PART V

FLEXOWRITER MODEL FTM

DESCRIPTION

PURPOSE

The Flexowriter Model FTM was designed to speed inter-office communications. It has been expressly adapted to meet the demand for an electric typing machine which can rapidly transmit messages to and receive messages from another remote typing machine. Also, the Model FTM will punch and read a seven-eighth inch wide paper tape to provide for automatic typing.

COMBINATIONS

The Flexowriter Model FTM can be equipped with or without tape punching and reading facilities. Due to the fact that the code selector transmits and the code translator receives, tape punching and reading facilities are optional.

The chart in Figure 1-1 shows the combinations that may be provided according to application of a Model FTM.

The Flexowriter FTM** (shown in Figure 1-1) which provides for typing, transmitting, punching tape, reading tape, and receiving, includes the following in one unit:

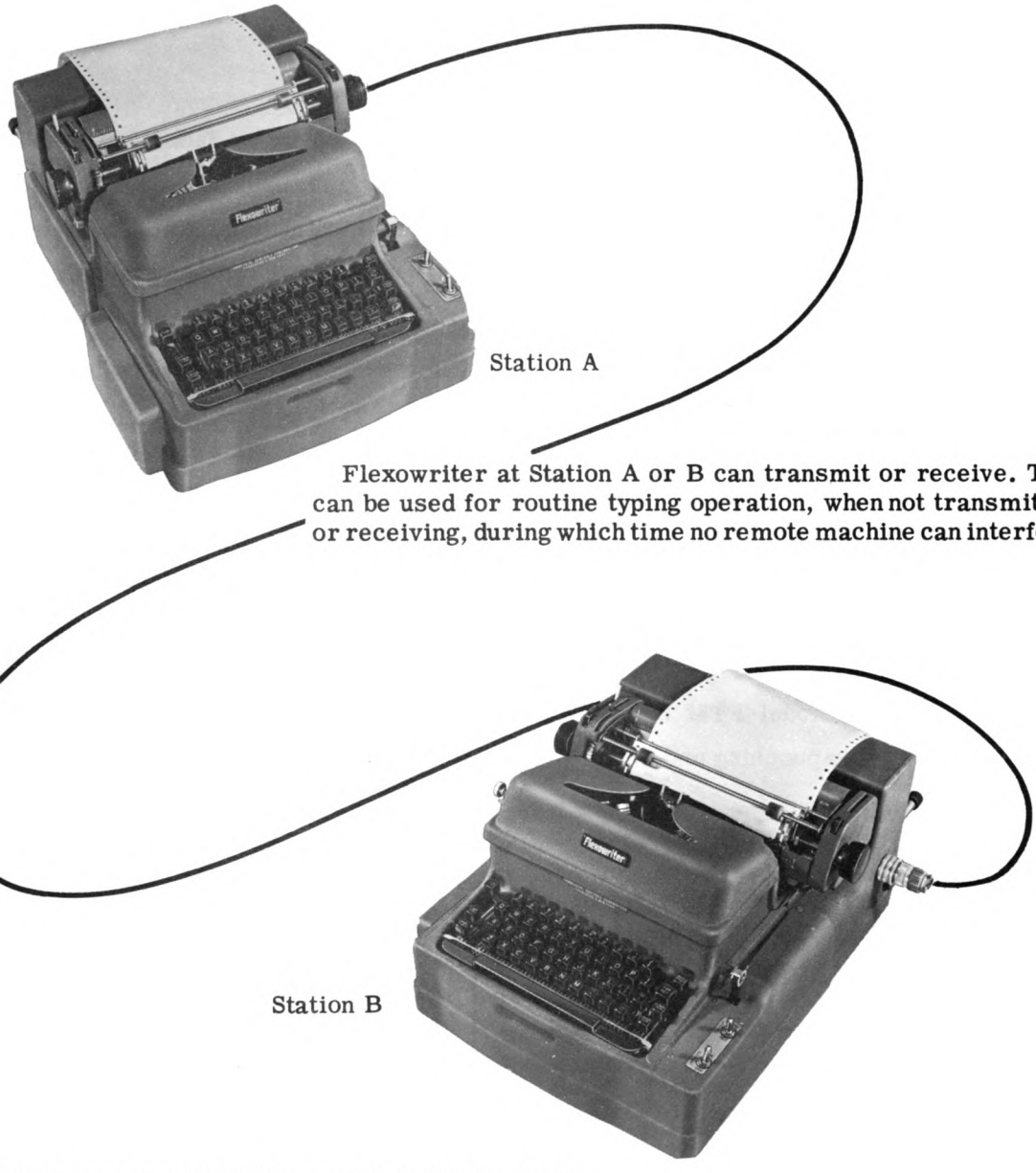
Writing Machine — This is a heavy-duty electric typing machine with a standard keyboard. It provides for manual or automatic typing.

Code Selector — This unit is operated in response to depressing a keylever. The resultant

Combination	Equipped With					Capable Of				
	Writing Machine	Code Selector	Tape Punch	Tape Reader	Code Translator	Typing	Transmitting	Punching Tape	Reading Tape	Receiving
Flexowriter FTM Transmitter	X	X				X	X			
Flexowriter FTM Receiver	X				X	X				X
Flexowriter FTM Transmitter-Receiver	X	X			X	X	X			X
Flexowriter FTM Recorder-Reproducer Transmitter-Receiver **	X	X	X	X	X	X	X	X	X	X
Flexowriter FTM Recorder-Transmitter	X	X	X			X	X	X		
Flexowriter FTM Reproducer-Receiver	X			X	X	X			X	X

Figure 1-1 Combination Chart

Description



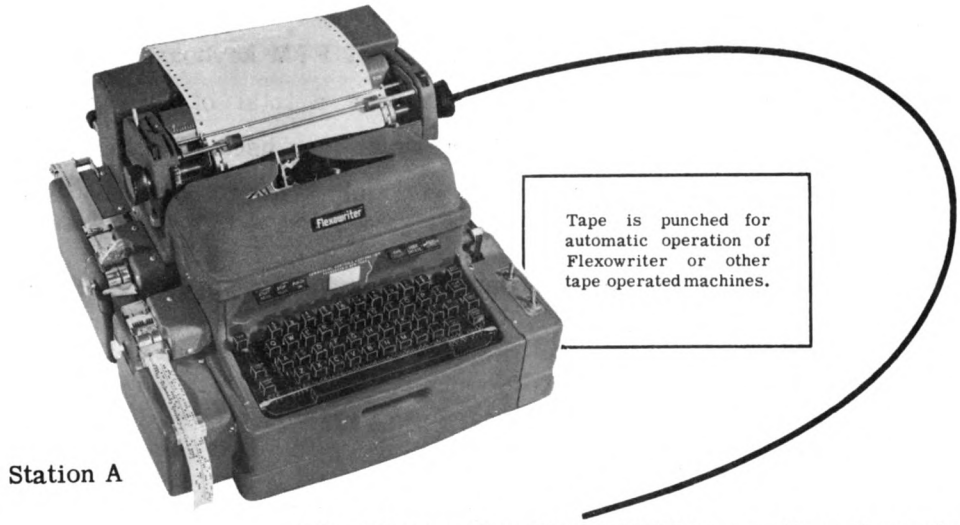
Flexowriter at Station A or B can transmit or receive. They can be used for routine typing operation, when not transmitting or receiving, during which time no remote machine can interfere.

Operator at Station A places the line switch in the transmitting (send) position.

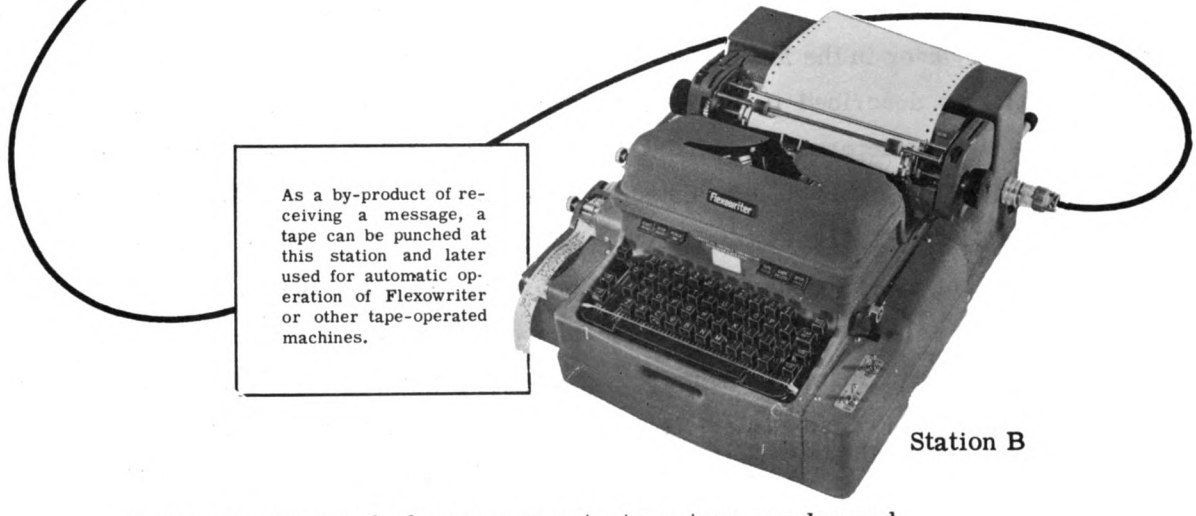
This automatically signals Flexowriter at Station B. If B is not in use and the line switch is in receive position an indicating light on both machines will turn on indicating a connection. However, if Station B is in use, (line switch not in receive position) a buzzer will sound in both machines, indicating no connection.

When Stations A & B are connected, Station A operator types and as a by-product of typing message, impulses are received at Station B which actuate type bars and types received message.

Figure 1-2 Model FTM Transmitter-Receiver



The Flexowriter Model FTM transmits and receives in the same manner as described in Figure 1-2. As a by-product ot typing and transmitting a message, data is recorded in tape at Station A. If required, duplicate tapes can be punched at Station B as by-product of receiving message.



A previously punched tape can actuate a tape reader and transmit a message as a by-product of automatic typing.

(The Flexowriter can be used as a Flexowriter Model FL affording all of the features of punching, reading and duplicating tape and typing without transmitting.)

Figure 1-3 Model FTM Recorder-Reproducer Transmitter-Receiver

selector operation selects a code for that particular keylever position and transmits that code over a cable to actuate another Model FTM automatically and/or it (the code) can be stored in a tape for future use.

Tape Punch – The punch is also operated by the code selector and it perforates the proper code holes in a tape corresponding to the code selected.

