

28 COMPACT KEYBOARD SEND-RECEIVE
AND RECEIVE-ONLY TELETYPEWRITER SETS
GENERAL DESCRIPTION

CONTENTS	PAGE
1. INTRODUCTION.	1
2. GENERAL DESCRIPTION	1
COMPONENTS	2
A. Keyboard Unit	3
B. Motor Unit	5
C. Typing Unit	6
D. Cover	7
VARIABLE FEATURES	8
A. Motor Stop Time Delay Mechanism	8
3. TECHNICAL DATA.	9
POWER REQUIREMENTS	9
SIGNAL LINE REQUIREMENTS	9
WEIGHTS AND MEASURES	10
OPERATING SPEEDS	10

1. INTRODUCTION

1.01 This section is issued to describe the 28 Compact Keyboard Send-Receive (KSR) and Receive-Only (RO) Teletypewriter Sets. The KSR and RO Sets are designed to provide normal teletypewriter service in mobile and fixed stations where minimum equipment size is a prime requisite. The equipment size has been minimized by utilizing a modified 32 keyboard transmitter and a modified 28 typing unit. All mechanisms have been mounted to require minimum space.

2. GENERAL DESCRIPTION

2.01 The 28 Compact Keyboard Send-Receive (Figure 1) and Receive-Only (Figure 2) Teletypewriter Sets originate and monitor messages in a telegraphic network. The characters or functions which form a message are originated by depressing individual keys on a Keyboard Send-Receive Set. The resulting message is monitored by the local and selected typing units in the network. A Receive-Only Set primarily monitors the telegraphic network to print the characters or interpret the functions.



Figure 1 — 28 Compact Keyboard Send-Receive Set



Figure 2 — 28 Compact Receive-Only Set

2.02 The Keyboard Send-Receive and Receive-Only Sets are similar in appearance but differ in the number of mechanisms. The KSR is equipped with a keyboard transmitter mechanism and a distributor mechanism to originate and distribute coded information on the signal line. The RO has a control hood with power switch, local function keys, and break switch.

2.03 The KSR has a line guide assembly attached to the cover, to hold copy during message transmission. As the end of a printed line is approached, an indicator lamp on the cover is illuminated. The end-of-line indicator lamp informs the operator to prepare for carriage return and line feed functions. The companion lamp on the RO Set indicates power on.

2.04 All sets are equipped with a 3-speed gear shift assembly. The Baud (speed) selector is located to the left of the keyboard or control hood. The Baud can be changed with the motor unit in the idle or running condition. Sets equipped with 50 cycle motor units operate at Bauds of 45.5, 50.0, and 74.2 bits per second; sets equipped with 60 cycle motor units operate at Bauds of 45.5, 50.0, and 75.0 bits per second. The equivalent words per minute for each Baud, assuming six characters per word, are given in Table 3.

2.05 Both the signal line and power line cords are attached to terminal blocks in the rear of the set. For the KSR Set, the signal line is wired in series to the distributor, keyboard transmitter, typing unit, and back to the line. For the RO Set, the signal line is wired to the typing unit, break switch, and back to the line. In all cases the signal line provides current for energizing the typing unit selector magnets only. All other electrical components, i.e., distributor magnet, reset solenoid, motor unit, copy lights, etc., derive their power from the local ac line.

Note: The selector magnets on the typing unit are normally wired in parallel for 60 milliampere signal line current. By wiring the selector magnets in series, the typing unit can be adapted to a 20 milliampere signal line current.

Ac power is distributed to the electrical components within the set by means of terminal blocks, cables, and connectors. No separate electrical service unit is required within the set.

2.06 The intelligence for the 28 Compact Teletypewriter Sets is transmitted and received serially by means of a five level, binary permutation code. In addition to the five code bits, there is a start bit and a stop bit, always spacing and marking, respectively. The start bit precedes the code bits to initiate operation of the typing unit, and a stop bit follows the code bits to secure the typing unit. Variations of the KSR generate 7.00 and 7.42 units per character. The first bit (1 unit) is always spacing; the next five bits (5 units total) are either marking or spacing code levels, and the final bit (1 or 1.42 units) is always marking. The signal line remains energized by a remote dc power source during marking intervals, and becomes de-energized by local electrical contacts during spacing intervals.

COMPONENTS

2.07 The Keyboard Send-Receive Set consists of a keyboard unit, motor unit, typing unit, and cover. See Figure 3. The keyboard unit consists of the base, keyboard transmitter, distributor, and gear shift assembly; it provides mounting facilities for the motor unit, typing unit, and cover. The Receive-Only Set consists of a base unit, motor unit, typing unit, and cover. See Figure 4. The base unit has a gear shift assembly and provides mounting facilities for the motor unit, typing unit, and cover.

50-Cycle Synchronous Motor	
Input Voltage	115 VAC; Single Phase
Input Current - Starting	9 Amps
Running	2.4 Amps
Power Output	1/20 HP @ 3000 RPM
Power Consumption	107 Watts
Heat Dissipation	70 Watts
Protection	Thermal Cutout
60-Cycle Synchronous Motor	
Input Voltage	115 VAC; Single Phase
Input Current - Starting	9 Amps
Running	1.9 Amps
Power Output	1/20 HP @ 3600 RPM
Power Consumption	65 Watts
Heat Dissipation	50 Watts
Protection	Thermal Cutout

