E M^c Mahon

Bulletin No. 129
Issue 1
November, 1927

TELETYPE

PRINTING TELEGRAPH SYSTEMS

SPECIFICATIONS FOR THE MODEL 12 DIRECT KEYBOARD PAGE TELETYPE

TELETYPE
CORPORATION
SUBSIDIARY OF
Western Electric Company
CHICAGO, U.S.A.

1668

Printed in U.S.A.

Teletype Corporation,
Chicago, Ill., U.S.A.

EE-276
Issue 1
December, 1931.

CHANGES IN BULLETINS

#127 AND #129

Bulletin #127, Page 21

Bulletin #129, Page 10

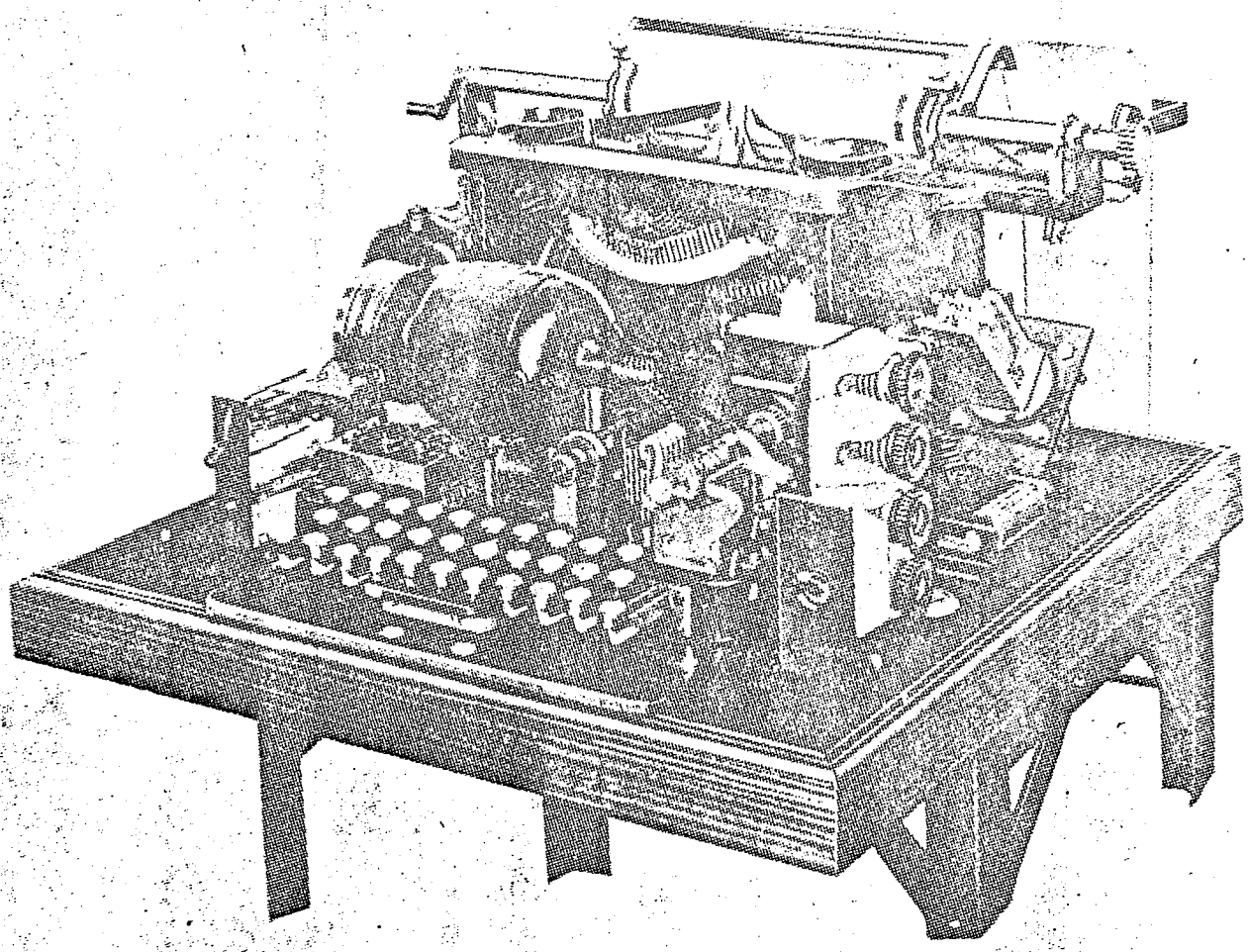
"Make Contact Type Adjustment" - Item "1" should be changed to read as follows:

> With the magnet plunger held in all the way, bend the outside contact spring so that when a 32-ounce scale is hooked over the outside spring at the side of the contact and pulled horizontally at right angles to the spring it shall require from 12 to 16 ozs. to cause the outside spring to just break contact with the middle spring.

C. P.

Printed in U. S. A.

I N D E X



MODEL 12 PAGE TELETYPE
WITH COVER REMOVED

SPECIFICATIONS FOR THE MODEL 12 DIRECT KEYBOARD PAGE TELETYPE

GENERAL DESCRIPTION

The Model 12 Page Teletype is a Direct Keyboard Page Printing Telegraph set. The depression of the keys on a keyboard resembling that of an ordinary typewriter causes electrical impulses to be transmitted over a line and the corresponding character to be printed on the Printer Unit at the transmitting station and any other stations connected to the transmitting station.

Page Teletypes can be supplied in two different outfits.

1 - Transmitting-Receiving Page Teletype.
2 - Receiving Only Page Teletype.

The only difference between the two outfits is that the transmitting-receiving outfit uses a Keyboard Distributor which is equipped with a set of keys, a transmitting mechanism and a receiving mechanism; while the receiving only outfit uses a Receiving Distributor equipped with a receiving only mechanism.

Each set consists of the following units:

1 - A table, on the top surface of which are fastened the control switches, main line relay connection block, fuses, resistances, and rails and clips to take printer and distributor units. The dimensions of the table top are 22" wide and 21½" deep. A space of 5½" behind the table must be provided to take care of paper roll overhang.

2 - Model 12 Page Printer Unit (described in bulletins #109 and #110).

3 - Model 12 Keyboard Distributor, or Receiving Distributor Unit, (described in bulletin #114). The Keyboard Distributor Unit is used when the outfit is to be used for both transmitting and receiving, and the Receiving Distributor when the set is used for receiving only.

4 - Main Line Relay, Morkrum Type RY20, (W.E. Co. 215-A).

5 - Silencing Cover

6 - Motor Generator Set and accessories for A.C. operation.

Figure shows the appearance of the set and some of the auxiliary apparatus.

SILENCING COVER, COPY HOLDER, AND CHANGES NECESSARY WHEN SET IS USED FOR RECEIVING ONLY

The standard (12-A) silencing cover is made in two sections, one to enclose the sides and back of the printer unit, and the other to enclose the receiving distributor or keyboard and the

miscellaneous apparatus on the mounting plate. The top of the printer is not covered thus making platen accessible as on a typewriter. Each half of the cover is made of sheet metal, lined on the inside with sound absorbing felt.

The copy holder shown in the Figure of the keyboard sending and receiving set may be mounted on the front half of the cover in either one of two positions. This is to permit the copy being placed directly above the keys if desired, or to the right of the center of the machine, so that the copy holder will not obstruct the operator's view of the printing on the machine.

For receiving only stations the same cover is used but the copy holder may be removed and a rectangular metal plate is screwed to the front of the cover to close the opening left by the removal of the keyboard. This arrangement is shown in the Figure of the receiving only set. This plate is furnished with each receiving distributor. When it is used, the bracket holding the LINE-TEST and BREAK keys must be set back about $\frac{3}{4}$" and remounted in holes provided for the purpose as these keys are not used by the operator at receiving only stations and the opening for them is to be covered by the metal cover.

Special (12-S) silencing covers can be furnished. This cover is made in one section covering all of the mechanism with the exception of the keyboard keys and control switches. A slot is provided in the top of the cover through which the paper passes. The top of this cover is hinged so that it may be lifted to gain access to the various mechanisms. A hole is provided in the left hand side of the cover through which the platen crank projects while on the right hand side there is a hole opposite the manual carriage push button, thus making them accessible from the outside of the cover. This cover is recommended only for installations where roll paper is to be used.

MAIN LINE RELAY

A Morkrum RY20 (W.E. Co. 215-A) Polar Relay is used on the set. These relays are provided with eight prongs which enter corresponding clips on the relay connection block provided on the mounting plate. The wiring of the relay is shown in drawing. The relay has two windings of 85 ohms each, which may be used separately or in series.

MOTOR GENERATOR SETS

At stations where the power supply is alternating current, a small motor generator set is required for the operation of the printer and distributor magnets as will be explained later. This motor generator is mounted on brackets bolted to the table legs. Standard motor generators can be provided for operation on 50 or 60 cycle, 110 volts, single phase, alternating current.