Tape Reader – This unit reads the codes in the tape to automatically operate the writing machine through the code translator, and operate the tape punch through the operation of the code selector.

Code Translator – The translator is actuated through the tape reader or from a remote Model FTM to automatically operate the writing machine.

BASIC FUNCTIONAL PRINCIPLES

The operation of a keylever in the Model FTM has the same results as described in Part II, Section 1, except the code selectors in the Model FTM may be connected by cable to a remote Flexowriter. Also, the Model FTM code translator may be actuated by impulses received from another Flexowriter code selector.

The example installation in Figure 1-2 shows two Flexowriter Model FTM Transmitter-Receivers connected by a cable. These two machines are identical. The Flexowriter at Station A or B can transmit or receive. They can be used for routine typing operation (line switch in local position), when not transmitting or receiving.

The other example installation in Figure 1-3 shows two Flexowriter Model FTM Recorder-Reproducer Transmitter-Receivers connected by cable. These two machines are identical.

KEYBOARD

The Model FTM keyboard is shown in Figure 1-4. It uses a total of 51 keylever positions, 43 of which are used for character operation. The remaining eight positions are used for functional operation including; back space, carriage return, tab, space, upper case and lower case.

CODE SYSTEM

The Model FTM uses a six unit binary code which provides for 64 possible code combinations. As shown in the keyboard chart (Figure 1-4) and the coded tape (Figure 1-5), 43 of these code combinations are used for characters. Six more combinations are used for functional operations which were described as; carriage return, back space, space, tabulation, lower case shift and upper case shift. The code combination 1-2-3-4-5-6 is used for a code delete operation and the 1-2-4-5-6 is used for a stop code. A seven-eighth inch wide paper tape is used and the code holes are numbered 612345 facing the leading edge of the tape. (See Figure 1-5.) The feed hole is between the 2 and 3 holes and is .394 inch from the right edge and its center line is even with the center line of the code holes.

CONTROL PANEL

The Model FTM switches are the same as described in Part II, Section I, except for the following: (See Figure 1-4.)

Stop Code – The operation of this switch will

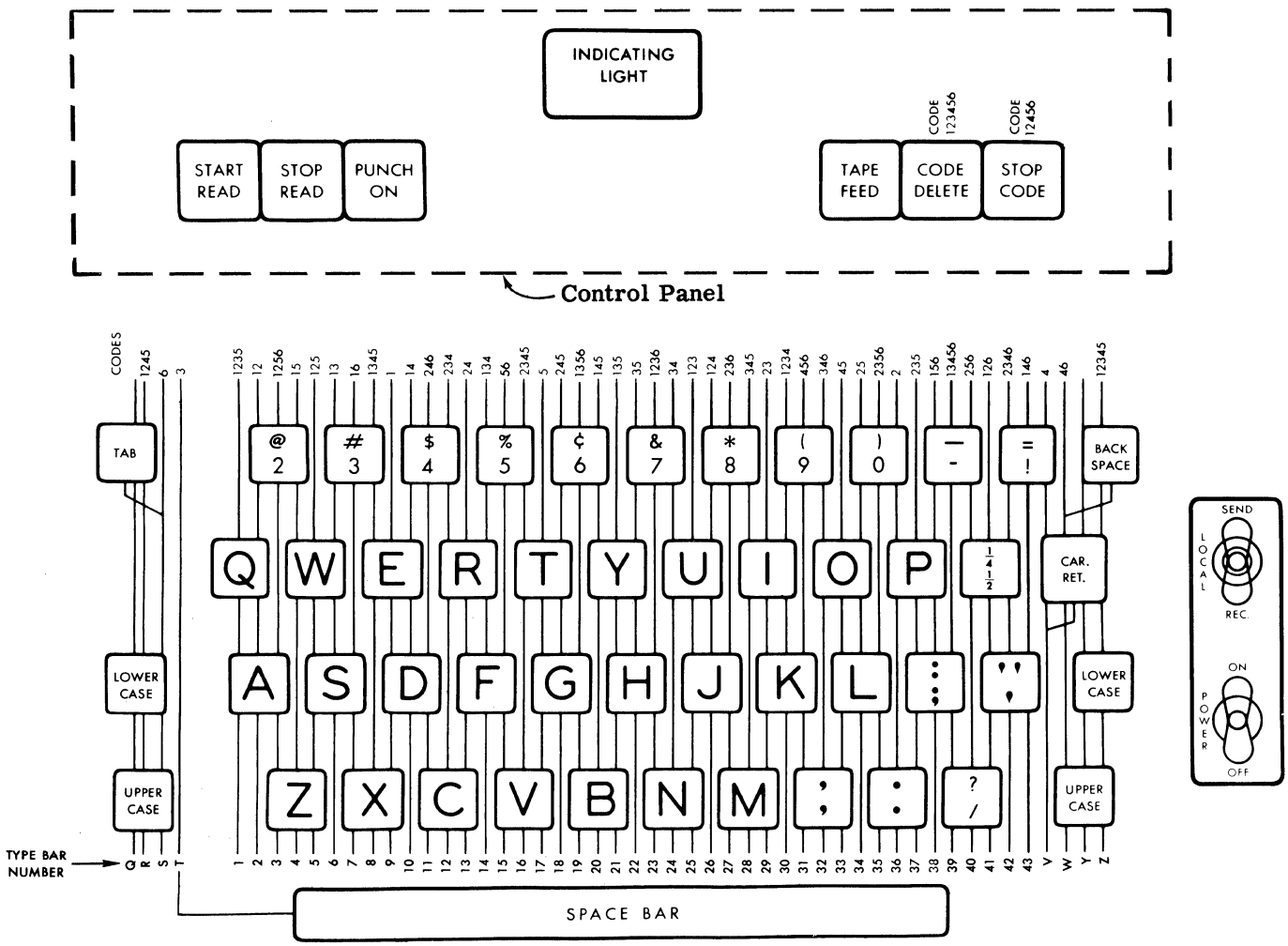


Figure 1-4 Model FTM Keyboard

cause a 1-2-4-5-6 code to be perforated in the tape.

Indicating Light — When two Model FTM's are connected, one in the "send" position and one in the "receive" position, the indicating light will be on.

Note: A buzzer is provided and wired to operate when one machine is trying to send a message but the local machine is not in condition to receive. The buzzer in the sending machine also operates under these conditions.

Line Switch — The line switch located on the right side of the machine has three positions, namely; Local, Send and Receive. (This switch is not used on a Model FTM Transmitter or Receiver.)

Local Position — When the line switch is in the local position, the machine may be used as a Flexowriter Model FL thus having all the features of punching, reading and duplicating tape and typing without transmitting.

Send Position — When the line switch is in send

Description

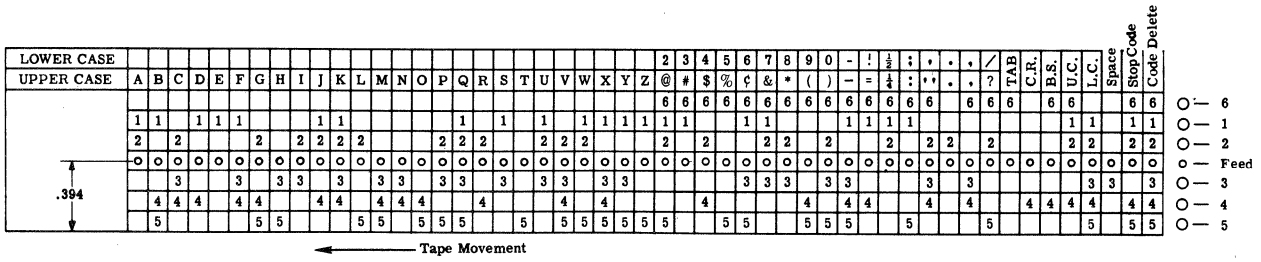


Figure 1-5 Coded Tape

position, the indicating light turns on (the light will remain off and a buzzer will sound in both machines if the receiving machine is not in receive position), and the machine is conditioned to send impulses, originating at the selector, to the receiver. Each keylever operation, then, will send coded impulses to automatically operate the receive machine.

Receive Position — When the line switch is in the receive position, the machine is conditioned to receive impulses from a remote machine to automatically operate the type bars.

Power Switch — This switch is located in front of the line switch and controls the power circuit, including, the motor, rectifier, transformer, etc. (See Part V, Section 3 — Power Circuit.)

The power switch should be in the Off position when the machines are left unattended. Also, the line switch should be left in the receive position. This will allow another Flexowriter to remotely turn on the power, transmit a message and turn the power off again at the end of the message.

SPECIFICATIONS

Power Supply — The Model FTM operates on 115 volt 60 cycle. This supply is used to operate a 35 millihorsepower motor, a step-down transformer and a full wave selinium rectifier. The current rating for the entire machine is 2.3 amps.

Signal Power -- The output of the rectifier supplies approximately 40 volts DC rated at 2 amps to operate the various relays and magnet coils in the circuit.

Signal Circuits — Six code signal circuits are used, a machine control circuit, a signal power circuit and a common wire. The normal voltage on all circuits is 40 volts DC with each circuit carrying approximately .05 amp. All nine signal wires are plug connected into the machine.

Weight and Dimensions — The width of the Model FTM is 18", the depth is 21" and the height is 10". The shipping weight of all Flexowriters is approximately 135 pounds while the unpacked weights are as follows:

Flexowriter Transmitter - 75 lbs.

Flexowriter Receiver - 75 lbs.

Flexowriter Transmitter-Receiver - 80 lbs.

Flexowriter Recorder-Reproducer

Transmitter - Receiver - 90 lbs.

Type Style – The Model FTM may be equipped with any of the type faces having a .265" motion as shown in Commercial Controls Type Available Catalog.

Carriage – The Model FTM may be equipped with a 12", 16" or 20" carriage, the carriage lengths on Flexowriters transmitting and receiving messages should be the same length.

Transmitting Distance – The effective transmitting distance is dependent upon the characteristics of the wire used in the cable. Each single wire (within cable) must be capable of carrying 150 milliamps with a voltage drop less than 8 volts. Two common power wires (on plugs JLH and JLJ) must each be capable of carrying the combined loads of the single wires (approximately 450 milliamps).

MAINTENANCE OF UNITS

The Model FTM Recorder-Reproducer-Transmitter-Receiver consists of five major units, namely; writing machine, code selector, tape punch, tape reader, and code translator. These units are all basically the same as the units described in Part II, Sections 2 through 7. Therefore, the maintenance procedures and adjustments will be the same with the exception of the following:

WRITING MACHINE

The power drive mechanism on a Model FTM uses a cog belt drive from the motor to the drive shaft. The use of a cog belt insures uniform speed of send and receive machines or in installations having multiple machine operation. The tension of the belt is obtained by turning the adjusting screw located on the rear base plate of the machine.