Table 1 — Motor Unit Operating Characteristics

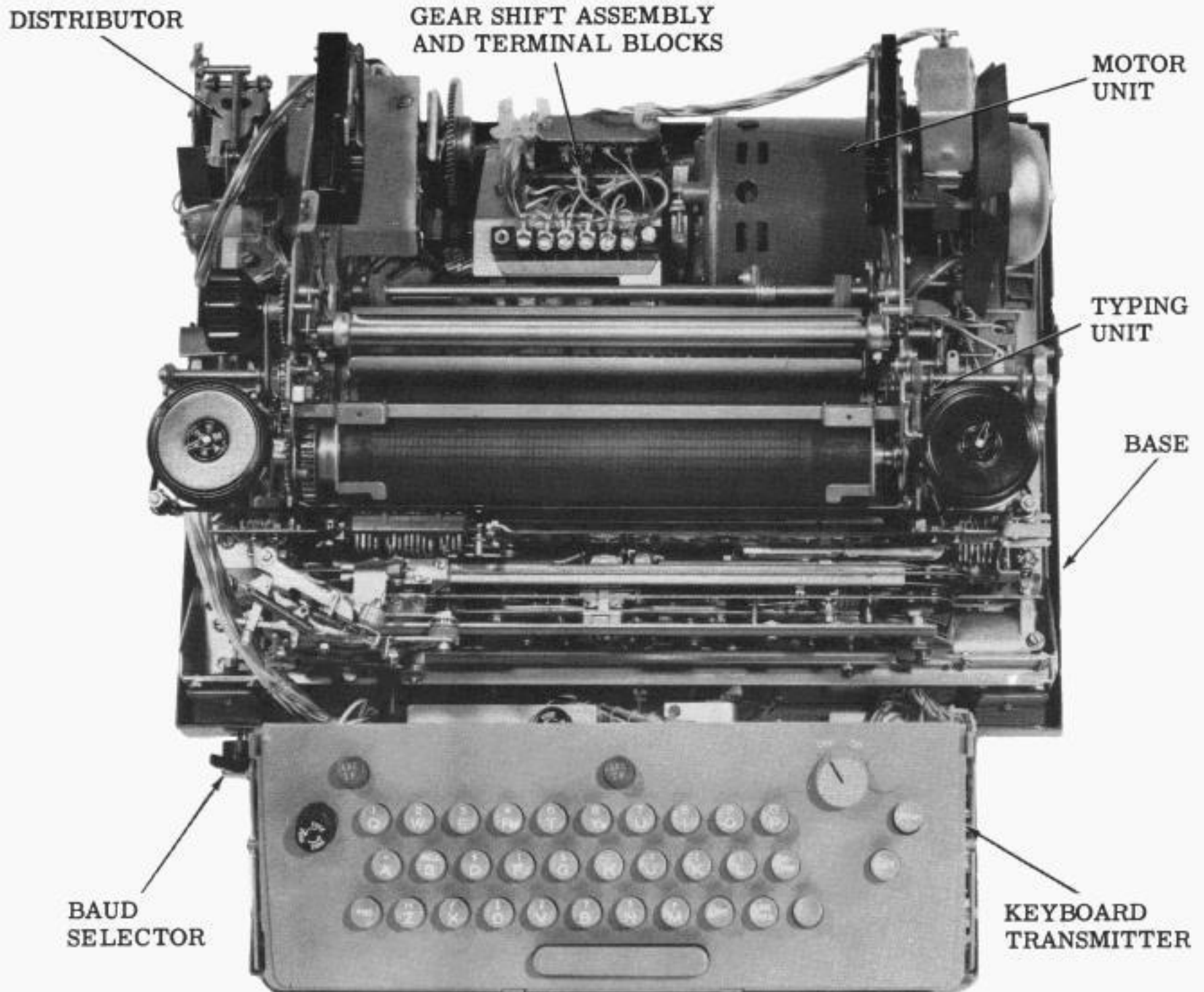


Figure 3 — Keyboard Send-Receive Set (Cover Removed)

	Weight (Pounds)	Depth (Inches)	Width (Inches)	Height (Inches)
RO	50	12	16-1/2	10
KSR	59	16	16-1/2	10

Table 2 — Weights and Measures

2.08 The transfer of mechanical and electrical energy between components in the KSR set is shown schematically in Figure 11. The operator inputs of Baud, power, and character selection are shown on the left side. The machine

outputs consisting of a printed character or function and signal line interruptions are shown on the right side. Functional paths which handle the transfer of code energy to the signal line are shown as heavy, solid or broken lines. Other paths which lend electrical and mechanical support to the operation of the set are shown as narrow, solid or broken lines.

A. Keyboard Unit

2.09 The keyboard unit (Figure 5) consists of the base, keyboard transmitter, distributor, and gear shift assembly. With the exception of local function bails, all functional connections between the keyboard transmitter and the balance

