Supplement #4 to
Morkrum Spec. 112,
Postal Spec. W.S. 5,
March 1924.

MORKRUM MULTIPLEX PRINTING TELEGRAPH SYSTEM

CONTENTS

MORKRUM MULTIPLEX PRINTING TELEGRAPH SYSTEM

GENERAL:

This supplement forms a part of Morkrum Specification #112 and Postal W.S. 5, dated January 1923.

Several changes have been made in the Morkrum Multiplex Printing Telegraph System which affect the wiring of the apparatus and method of operation of the system.

In general the changes are as follows:

(1) The line relay changed from 1-B to 1-A relay and the proper resistance and condensers for the operation of the 1-A relay added to the panel box.

(2) The condenser and line switch has been replaced by a new SOUNDER SWITCH. The condenser switch has been entirely eliminated and the line switch moved to the position formerly occupied by the sounder switch.

(3) The operating table power rotary switch has been eliminated.

(4) The transmitting distributor wiring and cam cutouts have been changed and the A.C. switch on distributor eliminated.

(5) The printer and switch relays have been provided with individual operating coil potentiometer resistances in order to improve the margin of operation of the printer relay.

(6) The holding relay condenser circuit resistance changed from 150 ohms to 250 ohms.

(7) The size of the tungsten line battery lamps changed from 50 watts to 60 watts.