All of the writing machine component adjustments and maintenance procedures may be found in Part II, Section 2.

CODE SELECTOR

The Model FTM code selector is the same as the selector explained in Part II, Section 3 with the exception of the selector slide coding. The selector slide coding arrangement is shown in the chart in Figure 2-1.

TAPE PUNCH

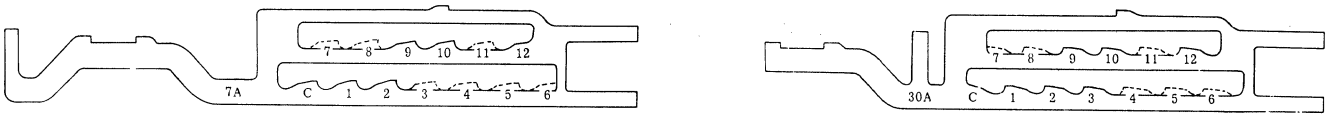
The Model FTM tape punch has the same description and sequence of operation as the punch explained in Part II, Section 5. The punch magnet coils, however, have a rating for 48 volt D. C. operation (coils are 800 Ohms).

TAPE READER

The operation and basic description of the Model FTM tape reader is basically the same as the reader described in Part II, Section 6, with the exception of the following:

The contact stackup arrangement

RC1 - 1 break, 1 transfer (1B, 1C)
RC2 - 1 break, 1 transfer (1B, 1C)
RC3 - 1 make, 1 transfer (1A, 1C)
RC4 - 1 make, 1 transfer (1A, 1C)
RC5 - 1 break, 1 transfer (1B, 1C)
RC6 - 1 make, 1 transfer (1A, 1C)



FRONT SLIDE

Position Number	Cam Surface
1B	8-11
	C-1-2-4-5
3A	8-11
	C-3
7A	9-10-12
	C-1-2
9A	9-10-12
	C-1-5
11A	9-12
	C-1-3
13A	9-10-12
	C-1-3-4-5
15A	9-10-12
	C-1-4
17A	9-10-12
	C-2-3-4
19A	8-10-12
	C-1-3-4
21A	9-10-12
	C-2-3-4-5
23A	9-10-12
	C-2-4-5
25A	9-10-12
	C-1-4-5
27A	9-10-12
	C-3-5
29A	9-10-12
	C-3-4
31A	8-12
	C-1-2-4
33A	8-9-11-12
	C-3-4-5
35A	9-10-12
	C-1-2-3-4
37A	8-11
	C-3-4-6
39A	8-10-12
	C-2-5
41C	7-8-9-10-11-12
	C-2
43C	7-8-9-10-11-12
	C-1-5-6
45C	7-8-9-10-11-12
	C-2-5-6
47C	7-8-9-10-11-12
	C-2-3-4-6
49C	
	C-4
51B	
	C-1-2-3-4-5

REAR SLIDE

Position Number	Cam Surface
2C	7-8-9-10-11-12
	C-6
6A	9-10-12
	C-1-2-3-5
8C	7-8-9-10-11-12
	C-1-2-5-6
10A	7-9-11-12
	C-1-2-5
12C	7-8-9-10-11-12
	C-1-6
14A	9-10-12
	C-1
16C	7-8-9-10-11-12
	C-2-4-6
18A	9-10-12
	C-2-4
20C	7-8-9-10-11-12
	C-5-6
22A	8-10-12
	C-5
24C	7-8-9-10-11-12
	C-1-3-5-6
26A	9-10-12
	C-1-3-5
28C	7-8-9-10-11-12
	C-1-2-3-6
30A	9-10-12
	C-1-2-3
32C	7-8-9-10-11-12
	C-2-3-6
34A	8-11
	C-2-3
36C	7-8-9-10-11-12
	C-4-5-6
38A	9-10-12
	C-4-5
40C	7-8-9-10-11-12
	C-2-3-5-6
42A	9-10-12
	C-2-3-5
44C	7-8-9-10-11-12
	C-1-3-4-5-6
46C	7-8-9-10-11-12
	C-1-2-6
48C	7-8-9-10-11-12
	C-1-4-6
50C	7-8-9-10-11-12
	C-4-6

Figure 2-1 Selector Slide Coding

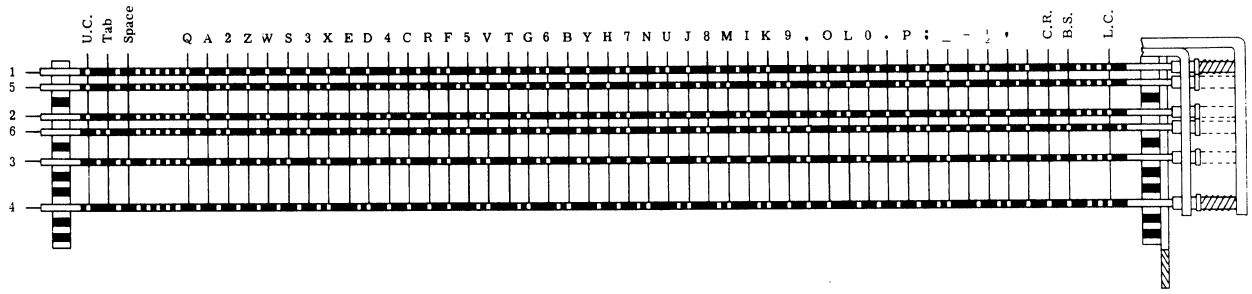


Figure 2-2 Permutation Bar Coding

Contact Adjustment:

1 - With a piece of blank tape in the reader and the pins resting against the tape, adjust all open contacts to .020" to .025" gap except the make contact of RC4 and RC6 (contacts in delay control circuit). These two contacts should be set at approximately .030".

2 - Remove tape and adjust normally closed contacts to .020" to .025".

3 - Adjust RTC to .020" to .025".

4 - Check for positive make with additonal overtravel on all contacts.

CODE TRANSLATOR

The Model FTM code translator is basically the same as the translator described in Part II, Section 7, except for the permutation bar coding arrangement (Figure 2-2) and the translator magnet coil ratings (800 Ohms for 48 volt D.C. operation).

CIRCUIT DESCRIPTION

The individual circuits discussed in this section are based on wiring diagram number 1055939 for the Flexowriter Model FTM Recorder-Reproducer Transmitter-Receiver. (See Figure 3-14.)

POWER CIRCUITS

The power circuit is controlled by the S1 power switch when the S2 line switch is in either "local" or "send" position. When the S2 switch is in "receive" position, the power circuit is controlled by the switch contacts on the K8 relay (also can be controlled by S1 switch).

When the power switch (S1) is in the on position, a 110 V A.C. circuit is complete to the 35 milihorse power motor (B) as follows: from JACP, TC4, S1, F1, K1 coil, main motor winding, TC3, to JACP. The initial surge of current through the circuit just described builds up a flux in the K1 coil which is strong enough to close the K1 contacts. The closing of K1 contacts will complete a circuit through the starting winding of the motor. Due to the characteristics of the motor and the starting relay, the K1 contacts will remain closed until the motor has reached its running speed of 1725 RPM. At this speed, the current flow through the K1 coil will have reduced to a point where the coil will no longer hold the K1 contacts closed. Thus, the motor, once it reaches its running speed, will operate by the circuit through its main winding.

Connected across A. C. supply terminal TC5 and TC6 is the primary winding of a stepdown transformer (T).

The secondary winding of this transformer is connected to a full wave selenium rectifier (CR1) through terminals TC7 and TC9. The secondary center tap is connected to terminal TC2 (-DC). The approximate voltages are as follows:

Across TC7 and TC9 - 115 Volts A. C.
Across TC5 and TC6 - 115 Volts A.C.

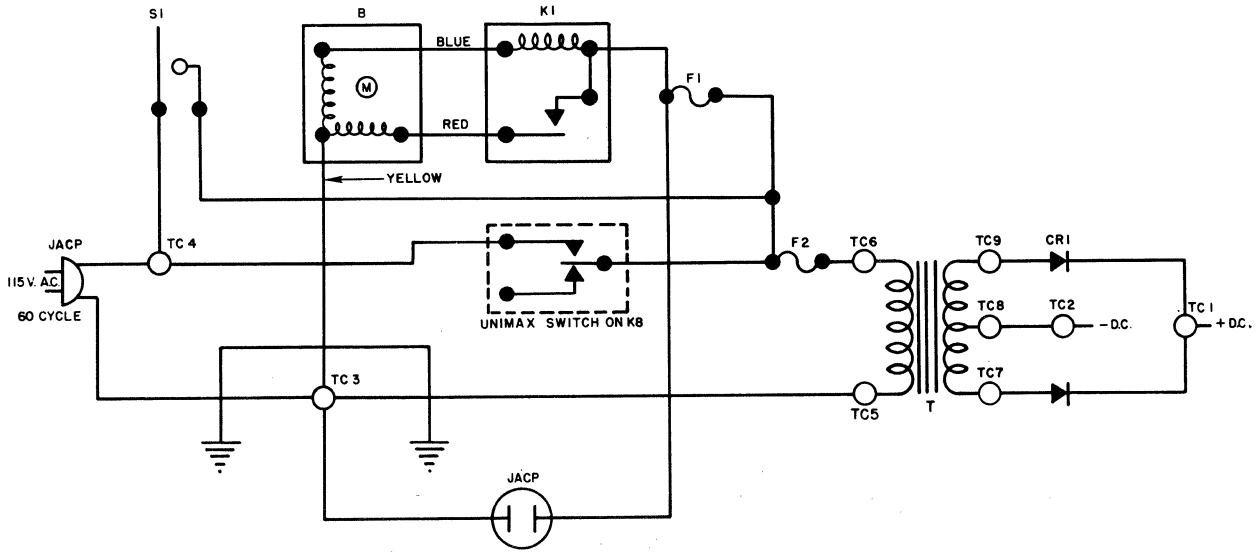


Figure 3-1 Power Circuit

Across TC7 and TC9 - 115 Volts A.C.
Across TC7 and TC8 - 57.5 Volts A.C.
Across TC8 and TC9 - 57.5 Volts A.C.
Across TC1 and TC2 - 48 Volts D.C.

The D.C. output of CR1 (terminals TC1 and TC2) supplies the power necessary to operate the various relay coils and magnets in the machine.

The A.C. and D.C. supply circuits are protected by a 2.0 amp Slo-Blo fuse (F1-A.C. and F2-D.C.).