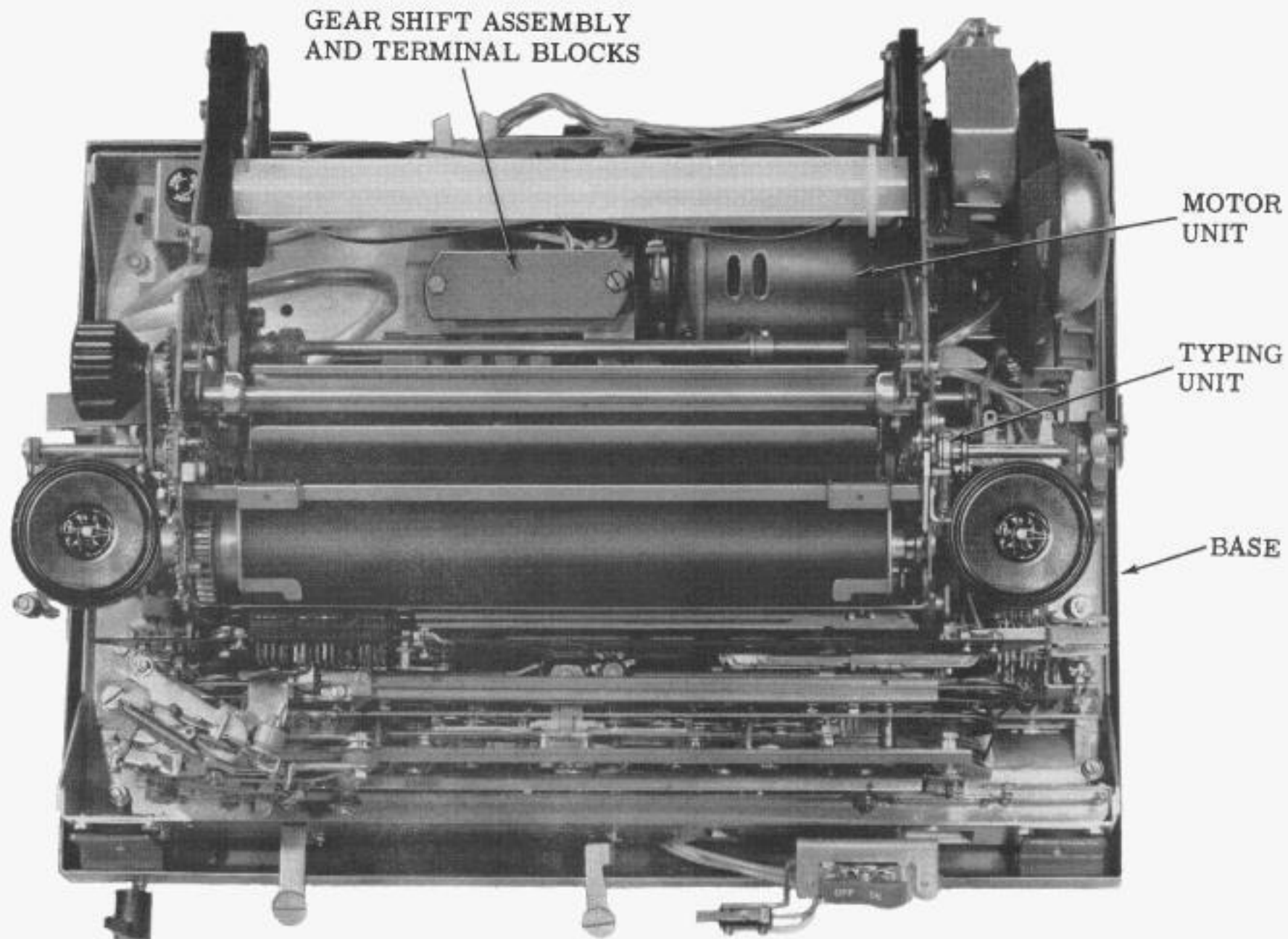


Figure 4 — Receive-Only Set (Cover Removed)

Unit Code	Baud (Bits per Second)	Words Per Minute
7.00	45.5, 50.0, & 75.0	65.0, 71.4, & 107
7.42	45.5, 50.0, & 75.0	61.3, 67.3, & 101
7.42	45.5, 50.0, & 74.2	61.3, 67.3, & 100

Table 3 — Operating Speeds

of the set are made through an electrical cable assembly. The Baud selector is mounted on the base and is connected to the gear shift assembly by a mechanical linkage. When tripped, the distributor sequentially applies current to the wire contacts (marking or spacing) at the keyboard transmitter.

2.10 The wire contacts at the keyboard transmitter are electrically connected to their respective distributor contacts through parallel wires. When the wire contacts are positioned by depressing a keytop, the distributor magnet wire contact is also closed to energize the distributor clutch magnet. When the distributor clutch magnet is energized, the distributor clutch is tripped to engage its cam sleeve with the distributor main shaft. The rotating cam sleeve sequentially operates the code level contacts to extend signal line current to existing marking or spacing wire contacts at the keyboard transmitter. Additional cams on the distributor sleeve operate (1), a timing contact which opens the clutch magnet circuit and (2), a reset contact which operates a solenoid to reset the keyboard transmitter.