We will now take up the various changes in detail

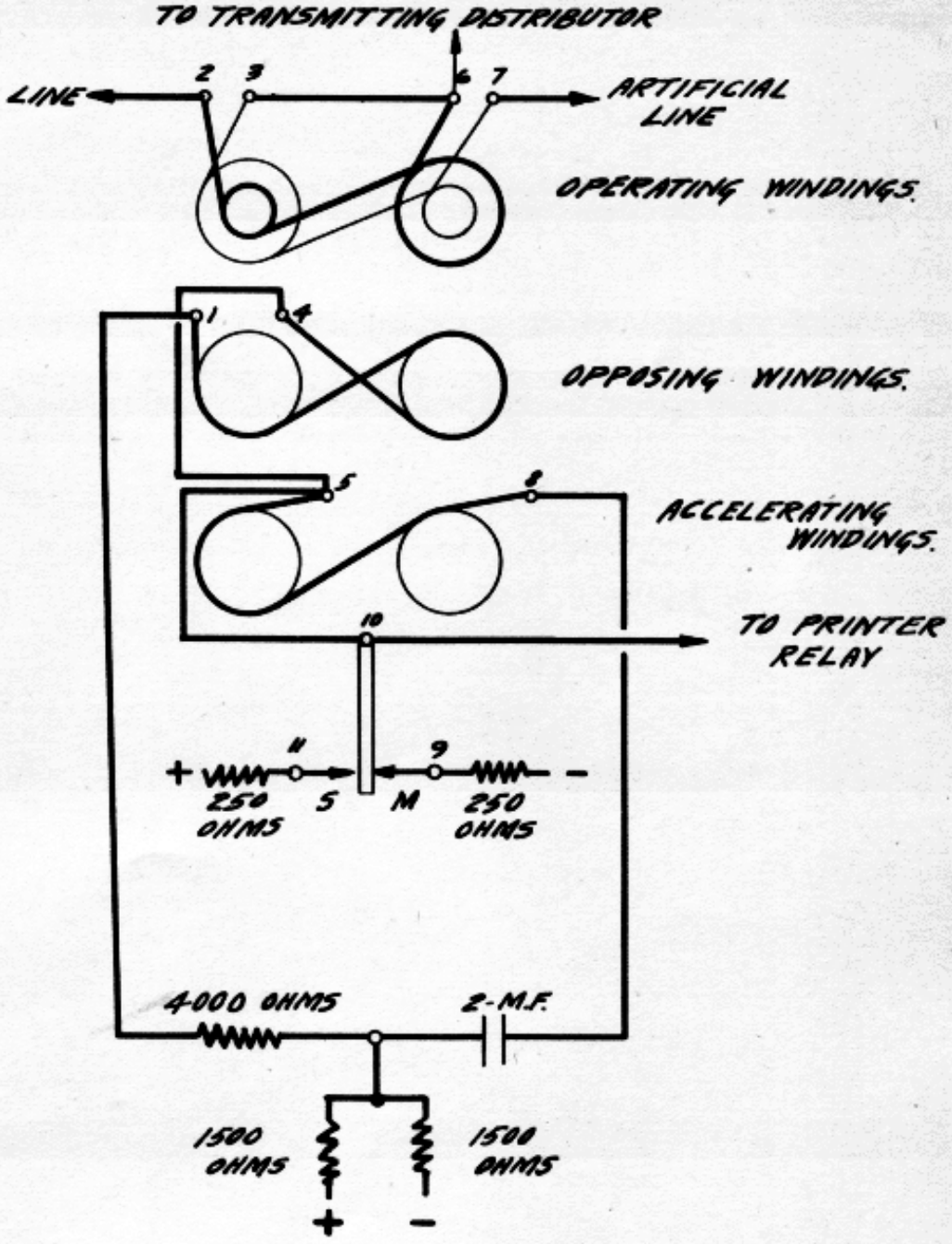
LINE RELAYS

Wiring diagram #376 included in this supplement shows the actual wiring of the 1-A Line Relay.

Figure 1 shows the theoretical connections of the line relay circuit. In addition to the regular operating windings the 1-A relays are provided with two auxiliary windings known as the accelerating (AA) winding and opposing (OO) winding.

The operating winding is connected to the line in the usual manner. The accelerating winding and opposing winding are connected together and to the condenser and resistances as shown in figure 1. With this circuit the speed of operation of the relay is greatly increased over that of a 1-B relay as will be understood from the following explanation.

When the tongue reaches the spacing contact a rush of current passes to the condenser through the accelerating winding in such direction as to hold the tongue against the spacing contact. At the same time current flows through the opposing winding and a resistance in series with it in such direction as to tend to move the tongue toward the marking contact, giving an opposing effect to the current in the accelerating and operating windings. The condenser charging current, however, diminishes to zero, while the current through the opposing winding increases to a steady value which will cause the tongue to move towards the marking contact, when the line current diminishes at the moment of reversal.



NUMBERS ON TERMINALS REFER TO THOSE ON DIAGRAM 376

FIGURE 1

1-A RELAY CIRCUIT

As soon as the tongue leaves the spacing contact, battery is cut off and the condenser discharges through the accelerating and opposing coils in a direction to assist the motion of the tongue, thus shortening the transit time. When the tongue reaches the marking contact, the same cycle of operations is repeated, the tongue, of course, tending to move in the reverse direction.

CONTACT TONGUE TRAVELS.

The contact tongue travels of the various relays are as follows:

Line relay	.004"	Printer relay	.004"
Switch relay	.006"	Corrector relay	.012"
Holding relay	.012"	Auto-speed relay	.012"

CONDENSER AND LINE SWITCH.

The condenser and line switch has been changed, the condenser side of the switch being eliminated entirely. The artificial line condensers are permanently connected to ground. The line switch has been removed to the position previously occupied by the sounder switch. (See theoretical diagram #571 included in this supplement).

SOUNDER SWITCH.

The switch placed in the position formerly occupied by the condenser and line switch is known as the SOUNDER SWITCH. It is a two-bladed switch with the blades connected together by an insulated bar. When the sounder switch is in its left or normal position the marking and spacing contacts of the printer relay are connected to the receiving contacts on the receiving distributor, and when in its right-hand position

the printer relay contacts are disconnected from the receiving contacts and the marking contact on the relay is connected to the sounder. It is to be noted that when the sounder switch is thrown to the right the printers will be inoperative due to the fact that the receiving distributor is disconnected from the relay contacts.

OPERATING TABLE POWER SWITCH.

The operating table rotary power switch on the right-hand side of the distributor table shelf has been eliminated, and the table power leads run from the terminal block direct to the operating tables.

TRANSMITTING DISTRIBUTOR.

The transmitting distributor described on page 27 of the original specifications has its wiring and cam cutouts slightly changed. Referring to figure 11 of the original specification, we notice that the AC contacts were used for transmitting AC for balancing purposes, and that the ten transmitting contacts control the code impulses. With this arrangement when transmitting code impulses, the transmitting line signal is somewhat dependent upon the transmitting contact adjustment, a wide contact gap for instance giving a shortened signal.