There is a 110 volt A. C. outlet (JACR) located on the left rear side frame of the Model FTM. This plug may be used to connect a 10 watt tape rewind motor for the purpose of rewinding tape.

The power relay (K8), when energized will close the switch contacts and complete the same circuits just described. This relay (K8) will be energized when the S2 switch is in receive position. (The energizing circuit for K8 is received from a remote machine. See Figure 3-10.)

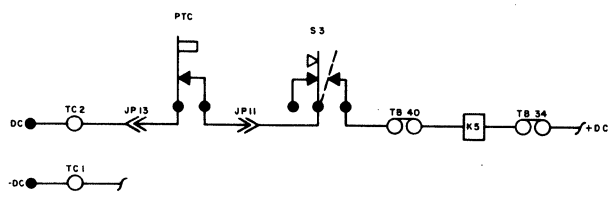


Figure 3-2 Punch Control Relay Circuit

RECORDING CIRCUITS

Punch Control Relay (K5) Circuit — When the punch on switch S3 is in the "On" position, a circuit is complete to the K5 relay as follows: from -DC, TC2, JP13, PTC, JP11, N/O S3, TB40, K5 coil, TB34, TC1, to +DC (See Figure 3-2.)

Key Lock Magnet — When the punch on switch (S3) is in the "Off" position, the key lock magnet (LKL) is energized as follows: from -DC, TC2, N/C S2, LKL, TC1, to +DC. (See Figure 3-3.)

When the S3 switch is in the "On" position, the key lock magnet (LKL) is energized as follows: from -DC, TC2, JP13, PTC, JP11, LKL, TC1, to +DC. In this circuit, the PTC contact controls the circuit to the key lock magnet, therefore, if the PTC contact should open, due to an unnatural condition of the tape in the punch, the key lock magnet will de-energize, locking the keyboard.

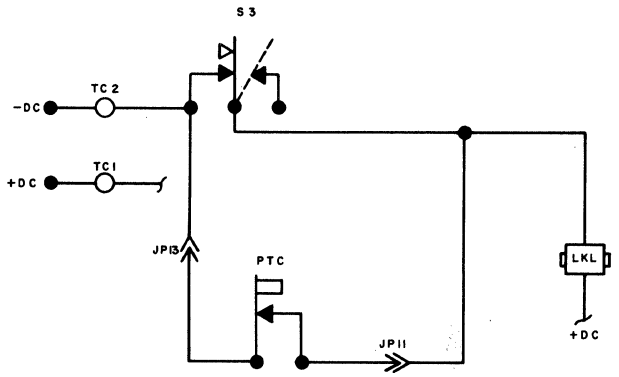


Figure 3-3 Key Lock Magnet Circuit

Punch Magnet Circuit — When a keylever is depressed, one or more selector contacts will close, depending upon the binary code given that particular keylever position. There are six selector code contacts (one for each unit of code), plus one selector common contact (SCC). The common contact (SCC) will close after the code contacts to insure all circuits to the punch magnets will be completed simultaneously.

For an example circuit, assume that the "A" character keylever was depressed. A DC circuit will be completed to the LP1 and LP2 (No. 1 and No.2 punch magnets) as follows: (Figure 3-4) (S3 "On" and K5 energized): from -DC, TC2, JP13, PTC, JP11, N/O S3, TB40, K5 - 7R and 8R, K7 -

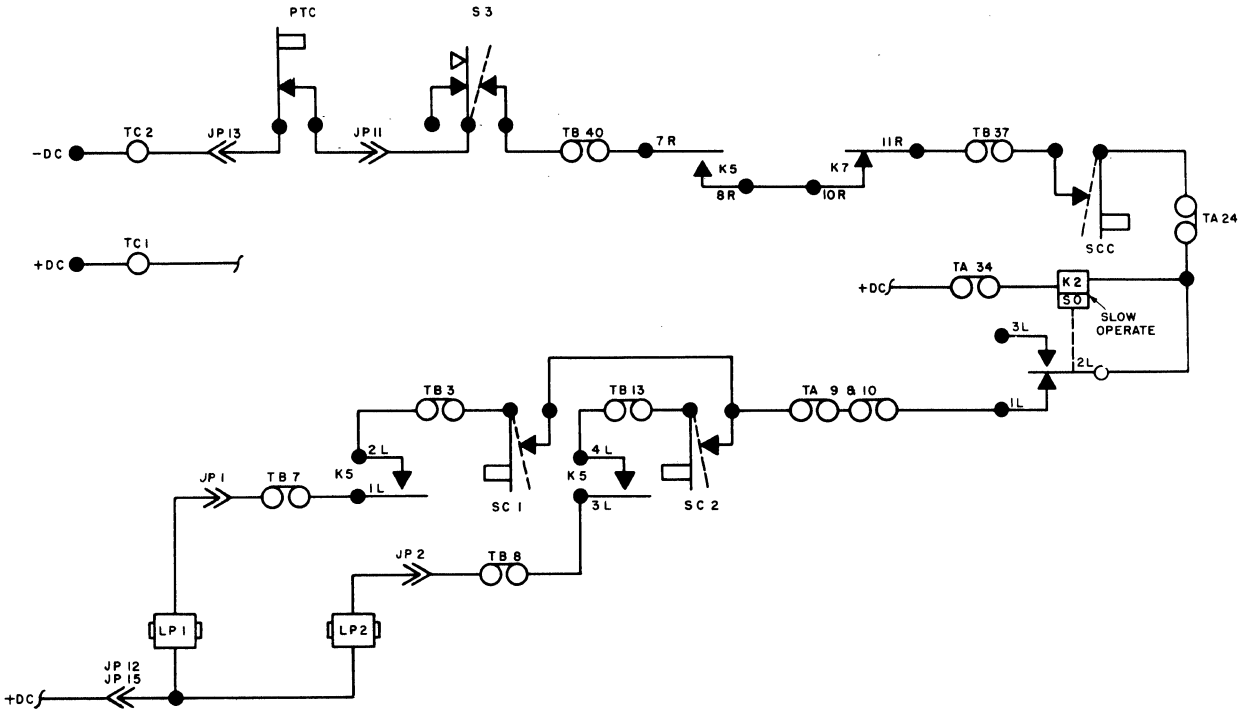


Figure 3-4 Example Punch Magnet Circuit

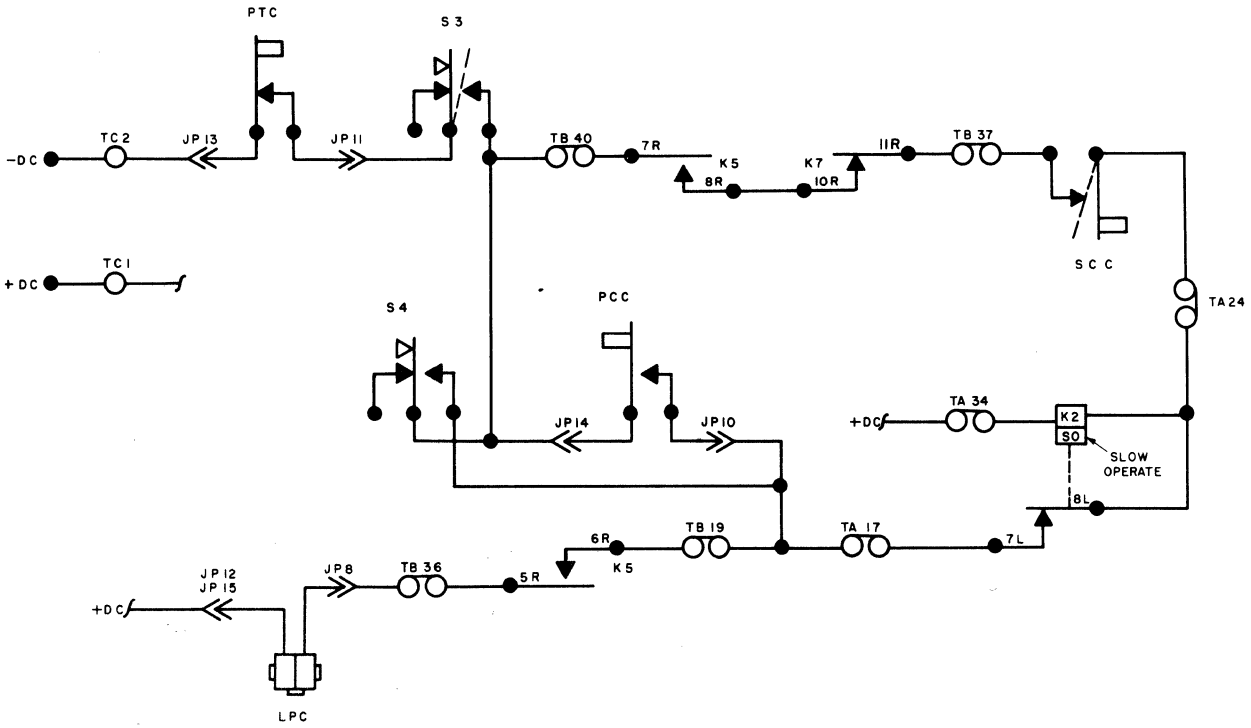


Figure 3-5 Clutch Magnet Circuit

10R and 11R, TB37, SCC, TA24, K2 - 2L and 1L, TA9 and 10, SC1 - SC2, TB3 - TB13, K5 - 2L and 1L - 4L and 3L, TB7 - TB8, JP1 - JP2, LP1 - LP2, JP12, and 15, TC1, to +DC. Therefore, the 1-2 code will be punched in the tape during the punch cycle of operation.

Clutch Magnet Circuit (Figure 3-5) – The clutch magnet (LPC) is energized after each initial operation of a keylever through the following circuit: from -DC, TC2, JP13, PTC , JP11, N/O S3, TB40, K5 - 7R and 8R, K7 - 10R and 11R, TB37, SCC, TA24, K2 - 8L and 7L, TA17, TB19, K5 - 6R and 5R, TB36, JP8, LPC, JP12 and JP15, TC1, to +DC. Note that the same circuit applies for both the punch magnets and the clutch magnet. Thus, they are energized at the same time, but due to the slow operating characteristics of the clutch magnet, the punch magnets will perform their function before the punch shaft starts to rotate.

A punch common contact (PCC) is connected in parallel with the selector common contact (SCC) in the clutch magnet circuit. This contact (PCC) is closed when any one or more of the latch levers are tripped due to its associated punch magnet being energized. The closing of contact PCC will cause a punch cycle to occur by completing a circuit to the clutch magnet (LPC) regardless of whether or not the selector common contact (SCC) is closed. Thus, contact PCC acts to insure an operation of the punch in the event the SCC is closed for a short time, which is sufficient to trip the punch latch levers, but insufficient to energize and engage the clutch.

