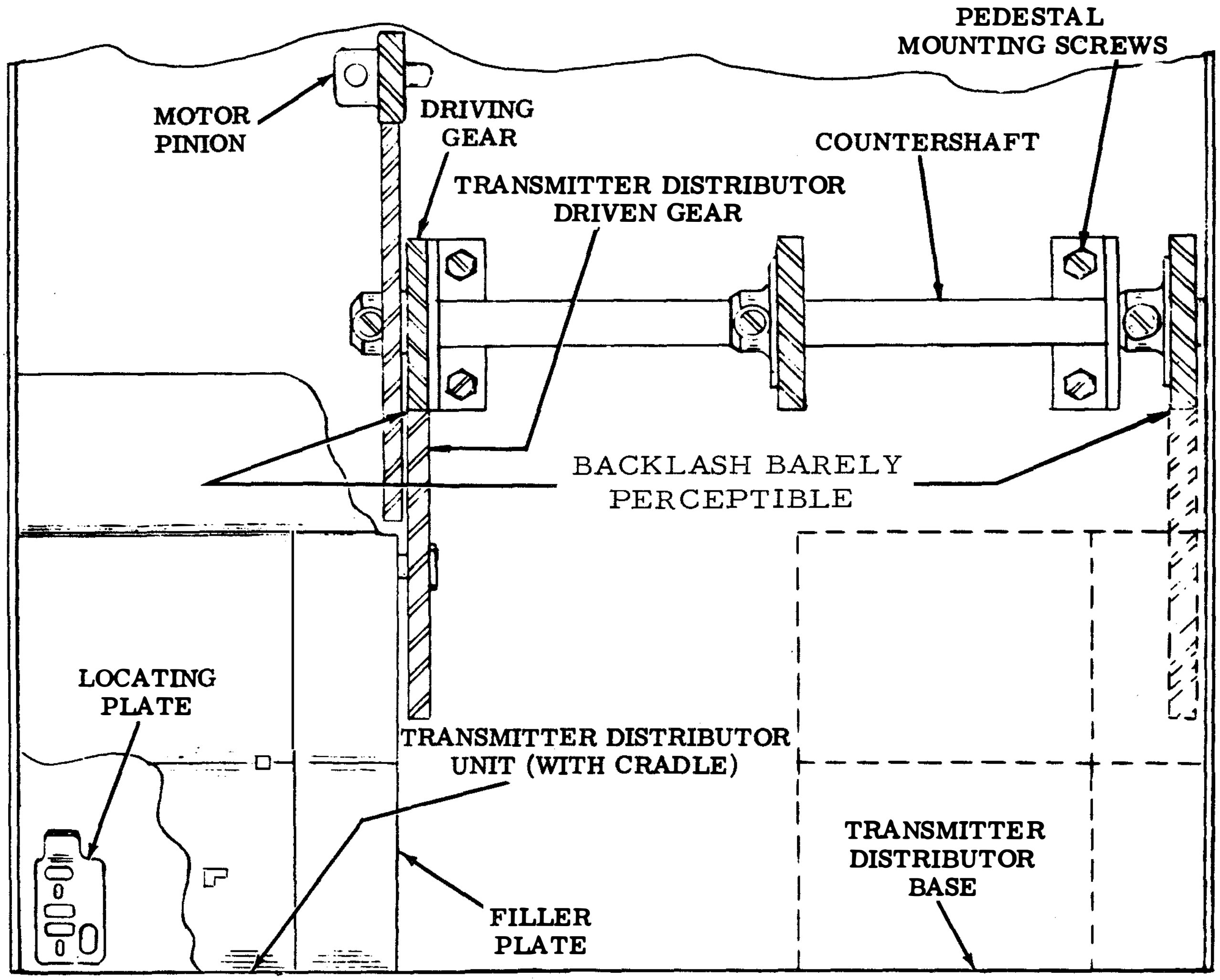


Figure 4-44. Countershaft

countershaft to obtain specified backlash.

(g) Tighten all mounting screws. Ensure there is no binding and repeat steps (b) and (c).

f. <u>Multicontact Multiple Mounting Base (Variable Speed) Adjustments</u>. Perform multiple mounting base (variable speed) adjustments in accordance with the following paragraphs.

(1) <u>Cross-Shaft Position</u>. Adjust cross-shaft position as follows:

(a) Refer to figure 6-45.

(b) Ensure cross-shaft assembly is parallel with front edge of base plate within 0.015 inch.

(c) If parallelism is not within specified limit, loosen cross-shaft pedestal mounting screws and position cross-shaft assembly to obtain specified parallelism and avoid binding of shaft.

(d) Tighten pedestal mounting screws.

(2) <u>Speed Change Gear</u>. Adjust speed change gear as follows:

(a) Refer to figure 6-46.

(b) Ensure each driven gear shaft is parallel with cross-shaft as gauged by eye. If not, proceed to steps (e), (f), and (g); then to step (c).

(c) Measure backlash between each driven gear on speed changing mechanism and corresponding driving gear on cross-shaft. Backlash should be between 0.004 and 0.008 inch.

(d) If clearances are not as specified proceed to step (e), (f), and (g).

(e) To adjust parallelism between a speed changing mechanism driven gear shaft and cross-shaft or backlash between a driven gear and corresponding driving gear, loosen speed changing mechanism mounting screws and locknuts on elevating screws.

(f) Position speed changing mechanism to obtain specified parallelism or backlash.

(g) Tighten mounting screws and elevating screws.

(h) Ensure each gear on speed changing mechanism mates over its entire thickness with corresponding driving gear on cross-shaft.

(i) If not loosen driving gear hub mounting screw on cross-shaft and position driving gear to obtain specified mating.

(j) Tighten driving gear hub mounting screw.

(3) <u>Line Shunt Switch</u>. Adjust line shunt switch as follows:

(a) Refer to figure 6-47.

(b) Place a transmitter distributor unit in one of the mounting positions.

(c) Note distance between point (A) where

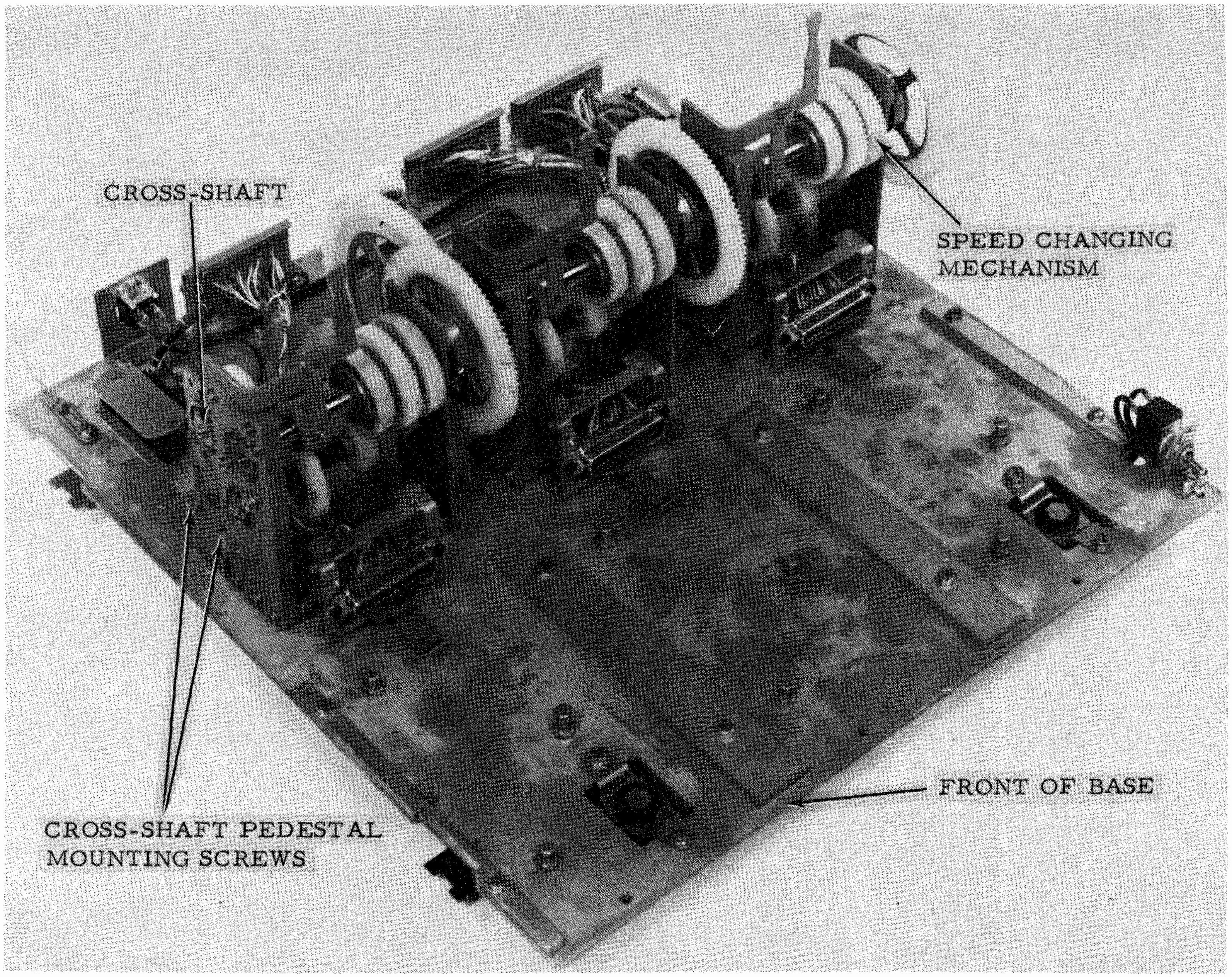


Figure 6-45. Cross-Shaft Position

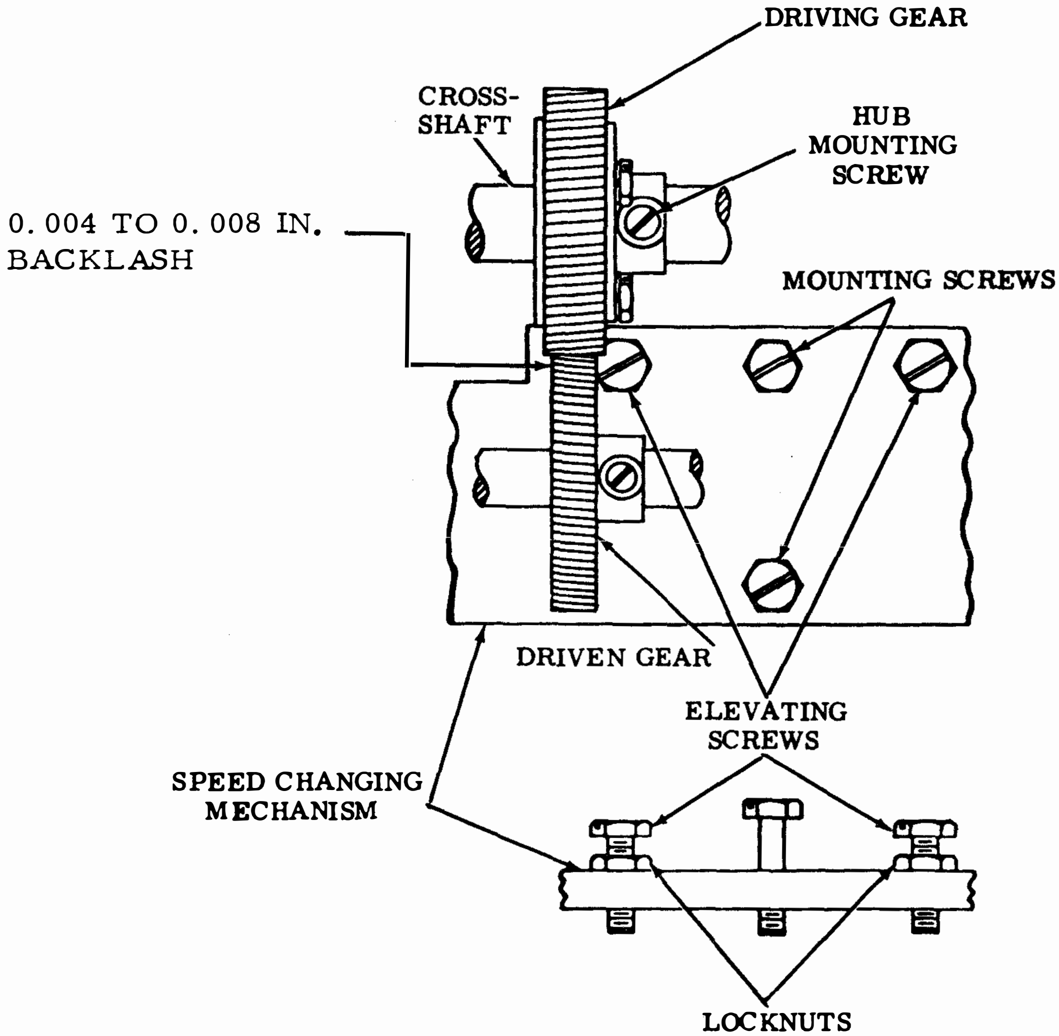


Figure 6-46. Speed Change Gear

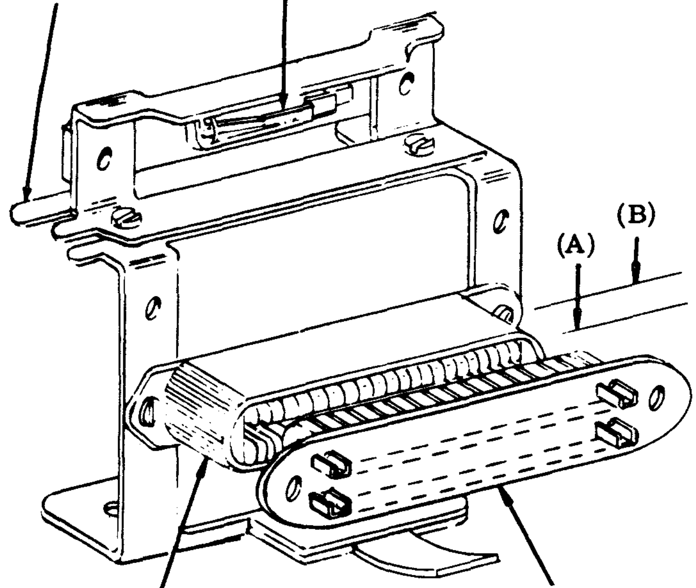


Figure 6-47. Line Shunt Switch

plug starts to engage receptacle and point (B) where plug is fully engaged with receptacle.

(d) Slowly withdraw unit. Ensure line shunt switch contacts close before unit is withdrawn one-half the distance from point (B) to point (A).

(e) If switch contacts do not close as specified, loosen switch bracket mounting screws to point of friction tightness and position switch by means of its pry point.

(f) Tighten mounting screws.

g. Cover Adjustments. Perform cover adjustments in accordance with the following paragraphs.

(1) Cover Plate. Adjust cover plate as follows:

(a) Refer to figure 6-48.

NOTE

When less than three transmitter distributor units are used on the base, the unused compartment contains a dummy unit. Position the top plate and cover in the same manner as if the compartment contained a transmitter distributor unit.

(b) With three transmitter distributor units in

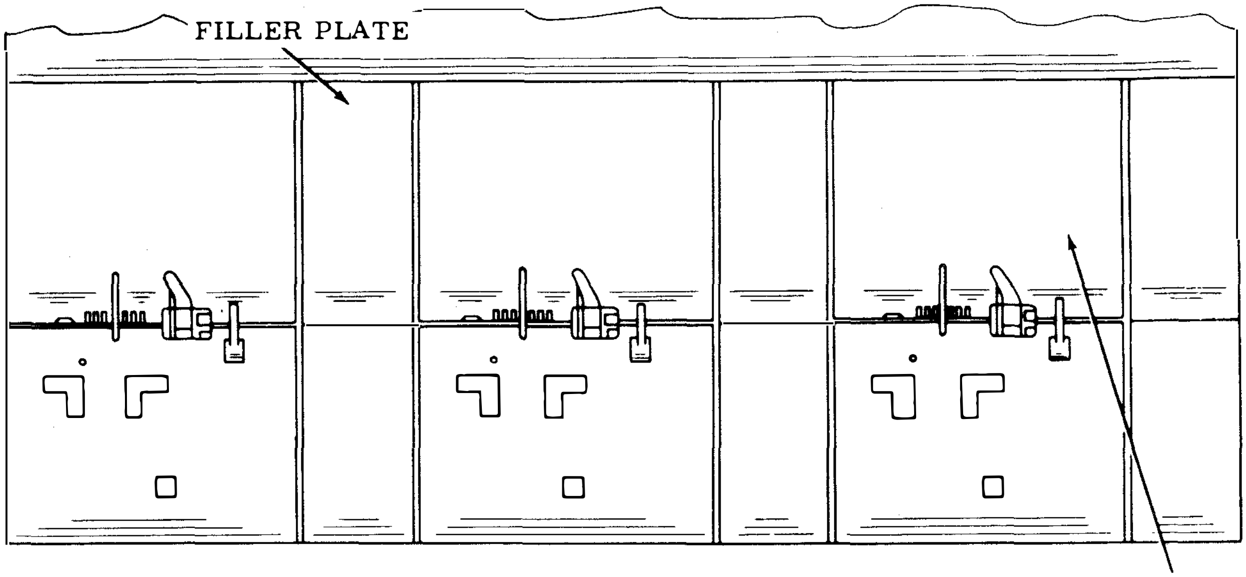


Figure 6-48. Cover Plates and Filler Plates

position on the base, ensure cover plates align horizontally and mating edge of each cover plate is flush with edge of corresponding top plate.

(c) If not, loosen cover plate detenting nuts and position cover plate.

(d) Tighten detenting nuts.

(e) Ensure cover plate opposite driving gear aligns with edge of top plate.

(f) If not, loosen corner plate detent mounting nuts and spring plate mounting nuts to point of friction tightness and position cover plate.

(g) Tighten cover plate detent mounting nuts and spring plate mounting nuts.

(2) Filler Plates. Adjust filler plates as follows:

(a) Refer to figure 6-48.

(b) Place a straight edge across top plates and filler plates 1/4 inch from cover plate. Gap between each plate and straight edge, 1/8 inch on each side of edge between top and filler plates (five edges) should be flush to 0.010 inch.

(c) If not, loosen filler plate mounting screws and plate mounting nuts to point of friction tightness. Position filler plate and its bracket to obtain specified gap.

(d) Tighten mounting screws and mounting nuts.

6-4.2 TRANSMITTER DISTRIBUTOR BASE (LOW-LEVEL). The adjustments for high-level

transmitter distributor bases
are also applicable to low-level
transmitter distributor bases.

SECTION II-ADJUSTMENTS
(VARIABLE FEATURES)

6-5. TRANSMITTER DISTRIBUTOR UNIT. Transmitter distributor unit high-level adjustments are described in paragraph 6-5.1. Low-level adjustment are described in paragraph 6-5.2.

6-5.1 TRANSMITTER DISTRIBUTOR UNIT (HIGH-LEVEL). Perform the transmitter distributor high-level adjustments described in the following paragraphs.

a. Tight-Tape and Tape Shoe Mechanism Adjustments. Perform tight-tape and tape shoe mechanism adjustments in accordance with the following paragraphs.

(1) Tight-Tape Switch. Adjust tight-tape switch as follows:

(a) Refer to figure 6-49.

(b) Place control lever in RUN position.

(c) Raise tight-tape arm until tight-tape switch contacts open.

(d) Measure gap between tight-tape arm and tape guideplate flange. Gap should be between 9/32 and 13/32 inch.

(e) If gap exceeds specified limits, loosen clamp screw. Using adjusting slot, position tight-tape intermediate arm to obtain specified gap.

(f) Tighten clamp screw.

(2) Torsion Spring. Adjust torsion spring as follows:

(a) Refer to figure 6-50.

(b) Attach spring scale hook as shown in figure.

(c) Force required to lift tape shoe should be not less than 2-1/2 ounces.

(d) If scale reading is less than specified limits, install new spring.

(3) Tape Shoe. Adjust tape shoe as follows:

(a) Refer to figure 6-50.

(b) Latch tape lid in position.

(c) Measure clearance between tap guideplate and tape shoe. Clearance should be between 0.005 and 0.008 inch.

(d) If clearance exceeds specified limits, loosen locknut and rotate adjusting screw to obtain specified clearance.

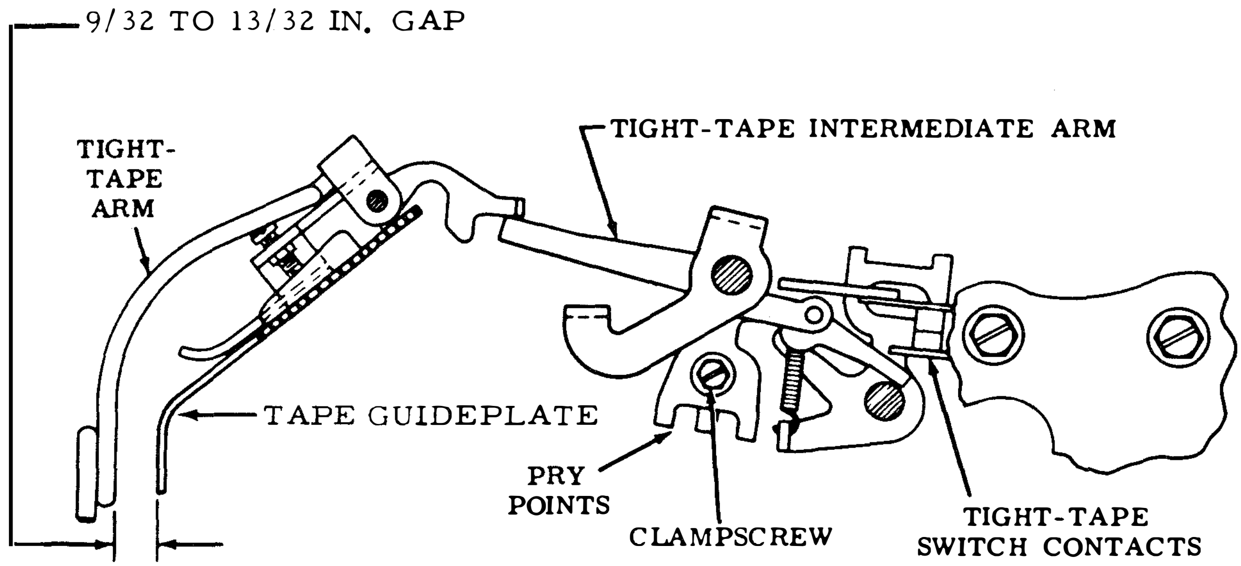
(e) Tighten locknut.

b. Tape Feed Assurance Mechanism Adjustments. Perform tape feed assurance mechanism adjustments in accordance with the following paragraphs.

(1) Tape Sensing Feedwheel Phasing. Adjust tape sensing feedwheel phasing as follows:

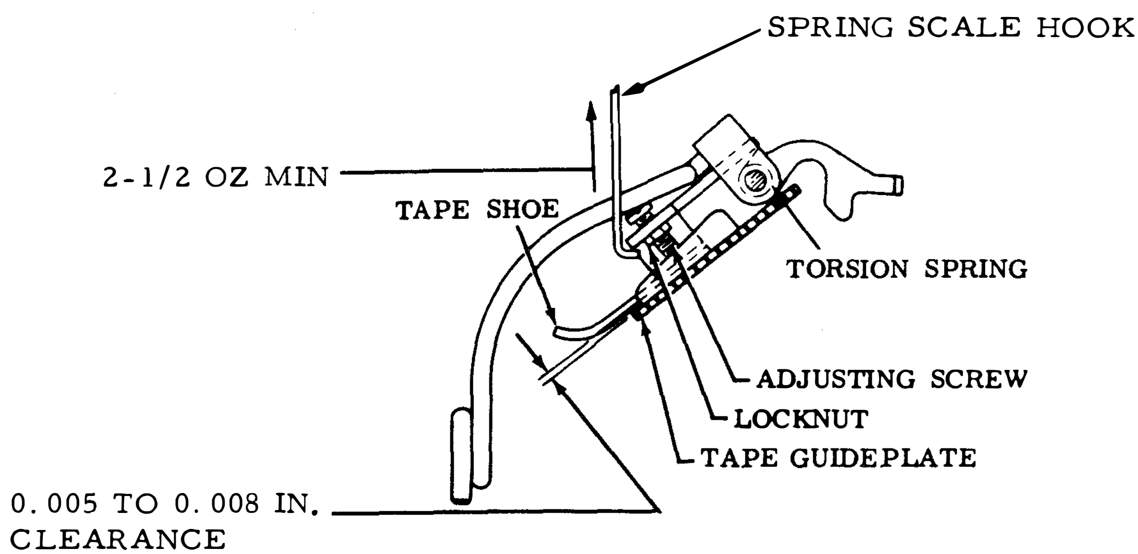
(a) Refer to figure 6-51.

(b) Place fresh fully perforated tape (10 holes per inch) on tape guideplate



REAR VIEW

Figure 6-49. Tight-Tape Switch



REAR VIEW

Figure 6-50. Torsion Spring and Tape Shoe

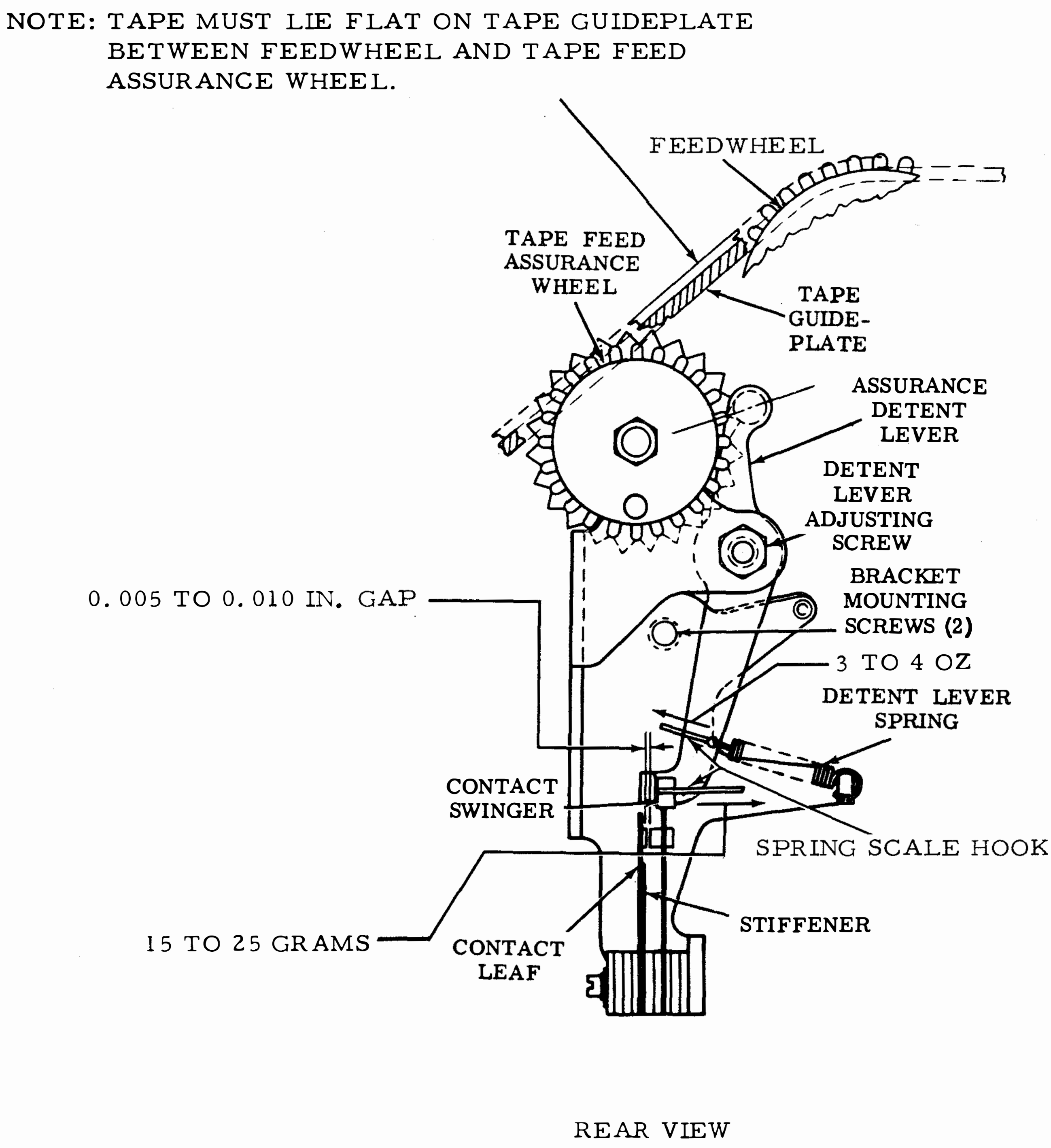


Figure 6-51. Tape Sensing Feedwheel Phasing, Tape Motion Contact Gap, Tape Motion Contact Swinger, and Detent Lever Spring

across feedwheel and tape feed assurance wheel.

NOTE

If tape is not available, use TP165800 gauge.

(c) Set detent adjusting lever screw at midrange.

(d) Ensure tape lies flat on tape guideplate between feedwheel and tape feed assurance wheel.

(e) If not, loosen bracket mounting screws to point of friction tightness and position bracket to meet requirement of step (c). If necessary, refine adjustment by rotating detent lever adjusting screw.

(f) Tighten bracket mounting screws.

(2) Tape Motion Contact Gap. Adjust tape motion contact gap as follows:

(a) Refer to figure 6-51.

(b) Place detent lever in detented position.

(c) Measure gap between normally closed contacts. Gap should be between 0.005 and 0.010 inch.

(d) If gap exceeds specified limits, bend contact leaf and stiffener to obtain specified gap.

(3) Tape Motion Contact Swinger. Adjust tape motion contact swinger as follows:

(a) Refer to figure 6-51.

(b) Attach spring scale hook to contact swinger as shown in figure.

(c) Force required to separate contacts should be between 15 and 25 grams.

(d) If scale reading exceeds specified limits, bend swinger to bring force required to open contact within specified limits.

(e) Perform adjustment described in paragraph 6-5.1b(2).

(4) Detent Lever Spring. Adjust detent lever spring as follows:

(a) Refer to figure 6-51.

(b) Attach spring scale hook to contact lever as shown in figure.

(c) Force required to move roller from ratchet should be between 3 and 4 ounces.

(d) If scale reading exceeds specified limits, install new spring.

c. Tape-Out Mechanism Adjustments. Perform tape-out mechanism adjustments in accordance with the following paragraphs.

(1) Tape-Out Contact. Adjust tape-out contact as follows:

(a) Refer to figure 6-52.

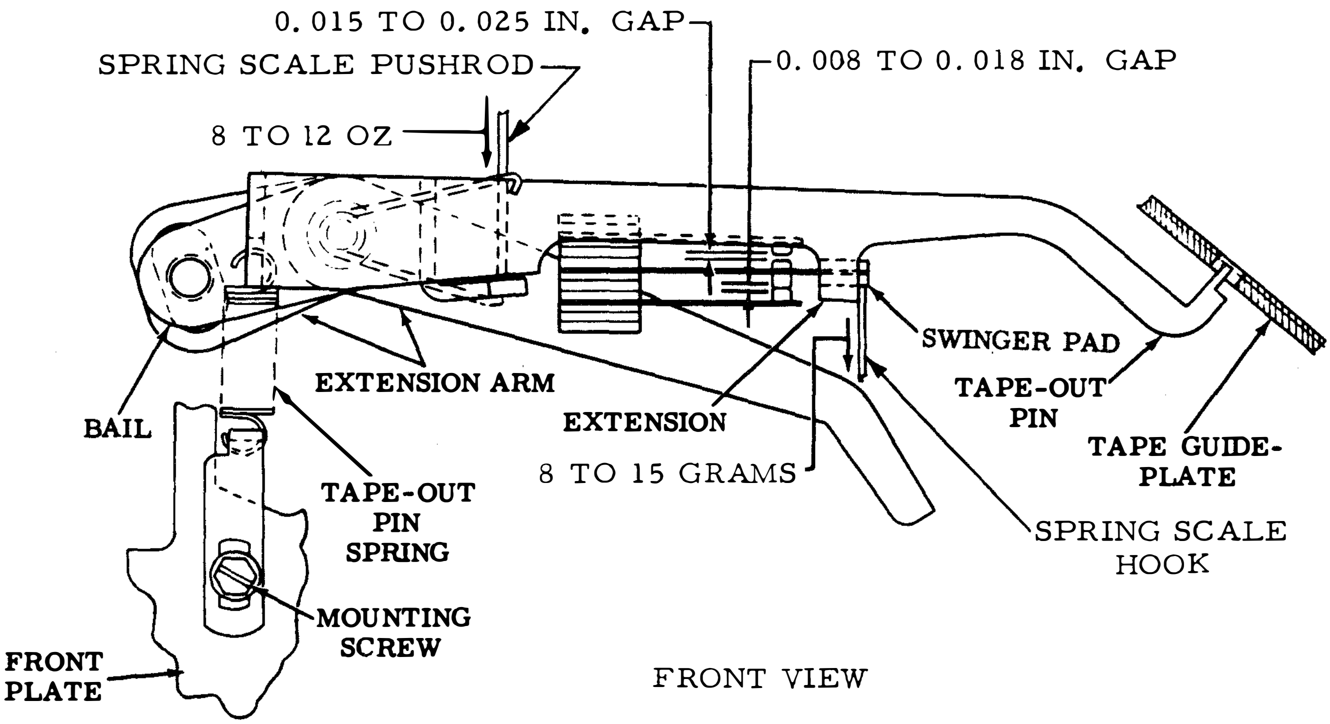


Figure 6-52. Tape-Out Contact and Tape-Out Bail Torsion Spring

(b) Loosen contact bracket mounting screws.

(c) Pivot contact assembly until pad on tape-out pin extension is not touching swinger pad.

(d) Measure gap between normally open (upper) contacts.

(e) Gap should be between 0.015 and 0.025 inch.

(f) If gap exceeds specified limits, bend upper contact spring to obtain specified gap.

(g) Return contact assembly to original position and tighten contact bracket mounting screws.

(h) Attach spring scale hook to swinger pad as shown in figure.

(i) Force required to separate normally closed (lower) contacts shold be between 8 and 15 grams.

(j) If scale reading exceeds specified limits, bend contact swinger to obtain specified scale reading. Repeat steps (b) through (g).

(k) Remove tape from unit, close tape lid, and place unit in run condition.

(l) With some clearance between tape-out pin extension and underside of contact swinger, measure gap between normally closed contacts. Gap should be between 0.008 and 0.018 inch.

(m) If gap exceeds specified limits, loosen contact bracket mounting screws and adjust contact mounting bracket to obtain specified gap.

(n) Tighten contact bracket mounting screws.

(2) Tape-Out Bail Torsion Spring. Adjust tape-out bail torsion spring as follows:

(a) Refer to figure 6-52.

(b) Apply spring scale pushrod as shown in figure.

(c) Force required to separate bail from tape-out pin should be between 8 and 12 ounces.

(d) If scale reading exceeds specified limits, install new spring.

(3) Tape-Out Pin Spring. Adjust tape-out pin spring as follows:

(a) Refer to figure 6-53.

(b) Remove tape and open tape lid.

(c) Apply spring scale pushrod to tape-out pin.

(d) Force required to press tape-out pin flush with tape guideplate should be between 1/2 and 1 ounce.

(e) If scale reading exceeds specified limits, install new spring.

(4) Tape-Out Pin. Adjust tape-out pin as follows:

(a) Refer to figure 6-53.

(b) Place control lever in either FREE or STOP position.

(c) Tape-out pin should be flush with surface of tape guideplate or 0.010 inch maximum below surface of tape guideplate.

(d) If position of tape-out pin is not as specified, place control lever in STOP position and loosen screw which holds stop arm to bracket with posts. Adjust stop arm to bring tape-out pin position within specified limits.

(e) Tighten screw.

d. Code Reading Contacts Adjustments. Perform code reading contacts adjustments in accordance with the following paragraphs.

(1) Normally-Closed Contacts - Backstop. Adjust normally-closed contacts - backstop as follows:

(a) Refer to figure 6-54.

NOTE

Remove code reading contact assembly from transmitter distributor unit before making initial adjustments.

(b) Ensure lower contact leaves for all levels are parallel with

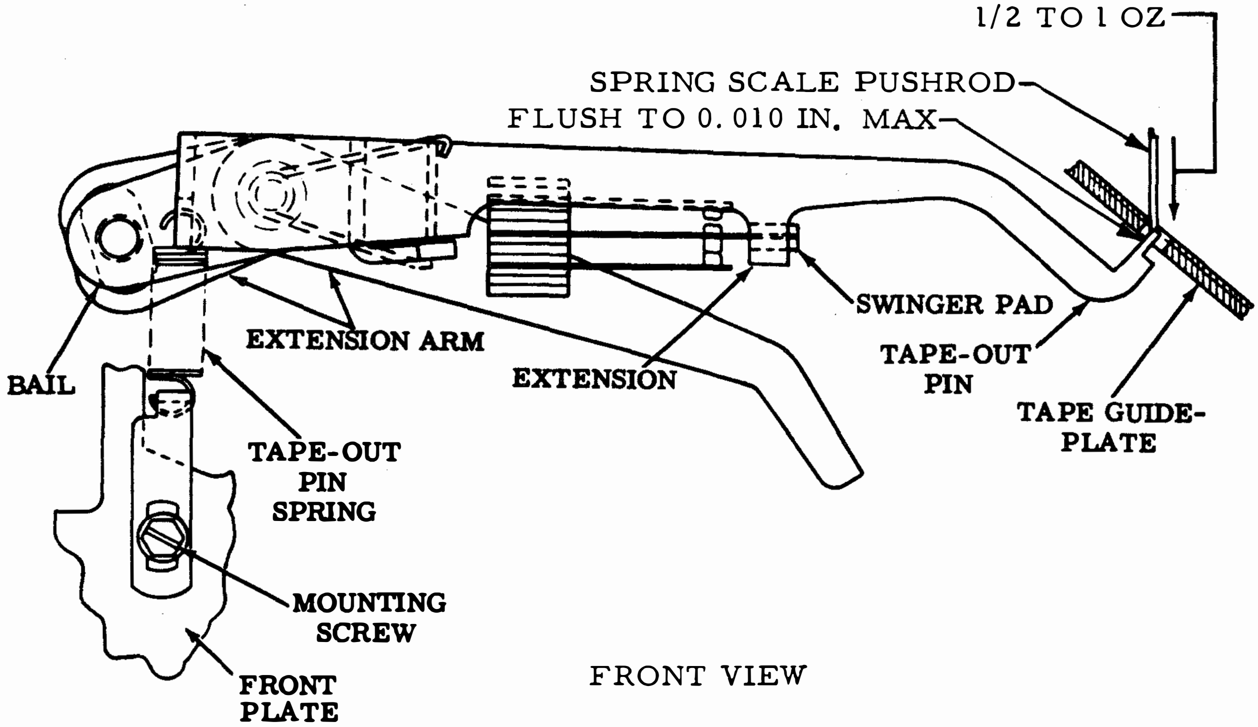


Figure 6-53. Tape-Out Pin Spring and Tape-Out Pin

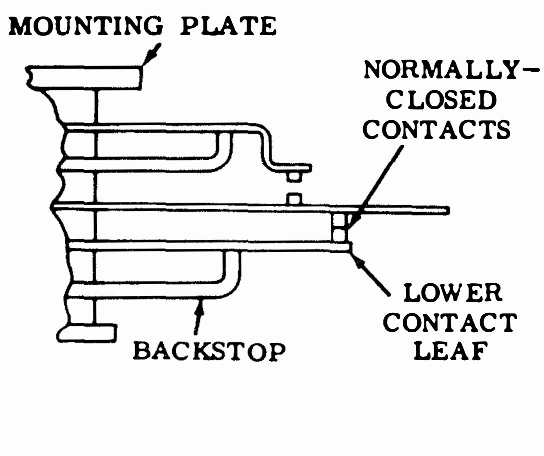


Figure 6-54. Normally-Closed Contacts - Backstop

mounting plate and aligned with each other.

(c) If lower leaf in any level is not parallel with mounting plate, bend its backstop to make lower leaf parallel with mounting plate.

(2) Normally-Closed Contacts - Spring. Adjust normally-closed contacts - spring as follows:

(a) Refer to figure 6-55.

(b) Hold swinger away from lower contact leaf using spring scale hook.

(c) Apply spring scale pushrod to lower contact leaf.

(d) Force required to move lower contact leaf away from its backstop should be between 2 and 6 ounces.

(e) Release swinger to allow normally closed contacts to close.

(f) Apply gram scale to swinger.

(g) Force required to open normally closed contacts should be between 30 and 40 grams.

(h) If scale reading in step (d) or (g) exceeds the specified limits, use a contact spring bender to bend the lower leaf or swinger.

NOTE

When using contact spring bender, start with contact pile-up farthest from handle of tool and work toward the handle so as not to disturb adjustments already made.

If it is necessary to bend backstop to obtain specified tension in step (h), repeat normally closed contacts - backstop adjustment described in paragraph 6-5.1d(1).

(3) Normally-Open Contact - Gap. Adjust normally-open contacts - gap as follows:

(a) Refer to figure 6-56.

(b) Measure gap between normally open contacts. Gap should be between 0.010 and 0.015 inch.

(c) If gap exceeds specified limits, bend upper backstop to obtain specified gap.

(4) Normally-Open Contacts - Spring. Adjust normally-open contacts - spring as follows:

(a) Refer to figure 6-56.

(b) Apply gram scale to normally open contact.

(c) Force required to move normally open contact away from backstop should be between 30 and 40 grams.

(d) If scale reading exceeds specified limits bend upper contact leaf.

NOTE

If it is necessary to bend backstop to obtain specified tension in step (d), perform

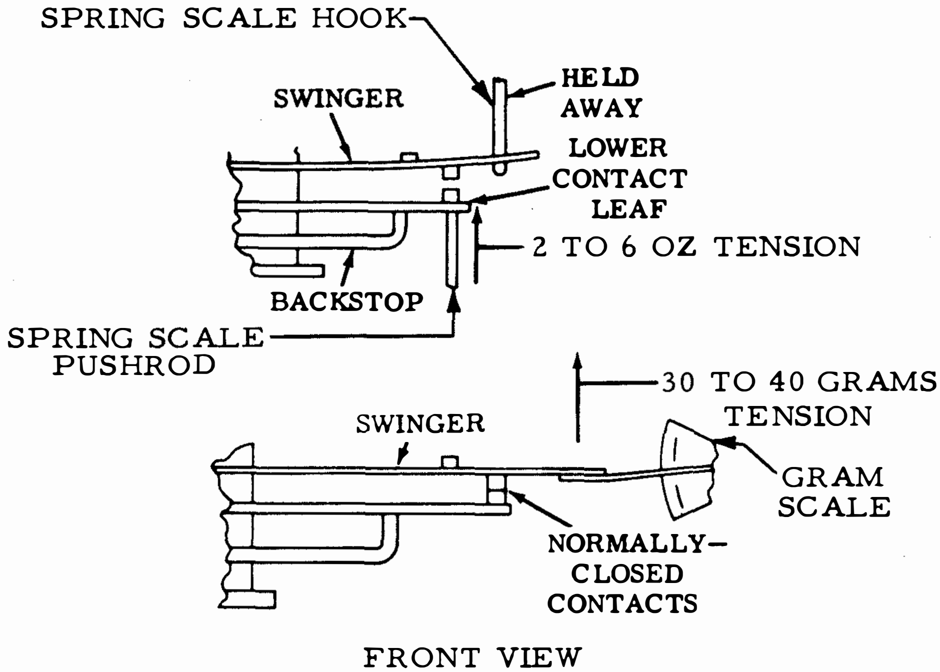


Figure 6-55. Normally-Closed Contacts - Spring

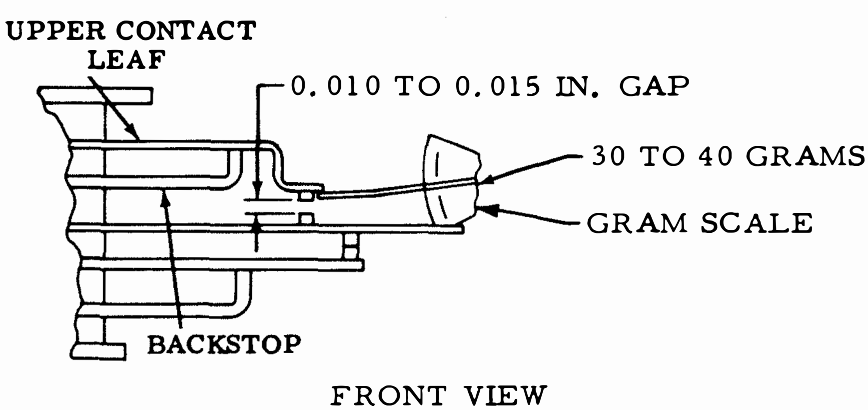


Figure 6-56. Normally-Open Contacts - Gap and Normally-Open Contacts - Spring

normally-open contacts - gap adjustment described in paragraph 6-5.1d(3).

(5) Contact Assembly Positioning. Adjust contact assembly positioning as follows:

(a) Refer to figure 6-57.

(b) Ensure each swinger is aligned with its sensing arm as gauged by eye.

(c) If any swinger is misaligned, loosen pile-up mounting screws and position pile-up so that swinger is in alignment with its sensing arm.

(d) Tighten pile-up mounting screws.

(6) Contact Swinger - Sensing Arm Clearance. Adjust contact swinger - sensing arm clearance as follows:

(a) Refer to figure 6-58.

(b) Position upstop post out of the way.

(c) Place sensing arms in their uppermost positions.

(d) Select blank combination (-----).

(e) Measure gap between contact assembly swinger and insulator on contact sensing arm. Gap should be between 0.015 and 0.025 inch.

(f) If gap exceeds specified limits loosen contact bracket mounting screws and position bracket to obtain specified gap.

(g) Tighten contact bracket mounting screws.

(7) Contact Sensing Arm - Upstop Clearance. Adjust contact sensing arm - upstop clearance as follows:

(a) Refer to figure 6-59.

(b) Rotate main shaft until sensing arms are in their highest positions.

(c) Engage clutch.

(d) Select a letters combination.

(e) Measure clearance between upper contact leaf and its backstop. There should be some clearance not exceeding 0.008 inch.

(f) If there is no clearance or clearance exceeds specified limit, loosen nut that holds eccentric upstop to front plate. Turn eccentric to obtain specified clearance. High part of eccentric should be toward left.

(g) Tighten eccentric nut.

(8) Sensing Arm - Transfer Lever Alignment. Adjust sensing arm - transfer lever alignment as follows:

(a) Refer to figure 6-60.

(b) Trip clutch.

(c) Select blank combination.

(d) Ensure each sensing arm engages at least 2/3

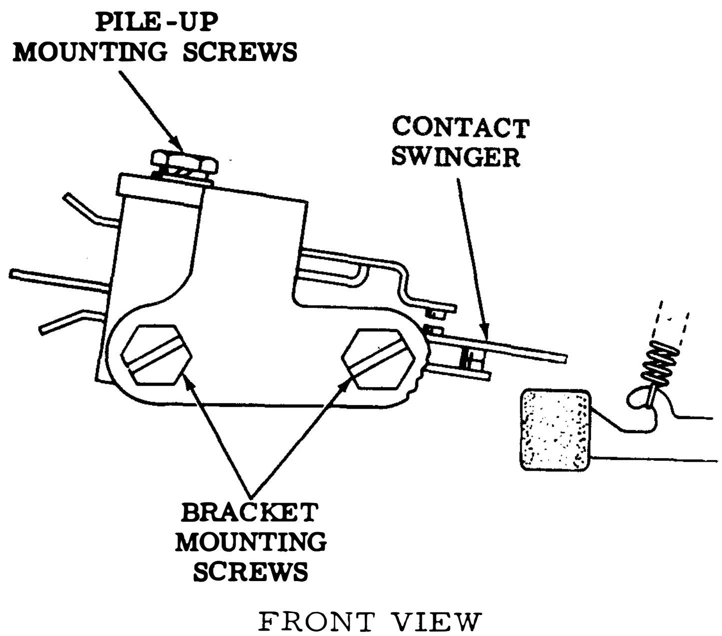


Figure 6-57. Contact Assembly Positioning

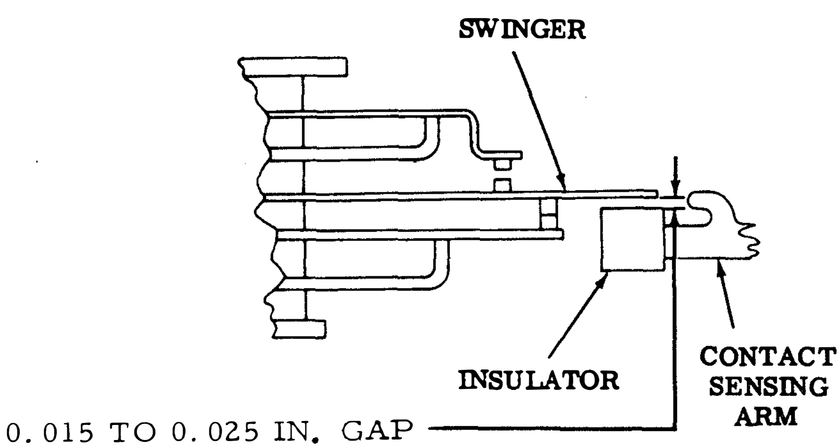


Figure 6-58. Contact Swinger - Sensing Arm Clearance

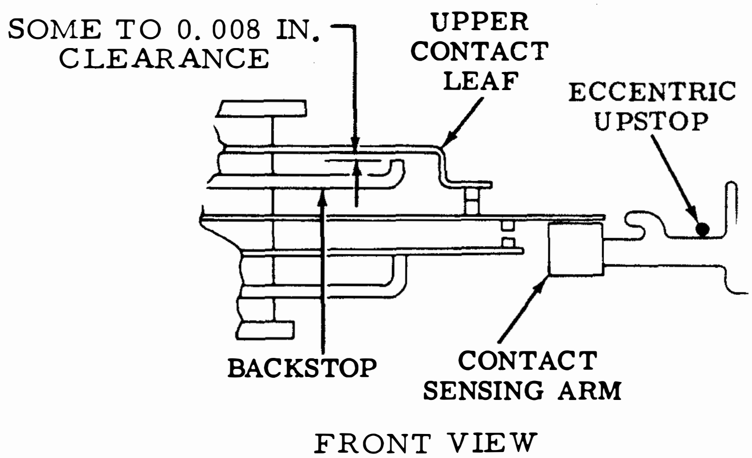


Figure 6-59. Contact Sensing Arm - Upstop Clearance

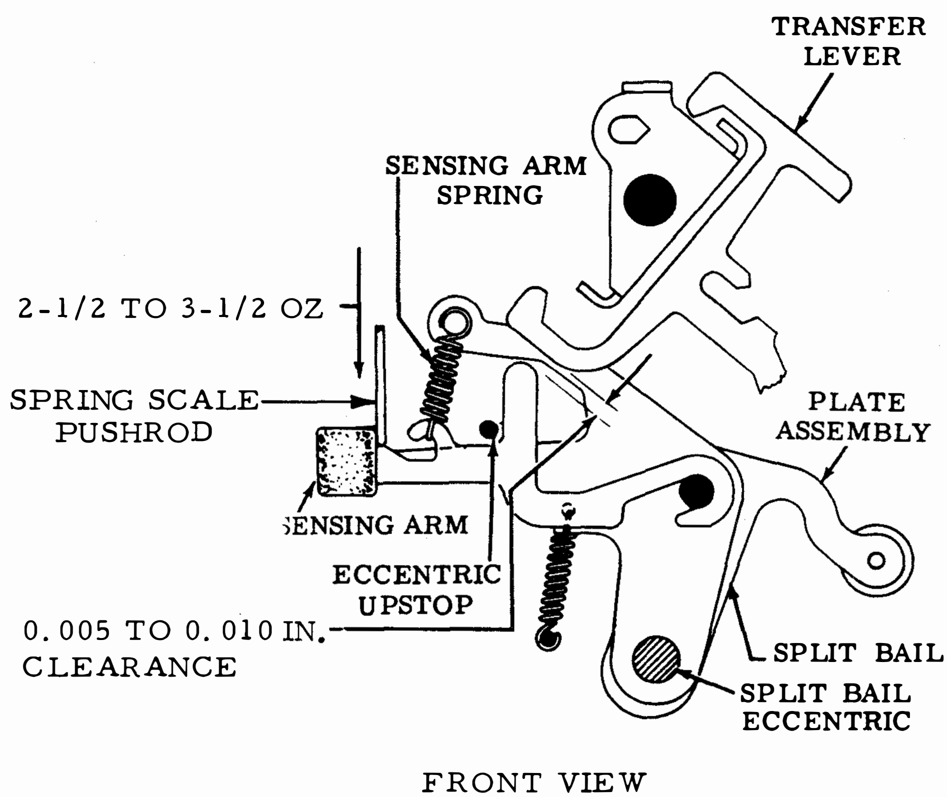


Figure 6-60. Sensing Arm - Transfer Lever Alignment, Sensing Arm Spring and Split Bail Eccentric

of its associated transfer lever as gauged by eye.