AUTO-TRANSFORMERS

In some cases only 220, 50 or 60 cycle alternating current is available. In these cases standard 110 volt, 50 or 60 cycle motors and motor generator sets would be provided, and an auto-transformer furnished to reduce the voltage from 220 to 110 volts. The transformer is comparatively small and may be screwed to the underside of the mounting plate, or to a wall.

USE OF PAGE PRINTER SET

These printer sets may be used for almost any kind of business where instantaneous and accurate communication is necessary. They are suitable for use in connection with any other standard telegraph systems used for long line operation or they may be connected directly together for short line operation. They can be used for furnishing either half or full Duplex service. When operating full Duplex, a home record of outgoing traffic is desirable for convenience in sending. This can be readily provided by using a sending and receiving set for transmission of the messages, thus providing a home record, and a receiving-only set for the receiving side of the Duplex.

In addition to general telegraph service, these sets have found great use in merchandising houses, factories, hotels, banks, railroad offices, and in many other lines of business.

GENERAL OPERATING FEATURES

As explained previously, a printer set consists essentially of a keyboard distributor unit, a printer unit, and associated apparatus for transmitting and receiving signals. By the depression of certain keys at the transmitting end, the various letters, characters and functions are caused to be printed on the printer at the distant and as well as on the printer at the transmitting end.

These sets are so arranged that all the functions of an ordinary typewriter may be performed automatically such as shifting to the upper case, that is, to figures or punctuating marks; releasing to lower case; spacing; feeding paper; and returning the carriage.

LINE-TEST key is provided so as to furnish a means for disconnecting the machine from the line circuit so that it may be tested locally without sending signals over the line circuit. A BREAK key below the LINE-TEST key opens the line circuit when pressed inward, thereby sending out a break signal. A power switch is provided so that the power may be turned off when the machine is not in use.

The receiving-only machine is exactly like the transmitting machine except that the keyboard distributor is replaced by a receiving-only distributor.

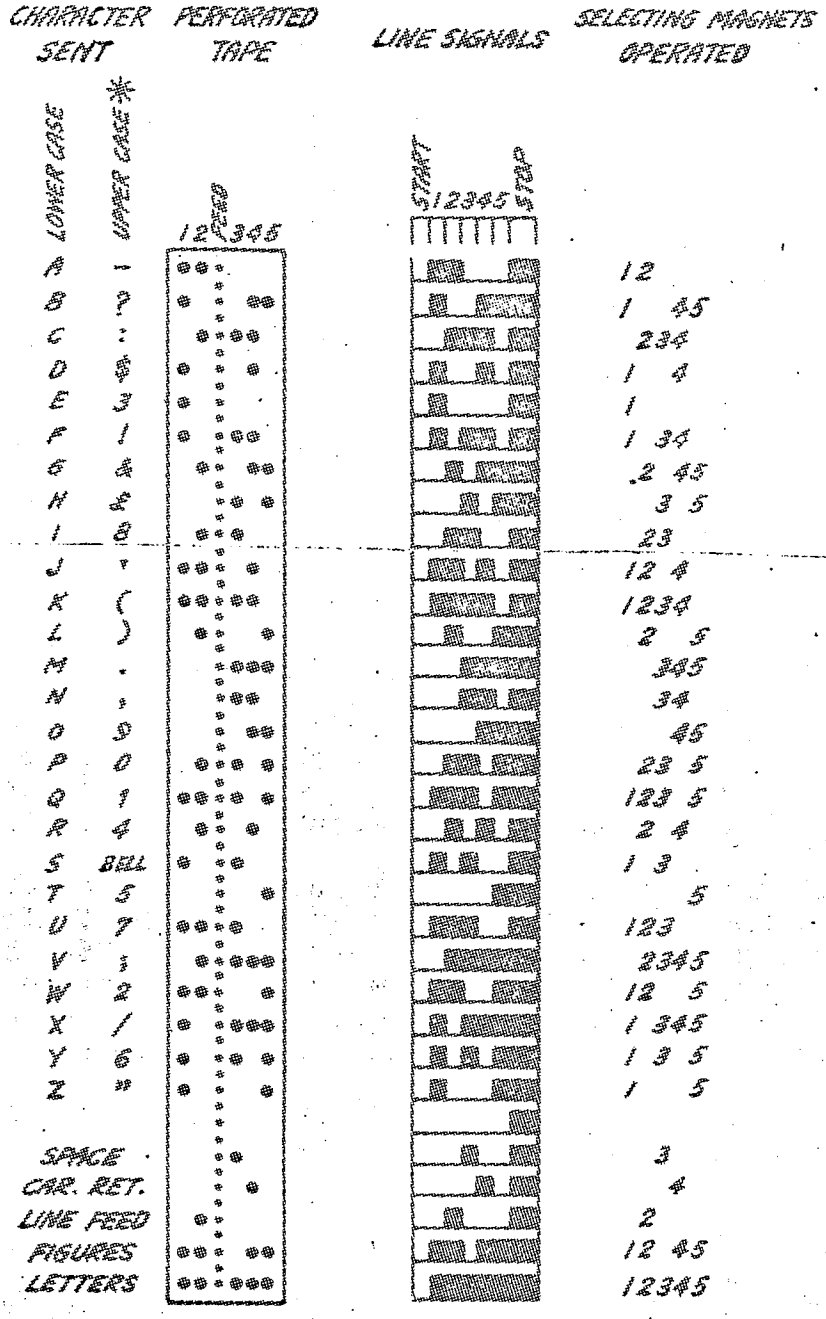
Sets may be provided with control relays which makes it possible to control the stopping and starting of the motors on the circuit by means of the power switch. The use of the control relay, therefore, makes it possible to shut down the motors whenever the sets are idle, thus reducing the wear of the mechanism and power consumption.

SPEED OF OPERATION

These printer sets are suitable for operating at speeds up to 368 operations or characters per minute, the operating speed depending upon line condition. The theoretical words per minute are based on six operations (five characters and one space) per word.

PRINTING TELEGRAPH CODE

START-STOP SYSTEM



—NOTE—

BLOCK SIGNAL INDICATES "MARKING" IMPULSES

* THE UPPER CASE CHARACTERS VARY WITH DIFFERENT TYPES OF PRINTERS.

DESCRIPTION OF OPERATION

CODE.

The signalling code employed to transmit the characters is the common "start-stop" code which consists of five selecting impulses used in various combinations of current and no current intervals, or positive and negative intervals in case of polarized signals. Each group of 5 selecting impulses is preceded by a start impulse and followed by a stop impulse to maintain unison of all stations on the circuit. Impulses which operate the selecting magnets are called marking impulses and those which do not operate selecting magnets are spacing impulses. Figure shows graphically the code used, there being 32 possible combinations.

OPERATION OF START-STOP SYSTEM

The printer sets referred to here are operated on the "start-stop" principle. The start signal and the stop signal cause the receiving distributor cylinder to revolve in unison with the transmitting distributor so that the character signals sent out by the transmitter may be properly passed to the printing units and translated into letters and other characters. The transmission of the start impulse, which is a spacing impulse, starts the receiving cylinder revolving. The speed of rotation is such that when the cam cylinder of the transmitting distributor has revolved far enough to send out the first impulse, the receiving distributor has revolved to the proper position to receive it. When the transmitter has revolved to the position to send out the second impulse, the receiving cam cylinder will have also rotated to a similar position.

At the end of the revolution of the receiving cylinder, after the fifth pulse has been transmitted, the sixth pulse contacts on the receiving distributor close and cause the main shaft of the printing unit to rotate and print the letter corresponding to the selection sent out. Meanwhile, the "stop" impulse has been sent out which causes the receiving cylinder to come to a stop.

Assuming that the transmitting cam cylinder is at rest and the receiving cam cylinder is at rest. If a key of the keyboard is depressed, the keyboard clutch will engage and the transmitting cylinder will start to rotate. Immediately the "start" signal will be sent out. This "start" signal will cause the start magnet of the receiving distributor to be energized pulling the armature out of the notch of the cylinder and permitting the cylinder to rotate.

The receiving cam cylinder is geared to rotate one-seventh faster than the transmitting cylinder, but the receiver mechanism is so constructed that the distance from the position where the receiver mechanism can receive one impulse and where it can receive the next impulse is one-seventh greater than the distance between the positions where the transmitter can send out one impulse and the next one. In other words, if the transmitting cam cylinder has to travel one inch to get from the position where it sends out the first impulse to the position where it sends out the second, the receiving cam cylinder must travel one

and one-seventh inches to get from the position where it can receive the first impulse to the position where it can receive the second, but as the receiver travels one-seventh faster, it will reach this second position at the same time the transmitter reaches its second position.

At the end of the revolution the start magnet armature latches in the cylinder notch and stops the receiving cam cylinder which will remain stopped until the next "start" impulse is sent out.