When it is necessary to "feed out" the tape with feed holes only, the tape feed switch (S4) may be depressed. This switch operation will complete a circuit direct to the clutch magnet.

Anti-Repeat Circuit – It is possible during punching operation for the punch to finish a cycle of operation before the selector common contact (SCC) opens. This would cause a repeat operation in the punch. To prevent this, an anti-repeat circuit is used in the following manner: the same energizing circuit used for the punch magnets and clutch magnet is also used to energize the anti-repeat relay (see Figures 3-4 and 3-5). The K2 relay, however, has a slow operate coil. The pick up time of this relay is approximately 60 mili-seconds, thus allowing circuits to be completed to the punch and clutch magnets before K2 - 1L and 2L and K2 - 7L and 8L contacts break. Therefore, when K2 does pick up, the above contacts will be broken preventing a repeat cycle of the punch.

Code Delete Circuit (Figure 3-6) – The delete code is 1-2-3-4-5-6 and when it is necessary to punch this code in the tape, the S5 switch is depressed. When S5 switch is depressed, the K6 relay is energized as follows: from -DC, TC2, JP13, PTC, JP11, N/O S3, S5, TB27, K6 coil, TB34, TC1, to +DC. When K6 is energized all seven of the K6 contacts make, completing a circuit to the six punch magnets (LP1 through LP6). The circuit to LP1, LP2, LP4, LP5 and LP6 is as follows: from -DC, TC2, JP13, PTC, JP11, N/O S3, N/C S4, TB28, K6 - 6R and 5R, TB30, TA24, K2 - 2L and 1L, TA9 and 10, TB39, K6 - 2L and 1L - 4L and 3L - 8L and 7L - 2R and 1R - 4R and 3R, TB3 - 13 - 33 - 6 -16, K5 - 2L and 1L - 4L and 3L - 8L and 7L - 2R and 1R - 4R and 3R, TB7 - 8 - 10 - 17 - 18, JP1 - 2 - 4 - 5 - 6, LP1 - 2 - 4 - 5 - 6, JP12, - 15, TC1, to +DC. The circuit to LP3 is

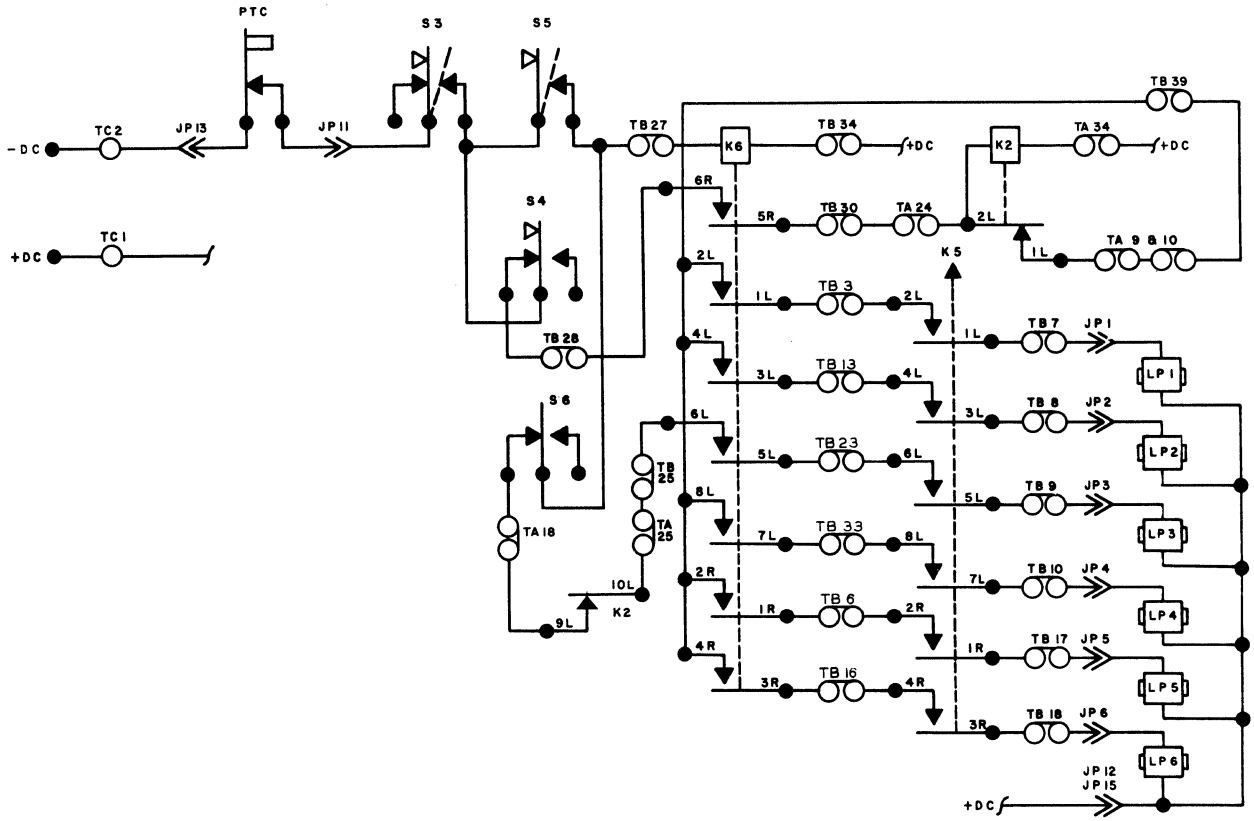


Figure 3-6 Code Delete & Stop Code Circuits

as follows: from -DC, TC2, JP13, PTC, JP11, N/O S3, S5, N/C S6, TA18, K2 - 9L and 10L, TA25, TB25, K6 - 6L and 5L, TB23, K5 - 6L and 5L, TB9, JP3, LP3, JP12 and 15, TC1, to +DC.

The clutch magnet will also be energized, thus releasing the clutch, rotating the punch shaft and punching the delete code (1-2-3-4-5-6) in the tape.

As long as the S5 switch is held depressed, the K2 (anti-repeat) relay will be held energized preventing a repeat of the delete code as follows: the S5 switch held depressed would hold K6 energized, thus holding K6 - 5R and 6R closed, which in turn keep K2 energized.

Stop Code Circuit (Figure 3-6) — The stop code is 1-2-4-5-6 and when it is necessary to punch this code in the tape the S6 switch is depressed. When the S6 switch is depressed, the K6 relay, the LP1, LP2, LP4, LP5 and LP6 punch magnets are all energized in the same manner as explained in the Code Delete Circuit. The LP3, however, is not energized due to the fact that its circuit is broken when the S6 normally closed contacts break when the switch is depressed.

REPRODUCING CIRCUITS (READER AND TRANSLATOR)

Manual Start and Stop Circuits (Figure 3-7)— A tape may be reproduced by inserting it in the reader and manually depressing the start read switch (S7). This will cause the reader to read

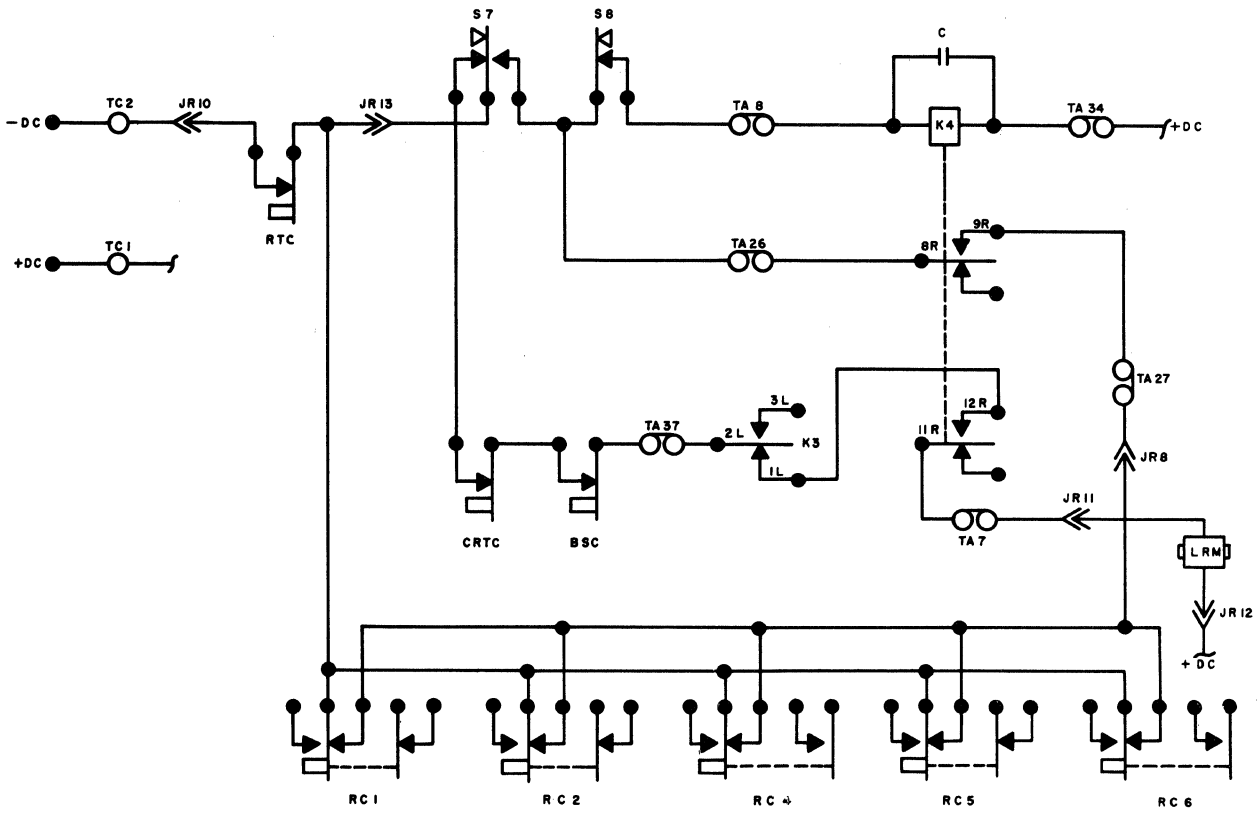


Figure 3-7 Start & Stop Circuits

and feed the tape resulting in automatic operation of the keyboard (a remote machine keyboard may be automatically operated by this same "local" reader operation).