(e) If engagement is not as specified, add TP8896 shims between plate assembly and split bail spacer until engagement is as specified. Store remaining shims under flat washer at end of split bail eccentric screw.

(9) <u>Sensing Arm Spring</u>. Adjust sensing arm spring as follows:

(a) Refer to figure 6-60.

(b) Disengage clutch.

(c) Apply spring scale pushrod to sensing arm as shown in figure.

(d) Force required to start sensing arm moving should be between 2-1/2 and 3-1/2 ounces.

(e) If scale reading exceeds specified limits, install new spring.

(10) <u>Split Bail Eccentric</u>. Adjust split bail eccentric as follows:

(a) Refer to figure 6-60.

(b) Trip clutch.

(c) Select blank combination.

(d) Measure clearance between closest transfer lever and its associated sensing arm. Clearance should be between 0.005 and 0.010 inch.

(e) If clearance exceeds specified limits, loosen split bail eccentric locknut.

(f) Rotate split bail eccentric to meet requirement.

(g) Tighten locknut.

(11) <u>Contact Swinger - Sensing Arm Clearance (Strobing)</u>. Adjust contact swinger - sensing arm clearance (strobing) as follows:

NOTE

When strobing the code reading contacts, use a DXD scale whose unit corresponds to that of the unit being checked. Refer to Table 6-4, Contact Operating Requirements (contact swinger - sensing arm clearance). Synchronize the signal generator on the transmitter distributor unit with the DXD so that the end of the stop pulse image is in line with the end of the stop pulse on the DXD scale when transmission is continuous. Use a normal signal line direct current of 60 milliampere ±10 percent or 20 milliampere ±10 percent to strobe the contacts.

(a) Ensure contacts open and close within the range specified in Table 6-1.

(b) Ensure breaks in pulses are confined to first and last 10 divisions of the trace.

(c) If contacts do not open and close within the

Table 6-4. Contact Operating Requirements (Contact Swinger - Sensing Arm Clearance)

		Beginning Pulse			End of Pulse			
Levels	Unit Code	Scale Segment	Scale Division	Tolerance (Div)	Scale Segment	Scale Division	Tolerance (Div)	Max. Pulse Length Osc (Div)
5	7.00	Pulse 1	25	±20	Pulse 5	15	±20	3
5	7.42	Pulse 1	30	±20	Pulse 5	40	±20	3
6	8.50	Pulse 0	45	±25	Pulse 5	5	±25	4

range specified in step (a) or breaks in pulses are not confined to first and last 10 divisions of the trace in step (b), loosen contact bracket mounting screws. Position bracket to meet requirement of step (a) or step (b).

(d) Tighten contact bracket mounting screws.

e. Auxiliary Contacts Adjustments. Perform adjustments in accordance with the following paragraph.

(1) Normally-Open Contacts. Adjust normally-open contacts as follows:

(a) Refer to figure 6-61.

NOTE

Make initial adjustments with auxiliary contacts removed from transmitter distributor unit.

(b) Attach spring scale hook to normally-open contact leaf as shown in figure.

(c) Force required to move contact leaf away from stiffeners should be between 5-1/2 and 6 ounces.

(d) If scale reading exceeds specified limits, bend normally open contact leaf to obtain specified contact leaf tension.

(e) Measure gap between normally open contacts. Gap should be between 0.015 and 0.020 inch.

(f) If gap exceeds specified limits, bend contact stiffener to obtain specified gap.

(2) Normally-Closed Contacts. Adjust normally-closed contacts as follows:

(a) Refer to figure 6-61.

(b) Apply spring scale pushrod to contact swinger.

(c) Force required to open normally closed contacts should be between 4 and 5 ounces.

(d) If scale reading exceeds specified limits, bend contact swinger leaf to obtain specified tension.

(3) Contact Sensing Arm. Adjust contact sensing arm as follows:

(a) Refer to figure 6-62.

NOTE

Make secondary adjustments with auxiliary contacts installed in transmitter distributor unit.

(b) Disengage and latch clutch.

(c) Ensure swinger insulator is centrally positioned with respect to its operating bail.

(d) If insulator is not centrally positioned, loosen contact assembly screws. Position swinger and contact springs so swinger insulator is centrally

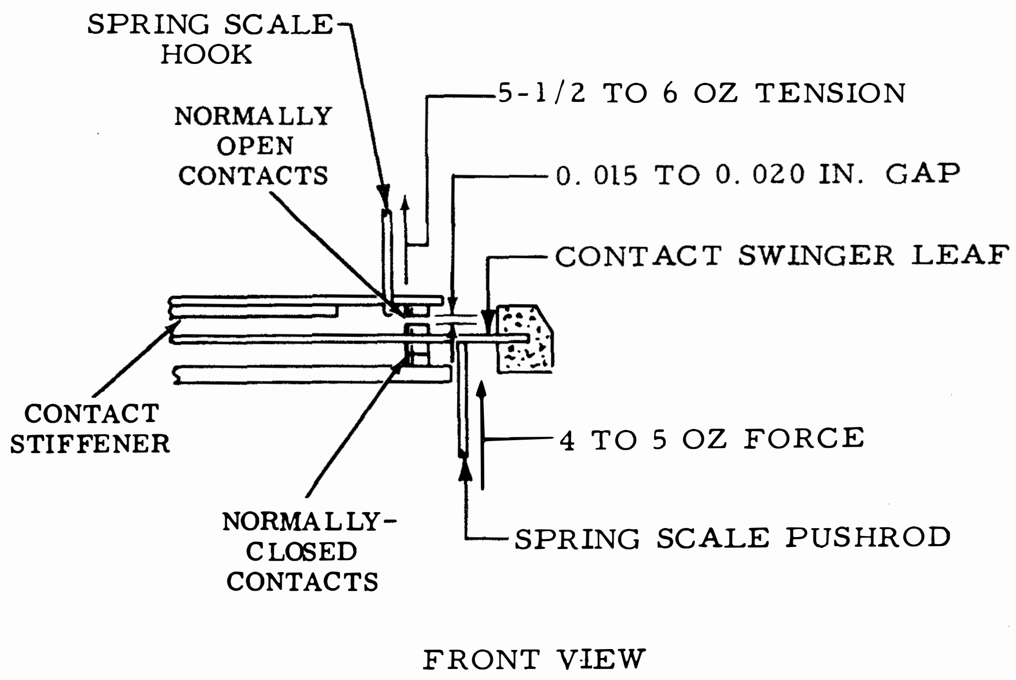


Figure 6-61. Normally-Open Contacts and Normally-Closed Contacts

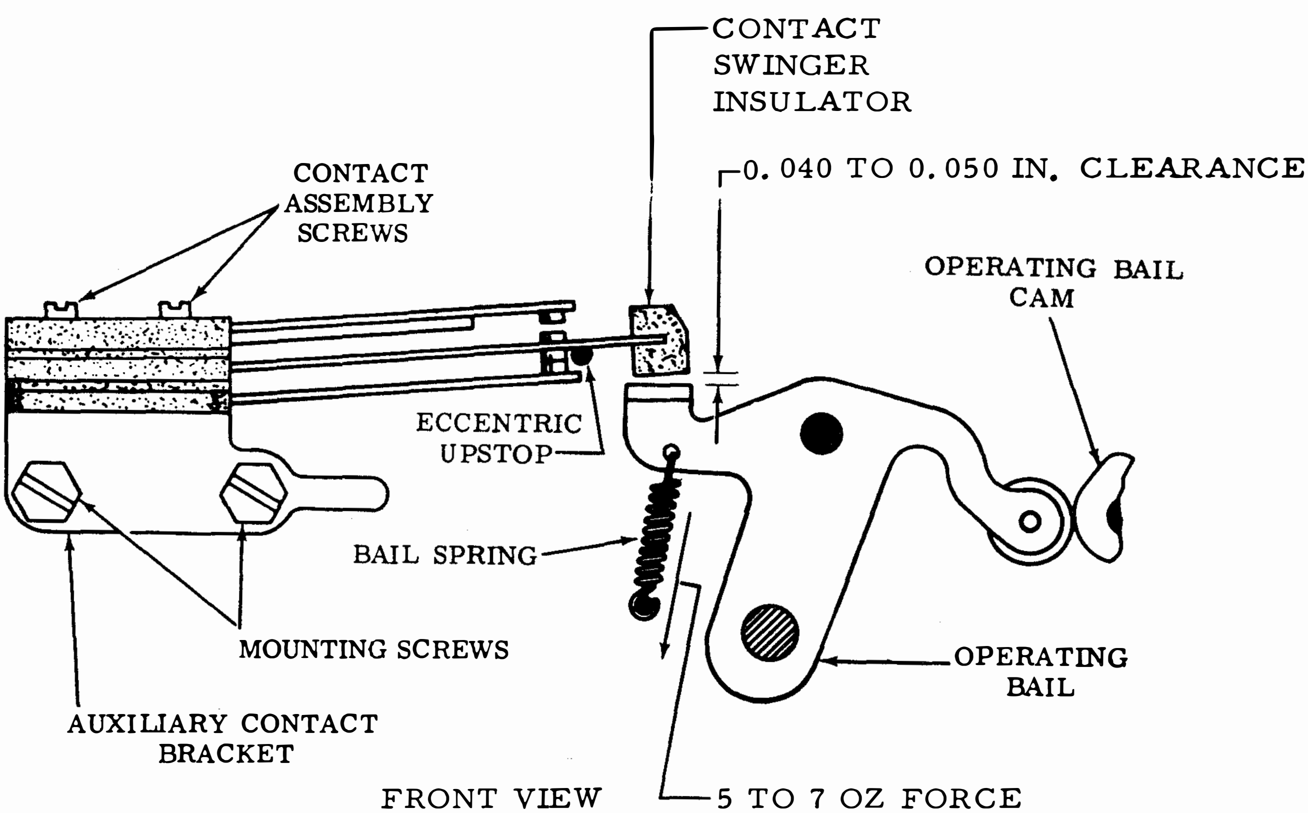


Figure 6-62. Contact Sensing Arm and Auxiliary Contact Operating Bail Spring

located with respect to its operating bail.

(e) Tighten contact assembly screws.

(f) Measure clearance between swinger insulator and bail. Clearance should be between 0.040 and 0.050 inch.

(g) If clearance exceeds specified limits, loosen contact bracket mounting screws and position contact bracket to obtain specified clearance.

(h) Tighten contact bracket mounting screws.

(4) <u>Auxiliary Contact Operating Bail Spring</u>. Adjust auxiliary contact operating bail spring as follows:

(a) Refer to figure 6-62.

(b) Disengage clutch.

(c) Disconnect end of auxiliary contact operating bail spring farthest from operating bail.

(d) Attach spring scale hook to free end of spring.

(e) Force required to extend spring to its installed length should be between 5 and 7 ounces.

(f) If required force is within specified limits, reconnect free end of spring.

(g) If required force exceeds specified limits, install new spring.

(5) <u>Contact Swinger - Operating Bail Clearance</u>. Adjust contact swinger - operating bail clearance as follows:

NOTE

When strobing the auxiliary contacts, use a DXD scale whose unit corresponds to that of the unit being checked. Refer to Table 6-5, Contact Operating Requirements (contact swinger - operating bail clearance). Synchronize the signal generator on the mitter distributor unit with the DXD so that the end of the stop pulse image is in line with the end of the stop pulse on the DXD scale when transmission is continuous. Use a normal signal line direct current of 60 milliampere $\pm$10 percent or 20 milliampere $\pm$10 percent to strobe the contacts.

(a) Ensure contacts open and close within the range specified in Table 6-5.

(b) If contacts do not open and close within the specified range, loosen contact bracket mounting screws. Position bracket to bring contact opening and closure within specified range.

(c) Tighten contact bracket screws.

f. <u>Tape Lid Sensing Lever Adjustments</u>. Perform tape lid sensing lever adjustments in accordance with the following paragraph.

Table 6-5. Contact Operating Requirements (Contact Swinger - Operating Bail Clearance)

Levels	Unit Code	Start of Pulse			End of Pulse		
		Scale Segment	Scale Division	Tolerance (Div)	Scale Segment	Scale Division	Tolerance (Div)
5	7.00	Pulse 1	65	±15	Pulse 4	65	±15
5	7.42	Pulse 1	75	±15	Pulse 4	90	±15
6	8.50	Pulse 1	0	±20	Pulse 4	60	±20

(1) <u>Switch Lever Spring</u>. Adjust switch lever spring as follows:

(a) Refer to figure 6-63.

(b) Open tape lid.

(c) Apply spring scale pushrod to switch lever as shown in figure.

(d) Force required to separate switch lever from contact should be between 20 and 35 grams.

(e) If scale reading exceeds specified limits, install new spring.

(2) <u>Switch Lever</u>. Adjust switch lever as follows:

(a) Refer to figure 6-63.

(b) Open tape lid and depress tape-out sensing pin.

(c) Measure gap between normally-closed tape-out switch contacts. Clearance should be between 0.005 and 0.015 inch.

(d) If gap exceeds specified limits, loosen adjustment screw.

(e) Seat tape lid sensing lever firmly against tape guideplate and rotate switch lever clockwise or counterclockwise as necessary to obtain specified contact gap.

(f) Tighten adjustment screw.

g. <u>Tape Deflector Adjustments</u>. Perform tape deflector adjustments as follows:

(1) <u>Tape Deflector Bracket</u>. Adjust tape deflector bracket as follows:

(a) Refer to figure 6-64.

(b) Place unit in operating position.

(c) Ensure deflector tang is positioned centrally in its hole in top plate.

(d) If tang is not in center of hole, remove rear screw which holds tape deflector spring to cover.

(e) Loosen forward screw and position tape deflector.

(f) Replace rear screw and tighten both forward and rear screws.

(2) <u>Tape Deflector Spring</u>. Adjust tape deflector spring as follows:

(a) Refer to figure 6-64.

(b) Attach spring scale hook as shown in figure.

(c) Force required to start deflector moving from its operating position should be between 1-1/2 and 4 ounces.

(d) If scale reading exceeds specified limits, loosen mounting screw and position spring using enlarged mounting slot.

(e) Tighten mounting screw.

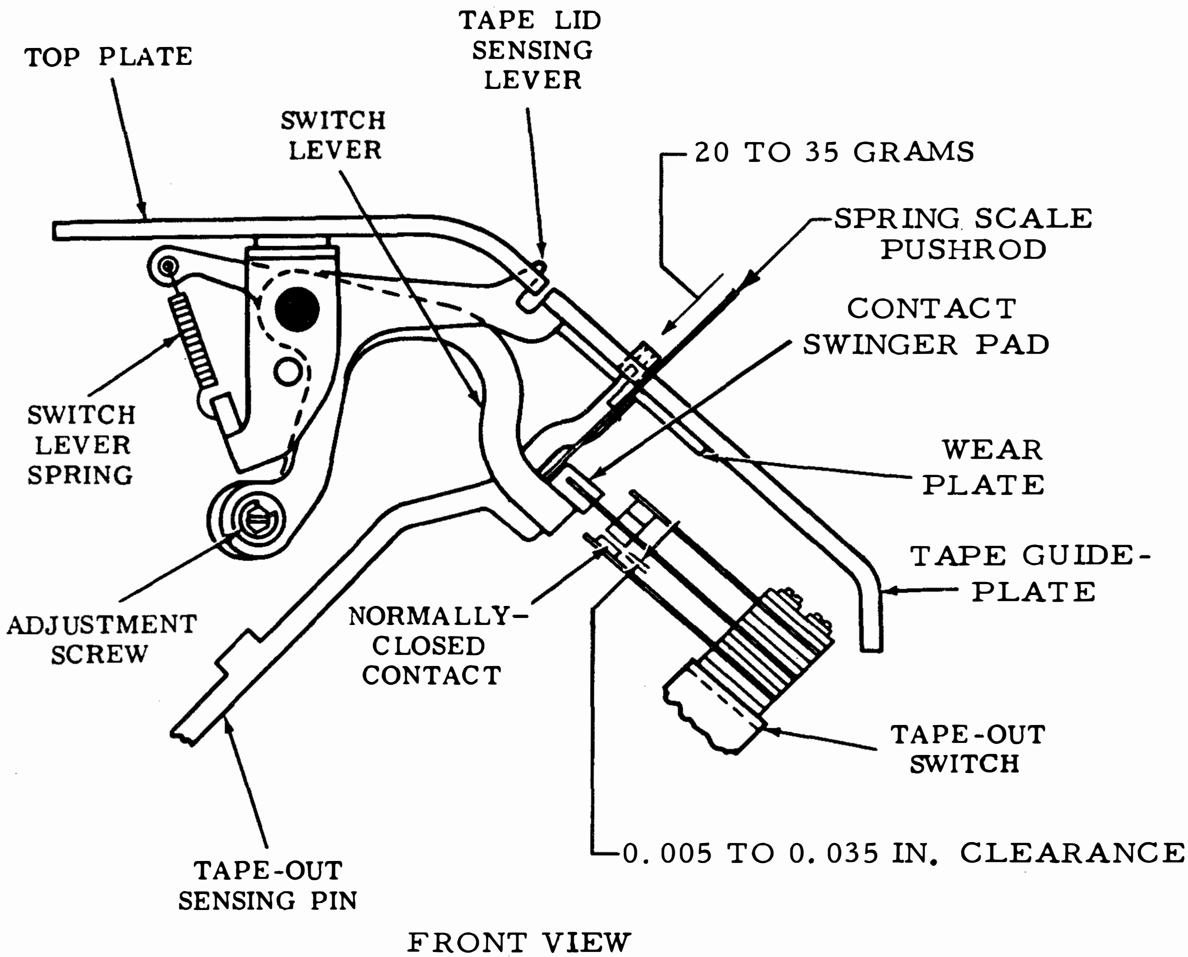


Figure 6-63. Switch Lever Spring and Switch Lever

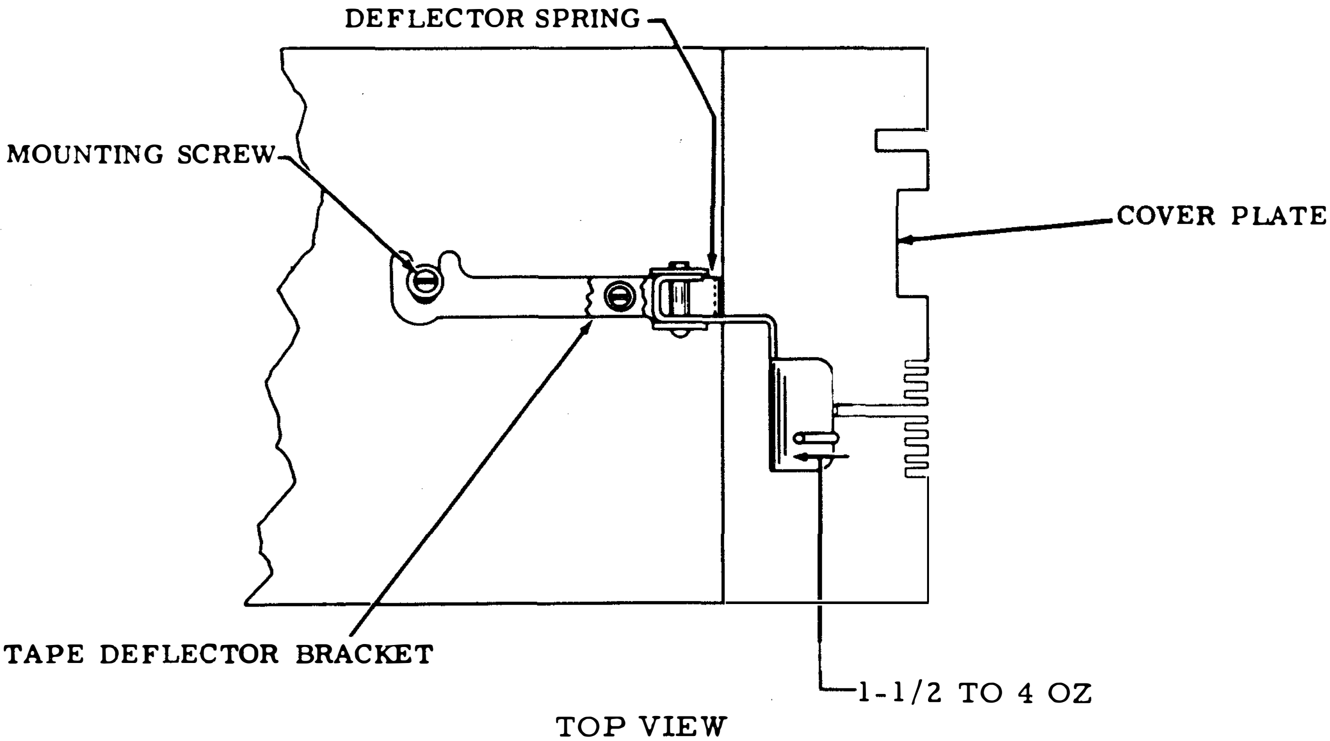


Figure 6-64. Tape Deflector Bracket and Tape Deflector Spring

h. Start - Stop Pulse Contact Adjustments. Perform start - stop pulse contact adjustments in accordance with the following paragraphs.

(1) Contact Lever. Adjust contact lever as follows:

(a) Refer to figure 6-65.

(b) Remove contact assembly from unit.

(c) Ensure there is no clearance between contact lever and insulator.

(d) Apply gram scale as shown in figure.

(e) Force required to move insulator from contact operating lever should be between 20 and 30 grams.

(f) If scale reading exceeds specified limits, bend lower contact spring to obtain specified scale reading.

(2) Contact Gap (Start and Stop Contact). Adjust contact gap (start and stop contacts) as follows:

(a) Refer to figure 6-65.

(b) Measure contact gap between upper spring and lower spring. Gap should be between 0.012 and 0.018 inch.

(c) If gap exceeds specified limits, bend

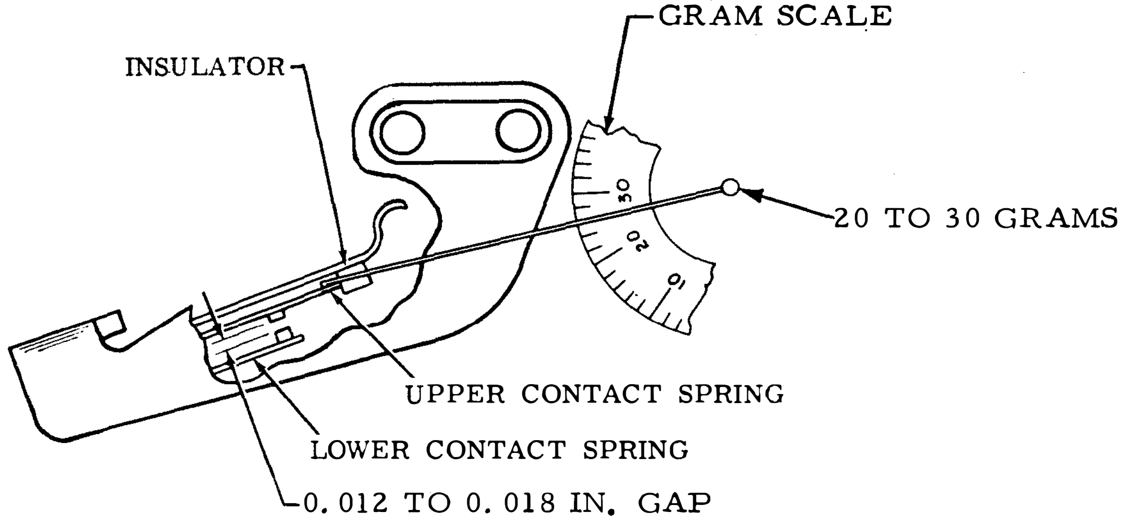


Figure 6-65. Contact Lever and Contact Gap (Start and Stop Contacts)

upper contact spring to obtain specified gap.

(3) Contact Bracket. Adjust contact bracket as follows:

(a) Refer to figure 6-66.

(b) Place unit in stop position.

(c) Latch clutch.

(d) Measure clearance between contact operating lever and transfer lever. Clearance should be between 0.012 and 0.018 inch.

(e) If clearance exceeds specified limits, loosen mounting bracket screws and position assembly to obtain specified clearance.

(f) Tighten mounting bracket screws and install contact assembly in unit.

(4) Contact Bracket (Strobing). Adjust contact bracket (strobing) as follows:

NOTE

When strobing auxiliary contacts, use a 7.42 unit DXD scale. Synchronize transmitter distributor unit signal generator with the DXD so the end of the stop pulse image is in line with the stop pulse on the DXD scale when transmission is continuous. Use normal

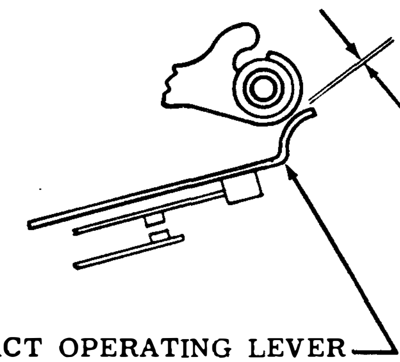


Figure 6-66. Contact Bracket

signal line direct current of 60 milliampere ±10 percent to strobe contacts.

(a) Ensure contacts close within range specified below.

	Min Range	Closure Range
Stop Contact	95 divisions	0 divisions of stop segment to 142nd division of stop segment
Start Contact	60 divisions	122nd division of stop segment to 95th division of start segment

NOTE

Breaks are permissible within 5 divisions of the beginning or end of a trace.

(b) If closure range is not within specified limits, loosen contact bracket mounting screw and position contact bracket to obtain specified closure range.

(c) Tighten contact bracket mounting screws.

i. Rub-Out Deleter Adjustments. Perform rub-out deleter adjustments in accordance with the following paragraphs.

(1) Rub-Out Deleter Bail Guide. Adjust rub-out deleter bail guide as follows:

(a) Refer to figure 6-67.

(b) Place each sensing pin in its highest position.

(c) Ensure deleter bail moves freely in its guide.

(d) Ensure rub-out deleter bail rests against lower projection of sensing pin when rub-out permutation code is present. If not, loosen mounting screws to point of friction tightness.

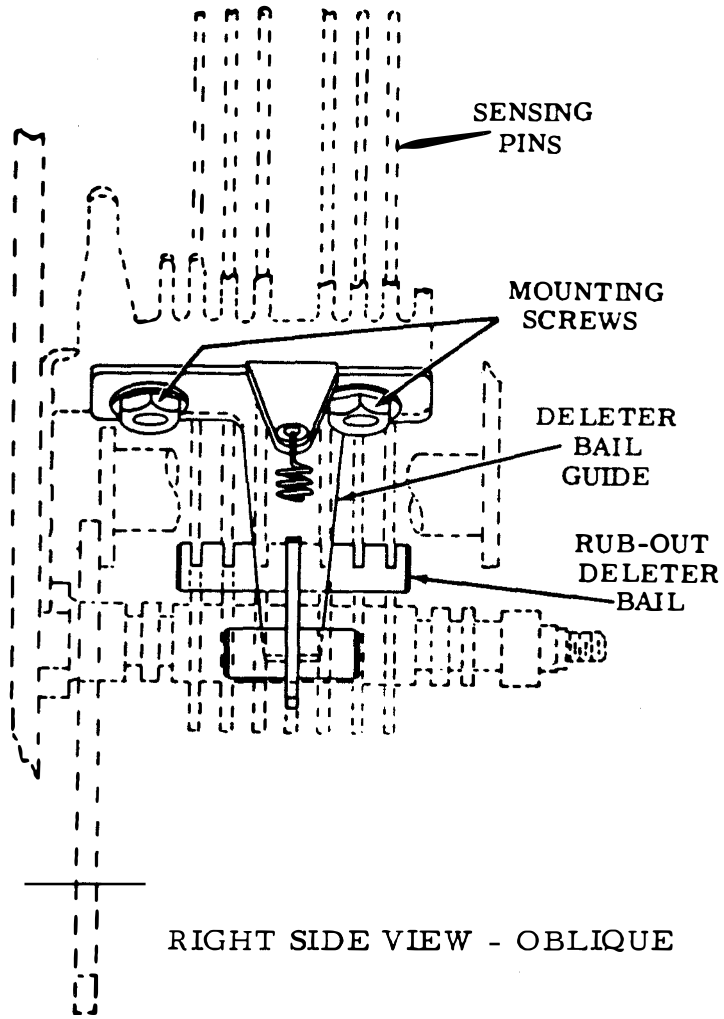


Figure 6-67. Rub-Out Deleter Bail Guide

(e) Position deleter bail guide so that rub-out deleter rests against lower projection of sensing pin.

(f) Tighten mounting screws.

(2) Sensing Pin Spring. Adjust sensing pin as follows:

(a) Refer to figure 6-68.

(b) Place sensing pin in its highest position.

(c) Hold rub-out deleter bail away from pin.

(d) Apply spring scale pushrod to sensing pin as shown in figure.

(e) Force required to move sensing pin to a position flush with surface of tape guide should be between 3 and 5 ounces.

(f) If scale reading exceeds specified limits, install new spring.

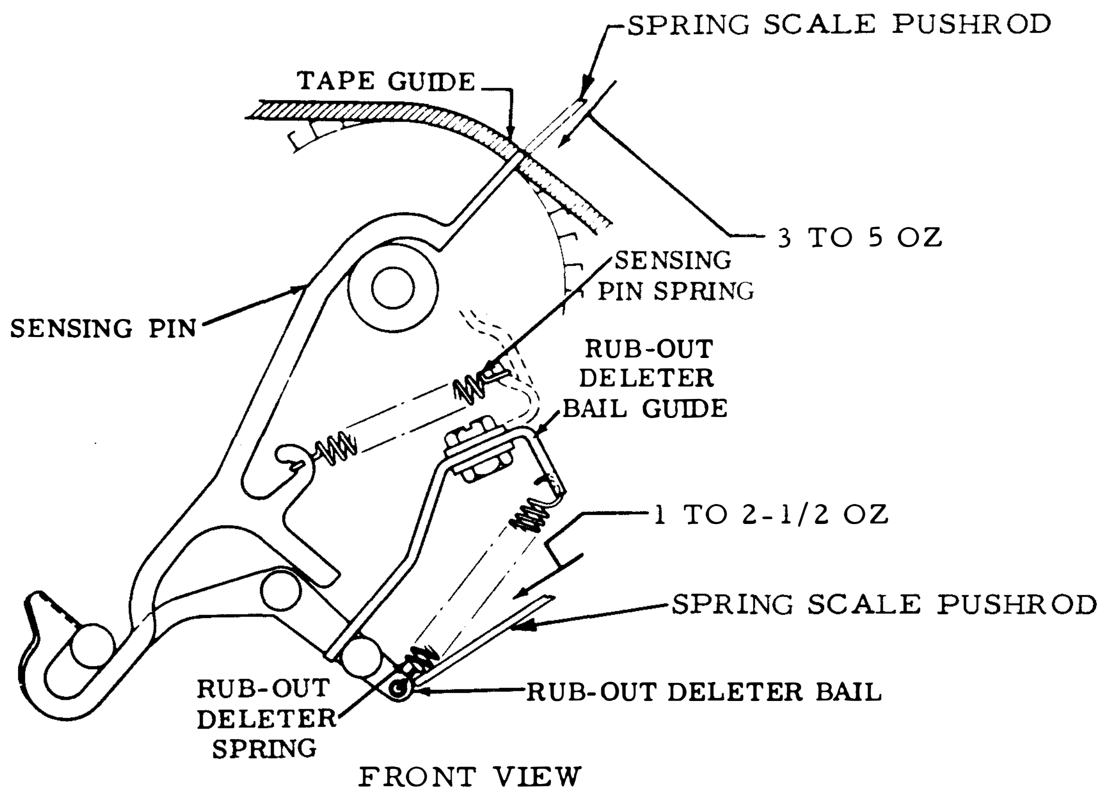


Figure 6-68. Sensing Pin Spring and Rub-Out Deleter Bail Spring

(3) Rub-Out Deleter Bail Spring. Adjust rub-out deleter bail spring as follows:

(a) Refer to figure 6-68.

(b) Place sensing pin in its highest position.

(c) Apply spring scale pushrod to rub-out deleter bail as shown in figure.

(d) Force required to move bail away from sensing pin should be 1 to 2-1/2 ounces.

(e) If scale reading exceeds specified limits, install new spring.

j. Tape Notch Sensing Mechanism Adjustments. Perform tape notch sensing mechanism adjustments in accordance with the following paragraphs.

(1) Tape Notch Sensing Pin Spring. Adjust tape notch sensing pin spring as follows:

(a) Refer to figure 6-69.

(b) Place sensing pin in highest position.

(c) Apply spring scale pushrod to sensing pins as shown in figure.

(d) Force required to move sensing pin to a position flush with surface of

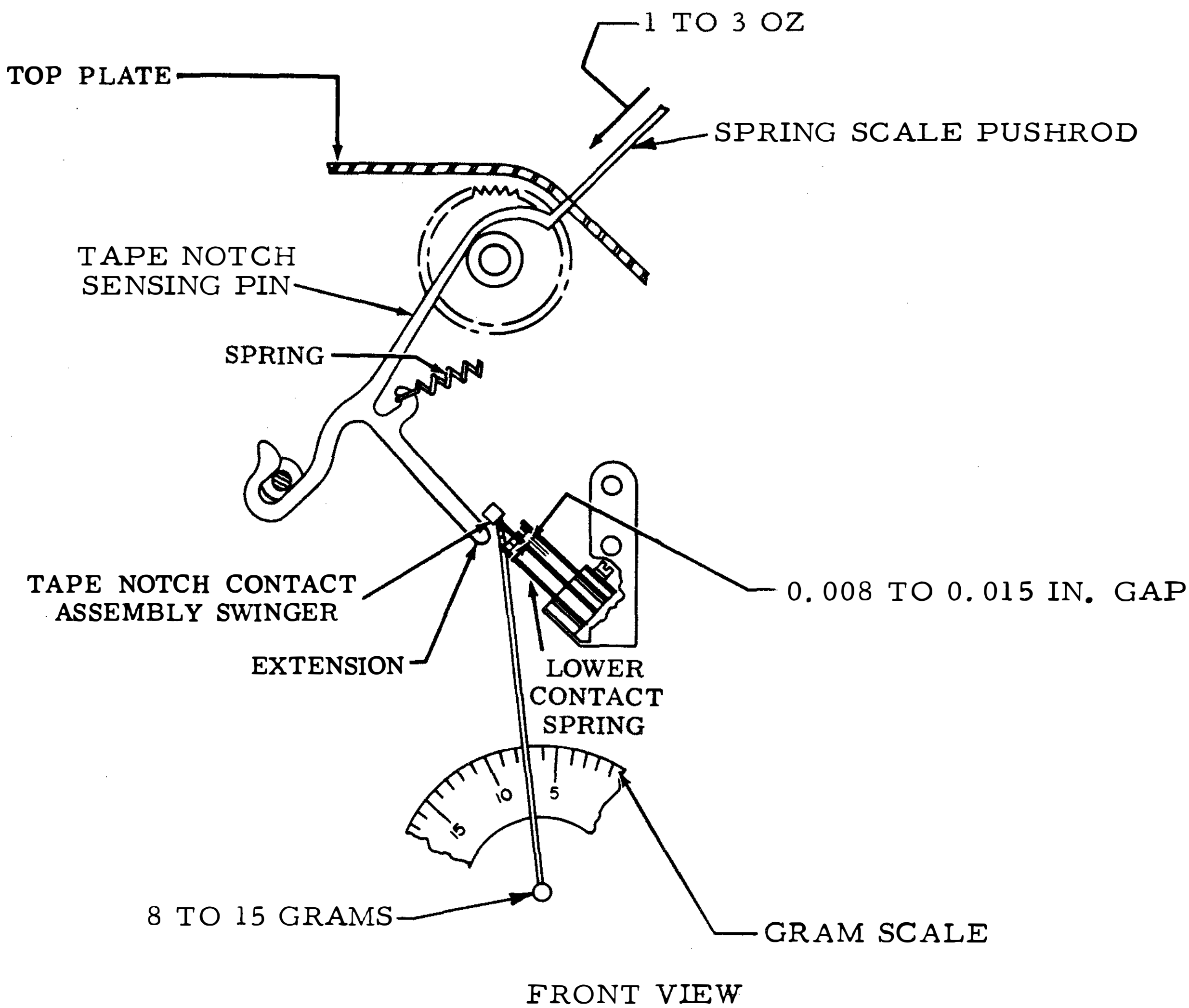


Figure 6-69. Tape Notch Sensing Pin Spring and Tape Notch Sensing Contact

top plate should be between 1 and 3 ounces.

(e) If scale reading exceeds specified limits, install new spring.

(2) Tape Notch Sensing Contact. Adjust tape notch sensing contact as follows:

(a) Refer to figure 6-69.

(b) Ensure insulator on swinger is centrally positioned relative to extension on sensing pin. If not, loosen contact assembly mounting screws and position contact assembly to meet requirements.

(c) Tighten mounting screws.

(d) Place sensing pin flush with top plate and measure clearance between sensing pin extension and insulator of contact swinger.

(e) Measure gap between normally-open contacts. Gap should be between 0.008 and 0.015 inch.

(f) If gap exceeds specified limits, bend swinger to obtain specified contact gap.

(g) Hold sensing pin extension away from swinger. Apply gram scale to swinger as shown in figure.

(h) Force required to just separate normally closed contacts should be between 8 and 15 grams.

(i) If scale reading exceeds limits, bend lower contact spring to obtain specified scale reading.

(3) Contact Bracket (Strobing). Adjust contact bracket (strobing) as follows:

NOTE

When using tape notch sensing contacts, use a 7.42 unit DXD scale. Synchronize the transmitter distributor so the end of stop pulse image is in line with the end of stop pulse on DXD scale when transmission is continuous. Use a normal direct current line signal of 60 milliampere ±10 percent or 20 milliampere ±10 percent to strobe these contacts.

(a) To adjust units with tape slack arm proceed as follows:

1. Ensure contact opens no earlier than the 15 mark of the first pulse and opens no later than the 55 mark of the first pulse.

2. Ensure contact closes no earlier than the 15 mark of the fifth pulse and closes no later than the 55 mark of the fifth pulse.

3. Permit contact breaks between the 15 mark and the 55 mark of the fifth pulse. Do not permit magnitude of the breaks to extend beyond these limits.

4. If requirements of steps 1, 2, and 3 are not met, loosen bracket contact mounting screws and position contact bracket to meet requirements.

5. Tighten mounting screws.

(b) To adjust units without tape slack arm, proceed as follows:

1. Ensure contact closes no earlier than the 15 mark of the first pulse and closes no later than the 55 mark of the first pulse.

2. Ensure contact opens no earlier than the 15 mark of the fifth pulse and opens no later than the 55 mark of the fifth pulse.

3. Permit contact breaks between the 15 and 55 marks of the first pulse. Do not permit the magnitude of the breaks to extend beyond these limits.

4. If requirements of steps 1, 2, and 3 are not met, loosen bracket contact mounting screws and position contact bracket to meet requirements.

5. Tighten mounting screws.

k. Transmitter Stop Mechanism Adjustments. Perform transmitter stop mechanism adjustments in accordance with the following paragraph.

(1) Start-Stop Gap (For Tabulator Control). Adjust start-stop gap (for tabulator control) as follows:

(a) Refer to figure 6-70.

(b) Position timing bail on lower part of its cam.

(c) Measure start-stop contact gap. Gap should be between 0.018 and 0.025 inches.

(d) If gap exceeds specified limits, loosen clamp screw which holds yield arm to timing arm to the point of friction tightness. Position timing arm to obtain specified contact gap.

(e) Tighten clamp screw.

(2) Timing Bail Spring. Adjust timing bail spring as follows:

(a) Refer to figure 6-70.

(b) Apply spring scale pushrod to timing bail as shown in figure.

(c) Force required to start bail moving should be between 5-1/2 and 8 ounces.

(d) If scale reading exceeds specified limits, install new spring.

l. Tape Slack Arm Adjustment. Perform tape slack arm and tape slack contacts as follows: adjustment in accordance with the following paragraph.

(1) Pefer to figure 6-71.

(2) Close tape lid.

(3) Place control lever in RUN position.

(4) Raise tape slack arm to its maximum height.

(5) Measure gap between tape slack contacts. Gap should be between 0.010 and 0.020 inch.

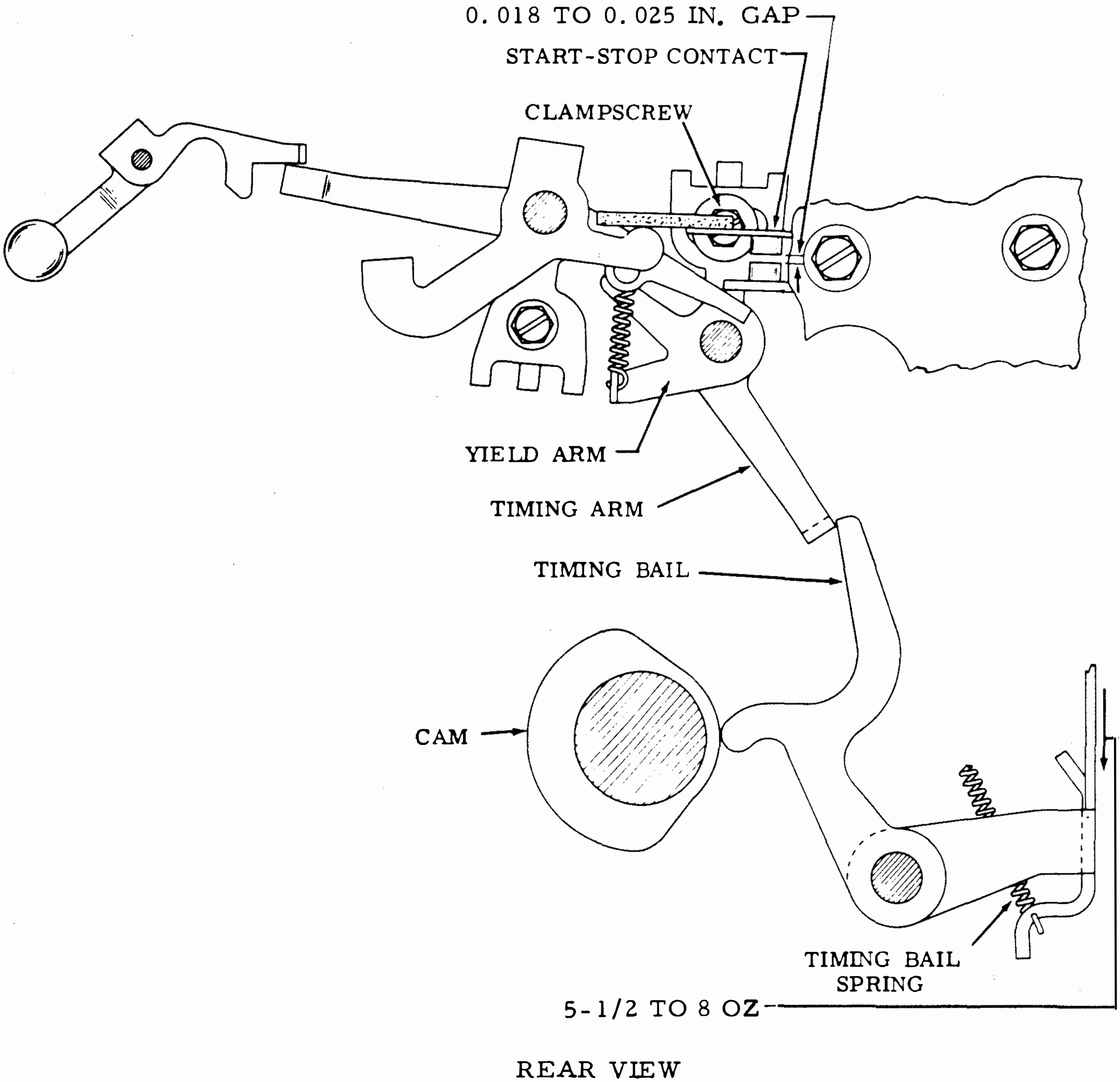


Figure 6-70. Start-Stop Gap (For Tabulator Control) and Timing Bail Spring

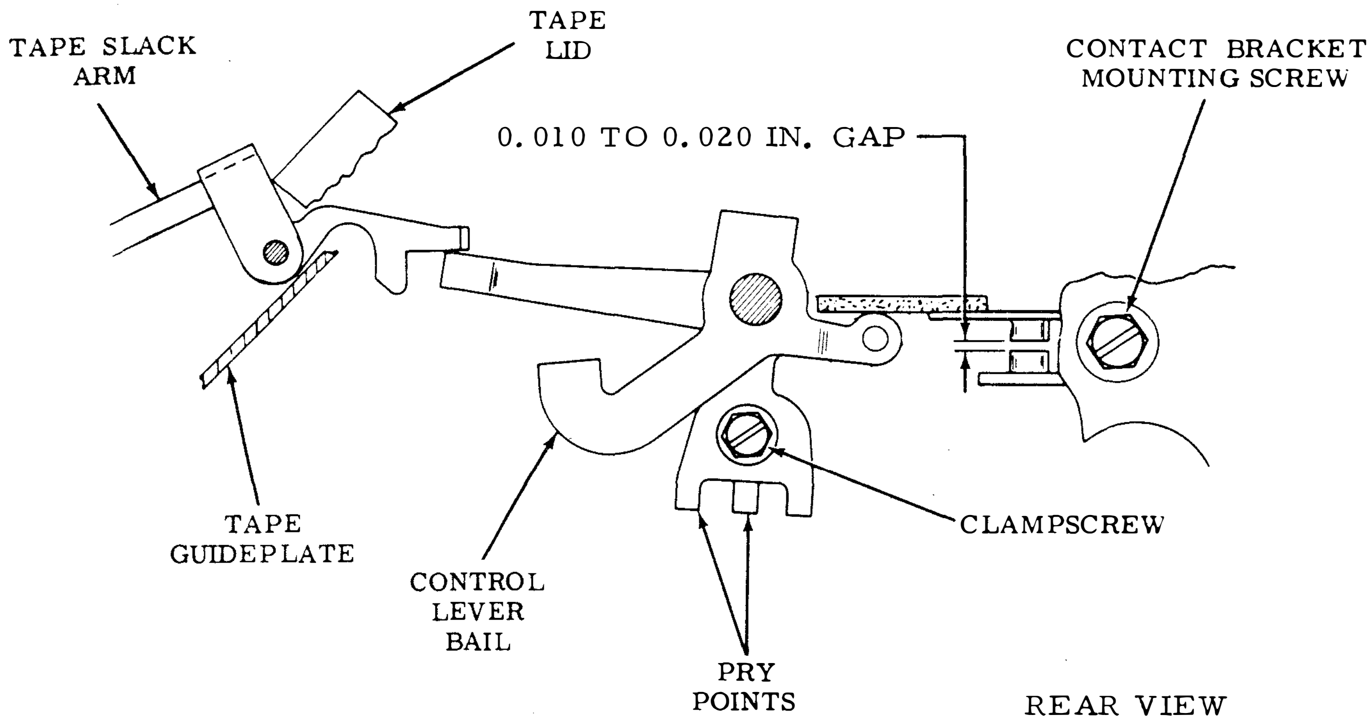


Figure 6-71. Tape Slack Contacts

(6) If gap exceeds specified limits, loosen clamp screw and position pry points to obtain specified contact gap.

(7) Tighten clamp screws.

m. <u>Tape Withhold Mechanism Adjustments</u>. Perform tape withhold mechanism adjustments in accordance with the following paragraphs.

(1) <u>Magnet Armature Gap</u>. Adjust magnet armature gap as follows:

(a) Refer to figure 6-72.

(b) Place armature in attracted position.

(c) Measure gap between end of armature adjusting screw and plate. Gap should be between 0.025 and 0.035 inch.

(d) If gap exceeds specified limits, loosen armature adjusting screw locknut to point of friction tightness and turn screw to obtain specified gap.

(e) Tighten locknut.

(2) <u>Blocking Bail Arm Eccentric</u>. Adjust blocking bail arm eccentric as follows:

(a) Refer to figure 6-73.

(b) Place each sensing pin in its lowest position.

(c) Place high part of blocking bail arm eccentric pivot to right at

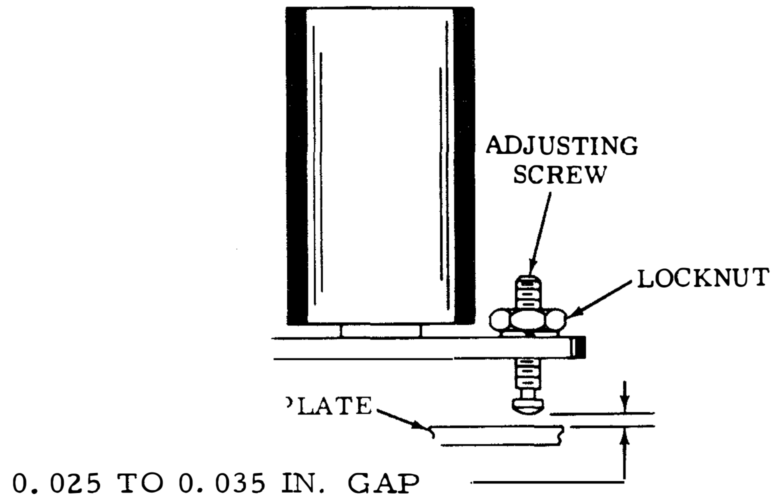


Figure 6-72. Magnet Armature Gap

approximately the same angular position as feed pawl eccentric.

(d) Ensure there is clearance between extension on blocking bail and tail of feed pawl.

(e) If there is no clearance, loosen arm eccentric clampscrew and rotate arm eccentric until extension blocking bail clears tail of feed pawl.

(f) Tighten clampscrew.

(3) Blocking Bail Eccentric Pivot. Adjust blocking bail eccentric pivot as follows:

(a) Refer to figure 6-73.

(b) Trip clutch.

(c) Place armature in attracted position and hold.

(d) Hold main shaft latched in stop position.

(e) Measure clearance between blocking bail extension and feed pawl at closest point. Clearance should be 0.002 and 0.035 inch.

(f) If clearance exceeds specified limits, loosen eccentric pivot clampscrew to point of friction tightness and rotate pivot to obtain specified clearance.

(g) Tighten clampscrew.

(h) Recheck blocking bail arm eccentric adjustment, paragraph 6-5.1m(2) and readjust if necessary.

(i) Ensure there is some clearance not exceeding 0.015 inch between feed pawl and feed ratchet at closest point as feed pawl is cammed out of ratchet during blocking operation (magnet armature in attracted position paragraph 6-5.1m(1)).

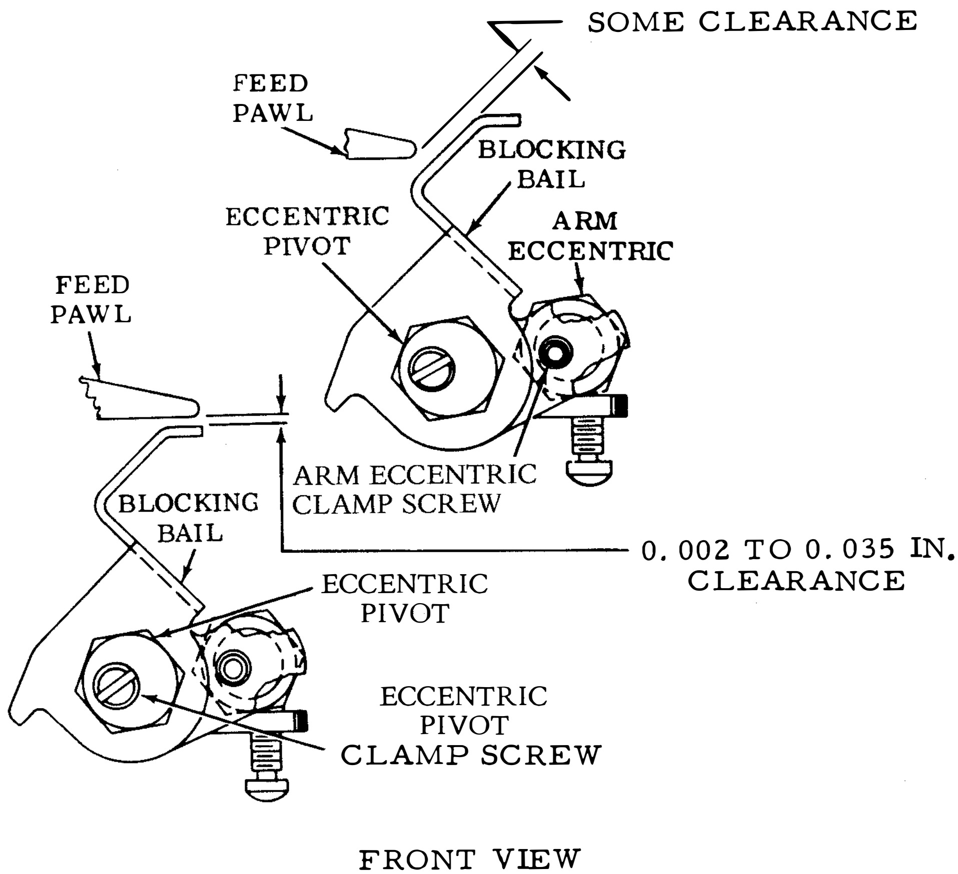


Figure 6-73. Blocking Bail Arm Eccentric and Blocking Bail Eccentric Pivot

(j) If there is no clearance or clearance exceeds 0.015 inch repeat adjustments of paragraph 6-5.1m(2) and step (b) through (g) of this paragraph.