The reason that the receiving cylinder is made to revolve one-seventh faster than the transmitting cylinder is this: It is not possible to maintain several units at absolutely the same speed. No matter how delicate the speed controlling mechanism, there would be a slight difference in the speed of two units working together. In a short time this speed difference would cause the transmitting mechanism and the receiving mechanism to get out of unison so that when the transmitter was sending out the first impulse of a character signal, the receiving mechanism might be in the position to receive the second.

This is avoided by arranging the receiving mechanism to run faster than the transmitting which allows it to complete its revolution sooner than the transmitter completes the corresponding one. When the receiver has completed a revolution it comes to a stop until the transmitter again sends out a "start" impulse. Now, if the speed of the receiving mechanism is slightly faster than its proper speed, the only effect will be that it will remain at rest slightly longer while if its speed is slightly slower than the proper speed, it will remain at rest just that much less time. Of course there will be a slight error in the position of the receiving mechanism in the various positions but the mechanism is constructed to provide for this and, due to the fact that the receiver starts each revolution in unison with the transmitting distributor, this error does not become any greater.

INSTALLATION ARRANGEMENTS

LOCAL POWER SUPPLY

The printer unit and distributor unit may be equipped with either 110 volt direct current motors or with 110 volt, 50 or 60 cycle alternating current motors. The power supply to the set may, therefore, be any of these kinds. If the available power supply is other than the above a motor generator having a motor suitable for operation on the power supply and 110 volt compound wound direct current generator having a capacity of 250 watts for a single 12 type set, and 150 watts additional for added sets must be provided. In such cases motors of the printer and distributor units will be 110 volt direct current. In the case of 110 volt, 50 or 60 cycle, AC supply, a small motor generator previously mentioned will be required for supplying the direct current for the printer magnets, biasing current and local test circuit.

Where the supply is AC and control relays are employed, these relays may be used to control M-G sets provided a suitable supply of direct current is available at one of the stations for the signal and control circuits. If no direct current is available, one of the M-G sets will have to be controlled independently of the control relays and auxiliary

switches will be required.

LINE BATTERY POWER SUPPLY

For line battery, a supply of direct current of such voltage as to be capable of giving a line current sufficient to satisfactorily operate the line relays is required. Where the power supply is 110 volts direct current grounded, this source can be used for line battery. Where such power source is not available, telegraph battery of approximately 110 volts potential can be used and for short line operation as low as 48 volts DC will be satisfactory. Where ungrounded battery is available, it will be necessary to operate the circuit with metallic return to the source of ungrounded DC used as line battery.

For make and break operation, the current for the signalling line shall be 60 milliamperes. For polar operation, this value can be reduced to as low as 30 milliamperes.

The control line requires from 50 to 60 milliamperes for its operation.

INSTALLATION DIRECTIONS

The wiring diagrams shown on print 911 and the accompanying notes cover the line and power circuit arrangements under various conditions.

Diagram #1 shows the wiring of terminal and intermediate stations on a circuit where the power supply is 110 volts DC and the motors are under local control.

Where the power supply is 110 AC and the motors under local control the circuits are as shown in diagram #2. In this case motor generator sets are provided.

The conditions as shown in diagram #3 are the same as those in #1 except that control relays are used.

Diagram #4 shows the connections at the stations when 110 AC is available and control relays are used.

Let us suppose that a set is to be installed at one of the stations on a circuit. The table when received from the factory will be wired for either DC or AC with or without control relays. Say for instance that the set is for AC operation (i.e. it includes a M-G set) and that it is equipped with control relays. We would refer to the notes under "Remote Motor Control". As the set is for AC power the directions for making the motor power connections would be found under notes 1-B and 1-C.

If the small M-G set is also to be used for line battery (1-B), remove wire from L (wire that runs to M-G receptacle) and connect it to power fuse O. Then connect the AC power leads to power fuses P and O. If the line battery is not to be furnished by the M-G set, the only wiring necessary would be to connect the AC power leads to the power fuses P and O (1-C).

Referring to the notes under Line Current Supply, division #2, we see that the line current may be supplied from either an available telegraph source or from the small generator set. It is first necessary to determine the polarity of the line current supply. If a telegraph source is to be used, we must also determine which side of the supply is grounded. After this information is available the directions as shown in the notes, should be followed. Let us say that the set is to be installed at station A and that the ungrounded side of the telegraph current supply is negative. Then this ungrounded side would be connected to the line fuses T and W (note 2-B). If the ungrounded side is positive it would be necessary to connect this positive side to the line fuses S and W.

If the line current is to be supplied from the small motor generator set at station A, we find in notes under 2-C that the line fuses T and W are to be connected to the power fuse R and that the positive side of the generator receptacle is to be connected to ground. By consulting note 3 and diagram #4 we find that the Signal Line should be connected to the line fuse S if the line current is negative or to the line fuse T if the line current is positive.

The Motor Control Line should then be connected to line fuse V (note #4).

Thus the connections on any set may be made by following the directions contained in the chart.

Print #798 shows the line connections for half duplex operation and the line connections for duplex operation.

CONVERTING KEYBOARD TO GIVE REPEAT ACTION

Where it is desired, the keyboard may be modified so that when a key is held depressed, the signals for that character or function will be sent out repeatedly until the key is released. This is sometimes useful for continuous spacing or line-feeding and slightly increases the actual speed of the keyboard.

The keyboard is modified to provide this repeat action by removing the trip-off pawl eccentric from the plate to which it is fastened and adding washers under the heads of the screws which mount the trip-off pawl stop plate. The added washers will project under the trip-off pawl and prevent it from moving downward and disengaging from the clutch lever pawl. These washers (#41663) will be found under the heads of the two brace screws on the transmitter shaft front bracket. One or more washers may be required to make the adjustment referred to.

ADJUSTMENTS

ADJUSTMENT OF RY20 (#215-A) LINE RELAY

The following outlines a form of mechanical adjustment for the No. 215-A relay which may be followed where a mechanical adjustment is to be given for putting the relay into operating condition. Adjusting the relay on a test-table as is done with the relays for the carrier or metallic telegraph systems is desirable where this can be done.

1. Clean Contacts.

Back off both pole pieces until an air gap of approximately 1/16 inch is obtained between each pole piece and the armature.
Clean the contacts. One method now employed is to use a very fine grade of emery paper similar to "000 French Emery Paper" around a thin flat blade, rubbing the contacts carefully until projections or "build-ups" are removed and then blowing out any resulting dust. In cleaning the armature contact, the armature should be supported in its mid-position by the opposite contact screw, to avoid bending the contact springs.

2. Remove Magnetic Dust from Pole Pieces and Armture.

Clean the pole pieces and armature with a tool, made from a piece of thin stiff metal, around the end of which have been wound two or three layers of friction tape. In using this tool the taped end should be pressed against the pole pieces so that any foreign particles will be imbedded in the tape.

3. Contact Adjustment.

See that the armature is perfectly vertical. Turn in one contact screw until it just touches the armature, then turn in the other contact screw until there is .002" gap between the armature and screw. Back off the other contact screw until there is a .004" gap between it and the armature when the armature is held against the first adjusted contact screw. This adjustment will give a total contact travel of .004". Use thickness gauge for measuring clearances.

4. Pole Piece Adjustment.

Turn up one of the pole pieces until the armature will remain against the corresponding contact when placed there. Then do the same with the other pole piece. In this manner turn in the two pole pieces alternately until the armature will hold against either contact to which it is moved.

Now back off each pole piece slightly until the armature remains central, that is, not touching either contact. When this condition is produced, the gap between the armature and a pole piece, when the armature is held against the opposite contact, should be about two or three thicknesses of printer paper, and with the armature central the gap between it and either pole piece should be equal.

The pole piece lock nuts should be tightened securely, care being taken not to disturb the adjustments.

SPEED SETTING

The receiving distributor and the keyboard and receiving distributor units are provided with governors and targets for setting and checking

the speeds of operation.

The above units are supplied for two different speed ranges and they have different motor gear ratios. The high speed units have a receiving cam gear ratio of 5 to 1 and are suitable for speeds of from 368 operations to 270 operations per minute. The low speed units have a receiving cam gear ratio of 7 to 1 and are suitable for speeds of from 270 to 180 operations per minute.

To check speed, strike the tines of the fork a light blow and sight at the target, which should be well illuminated, through the moving slits in the shutters. If the motor is running at the correct speed with the proper number of spots passing between shutter openings, the spots on the target will appear to be stationary. If the motor is running fast, the spots will appear to be moving in the direction in which the motor is rotating; if slow, in the opposite direction. The governor adjusting wheel should be turned to such a position that the spots appear to be stationary. It is well to stop the motor before attempting to turn the adjusting wheel.