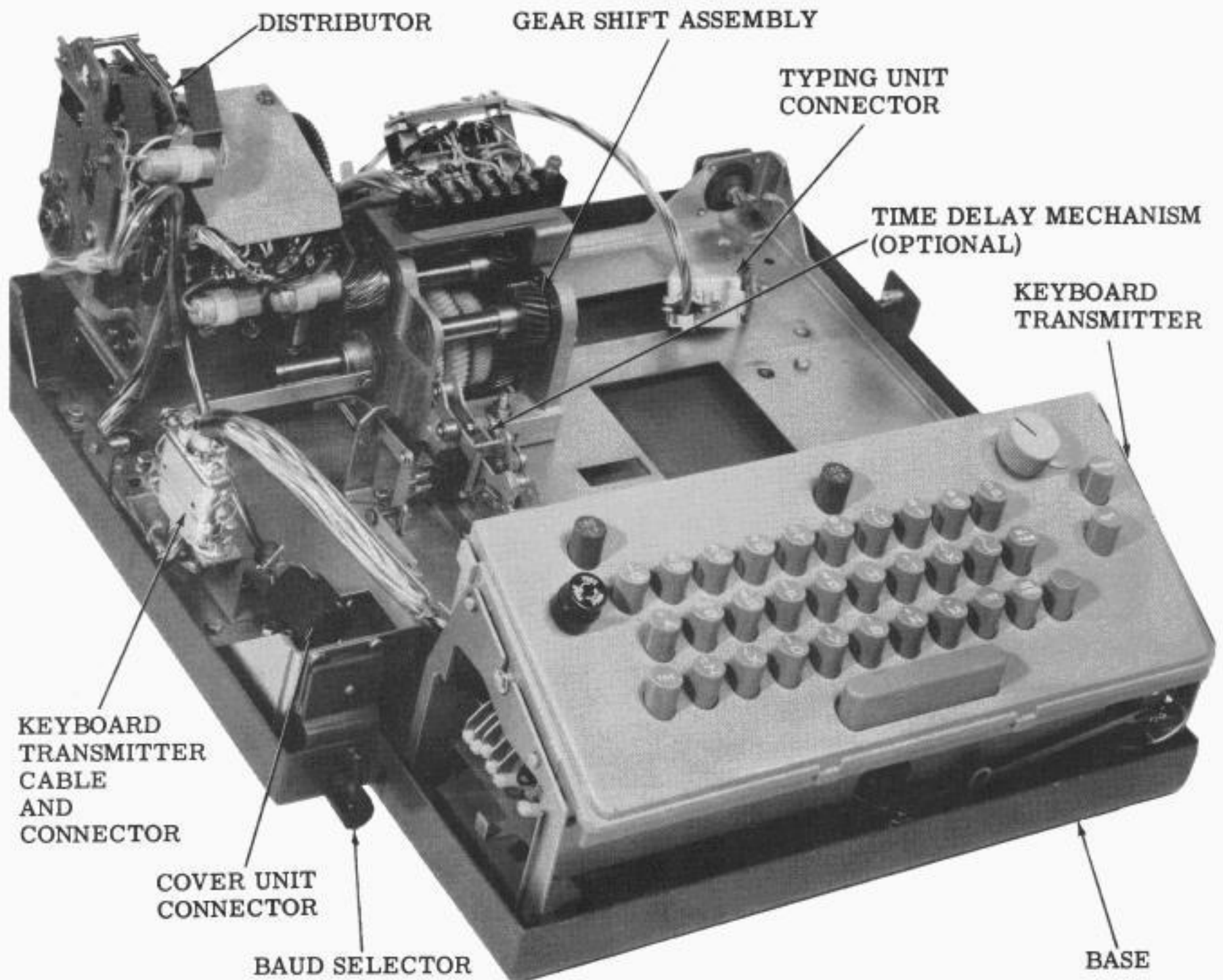


Figure 5 — Keyboard Unit with Time Delay Mechanism

2.11 The operating speed of the set is controlled by a sliding key which is positioned through the gear shift linkage and selector. When operated, the key engages one of three speed gears with the drive shaft of the gear shift assembly.

2.12 Other features on the keyboard unit include a margin indicator switch, repeat switch, break contact, and, as an option, a motor stop time delay mechanism. The local line feed and local carriage return mechanisms link the keyboard unit with the typing unit. The power and signal line current are distributed from the terminal blocks which are located above the gear shift assembly.

B. Motor Unit

2.13 Mechanical motion for driving the distributor and typing unit is provided by a 1/20 horsepower, two pole, single phase, synchronous motor unit. See Figure 6. The motor unit operates from a $115 \pm 10\%$ volt ac source. Both $50 \pm 0.75\%$ cycle, 3000 rpm or $60 \pm 0.75\%$ cycle, 3600 rpm motors are available.

2.14 The motor rests in the cradle of a mounting bracket and is held in place by a strap at each end. The cradle is isolated from the motor by resilient mounts to reduce vibration. A small fan is mounted at each end of the rotor within the motor housing, and a combination handwheel and fan is mounted on the rear of

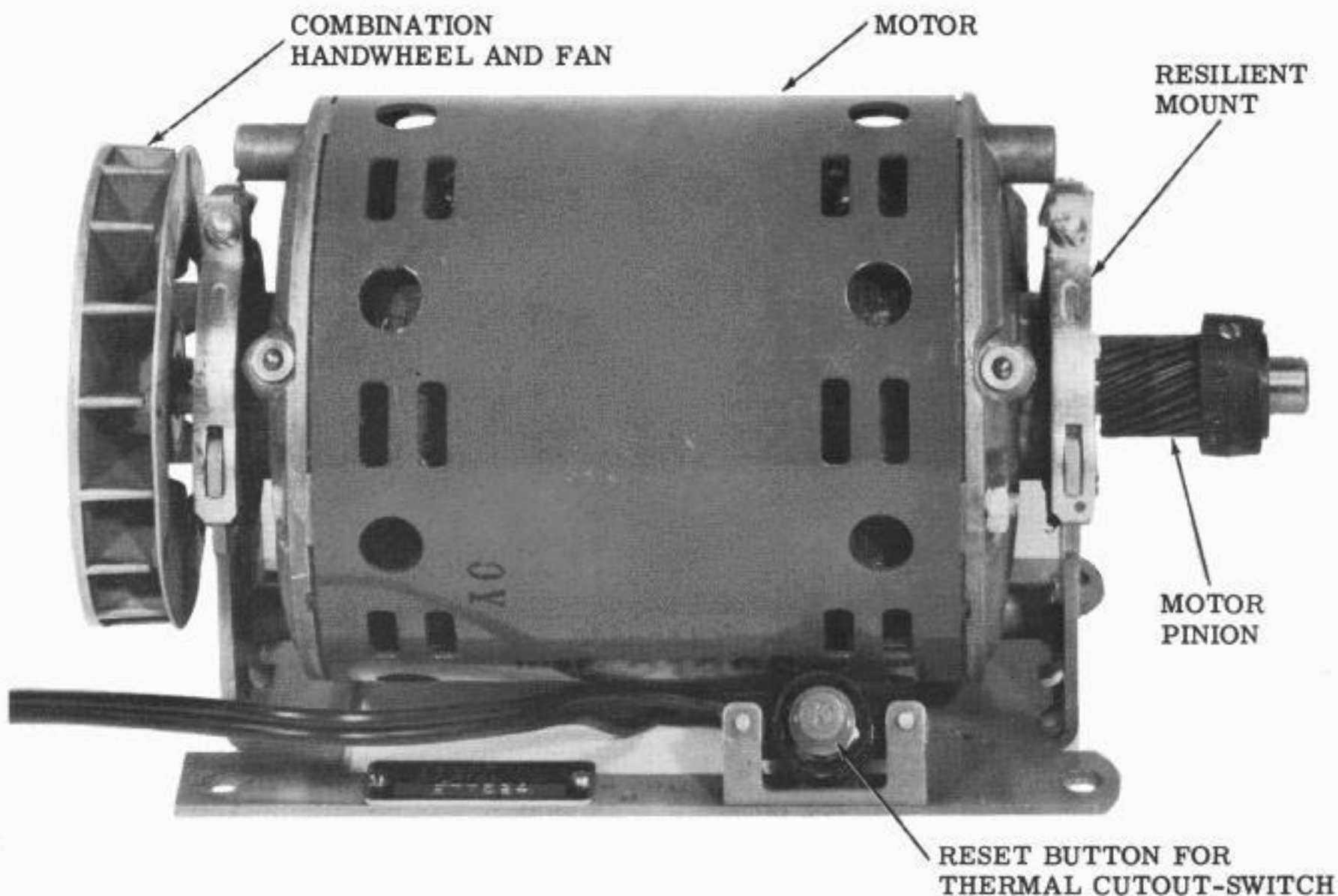


Figure 6 — Motor Unit (Rear View)

the shaft. A start relay and start capacitor are mounted in front of the motor. A thermal cutout switch is located in the rear of the motor. The thermal cutout switch provides protection against overload.