When the S7 start read switch is depressed, a DC circuit is complete to the K4 read control relay as follows: from -DC, TC2, JR10, RTC, N/O S7, N/C S8, TA8, K4 coil, TA34, TC1, to +DC. When the K4 - 8R and 9R contacts make, a holding circuit is complete to the K4 relay as follows: from -DC, TC1, JR10, RTC, normally closed contacts of RC1 - RC2 - RC4 - RC5 and RC6, JR8, TA27, K4 - 9R and 8R, TA26, S8, TA8, K4 coil, TA34, TC1, to +DC.

With the holding circuit complete to the K4 coil, the S7 switch may be released. When the S7 returns to the normal position, a DC circuit is complete to the reader magnet (LRM) as follows: from -DC, TC2, JR10, RTC, JR13, N/C S7, CRTC, BSC, TA37, K3 - 2L and 1L, K4 - 12R and 11R, TA7, JR11, LRM, JR12, TC1, to +DC. Thus, with the reader magnet energized, the reader operation will take place.

Note: A. 25 mfd. capacitor is used across the K4 coil to delay drop-out momentarily. This insures positive stop code operation (see Stop Code Circuit).

Once the above circuit to the reader magnet is established, the magnet will remain energized and the reader will operate continuously until either the magnet circuit is broken automatically (Delay Control Circuit or Stop Code Circuit) or the stop

read switch (S8) is manually depressed.

When the stop read switch (S8) is depressed, the holding circuit to the read control relay (K4) is broken. Thus, when the reader finishes the cycle of operation (RCC open), the K4 relay drops out breaking K4 - 11R and 12R, and stopping reader operation.

Translator Magnet Circuits — When a reader pin senses a code in the tape, a corresponding reader contact closes, completing a circuit to the translator magnet related to the reader contact.

Each of the six reader contacts are individually connected to an open contact on the K4 read control relay. Therefore, it is obvious the K4 relay must be energized before a circuit can be established to a translator magnet.

For an example circuit, assume that a 1 code is read in the reader tape. The translator magnet LT1 and the translator clutch LTC will be energized as follows (the clutch magnet is energized with the same pulse as the code magnet) (Figure 3-8): from -DC, TC2, JR10, RTC, N/O RC1, JR1, TA3, K4 - 3L and 2L, TA1, JTA1, LT1, JTA5, TC1, to +DC. This same pulse passes through a blocking rectifier and energizes the LTC. Thus, translator operation takes place causing character E to be typed.

Note: See Automatic Send and Receive Circuits on page 3-12.

Delay Control Circuit (Figure 3-9) — It is essential to have an automatic delay control circuit incorporated in the Model FTM in order to delay the operation of the tape reader until a function in the writing machine has been completed. There are three functions which require more operating time than the regular characters. These functions are: carriage return (4), tabular (6), and back space (4-6).

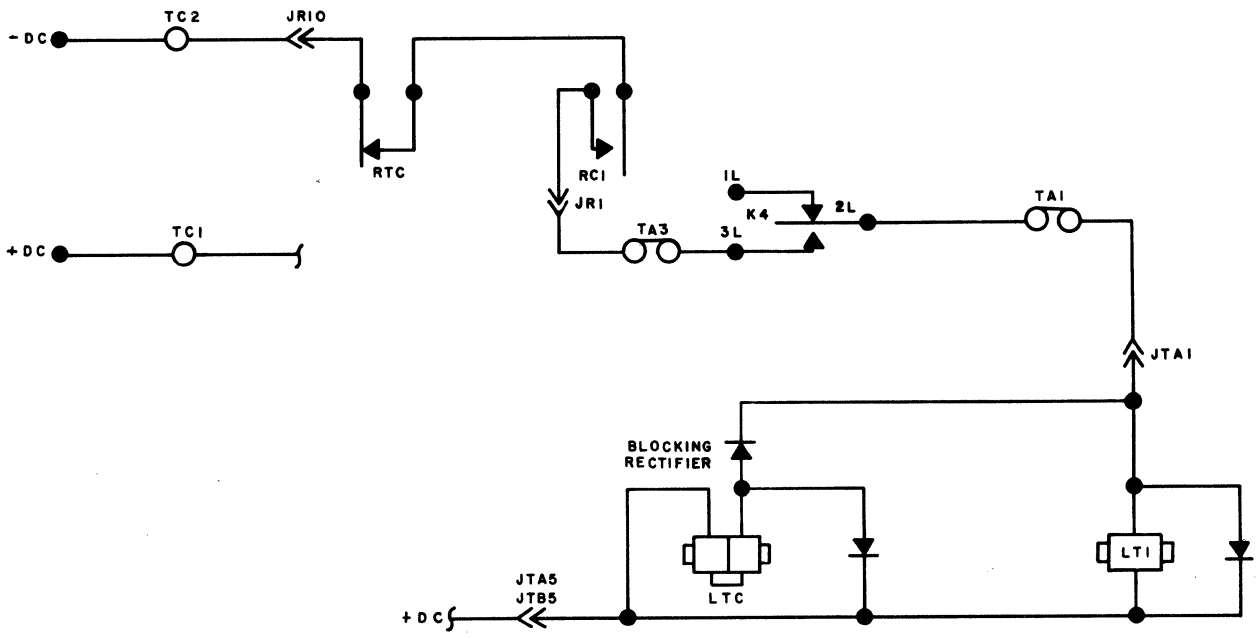


Figure 3-8 Example Translator Magnet Circuit

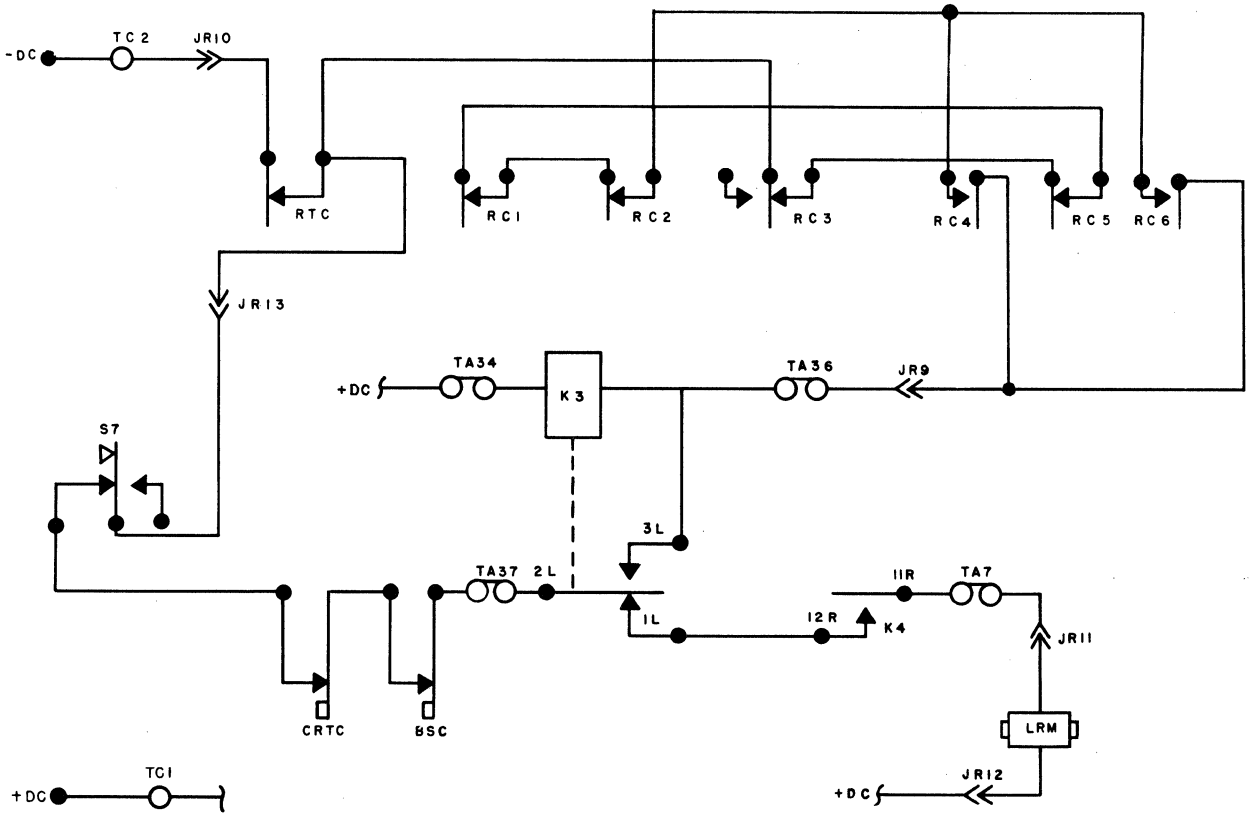


Figure 3-9 Delay Control Circuit

A transfer contact is used on a delay control relay K3 which breaks the circuit to the reader magnet when any of the above codes are read. This will stop the reader operation for the time required of the functional operations mentioned.

The K3 (delay control relay) is energized by operating either the RC4 or RC6 contacts, or operating these two reader contacts simultaneously. If a 4 code (CR) is read by the reader for example, the following circuit to K3 would be completed: from -DC, TC2, JR10, RTC, RC3 - N/C transfer, RC5 - break contact, RC1 - break contact, RC2 - break contact, RC4 - make contact, JR9, TA36, K3 coil, TA34, TC1, to +DC.

At the same time the above circuit is complete to the K3, a circuit would also be completed to translator magnet LT4 and translator clutch magnet LTC. Translator operation would take place, causing carriage return operation. The operation of the carriage return mechanism would open contacts CRTC.

When K3 picks up, its contacts transfer (strap 2L breaks with 1L and makes with 3L), breaking the reader magnet circuit and providing a holding to K3. Thus, when CRTC contact opens, the holding circuit to K3 is broken. The K3 contacts return to their normal position, but the circuit to the reader magnet will not be complete until the carriage returns to the left hand margin and the clutch toggle unlocks. When this takes place, the CRTC contact closes, completing the energizing circuit to the reader magnet, starting the

reader operation again.

Stop Code Circuit — When a stop code 1-2-4-5-6 is read by the reader, the holding circuit for the K4 relay (read control relay) will be broken, thus de-energizing the reader magnet and stopping the reader operation. A normally closed contact on RC1, RC2, RC4, RC5 and RC6 completes the holding circuit through K4 - 8R and 9R to the K4 coil. If all five of the contacts (RC1, RC2, RC4 and RC6) were to open simultaneously, the K4 relay would drop out, opening contacts K4 - 11R and 12R, thus breaking the circuit to LRM. The start read switch (S7) would have to be depressed to start the reader operation again. (See Figure 3-7.)