It is advisable to set the speed approximately by means of some speed setting device, such as a tachometer or speedometer, and then to make the refinements by the use of the fork. This should be done to avoid the possibility of getting a speed multiple, i. e. the speed could be half the desired speed or twice the speed or some other multiple but the spots would appear to be stationary through the fork shutters.

The table below shows various speeds of operation, corresponding line frequencies and the number of spots required on the flywheel target when using the 87.6 V.P.S. tuning fork to check these speeds.

Operations per Minute	Theoretical Words per Minute	Line Frequency Cycle per Sec.	Receiving Distributor Gear Ratio	Number of Black Spots Required on Target
368.1	61.3	22.8	5 to 1	5
334.6	55.8	20.7	5 to 1	11
306.9	51.2	19.0	5 to 1	6
290.5	48.2	18.0	5 to 1	19
263.	43.8	16.3	7 to 1	5
239.1	39.8	14.8	7 to 1	11
207.6	34.6	12.9	7 to 1	19
187.8	31.3	11.6	7 to 1	7

ORIENTATION RANGE

Before taking an orentation range the adjustments of the line relay and the distributors should be checked and the speed should be very carefully set. After this has been done, "RY" (the letters "R" and "Y" sent alternately) should be sent continuously from the distant station while the range is being taken. The setting should not be made by testing on the local test circuit because the current through

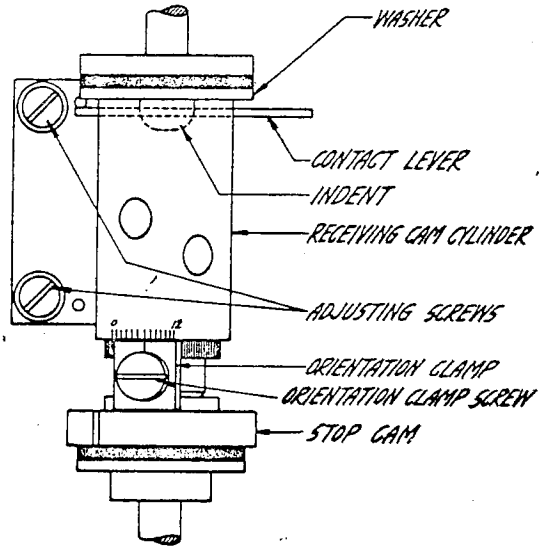


FIGURE 1.

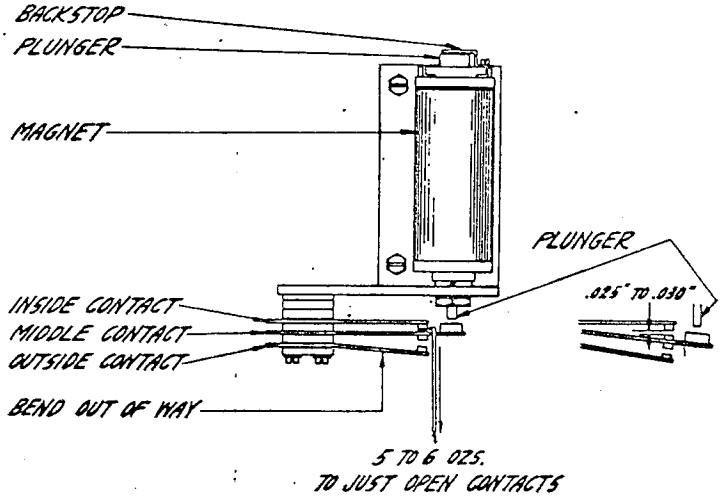


FIGURE 2.

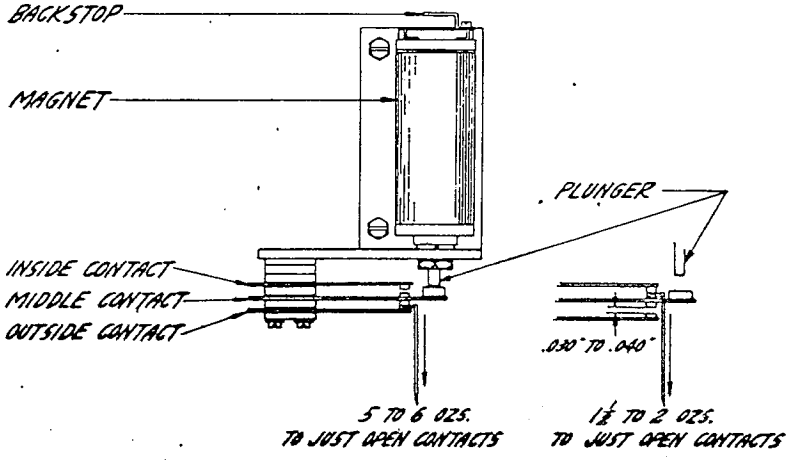


FIGURE 3.

the relay windings under this condition is less than when on the line which may result in a slightly erroneous setting.

The high extreme of the range is limited by the closing of the sixth pulse contacts, which in most cases occurs when the indicating mark on the clamp is at the end of the seventh division (reading the divisions on the cam cylinder from left to right), so the setting must be made with respect to the lower extreme.

Loosen the receiving cam cylinder clamping screw (see Fig. 1) and shift the cam cylinder in a clockwise direction to a point where errors occur in the "RY". Then move the cylinder in a counter-clockwise direction very carefully to a point where the "RY" prints perfectly. This will be the lower extreme of the range. Note the position on the cam cylinder scale. Now move the cylinder to a point where the sixth pulse contacts just are about to close when the stop cam is in its stopped position. If the "RY" comes in perfectly with the cylinder in this position, the high limit cannot be found. The final setting in such cases must be made with respect to the lower limit, that is, the cylinder must be set $2\frac{1}{2}$ divisions to the right of the lower limit, on high speed operation (368 operations per minute) and $1\frac{1}{4}$ divisions to the right on low speed operation (187 operations per minute). The setting for intermediate speeds should be in like proportion.

If the line signals become biased or vary sufficiently to cause errors, the lineup of the line circuit should be corrected rather than the orientation setting changed to accommodate the defective signal.

For certain special cases, where the signals have a definite tendency to be biased to marking or to spacing, it may be necessary to make a special adjustment by receiving signals from all sending stations on the circuit under average conditions, measuring the range of orientation and making a setting to accommodate best the various sending stations.

CONTROL RELAY ADJUSTMENTS

BREAK CONTACT TYPE (FIG. 2)

1. Bend the outside contact spring far enough out of the way to prevent its touching the middle contact spring when the magnet is energized.

2. Bend the middle contact spring so that it will require a tension of from 5 to 6 ozs. to separate the middle and the inside contact springs pulling next to the contact point of the middle spring.

3. Bend the inside contact spring so that when the magnet plunger is held in all the way by hand, the contact gap is from .025" to .030". After this adjustment has been made, check the contact tension.

MAKE CONTACT TYPE (FIG. 3)

1. With the magnet plunger held in all the way bend the outside contact spring so that it will require a tension of from 5 to 6 ounces

to open contacts pulling at outside contact spring at the contact point.

2. With the magnet plunger held in all the way adjust the inside contact spring so that there is a gap of from .030" to .040" between the middle and the inside contact spring contact points.

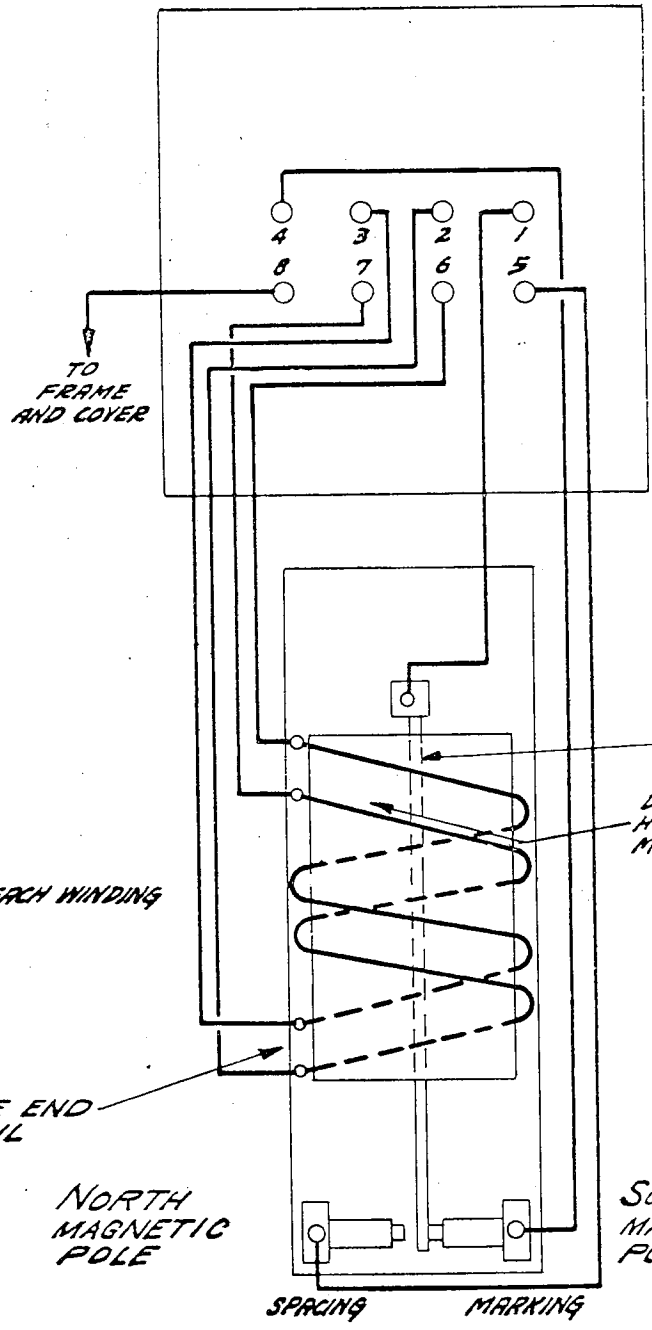
3. Then adjust the tension on the middle spring so that it will require a tension of from 1½ to 2 ounces to separate the middle and the inside contacts pulling next to the middle contact point.