6-5.2 TRANSMITTER DISTRIBUTOR UNIT (LOW-LEVEL). The adjustments for the high-level transmitter distributor unit variable features are also applicable to the low-level transmitter distributor unit variable features.

6-6. TRANSMITTER DISTRIBUTOR BASE. There are no variable features for the transmitter distributor base which require adjustment.

SECTION III ADJUSTMENTS (EARLIER DESIGN BASIC UNITS)

6-7. TRANSMITTER DISTRIBUTOR UNIT. Transmitter distributor unit high-level adjustments are described in paragraph 6-7.1. Low-level adjustments are described in paragraph 6-7.2.

6-7.1 TRANSMITTER DISTRIBUTOR UNIT (HIGH-LEVEL). Perform the transmitter distributor unit high-level tape lid mechanism adjustments in accordance with the following paragraphs.

NOTE

Before making the following adjustments, remove top and tape guideplate from unit and lubricate tape lid mechanism.

a. Tape Lid. Adjust tape lid as follows:

(1) Refer to figure 6-74.

(2) Hold tape against notch in tape guideplate.

(3) Align feedwheel groove in tape lid with slot in plate.

(4) Measure clearance between tape lid and pivot shoulder. There should be some clearance not exceeding 0.010 inch.

(5) If clearance is not as specified, loosen tape lid mounting nuts to point of friction tightness.

(6) Insert tip of TP156743 gauge through slot and into groove of lid and position tape lid bracket to obtain specified clearance.

(7) Tighten tape lid mounting nuts.

(8) Ensure tape lid front bearing rests squarely against tape guideplate and measure clearance between rear bearing surface and tape guideplate. There should be some clearance not exceeding 0.003 inch.

NOTE

When both plates are assembled on unit, left edge of lid may touch top plate and some change in this clearance may be expected.

(9) If clearance exceeds specified limits, loosen tape lid bracket mounting screws to point of friction tightness. Press tape lid against tape guideplate. Position bracket to obtain specified clearance between rear bearing surface and tape guideplate.

(10) Tighten bracket mounting screws.

(11) Latch tape lid against tape guideplate.

(12) The release plunger should have some end play.

(13) If there is no end play, loosen eccentric mounting post locknut to point of friction tightness. Raise tape lid and rotate high part of eccentric toward tape guideplate. Close lid and rotate eccentric toward bracket until latch just falls under flat on post.

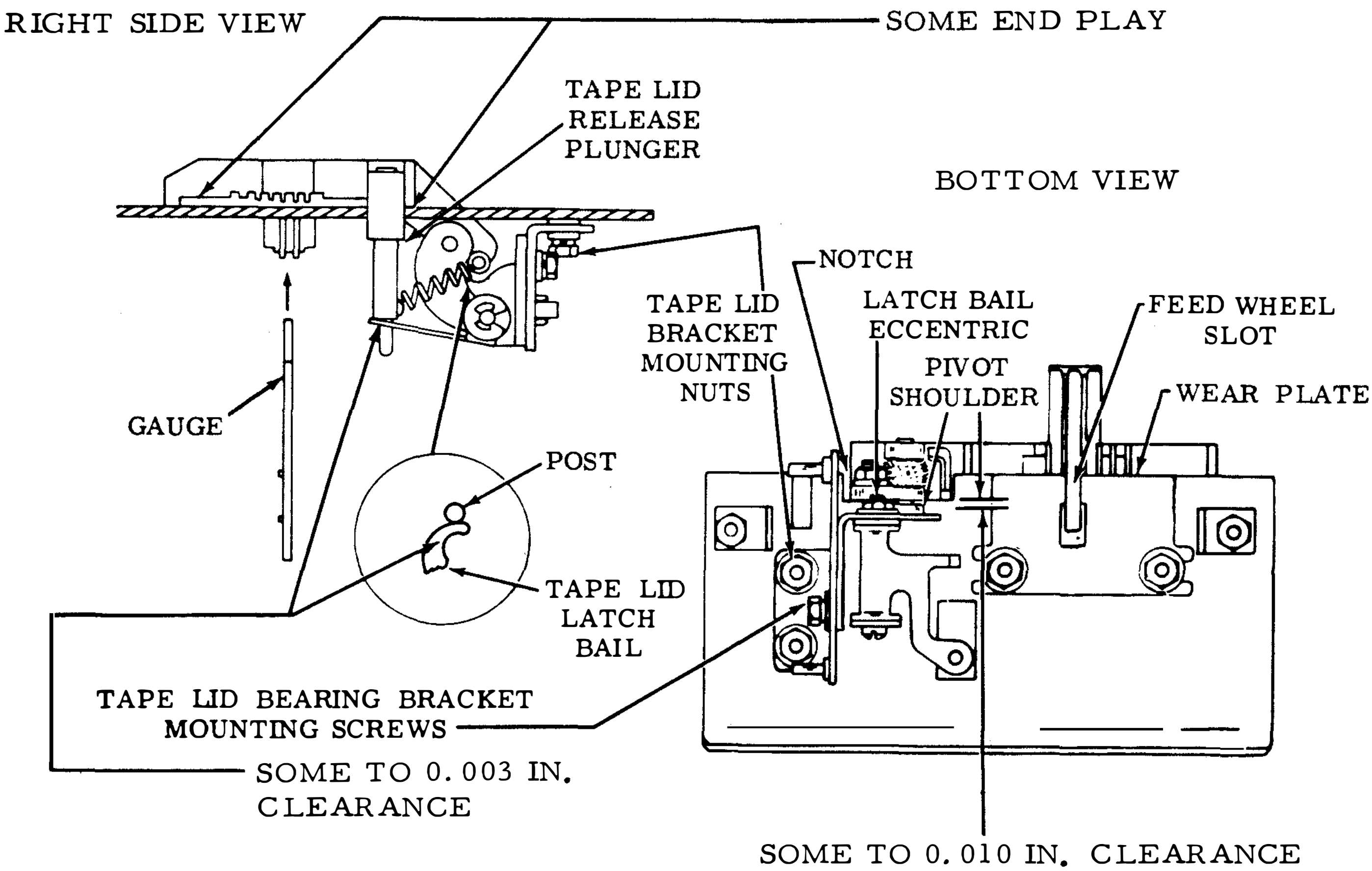


Figure 6-74. Tape Lid

(14) Depress plunger. With lid held down operate plunger. Tip of latch should clear post.

b. Tape Lid Release Plunger Spring (For Units without Tape Lid Spring). Adjust tape lid release plunger spring (for units without tape lid spring) as follows:

(1) Refer to figure 6-75.

(2) Hold tape guideplate horizontal.

(3) Unlatch tape lid.

(4) Apply spring scale pushrod to tape lid release plunger as shown in figure.

(5) Force required to start tape lid bail moving should be between 28 and 48 ounces.

(6) If scale reading exceeds specified limits, install new spring.

6-7.2 TRANSMITTER DISTRIBUTOR UNIT (LOW-LEVEL). The adjustments for the high-level transmitter distributor unit earlier designs are also applicable to the low-level transmitter distributor and earlier designs.

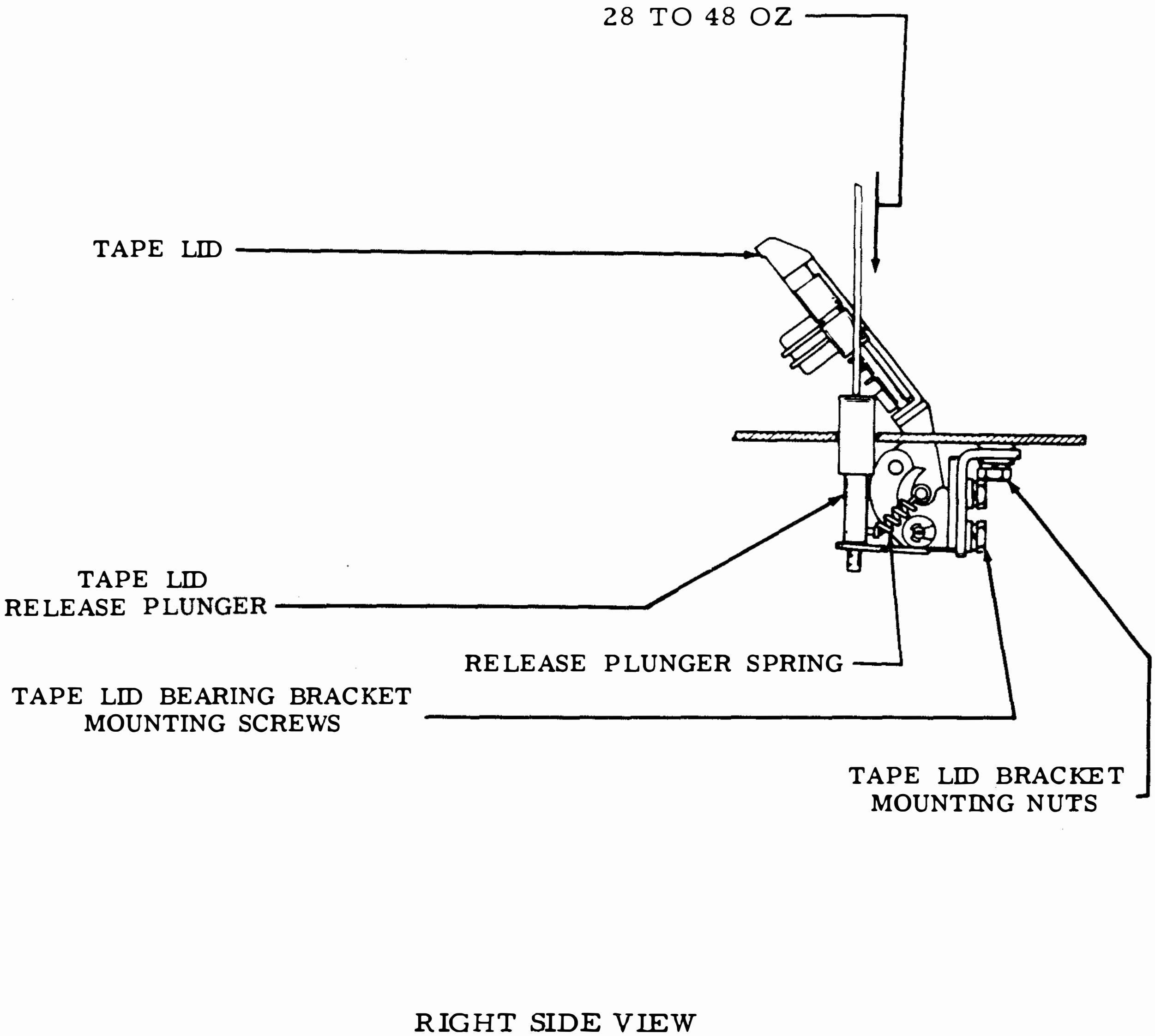


Figure 6-75. Tape Lid Release Plunger Spring (For Units Without Tape Lid Spring)

SECTION IV-REPAIR

6-8. GENERAL. After a fault has been isolated to a specific mechanical function, and the trouble cannot be corrected by performing an adjustment, a defective mechanical part is indicated. Repair action will then consist of removal and replacement of the defective component.

CAUTION

Disconnect external ac or dc power source before working on transmitter distributor unit.

6-9. DISASSEMBLY AND REASSEMBLY PROCEDURES. The following procedures are provided to enable the technician to disassemble the transmitter distributor set to gain access to a defective component and to reassemble the set after a defective component has been replaced. The procedures are also provided to aid the technician when disassembly is required for inspection, cleaning, and lubrication.

NOTE

If a part is mounted on shims, the number of shims used at each of its mounting screws should be noted at the time of removal, so that the same shim pile-up can be replaced when the part is reassembled. Retaining rings are of spring steel and have a tendency to release suddenly. Hold the ring with left-hand to prevent rotation, and place the blade of a suitable screwdriver in one of the slots of the retaining ring. Rotate the screwdriver in a direction to increase the diameter of the retaining ring. It will come off easily without springing. Avoid loss of springs in disassembly by holding one spring loop with the left-hand while gently removing the opposite loop with a spring hook or suitable probe. Do not stretch or distort springs in removal.

a. Transmitter Distributor Unit. Disassemble and reassemble transmitter distributor unit (figure 6-76) in accordance with the following paragraphs.

(1) Cover Plate. Remove and replace cover plate assembly as follows:

(a) To remove the cover plate assembly (figure 6-77), lift the cover plate from its detented position.

(b) To replace the cover plate assembly, align the ends of the cover plate and top plate, slide the tips of the plate spring under the edge of the top plate, and snap the cover plate down into its detented position.

(2) Top Plate. Remove and replace top plate (figure 6-77) as follows:

(a) To remove top plate, loosen the front and rear mounting screws and lift the plate upward.

(b) To replace the top plate, guide the mounting screws into the notch of the front and rear plates. Align the sensing pins and feed wheel with their respective

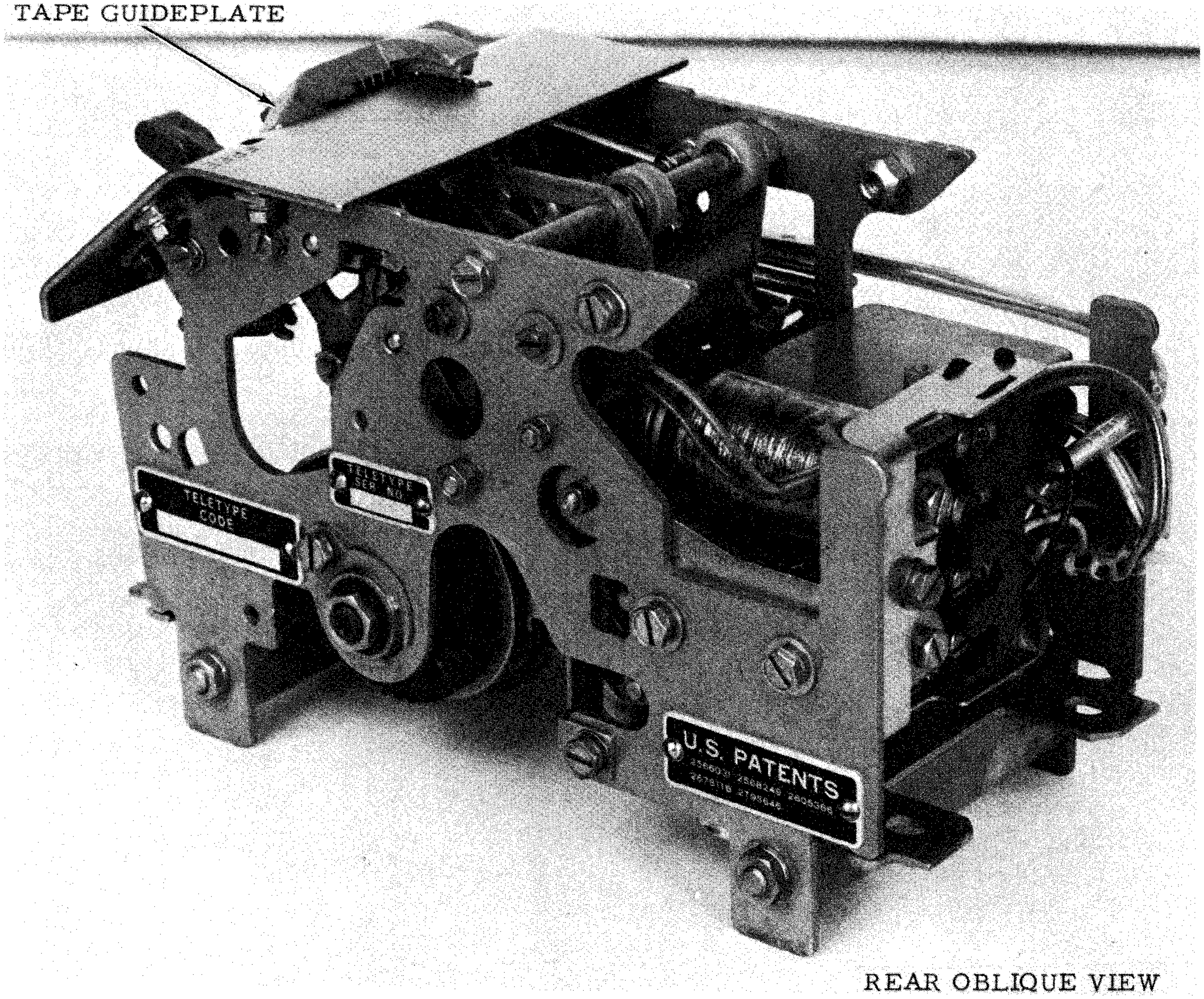


Figure 6-76. Typical Transmitter Distributor Unit (Cover Plate Removed)

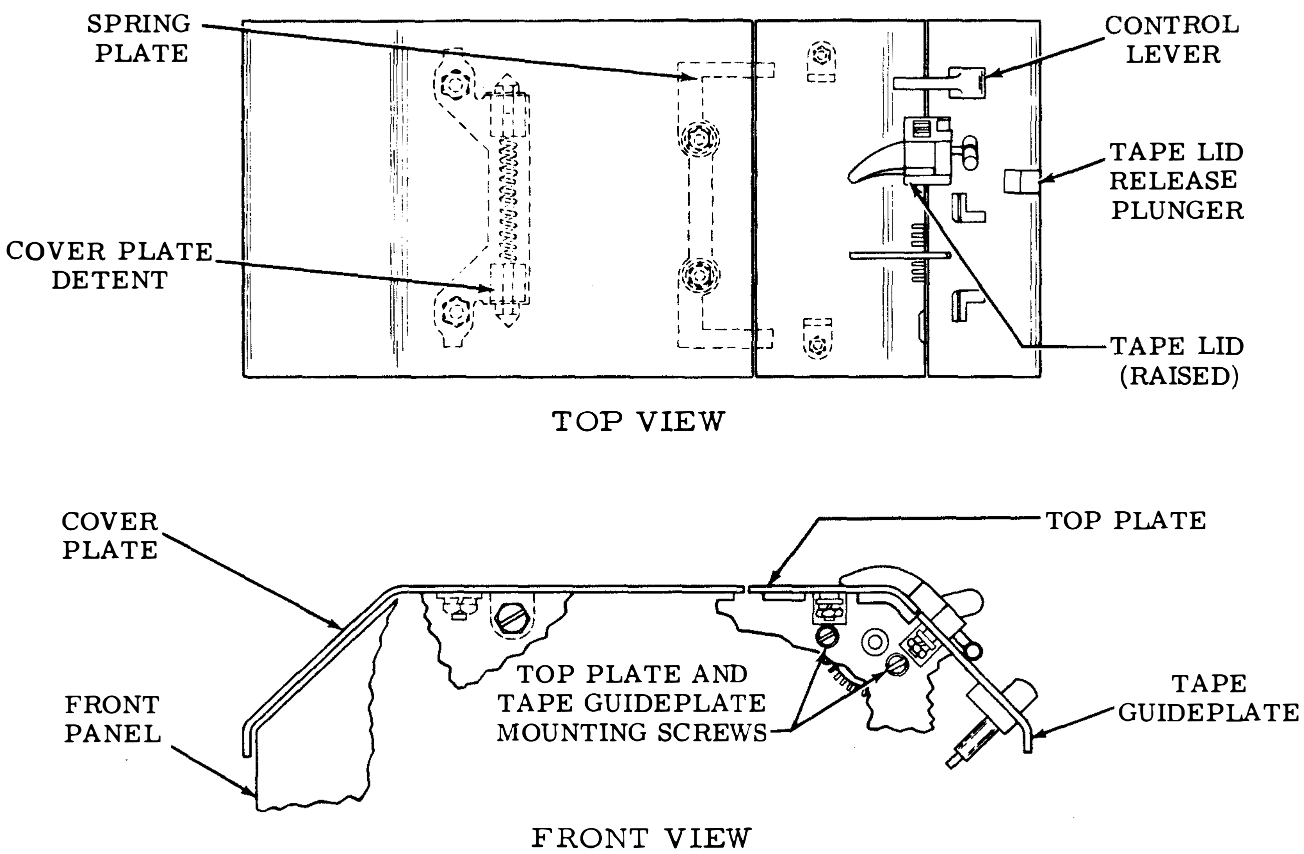


Figure 6-77. Plate Assemblies

slots. Refer to top plate adjustment procedure in paragraph 6-3.1c if the plates do not align.

(3) Tape-Guideplate. Remove and replace tape guideplate (figure 6-77) as follows:

(a) To remove the tape guideplate, loosen the front and rear mounting screws and slide the plate upward.

(b) To replace the tape guideplate, guide the mounting screws into the respective notch of the front and rear plates while guiding the tape-out pin into its notch and locating the sensing pins against the left edge of the tape guideplate. Refer to tape guideplate adjusting procedure in paragraph 6-3.1a(6).

(4) Oil Reservoir. Remove and replace oil reservoir as follows:

(a) To remove the oil reservoir, remove the screws that secure the casting and lift the assembly upward and toward the right.

(b) To replace the oil reservoir, reverse the procedure.

(5) Rear Plate Assembly. Remove and replace rear plate assembly in accordance with the following procedure.

(a) Removal. To remove rear plate assembly:

1. Remove cable assembly leads from start-stop contact assembly and magnet assembly.

2. Remove hex huts and lockwashers from bottom posts.

3. Remove main shaft retaining ring.

4. Remove screws TP151630 which hold the plate to post TP156622.

5. Remove the two screws which hold the clutch trip magnet assembly bracket to the rear plate and remove clutch trip magnet assembly.

6. Remove rear plate assembly from the remainder of the unit.

(b) Replacement. To replace the rear plate assembly, reverse the removal procedure.

(6) Main Shaft Assembly. Remove and replace main shaft assembly as follows:

(a) Removal. To remove the main shaft assembly, remove clamp TP156831 and plate TP156832 from front plate assembly and detach the main shaft assembly.

(b) Replacement. To reinstall the main shaft assembly, replace in the reverse order.

(7) Center Plate Assembly. Remove and replace center plate assembly in accordance with the following procedure.

(a) Removal. To remove the center plate:

1. Remove the post TP156622.

2. Remove the two nuts which hold the center plate to the two guide posts.

3. Remove the spring TP7603.

4. Remove the center plate assembly.

(b) Replacement. To replace the center plate assembly, reverse the removal procedure.

(8) Contact Box Assembly. Remove and replace contact box assembly in accordance with the following procedure:

(a) Removal. Remove contact box assembly as follows:

1. Remove cover plate in accordance with procedure in paragraph 6-9a(1).

2. Remove nut and lockwasher and lift cover from the contact box.

3. Disconnect spring.

4. Tag and disconnect signal line leads after removing two screws and lockwasher.

5. Remove two screws, lockwashers and washer, and lift the contact box from front plate.

(b) Replacement. To replace contact box

assembly, reverse disassembly procedure.

(9) Front Plate Mechanism. To remove front plate mechanism, refer to applicable detailed illustrations in the parts list, Chapter 7, and remove the rear plate assembly, center plate assembly, main shaft assembly, and contact box per paragraphs 6-9a(5) through 6-9a(8). The remaining mechanisms in the distributor transmitter are associated with the front plate and are disassembled as shown in the parts list illustrations. To disconnect leads to the tape-out switch, remove screws, lockwashers, and nut plate to detach the switch bracket, adjusting bracket, bushing, and spacer, all of which are part of the switch assembly. Removal of the leads requires disassembly of the switch. To reassemble the front plate mechanism, reverse the procedure followed in disassembly.

(10) Reassembly of Transmitter Distributor. To reassemble the transmitter distributor, reverse the procedure used in removing the component mechanisms.

NOTE

When reassembling the transmitter distributor, verify that the tip of the tape-out sensing pin rides through the aperture for it in the tape lid, and that the upper extension of the pin rides under the switch swinger. The sensing pins should be centered in their slots on the top plate. If the clutch lever is tripped, the pins will extend in above the installed position of the tape guideplate and cover plate, and assembly will be easier than if clutch is latched.

b. Disassembly And Reassembly of Base. Disassemble and reassemble transmiter distributor base in accordance with the following paragraphs.

(1) Disassembly. Disassemble base as follows:

(a) Remove cover and transmitter distributor unit per paragraph 6-9a. Disconnect external cable to motor terminal board.

CAUTION

Be sure external power supply is turned off before disconnecting base cabling. The signal line should also be shunted externally to avoid interference with other equipment on the line while the transmitter distributor is out of service.

(b) Remove intermediate gear assembly. Disconnect cable from motor terminal boards. Remove line shunt switch and connector. On earlier standard sized models, remove two screws, lockwashers, washer, and cable clamps to separate signal and power input cables from base.

(2) Reassembly. Reassemble the base in the reverse order of disassembly.

CHAPTER 7
PARTS LIST

7-1. SCOPE. This chapter provides a list of maintenance parts and parts location diagrams for Transmitter Distributor Sets Model 28.

7-2. MAINTENANCE PARTS LIST. Maintenance parts are listed by major units, in tables 7-1 through 7-4. The parts are listed for each unit in numerical part number sequence. Reference to the applicable parts location diagram is included for each part listed.

7-3. LIST OF MANUFACTURERS. Transmitter Distributor Sets Model 28 are manufactured by Teletype Corporation, Skokie, Illinois.

7-4. PARTS LOCATION DIAGRAMS. Figures 7-1 through 7-54 show location of all parts listed in tables 7-1 through 7-4. The parts location diagrams are used to locate and identify a particular part which is indexed by part number. The user then refers to the part number in the applicable table to obtain a description of the part to be ordered.

7-5. LIST OF ABBREVIATIONS. Table 7-5 contains the explanations of a list of abbreviations used throughout the parts list.

Table 7 1. Transmitter Distributor Unit (LXD)

Part Number	Figure Number(s)	Description	Notes
256M	7-8	Coil, Magnet	
262M	7-8	Coil, Magnet	
1030	7-1	Screw, 6-40 Shoulder	
1095	7-20	Screw, 4-40 x 5/32 Hex	
1293	7-9,-10	Screw, 4-40 x 1/8 Fil	
2191	7-1 thru -10,-12, -18,-19,-20,-23	Lockwasher	
2438	7-8	Washer, Flat	
2669	7-2,-7	Lockwasher	
2836	7-7	Spring	
3595	7-13,-14	Nut, 1/4-32 Hex	
3598	7-1,-2,-3,-4 -6,-7,-18,-20	Nut, 6-40 Hex	
3599	7-5 thru -12, -15 thru -19, -23	Nut, 4-40 Hex	
3606	7-1,-6	Nut, 6-40 Hex	
3636	7-13,-14	Washer, Flat	
3640	7-2 thru -6,-8 thru -12,-14, -19,-20	Lockwasher	
3646	7-22	Lockwasher	
3649	7-7	Washer, Flat	
5740	7-17	Screw, 2-56 x 1/4 Fil	
7002	7-1,-2,-3,-7,-8 -9,-10,-12,-18, -19,-20,-23	Washer, Flat	
7603	7-1,-5	Spring	
8896	7-4	Shim, 0.004" Thk	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
31636	7-2	Spring	
33765	7-19,-20	Washer, Flat	
41732	7-7,-24	Plate, Clamp	
41814	7-24	Bushing, Insulating	
42823	7-13	Washer, Flat	
45024	7-6	Spring	
45027	7-19	Spring	
45815	7-1	Lockwasher	
47024	7-18	Washer, Flat	
70388	7-1	Spring	
70878	7-15,-16,-17	Spring	
71073	7-17	Washer, Flat	
73894	7-18	Screw, 6-40 Set	
74987	7-18	Spring, Compression	
76275	7-3	Plate, Nut	
76295	7-3	Spring	
76422	7-6	Spring	
76461	7-3	Washer, Flat	
78557	7-4	Spring	
80531	7-1	Washer, Flat	
80581	7-20	Spring	
80945	7-4	Spring	
81778	7-8	Screw, 4-40 x 3/16 Fil	
82547	7-7	Insulator, 0.094" Thk	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
82548	7-7,-24	Insulator, 0.062" Thk	
83497	7-22	Washer, Flat	
85318	7-7	Washer, Leather	
86283	7-1	Spring	
86304	7-9 thru -12	Spring	
86959	7-7	Bushing, Insulating	
87401	7-8	Spring	
87402	7-8	Spring	
90573	7-1	Spring	
90790	7-6	Washer, Flat	
90791	7-9 thru -12,-22	Lockwasher	
91120	7-2	Spring	
91904	7-2	Washer, Flat	
93117	7-17	Lockwasher	
93118	7-3,-5	Lockwasher	
93356	7-5,-6	Washer, Felt	
93587	7-2,-7,-18	Washer, Flat	
93899	7-19,-20	Spring	
93984	7-8	Lockwasher	
101386	7-1	Spring	
101714	7-6,-19,-20	Spring	
101998	7-3	Bushing, Shoulder	
102086	7-24	Insulator	
102994	7-1	Washer, Flat	
104751	7-15,-16,-17	Spring	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
104807	7-20	Washer, Flat	
110434	7-13,-14	Screw, 4-40 x 3/16 Fil	
110743	7-2,-4 thru -24	Lockwasher	
111017	7-23	Screw, 6-40 x 5/16 Fil	
111640	7-5	Screw, 2-56 x 7/32 Fil	
112626	7-2,-7	Nut, 10-32 Hex	
112633	7-1	Spring w/Wick	
114107	7-18	Spring	
115141	7-6	Screw, 6-40 Shoulder	
115221	7-1,-4	Washer, Felt	
116959	7-20	Screw, 6-40 Eccentric Shld	
119401	7-15,-16,-17	Washer, Flat	
119647	7-4,-6,-15,-16, -17	Ring, Retaining	
119648	7-2,-5,-15,-17, -19,-20	Ring, Retaining	
119649	7-6,-8,-15,-16, -17,-18	Ring, Retaining	
119650	7-6,-19,-20	Ring, Retaining	
119651	7-2,-15	Ring, Retaining	
119652	7-1,-4,-6,-7, -15,-17	Ring, Retaining	
121125	7-8	Washer, Spring	
121242	7-21	Clamp, 1/8" ID Cable	
121243	7-21	Clamp, 3/16" ID Cable	
121244	7-7,-21	Clamp, 1/4" ID Cable	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
121245	7-21	Clamp, 5/16" ID Cable	
121246	7-21	Clamp, 3/8" ID Cable	
121247	7-21	Clamp, 7/16" ID Cable	
121248	7-21	Clamp, 1/2" ID Cable	
121249	7-21	Clamp, 5/8" ID Cable	
121250	7-21	Clamp, 3/4" ID Cable	
121251	7-21	Clamp, 1" ID Cable	
124177	7-1,-6	Lockwasher	
125011	7-2,-3,-4,-6,-8, -10,-15 thru -19,-20,-22,-24	Washer,Flat	
125015	7-8	Washer, Flat	
125126	7-9 thru -12,-22	Screw, 2-56 x 9/32 Fil	
125220	7-22	Nut, 8-40 Hex	
125229	7-2	Nut, 6-32 Hex	
125253	7-20	Spring	
125802	7-7	Washer, Flat	
128357	7-2,-5,-19,-20	Ring, Retaining	
130499	7-13,-14	Bearing, Ball	
130511	7-18	Screw, 4-40 x 11/64 Fil	
130667	7-13,-14	Lockwasher	
130683	7-4	Lockwasher	
138034	7-3,-5	Plate, Clamp	
144216	7-21	Connector, Red Insulated	
144227	7-21	Connector, Black Insulated	
145779	7-6	Post, Spring	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
145798	7-6	Pawl	
146643	7-18	Block, Strap	
150013	7-13,-14	Disk, Adjusting	
150026	7-13	Lever, Shoe Release	
150027	7-14	Lever, Shoe Release	
150029	7-13,-14	Wick, Felt	
150034	7-14	Disk, Two-Stop Clutch	
150043	7-13,-14	Shoe, Secondary Clutch	
150044	7-13,-14	Shoe, Primary Clutch	
150241	7-13,-14	Spring	
150830	7-14	Bushing, Shoulder	
150841	7-14	Bearing	
151073	7-2,-6,-8	Screw, 4-40 x 5/32 Fil	
151103	7-1,-4	Spring	
151152	7-4,-6,-9 thru -12,-15,-16,-17	Screw, 4-40 x 3/16 Hex	
151171	7-9,-10	Toggle, Contact	
151180	7-9,-10	Link, Toggle	
151182	7-9 thru -12,-22	Washer, Insulating	
151395	7-7	Spring	
151398	7-4	Spring	
151414	7-21	Switch, Sensitive	
151630	7-2,-3,-4,-6,-7, -8,-19,-20	Screw, 6-40 x 1/4 Hex	
151631	7-2,-7	Screw, 6-40 x 5/16 Hex	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
151632	7-1,-3,-5,-7,-10	Screw, 6-40 x 3/8 Hex	
151637	7-4	Screw, 4-40 x 1/4 Fil	
151687	7-22	Screw, 4-40 x 7/16 Fil	
151692	7-1,-7	Screw, 6-40 x 3/16 Fil	
151715	7-15	Spring	
151722	7-1,-2,-3,-7,-19	Screw, 6-40 x 3/16 Hex	
151728	7-13	Spring	
151730	7-15	Spring	
151732	7-13	Screw, 4-40 x 11/32 Fil	
151733	7-7,-24	Screw, 4-40 x 9/16 Fil	
151736	7-14	Spring	
151737	7-2,-13,-14,-19, -20	Screw, 4-40 x 11/64 Hex	
151820	7-9,-10	Spring, Contact	
151880	7-4,-9,-10,-11, -12,-15,-16,-17	Nut, 4-40 Hex	
152458	7-8	Shield, Terminal	
152871	7-1,-8	Spring	
152893	7-3,-4,-5,-7,-8, -15 thru -18,-24	Screw, 4-40 x 1/4 Hex	
153360	7-19,-20	Stud	
153537	7-2	Screw, 6-40 x 9/32 Hex	
153799	7-4	Screw, 4-40 x 21/64 Hex	
153817	7-9 thru -12	Screw, 4-40 x 3/8 Hex	
153819	7-2	Lockwasher	
154040	7-1,-4	Lever, Transfer	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
154042	7-9,-10	Terminal	
154043	7-9,-10	Terminal	
154045	7-9,-10	Screw, 6-40 Spl	
154095	7-9,-10,-12	Eccentric, Contact Box	
154130	7-9,-12	Box, Contact	
154131	7-9,-12	Cover, Contact	
154156	7-21	Grommet, Rubber	
154166	7-9,-12	Suppressor, Arc	
154173	7-21	Plate	
154189	7-9,-12	Insulator	
154194	7-9,-10	Base	
154226	7-9	Box w/Strap	
154349	7-1	Spring	
154694	7-13	Disk, Clutch Cam	
154697	7-21	Grommet, Rubber	
155494	7-1,-4	Spring	
155750	7-3,-4,-21	Sleeve, 3/32" ID x 1/2" Lg Insulating	
155751	7-21	Sleeve, 1/8" ID x 1" Lg Insulating	
155752	7-21	Sleeve, 5/64" ID x 1/2" Lg Insulating	
155753	7-21	Sleeve, 1/8" ID x 1/2" Lg Insulating	
155754	7-3,-4,-21	Sleeve, 1/16" ID x 1/2" Lg Insulating	
155755	7-21	Sleeve, 11/64" ID x 5/8" Lg Insulating	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
156450	7-3,-5	Screw, 2-56 x 1/2 Fil	
156501	7-2	Screw, 6-40 x 7/32 Fil	
156509	7-2	Washer, Flat	
156510	7-2	Post	
156511	7-2	Bail	
156514	7-2	Plate w/Studs	
156515	7-2	Washer, Felt	
156516	7-2	Latch	
156518	7-1,-3,-19	Post	
156519	7-1	Washer, Felt	
156520	7-1	Arm	
156521	7-1	Screw, 6-40 Eccentric Shldr	
156522	7-1	Pawl	
156523	7-1	Stud, Eccentric	
156524	7-1	Bail	
156531	7-8	Bracket w/Post	
156532	7-8	Core	
156533	7-8	Screw, 4-40 Eccentric	
156534	7-8	Bail	
156537	7-8	Armature	
156539	7-8	Washer, Felt	
156549	7-15,-17	Lid, Tape	
156551	7-15,-17	Guide, Right	
156553	7-15	Post, Eccentric	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
156554	7-15	Bail	
156555	7-15,-17	Plunger, Tape Lid	
156556	7-15 thru -18	Bracket	
156557	7-15	Plate, Tape Guide	
156558	7-15,-17	Washer, Felt	
156559	7-15	Post	
156560	7-15,-17	Bail	
156561	7-15,-17	Shaft	
156567	7-18	Plate, Top	
156574	7-6	Post, Spring	
156575	7-6	Screw, 6-40 Eccentric Shldr	
156576	7-7	Washer, Felt	
156577	7-6	Roller, Detent Lever	
156578	7-6	Bail w/Stud	
156581	7-7	Stud	
156588	7-7	Ring, Retaining	
156589	7-7	Post, Spring	
156590	7-1	Latch	
156591	7-6,-7	Washer, Felt	
156594	7-7	Lever, Trip	
156595	7-7	Lever, Latch	
156596	7-7	Bail	
156597	7-7,-24	Plate, Rear	
156598	7-2,-7	Post	
156599	7-7	Plate	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
156602	7-2	Plate	
156608	7-18	Plate, Cover	
156609	7-18	Plate, Spring	
156618	7-1,-4	Post	
156621	7-1	Guide, Transfer Lever	
156622	7-6	Post	
156623	7-2	Washer, Flat	
156624	7-1	Post	
156625	7-1	Bracket	
156631	7-1,-4	Washer, Felt	
156632	7-8	Screw, 6-40 x 13/32 Hex	
156633	7-7	Washer, Felt	
156636	7-1	Wheel, Feed	
156638	7-1,-4	Guide, Transfer Lever	
156639	7-1,-19	Post	
156640	7-1,-4	Post	
156641	7-1,-4	Pin, Sensing	
156643	7-9 thru -12	Bracket	
156644	7-9,-10,-12	Link, Drive	
156647	7-15,-16,-17	Lever, Start-Stop	
156648	7-9	Contact Box Assembly	
156649	7-1	Plate, Front	
156662	7-8	Plate	
156663	7-9,-10,-12,-22	Bushing, Insulating	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
156668	7-6	Screw, 6-40 Spl	
156673	7-15,-16,-17	Bail w/Stud	
156677	7-8	Plate, Insulator	
156747	7-9,-12	Screw, 6-40 x 19/64 Hex	
156773	7-6	Modification Kit	
156777	7-6	Jumper, 2" Black	
156778	7-18	Rod	
156779	7-18	Plunger	
156780	7-18	Bracket, Detent	
156782	7-2,-7	Nut, 6-40 Spl	
156811	7-15,-17	Guide, Left	
156817	7-8	Shaft	
156831	7-2	Clamp	
156832	7-2	Plate	
156833	7-13,-14	Drum Assembly, Clutch	
156836	7-13	Camshaft	
156844	7-13,-14	Gear, 40T	
156880	7-8	Jumper, 2-3/8" Black	
156881	7-8	Jumper, 1-1/2" Black	
157240	7-5	Spring	
158182	7-14	Disk, Clutch Cam	
158186	7-16	Screw, 4-40 x 7/32 Fil	
158258	7-21	Connector, 20-Pt Plug	
158625	7-15	Bracket w/Stud	
158626	7-15	Bracket w/Studs	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
158757	7-8	Hinge, Mounting	
158923	7-14	Bearing, Sleeve	
158926	7-14	Screw, 4-40 x 7/32 Hex	
159291	7-2	Bail	
159292	7-2	Bail	
159293	7-2,-19,-20	Arm, Extension	
159295	7-2	Bracket w/Posts	
159297	7-2	Arm, Stop	
159298	7-2	Spring, Torsion	
159312	7-2	Wick, Leather	
160016	7-13	Camshaft	
160025	7-4	Bracket	
160067	7-4	Feedwheel	
160086	7-4	Post, Guide	
160087	7-6	Post, Spring	
160088	7-6	Bail w/Stud	
160089	7-4	Post, Stop	
160090	7-4	Lever, Transfer	
160091	7-7	Reservoir Assembly	
160092	7-7	Stiffener	
160093	7-7	Wick, Leatner	
160096	7-4	Bracket w/Bushing	
160097	7-4	Contact Assembly	
160398	7-7	Spring, Contact	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
160399	7-7	Spring, Contact	
160593	7-7	Terminal	
160596	7-3	Spring	
160597	7-7	Plate	
160598	7-7	Stiffener	
160599	7-7	Wick, Leatner	
160600	7-7	Reservoir, Oil	
160601	7-7	Guard	
160602	7-6	Arm	
160604	7-6,-19,-20	Post	
160605	7-6	Arm	
160606	7-6	Arm w/Spring-Post	
160607	7-6	Bail	
160608	7-7,-24	Bracket, Contact	
160613	7-6-20	Arm w/Hub	
160615	7-7	Reservoir Assembly	
160616	7-6,-19	Plate	
160621	7-8	Bracket	
160622	7-8	Guide	
160623	7-8	Shield	
160625	7-2	Clip w/Wick	
160626	7-3,-5	Insulator, 0.031" Thk	
160627	7-3,-5	Bushing, Insulating	
160628	7-3,-5	Spring, Contact	
160629	7-3	Bracket, Contact	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
160630	7-3,-5	Spring, Contact	
160631	7-3,-5	Spring, Contact	
160632	7-3	Contact Assembly	
160634	7-6	Post	
160635	7-6	Bail	
160638	7-3	Bracket, Spring	
160639	7-7	Contact Assembly	
160640	7-1,-15	Pin, Tape-Out Sensing	
160647	7-15,-18	Lid, Tape	
161117	7-6	Spring	
161291	7-15,-17	Bushing	
161439	7-7	Wick, Felt	
161440	7-15,-16,-17	Spring	
161591	7-2	Cable Assembly	
161592	7-2	Plate w/Studs	
161594	7-21	Connector, 36-Pt Plug	
162249	7-2	Screw, 6-32 Insulating	
162462	7-2	Modification Kit	
162493	7-4	Bail	
162498	7-4	Screw, 4-40 Eccentric	
162499	7-4	Nut, 4-40 Shoulder	
162500	7-4	Arm, Sensing	
162501	7-4	Post, Spring	
162503	7-4	Shaft, Spring	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
162573	7-14	Retainer	
162891	7-9	Cover, Contact Box	
162997	7-9	Contact Box Assembly	
163445	7-9,-10	Insulator, Strip	
163536	7-9	Spacer, 0.562" Thk	
163665	7-15	Modification Kit	
163666	7-15	Guide, Right	
163991	7-17	Shaft	
163992	7-2	Arm, Extension	
163995	7-17	Plate	
163996	7-4	Contact Assembly	
163997	7-17	Bail	
163998	7-6	Bail	
163999	7-17	Plate, Tape Guide	
164000	7-4	Pin, Tape-Out	
164285	7-13	Camshaft	
164467	7-15,-16,-17	Post, Eccentric	
164468	7-15,-16,-17	Bail	
164469	7-15,-16,-17	Post	
164470	7-15,-16,-17	Bracket w/Stud	
164471	7-15,-16,-17	Bracket w/Studs	
164472	7-16	Modification Kit	
165027	7-8	Nétwork, Spark Suppression	
170276	7-18	Plate, Cover	
170277	7-17	Lid, Tape	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
170282	7-1	Nut, 6-40 Hex	
171671	7-21	Connector, Blue Insulated	
171672	7-21	Connector, Red Insulator	
171952	7-21	Connector, Green Shielding	
171972	7-21	Connector, Green Insulated	
172764	7-15	Guide, Left	
172881	7-7	Reservoir Assembly, Oil	
172885	7-1	Arm, Cam Follower	
172887	7-8	Bail	
172889	7-14	Shaft, Main	
172890	7-14	Camsleeve	
172899	7-4	Post, Guide	
172900	7-4	Post, Stop	
173118	7-4	Cable	
173171	7-2	Plate w/Stud	
173173	7-14	Disk	
173208	7-7	Wick, Leather	
173349	7-13	Camshaft	
173350	7-15	Guide, Tape	
173351	7-4	Finger w/Posts	
173359	7-4	Guide	
173424	7-6	Bail, Sensing	
174010	7-1,-4	Plate	
174087	7-6	Modification Kit	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
174263	7-1	Pin, Tape Editing	
174265	7-3	Contact Assembly	
174266	7-3	Bracket, Contact	
174267	7-18	Plate w/Studs	
174272	7-3	Bracket, Contact	
174273	7-3	Arm, Extension	
174275	7-5	Feedwheel	
174276	7-5	Roller	
174277	7-5	Lever w/Stud	
174279	7-5	Ratchet w/Shaft	
174281	7-5	Bracket w/Bushing	
174283	7-5	Contact Assembly, Tape Motion	
174284	7-16,-19	Plate, Tape Guide	
174286	7-3	Bail w/Spacer	
174287	7-3	Pin, Tape-Out	
174288	7-16	Shaft	
174290	7-16	Guide w/Bail, Tape	
174292	7-16	Guide, Left	
174293	7-16	Bail	
174294	7-16	Spring, Torsion	
174295	7-3	Contact Assembly, Tape-Out	
174303	7-3	Sleeve	
174304	7-3	Spring, Contact	
174305	7-3	Spring, Torsion	
174309	7-18	Modification Kit	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
174342	7-16	Lid, Tape	
174349	7-15,-16,-18	Plate	
174411	7-10	Insulator	
174412	7-10	Spacer, 0.531" Thk	
174413	7-10	Terminal	
174414	7-10	Bushing	
174415	7-10	Cover, Contact Box	
174416	7-10	Box, Contact	
174420	7-10	Contact Box Assembly	
174421	7-10	Filter, R.F.	
174491	7-9	Modification Kit	
176389	7-18	Label, Free-Stop	
176390	7-18	Label, Fun	
176603	7-18	Bracket w/Stud	
176605	7-18	Lever, Sensing	
176606	7-18	Lever, Switch Actuating	
176607	7-15,-18	Plate w/Studs	
176608	7-18	Plate w/Studs	
176609	7-3	Spring, Contact	
177048	7-4	Latch	
177060	7-1,-15,-18	Pin w/Sleeve, Sensing	
178499	7-3	Contact Assembly	
178535	7-8	Suppressor, Spark	
179163	7-5	Stiffener	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
179167	7-5	Screw, 4-40 Eccentric Shldr	
179189	7-1	Screw, 6-40 Eccentric Shldr	
179262	7-3	Bracket, Spring	
179639	7-11,-12	Contact Assembly	
179643	7-11	Network, Filter	
179748	7-21	Connector, 5-Pt Plug	
179749	7-21	Connector, 5-Pt Receptacle	
179884	7-5,-19	Plate, Front	
192013	7-21	Connector, 50-Pt Plug Type	
192236	7-13	Gear, 60T	
192237	7-18	Plate, Cover	
192591	7-2	Plate w/Studs	
192600	7-12	Contact Box Assembly	
193852	7-13	Spring	
194034	7-4	Modification Kit	
194048	7-11,-22	Screw, 4-40 Spl	
194106	7-19	Bracket, Spring	
194204	7-15,-16	Guide, Tape	
194341	7-4	Cable Assembly	
194354	7-13	Gear, 45T	
194357	7-13	Camshaft	
194502	7-13	Camshaft	
194503	7-6	Plate, Center	
194505	7-6	Follower, Cam	
194506	7-6	Bracket, Cam Follower Guide	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
194578	7-13	Camshaft	
194901	7-11,-22	Screw, 4-40 Spl	
194982	7-21	Clip, Connector	
195186	7-9,-12	Screw, 4-40 x 7/8 Hex	
195187	7-9,-11	Screw, 4-40 x 1-1/2 Hex	
195651	7-11	Box, Contact	
195652	7-11	Cover, Contact Box	
195923	7-9	Filter, RF	
197920	7-12	Contact Box Assembly	
197966	7-15	Plate w/Stud	
197967	7-18	Plate w/Stud	
197994	7-15	Modification Kit	
198605	7-21	Connector, 4-Pt Plug	
198607	7-21	Connector, 4-Pt Receptacle	
198610	7-11	Contact Box Assembly	
198672	7-15	Modification Kit	
198673	7-15	Guide, Right	
199110	7-15	Guide, Right	
199111	7-15	Lever, Tight-Tape	
199112	7-15	Bail	
199126	7-1	Lever, Tape Advance	
199129	7-1	Pawl, Feed	
199130	7-2	Plate	
199131	7-2	Plate, Clamp	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
199133	7-7	Post, Spring	
199134	7-18	Plate w/Stud	
199138	7-13	Link, Drive	
199140	7-13	Link, Driven	
199143	7-13	Spacer, 0.316" Thk	
199146	7-5	Bracket w/Bushing	
199147	7-5	Plate, Nut	
199148	7-5	Clamp	
199149	7-5	Bracket	
199151	7-5	Lever	
199153	7-16	Shaft	
199154	7-16	Plate	
199159	7-13	Camshaft	
199160	7-13	Camshaft	
199163	7-2	Bracket	
199175	7-5	Bracket	
199190	7-1	Screw, 4-40 Shoulder	
199193	7-11,-12	Bushing, Insulating	
199196	7-11	Link	
199229	7-15	Modification Kit	
199482	7-13	Camshaft	
199505	7-11	Contact Box Assembly	
199507	7-15	Guide, Left	
301685	7-17	Guide, Tape	
301686	7-17	Nut, 2-56 Shoulder	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
301693	7-17	Plate	
301702	7-17	Plate w/Studs	
304665	7-4	Modification Kit	
304762	7-1	Latch	
304763	7-1	Plate, Wear	
304764	7-7	Post	
304765	7-1	Post, Eccentric	
304766	7-7	Bail, Operating	
304767	7-1	Bail, Trip	
305008	7-12	Contact Box Assembly	
305767	7-20	Arm	
305997	7-19,-20	Lever, Trip	
305998	7-19,-20	Post	
306001	7-20	Pin, Tape-Out	
306004	7-20	Lever, Reset	
306006	7-20	Link, Reset	
306007	7-19,-20	Bracket, Spring	
306009	7-20	Bracket	
306010	7-19,-20	Bail, Depressor	
306011	7-19,-20	Sleeve, Stop	
306013	7-19,-20	Bail, Reset	
306015	7-19,-20	Bracket, Spring	
306016	7-20	Latch	
306017	7-19,-20	Bail, Adjusting	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
307283	7-19,-20	Anchor, Spring	
311271	7-1	Stud	
311453	7-5	Roller	
311538	7-13	Camshaft	
315548	7-12	Box, Contact	
315760	7-12	Contact Box Assembly	
317385	7-19	Pin, Tape-Out	
320043	7-22	Cover, Outer	
320054	7-22,-23	Cable Assembly	
320410	7-6	Terminal, Spade Type	
320416	7-21	Terminal, Ring Type	
320418	7-21	Terminal, Ring Type	
320424	7-1	Bail	
321143	7-12,-22	Link	
321267	7-22	Box w/Bracket	
321268	7-22	Network, Filter	
321269	7-22	Insulator	
321270	7-22	Box, Inner	
321271	7-22	Posts, Nylon	
321273	7-22	Cover, Inner	
321284	7-23	Bracket, Connector Mounting	
323646	7-22	Contact Box Assembly	
323767	7-19	Arm	
323768	7-19	Spring	
323769	7-19	Bracket	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
323770	7-19	Latch	
323771	7-19	Arm	
323772	7-19	Link, Reset	
323773	7-19	Lever, Reset	
323774	7-19	Screw, 4-40 x 3/8 Shoulder	
323775	7-16,-19	Lid, Tape	
323838	7-22	Eccentric, Contact Box	
325947	7-22	Contact Assembly	
325949	7-22	Screw, 8-32 x 1 Nylon Fil	
325950	7-22	Screw, 8-32 x 1/2 Nylon	
325951	7-22	Nut, 6-32 Nylon Hex	
325986	7-6	Spring	
326354	7-8	Core	
326358	7-24	Spring, Contact	
326360	7-24	Spring, Contact	
326371	7-8	Magnet Assembly	
326748	7-24	Strap, Contact	
326749	7-24	Card, Circuit	
326750	7-24	Board, Filter	
326751	7-24	Resistor, 220 Ohm	
326752	7-24	Capacitor, 0.03 MFD	
327119	7-10	Screw, 4-40 x 1/2 Hex	
327258	7-21	Sleeve, 5/64" ID x 1/4" Lg Insulating	
327445	7-4	Finger	