C. Typing Unit

2.15 Signal line current and ac power are admitted to the typing unit (Figures 7 and 8) through its connector. The signal line current controls the selector magnets. Ac power operates the signal bell, mounted on the typing unit, when the signal bell function closes a set of local contacts.

2.16 The typing unit will accommodate a five inch diameter roll of paper. The printed copy is friction fed through the platen.

2.17 A single character or function is processed by the typing unit during two revolutions of the main shaft. The first revolution is used to select the codebars, and the

second is used to operate the function or printing and spacing mechanisms. After the first phase of the cycle is complete, ie, codebar selection, a second coded character may be introduced to the otherwise idle selector. Therefore, two coded combinations are normally processed by the typing unit at the same time. At the output, a function or printing and spacing operation is performed as a subsequent coded character is received.

2.18 The typing unit is composed of major mechanisms which are interconnected mechanically to perform either a function or type a character. The major mechanisms are the selector mechanism, code bar mechanism, function mechanism, and printing and spacing mechanism. The main shaft accepts rotational motion and, through a series of cams, clutches, and gears, distributes the motion to operate the typing unit mechanisms. The motion is extended to each mechanism as the typing unit, once

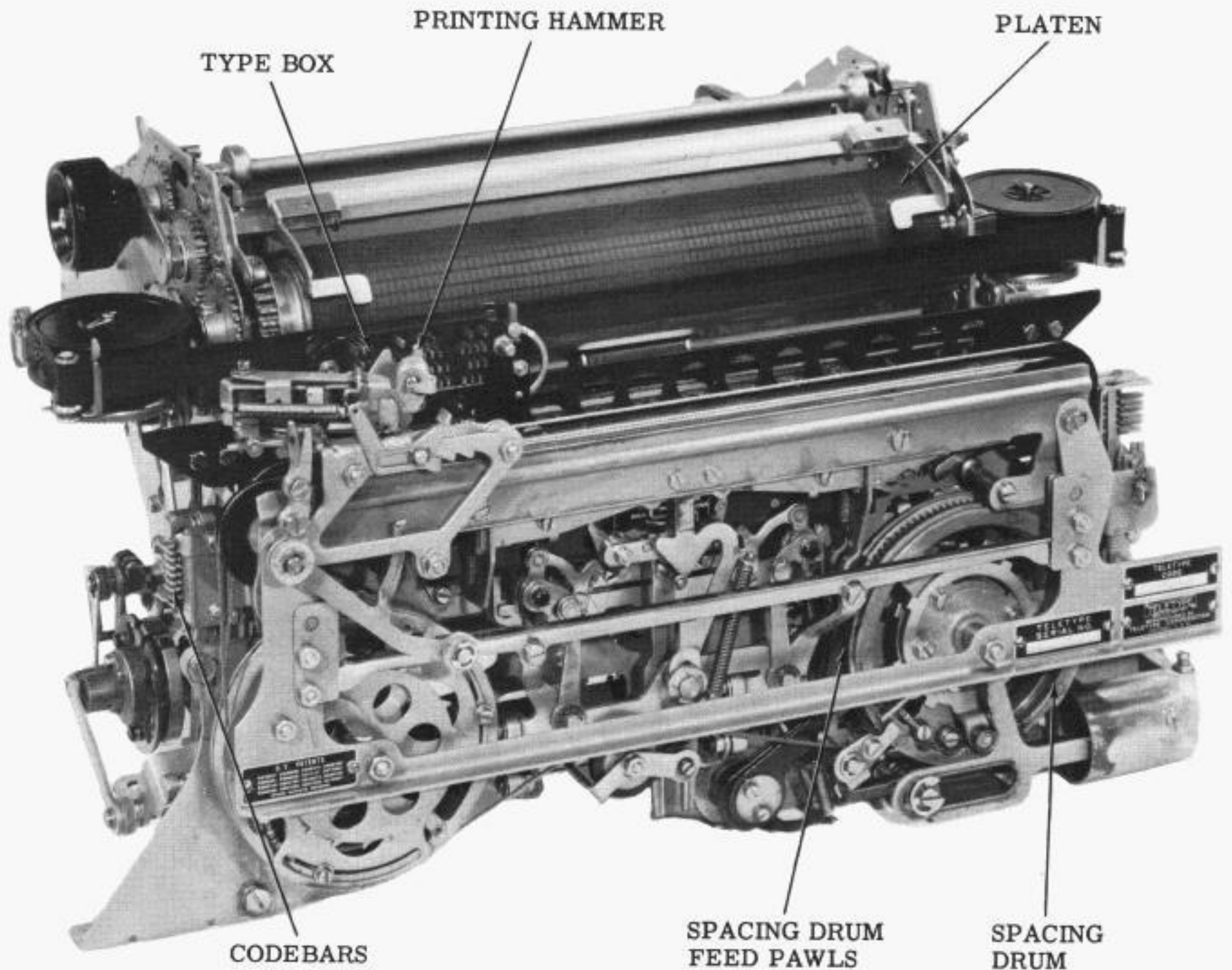


Figure 7 - Typing Unit (Front View)

tripped, proceeds through its operating cycle. A special cam is provided on the main shaft to operate an externally mounted mechanism which records the number of idle revolutions, i.e., when neither a function nor a character is being processed, to close a set of contacts. This mechanism is part of the motor stop time delay mechanism which is available as an optional feature.

D. Cover

2.19 The cover provides a protective enclosure for the 28 Compact Teletypewriter Sets. Refer to Figures 9 and 10. The

cover is positioned on the base by three retainers and is locked to the base by two spring loaded latches. The latches are attached to the inside surfaces of the cover and are accessible through the dome.

2.20 The dome is released by depressing the plungers on the left and right sides. When raised, the dome is supported in an open position by the stop arm.