The operating current for both types should be between .050A and .060A.

The foregoing adjustments also apply to relays equipped with two contact springs.

REVISIONS
(1) CHANGED WIRING TO AGREE WITH ACTUAL WIRING

LOOKING AT RELAY FROM TOP



TELETYPE CORPORATION

~~610~~

~~AUG. 1, 1924~~

610-A

(1) DEC. 12 1930

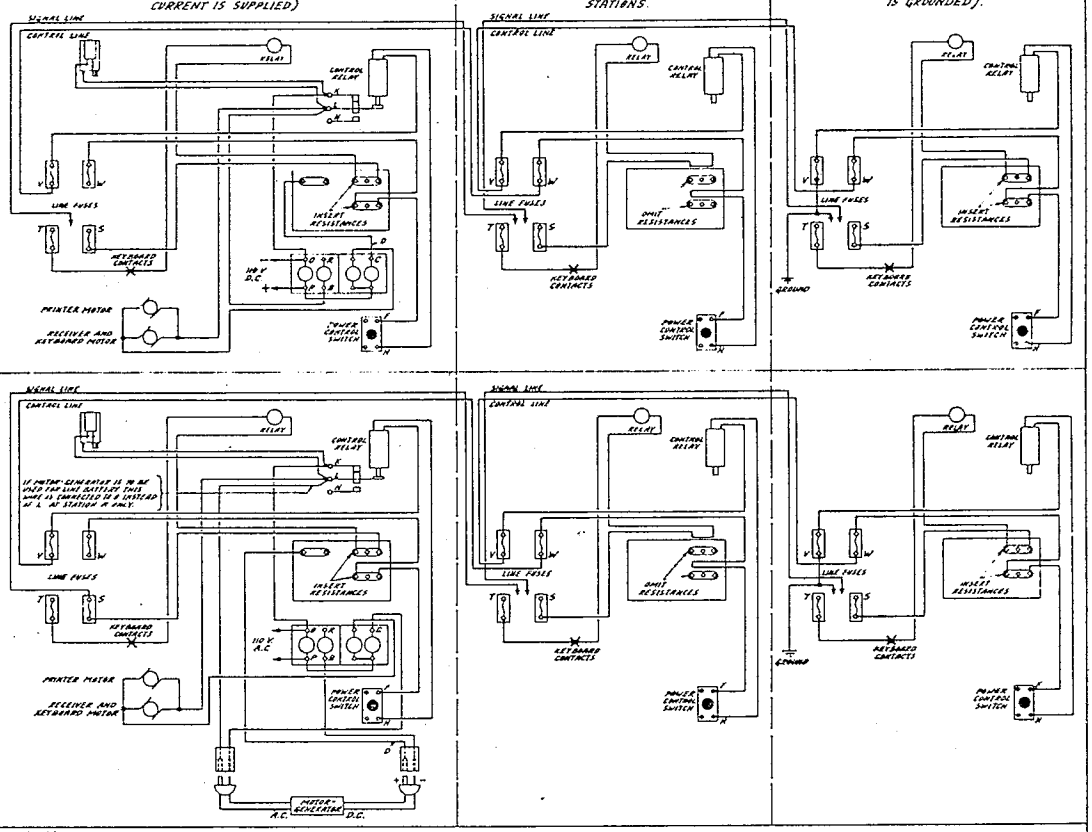
WIRING DIAGRAM
RY20
RELAY
(W.E.CO. 215A)

DRAWN A.D.
TRACED J.J.P
CHECKED A.E.
ENG'R'D
APPROVED J.C.P.

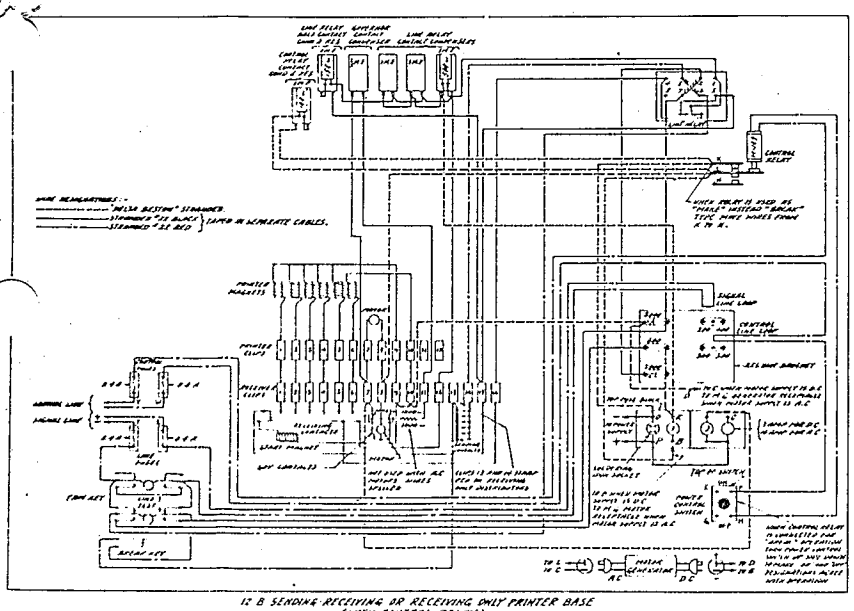
REMOTE MOTOR CONTROL OVER SECOND WIRE
(USING 12B PRINTER BASES - WITH CONTROL RELAY)