When a code delete (1-2-3-4-5-6) is read in the reader, a normally open contact on RC3 maintains the holding circuit to K3.

A .25 mfd. capacitor is placed across the K4 (read control relay) to delay the drop-out time momentarily. This is necessary to insure that all six translator magnets and clutch magnet are energized before the K4 relay contacts transfer.

SEND AND RECEIVE CIRCUITS

The following circuits are used when the line switch S2 is placed in the "send" position on the "local" machine and the S2 switch on the "receive" machine is placed in the "receive" position.

Power Relay (K8) Circuit — The power relay in the "receive" machine is energized (due to the above position of the S2 switch). This relay, when energized, will condition the power circuit

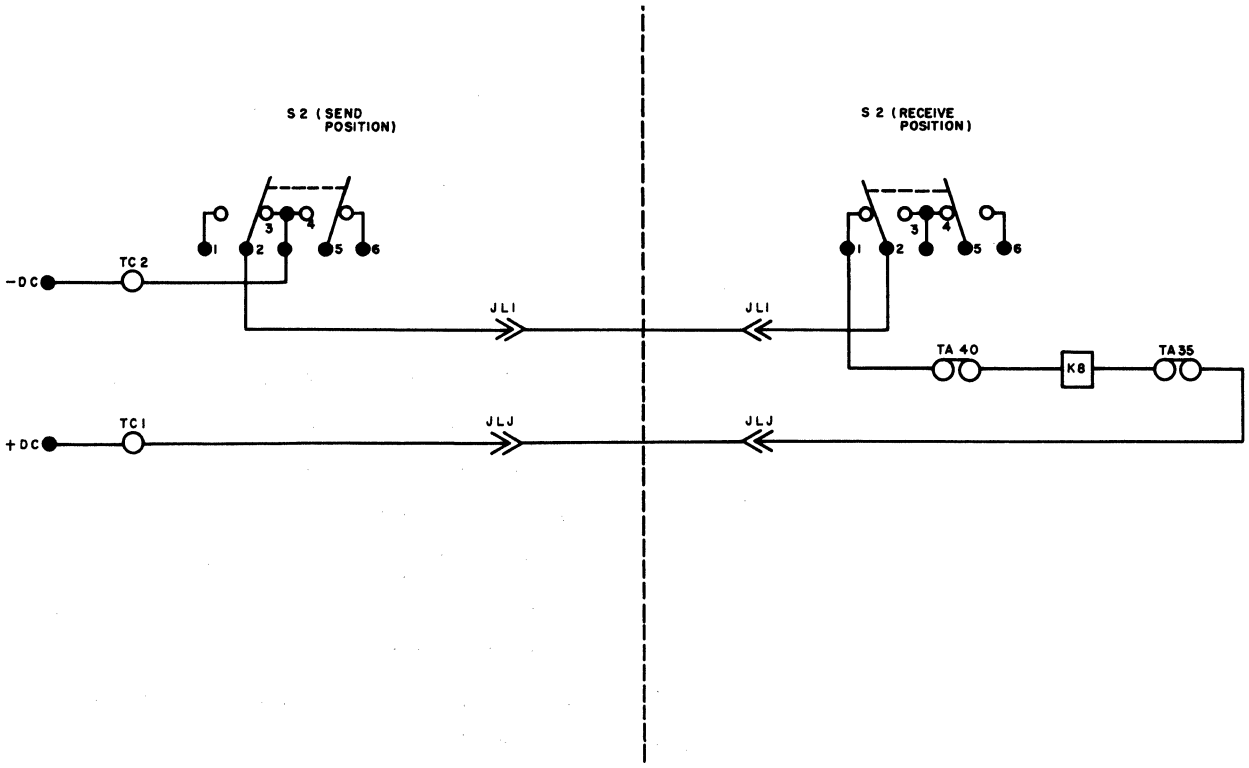


Figure 3-10 Power Relay (K8) Circuit

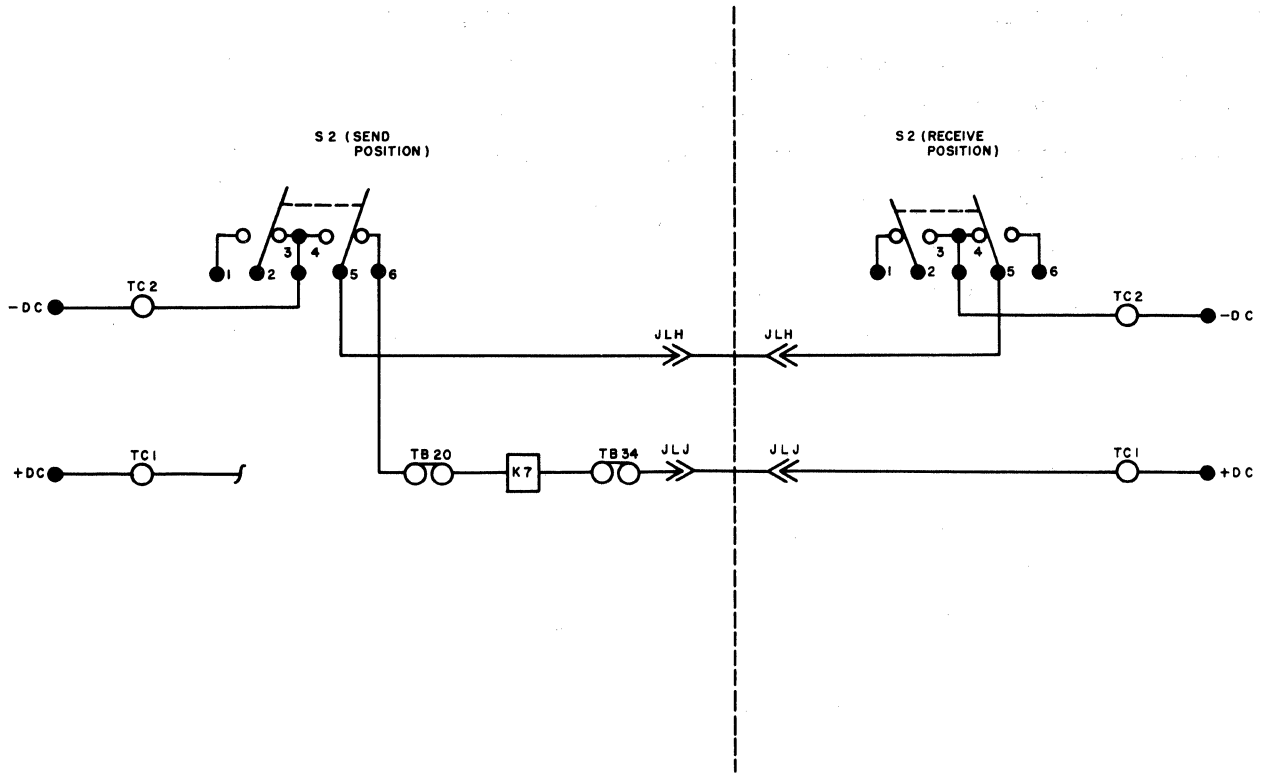


Figure 3-11 Send Relay (K7) Circuit

in the receive machine (see Power Circuit). Also, a circuit to the indicating light (I) will be made and the buzzer (LB) circuit will be broken.

The circuit to K8 is as follows: from -DC (Send) to TC2, S2 - 3 and 2, JLI (Send), JLI (Receive), S2 - 2 and 1, TA40, K8 coil TA35, JLJ (Receive), JLJ (Send), TC1, to +DC. (See Figure 3-10.)

Send Relay (K7) Circuit — The send (K7) relay, when energized, conditions the sending machine to transmit the electrical code impulses originating at the selector contacts to the receive machine.

The circuit to K7 is as follows: from -DC (Receive), TC2, S2 - 5 and 4, JLH (Receive), JLH (Send), S2 - 5 and 6, TB20, K7 coil, TB34, JLJ (Send), JLJ (Receive), TC1, to +DC. (See Figure 3-11.)

Indicating Light and Buzzer Circuits — In the send machine, the indicating light will operate and the buzzer will not operate when the K7 relay is energized. This is due to K7 contact strap 8R breaking with 7R and making with 9R (See Figure 3-12.)

The indicating light will operate and the buzzer will not operate in the receive machine. This is due to the K8 relay being energized, making contact straps 3L and 4L and breaking straps 1L and 2L (See Figure 3-12.)

Send and Receive Signal Circuit — The electrical impulses originating at the selector contacts (on the send machine) are transmitted to the corresponding translator magnets in the receive machine. These translator magnets are therefore energized causing a character or functional operation.