2.21 Power circuits are extended to the cover through a six point connector. A step down transformer is attached to the inside surface of the cover. Line voltage is reduced for the copyrights in the cover.

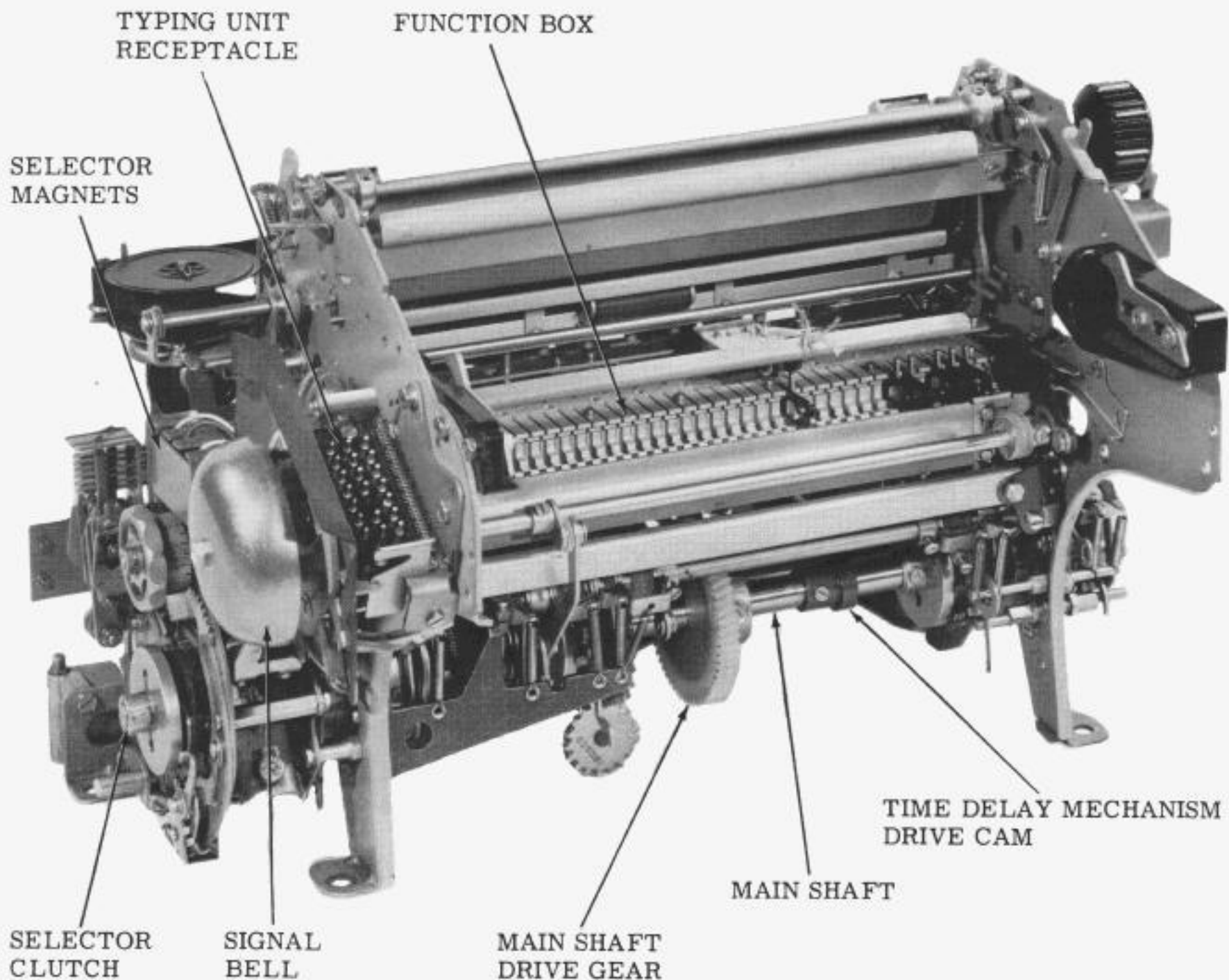


Figure 8 - Typing Unit (Rear View)

2.22 The power indicator lamp for the Receive Only Set is located on the cover unit. The lamp is illuminated when the power switch is turned on.

2.23 The margin indicator lamp for the Keyboard Send-Receive Set is illuminated when the switch on the keyboard unit is tripped by the typing unit. The margin indicator contains a neon bulb which is illuminated from line voltage. The lamp circuit is routed through the six point connector.

2.24 The window at the top of the cover permits visual observation of the printed copy. A copy holder and line guide is provided on Keyboard Send-Receive Sets.

VARIABLE FEATURES

A. Motor Stop Time Delay Mechanism

2.25 A motor stop time delay mechanism is available as an optional feature and is used in conjunction with a separate electrical service unit. The motor stop time delay mechanism consists of a time delay mechanism and a stop magnet assembly. The stop magnet assembly, located in a separate service unit, requires an electrical pulse to open the power circuit to the set. The pulse originates from a time delay mechanism on the keyboard or base unit. Upon receipt of a pulse, the motor is stopped and the signal line is shunted.