DIAGRAM #3

DIAGRAM #4



1 MOTOR POWER CONNECTIONS FOR FOLLOWING CONDITIONS:			
1A. IF POWER SUPPLY IS 110 V. D.C. (DIAGRAM 3)	CONNECT 110 V. D.C. + TO P AND − TO O. (L IS CONNECTED TO B AND WIRE D TO C).	SAME AS STATION A.	SAME AS STATION A.
1B. IF POWER SUPPLY IS 110 V. A.C. AND LINE BATTERY IS FURNISHED BY MOTOR-GENERATOR WHICH RUNS AT ALL TIMES. (DIAGRAM 4)	CONNECT 110 V. A.C. LEADS TO P AND O. DISCONNECT WIRE FROM L ON CONTROL RELAY (WHICH RUNS TO MOTOR-GENERATOR RECEPTACLE) AND CONNECT IT TO O. (ON SETS SHIPPED FROM THE FACTORY C AND L ARE CONNECTED TO M-G MOTOR RECEPTACLE, WIRE D TO + SIDE OF M-G GENERATOR RECEPTACLE AND B TO − SIDE).	CONNECT 110 V. A.C. LEADS TO P AND O. (C AND L ARE CONNECTED TO M-G MOTOR RECEPTACLE, WIRE D TO + SIDE OF M-G GENERATOR AND B TO − SIDE).	SAME AS STATION B.
1C. IF POWER SUPPLY IS 110 V. A.C. AND LINE BATTERY IS NOT FURNISHED BY MOTOR-GENERATOR. (DIAGRAM 4)	CONNECT 110 V. A.C. LEADS TO P AND O. (C AND L ARE CONNECTED TO M-G MOTOR RECEPTACLE, WIRE D TO + SIDE OF M-G GENERATOR RECEPTACLE AND B TO − SIDE).	SAME AS STATION A.	SAME AS STATION A.
2 LINE CURRENT SUPPLY FOR FOLLOWING CONDITIONS:			
2A. IF MOTOR SUPPLY IS GROUNDED 110 V. D.C. AT STATION A (DIAGRAM 3)	IF UNGROUNDED SIDE OF LINE CURRENT SUPPLY IS NEGATIVE RUN WIRE FROM O TO LINE FUSES T AND W. IF POSITIVE RUN WIRE FROM P TO LINE FUSES S AND W.	NO LINE CURRENT CONNECTIONS REQUIRED AT THIS STATION.	IF LINE CURRENT SUPPLY IS NEGATIVE RUN WIRE FROM LINE FUSES S AND V TO GROUND. IF POSITIVE RUN WIRE FROM LINE FUSES T AND V TO GROUND.
2B IF MOTOR SUPPLY IS UNGROUNDED 110 V DC AND A SOURCE OF GROUNDED D.C. SUCH AS TELEGRAPH BATTERY IS AVAILABLE AT STATION A. (DIAGRAM 3)	IF UNGROUNDED SIDE OF LINE CURRENT SUPPLY IS NEGATIVE CONNECT IT TO LINE FUSES T AND W IF POSITIVE CONNECT IT TO LINE FUSES S AND W.	" "	" "
IF MOTOR SUPPLY IS 110 V. A.C. AND LINE CURRENT IS SUPPLIED FROM MOTOR GENERATOR SET WHICH RUNS AT ALL TIMES. (DIAGRAM 4)	CONNECT LINE FUSES T AND W TO R AND CONNECT + SIDE OF GENERATOR RECEPTACLE TO GROUND.	" "	RUN WIRE FROM LINE FUSE S TO GROUND.
3 SIGNAL LINE CONNECTIONS. (DIAGRAMS 3 AND 4)	IF LINE CURRENT IS NEGATIVE CONNECT LINE WIRE TO LINE FUSE S. IF POSITIVE CONNECT IT TO LINE FUSE T.	INCOMING TO LINE FUSE T IF LINE CURRENT IS NEGATIVE, TO LINE FUSE S IF LINE CURRENT IS POSITIVE. / OUTGOING TO LINE FUSE S IF LINE CURRENT IS NEGATIVE, TO LINE FUSE T IF LINE CURRENT IS POSITIVE.	IF LINE CURRENT IS NEGATIVE CONNECT LINE WIRE TO LINE FUSE T. IF LINE CURRENT IS POSITIVE CONNECT LINE WIRE TO LINE FUSE S.
MOTOR CONTROL LINE CONNECTIONS. (DIAGRAMS 3 AND 4)	CONNECT CONTROL LINE TO LINE FUSE V.	INCOMING TO LINE FUSE W. OUTGOING TO LINE FUSE V.	CONNECT CONTROL LINE TO LINE FUSE W.



12 B SENDING RECEIVING OR RECEIVING ONLY PRINTER BASE
(WITH CONTROL RELAY).

POSSIBLE NUMBER OF MACHINES ON A CIRCUIT

THE NUMBER OF MACHINES WHICH CAN BE WORKED ON A CIRCUIT DEPENDS ALMOST UPON THE RESISTANCE OF THE LINE AND RESISTANCE OF THE LINE AND CONTROL RELAYS.

LINE CURRENT VALUES.

SIGNAL LINE : .050 TO .060 AMPERES
CONTROL LINE : .050 TO .060 AMPERES
} AT 110 VOLTS D.C.

LINE CURRENT LIMITING RESISTANCES.

EACH MACHINE IS PROVIDED WITH ONE 300-400 OHM (19BJ) RESISTANCE AND ONE 300-500 OHM (19GJ) RESISTANCE.

CONNECT THE 19BJ RESISTANCE IN SIGNAL LINE LOOP AT ONE TERMINAL STATION AND 19GJ RESISTANCE IN SIGNAL LINE LOOP AT OTHER TERMINAL.

CONNECT THE 19GJ RESISTANCE IN CONTROL LINE LOOP AT ONE TERMINAL STATION AND 19BG RESISTANCE IN CONTROL LINE LOOP AT OTHER TERMINAL.

DO NOT BREAK LINE LOOPS AT INTERMEDIATE STATIONS.

BY SHORTING OUT SECTIONS OF THE RESISTANCES AS SHOWN BELOW TOTAL RESISTANCE INSERTED IN LINE WILL BE AS INDICATED.

TERMINAL STATION A 300-400 OHM (19BJ) RES.	TERMINAL STATION B 300-500 OHM (19GJ) RES.	COMBINED RES. (OHMS)
300 400	300 500	1400
		1200
		1100
		1000
		900
		800
		700
		600
		500
		400
		300
		200

MORKRUM-KLEINSCHMIDT CORPORATION

911

NOVEMBER 28, 1927

MODEL 12 PAGE TELETYPE INSTALLATION INFORMATION

DRAWN A.O.
TRACED A.P.
CHECKED A.C.
ENG'R'D A.S.B.
APPROVED J.S.W.

LOCAL MOTOR CONTROL
(USING 12-A PRINTER BASES - WITHOUT CONTROL RELAY)

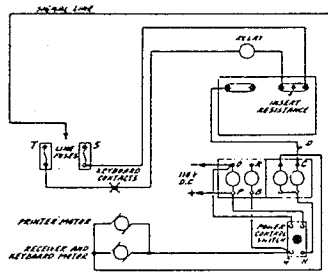
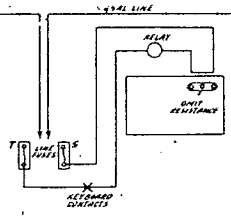
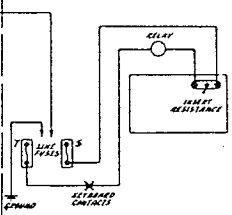
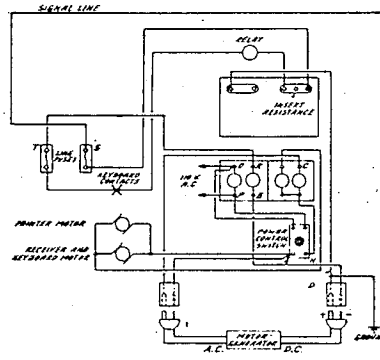
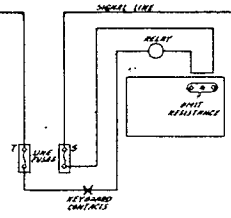
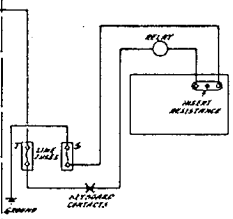
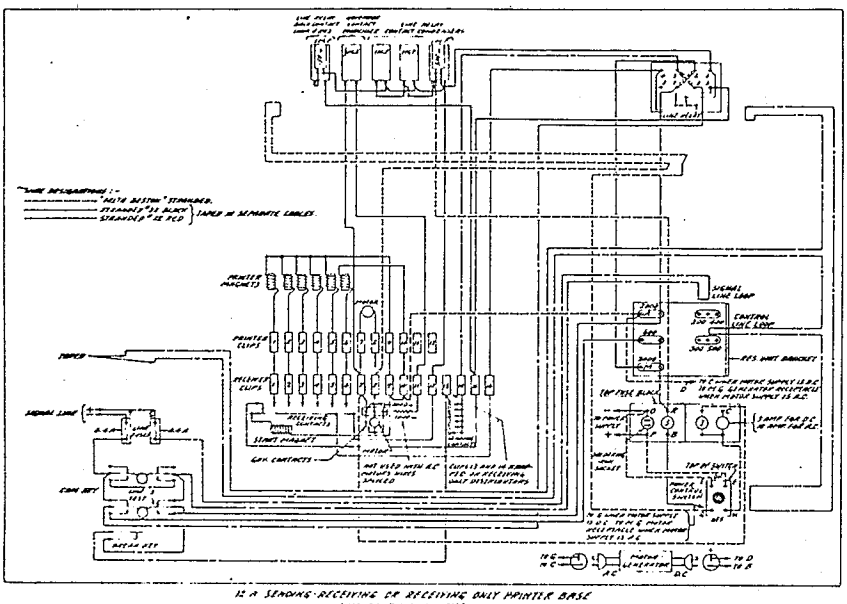
	STATION A (STATION FROM WHICH LINE CURRENT IS SUPPLIED).	STATION B AND OTHER INTERMEDIATE STATIONS.	STATION C (STATION AT WHICH LINE IS GROUNDED).
DIAGRAM #1			
DIAGRAM #2			
1. MOTOR POWER CONNECTIONS FOR FOLLOWING CONDITIONS:			
1A. IF POWER SUPPLY IS 110 V. D.C. (DIAGRAM 1)	CONNECT 110 V. D.C. + TO P AND − TO D. (G IS CONNECTED TO B AND WIRE D TO C).	SAME AS STATION A.	SAME AS STATION A.
1B. IF POWER SUPPLY IS 110 V. A.C. (DIAGRAM 2)	CONNECT 110 V. A.C. LEADS TO P AND D. (G AND C ARE CONNECTED TO M-G MOTOR RECEPTACLE, WIRE D TO + SIDE OF M-G GENERATOR RECEPTACLE AND B TO −SIDE).	SAME AS STATION A.	SAME AS STATION A.
2. LINE CURRENT SUPPLY FOR FOLLOWING CONDITIONS:			
2A. IF MOTOR SUPPLY IS GROUNDED 110 V. D.C. AT STATION A. (DIAGRAM 1)	IF UNGROUNDED SIDE OF LINE CURRENT SUPPLY IS NEGATIVE RUN WIRE FROM LINE FUSE T TO D. IF POSITIVE RUN WIRE FROM LINE FUSE S TO P.	NO LINE CURRENT CONNECTIONS REQUIRED AT THIS STATION.	IF LINE CURRENT SUPPLY IS NEGATIVE CONNECT LINE FUSE S TO GROUND. IF POSITIVE CONNECT LINE FUSE T TO GROUND.
2B. IF MOTOR SUPPLY IS UNGROUNDED 110 V D.C. AND A SOURCE OF GROUNDED D.C. SUCH AS TELEGRAPH BATTERY IS AVAILABLE AT STATION A. (DIAGRAM 1)	IF UNGROUNDED SIDE OF LINE CURRENT SUPPLY IS NEGATIVE CONNECT IT TO LINE FUSE T. IF POSITIVE CONNECT IT TO LINE FUSE S.	" "	" "
2C. IF MOTOR SUPPLY IS 110 V A.C AND LINE CURRENT IS SUPPLIED FROM MOTOR GENERATOR SET CONTROLLED BY CAPTIVE SWITCH. (DIAGRAM 2)	CONNECT LINE FUSE T TO R AND CONNECT + SIDE OF GENERATOR RECEPTACLE TO GROUND.	" "	RUN WIRE FROM LINE FUSE S TO GROUND.
3. SIGNAL LINE CONNECTIONS. (DIAGRAMS 1 AND 2)	IF LINE CURRENT IS NEGATIVE CONNECT LINE WIRE TO LINE FUSE S. IF POSITIVE CONNECT IT TO LINE FUSE T.	INCOMING TO LINE FUSE T IF LINE CURRENT IS NEGATIVE, TO LINE FUSE S IF LINE CURRENT IS POSITIVE. OUTGOING TO LINE FUSE S IF LINE CURRENT IS NEGATIVE, TO LINE FUSE T IF LINE CURRENT IS POSITIVE.	IF LINE CURRENT IS NEGATIVE CONNECT LINE WIRE TO LINE FUSE T. IF LINE CURRENT IS POSITIVE CONNECT LINE WIRE TO LINE FUSE S.