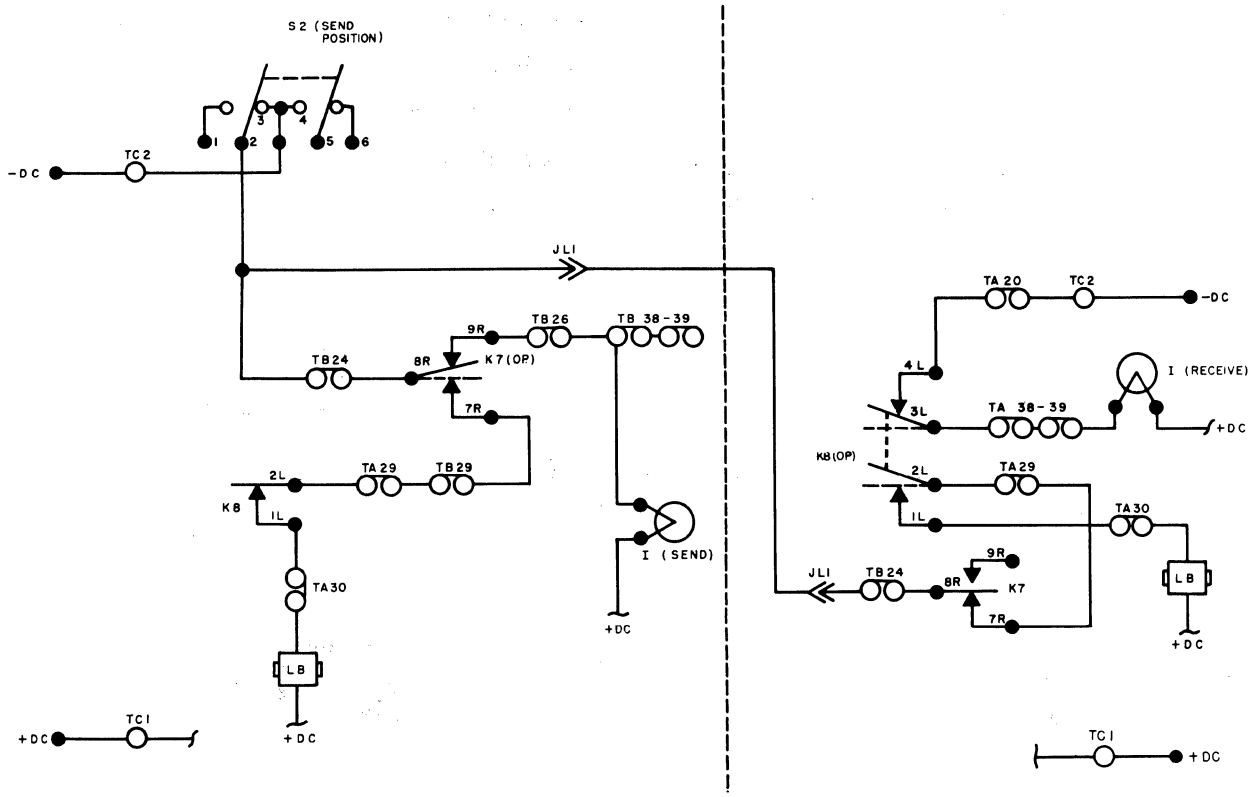


Figure 3-12 Indicating Light & Buzzer Circuits

For an example operation, assume that the "E" keylever was depressed in the send machine. This would close the SC1 contact (on code selector), completing a DC circuit to the LT1 translator magnet in the receive machine as follows: from -DC (Receive), TC2, S2 - 4 and 5 (Receive), JLH (Receive), JLH (Send), S2 - 5 and 6 (Send), TB20, K7 - 12R and 11R, TB37, SCC, TA24, K2 - 2L and 1L, TA9 and 10, SC1, TB3, K7 - 3L and 2L, TB1, JLA (Send), JLA (Receive), TB1, K7 - 2L and 1L, TB2, TA2, K4 - 1L and 2L, TA1, JTA1, LT1, JTA5, TC1, to +DC (Receive).

The same code pulse which energized the LT1 translator magnet is also used to energize the translator clutch magnet (LTC). A blocking rectifier (CR2) is used to prevent the code pulse from energizing the other five translator magnets (a blocking rectifier is used in each of the six code pulse circuits).

The suppressors (CR3), shown across the magnets in Figure 3-13, prevent excessive arc-in of the selector common contacts (SCC) in the send machine when a multiple circuit is used.

The result of the above example operation will be the printing of the character "E" on the receive machine. It is also possible, with this type of machine (Model FTM Recorder-Reproducer Transmitter-Receiver), to turn on the S3 (Punch On) switch in both machines and punch the character "E" code (1) in the punch tapes. This circuit is described on page 3-2, Punch Magnet Circuit. It should be noted however, the DC supply is from the receive machine. This

is due to the K7 relay being energized, thus having the K7 - 11R contact strap making with K7 - 12R strap.

Automatic Send and Receive Signal Circuits – When reproducing copy in a local machine, it is possible to transmit this information to a remote machine at the same time. The circuits involved in this arrangement are the same as explained for "Reproducing Circuits" on page 3-5 combined with "Send and Receive Circuits" on page 3-9 .

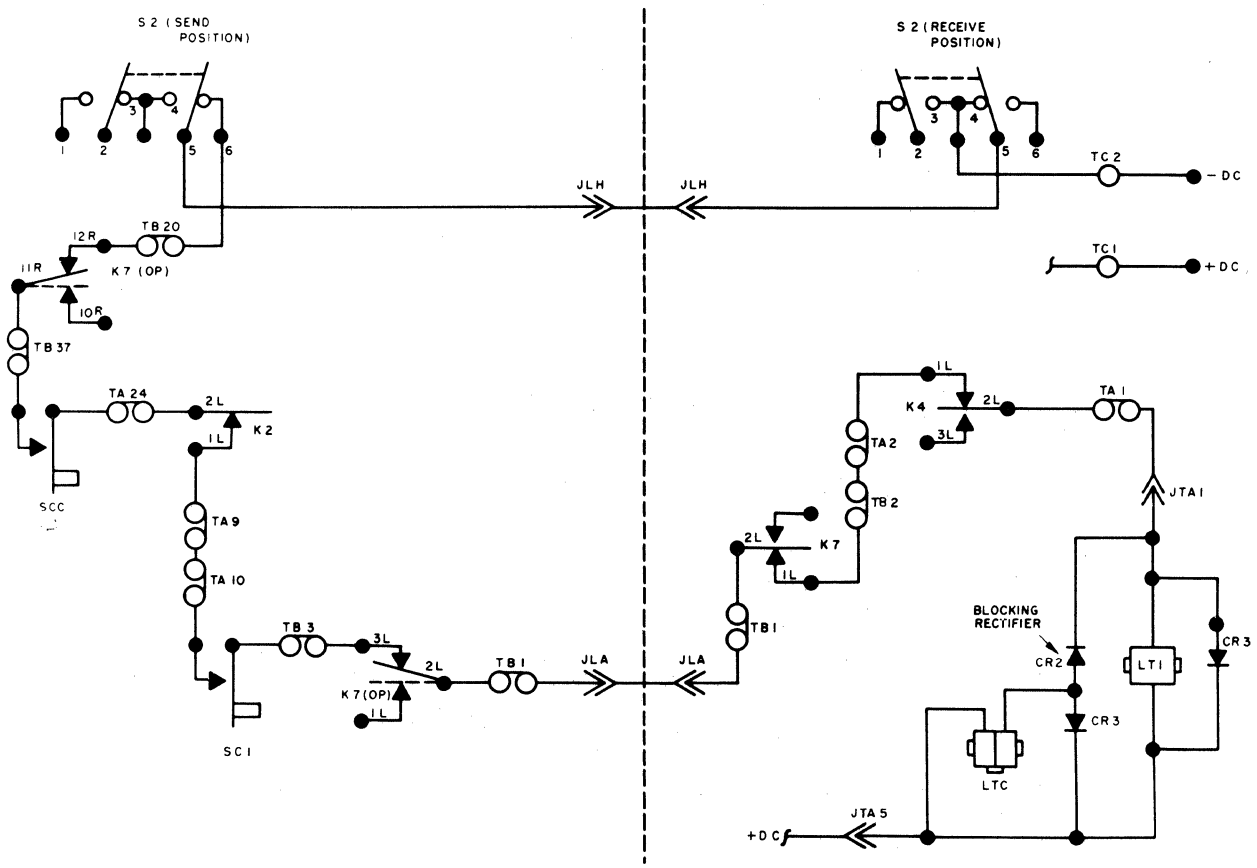


Figure 3-13 Send & Receive Signal Circuit

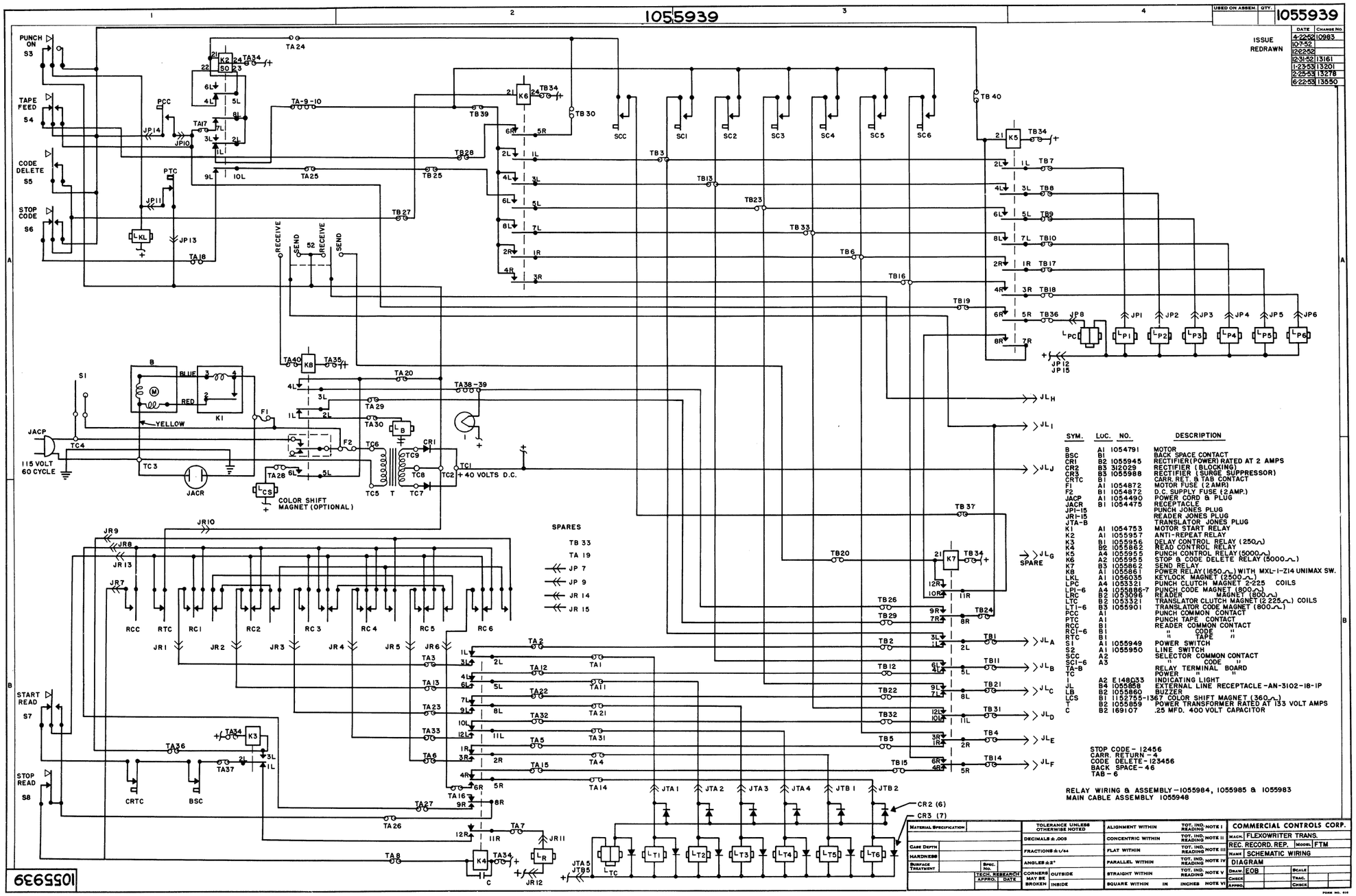


Figure 3-14 Model FTM - Recorder Reproducer - Transmitter Receiver Wiring Diagram