Table 7-1. Transmitter Distributor Unit (LXD) - Continued

Part Number	Figure Number(s)	Description	Notes
327476	7-4	Guide	
328175	7-2	Nut, 3-48 Hex	
333635	7-24	Contact Assembly	

Table 7 2. Transmitter and Transmitter Distributor Base (LXDB)

Part Number	Figure Number(s)	Description	Notes
2191	7-25 thru -31, -33 thru -36	Lockwasher	
2322	7-25,-28	Lockwasher	
2669	7-25 thru -31,-33	Lockwasher	
3438	7-25,-26,-35	Washer, Flat	
3598	7-28,-35	Nut, 6-40 Hex	
3606	7-26	Nut, 6-40 Hex	
3639	7-35	Lockwasher	
3640	7-30	Lockwasher	
3646	7-27	Lockwasher	
5599	7-27	Nut, 8-32 Hex	
7002	7-25,-26,-33	Washer, Flat	
8330	7-31,-35	Washer, Flat	
34432	7-28,-29,-30, -33,-35	Washer, Flat	
42827	7-25	Screw, 3-48 x 1/4 Fil	
44048	7-25,-26,-27	Washer, Flat	
45026	7-25,-26,-28,-33	Screw, 3-48 Shoulder	
45815	7-34	Lockwasher	
55219	7-25,-26	Screw, 8-32 x 3/8 Fil	
61085	7-27	Lockwasher	
70073	7-25,-26,-28,-33	Nut, 3-48 Hex	
74014	7-28,-31	Screw, 10-32 x 3/4 Hex	
74032	7-25,-26,-28	Washer, Flat	
74100	7-25,-26,-27,-33	Washer, Leather	
75607	7-28	Washer, Flat	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
83561	7-28	Washer, Spring	
84551	7-32	Jumper, 5-1/5" Black	
89822	7-32	Jumper, 3-11/16" Black	
90790	7-35,-36	Washer, Flat	
91683	7-25,-26	Nut, 15/32-32 Hex	
91684	7-25,-26	Nut, 15/32-32 Ring	
95063	7-32	Connector, 3-Pt Plug	
98726	7-27	Screw, 3-38 x 1/4 Fil	
99381	7-25,-26	Foot, Rubber	
100832	7-28	Screw, No. 0 x 3/16 Drive	
102416	7-35	Screw, 6-40 Shoulder	
104124	7-25,-28	Screw, 1/4-32 x 11/32 Hex	
104672	7-32	Connector, 12-Pt Plug	
107393	7-28	Switch, SP-ST Toggle	
110435	7-35	Nut, 4-40 Hex	
110743	7-25,-26,-34, -35,-36	Lockwasher	
111017	7-25,-26,-28,-34	Screw, 6-40 x 5/16 Fil	
111516	7-28	Washer, Flat	
112080	7-26	Washer, Flat	
112626	7-25,-26,-28	Nut, 10-32 Hex	
113203	7-32	Cord	
114466	7-25,-27	Connector, 3-Pt Rcpt	
114467	7-25,-27	Connector, 3-Pt Plug	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
114478	7-25	Nut, 15/32-32 Hex	
116499	7-25,-27	Switch, Toggle	
116669	7-27	Lens, Red	
116699	7-27	Lamp, 1/25 Watt Neon	
117366	7-32	Jumper, 8-1/2" Green	
117535	7-25,-26,-33	Washer, Flat	
117878	7-32	Jumper, 3" Black	
119634	7-27	Button, Plug	
119651	7-28	Ring, Retaining	
119652	7-35	Ring, Retaining	
119655	7-36	Ring, Retaining	
120175	7-25,-26,-27	Plate, ON-OFF	
120206	7-27	Socket, Lamp	
120557	7-25,-26	Washer, Flat	
121242	7-32	Clamp, 1/8" ID Cable	
121243	7-32	Clamp, 3/16" ID Cable	
121244	7-25,-32,-33	Clamp, 1/4" ID Cable	
121245	7-32	Clamp, 5/16" ID Cable	
121246	7-25,-32	Clamp, 3/8" ID Cable	
121247	7-32	Clamp, 7/16" ID Cable	
121248	7-32,-33	Clamp, 1/2" ID Cable	
121249	7-32	Clamp, 5/8" ID Cable	
121250	7-32	Clamp, 3/4" ID Cable	
121251	7-32	Clamp, 1" ID Cable	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
124396	7-25,-26,-34	Switch Assembly	
124850	7-28	Screw, 10-32 x 15/32 Fil	
125011	7-25,-26,-28	Washer, Flat	
125170	7-27	Screw, 8-32 x 5/16 Fil	
125181	7-31	Screw, 2-56 x 3/8 Fil	
125802	7-35	Washer, Flat	
136148	7-25,-26	Modification Kit	
139159	7-32	Connector, 3-Pt Plug	
142665	7-25,-26	Nut, 8-32 Spl	
145313	7-35	Washer, Felt	
145368	7-36	Gear, 27T	
145370	7-36	Gear, 42T	
145373	7-35	Gear, 66T	
145375	7-35	Gear, 63T	
145381	7-35	Washer, Thrust	
145383	7-35	Key	
145384	7-35	Pin, Guide	
145385	7-35	Spring, Compression	
145386	7-35	Sleeve	
146647	7-36	Belt, 50T	
150646	7-35	Screw, 6-40 Shoulder	
150949	7-28	Plate, Serial	
150950	7-28	Plate, Code	
151152	7-30	Screw, 4-40 x 3/16 Hex	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
151245	7-35	Washer, Felt	
151335	7-25,-26,-28	Stud	
151346	7-31,-35	Screw, 6-40 x 3/8 Fil	
151411	7-25,-26,-28,-34	Block, Terminal	
151412	7-25,-26,-28,-34	Insulator, Terminal Block	
151414	7-26,-28,-32	Switch, Sensitive	
151416	7-25,-26,-28,-34	Nut, 6-40 Terminal	
151442	7-28	Screw, 6-40 x 1/2 Hex	
151606	7-26,-28	Screw, 10-32 x 1/4 Hex	
151610	7-31,-35,-36	Washer, Flat	
151618	7-31	Screw, 6-40 x 7/16 Fil	
151630	7-25 thru -28, -31,-33,-34	Screw, 6-40 x 1/4 Hex	
151631	7-29,-30,-31,-34 -35,-36	Screw, 6-40 x 5/16 Hex	
151632	7-25,-31,-33,-36	Screw, 6-40 x 3/8 Hex	
151657	7-26	Screw, 6-40 x 1/4 Fil	
151658	7-26	Screw, 6-40 x 5/16 Fil	
151659	7-36	Screw, 6-40 x 1/2 Fil	
151660	7-35	Screw, 6-40 x 7/8 Fil	
151690	7-31,-34	Screw, 10-32 x 5/16 Fil	
151692	7-30	Screw, 6-40 x 3/16 Fil	
151694	7-29,-30	Screw, 6-40 x 11/32 Fil	
151722	7-29,-30,-31,-33	Screw, 6-40 x 3/16 Fil	
151723	7-25,-27,-28,-33	Screw, 10-32 x 3/8 Hex	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
151724	7-35	Screw, 10-32 x 5/8 Hex	
151731	7-34	Screw, 4-40 x 7/8 Fil	
151819	7-32	Jumper, 3" Black	
151827	7-25,-26,-34	Strap, Terminal	
151922	7-34	Clamp	
152441	7-35	Washer, Flat	
152887	7-35	Screw, 4-40 x 1/2 Hex	
152893	7-25,-26,-28,-36	Screw, 4-40 x 1/4 Hex	
153441	7-26,-29,-30	Screw, 10-32 x 7/16 Hex	
153442	7-28	Screw, 10-32 x 1/2 Hex	
153537	7-31	Screw, 6-40 x 9/32 Hex	
153819	7-25,-26,-28,-33	Lockwasher	
153939	7-32	Jumper, 4" Black	
154689	7-32	Jumper, 3" Black	
155551	7-29,-30,-36	Clamp, Bearing	
155750	7-32""	Sleeve, 3/32 ID x 1/2" Lg Insulating	
155751	7-32	Sleeve, 1/8" ID x 1" Lg Insulating	
155752	7-32	Sleeve, 5/64" x 1/2" Lg Insulating	
155753	7-28,-32	Sleeve, 1/8" ID x 1/2" Lg Insulating	
155754	7-32	Sleeve, 1/16" ID x 1/2" Lg Insulating	
155755	7-32	Sleeve, 11/64" ID x 5/8" Lg Insulating	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
156501	7-25,-27	Screw, 6-40 x 7/32 Fil	
156626	7-29	Gear, 88T	
156627	7-29	Pinion, 18T	
156628	7-29	Gear, 72T	
156629	7-29	Pinion, 24T	
156656	7-32	Jumper, 2-3/4" Black	
156658	7-29	Gearset, 60 WPM	
156659	7-29	Gearset, 100 WPM	
156725	7-29	Pinion, 24T	
156726	7-29	Gear, 94T	
156728	7-29	Gearset, 75 WPM	
156751	7-25	Plate, Base	
156752	7-25	Bar	
156753	7-25	Bar	
156754	7-25	Plate w/Spacers	
156755	7-25	Plate w/Spacers	
156756	7-25	Guard	
156757	7-25,-26	Bracket, Switch	
156758	7-25,-26,-28	Bracket	
156764	7-25,-26,-28	Stud	
156805	7-29	Retainer	
156806	7-29	Post	
156807	7-29	Disk	
156808	7-29	Disk	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
156819	7-29,-30	Shaft, Bearing	
156821	7-29	Housing, Bearing	
157195	7-34	Stud	
157215	7-25,-26,-28	Mount, Vibration	
158745	7-36	Clamp, Bearing	
158788	7-29	Clamp, Bearing	
159341	7-31,-35,-36	Bearing, Ball	
161238	7-27,-32	Connector, 36-Pt Rcpt	
161239	7-25,-32	Connector, 36-Pt Plug	
161246	7-29,-30,-36	Pinion, 20T	
161351	7-29	Gear, 49T	
161352	7-29	Pinion, 11T	
161353	7-29	Gear, 63T	
161354	7-29	Pinion, 15T	
161358	7-29	Gearset, 67 WPM	
161359	7-29	Gearset, 71 WPM	
161520	7-31	Belt, 64T	
161548	7-28	Bracket, Switch	
161595	7-25,-26,-28,-32	Connector, 36-Pt Rcpt	
162072	7-34	Capacitor, 88 to 108 MFD	
162199	7-26	Latch	
162201	7-26	Guard	
162202	7-26	Bar	
162203	7-26	Bar	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
162204	7-26	Plate	
162205	7-26,-34	Plate	
162206	7-26	Plate, Base	
162215	7-28	Hub	
162291	7-25,-26	Bracket, Connector Mounting	
162463	7-25	Modification Kit	
163702	7-28	Pan w/Brackets	
163704	7-28	Base	
163705	7-28	Bracket, Connector	
163707	7-28	Post	
163708	7-28	Clamp	
163709	7-28	Bushing, Eccentric	
163710	7-28	Plate, Adjusting	
163711	7-28	Plate, Mounting	
163712	7-28	Eccentric	
163713	7-28	Plate	
163716	7-29	Pulley, 14T	
163722	7-31	Bar, Mounting Plate	
163723	7-31	Clamp	
163724	7-31	Plate	
163725	7-31	Gear, 40T	
163728	7-31	Plate, Bearing Mounting	
163729	7-31	Clamp, Bearing	
163730	7-31	Hub	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
163731	7-31	Pulley, 28T	
163733	7-30	Pulley, 16T	
163736	7-30	Housing, Bearing	
163737	7-30,-36	Clamp, Bearing	
163741	7-31	Plate, Bearing Mounting	
163743	7-31	Pulley, 32T	
163744	7-31	Belt, 85T	
163757	7-28	Cable Assembly	
164119	7-28	Plate, Teletype Ident	
164684	7-28	Bracket	
164685	7-28	Bracket	
164906	7-32	Cable Assembly	
164965	7-35	Washer, Flat	
165082	7-26	Clamp, Cable	
165083	7-26	Keeper, Clamp	
170863	7-26	Mount, Vibration	
173098	7-30	Gearset, 60 WPM	
173099	7-30	Gear, 110T	
173100	7-30	Pinion, 45T	
173101	7-30	Gearset, 75 WPM	
173102	7-30	Gear, 94T	
173103	7-30	Pinion, 48T	
173104	7-30	Gearset, 100 WPM	
173105	7-30	Gear, 84T	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
173106	7-30	Pinion, 56T	
173159	7-29	Pinion, 32T	
173160	7-29	Gear, 80T	
173162	7-27	Bracket	
173397	7-27	Plate, Base	
173427	7-29	Gearset, 120 WPM	
173595	7-29	Gearset, 107 WPM	
173596	7-29	Gear, 84T	
173597	7-29	Pinion, 30T	
173598	7-29	Gearset, 65 WPM	
173599	7-29	Gear, 120T	
173600	7-29	Pinion, 26T	
173974	7-25,-26	Screw, 10-32 x 5/16 Hex	
173996	7-32	Connector, 3-Pt Plug	
174173	7-32	Cable Assembly	
174233	7-32	Plug, Red	
174250	7-36	Pin, Roll	
174346	7-30	Gearset, 67 WPM	
174347	7-30	Pinion, 44T	
174348	7-30	Gear, 98T	
176152	7-29	Gearset, 67 WPM	
176153	7-29	Gear, 98T	
176154	7-29	Pinion, 22T	
176417	7-31	Ring, Retaining	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
192784	7-29	Pinion, 25T	
192785	7-29	Gear, 112T	
192786	7-29	Pinion, 20T	
192787	7-29	Gear, 112T	
193622	7-29	Gearset, 66 WPM	
193665	7-29	Gearset, 53 WPM	
194348	7-29	Gearset, 100 WPM	
194349	7-29	Pinion, 52T	
194350	7-29	Gear, 104T	
194351	7-29	Gear, 56T	
194352	7-29	Pinion, 17T	
194353	7-29	Gearset, 60 WPM	
194355	7-29	Pinion, 15T	
194879	7-26	Plate Assembly	
194941	7-25,-27	Plate, Cover	
195012	7-25	Bracket	
195013	7-25	Plate	
195263	7-36	Gear, 22T	
195264	7-35	Gear, 49T	
195429	7-29	Pinion, 20T	
195430	7-29	Gear, 72T	
195442	7-34,-35,-36	Modification Kit	
195443	7-34,-35,-36	Modification Kit	
195445	7-34	Bracket, Switch	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
195446	7-34	Block	
195447	7-36	Pulley, 18T	
195448	7-36	Belt, 55T	
195449	7-36	Gear, 24T	
195450	7-36	Pulley, 20T	
195451	7-36	Shaft w/Gear & Bearing	
195452	7-35	Bracket	
195453	7-35	Lever	
195454	7-35	Arm, Idler	
195456	7-35,-36	Bracket w/Bearing	
195457	7-35	Shaft	
195458	7-36	Shart w/Bearing	
195459	7-36	Gear, 48T	
195460	7-36	Shaft w/Bearings	
195462	7-34	Bracket	
196900	7-35	Gear, 50T	
196902	7-35	Eccentric	
196903	7-35	Guard, Gear	
197616	7-29	Pinion, 31T	
197617	7-29	Gear, 92T	
197618	7-29	Gearset, 101 WPM	
197695	7-29	Gear, 78T	
197696	7-29	Pinion, 21T	
197697	7-29	Gearset, 67 WPM	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
198083	7-31	Shaft w/Bearing	
198084	7-30,-31	Shaft w/Bearing	
198088	7-31	Modification Kit	
198090	7-31	Modification Kit	
198091	7-35	Bearing, Ball	
199132	7-33	Post	
199135	7-33	Pan, Oil	
199156	7-33	Bar	
199157	7-33	Bar	
199158	7-33	Bracket, Connector Mounting	
305528	7-29	Pinion, 26T	
305529	7-29	Pinion, 28T	
305530	7-29	Pinion, 40T	
305531	7-29	Gear, 106T	
305532	7-29	Gear, 104T	
305533	7-29	Gear, 100T	
305534	7-29	Gearset, 60 WPM	
305535	7-29	Gearset, 67 WPM	
305536	7-29	Gearset, 100 WPM	
305763	7-33	Post	
308177	7-29	Pinion, 20T	
308178	7-29	Gear, 102T	
308179	7-29	Gearset, 58.8 WPM	
308180	7-29	Pinion, 24T	

Table 7-2. Transmitter and Transmitter Distributor Base (LXDB) - Continued

Part Number	Figure Number(s)	Description	Notes
308181	7-29	Gear, 102T	
308182	7-29	Gearset, 58.8 WPM	
308183	7-29	Pinion, 24T	
308184	7-29	Gear, 112T	
308185	7-29	Gearset, 53.7 WPM	
308186	7-29	Pinion, 19T	
308187	7-29	Gear, 71T	
308188	7-29	Gearset, 66.9 WPM	
320410	7-32	Terminal, Spade Type	
320418	7-28,-32	Terminal, Ring Type	
320420	7-32	Terminal, Ring Type	
323832	7-29	Gearset, 71 WPM	
323839	7-29	Gearset, 65 WPM	
323840	7-29	Gearset, 107 WPM	
327337	7-29	Pinion, 26T	
327338	7-29	Gear, 100T	
327339	7-29	Pinion, 26T	
327340	7-29	Gear, 91T	
327341	7-29	Pinion, 36T	
327342	7-29	Gear, 84T	
327447	7-27	Insulator	
328367	7-29	Pinion, 20T	
328368	7-29	Gear, 88T	

Table 7-3. Motor Unit

Part Number	Figure Number(s)	Description	Notes
1030	7-46	Screw, 6-40 Shoulder	
2191	7-39,-41,-43 thru -47	Lockwasher	
2263	7-39	Nut, 8-32 Hex	
3599	7-46,-47	Nut, 4-40 Hex	
3606	7-46	Nut, 6-40 Hex	
3640	7-41,-42,-46,-47	Lockwasher	
6320	7-45,-46	Screw, 6-32 Contact	
6345	7-43,-45,-46	Nut, 6-32 Hex	
7002	7-41,-44,-45,-46	Washer, Flat	
8330	7-46	Washer, Flat	
36273	7-41	Washer, Flat	
42823	7-46	Washer, Flat	
71999	7-39,-43	Spring, Motor Thrust	
76461	7-46	Washer, Flat	
76834	7-47	Screw, 4-40 x 3/8 Flat	
82392	7-46	Shim, 0.004" Thk	
86736	7-46	Plate, Clamping	
87334	7-42	Washer, Insulating	
90560	7-46	Washer, Flat	
91228	7-38,-43	Strap Assembly, 2-1/2" Brd	
91229	7-43	Strap, 2" Braided	
91837	7-43	Washer, Insulating	
92260	7-43	Lockwasher	
93118	7-46	Lockwasher	

Table 7-3. Motor Unit - Continued

Part Number	Figure Number(s)	Description	Notes
96264R	7-37	Jumper, 5" Red	
98642	7-43	Lockwasher	
98712	7-45	Screw, 4-40 x 1/4 Flat	
104752	7-41	Washer, Flat	
104807	7-46	Washer, Flat	
110434	7-41	Screw, 4-40 x 3/16 Fil	
110435	7-46	Nut, 4-40 Hex	
110475	7-46	Screw, 2-64 x 5/64 Rd	
110743	7-45,-46,-47	Lockwasher	
111017	7-46	Screw, 6-40 x 5/16 Fil	
111062	7-43	Terminal	
119223	7-42	Screw, 4-40 x 1-15/32 Fil	
119648	7-46	Ring, Retaining	
119651	7-46	Ring, Retaining	
122200	7-43	Shield Assembly, End	
122201	7-39,-43	Bearing, Ball	
122202	7-43	Stud	
122204	7-43	Cap, Brush	
122205	7-43	Brush w/Spring	
122206	7-43	Holder, Brush	
122207	7-41,-42,-43	Strap Assembly	
122208	7-43	Washer, Flat	
122210	7-43	Armature, Motor	
122211	7-39,-43	Washer, Pull	
122220	7-39,-43	Oiler, Ball	

Table 7-3. Motor Unit - Continued

Part Number	Figure Number(s)	Description	Notes
122221	7-43	Stator	
122229	7-39	Bolt, 8-32 x 4-11/16 Fil	
122233	7-43	Capacitor Assembly	
122245	7-37,-41	Capacitor, 43 to 48 MFD	
122249	7-37,-41	Switch, Thermostatic	
122251	7-39	Stator, Motor	
122252	7-39	Shield Assembly, End	
122253	7-43	Shield Assembly, End	
123769	7-39	Fan, Motor	
125011	7-42,-45,-46	Washer, Flat	
125143	7-43	Screw, 6-32 x 3/8 Flat	
125802	7-46	Washer, Flat	
128874	7-39	Rotor, Motor	
139697	7-47	Screw, 4-40 x 9/32 Fil	
142589	7-37,-42	Bracket w/Cradle, Motor	
150040	7-39	Screw, 6-40 x 5/8 Fil	
150701	7-38,-43	Motor Assembly, Std, Series, 1/20 HP, 115V/60 Hz/3600 RPM	
150845	7-45	Governor Assembly	
150846	7-44	Holder Assembly, Left Brush	
150847	7-44	Holder Assembly, Right Brush	
150849	7-45,-46	Washer, Insulating	
150850	7-45,-46	Insulator, 0.031" Thk	
150856	7-45,-46	Arm, Contact	
150857	7-45,-46	Clamp	

Table 7-3. Motor Unit - Continued

Part Number	Figure Number(s)	Description	Notes
150858	7-45,-46	Bracket, Contact	
150859	7-45,-46	Bracket, Mounting	
150865	7-45	Screw, 4-40 Clamping	
150866	7-45	Clamp	
150868	7-45,-46	Bushing, Insulating	
150869	7-45	Spring	
150872	7-45	Stud	
150873	7-44	Collar	
150877	7-45	Bracket, Guide	
150879	7-45	Cover, Governor	
150880	7-44	Spring, Governor Brush	
150881	7-44	Spring, Governor Brush	
150882	7-44	Brush, Contact	
150884	7-44	Mounting, Brush	
150885	7-44	Plate, Brush	
150886	7-44	Plate, Clamp	
150997	7-45	Fan, Governor	
151152	7-45,-46,-47	Screw, 4-40 x 3/16 Hex	
151346	7-39,-44	Screw, 6-40 x 3/8 Fil	
151453	7-43	Nut, 10-32 Hex	
151455	7-43	Spring, Helical Clip	
151620	7-41,-42,-43	Strap, Motor Mounting	
151621	7-41,-42,-43	Screw, 6-32 x 3/4 Rd	
151622	7-41,-42,-43	Nut, 6-32 Sq	

Table 7-3. Motor Unit - Continued

Part Number	Figure Number(s)	Description	Notes
151630	7-41,-43,-47	Screw, 6-40 x 1/4 Hex	
151637	7-42,-45	Screw,4-40 x 1/4 Fil	
151642	7-39,-44	Screw, 6-40 x 3/4 Fil	
151657	7-44	Screw, 6-40 x 1/4 Fil	
151658	7-44	Screw, 6-40 x 5/16 Fil	
151659	7-45,-46	Screw, 6-40 x 1/2 Fil	
151661	7-44,-45	Screw, 6-40 x 1 Fil	
151686	7-42,-46	Screw, 4-40 x 3/8 Fil	
151687	7-47	Screw, 4-40 x 7/16 Fil	
151692	7-46	Screw, 6-40 x 3/16 Fil	
151693	7-46	Screw, 6-40 x 9/16 Fil	
151795	7-37,-39	Motor Assembly, Std, CCW, AC Synchronous, 1/20 HP, 115V, 50/60 HZ, 3000/3600 RPM	
151922	7-37,-42	Clamp	
151923	7-37,-41	Relay, Motor Starting	
151925	7-37,-42	Clamp	
151926	7-42	Nut, 4-40 Spl	
151927	7-37,-41	Cable w/Terminals	
152035	7-47	Plug	
152042	7-47	Cover	
152044	7-47	Cover	
152046	7-38,-47	Bracket w/Cradle, Motor	
152059	7-38	Cable w/Terminals	
152067	7-38,-47	Nipple	
152297	7-39	Washer, Bearing	

Table 7-3. Motor Unit - Continued

Part Number	Figure Number(s)	Description	Notes
152495	7-45,-46	Bushing	
153030	7-39,-40,-43	Mount, Vibration	
153031	7-43	Bushing, Lead	
153049	7-39	Washer, Insulating	
153101	7-43	Grommet, Rubber	
153102	7-43	Setscrew, 8-32	
153103	7-43	Screw, 4-40 Self-Tapping	
153114	7-43	Jumper, 8-1/2" Black	
153342	7-46	Screw, 6-40 x 15/16 Hex	
153535	7-46	Screw, 6-40 Shoulder	
153536	7-46	Gear Assembly	
153885	7-46	Spring Assembly	
153962	7-46	Disc	
153963	7-46	Disc	
153964	7-46	Counterweight	
153965	7-46	Bracket	
153966	7-46	Gear Assembly	
153967	7-46	Gear, 28T	
153968	7-46	Gear Assembly	
153976	7-46	Gear, 32T	
153977	7-46	Gear, Worm	
153979	7-46	Gear, Post	
154375	7-45,-46	Backstop	
154628	7-46	Governor Assembly	

Table 7-3. Motor Unit - Continued

Part Number	Figure Number(s)	Description	Notes
154674	7-46	Gear, 20T	
154676	7-46	Disc Assembly	
154680	7-46	Bearing, Roller	
154684	7-46	Insulator	
154685	7-46	Fan Assembly	
154693	7-46	Bracket	
155585	7-46	Bearing, Ball	
155593	7-46	Bearing, Ball	
155594	7-46	Screw, 4-40 Shoulder	
155600	7-46	Bracket	
155601	7-46	Plate, Gear Train	
155602	7-46	Gear, 28T	
155603	7-46	Gear, 28T	
155605	7-46	Bearing, Ball	
155611	7-46	Ring, Bearing	
155613	7-46	Gear, 28T	
155762	7-41	Sleeve, 5/64" ID x 1/2" Lg Insulating	
156875	7-41	Screw, 6-40 x 5/32 Fil	
157987	7-46	Washer, Insulating	
160302	7-42	Plate, Nut	
161099	7-37	Cable w/Terminals	
161575	7-43	Armature, Motor	
161576	7-43	Stator, Motor	
161577	7-38,-43	Motor Assembly, Hvy, Series, 1/15 HP, 115V/60 HZ/3600 RPM	

Table 7-3. Motor Unit - Continued

Part Number	Figure Number(s)	Description	Notes
161578	7-38,-47	Suppressor, Noise	
161579	7-38,-47	Capacitor, 0.5 MFD	
161984	7-37,-40	Motor Assembly, Miniature, AC Synchronous, 25 MHP, 115V/60 HZ/3600 RPM	
162072	7-37,-42	Capacitor, 88 to 108 MFD	
162196	7-37,-42	Insulator	
162464	7-40	Stator, Motor	
162466	7-40	Shield, Rear End	
162467	7-40	Shield, Front End	
162469	7-40	Washer, Spring	
162482	7-40	Bolt, 6-32 x 3-1/2 Fil	
162910	7-42	Insulator	
164890	7-40	Bearing, Ball	
164891	7-40	Shim, 0.032" Thk	
164892	7-40	Shim, 0.018" Thk	
164893	7-40	Collar, Thrust	
164894	7-40	Shim, 0.018" Thk	
164962	7-42	Bracket	
172902	7-40	Nut, 6-32 Hex	
173425	7-37,-42	Relay, Motor Starting	
174471	7-37,-42	Switch, Thermostatic	
176417	7-40	Ring, Retaining	
179010	7-42	Bracket, Relay	
179103	7-38,-47	Resistor, 250 Ohm	

Table 7-3. Motor Unit - Continued

Part Number	Figure Number(s)	Description	Notes
179420	7-38,-47	Container	
179423	7-47	Plate w/Bracket	
179424	7-38,-47	Lid w/Insulator	
198691	7-47	Plate w/Resistor Assembly	
198692	7-47	Container Assembly	
199721	7-39	Bolt, 8-32 x 5-13/16 Fil	
305658	7-37,-41	Spring	
305659	7-37,-41	Insulator	
305660	7-37,-41	Plate, Mounting	
305661	7-37,-41	Bracket w/Cradle, Motor	
312530	7-47	Washer, Textolite	
312531	7-47	Washer, Fiber	
320410	7-43	Terminal, Spade Type	
320418	7-41	Terminal, Ring Type	
320420	7-38,-43	Terminal, Ring Type	
320422	7-38,-43	Terminal, Ring Type	
324115	7-45	Fan, Governor	
324116	7-45	Governor Assembly	
330564	7-40	Rotor	
330579	7-47	Screen w/Brackets	
332865	7-39	Fan	
334877	7-37,-41	Switch	

Table 7-4. Electrical Service Assembly

Part Number	Figure Number(s)	Description	Notes
2191	7-50,-51	Lockwasher	
3598	7-50	Nut, 6-40 Hex	
3599	7-51,-52	Nut, 4-40 Hex	
3650	7-53	Washer, Flat	
7001	7-50	Washer, Flat	
7002	7-50,-51	Washer, Flat	
7096	7-53	Bushing, Insulating	
92527	7-50	Lockwasher	
104807	7-53	Washer, Flat	
107116	7-50,-51	Lockwasher	
110743	7-50 thru -53	Lockwasher	
111017	7-50	Screw, 6-40 x 5/16 Fil	
116783	7-50	Holder, Fuse	
118146	7-53,-54	Resistor, 4700 Ohm	
118147	7-54	Resistor, 6800 Ohm	
118178	7-54	Resistor, 220K Ohm	
118659	7-50	Switch, Toggle	
118720	7-53,-54	Resistor, 100K Ohm	
120175	7-50	Plate, ON-OFF	
124611	7-50	Screw, 8-32 x 3/8 Hex	
125011	7-51,-52	Washer, Flat	
125229	7-51	Nut, 6-32 Hex	
126255	7-48,-49	Bumper, Rubber	
129850	7-53	Resistor, 680 Ohm	
129854	7-53,-54	Resistor, 10K Ohm	

Table 7-4. Electrical Service Assembly - Continued

Part Number	Figure Number(s)	Description	Notes
131807	7-52	Fuse, 0.5 Amp	
137438	7-54	Resistor, 100 Ohm	
137442	7-53	Resistor, 1500 Ohm	
137604	7-53	Resistor, 620 Ohm	
139143	7-53	Resistor, 43K Ohm	
144495	7-53,-54	Pad, Transistor Mounting	
144835	7-53	Bushing, Spring	
145781	7-48,-49,-50	Grommet	
145822	7-48,-49,-50	Stud, Oval Head	
150040	7-50	Screw, 6-40 x 5/8 Fil	
150089	7-52	Screw, 4-40 x 1/2 Fil	
150966	7-51	Insulator, Terminal Block	
151335	7-50,-51	Stud	
151415	7-51	Block, Terminal	
151416	7-50	Nut, 6-40 Hex	
151442	7-51	Screw, 6-40 x 1/2 Hex	
151629	7-50	Nut, 6-40 Lug	
151630	7-50,-51	Screw, 6-40 x 1/4 Hex	
151637	7-50,-52	Screw 4-40 x 1/4 Fil	
151659	7-50	Screw, 6-40 x 1/2 Fil	
151685	7-53	Screw, 4-40 x 5/16 Fil	
151686	7-51	Screw, 4-40 x 3/8 Fil	
151687	7-51	Screw, 4-40 x 7/16 Fil	
151693	7-53	Screw, 6-40 x 9/16 Fil	

Table 7-4. Electrical Service Assembly - Continued

Part Number	Figure Number(s)	Description	Notes
151722	7-50,-51	Screw, 6-40 x 3/16 Hex	
151723	7-50	Screw, 10-32 x 3/8 Hex	
151827	7-50,-51	Strap, Terminal	
151880	7-53	Nut, 4-40 Hex	
152035	7-50	Plug	
152888	7-53	Screw, 4-40 x 6/16 Hex	
153799	7-51	Screw, 4-40 x 21/64 Hex	
155753	7-50	Sleeve, 1/8 ID x 1/2" Lg Insulating	
158250	7-50	Block, Terminal	
158252	7-50	Insulator, Terminal Block	
161595	7-51	Connector, 36-Pt Rcpt	
162360	7-50	Fuse, SI-BL 0.8 Amp	
171533	7-52	Resistor, 4 Ohm	
171585	7-52	Capacitor, 0.22 MFD	
171587	7-53	Capacitor, 0.25 MFD	
171829	7-53	Capacitor, 0.15 MFD	
171831	7-52	Capacitor, 10 MFD	
172726	7-50	Resistor, 250 Ohm	
177113	7-52,-53	Insulator	
178844	7-52,-53	Varistor	
178860	7-52,-53	Capacitor, 0.022 MFD	
181266	7-52	Bushing, Insulating	
181618	7-54	Capacitor, 0.01 MFD	
181619	7-54	Diode	

Table 7-4. Electrical Service Assembly - Continued

Part Number	Figure Number(s)	Description	Notes
181667	7-53	Diode	
181675	7-53	Transistor, Power	
181999	7-50	Insulator	
182180	7-52	Resistor, 200 Ohm	
182284	7-50	Insulator, 0.015" Thk	
182520	7-52	Rectifier	
182523	7-50	Clamp, 1-3/8" ID Mounting	
182751	7-53	Resistor, 3600 Ohm	
195180	7-51	Bumper, Rubber	
198937	7-52	Resistor, 2700 Ohm	
303142	7-54	Circuit Card Assembly, LLK	
305298	7-52	Resistor, 3300 Ohm	
311664	7-52	Resistor, 2500 Ohm	
312284	7-52	Capacitor, 1.5 MFD	
312385	7-52	Capacitor, 0.1 MFD	
315930	7-54	Transistor	
315931	7-54	Transistor	
318835	7-52	Transistor	
320038	7-52	Jack, Red Test	
320039	7-52	Jack, Black Test	
320040	7-52	Jack, Orange Test	
320041	7-52	Jack, Green Test	
320042	7-52	Jack, Slate Test	
320045	7-53	Card, Circuit	
320047	7-54	Capacitor, 2 MFD	

Table 7-4. Electrical Service Assembly - Continued

Part Number	Figure Number(s)	Description	Notes
320048	7-54	Capacitor, 0.5 MFD	
320049	7-54	Capacitor, 0.15 MFD	
320051	7-54	Card, Circuit	
320056	7-50	Bracket	
320408	7-51	Terminal, Spade Type	
320410	7-50,-51	Terminal, Spade Type	
320418	7-50,-51	Terminal, Ring Type	
320420	7-50	Terminal, Ring Type	
321128	7-50	Transformer, Power	
321129	7-50	Capacitor, 750 MFD	
321130	7-52	Card, Circuit	
321133	7-51	Inductor	
321145	7-52	Transistor	
321148	7-53	Sink, Heat	
321149	7-53	Diode	
321151	7-53	Resistor, 110 Ohm	
321153	7-53	Spacer	
321154	7-53	Diode	
321155	7-53	Resistor, 2000 Ohm	
321156	7-53	Diode	
321157	7-53,-54	Capacitor, 500 PF	
321158	7-53	Capacitor, 0.1 MFD	
321159	7-52,-53	Choke	
321160	7-53	Potentionmeter	

Table 7-4. Electrical Service Assembly - Continued

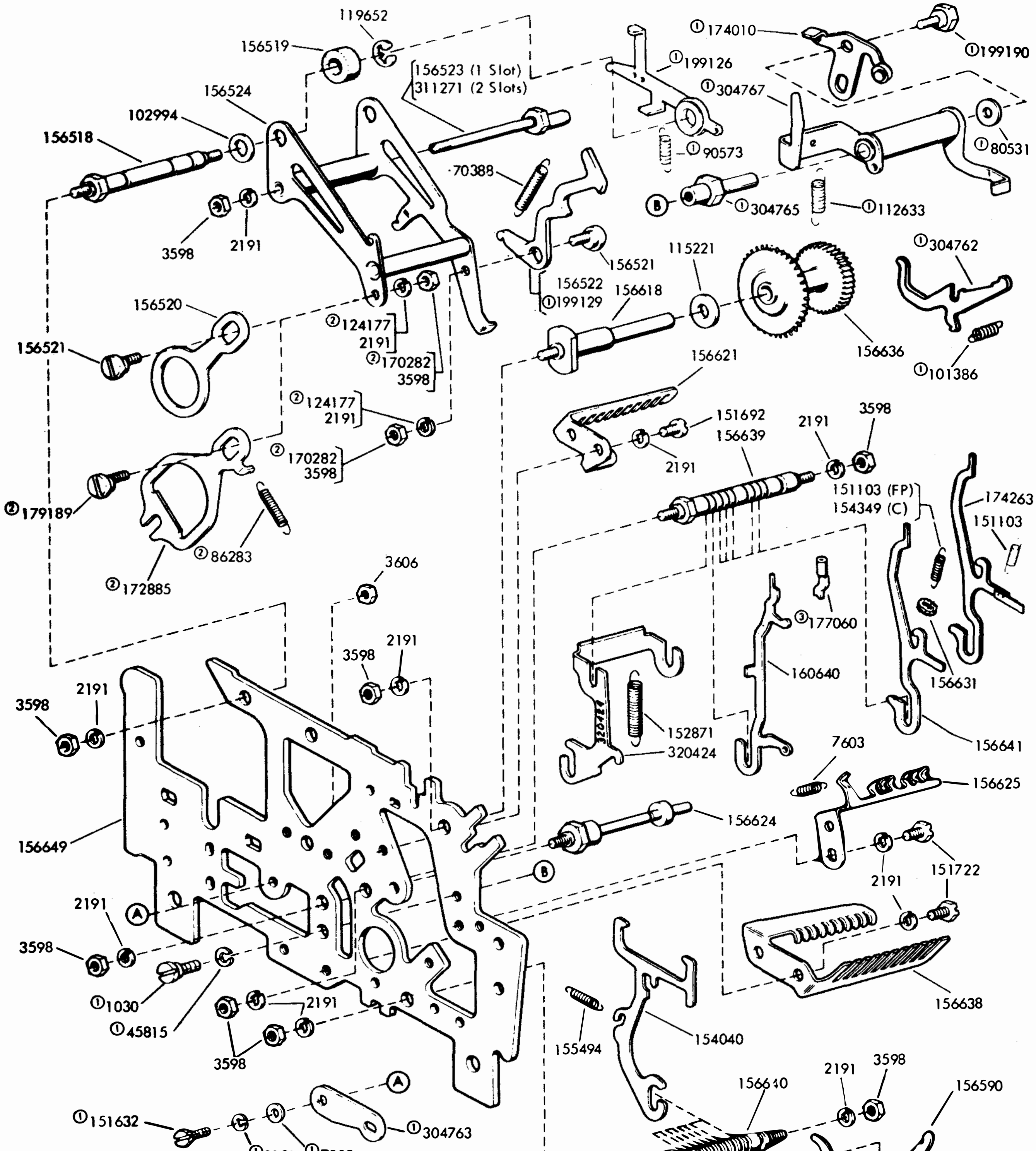
Part Number	Figure Number(s)	Description	Notes
321161	7-53	Diode	
321164	7-53	Potentiometer	
321165	7-53	Transistor	
321166	7-53	Transistor	
321167	7-53	Jumper, 2-7/8" Yellow	
321168	7-53	Jumper, 2-7/8" Blue	
321169	7-53	Jumper, 2-7/8" Orange	
321170	7-53	Jumper, 2-7/8" Red	
321171	7-53	Jumper, 3-3/4" Black	
321199	7-51	Connector, 90 Degree Angle	
321204	7-54	Resistor, 13K Ohm	
321207	7-51	Strip, Terminal	
321208	7-51	Plate	
321258	7-53	Resistor, 20K Ohm	
321259	7-53	Resistor, 15 Ohm	
321261	7-53	Transistor	
321263	7-53	Resistor, 13 Ohm	
321264	7-53	Capacitor, 2.7 MFD	
321285	7-50	Bracket, Mounting	
321286	7-52	Diode	
321288	7-52	Sink, Heat	
321290	7-52	Circuit Card Assembly, PS	
321292	7-53	Resistor, 1300 Ohm	
321299	7-53	Card, Circuit	
321986	7-48	Cover w/Bumpers	

Table 7-4. Electrical Service Assembly - Continued

Part Number	Figure Number(s)	Description	Notes
321987	7-48	Cover w/Studs	
321991	7-53	Circuit Card Assembly, CMD	
321995	7-50,-51	Container, Outer	
321996	7-50	Cover	
321997	7-50	Bracket	
323501	7-50,-51	Bracket, Connector Mounting	
323505	7-49	Cover w/Bumpers	
323506	7-49	Cover w/Studs	
323970	7-50	Cable Assembly	
323971	7-50	Cable Assembly	
324139	7-51	Cable	
324144	7-53,-54	Transistor	
324147	7-53,-54	Pad, Transistor Mounting	
324154	7-50	Cable	
324698	7-50	Nut, No. 10 Speed	
325926	7-51	Nut, 4-40 Hex	
326270	7-50,-51	Connector, 15-Pt Circuit Card	
326351	7-50	Transformer Assembly	
326352	7-50	Cable Assembly	
326353	7-50	Cable Assembly	
326369	7-50	Cable	
326378	7-51	Label	
326382	7-50	Label	
326792	7-50,-51	Electrical Service Assembly	

Table 7-4. Electrical Service Assembly - Continued

Part Number	Figure Number(s)	Description	Notes
326793	7-51	Cable Assembly	
326794	7-51	Insulator	
326795	7-51	Container, Inner	
326796	7-51	Cable w/Terminals	
327284	7-51	Cover, Inner	
327287	7-51	Cable Assembly	
327288	7-51	Bracket	
327386	7-51	Decalcomania	
327444	7-51	Capacitor, 2 MFD	
327792	7-51	Decalcomania	
327794	7-52	Diode	

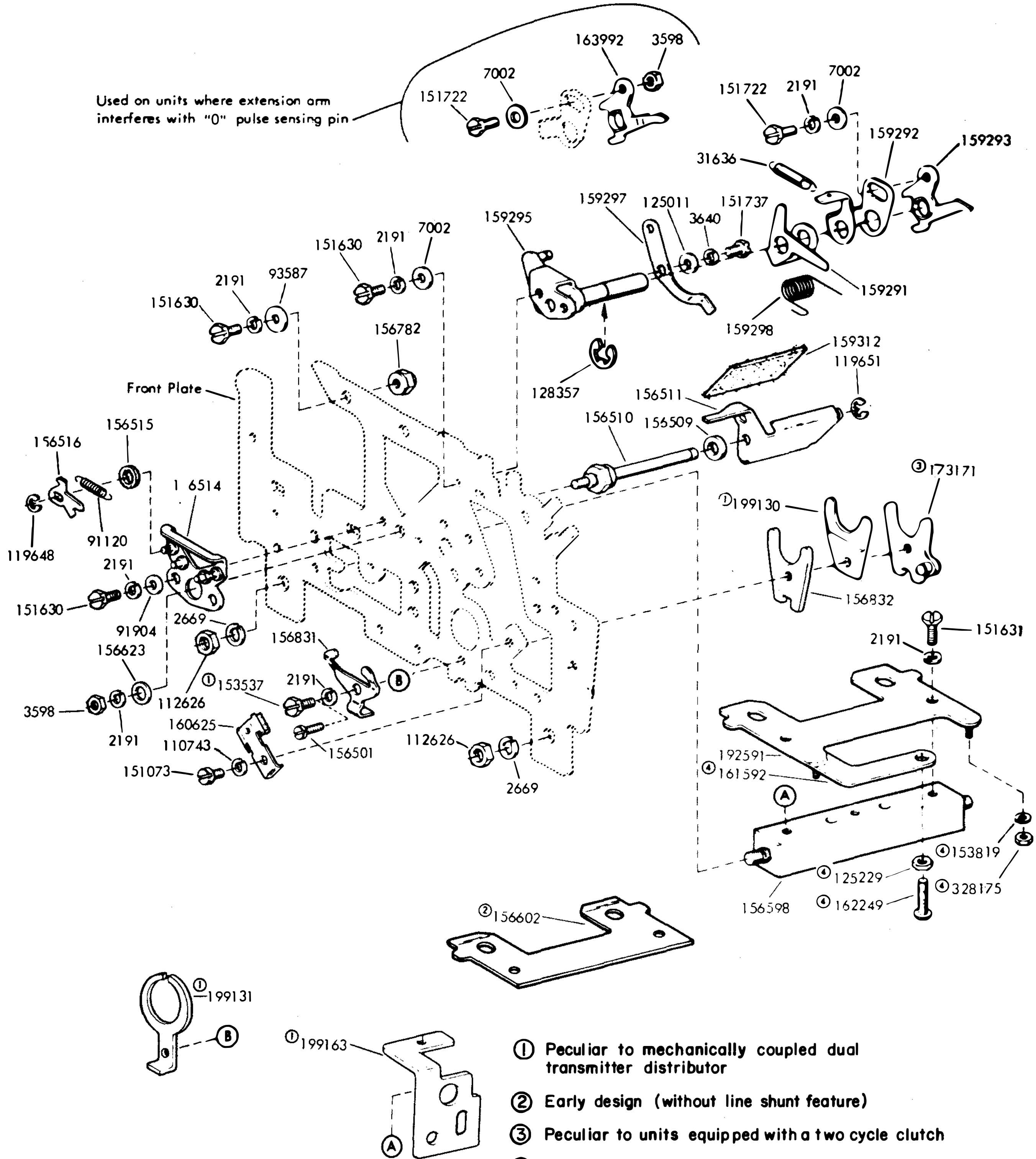


① Peculiar to mechanically coupled dual transmitter distributor
② Peculiar to units equipped with a two cycle clutch
③ Same as 160640 except with sleeve

See Figure 7-4 for 6, 7 and 8 level peculiarities

(FP) used with fully perforated tape
(C) used with chadless tape

Figure 7-1. Front Plate Mechanism (Sheet 1 of 3)



① Peculiar to mechanically coupled dual transmitter distributor

② Early design (without line shunt feature)

③ Peculiar to units equipped with a two cycle clutch

④ 162462 Modification Kit to convert an LXDI or LXD3 to an LXD4 transmitter distributor unit. Includes a 161591 cable. (Specification 58945)

Figure 7-2. Front Plate Mechanism (Sheet 2 of 3)

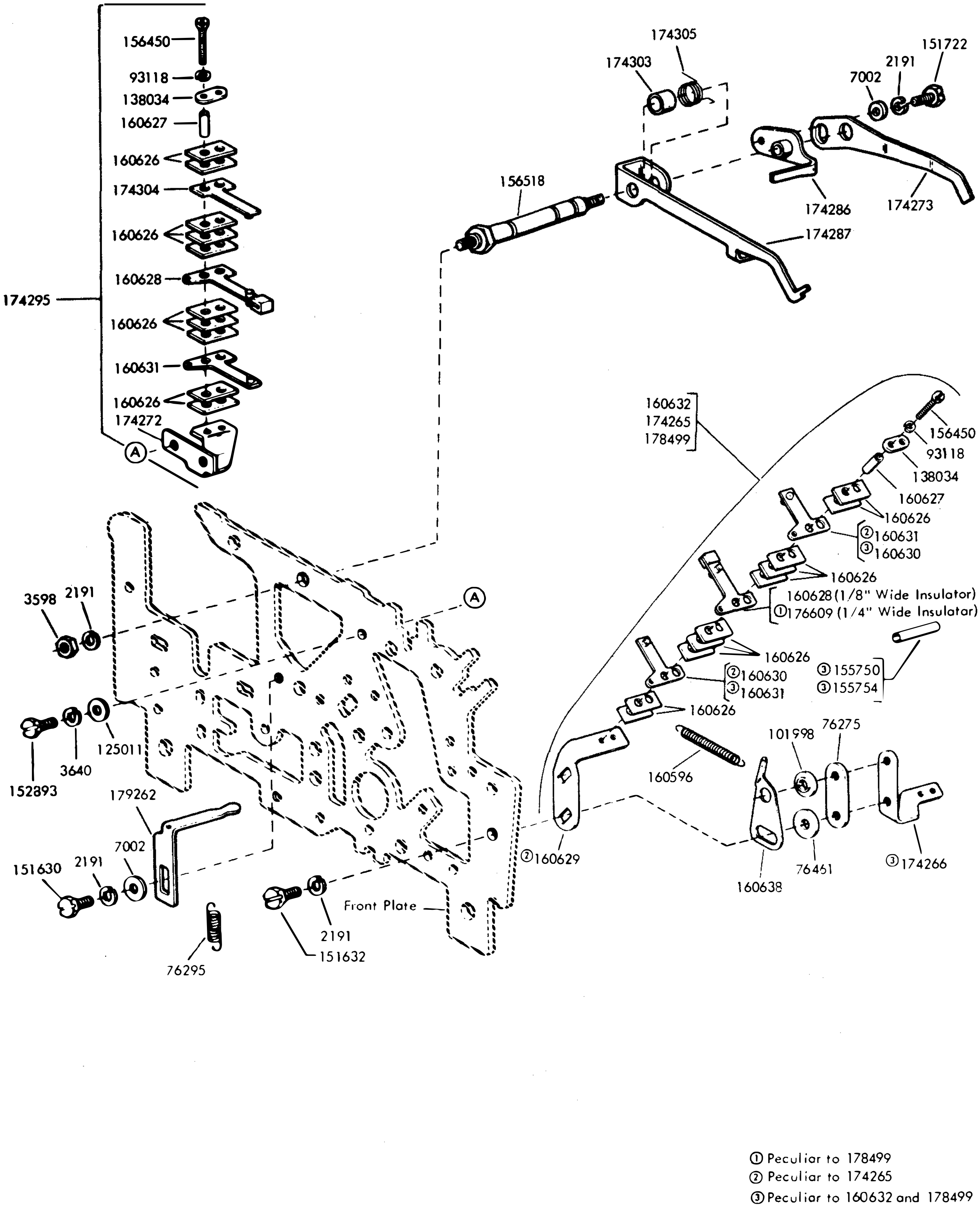
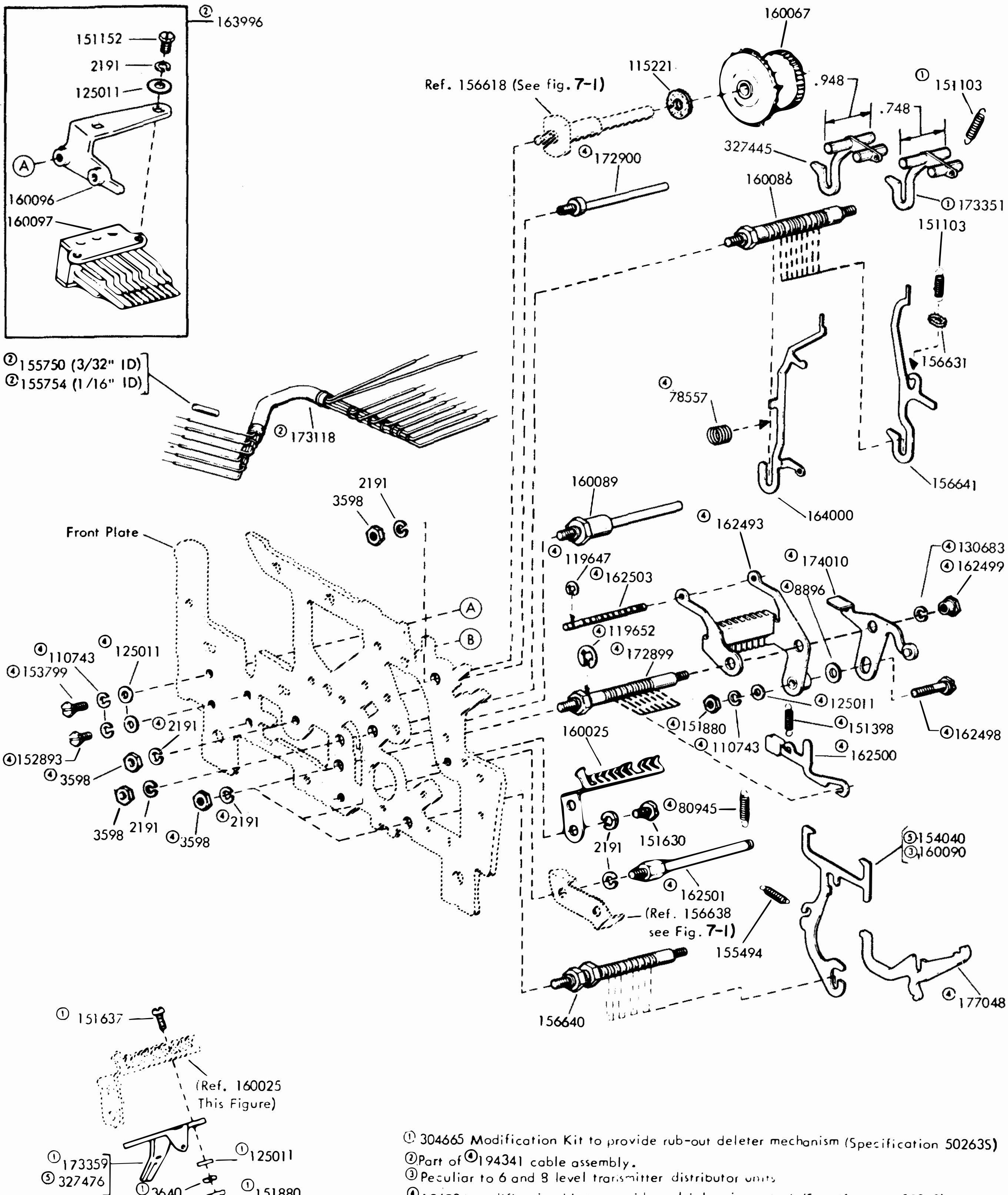