DIAGRAM #3

DIAGRAM #4

1. MOTOR POWER CONNECTIONS FOR FOLLOWING CONDITIONS:	
1A. IF POWER SUPPLY IS 110 V. D.C. (DIAGRAM 3)	CONNECT 11… D TO C).
1B. IF POWER SUPPLY IS 110 V. A.C. AND LINE BATTERY IS FURNISHED BY MOTOR-GENERATOR WHICH RUNS AT ALL TIMES. (DIAGRAM 4)	CONNECT 110 … TROL RELAY … IT TO D. (C … TO M-G MO … CEPTACLE A…
1C. IF POWER SUPPLY IS 110 V. A.C. AND LINE BATTERY IS NOT FURNISHED BY MOTOR-GENERATOR. (DIAGRAM 4)	CONNECT 11… MOTOR REC… AND B TO …
2. LINE CURRENT SUPPLY FOR FOLLOWING CONDITIONS:	
2A. IF MOTOR SUPPLY IS GROUNDED 110 V D.C. AT STATION A. (DIAGRAM 3)	IF UNGROUN… D TO LINE … S AND W.
2B. IF MOTOR SUPPLY IS UNGROUNDED 110 V D.C. AND A SOURCE OF GROUNDED D.C. SUCH AS TELEGRAPH BATTERY IS AVAILABLE AT STATION A. (DIAGRAM 3)	IF UNGROUN… LINE FUSES
2C. IF MOTOR SUPPLY IS 110 V. A.C AND LINE CURRENT IS SUPPLIED FROM MOTOR GENERATOR SET WHICH RUNS AT ALL TIMES. (DIAGRAM 4)	CONNECT LI… RECEPTACLE
3. SIGNAL LINE CONNECTIONS. (DIAGRAMS 3 AND 4)	IF LINE CU… TIVE CONNE…
4. MOTOR CONTROL LINE CONNECTIONS (DIAGRAMS 3 AND 4)	CONNECT CO…



12-A SENDING-RECEIVING OR RECEIVING ONLY PRINTER BASE (W/ CONTROL RELAY)

NOTE.

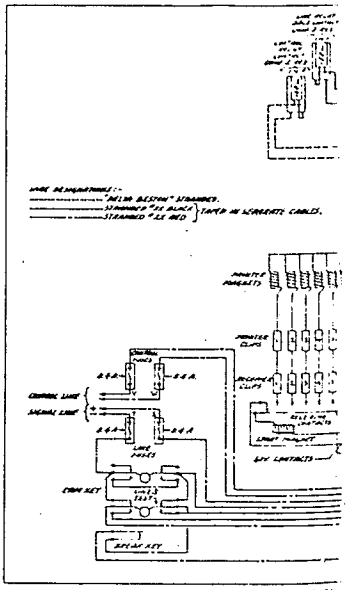
TO CONVERT 12-A TO 12-B BASES ADD CONTROL LINE FUSES, CONTROL RELAY, RELAY CONTACT PROTECTION RESISTANCE AND CONDENSER. CUT WIRE LOOPS AT CONTROL RELAY COIL, CONDENSER AND RESISTANCE, AND POWER CONTROL SWITCH AND CONNECT THEM TO UNITS. CONNECT WIRES AT CONTROL FUSES TO THESE UNITS. CONNECT LINK 1 TO CONTACTS K OR M AND LINK 7 TO CONTACT L. WIRES CONNECTED TO G AND W SHOULD BE CONNECTED INSTEAD TO D AND P. OMIT CONNECTIONS FROM D TO E AND P TO F.

WHEN CONTROL RELAY IS CONNECTED FOR "BREAK" OPERATION TURN POWER CONTROL SWITCH UP SIDE DOWN TO MAKE "ON" AND "OFF" DESIGNATIONS AGREE WITH OPERATION.

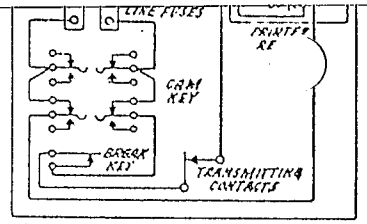
NOTE

THIS PRINT COVERS CONNECTIONS FOR VARIOUS CONDITIONS OF LINE CIRCUITS, MOTOR POWER SUPPLY AND LINE CURRENT SUPPLY.

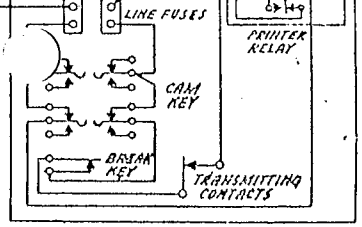
BEFORE STARTING INSTALLATION FIND INSTRUCTIONS COVERING CONDITIONS AT POINT WHERE INSTALLATION IS TO BE MADE.