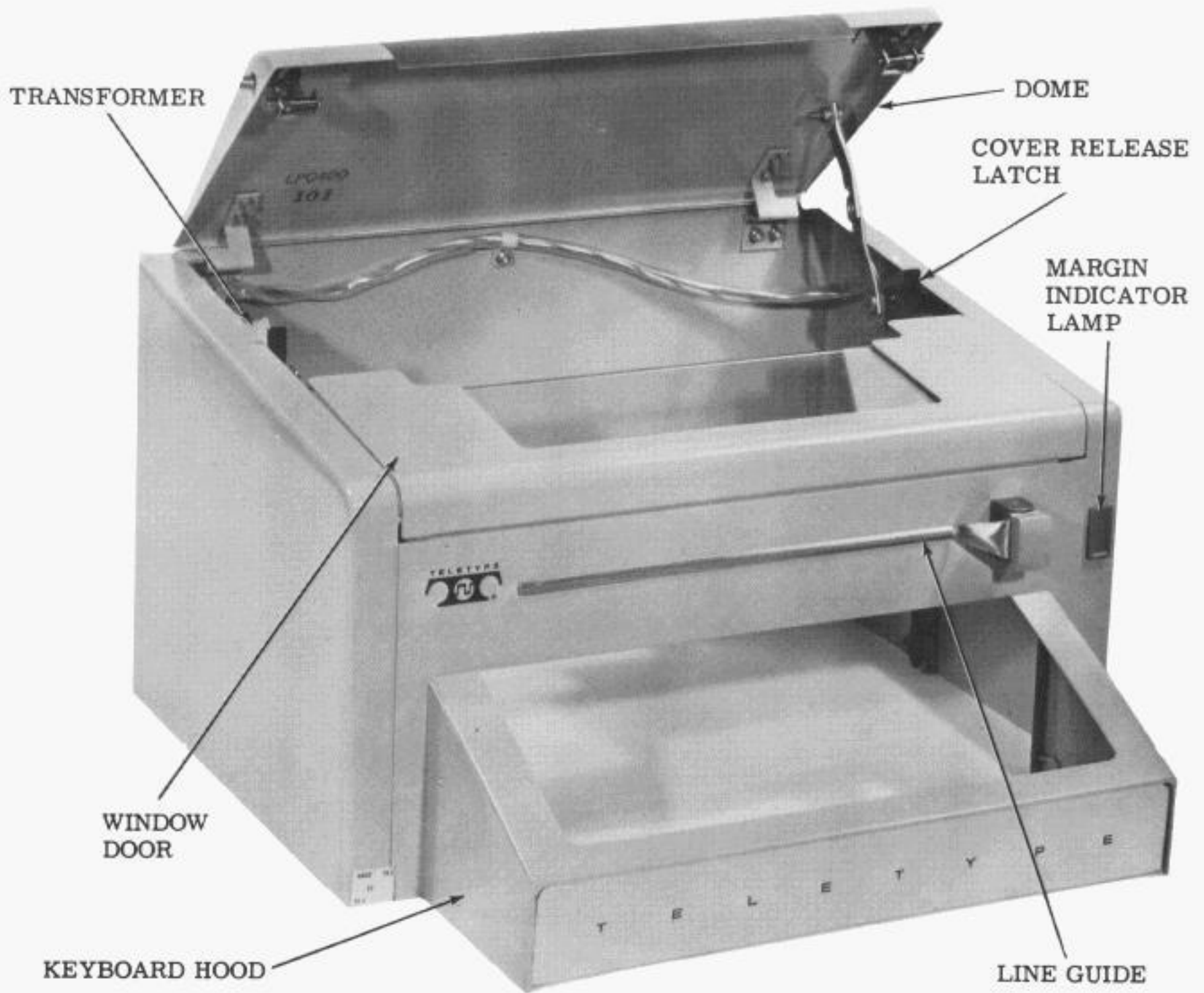


Figure 9 - Cover Unit (KSR Set)

2.26 The pulse occurs after the signal line has remained continuously energized from 756 to 1512 revolutions of the typing unit main shaft. A cam on the typing unit main shaft, drives a ratchet mechanism on the base. The motor is restored to its running condition when the signal line current is interrupted by a start pulse or line break.

3. TECHNICAL DATA

3.01 The data in this part is summarized for convenience.

POWER REQUIREMENTS

3.02 Variations of the 28 Compact Teletypewriter Set operate from a $115 \pm 10\%$ volt ac source with frequencies of 50 or 60 cycles per second. Synchronous motor units are available for frequencies; their characteristics are listed in Table 1.

SIGNAL LINE REQUIREMENTS

3.03 The selector magnets on the typing unit will operate from either a 20 ma or 60 ma signal line current. The selector magnets are