Figure 7-3. Front Plate Mechanism (Sheet 3 of 3)



① 304665 Modification Kit to provide rub-out deleter mechanism (Specification 50263S)
②Part of ④194341 cable assembly.
③Peculiar to 6 and 8 level transmitter distributor units
④194034 modification kit to provide multiple wire output (Specification 5939S)
⑤Peculiar to 6, 7 and 8 level transmitter units

Figure 7-4. Front Plate Mechanism (6, 7, and 8 Level Units)

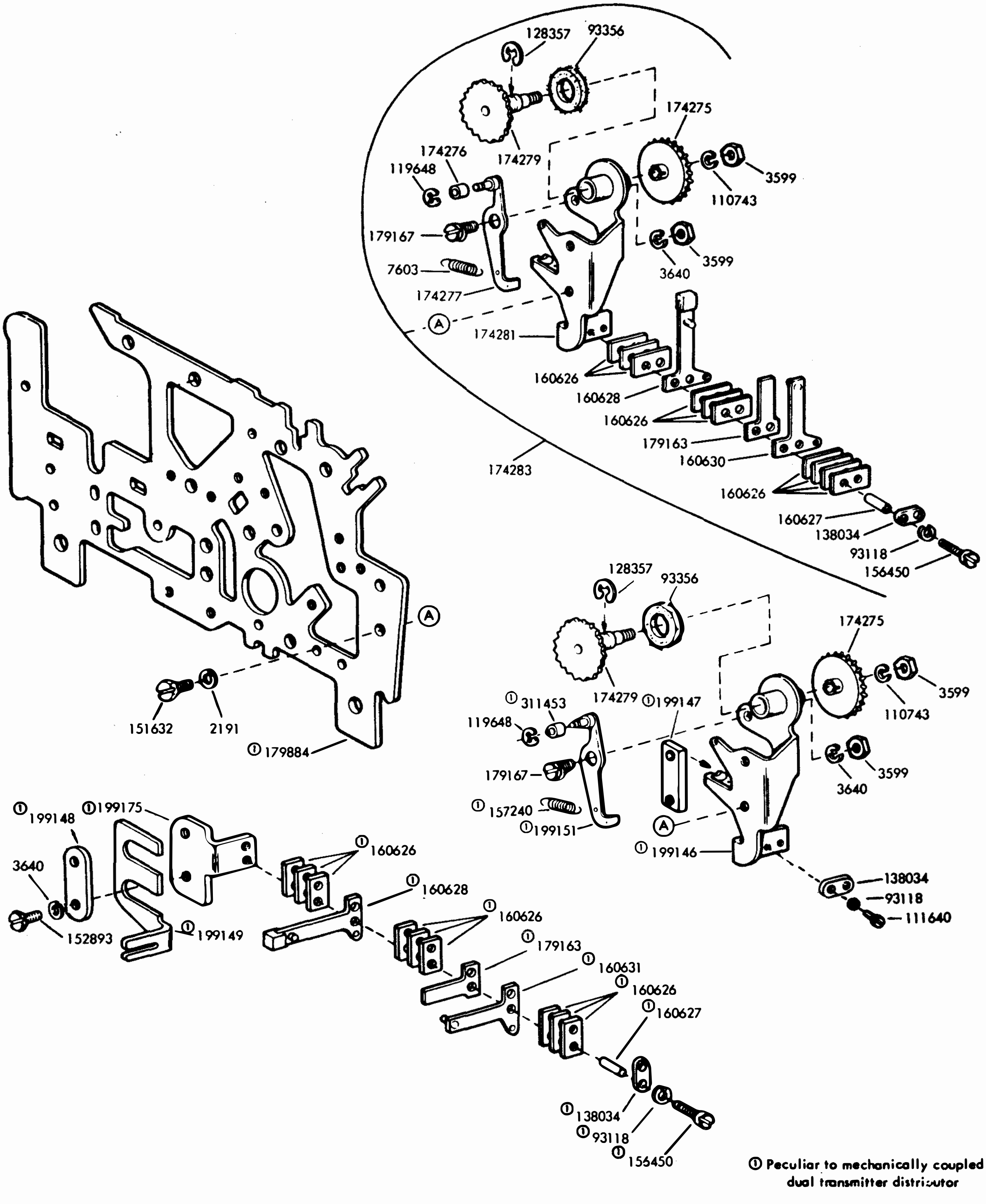
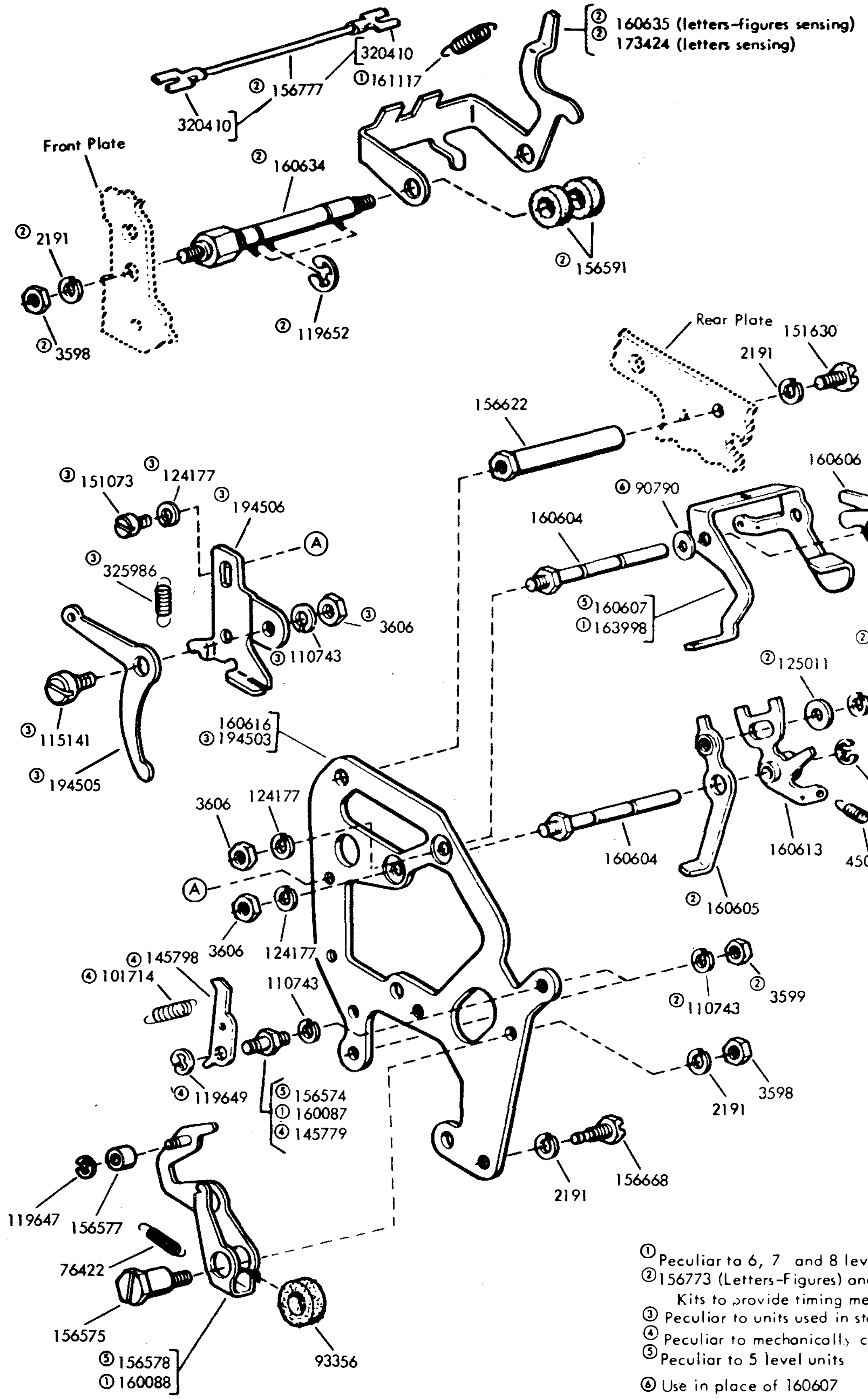


Figure 7-5. Front Plate Mechanism (With Tape Feed Assurance Contact)



① Peculiar to 6, 7 and 8 level units
② 156773 (Letters-Figures) and 174087 (Letters) Modification Kits to provide timing mechanism (Specification 5836S)
③ Peculiar to units used in station converter sets
④ Peculiar to mechanically coupled dual transmitter distributor
⑤ Peculiar to 5 level units
⑥ Use in place of 160607

Figure 7-6. Center Plate and Timing Mechanism

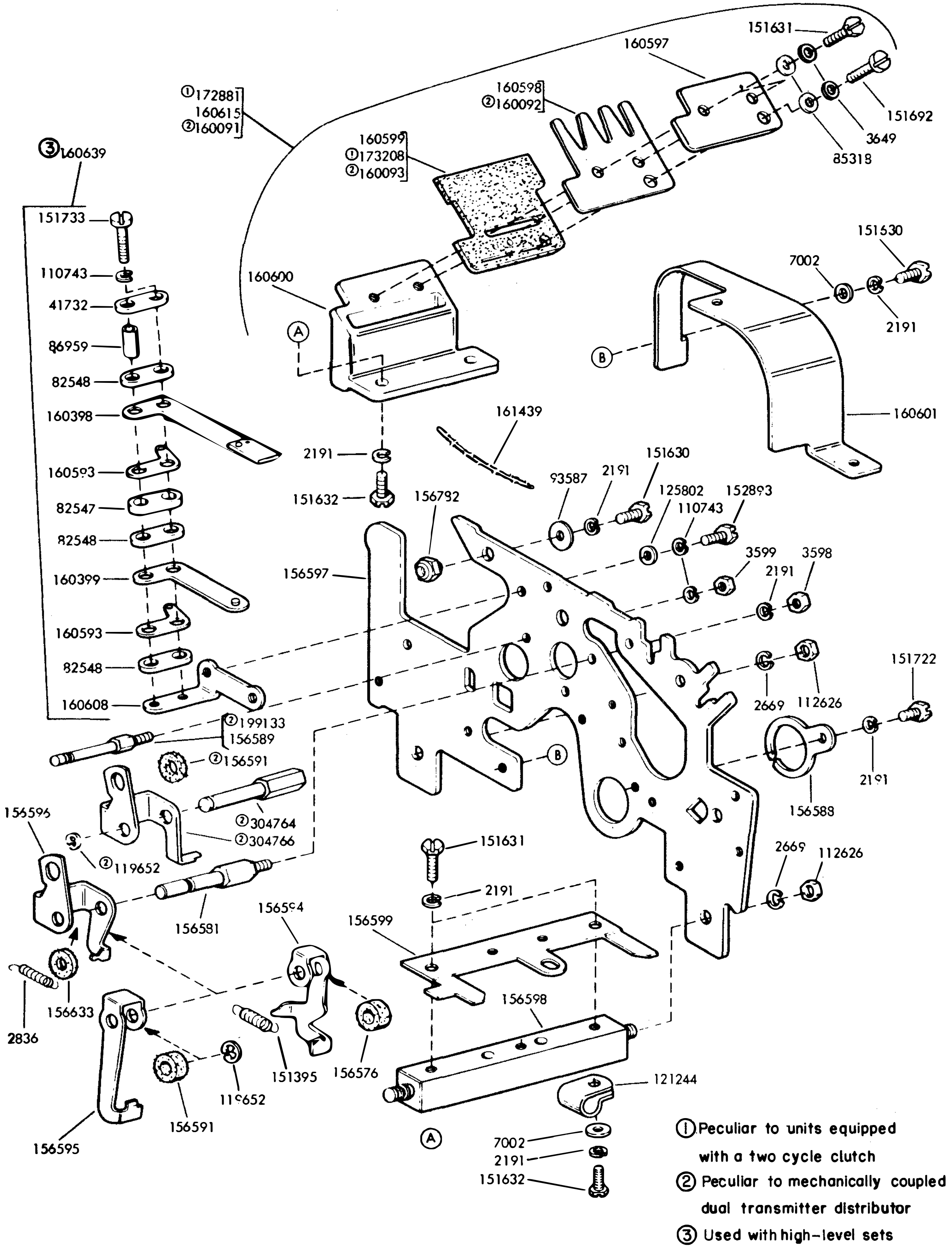


Figure 7-7. Rear Plate Mechanism

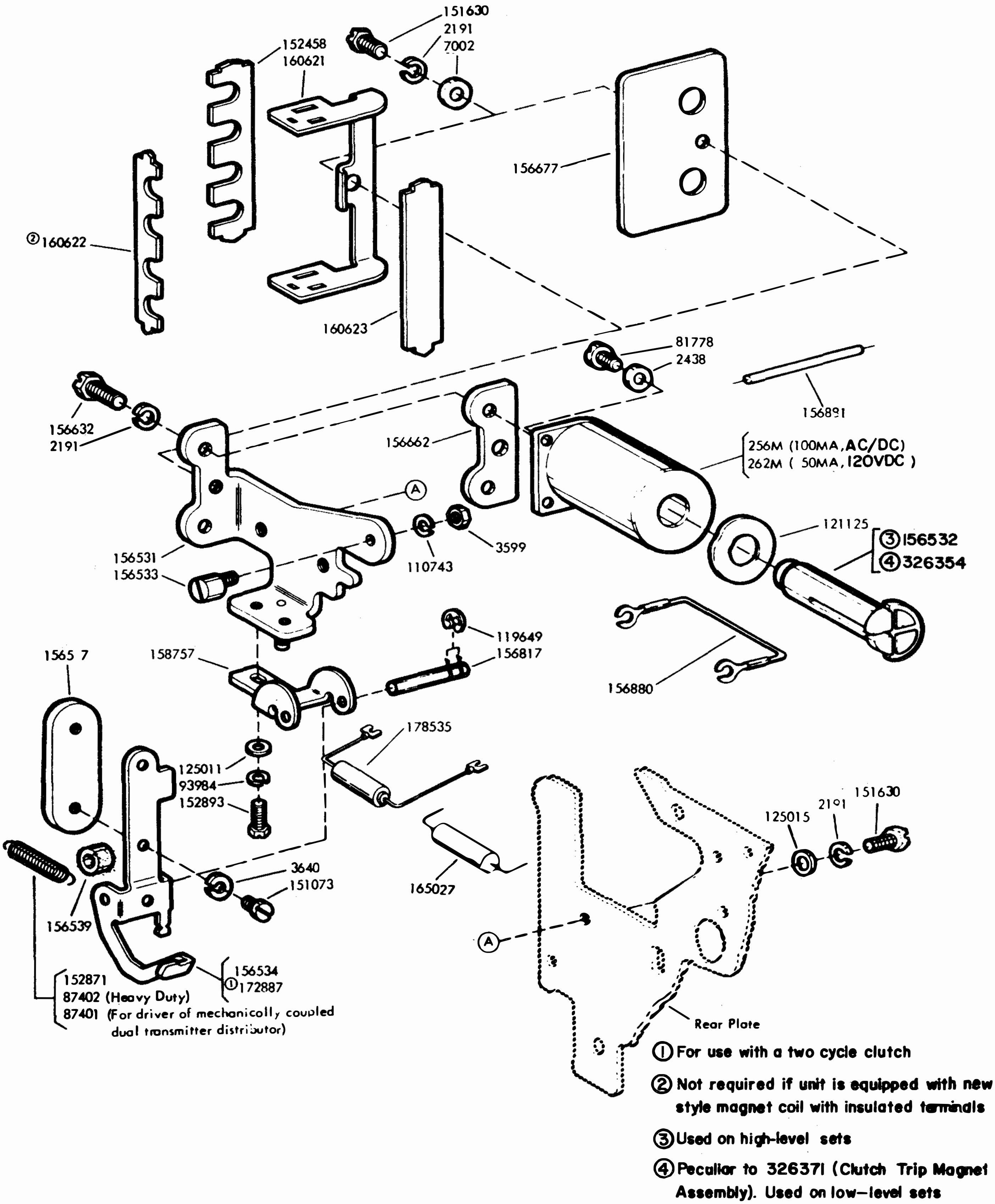


Figure 7-8. Clutch Trip Magnet Mechanism

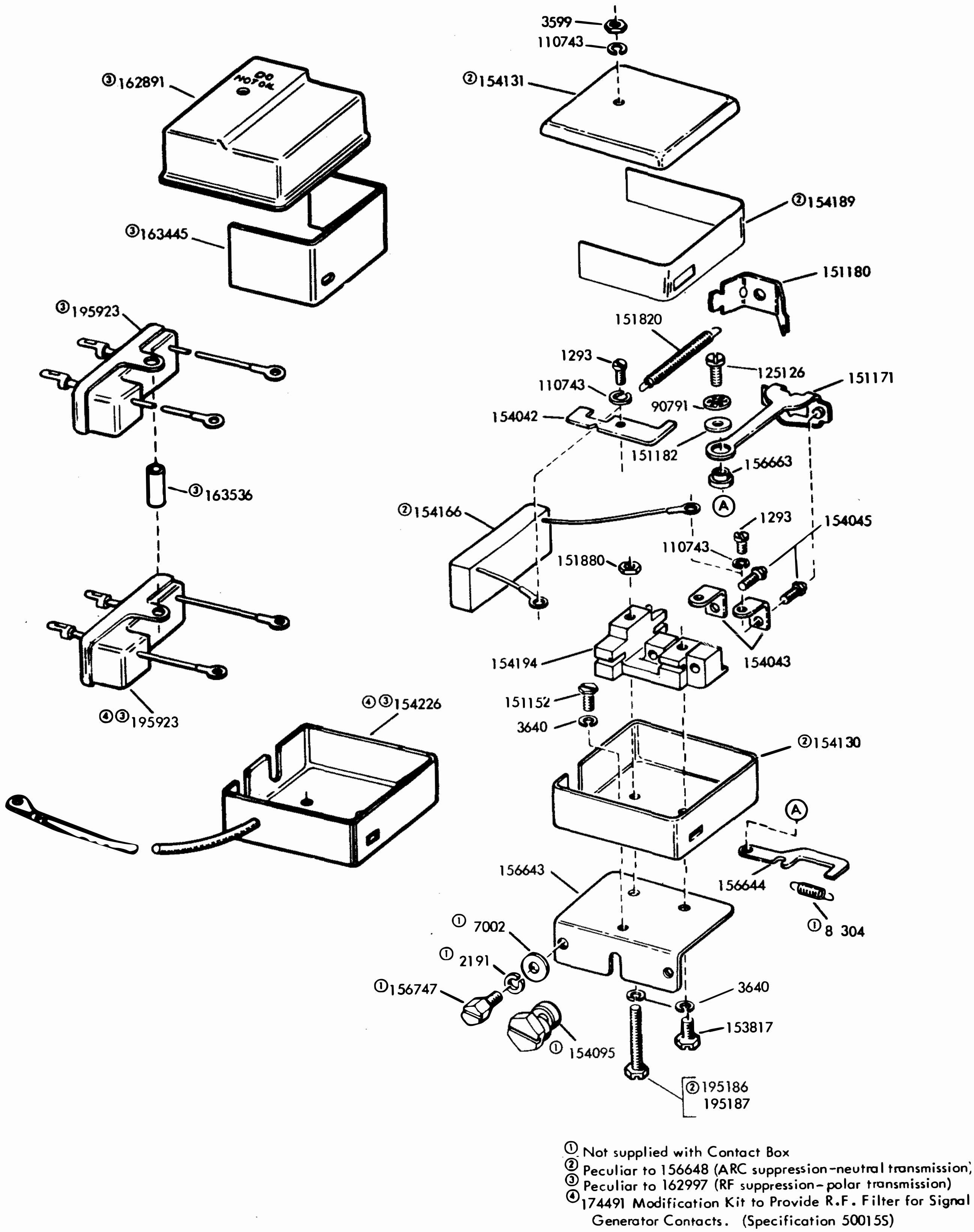


Figure 7-9. Contact Box Assemblies 156648 and 162997 - Used on High-Level Sets

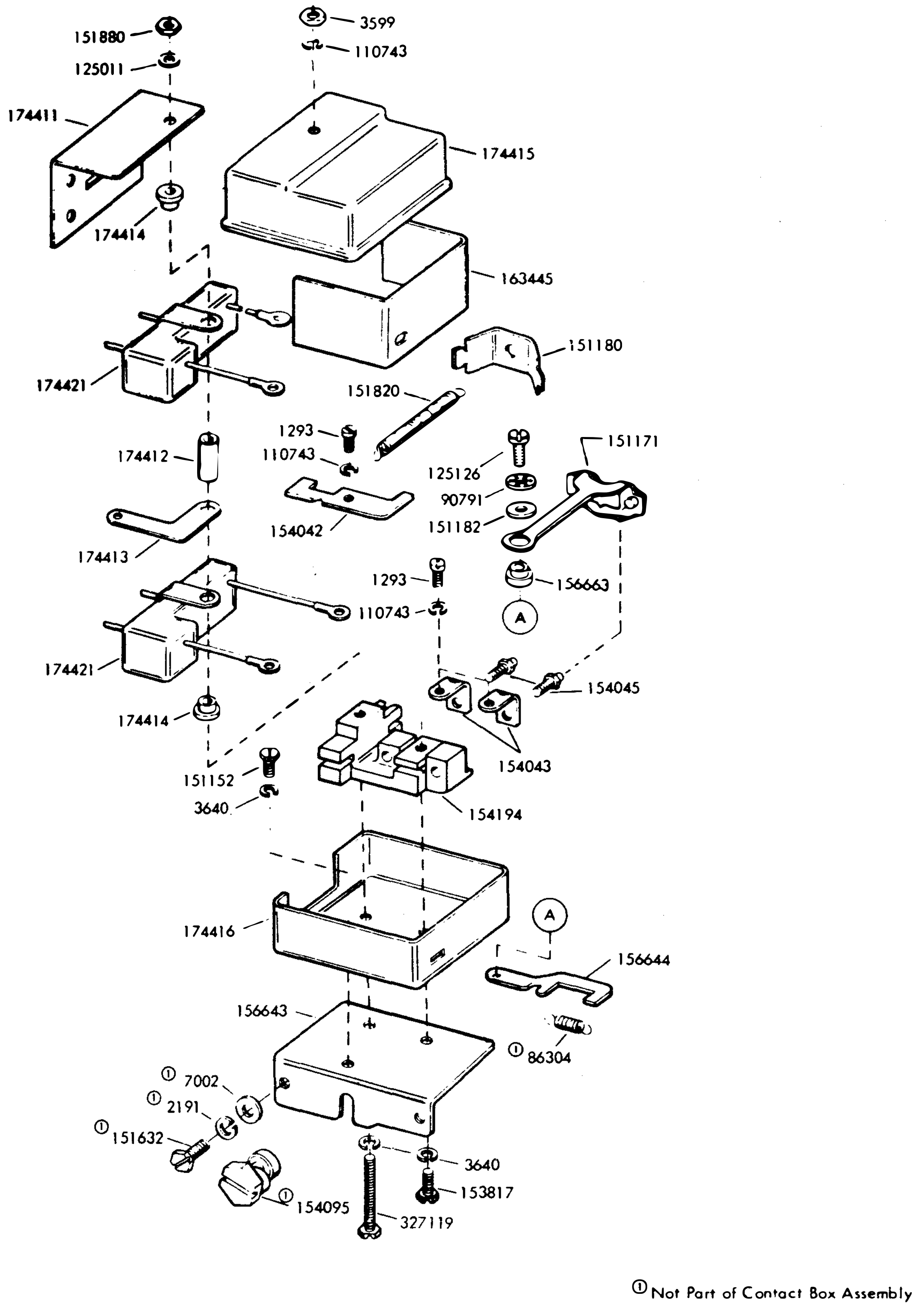


Figure 7-10. Contact Box Assembly 174420 - Used on High-Level Sets

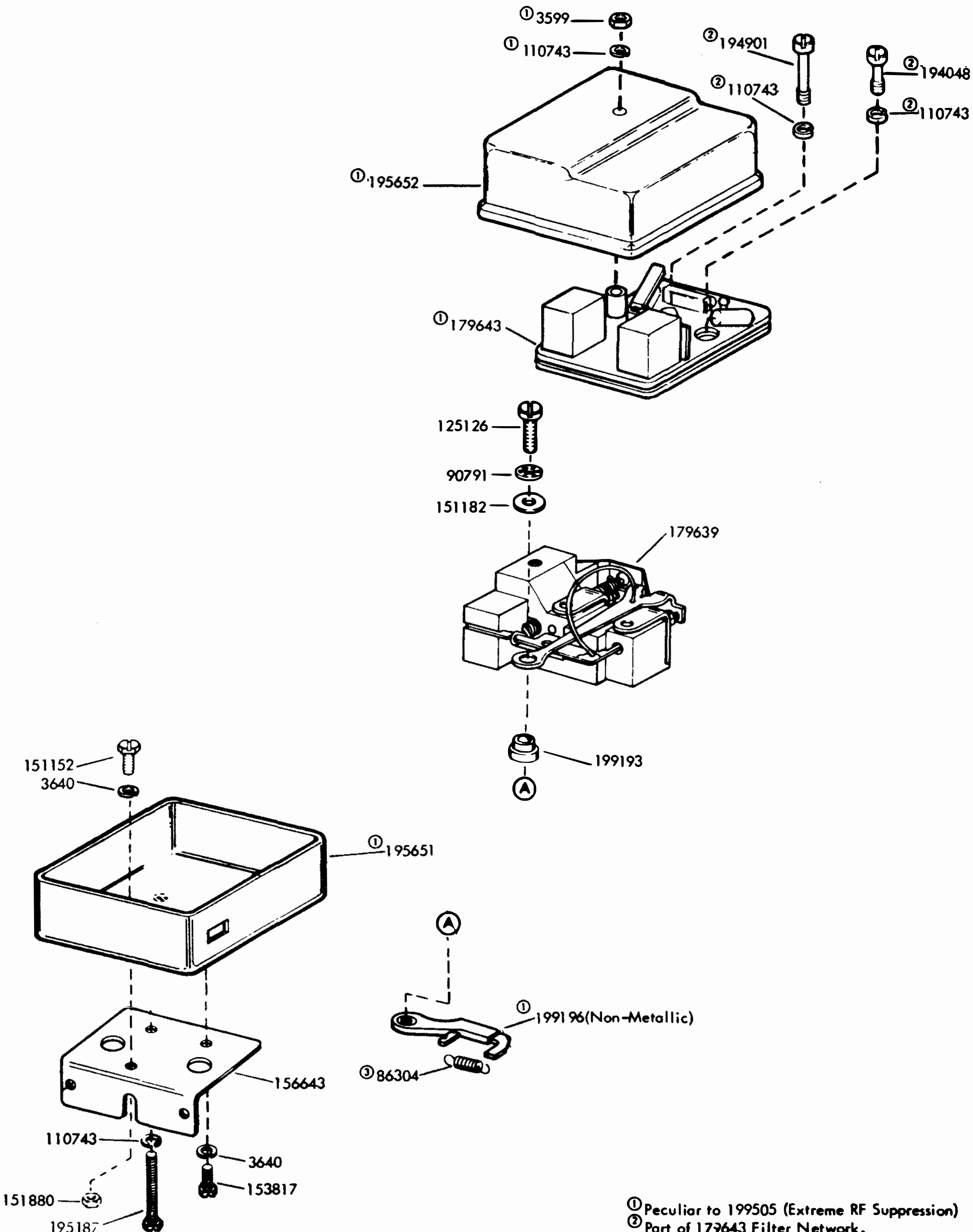


Figure 7-11. Contact Box Assemblies - 198610 (Low-Level Keyer) and 199505 (Extreme RF Suppression)

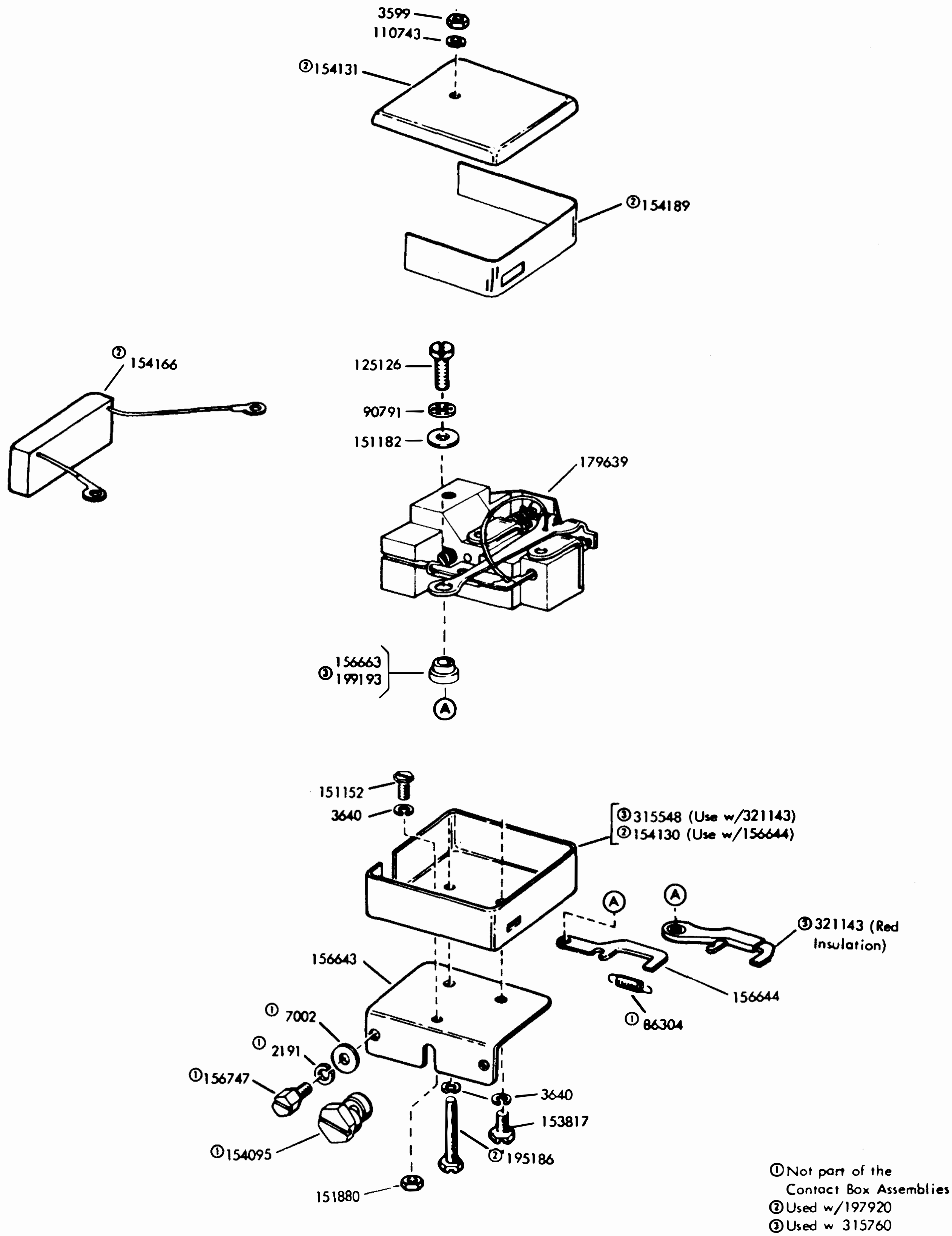
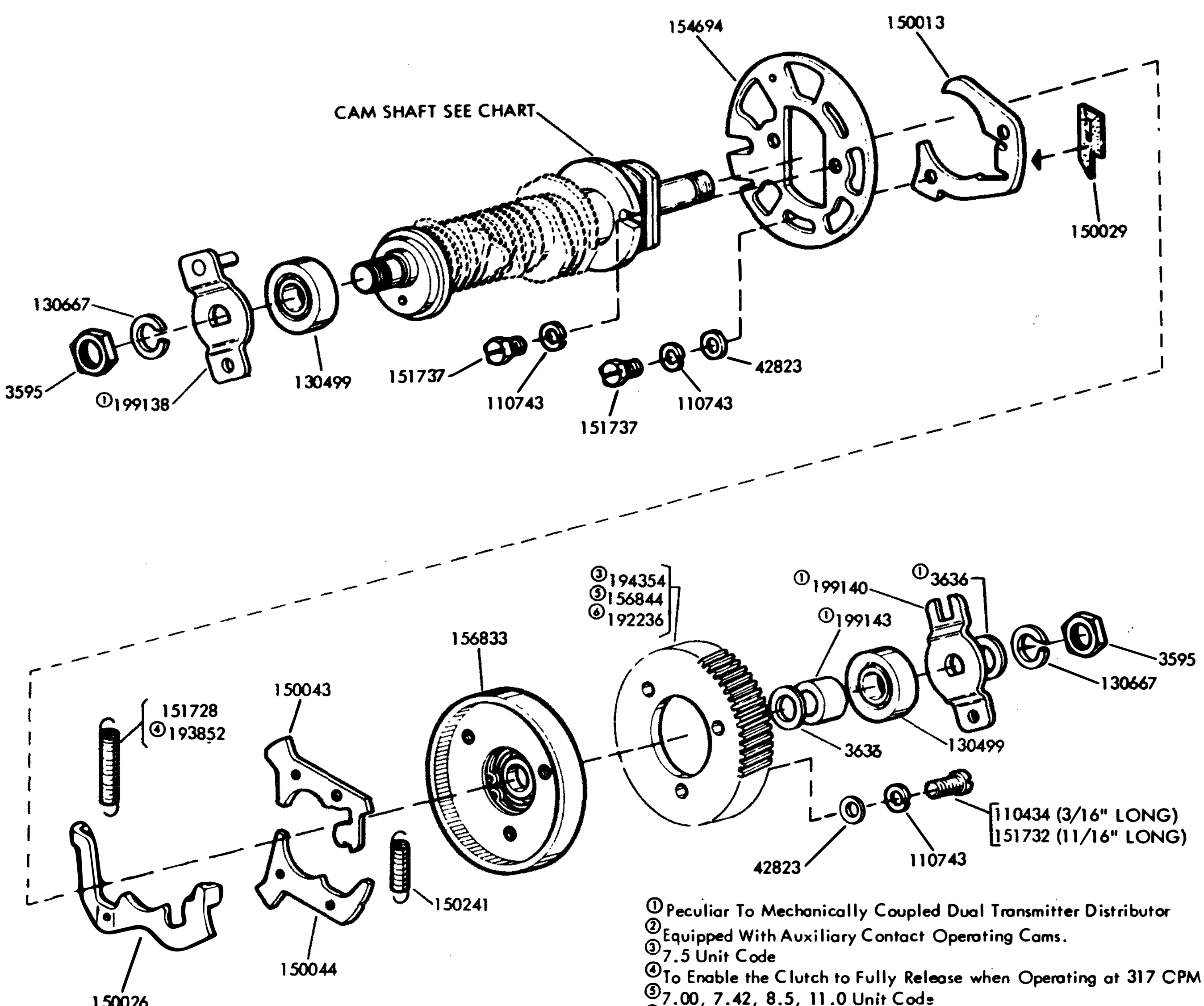


Figure 7-12. Contact Box Assemblies - 192600 (Neutral Transmission), 197920 (Neutral Transmission with Arc Suppression), 305008 (Polar Transmission), and 315760 (Polar Transmission with Insulated Drive)

CAMSHAFTS		
PART NO.	LEVEL	CODE
156836	5	7.42
160015	6	8.5
164285	5	7.0
173349	6	8.5
199482	8	11.0
194357	5	7.5
311538	5	6.6
194502 8-5 Level Converter		
194578 5-8 Level Converter		
②199159 Driver, 199160 Driven — Mechanically coupled dual Transmitter Distributor 5 level, 7.42 UC		



①Peculiar To Mechanically Coupled Dual Transmitter Distributor
②Equipped With Auxiliary Contact Operating Cams.
③7.5 Unit Code
④To Enable the Clutch to Fully Release when Operating at 317 CPM
⑤7.00, 7.42, 8.5, 11.0 Unit Code
⑥7.42 Unit Code (ASR Mounted with Transmitter-Distributor Base, LCXB, having own Motor)

Figure 7-13. Main Shaft Mechanism (One-Cycle)

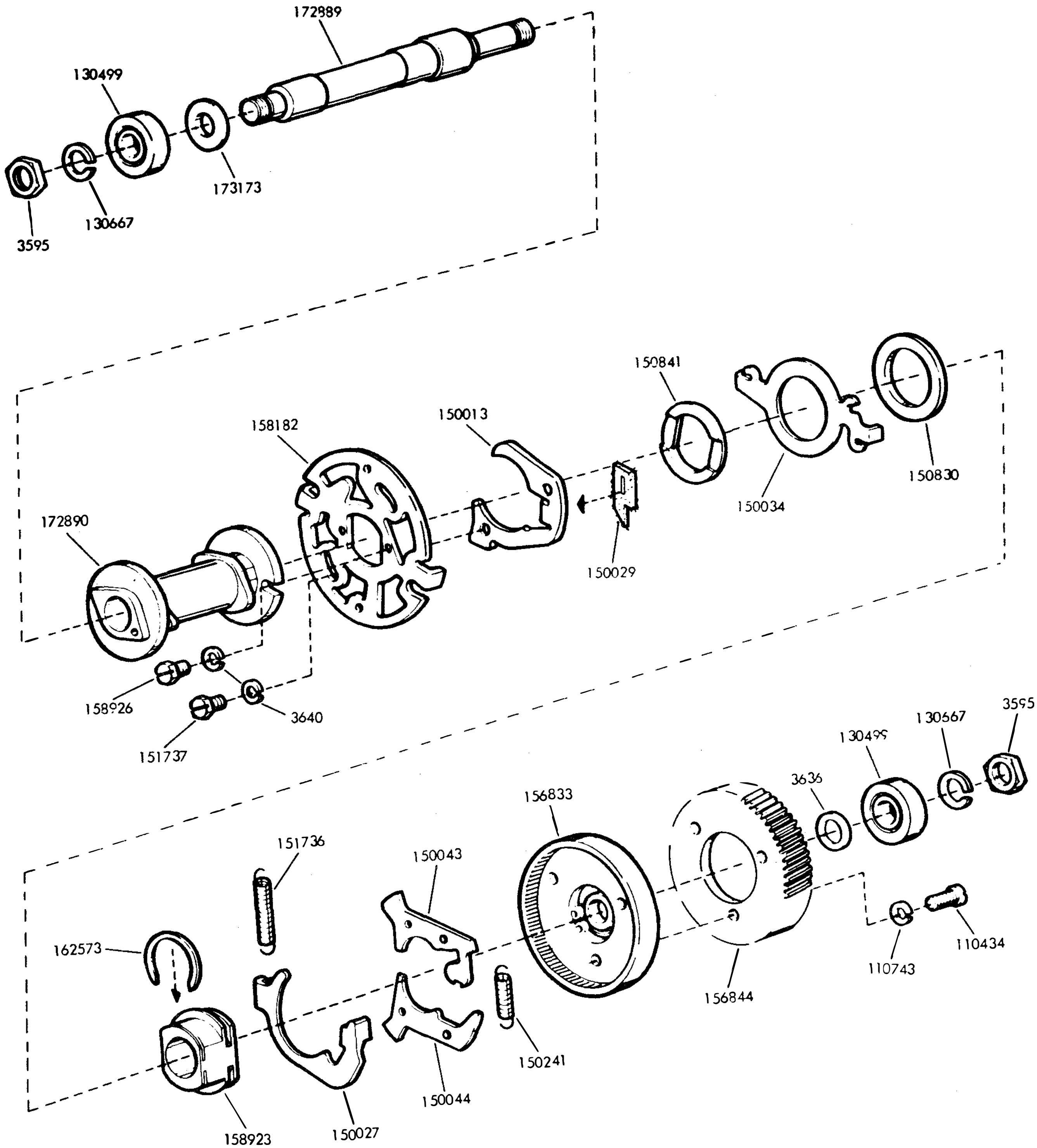


Figure 7-14. Main Shaft Mechanism (Two-Cycle)

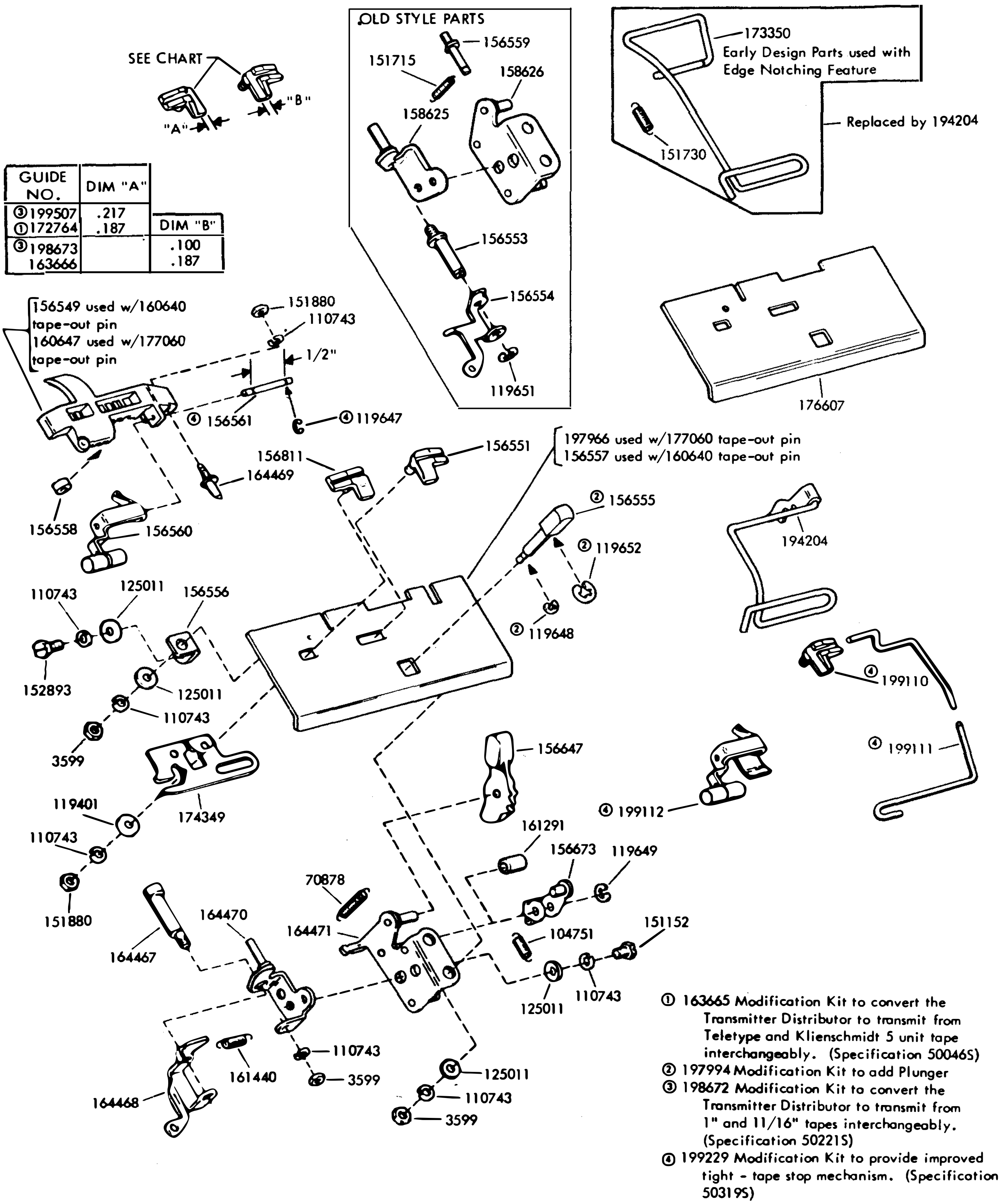
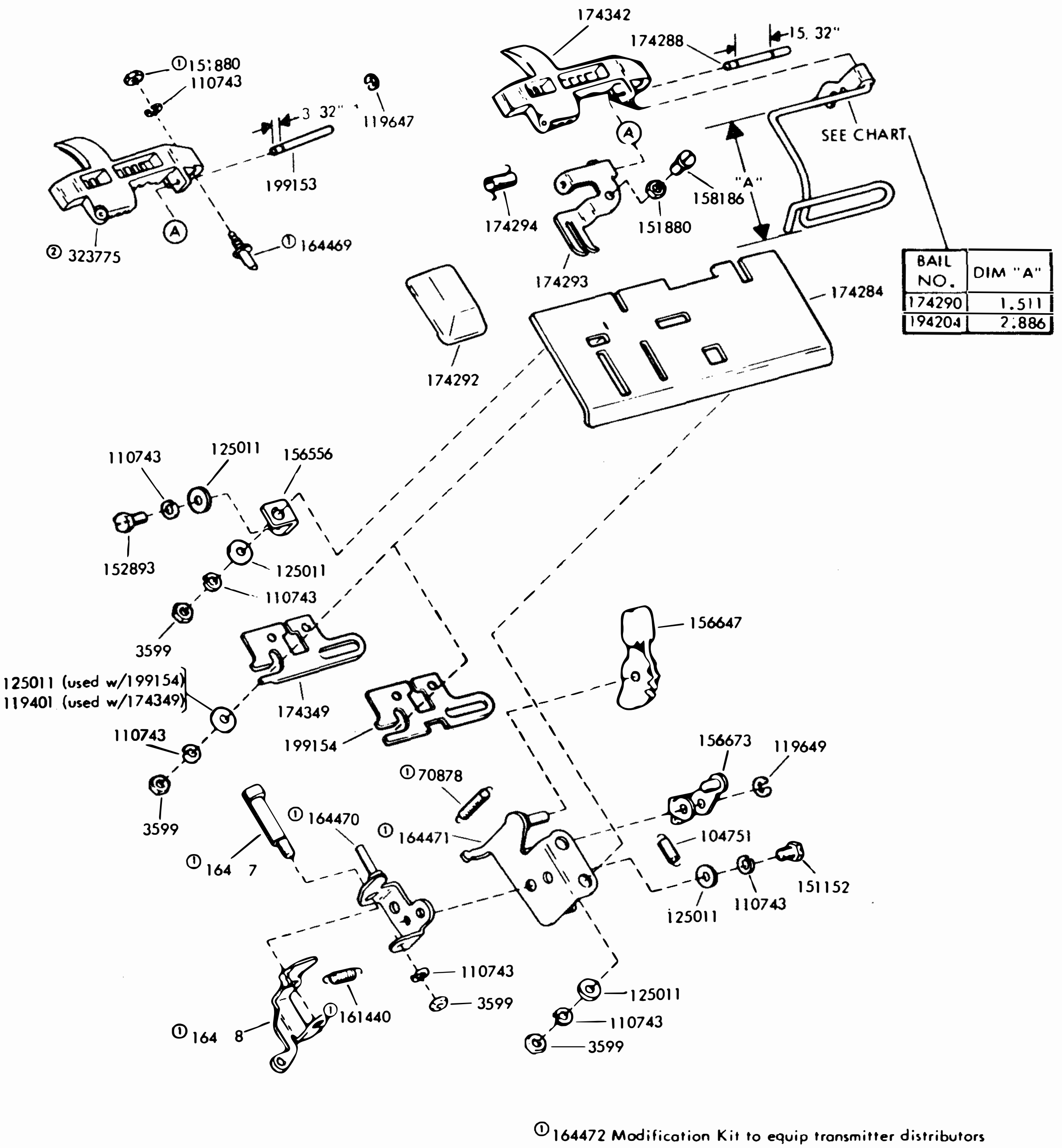


Figure 7-15. Tape Guide Plate Mechanisms (Sheet 1 of 3)



BAIL NO.	DIM "A"
174290	1.511
194204	2.886

① 164472 Modification Kit to equip transmitter distributors with improved tape lid latch mechanism. (Specification 50045S)
② Used w/Dual Coupled Transmitter

Figure 7-16. Tape Guide Plate Mechanisms (Sheet 2 of 3)