12-B SENDING-RE…

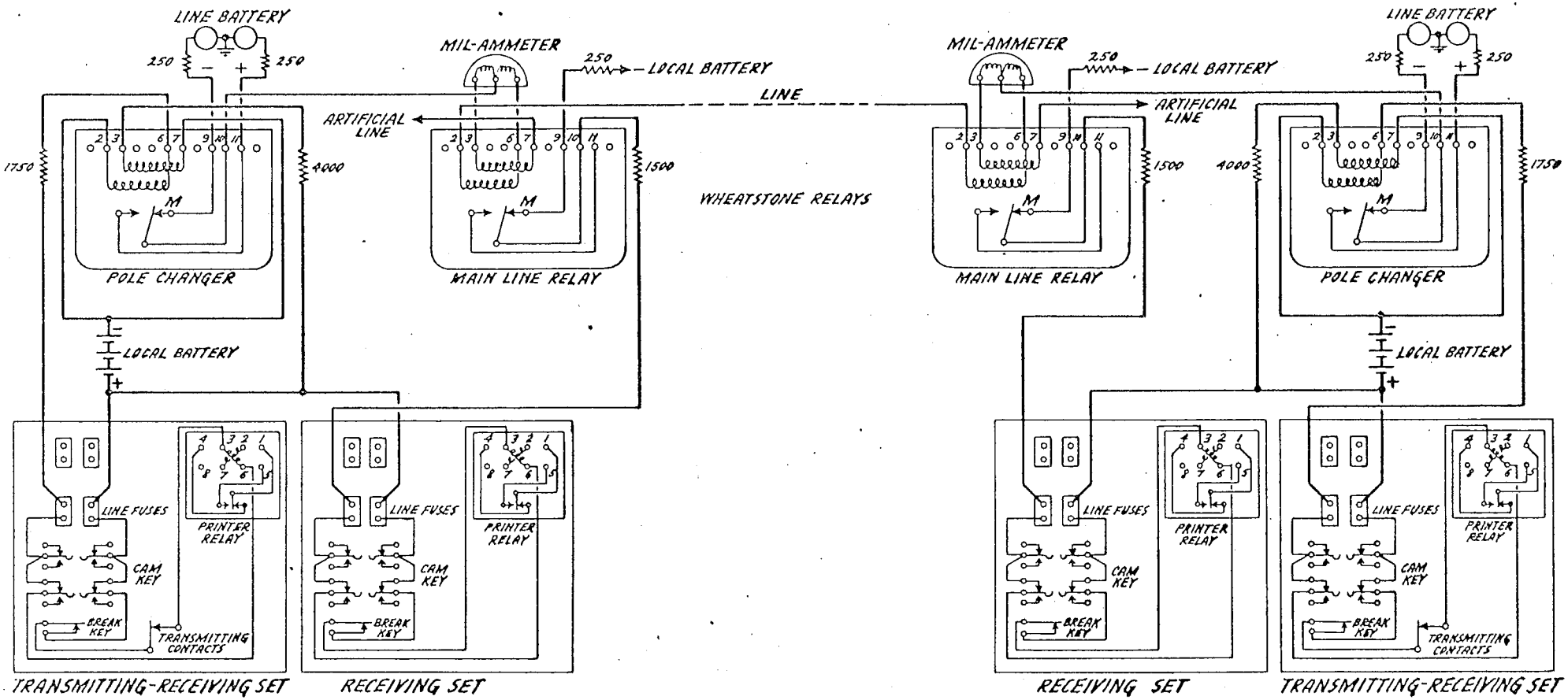


TRANSMITTING-RECEIVING SET



TRANSMITTING-RECEIVING SET

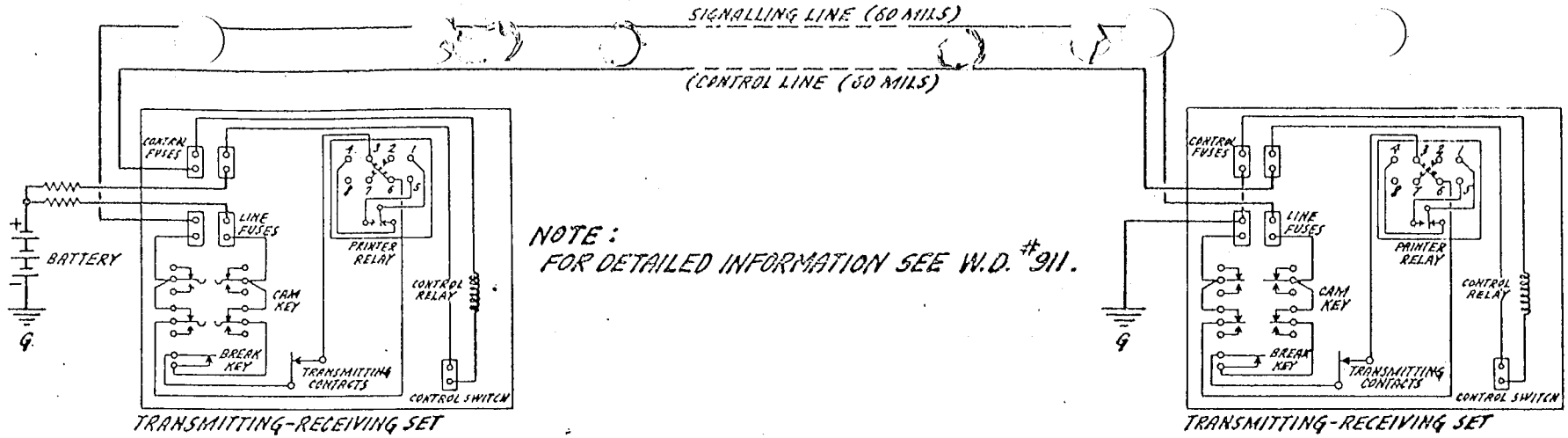
LINE CONNECTIONS FOR HALF DUPLEX OPERATION OF MODEL 12 SETS



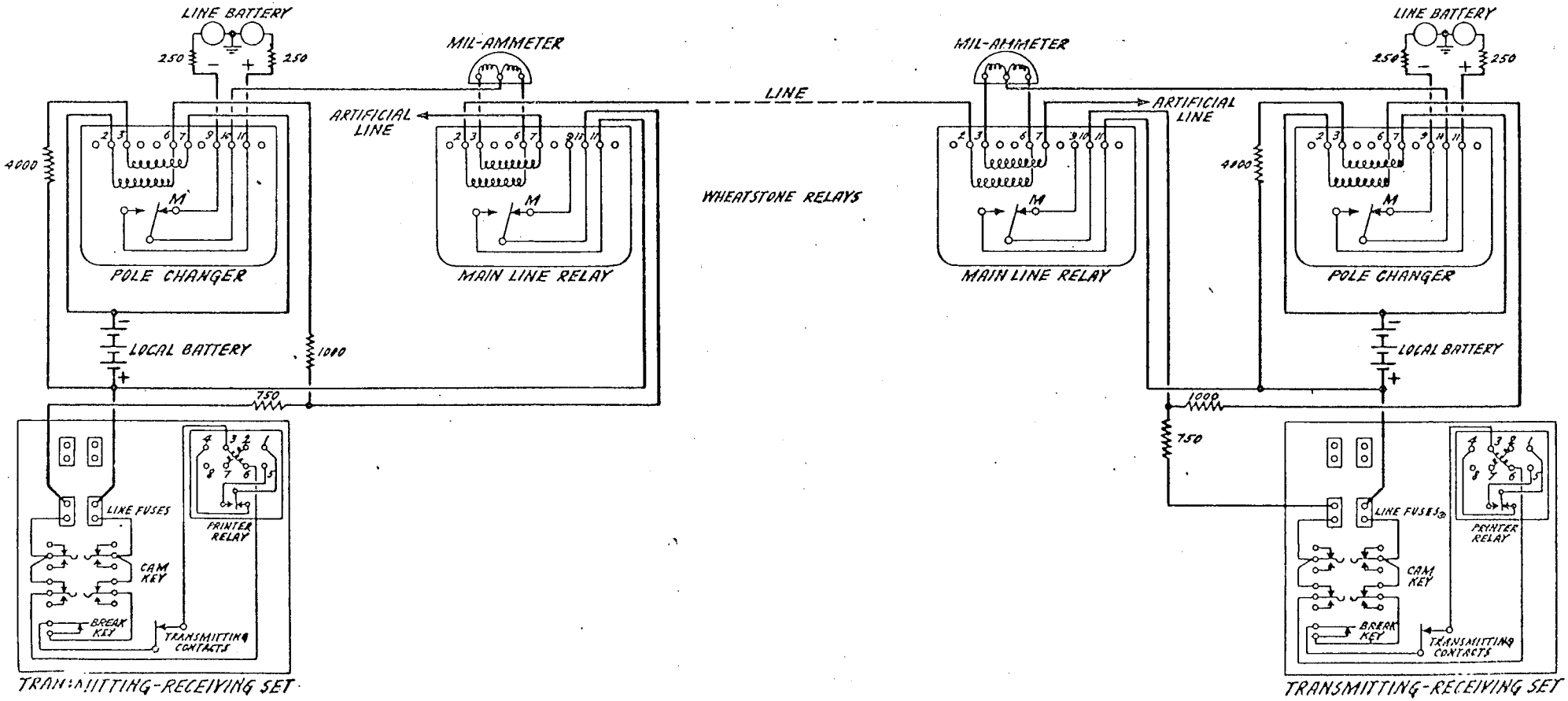
LINE CONNECTIONS FOR DUPLEX OPERATION OF MODEL 12 SETS

DRAWN A.D. TRACED A.D. CHECKED ENG'R'D A.S.B. APPROVED C.J.P.	MODEL 12 PAGE TELETYPE CIRCUIT DIAGRAMS		REVISED 11-28-27 J.P. NOTE ADDED.	REVISED 8-1-26. A.S.B. CONTROL SWITCH ADDED.	MAY 5, 1926. 798	MORKRUM-KLEINSCHMIDT CORPORATION

NOTE: FOR MODEL 12 PAGE TELETYPE SET WIRING SEE W.D. # 911



LINE CONNECTIONS FOR SIMPLEX OPERATION OF MODEL 12 SETS



LINE CONNECTIONS FOR HALF DUPLEX OPERATION OF MODEL 12 SETS