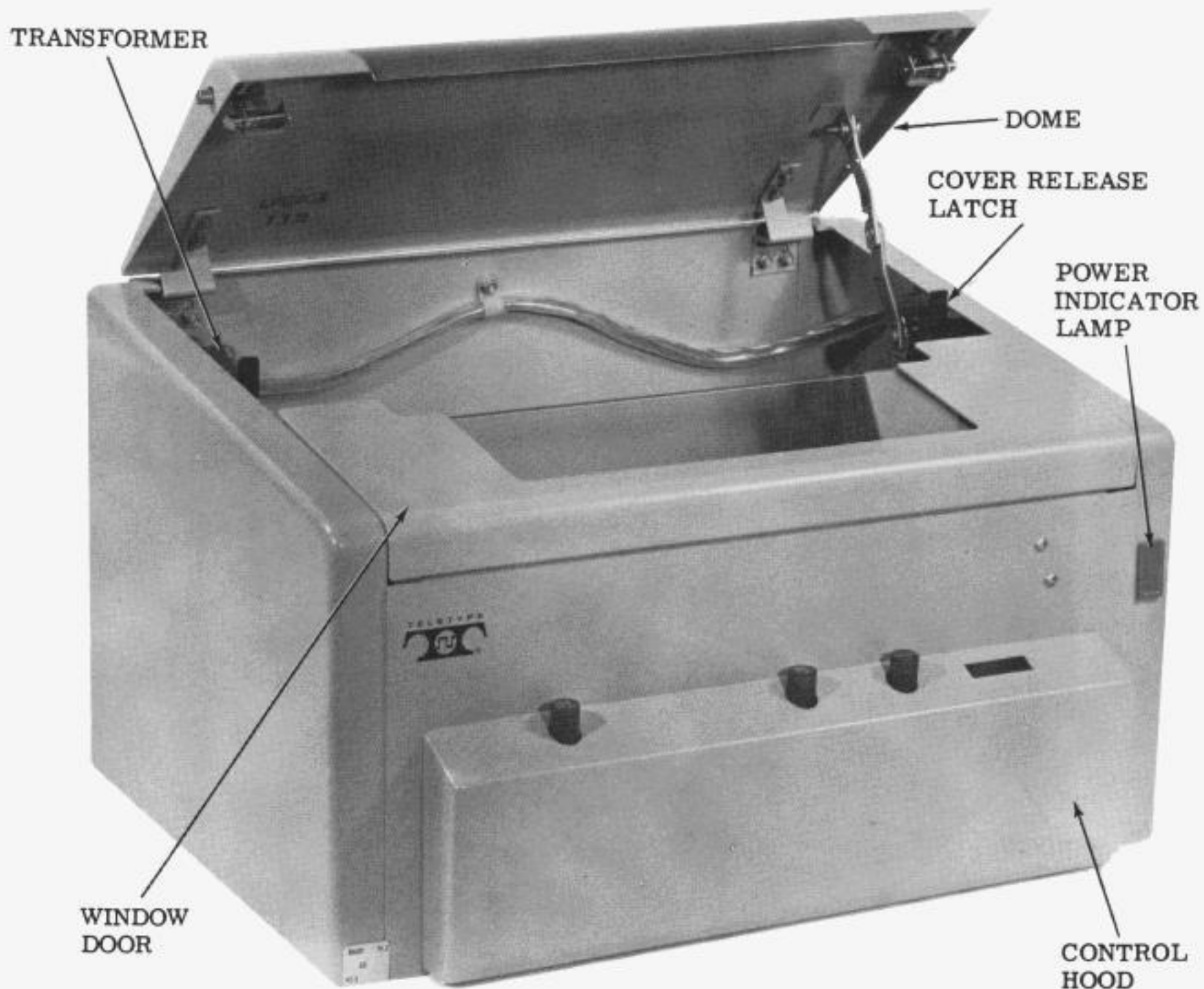


Figure 10 — Cover Unit (RO Set)

normally wired in parallel for 60 ma operation. The set may be connected directly to the signal line which carry 60 ma neutral current. However, if the signal loop carries 20 ma, the selector magnets on the typing unit must be wired in series.

WEIGHTS AND MEASURES

3.04 The weights and measures for the RO and KSR Sets are given in Table 2.

OPERATING SPEEDS

3.05 The 28 Compact Teletypewriter Set utilizes the five level Baudot telegraphic code. Sets are currently available to generate and receive the Bauds (bits per second) at the unit codes listed in Table 3. The corresponding words per minute (WPM) are also listed in the table.

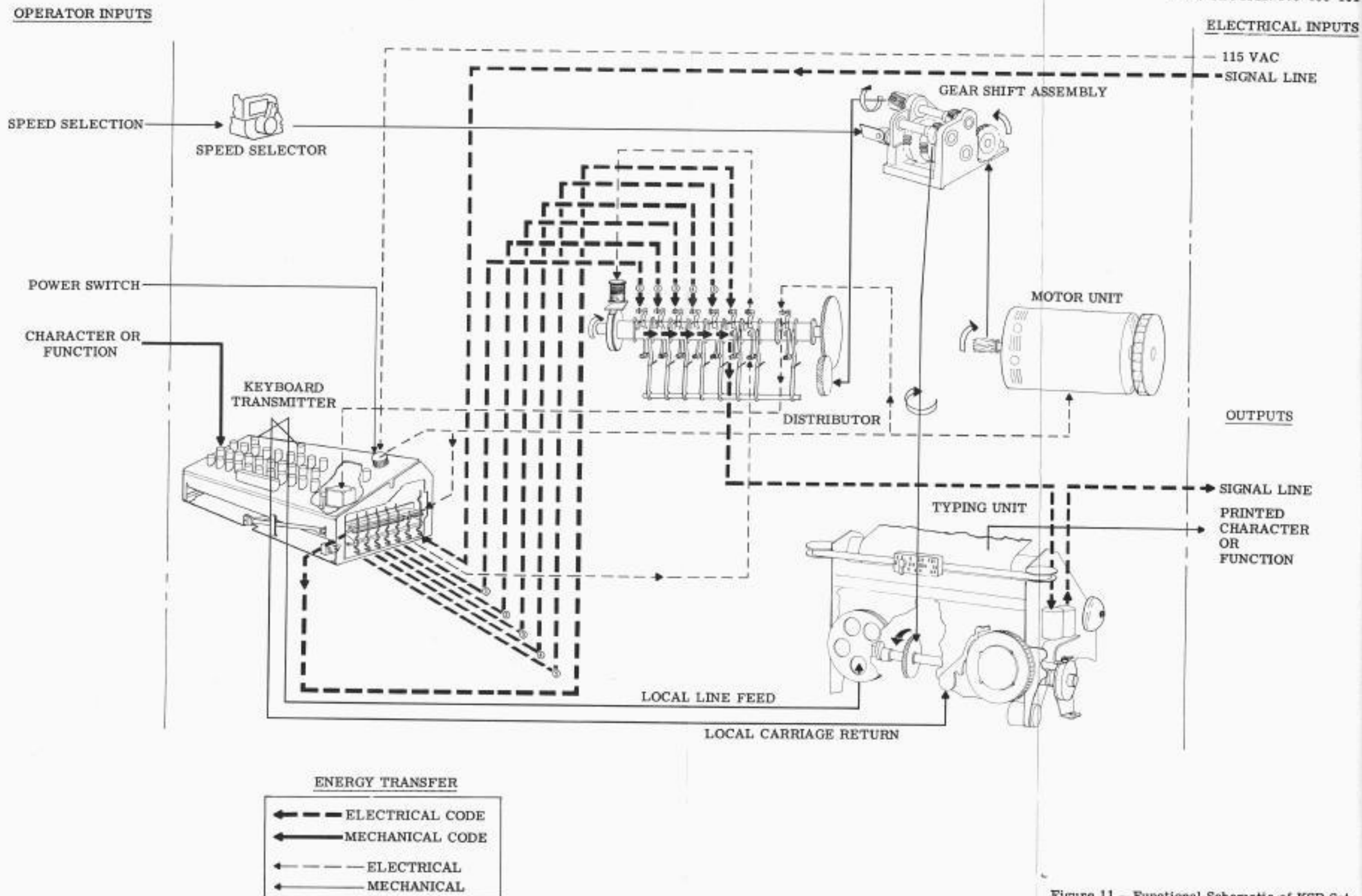


Figure 11 - Functional Schematic of KSR Set