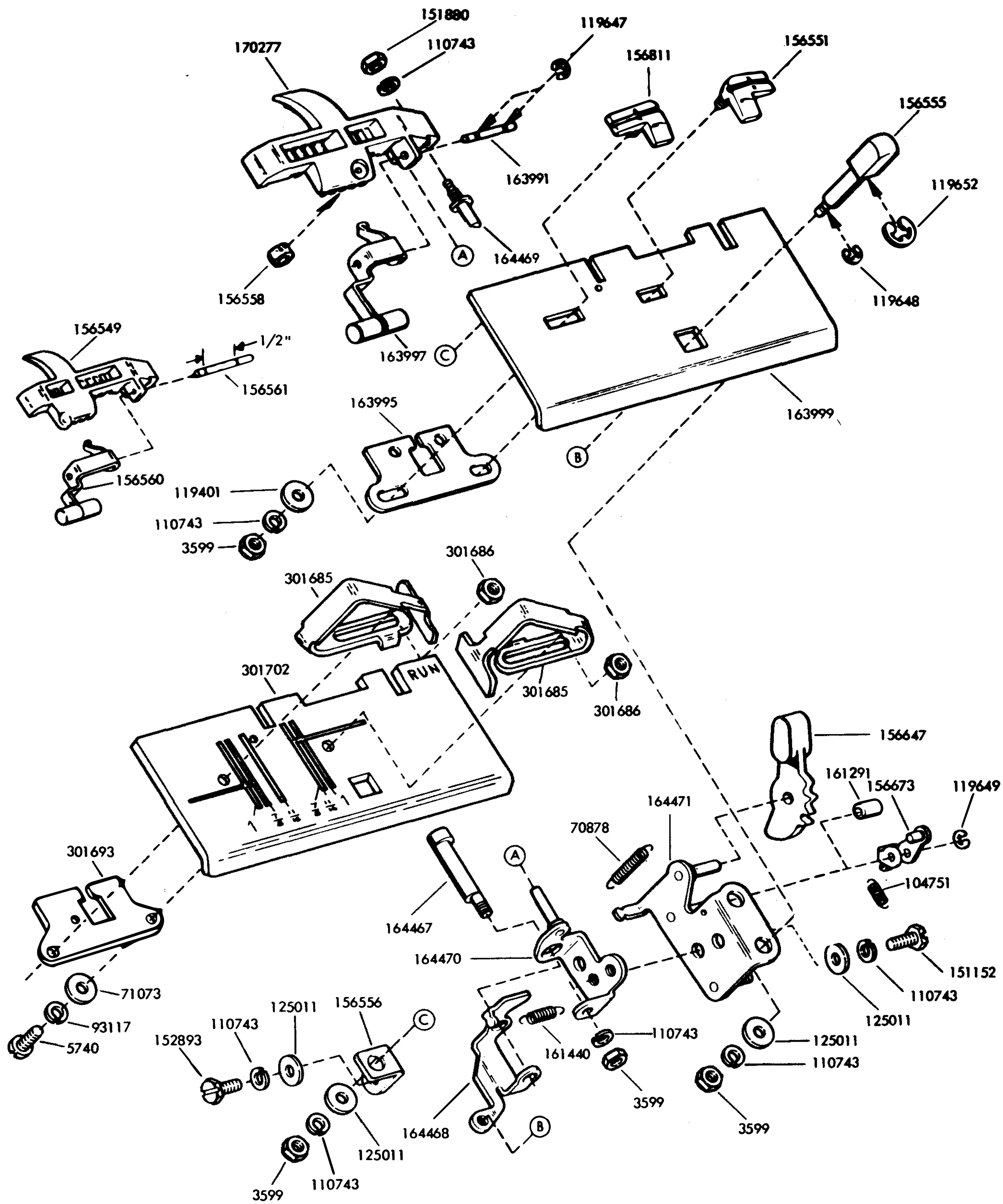
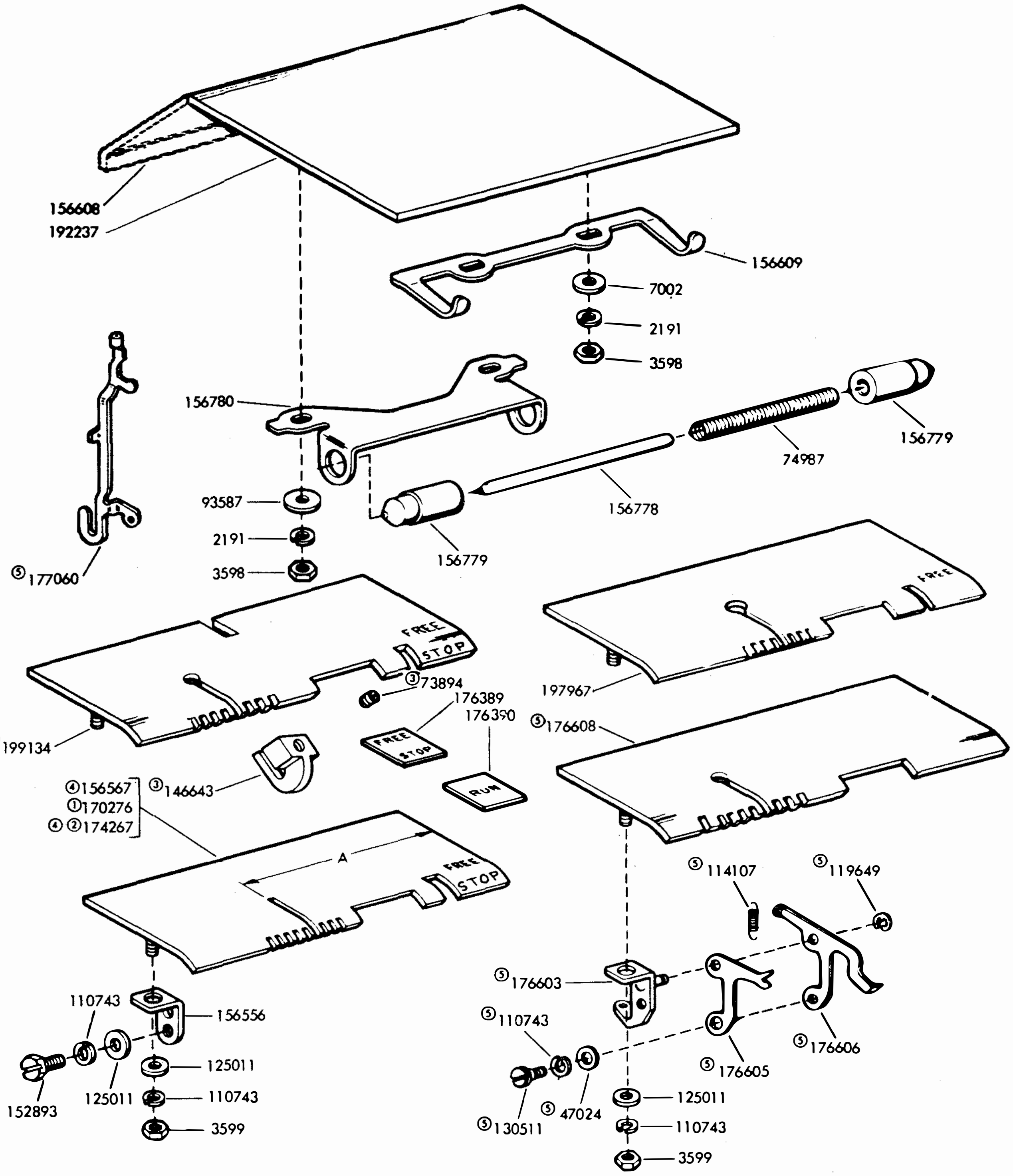


Figure 7-17. Tape Guide Plate Mechanisms (Sheet 3 of 3)



① Dimension "A" is 2.159 inches
② Peculiar to units equipped to detect a notch in edge of tape
③ Peculiar to mechanically coupled dual transmitter distributor
④ Dimension 'A' is 2.359 inches
⑤ 174309 Modification Kit to convert an LXD4 to an LXD15. Also includes 176607, 174349 and 160647 as shown on Figure 7-13. (Specification 50087S)

Figure 7-18. Cover and Top Plates

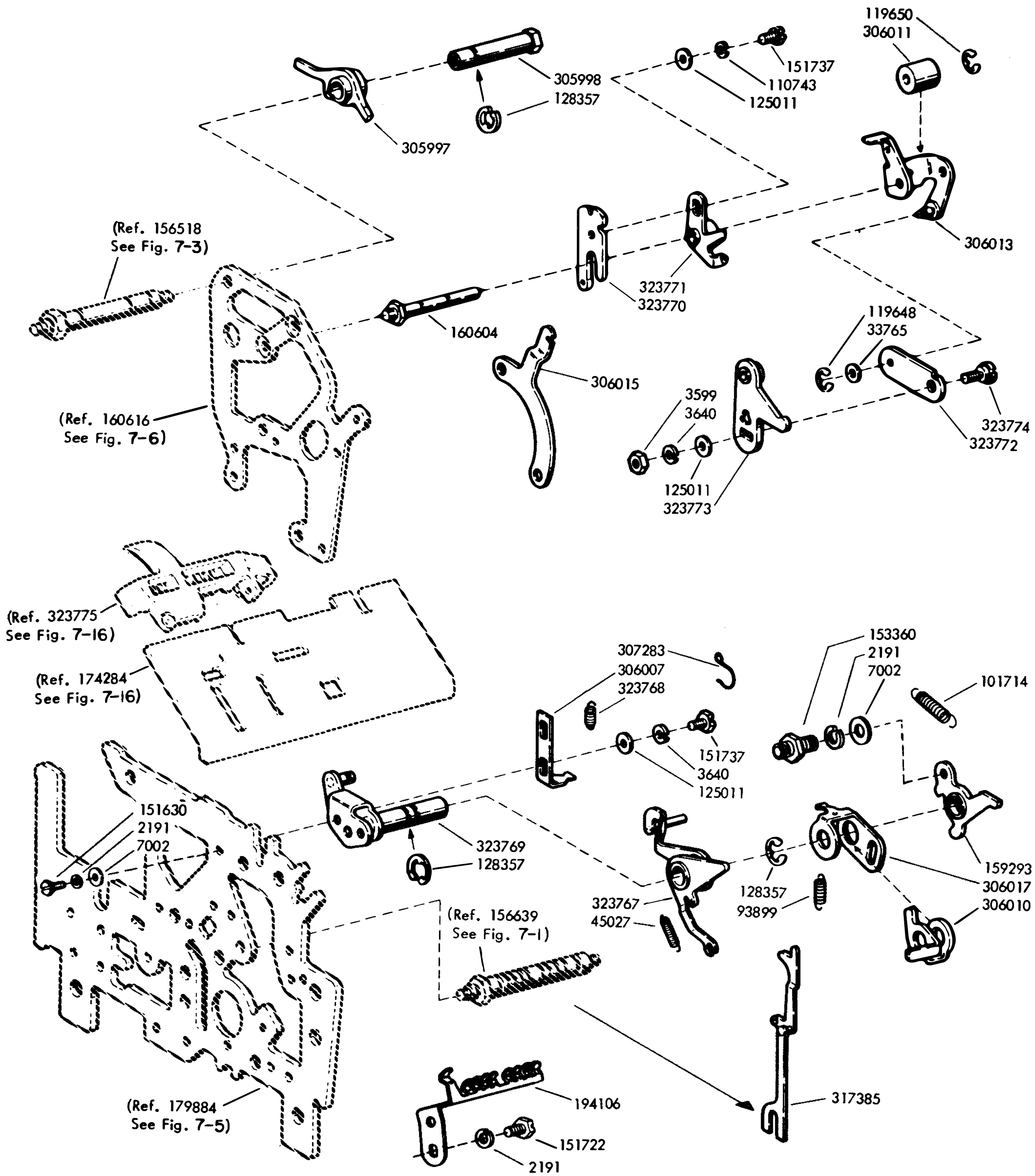


Figure 7-19. Tape-Out Mechanism for Mechanically Coupled Dual Transmitter Distributor

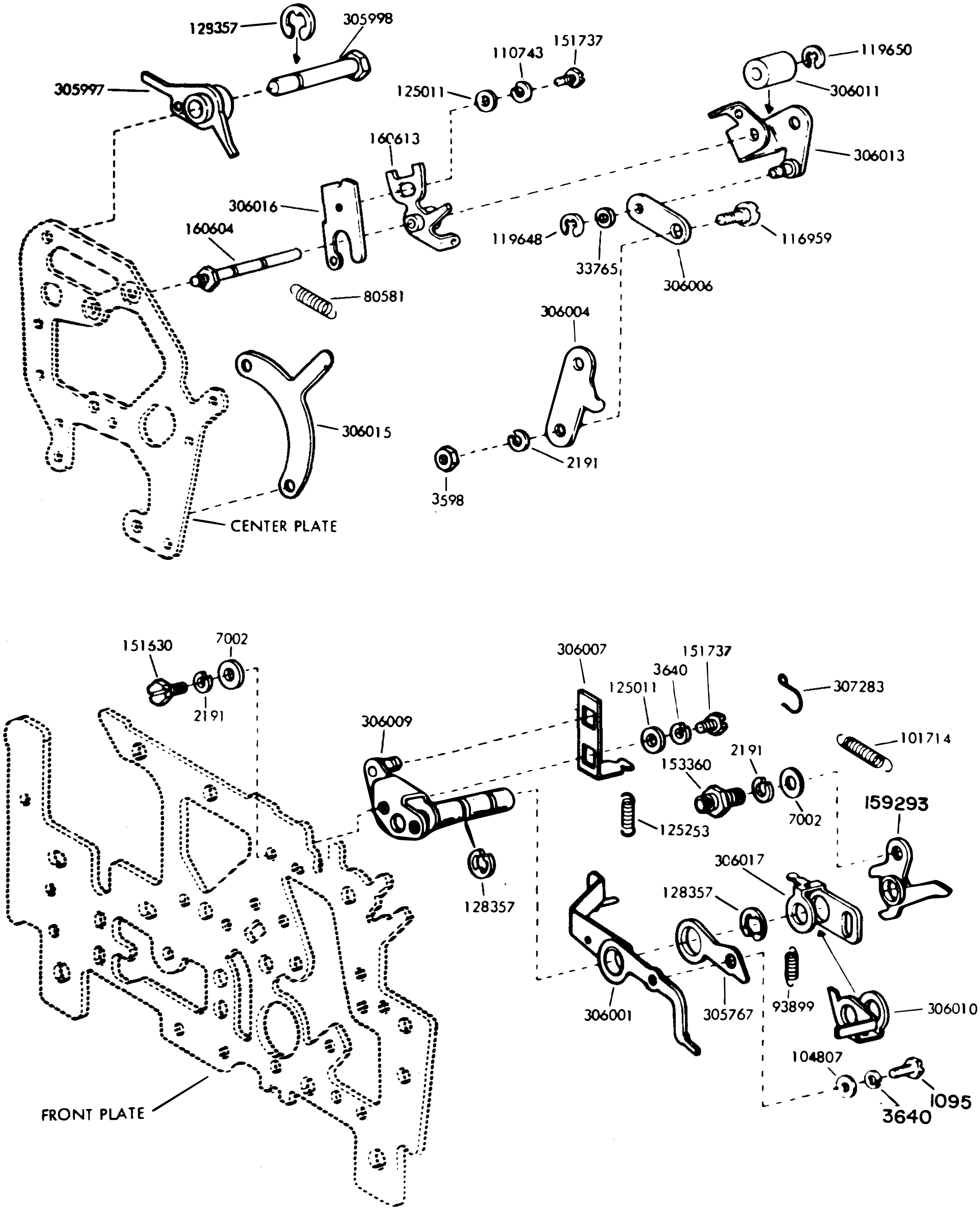
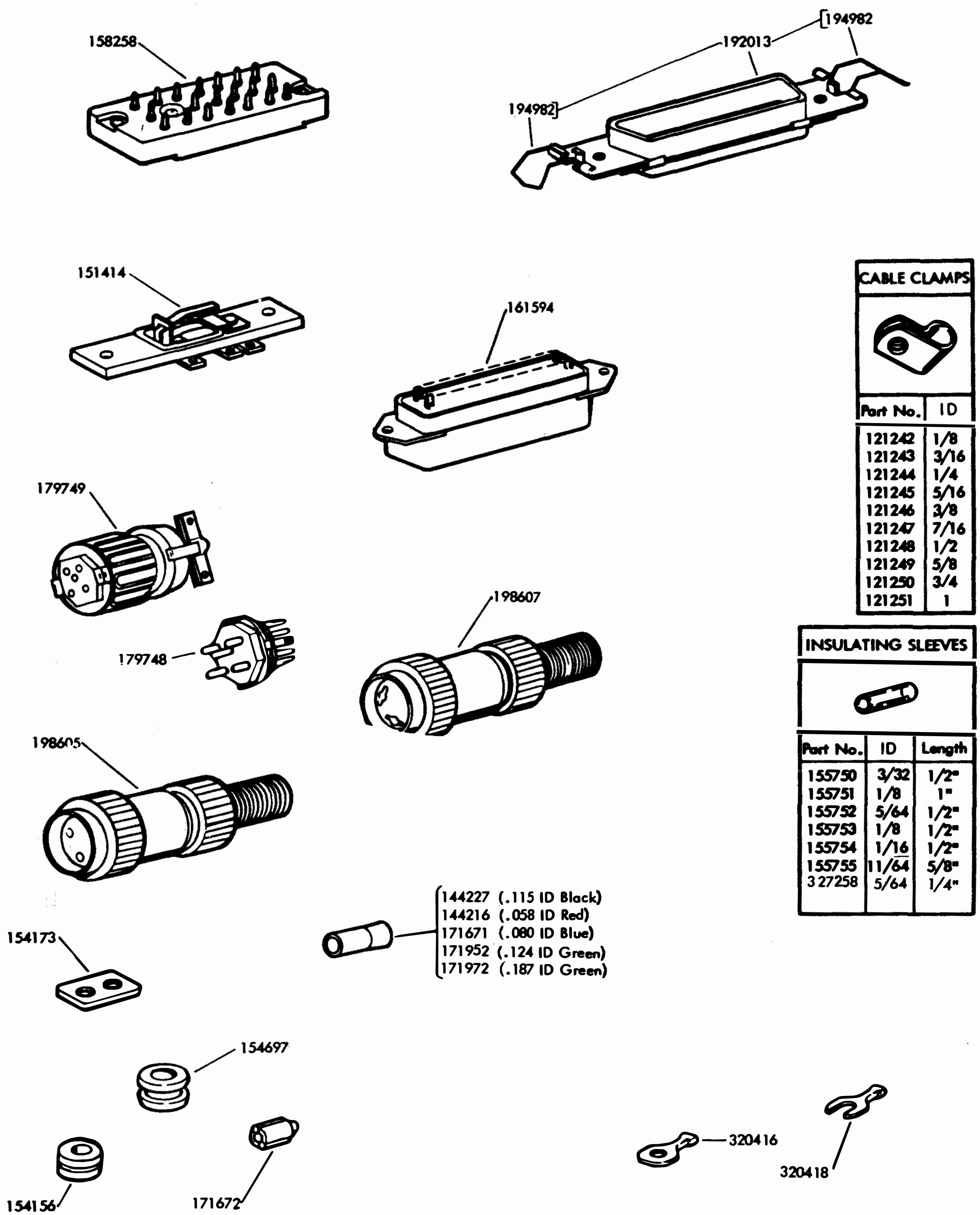


Figure 7-20. Tape-Out Mechanism for Mechanically Coupled Dual Transmitter Distributor (Early Design)



CABLE CLAMPS

Part No.	ID
121242	1/8
121243	3/16
121244	1/4
121245	5/16
121246	3/8
121247	7/16
121248	1/2
121249	5/8
121250	3/4
121251	1

INSULATING SLEEVES

Part No.	ID	Length
155750	3/32	1/2"
155751	1/8	1"
155752	5/64	1/2"
155753	1/8	1/2"
155754	1/16	1/2"
155755	11/64	5/8"
327258	5/64	1/4"

Figure 7-21. Cable Components

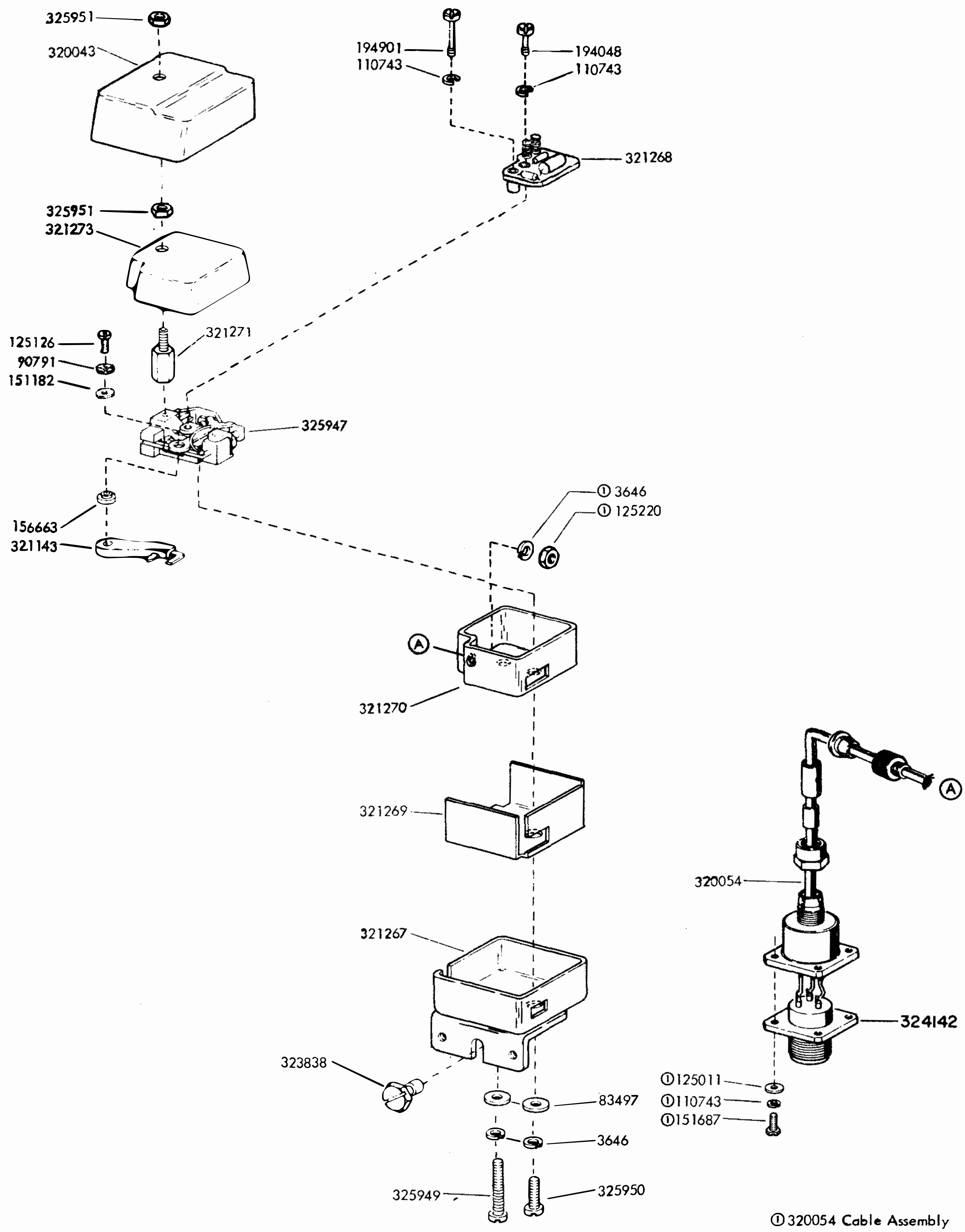


Figure 7-22. Contact Box Assembly 323646 - RFI Suppression Features for Low-Level Sets

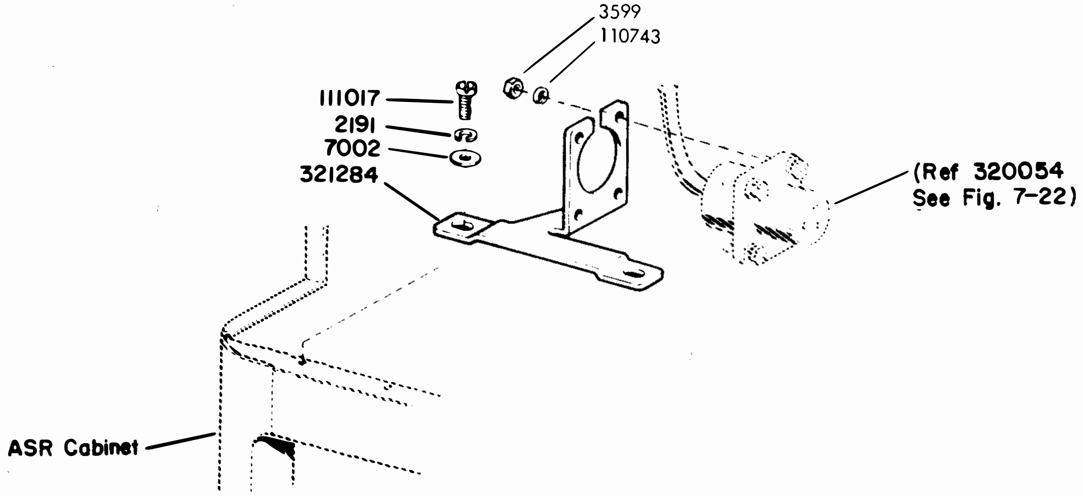


Figure 7-23. Mounting Components for Contact Box Cable - RFI Suppression Features for Low-Level Sets

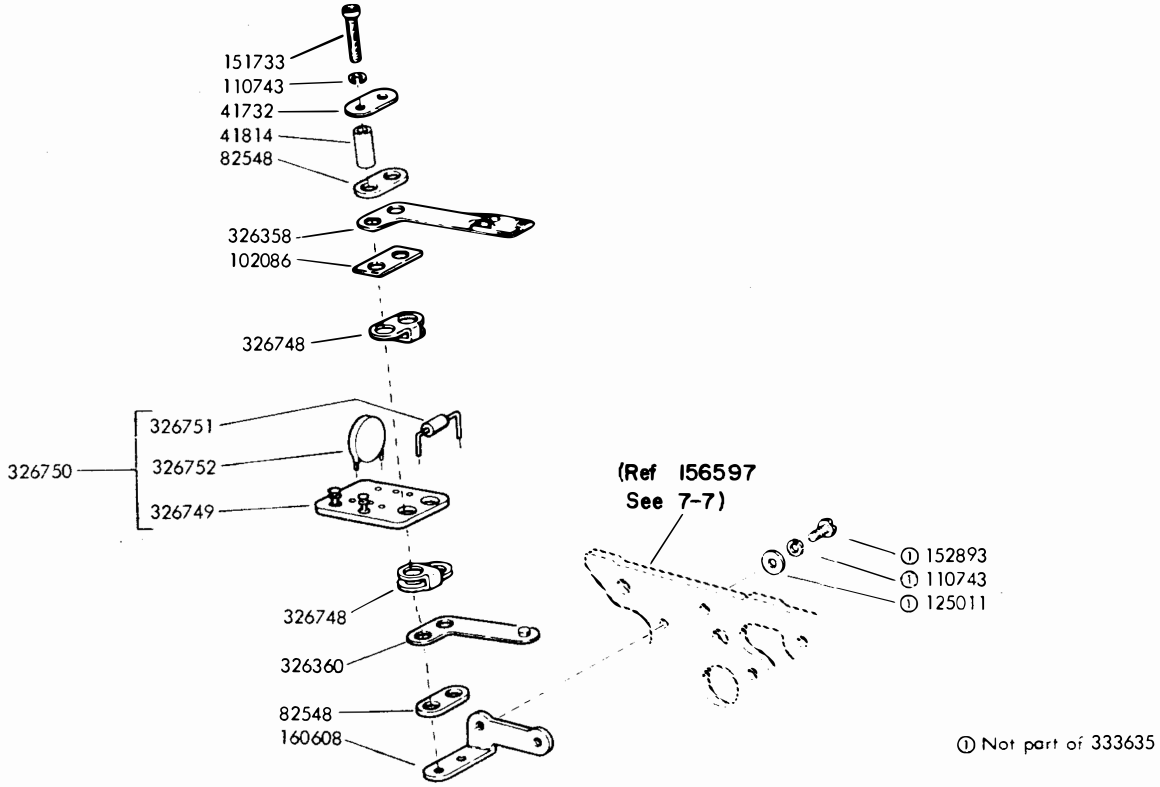
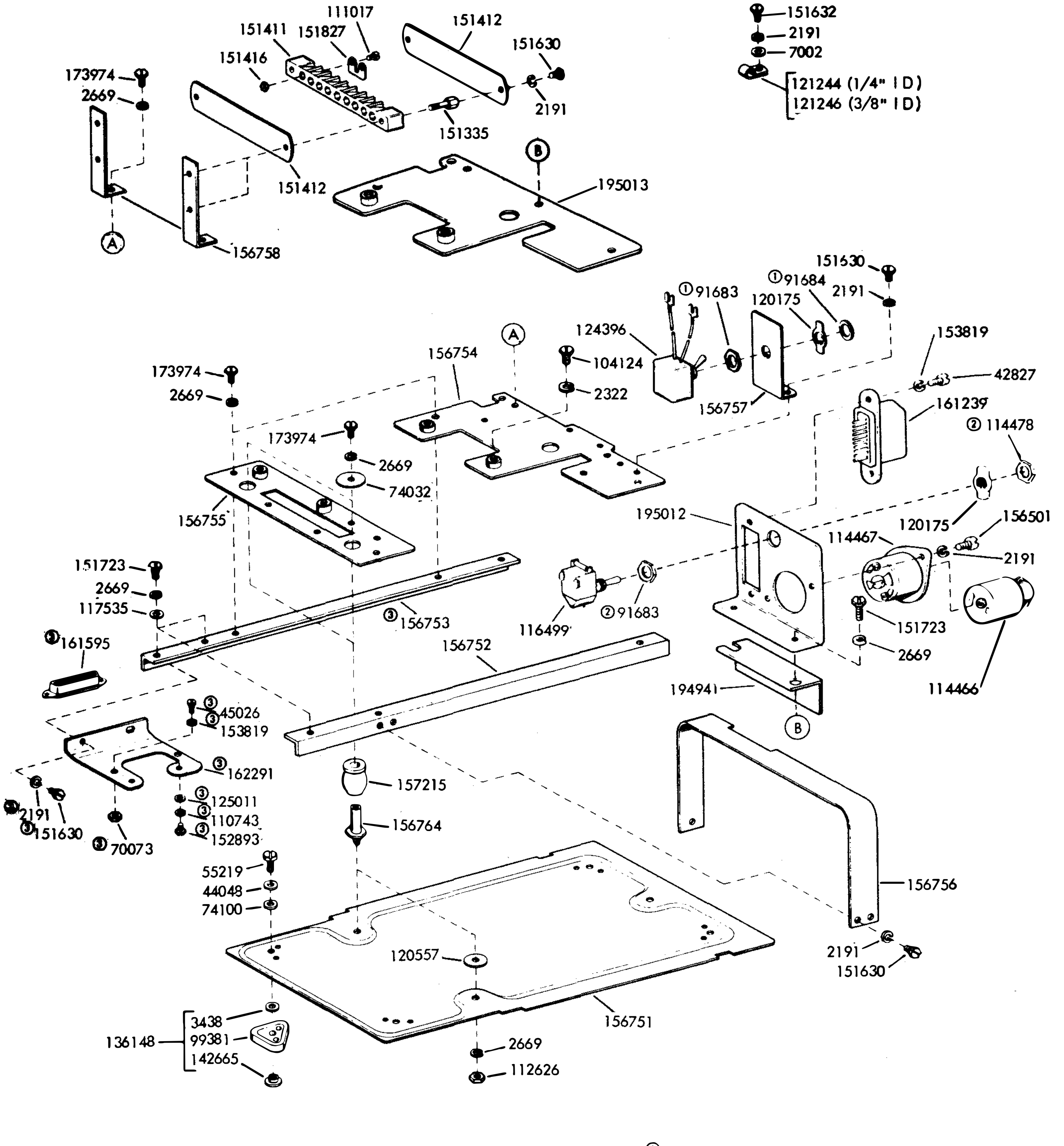


Figure 7-24. Start-Stop Contact Assembly 333635 - RFI Suppression Features for Low-Level Sets



① Supplied w/124396
② Supplied w/116499
③ 162463 Modification Kit to update Transmitter Distributor Base (Specification 5894S)

Figure 7-25. Base and Electrical Components

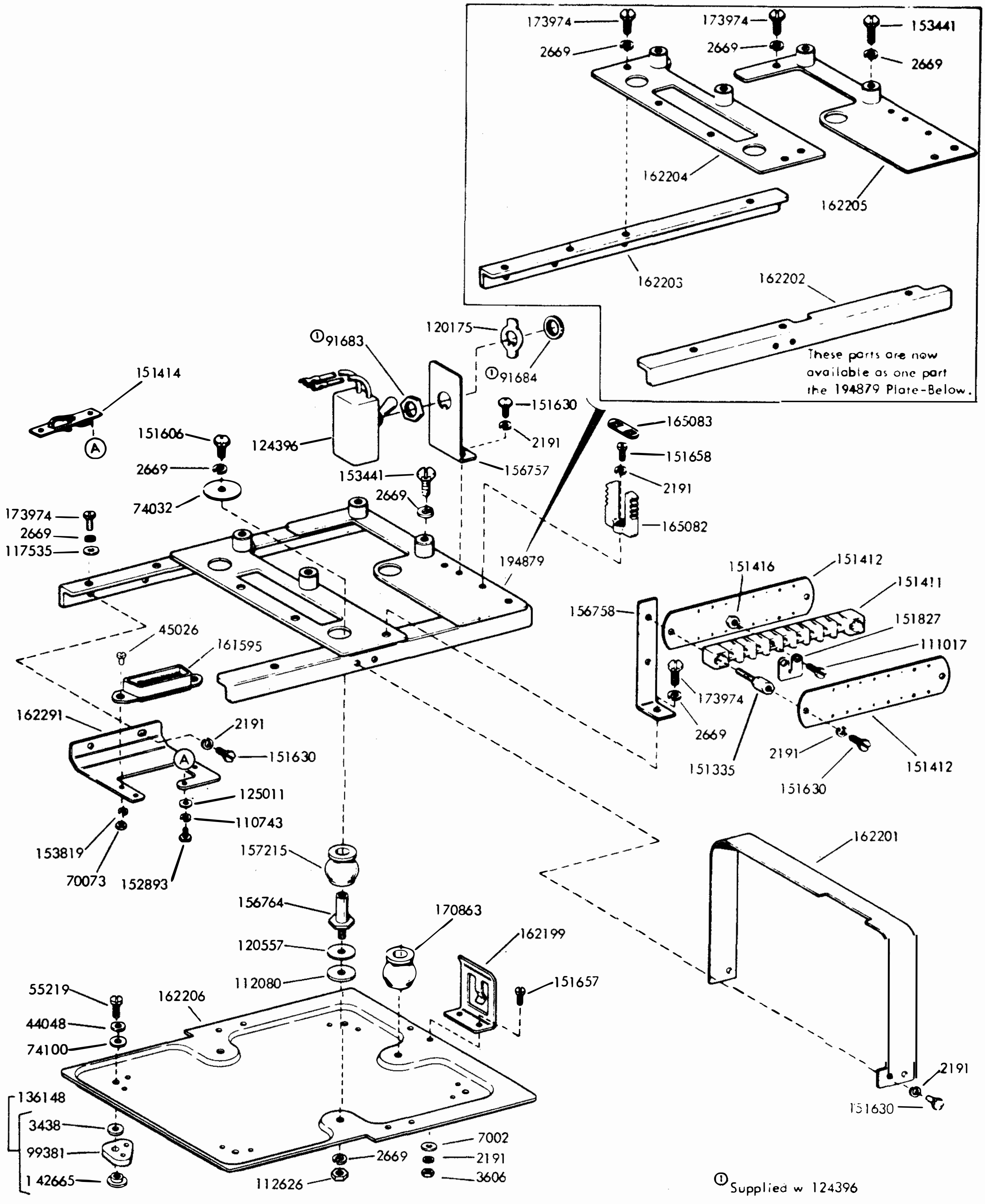


Figure 7-26. Miniature Base and Electrical Components (Sheet 1 of 2)

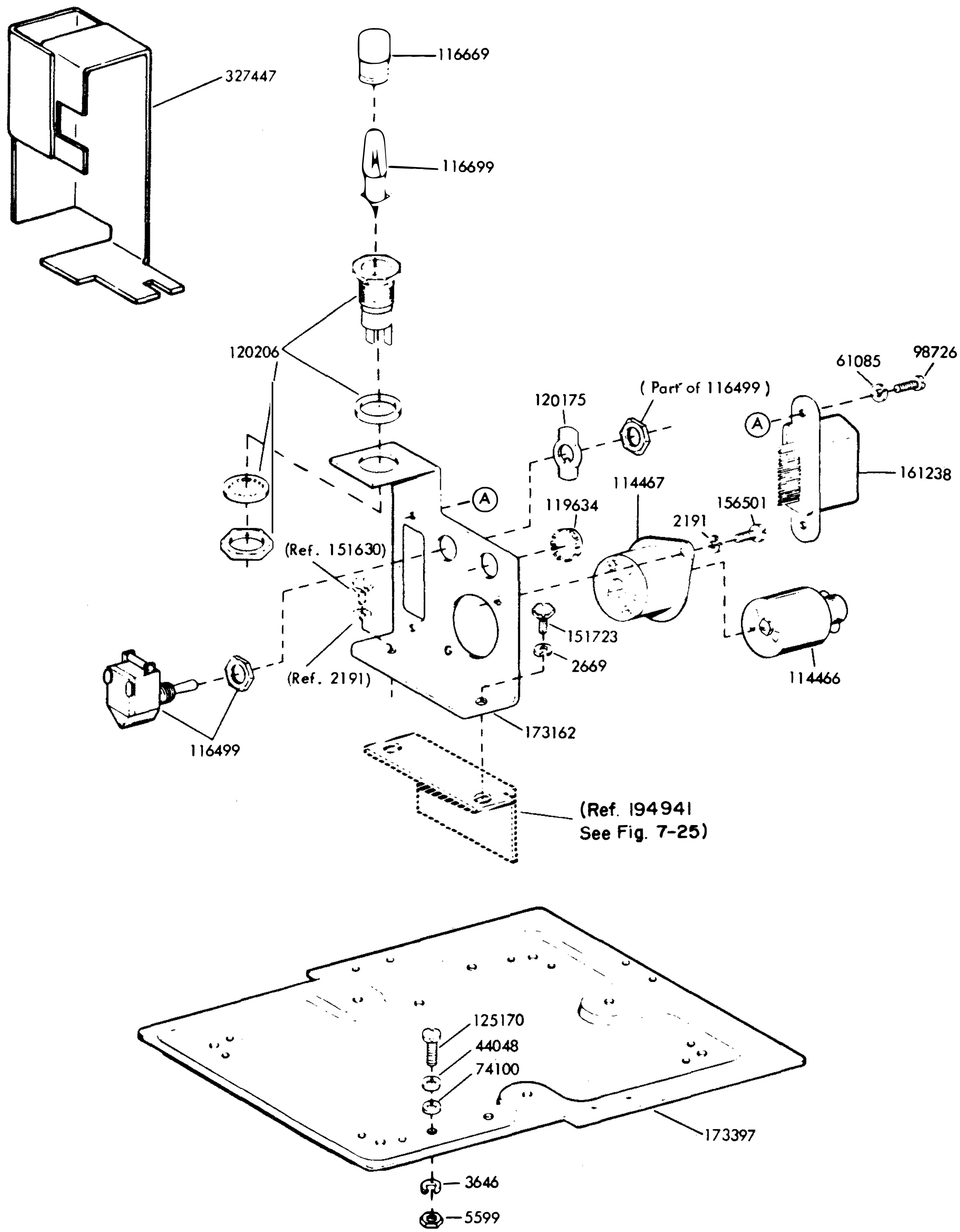


Figure 7-27. Miniature Base and Electrical Components (Sheet 2 of 2)

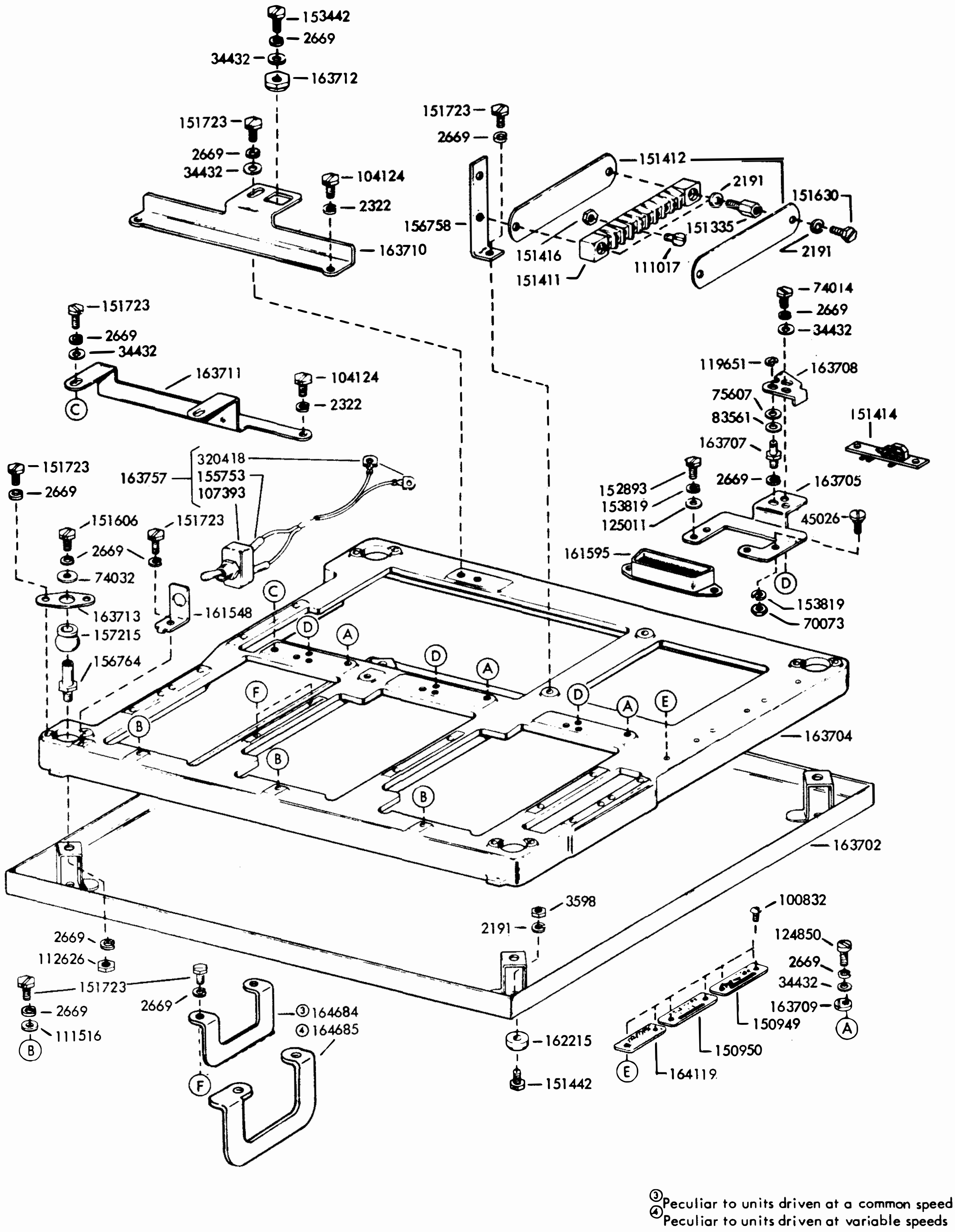
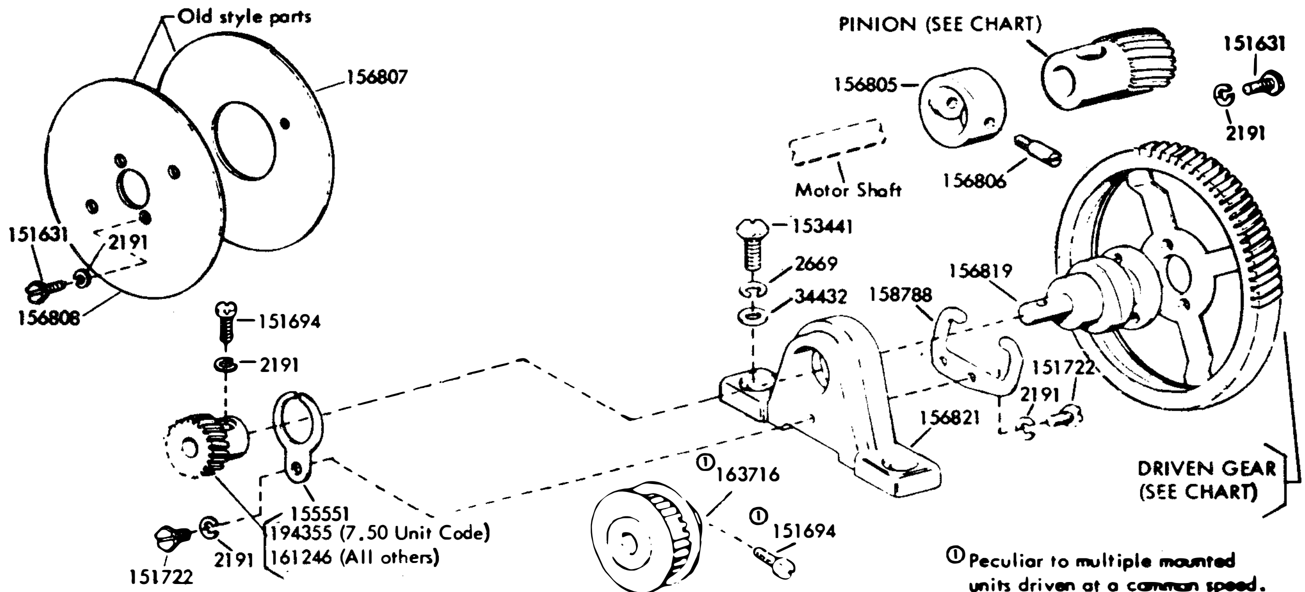


Figure 7-28. Multiple Mounting Base

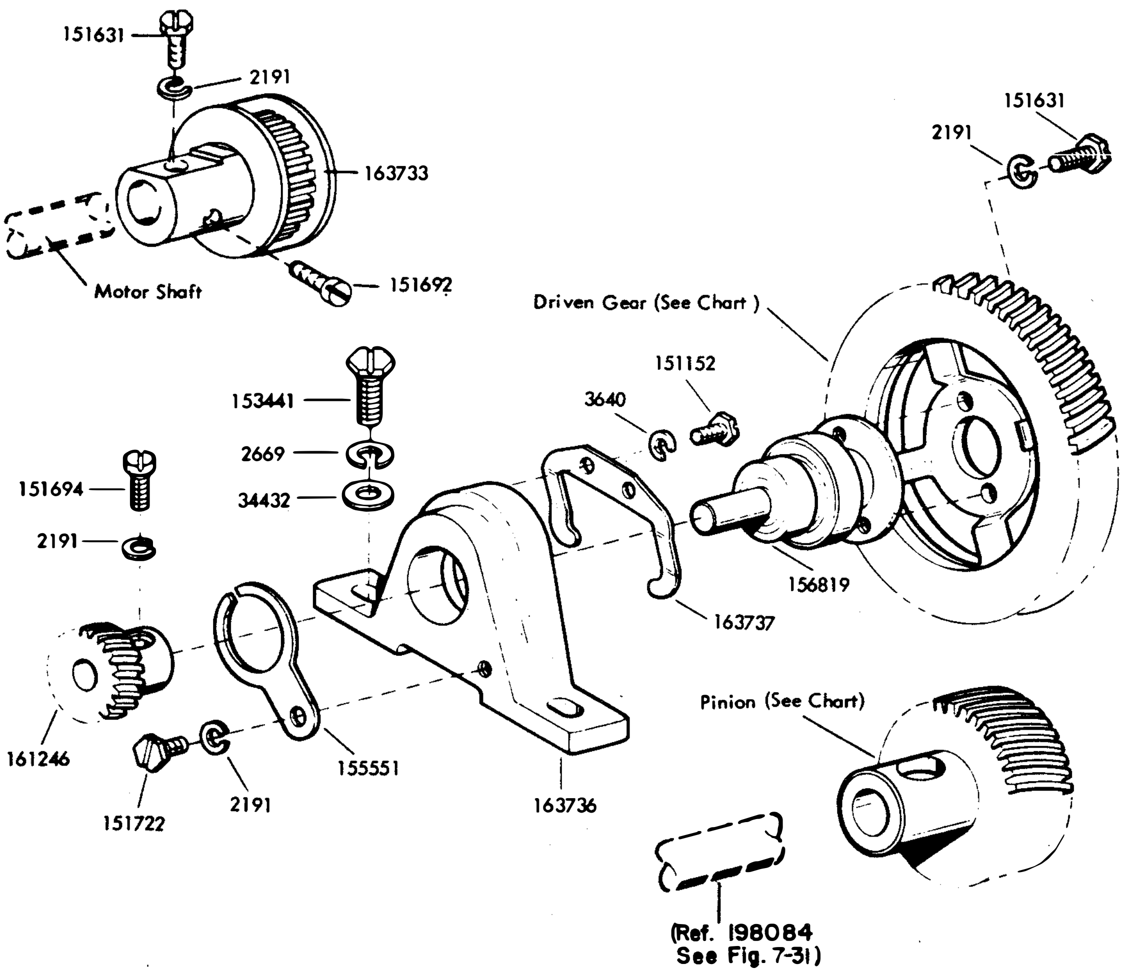


② The 156659 Gear Set (100 WPM) is applicable for 7.42 Unit Code-74.2 Baud, 8.5 Unit Code-85 Baud and 11.0 Unit Code, 110 Baud.

Gear Chart for Single Mounted Units or Multiple Mounted Units Driven at a Common Speed

Speed	Set Number	Pinion	Driven Gear	Unit Code	Baud	Single	Multiple	RPM	Hertz
60 WPM	156658	156627 (18T)	156626 (88T)	7.42	45.45	X	X	3600	60
65 WPM	173598	173600 (26T)	173599 (120T)	7.00	45.5		X	3600	60
67 WPM	161358	161352 (11T)	161351 (49T)	7.42	50	X		3600	60
67 WPM	176152	176154 (22T)	176153 (98T)	7.42	50		X	3600	60
71 WPM	161359	161354 (15T)	161353 (63T)	7.00	50	X		3600	60
75 WPM	156728	156725 (24T)	156726 (94T)	7.42	56.9	X	X	3600	60
100 WPM	②156659	156629 (24T)	156628 (72T)	See Note ②		X	X	3600	60
120 WPM	173427	173159 (32T)	173160 (80T)	8.5	102.9	X		3600	60
107 WPM	173595	173597 (30T)	173596 (84T)	7.00	75		X	3600	60
100 WPM	194348	194349 (52T)	194350 (104T)	7.50	75	X		3600	60
60 WPM	194353	194352 (17T)	194351 (56T)	7.50	45.5	X		3600	60
67 WPM	197697	197696 (21T)	197695 (78T)	7.42	50	X		3000	50
60 WPM	305534	305528 (26T)	305531 (106T)	7.42	45.5	X	X	3000	50
67 WPM	305535	305529 (28T)	305532 (104T)	7.42	50	X	X	3000	50
100 WPM	305536	305530 (40T)	305533 (100T)	7.42	74.2	X	X	3000	50
66 WPM	193622	192784 (25T)	192785 (112T)	8-8/13	57.69	X		3600	60
53 WPM	193665	192786 (20T)	192787 (112T)	8-8/13	46.15	X		3600	60
101 WPM	197618	197616 (31T)	197617 (92T)	7.42	75	X		3600	60
83.3 WPM		195429 (20T)	195430 (72T)	8.5	78	X		3600	60
58.8 WPM	308179	308177 (20T)	308178 (102T)	8.5	50	X	X	3600	60
58.8 WPM	308182	308180 (24T)	308181 (102T)	8.5	50	X	X	3000	50
53.7 WPM	308185	308183 (24T)	308184 (112T)	8.5	45.5	X	X	3000	50
66.9 WPM	308188	308186 (19T)	308187 (71T)	8.5	56.86	X	X	3600	60
71 WPM	323832	327339 (26T)	327340 (91T)	7.00	50.0	X	X	3000	50
65 WPM	323839	327337 (26T)	327338 (100T)	7.00	45.5	X	X	3000	50
107 WPM	323840	327341 (36T)	327342 (84T)	7.00	75.0	X	X	3000	50
68.2 WPM		328367 (20T)	328368 (88T)	7.00	75.0	X		3000	50

Figure 7-29. Drive Mechanism for Single Mounted Units or Multiple Mounted Units Driven at a Common Speed



Gear Chart for Multiple Mounted Units Driven at Independent Speeds					
Speed	Set Number	Pinion	Driven Gear	Unit Code	Baud
60 WPM	173098	173100 (45T)	173099 (110T)	7.42	45.45
67 WPM	174346	174347 (44T)	174348 (98T)	7.42	50
75 WPM	173101	173103 (48T)	173102 (94T)	7.42	56.9
100 WPM	173104	173106 (56T)	173105 (84T)	7.42	74.2

Figure 7-30. Drive Mechanism for Multiple Mounted Units Driven at Independent Speeds

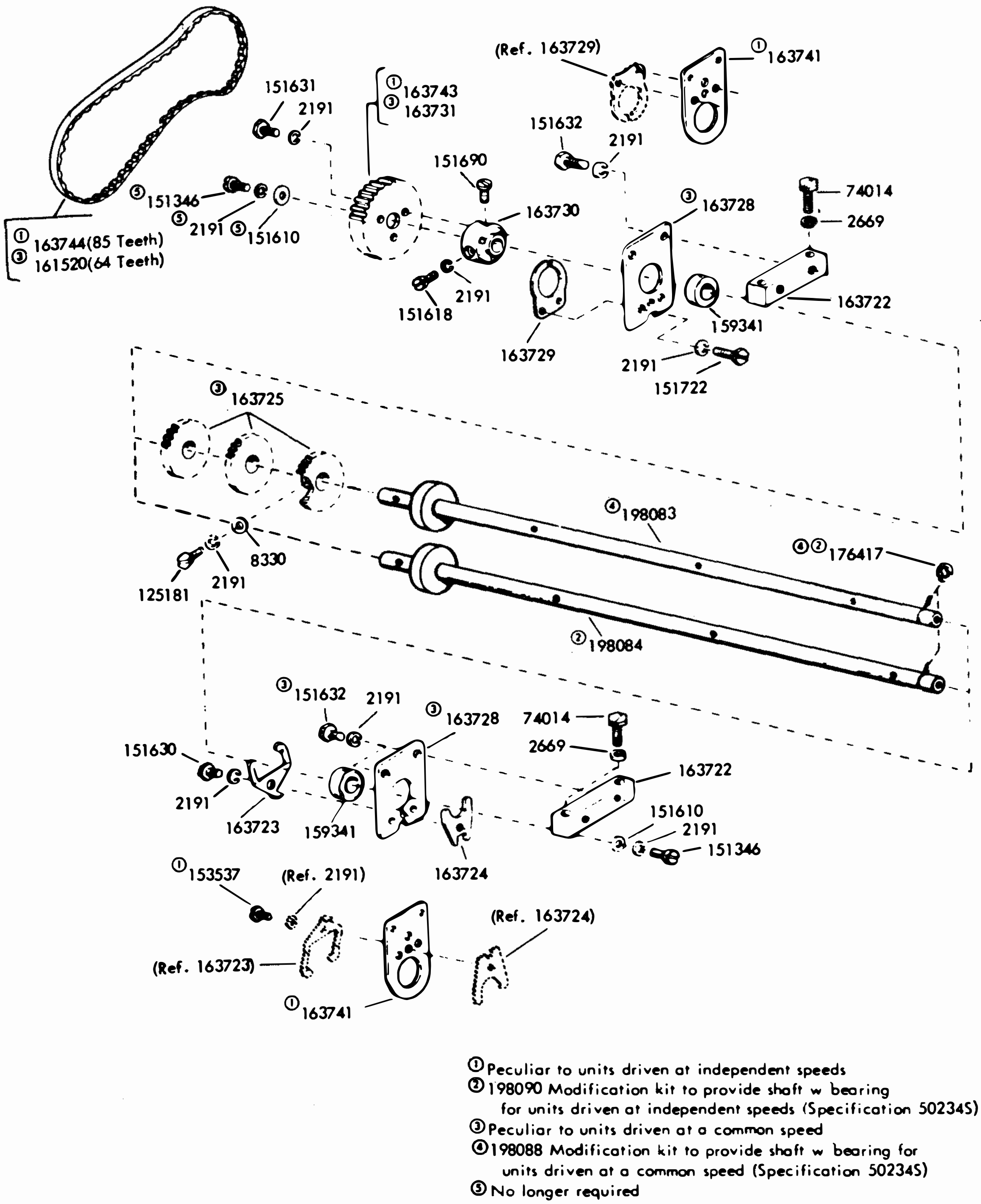
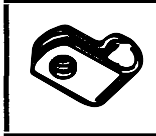


Figure 7-31. Shaft Mechanism for Multiple Mounted Units

CABLE CLAMPS	
	
Part No.	ID
121242	1/8
121243	3/16
121244	1/4
121245	5/16
121246	3/8
121247	7/16
121248	1/2
121249	5/8
121250	3/4
121251	1

INSULATING SLEEVES		
		
Part No.	ID	Length
155750	3/32	1/2"
155751	1/8	1"
155752	5/64	1/2"
155753	1/8	1/2"
155754	1/16	1/2"
155755	11/64	5/8"

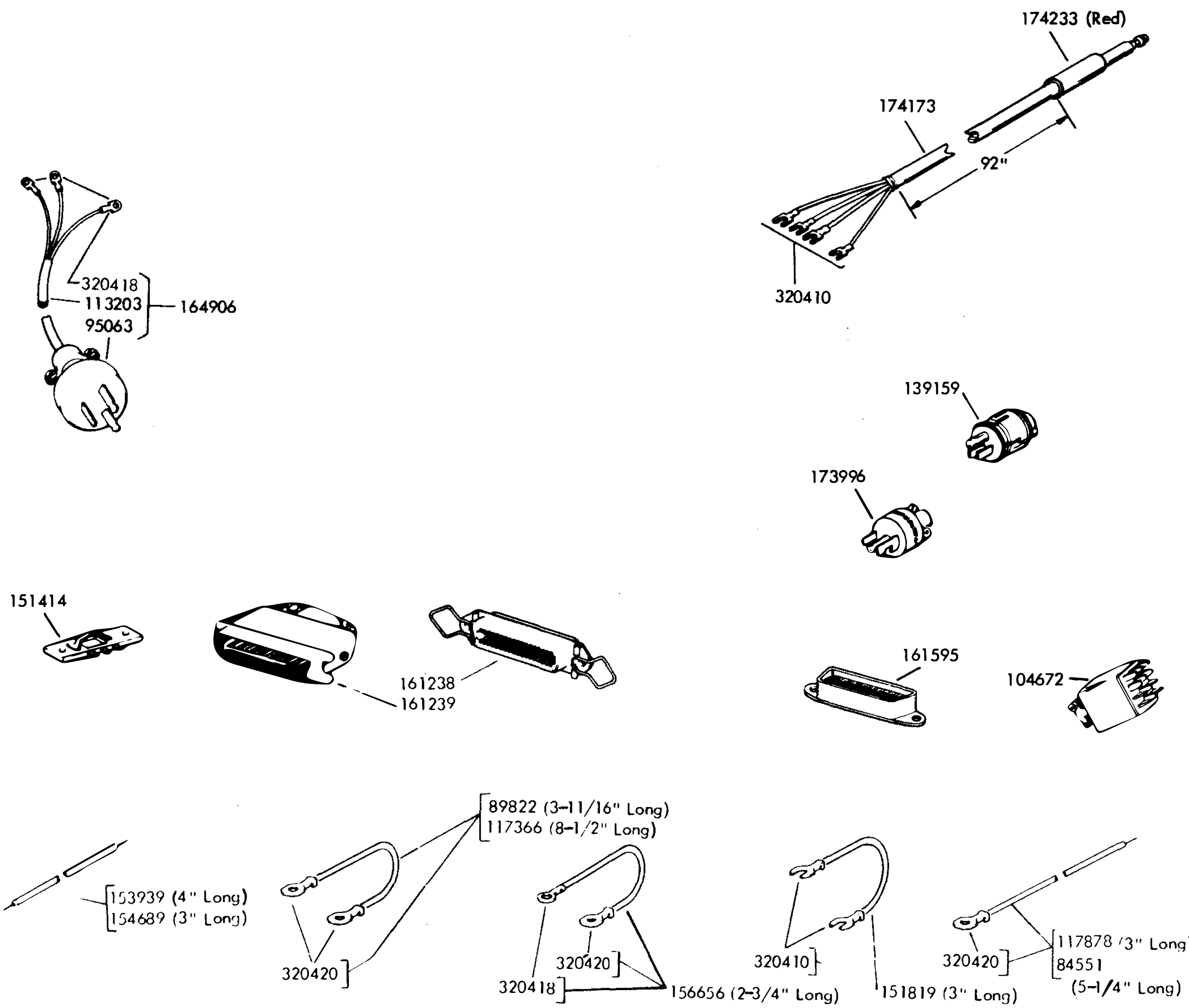


Figure 7-32. Cable Components

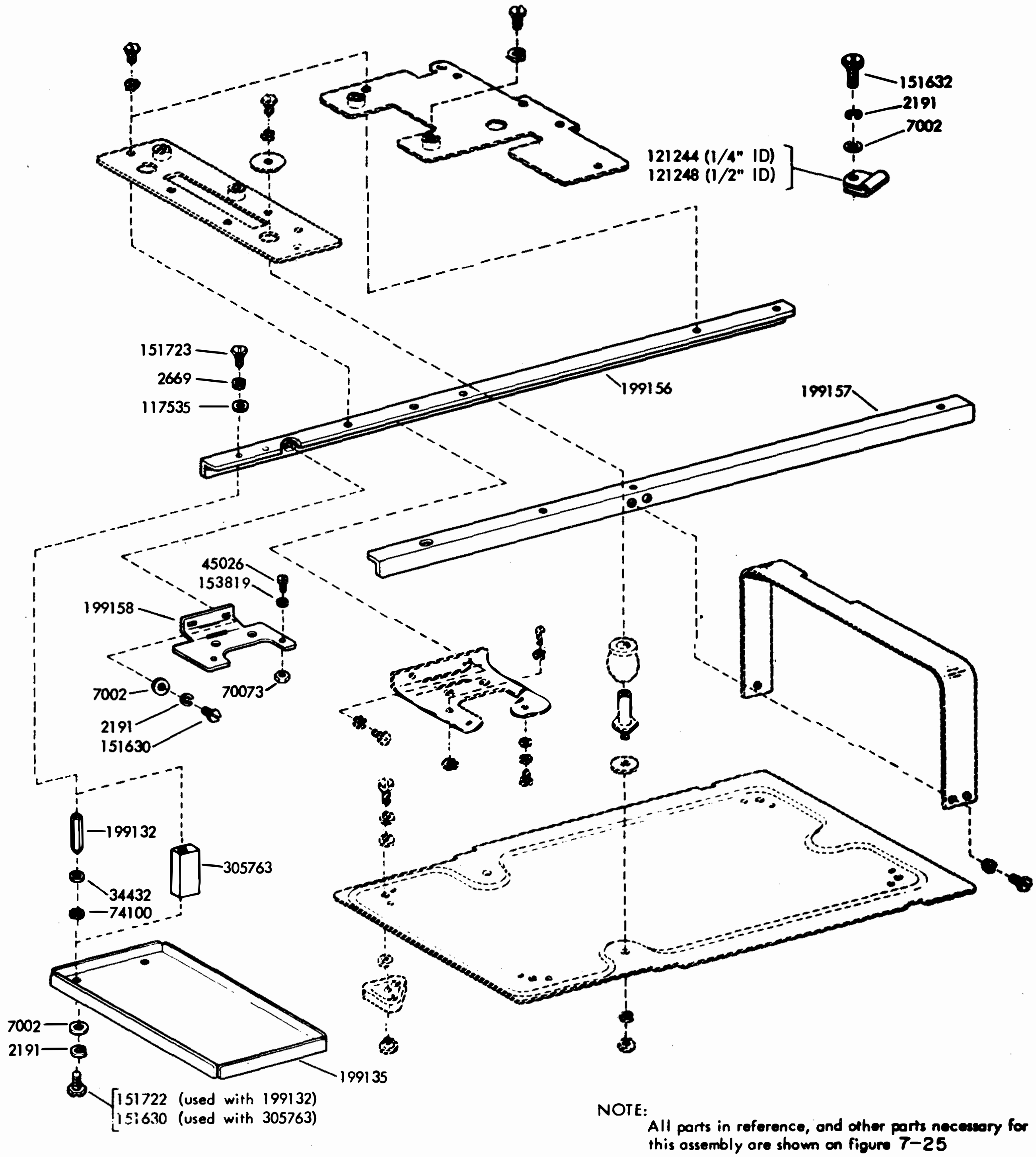
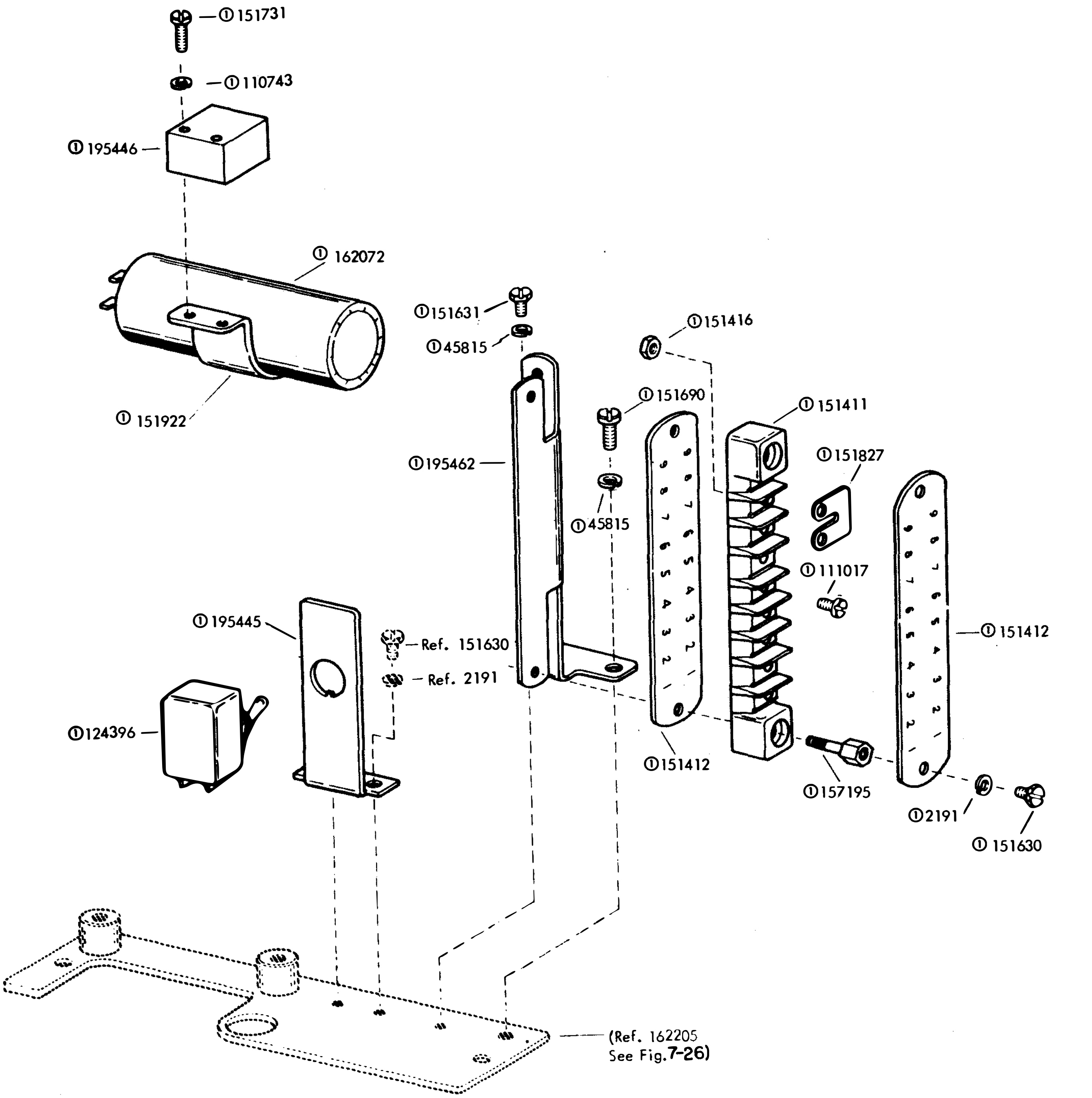


Figure 7-33. Pan, Bracket and Bars to Mount Mechanically Coupled Dual Transmitter Distributor



① Part of 195443 Modification
Kit also shown on Figs. 7-35 and 7-36.

Figure 7-34. Modification Kits 195442 and 195443 to Add Three-Speed Gearshift Assemblies (Sheet 1 of 3)

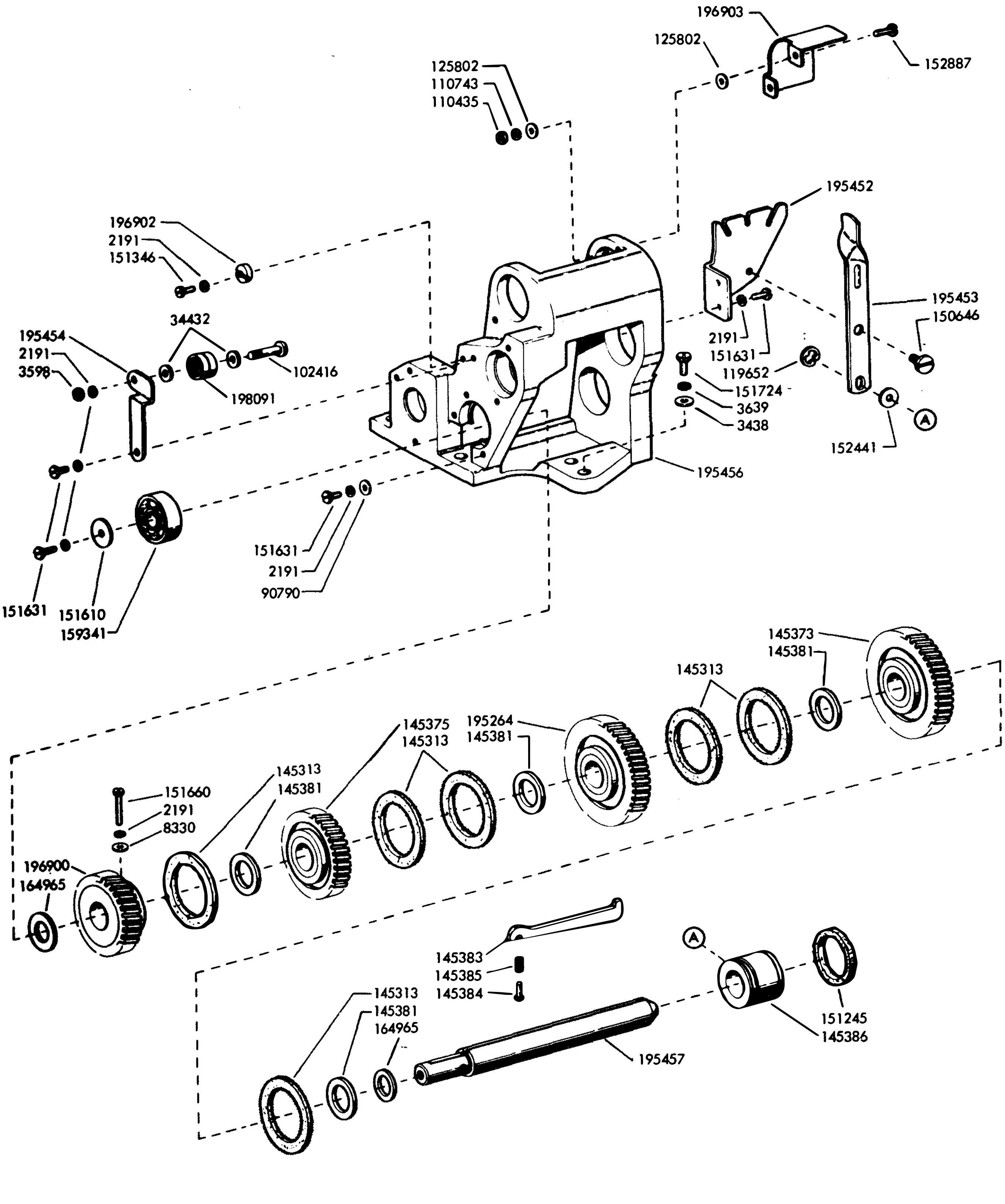


Figure 7-35. Modification Kits 195442 and 195443 to Add Three-Speed Gearshift Assemblies (Sheet 2 of 3)

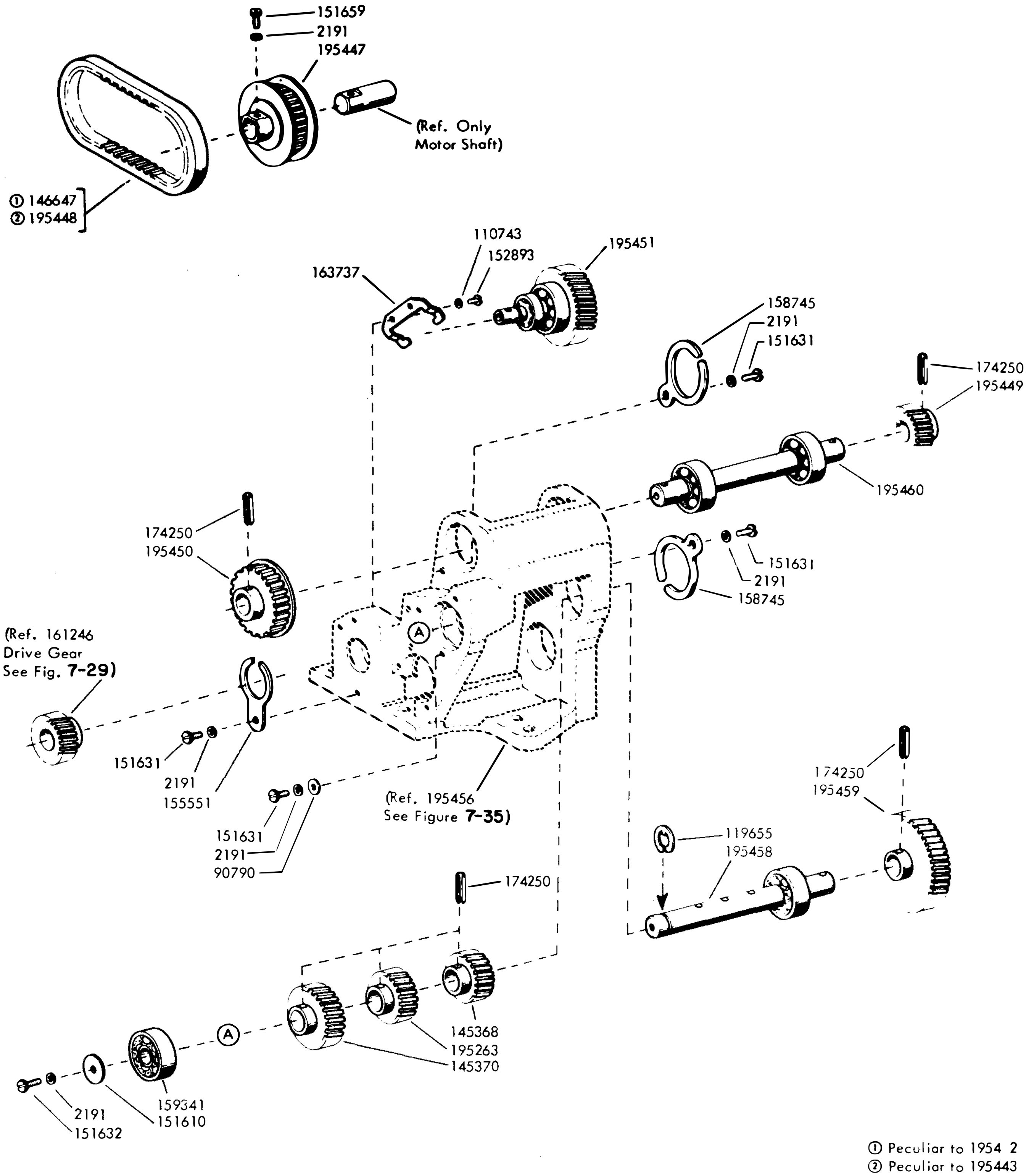


Figure 7-36. Modification Kits 195442 and 195443 to Add Three-Speed Gearshift Assemblies (Sheet 3 of 3)

SYNCHRONOUS MOTOR UNITS

Teletype Code	Motor Assembly	Motor Bracket	Mounting Plate	Thermostatic Switch	Fixed Capacitor	Spring or Clamp	Relay	Relay Insulator	Spring or Clamp	Cable Assembly	Jumper
LMU3	151795	305661	305660	122249	122245	305658	151923	305659	305658	151927	96264R (5" lg. Red)
LMU19	161984	142589		174471	162072	151922	173425	162196	151925	161099	96264R(5" lg Red)
LMU38	151795	305661	305660	334877	122245	305658	151923	305659	305658	151927	96264R(5" lg Red)

Figure 7-37. Synchronous Motor Cross-Reference Chart

SERIES MOTOR UNITS

Teletype Code	Motor Assembly	Motor Bracket	Container	Lid	Nipple	Capacitor	Resistor	Electrical Noise Suppressor	Cable Assembly	Jumper
LMU39	161577	152046	179420	179424	152067	161579	179103	161578	152059	91228(2-1/2" lg. w/320420 and 320422 Terminals)
LMU41	150701	152046	179420	179424	152067	161579	179103	161578	152059	91228(2-1/2" lg. w/320420 and 320422 Terminals)

Figure 7-38. Series Motor Cross-Reference Chart

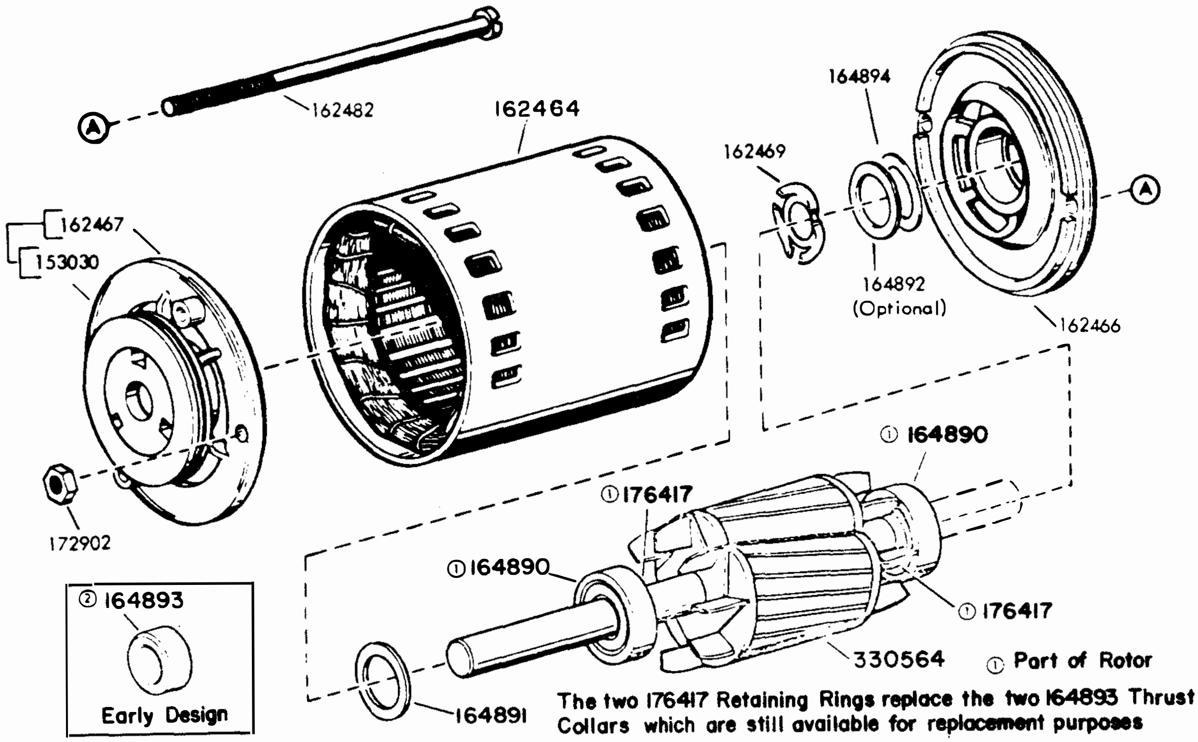


Figure 7-39. Synchronous Motor Assembly 151795 (Standard) - Used on LMU3 and LMU38

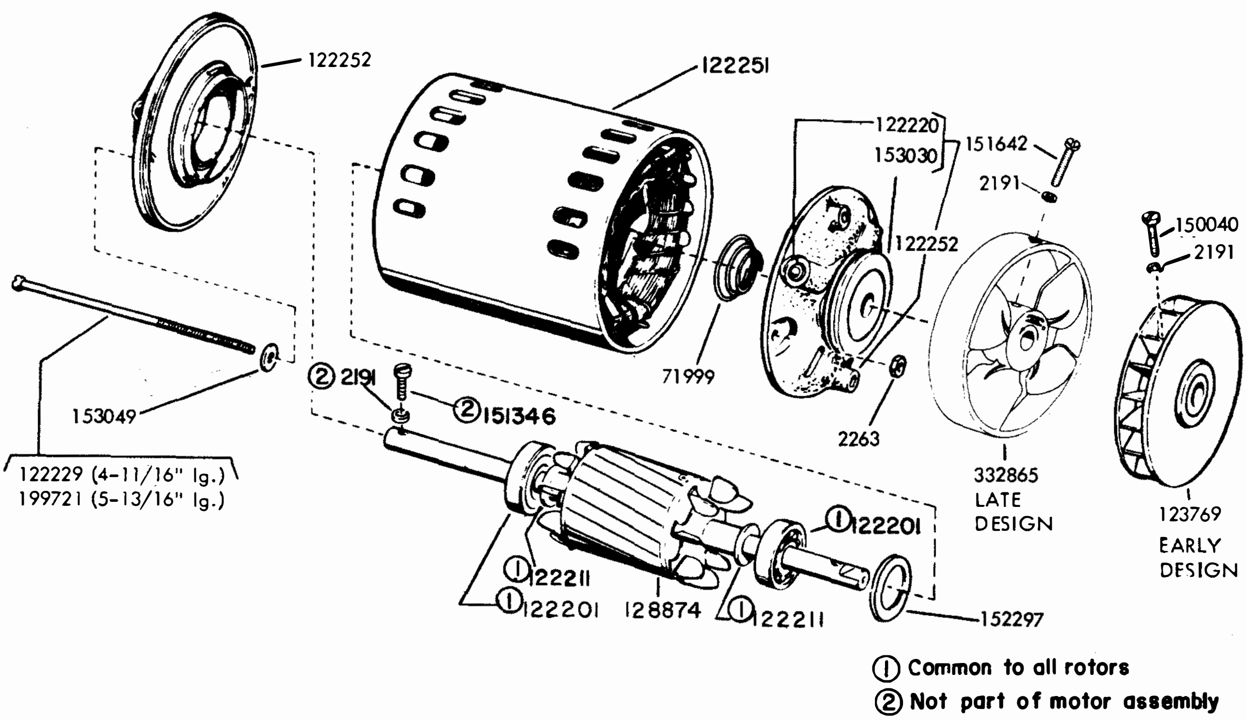


Figure 7-40. Synchronous Motor Assembly 161985 (MIniature) - Used on LMU19

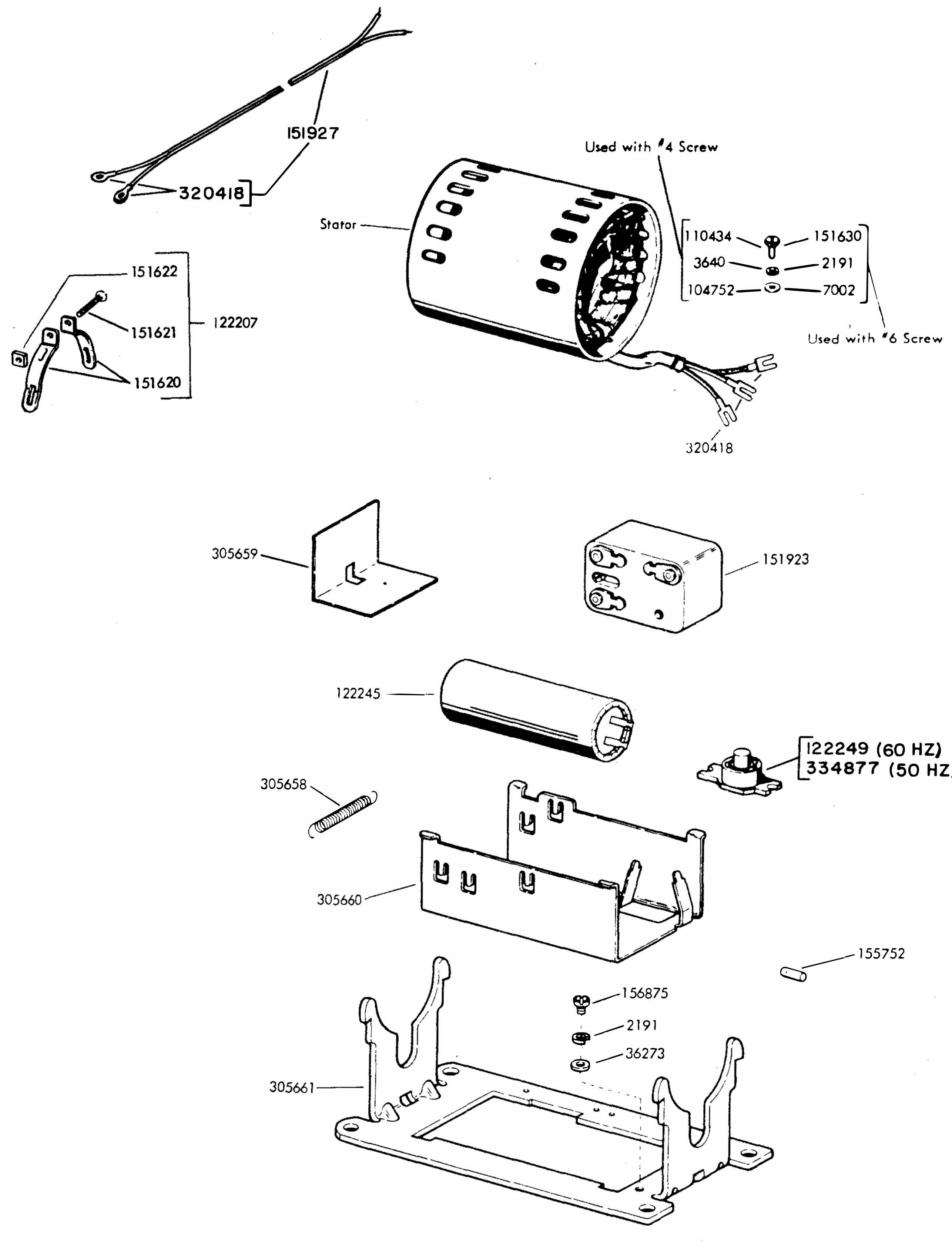


Figure 7-41. Relay and Capacitor Mounting (Synchronous) - Used on LMU3 and LMU38

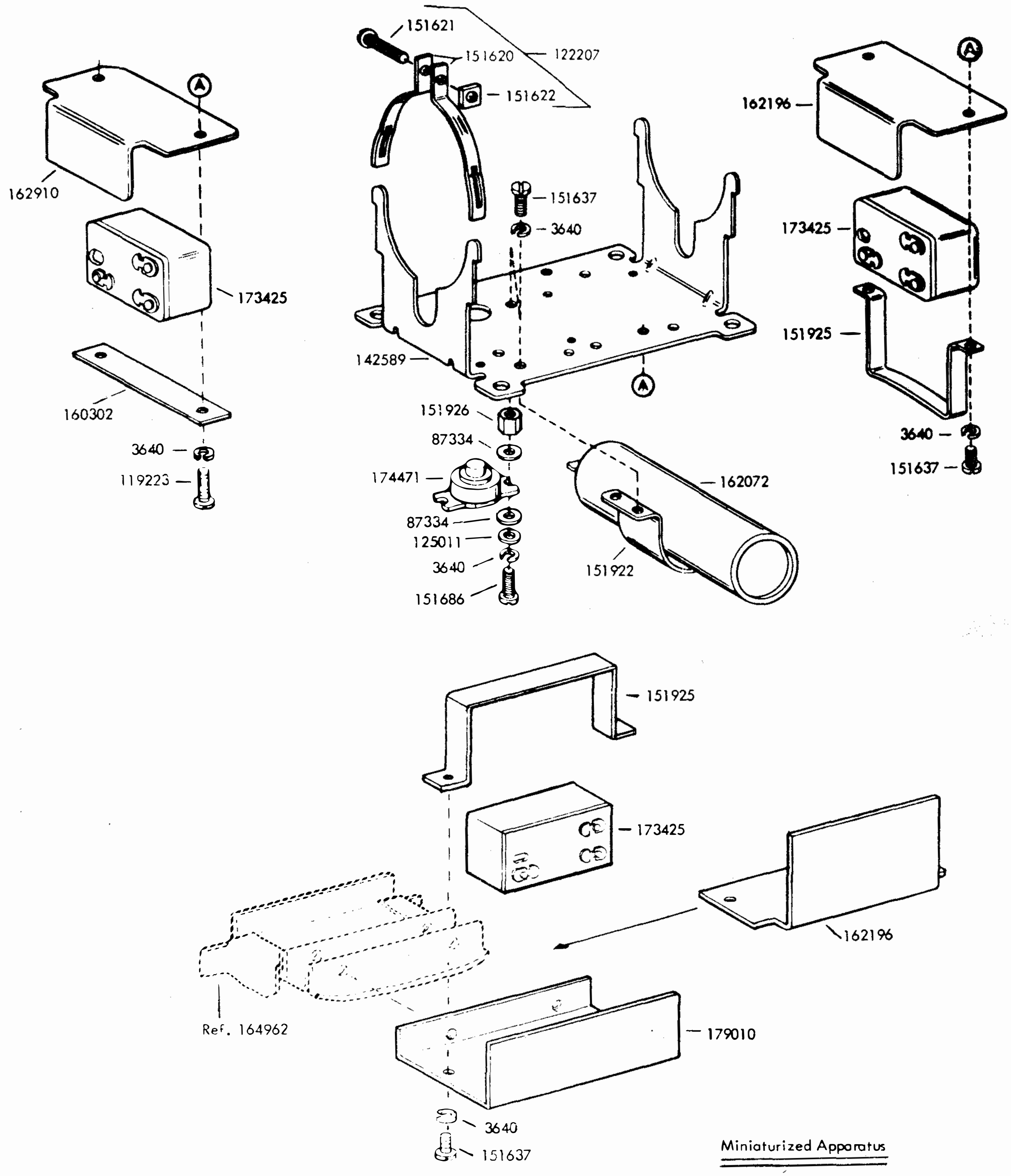
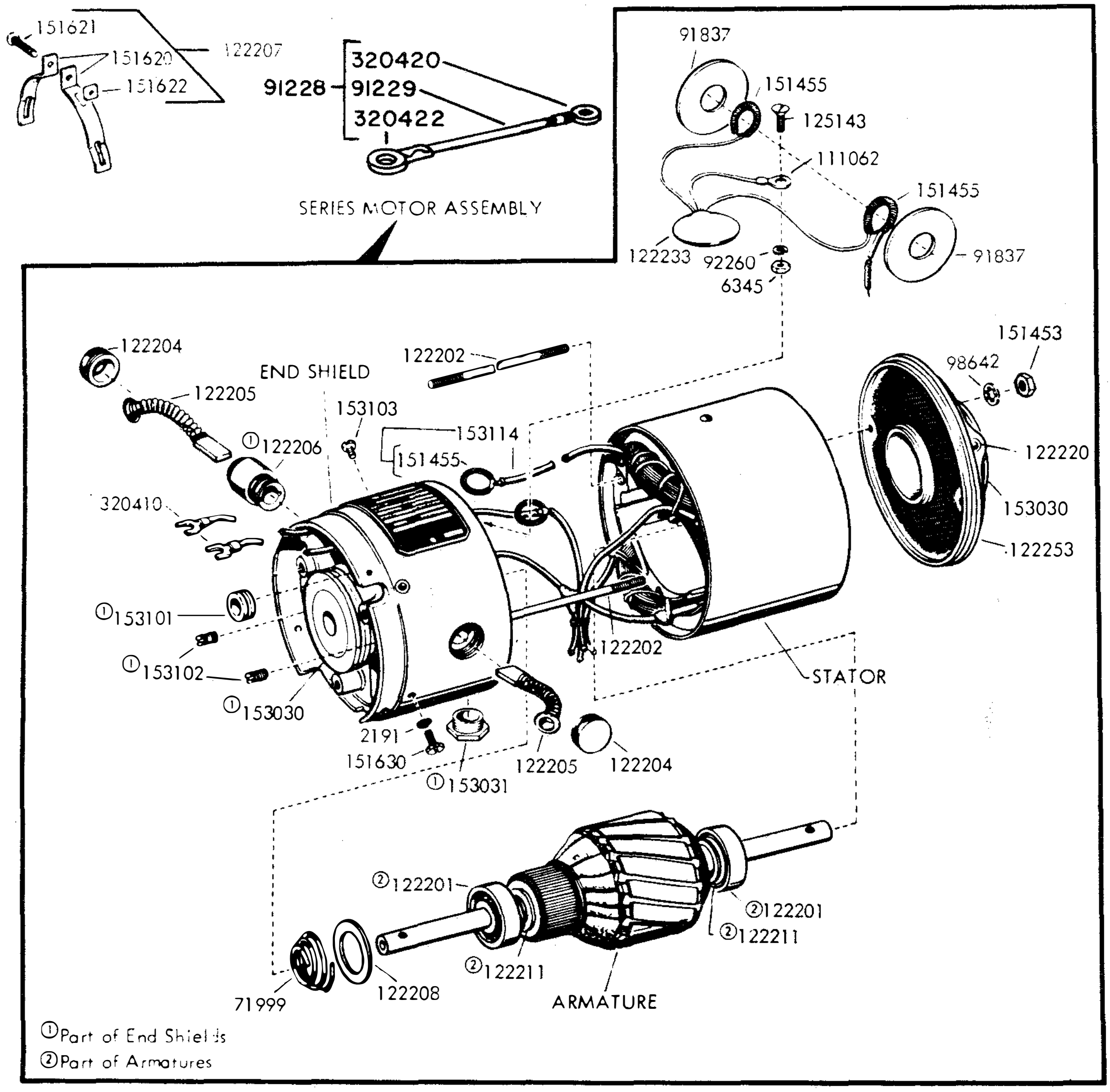


Figure 7-42. Relay and Capacitor Mounting (Synchronous) Used on LMU19



SERIES MOTORS STANDARD OR HEAVY DUTY					
	MOTOR ASSEMBLY	STATOR	ARM-ATURE	END SHIELD	MOTOR DATA
Standard	150701	122221	122210	122200	Series, 1/20 HP, 115V: 60 Hertz, 3600 RPM
Heavy	161577	161576	161575	122200	Series, 1/15 HP, 115V: 60 Hertz, 3600 RPM

Figure 7-43. Series Motor Assemblies - Used on LMU39 and LMU41

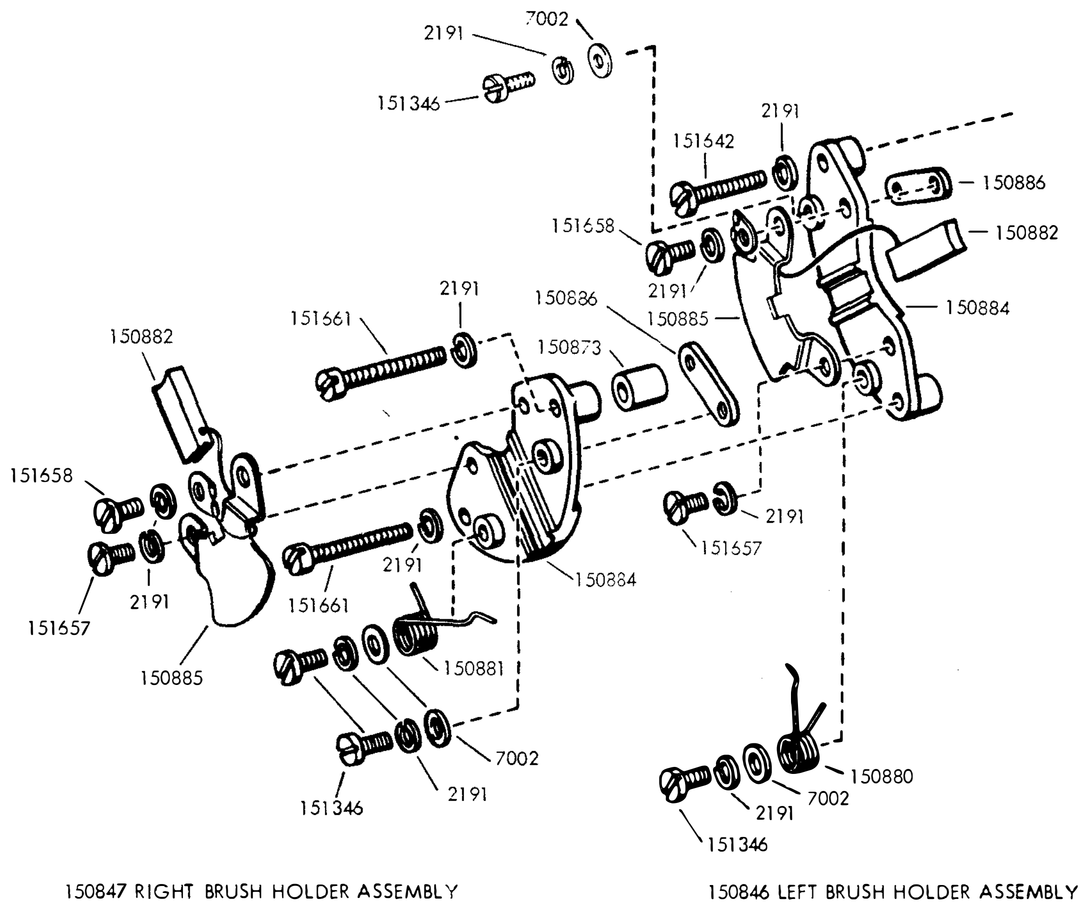


Figure 7-44. Brush Assemblies

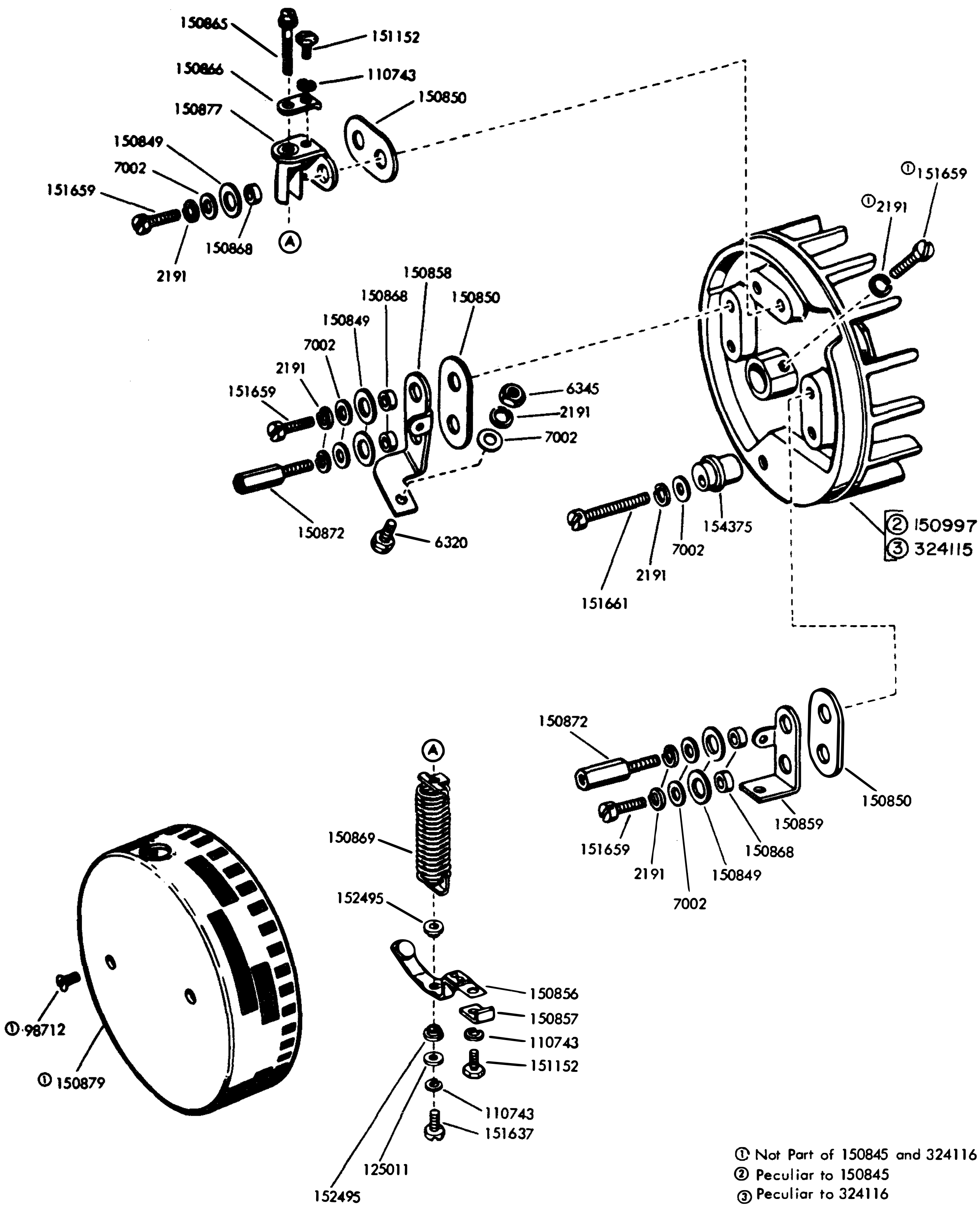


Figure 7-45. Governor Assemblies 150845 and 324116

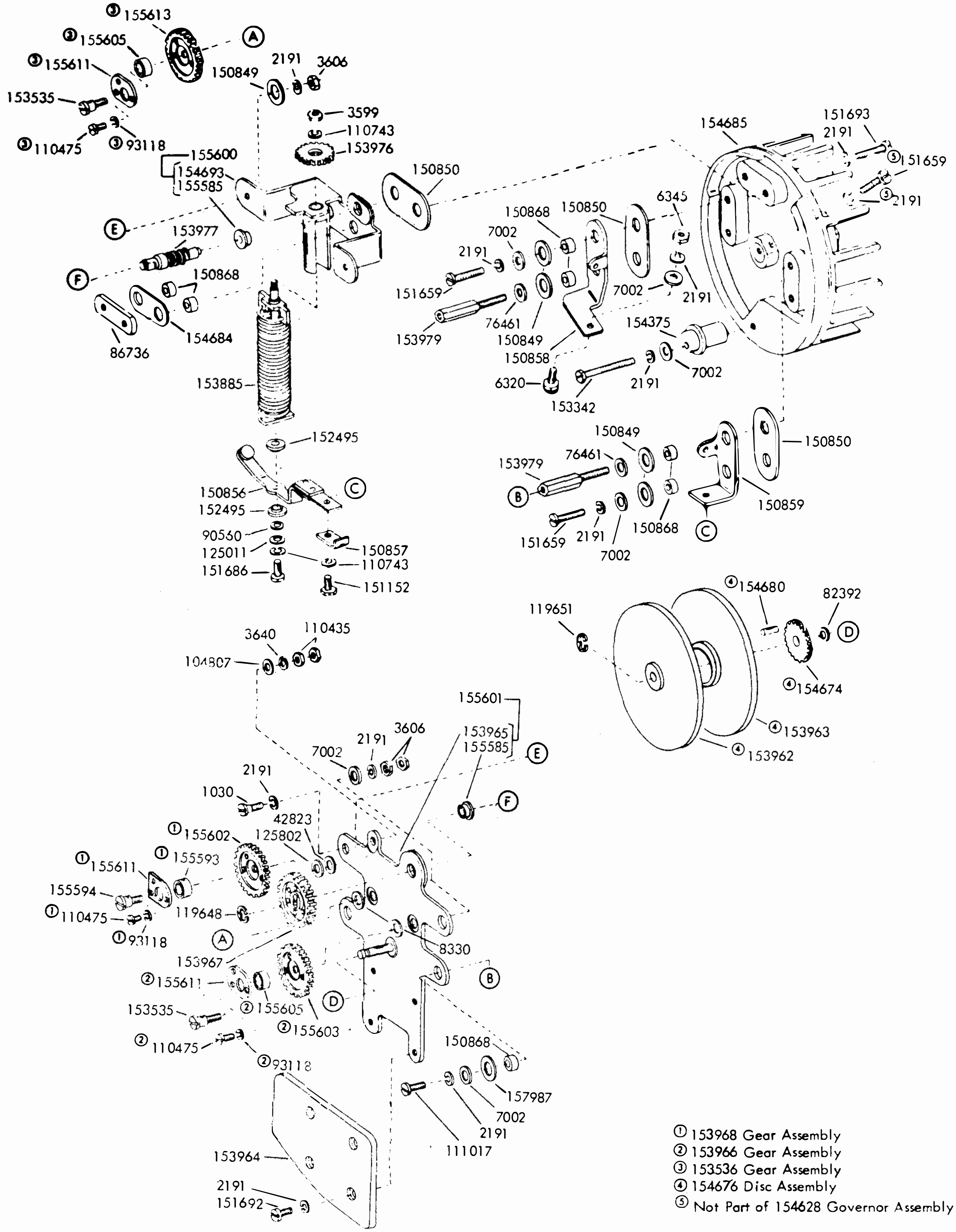
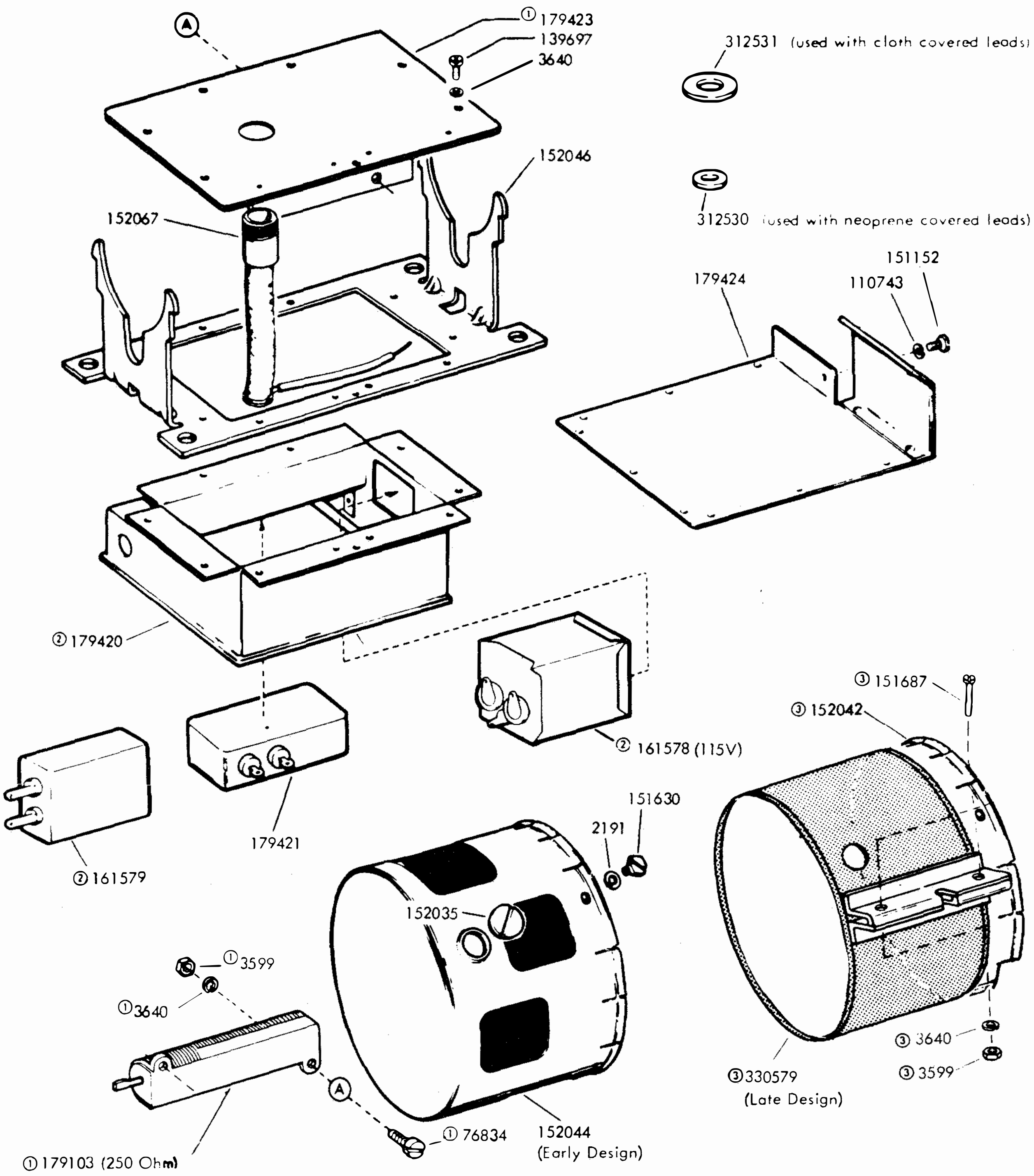


Figure 7-46. Governor Assembly 154628



① 198691 Plate w/Resistor Assembly
② 198692 Container Assembly
③ 152044 Cover Assembly

Figure 7-47. Series Motor Mounting Parts with RF Suppression - Used on LMU39 and LMU41

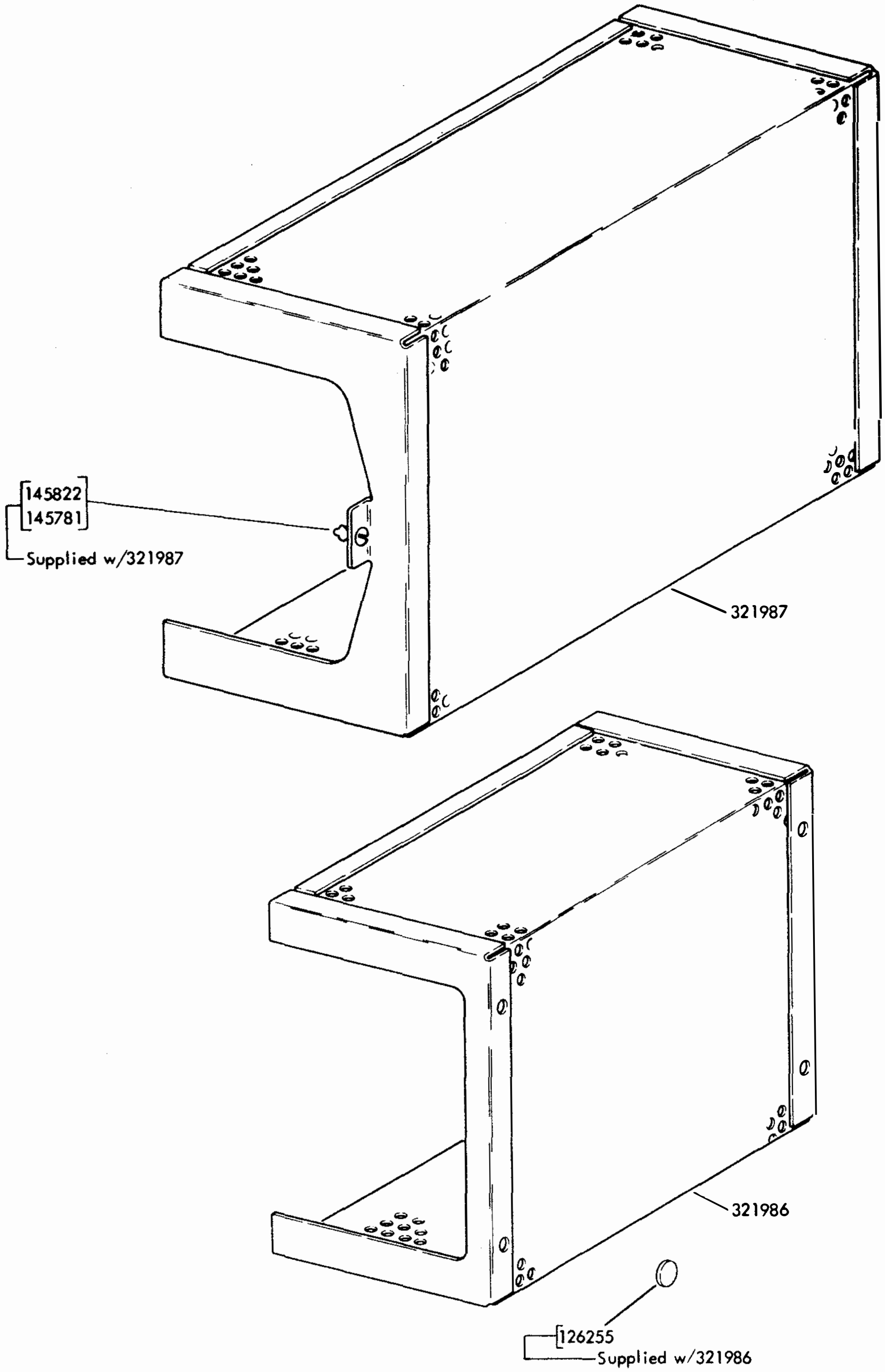
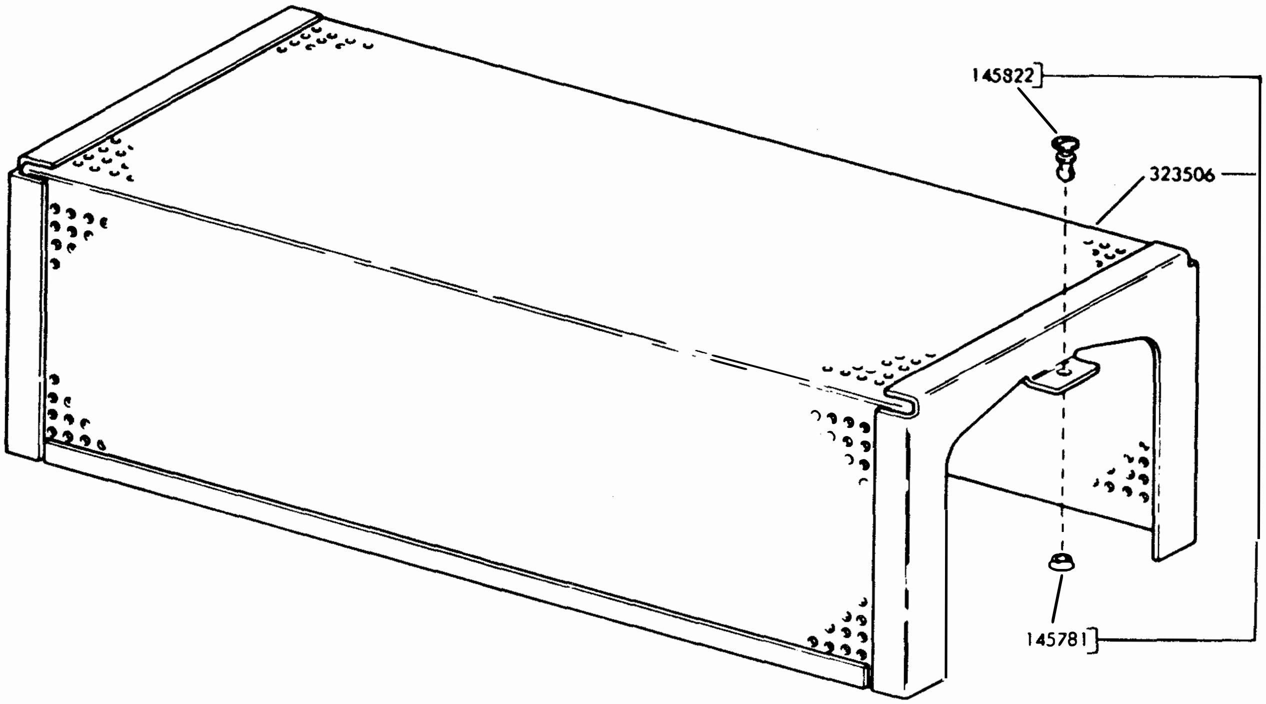


Figure 7-48. Electrical Service Assembly Covers (Sheet 1 of 2)



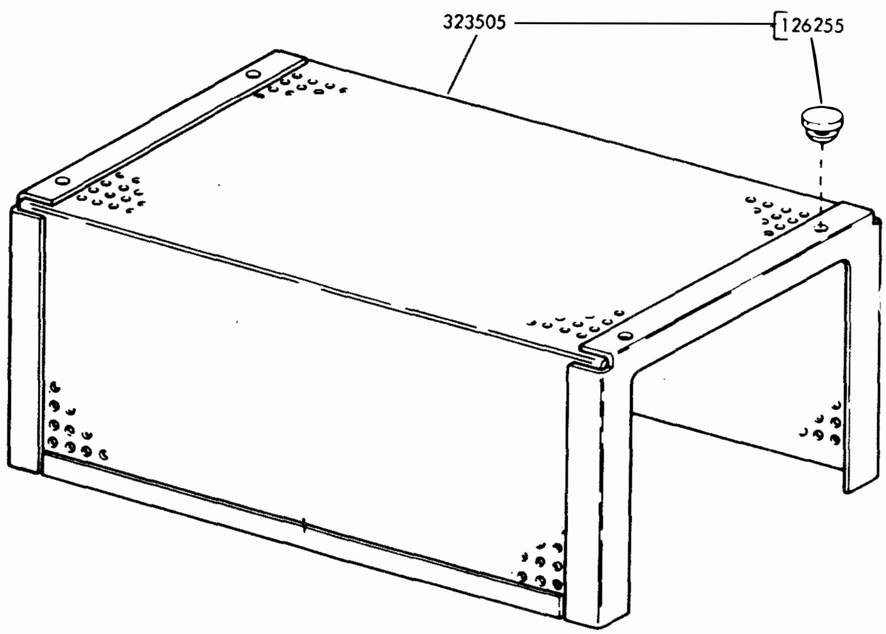


Figure 7-49. Electrical Service Assembly Covers (Sheet 2 of 2)

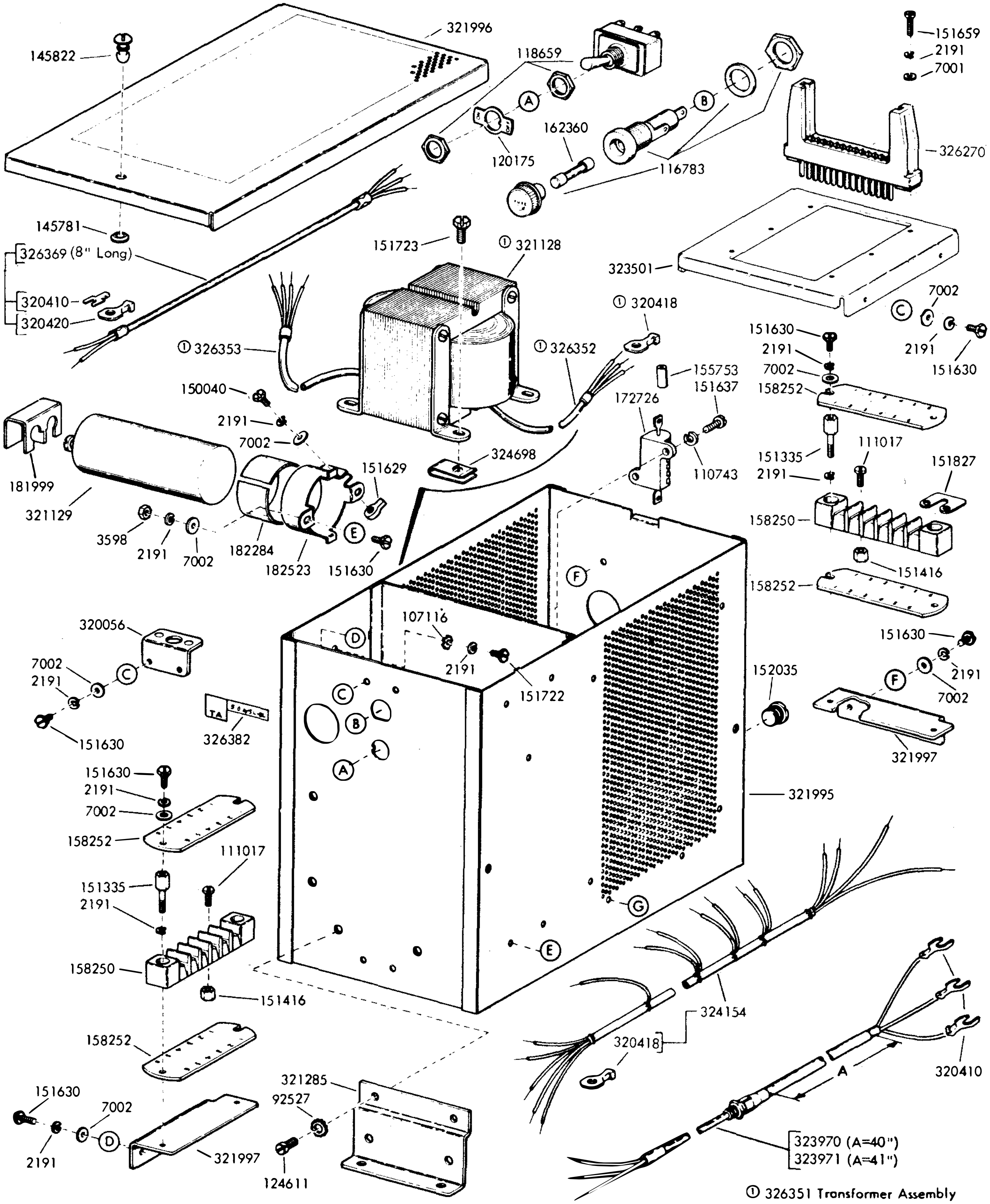


Figure 7-50. Electrical Service Assembly 326792 - Used with Mini TD Set (Sheet 1 of 2)

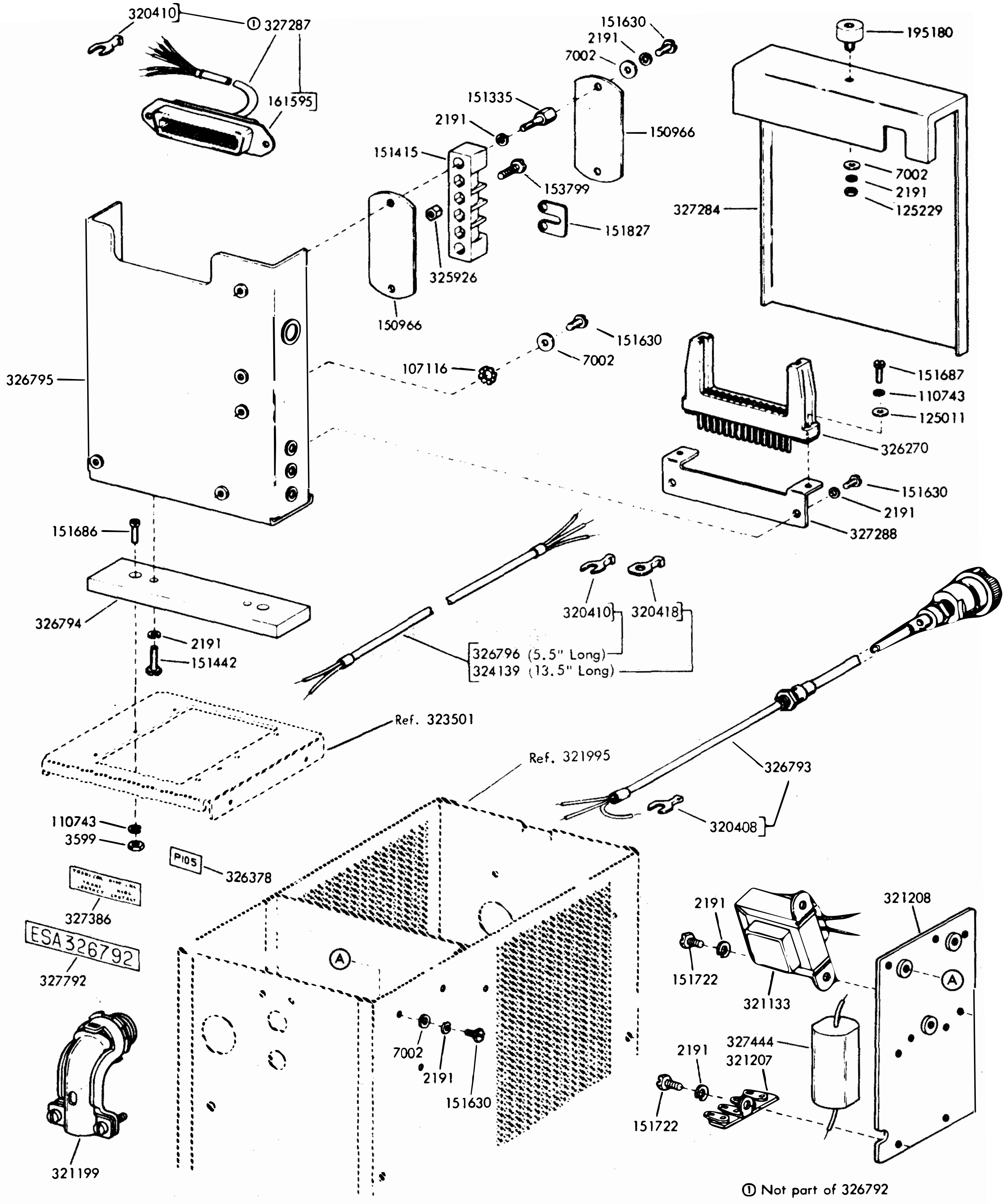
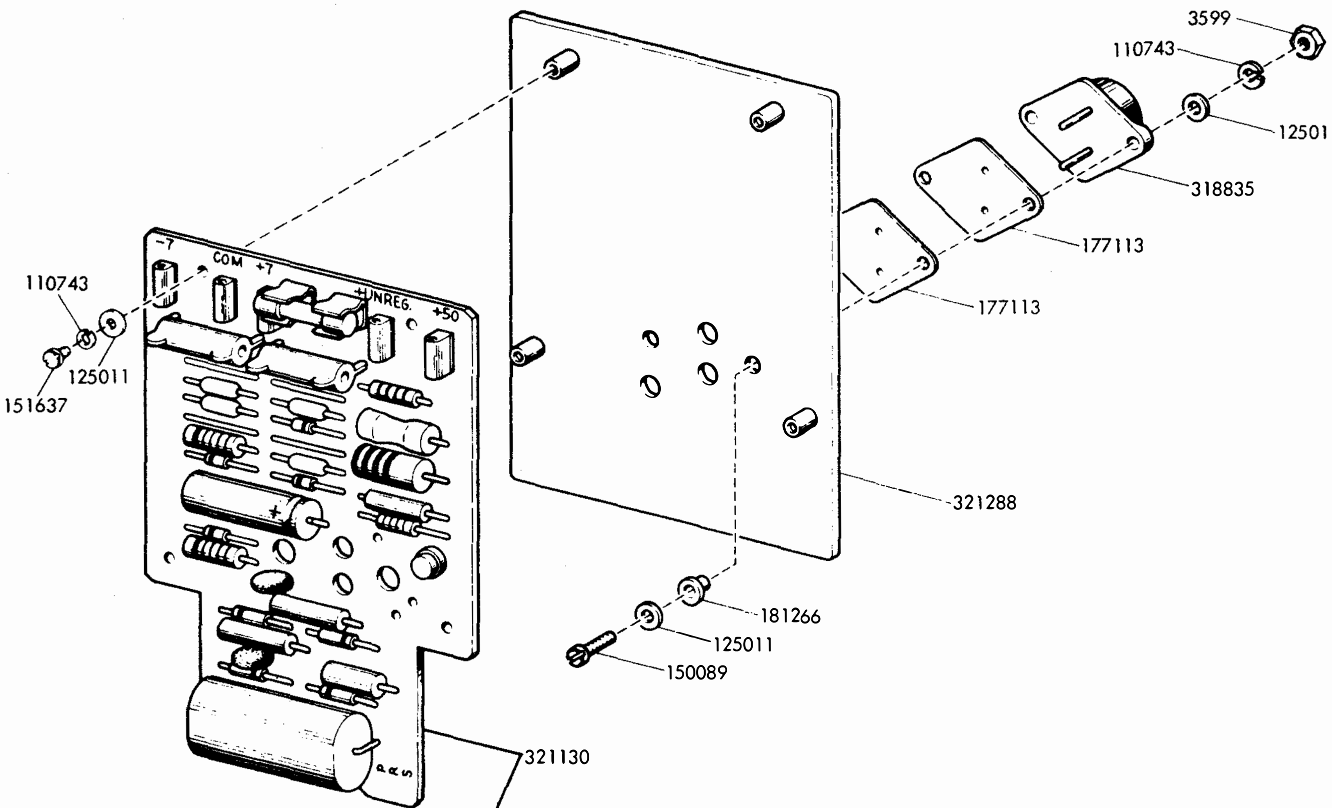
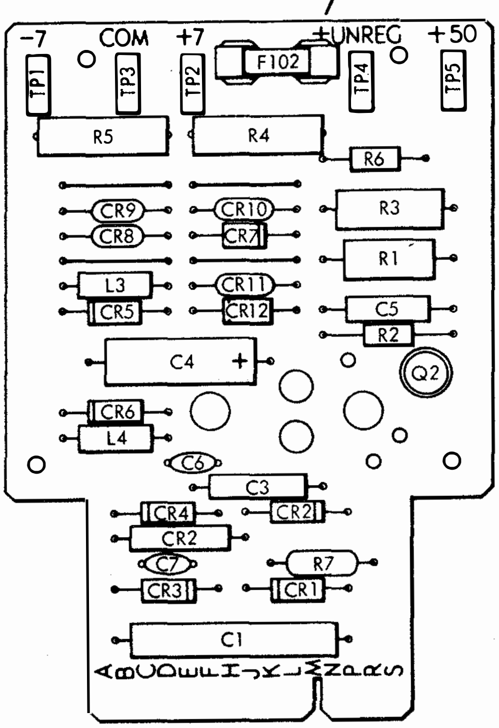


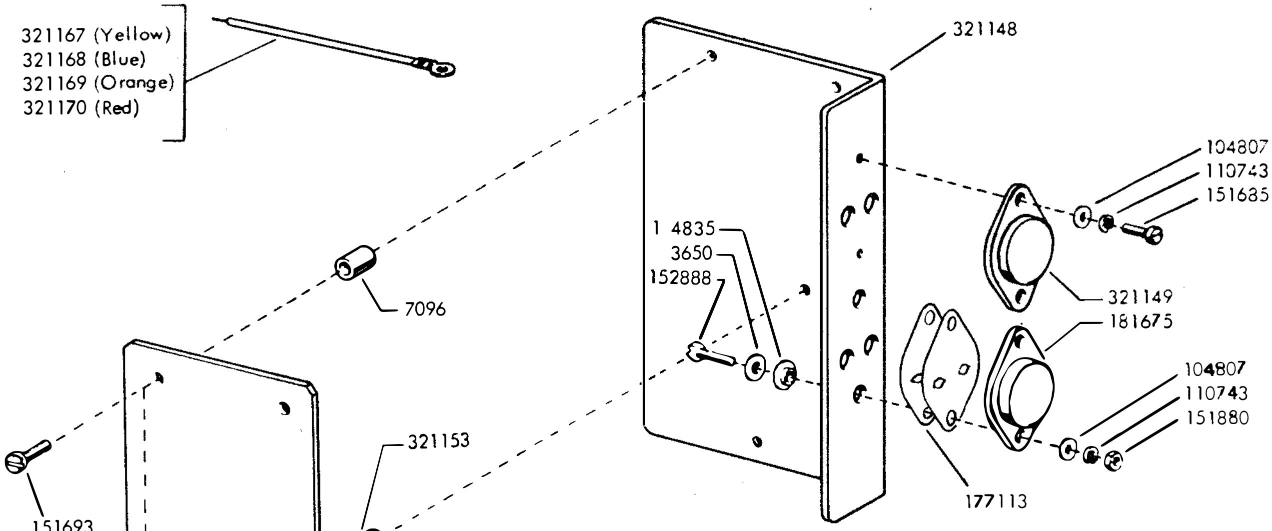
Figure 7-51. Electrical Service Assembly 326792 - Used with Mini TD Set (Sheet 2 of 2)

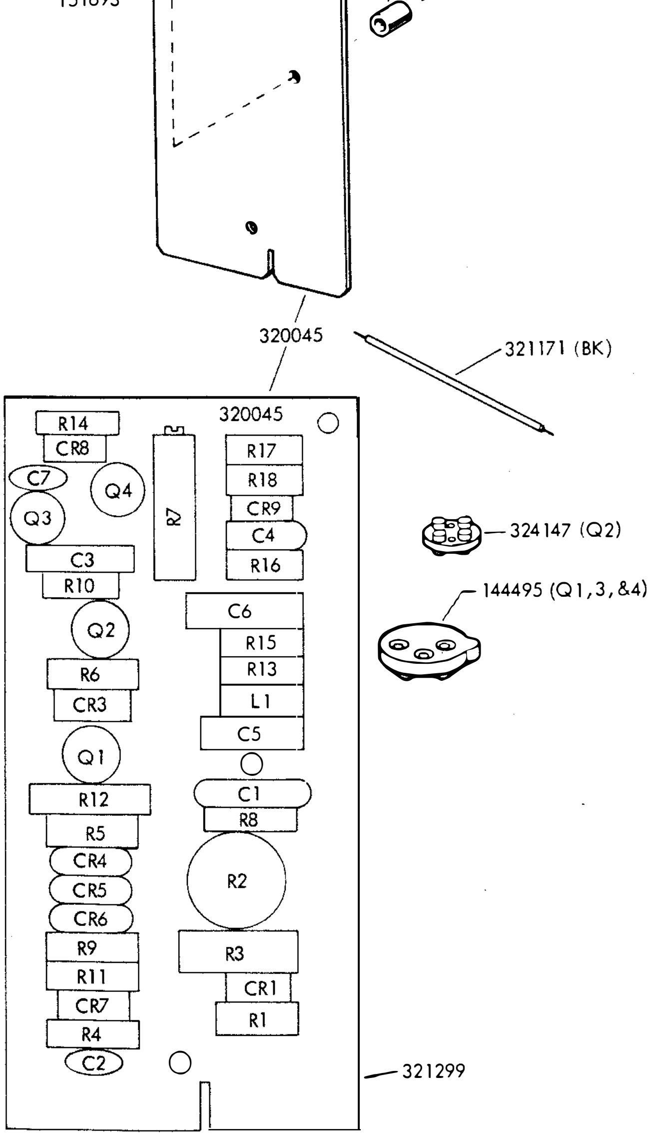




Reference Designation	Part No.	Description
C1	312284	Capacitor, 1.5 MFD
C2, 3	171585	Capacitor, .22 MFD
C4	171831	Capacitor, 10 MFD
C5	178860	Capacitor, .022 MFD
C6, 7	312385	Capacitor, .1 MFD
R1	198937	Resistor, 2700 Ohm
R2, 6	182180	Resistor, 200 Ohm
R3	171533	Resistor, 4 Ohm
R4, 5	311664	Resistor, 2500 Ohm
R7	305298	Resistor, 3300 Ohm
CR1,2,3,4	182520	Diode, IN4383
CR5, 6	327794	Diode, Zener (7.2V)
CR7, 12	321286	Diode, IN4749A
CR8,9,10,11	178844	Varistor, 100A
L3, 4	321159	Choke
Q2	321145	Transistor, 2N2270
TP1	320042	Jack, Test (Slate)
TP2	320041	Jack, Test (Green)
TP3	320039	Jack, Test (Black)
TP4	320040	Jack, Test (Orange)
TP5	320038	Jack, Test (Red)
F102	131807	Fuse, .5 Amp

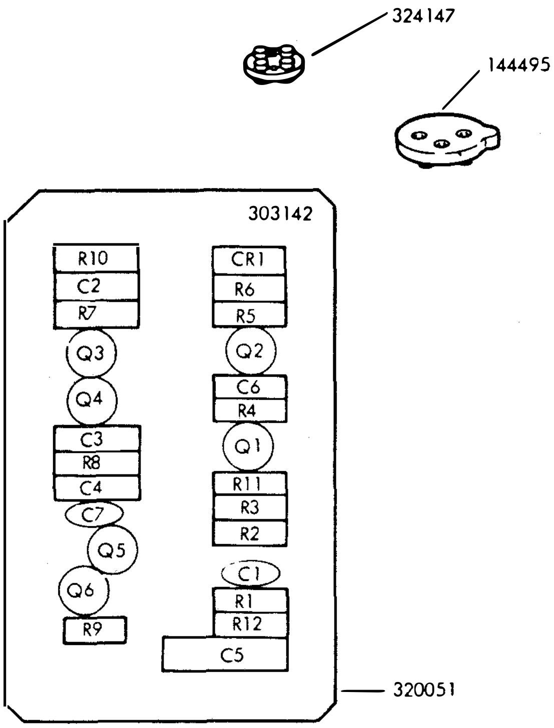
Figure 7-52. Power Supply Circuit Card 321290 (0.5 Ampere)





Reference Designation	Part No.	Description
R1	321263	Resistor , 13 Ohm
R2	321164	Potentiometer
R3	321155	Resistor, 2000 Ohm
R4,5	118720	Resistor, 100,000 Ohm
R6	129854	Resistor, 10,000 Ohm
R7	321160	Potentiometer
R8	113146	Resistor, 4700 Ohm
R9	129850	Resistor, 680 Ohm
R10, 18	321258	Resistor, 20,000 Ohm
R11	137604	Resistor, 620 Ohm
R12	321292	Resistor, 1300 Ohm
R12	139143	Resistor, 43,000 Ohm
R14	321259	Resistor, 15 Ohm
R15	182751	Resistor, 3600 Ohm
R16	137442	Resistor, 1500 Ohm
R17	321151	Resistor, 110 Ohm
C1	321158	Capacitor, .1 MFD
C2,7	321157	Capacitor, 500 PF
C3	171829	Capacitor, .15 MFD
C4	321264	Capacitor, 2.7 MFD
C5	178860	Capacitor, .022 MFD
C6	171587	Capacitor, .25 MFD
L1	321159	Choke
CR1	321161	Diode, 1N748A
CR3,9	321154	Diode, 1N757A
CR4,5,6	178844	Varistor, 100A
CR7	181667	Diode, 1N750A
CR8	321156	Diode, 1N482A
Q1	321166	Transistor, 2N1893
Q2	324144	Transistor, 2N4121
Q3	321165	Transistor
Q4	321261	Transistor, 2N4036

Figure 7-53. Clutch Magnet Driver Circuit Card 321991



Reference Designation	Part No.	Description
R1&3	118720	Resistor, 100,000 Ohm
R2	118178	Resistor, 220,000 Ohm
R4&8	129854	Resistor, 10,000 Ohm
R5&6	321204	Resistor, 13,000 Ohm
R7&10	118147	Resistor, 6800 Ohm
R9	137438	Resistor, 100 Ohm
R11&12	118146	Resistor, 4700 Ohm
CR1	181619	Diode, 1N914
C1&7	321157	Capacitor, 0.500 PF
C2	320048	Capacitor, 0.5 MFD
C3&4	320049	Capacitor, 0.15 MFD
C5	320047	Capacitor, 1 MFD
C6	181618	Capacitor, 0.01 MFD
Q1,4&6	315930	Transistor, 2N3568
Q2	324144	Transistor, 2N4121
Q3&5	315931	Transistor, 2N3638

Figure 7-54. Low-Level Keyer Circuit Card 303142

Table 7-5. List of Abbreviations

#	Number	MA	Milliampere
"	Inch	MFD	Microfarad
&	and	MHP	Millihorsepower
x	by	Mtg	Mounting
A	Ampere (comb form)	No.	Number
AC	Alternating Current		
Amp	Ampere	PF	Picofarad
		PS	Power Supply
Brd	Braided	Pt	Point
CCW	Counterclockwise	Rcpt	Receptacle
CMD	Clutch Magnet Driver	Rd	Round
comb	Combination	Ref	Reference
		RFI	Radio Frequency Interference
DC	Direct Current	RPM	Revolutions per Minute
Dim	Dimension		
		Shld	Shoulder
Fig.	Figure	SL-BL	Slow-Blow
Fil	Fillister	SP-ST	Single-pole Single-throw
		Spl	Special
Hex	Hexagon	Sq	Square
HP	Horsepower	Std	Standard
Hvy	Heavy		
HZ	Hertz	T	Teeth
		Thk	Thick
ID	Inside Diameter	Thru	Through
Ident	Identification		
		UC	Unit Code
K	Kilo		
		V	Voltage
Lg	Length, Long		
LLK	Low-Level Keyer	w/	with (comb form)
		WPM	Words per Minute

CHAPTER 8
INSTALLATION

8-1. INTRODUCTION. This chapter provides instructions for installation and checkout of transmitter distributor (TD) sets Model 28. The set may be single contact, multicontact, or miniaturized; they are installed in a similar manner.

8-2. UNPACKING. The TD set is packaged in two cardboard cartons. Unpack the set as follows:

a. Carefully slit cartons along sealed edges.

CAUTION

Avoid penetration to a depth which might scratch or mar the finish of the equipment.

b. Lift components from cartons and remove protective packaging material.

8-3. SPACE REQUIREMENTS. Outlines and approximate dimensions of single contact, multicontact, and miniaturized TD sets are shown in figure 8-1. The TD sets are self-contained installations supported on any flat surface large enough to permit the base to rest upon its four telephone-type feet. The location should be convenient to power and signal lines. Within limits of the slack in electrical connections, either set can be positioned readily after assembly or when in operation. Sufficient room should be allowed at the rear of the set for access to the power switch. Sufficient clearance should be allowed at the left of the set to permit air circulation. Head room should be sufficient to permit lifting the cover from the set.

8-4. INSTALLATION PROCEDURES. Installation procedures for high-level TD equipment are provided in paragraph 8-4.1. Information pertinent to low-level TD equipment installation is covered in paragraph 8-4.2.

8-4.1 INSTALLATION PROCEDURES (HIGH-LEVEL). The following paragraphs provide installation procedures for high-level TD equipment.

a. Preparation for Installation. Prepare TD set for installation as follows:

NOTE

Mounting hardware is packaged in a cloth bag packed with the base.

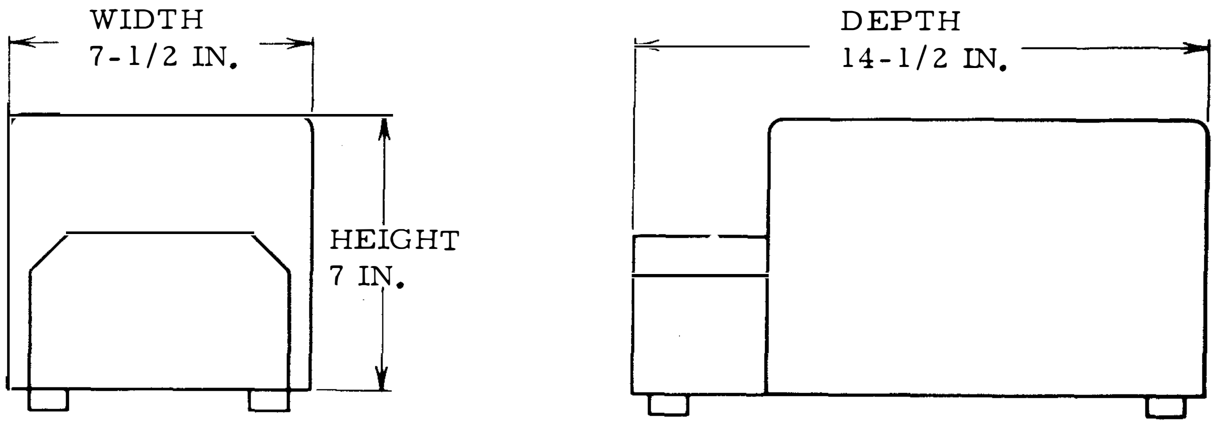
(1) Select gear and pinion set required for speed desired.

(2) Use two screws and lockwashers to attach drive gear (deep concave side forward) to the intermediate gear shaft.

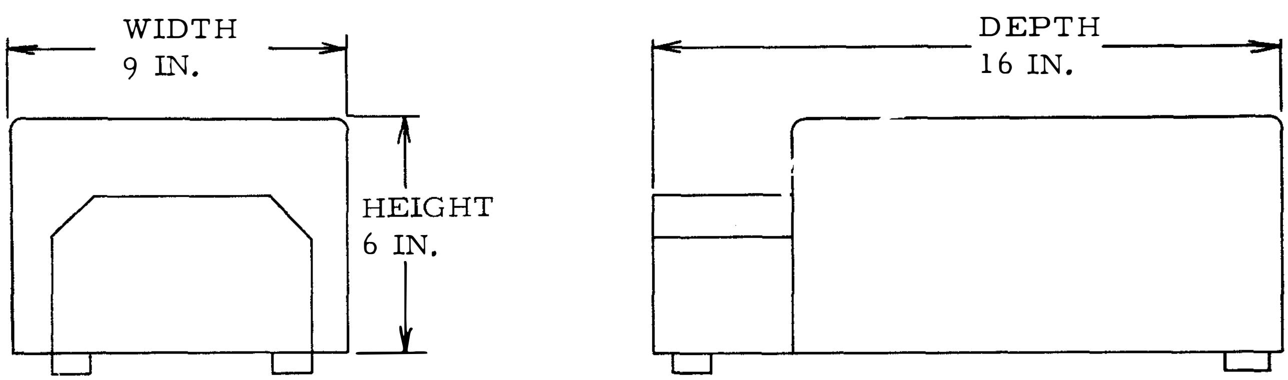
(3) Select motor shaft pinion gear to match operating speed of drive gear assembled to base.

(4) From parts bag attached to base, remove rubber pinion retainer and two posts.

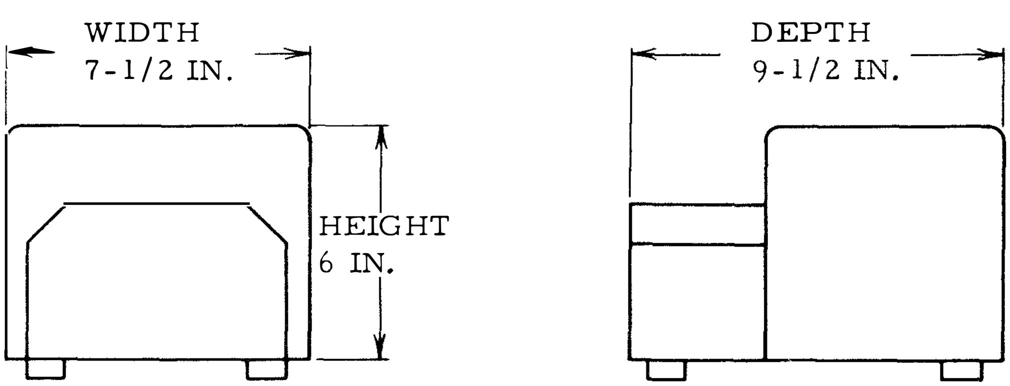
(5) Stretch retainer into place around pinion gear to match operating speed of drive gear assembled to base.



SINGLE CONTACT SET



MULTICONTACT SET



MINIATURIZED SET

Figure 8-1. Outlines and Installation Dimensions

(6) From parts bag attached to base, remove rubber pinion retainer and two posts.

(7) Stretch retainer into place around pinion gear shaft and fasten retainer and pinion to motor shaft with two posts.

(8) Mount retainer on end of shaft with pinion between motor and retainer.

(9) If motor pinion and intermediate shaft drive gear fail to mesh, check position of pinion on motor shaft. Lateral engagement of gears is adjusted by loosening intermediate gear mechanism mounting bracket and repositioning bracket.

(10) With access hole for power switch at rear, position cover over rear of unit, enclosing rear of base, gear guard and intermediate gear mechanism, and motor. Ensure air circulation vents are not obstructed. When cover is correctly positioned, push down to latch it on base.

(11) Slide panel portion of cover over transmitter distributor unit from front, engaging mounting plates of mechanism with detents in sides of panel. Panel portion of cover fits beneath cover plates of transmitter distributor unit and is held in place by spring effect of side panels.

NOTE

Units are shipped with sensing pins up. Rotate sensing shaft to latched position before attempting to open tape lid.

b. Installation. Install TD set in accordance with requirements specified in paragraph 8-3.

c. Electrical Connections. AC electrical power and signal line connections are made to terminals on terminal boards located at the rear of the base. Connections are indicated in high-level TD schematic and wiring diagrams included in Chapter 5.

CAUTION

External power and signal voltages should be off before completing electrical power connections.

8-4.2 INSTALLATION PROCEDURES (LOW-LEVEL). Procedures in paragraph 8-4.1 are also applicable to low-level TD equipment. The following paragraphs provide additional information applicable only to low-level TD sets.

a. Electrical Service Assembly (ESA) Installation. A table-mounted ESA (TP326792) is used with low-level TD equipment. Install the ESA as follows:

(1) Mount the ESA in space available anywhere near the set within the limit of the signal cables. Mounting brackets for the ESA are supplied; however, the user must supply the hardware to fasten the brackets to a table.

(2) Route the signal line conduit or cabling to the opposite side of the fuse and attach by means of a 3/4-inch conduit fitting.

(3) Connect the power line to the side of the ESA on which the fuse and power switch are located, and attach by means of a 3/4-inch conduit fitting.

NOTE

A Receive-Only (RO) Teletypewriter set may be connected to a monitoring cable for the purpose of monitoring the output signals from the TD.

(4) Route the signal cable, the clutch magnet driver cable, and the monitoring cable (see above NOTE) to the apparatus through a notch in the rear of the transmitter distributor cover.

(5) Connect the power cord from the TD to a source of primary ac power.

(6) Connect all grounding straps such as the snap panel to mounting plate and cover to mounting plate.

b. <u>ESA Circuit Card Hold-Down Installation</u>. The circuit card hold-down installation provides the means to secure circuit cards into connectors of low-level TD ESAs. This provides protection against shock, vibration, and loosening of circuit cards. The installation material consists of strips of Neoprene rubber foam. To install Neoprene rubber foam circuit card hold-downs in ESA TP326792, proceed as follows: (See figure 8-2, 2 sheets.)

(1) Turn screw at one end of TP321996 cover; loosen, remove, and retain.

(2) Measure and mark locations for placement of two TP344668 foam card holders on inside of TP321996 cover, as shown on sheet 1 of figure 8-2.

(3) Peel paper back from two TP344668 foam pieces; locate and place adhesive sides to inside of TP321996 cover, in areas shown on sheet 1 of figure 8-2. Press to obtain maximum adhesion.

(4) Remove and retain TP327284 inner cover from center circuit card.

(5) Measure and mark locations for placement of TP344667 foam card holder inside TP327284 cover, as shown on sheet 2 of figure 8-2.

(6) Peel paper back from TP344667 foam card holder and place adhesive side to inside of TP327284 cover, in area shown on sheet 2 of figure 8-2. Press to obtain maximum adhesion.

(7) Replace TP327284 cover to enclose center circuit card.

(8) Replace TP321996 cover and twist screw to lock in place.

c. <u>Electrical Connections (Low-Level)</u>. AC power and signal line connections are made to low-level TD equipment through the ESA. Connections are indicated in low-level TD schematic and wiring diagrams included in Chapter 5.

8-5. INSTALLATION CHECKOUT. Installation checkout consists of reference standards tests and performance tests.

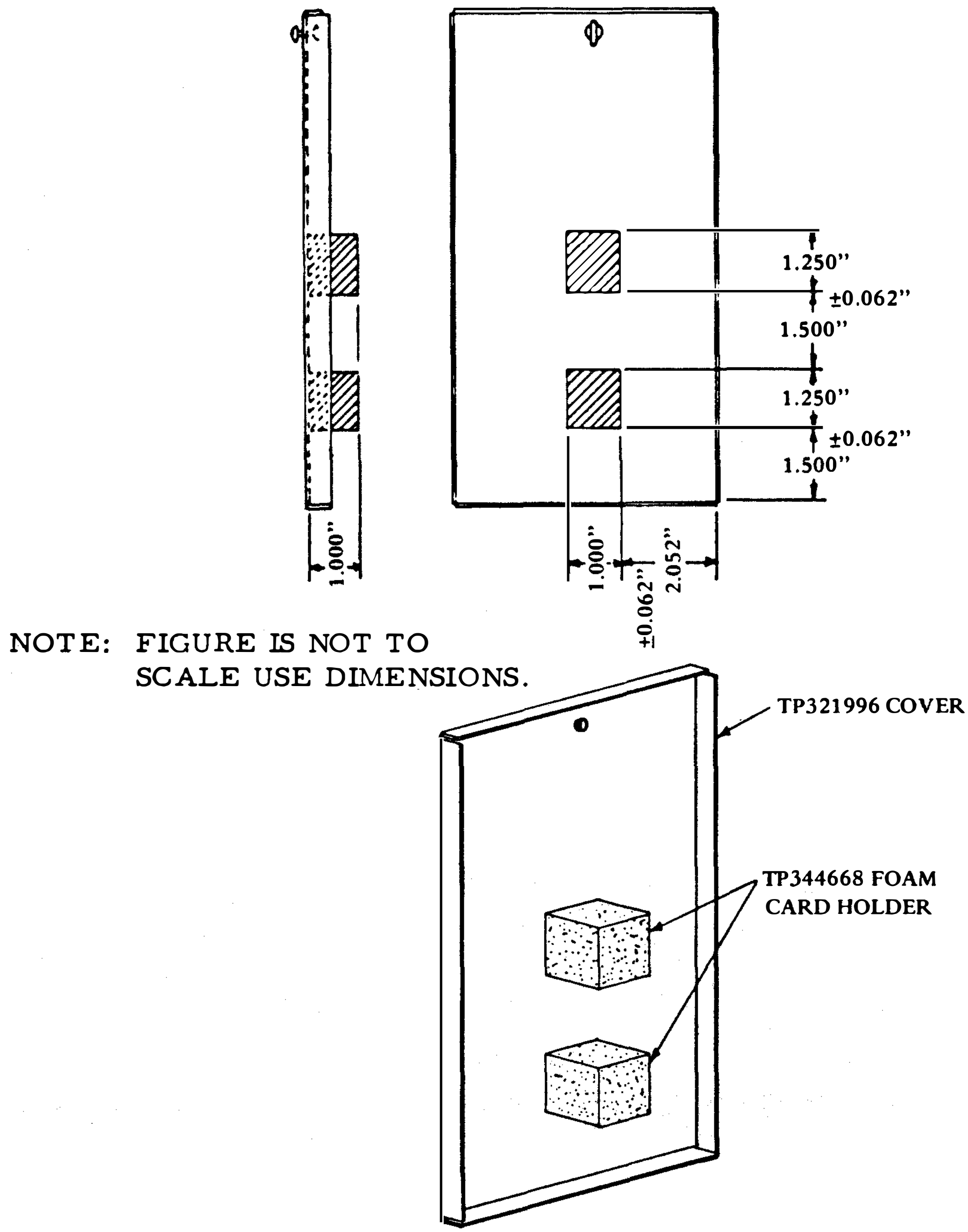
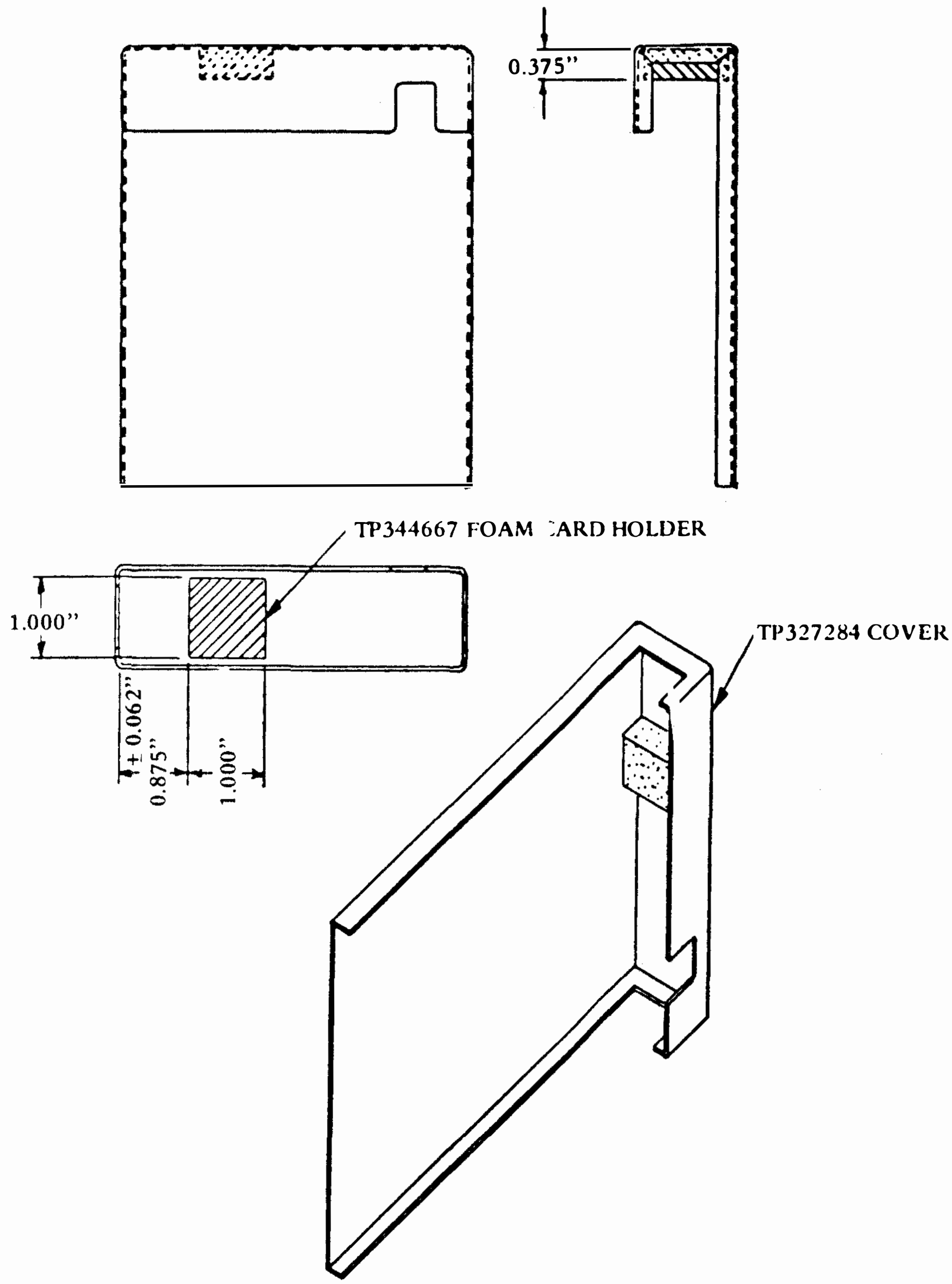


Figure 8-2. Circuit Card Hold-Down Installation for ESA TP326792 (Sheet 1 of 2)



NOTE: FIGURE IS NOT TO SCALE USE DIMENSIONS.

Figure 8-2. Circuit Card Hold-Down Installation for ESA TP326792 (Sheet 2 of 2)

a. Reference Standards Tests. After installation is satisfactorily completed, perform mechanical checks described in paragraph 4-8.a to determine that TD set is properly assembled to specified reference standards.

b. Performance Tests. After reference standards tests have been satisfactorily completed, conduct operational tests described in paragraph 4-8.b.