It has been found, however, that by connecting the transmitting distributor as shown in the theoretical diagram #571, and wiring diagram #559 of the new transmitting distributor, that the operation will be improved. Instead of connecting the common side of the transmitting contacts together and to the split of the ammeter, the alternate transmitting contacts are

connected together and each group to one of the AC contacts. The mates of these AC contacts are connected together and to the split of the ammeter; the AC switch being eliminated.

The cam cutouts are so arranged that one AC contact will be closed when a corresponding transmitting pulse contact is closed, but the AC contact cutout is shorter than the transmitting pulse cutout. The transmitted impulses from the AC contacts are, therefore, uniform in length regardless of the transmitting contact gap adjustments.

Diagram #559 shows the actual wiring of the new Morkrum Multiplex Transmitting Distributor. The various numbered contacts go to the same points as described on page 28, of the original specification.

A C CONTACTS.

As previously explained, the AC switch on the distributor has been eliminated. AC for balancing may now be procured by throwing the transmitter locking key to its front or locking position.

PRINTER AND SWITCH RELAY CONNECTIONS.

Referring to theoretical diagram #508 in the original specification it is noted that the printer and switch relay coils are brought to a single pair of potentiometer resistance coils. With this connection the printer relay is sometimes connected to battery in parallel with the switch relay which gives a different value of current through the coils of the printer relay than that which flows through it when it is connected to

battery by itself. To overcome this condition a separate pair of potentiometer resistances have been provided for each relay. See diagram #571.

DISTRIBUTOR TABLE WIRING.

Diagram #572 superseding diagram #487 shows the wiring and relative positions of the various units on the new Multiplex distributor table.

DISTRIBUTOR TABLE PANEL BOX WIRING.

Diagram #568 superseding diagram #490 shows the wiring and relative positions of units in the new Multiplex distributor table panel box. The cable connections between the distributor table and operating tables are also given in this diagram.

COMPLETE THEORETICAL DIAGRAM.

Diagram #571 superseding #508 shows the theoretical connections of the Morkrum Multiplex System.

STARTING A MORKRUM MULTIPLEX SYSTEM

Due to the several changes in switches and circuits the operation of the circuit is slightly different from that prescribed in the original specification. With the new arrangement of switches the various switches are thrown to the positions given below.

OPERATING TABLE PRINTER SWITCHES

The printer switches in all operating tables should be turned OFF when matching speed.

POSITION OF SWITCHES ON DISTRIBUTOR TABLES.

The corrector switch in CENTER position, sounder switch to

LEFT auto speed control motor switch to RIGHT, transmitter locking switch toward front. All other switches on the table are in their normal or LEFT positions.

SYNCHRONIZING

The circuit is then started and synchronized as before. When the transmitter locking switch is towards the front AC will be transmitted for balancing and synchronizing purposes. Two errors appear in the second paragraph on page 43 of the original specification. The paragraph should read as follows, the words in capitals following the corrections:

> If the corrector rheostat is turned to its extreme counter-clockwise position and the interval remains less than 30 seconds, the corrector magnet pole pieces should be moved FURTHER AWAY from the fork tines. This will make the corrector magnets LESS effective, thus decreasing the fork speed. Care should be taken to keep the pole pieces parallel to the tines.

PHASING.

The two distributors are brought into phase as explained on page 44 of the original specification with the exception that the indicator of the range finder should be set at 15. It is, of course, necessary that the "A" channel operating table printer switches be turned ON.

ORIENTATION.

The new method of orientation is as follows:

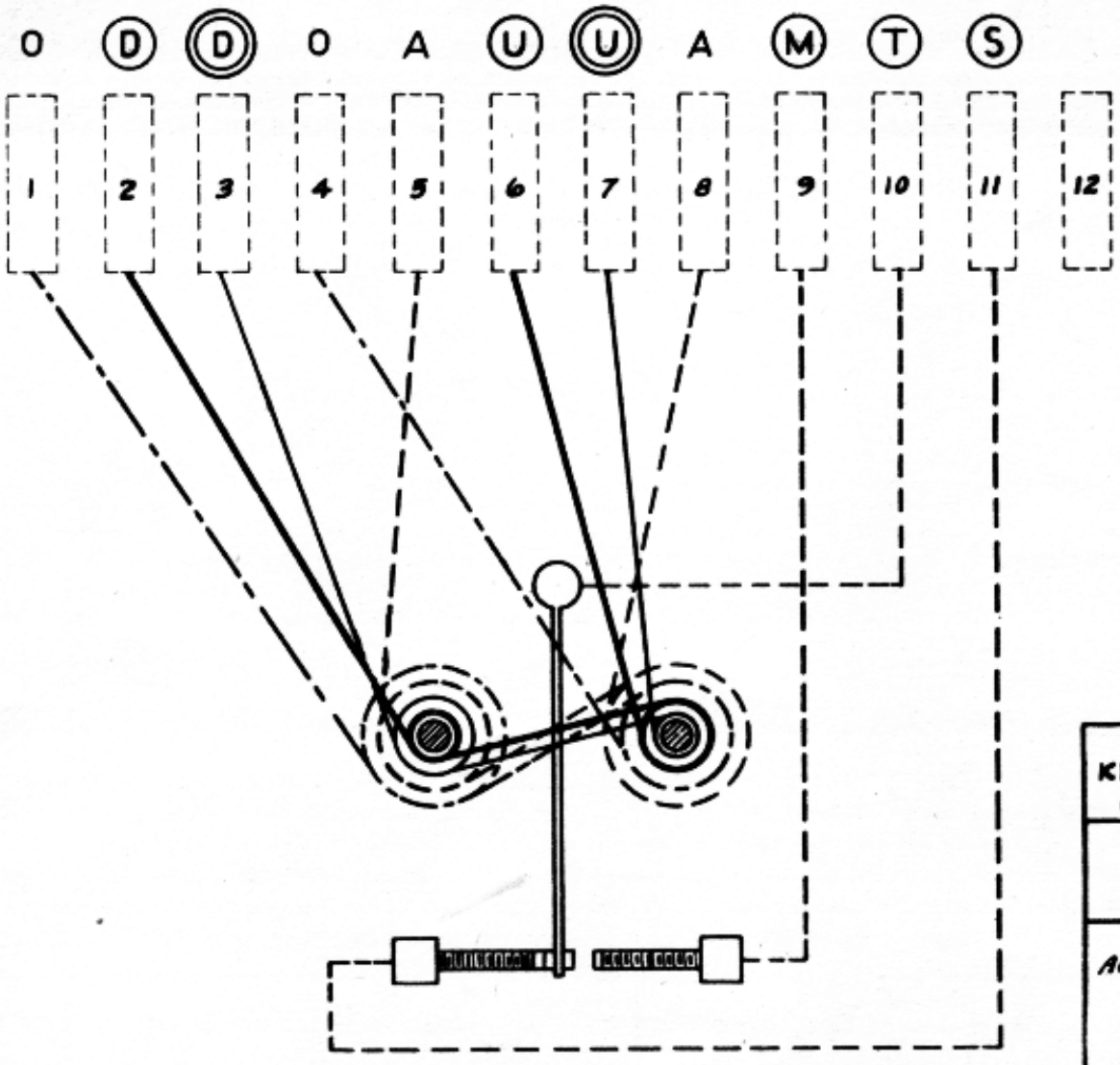
The distant terminal is asked to let LTRS run on the first channel. They will throw their transmitter locking key toward the

rear or operating position and let the transmitter operate with tape. The range finder or the receiving distributor is moved to the right until letters or functions other than the LTRS or Unshift signals are recorded. The position of the indicator is noted and the range finder moved to the left until letters or functions other than the LTRS signals are recorded on the printer and the position of the indicator again noted. The indicator is then set midway between the two extremes found.

The best position of the range finder is not likely to change and it is not necessary that it should be checked daily. It should, however, be checked when the printing is not correct, and the usual remedies do not correct the trouble.

FINAL TEST.

With the range finder set in its best position, all the operating table printer switches turned on, all switches on distributor table thrown to the left the distant end should be asked to run a test slip. A test slip should be run through the transmitters on all channels. When both ends are receiving test copy correctly on all channels the circuit is ready for business.



MORKRUM KLEINSCHMIDT CORPORATION

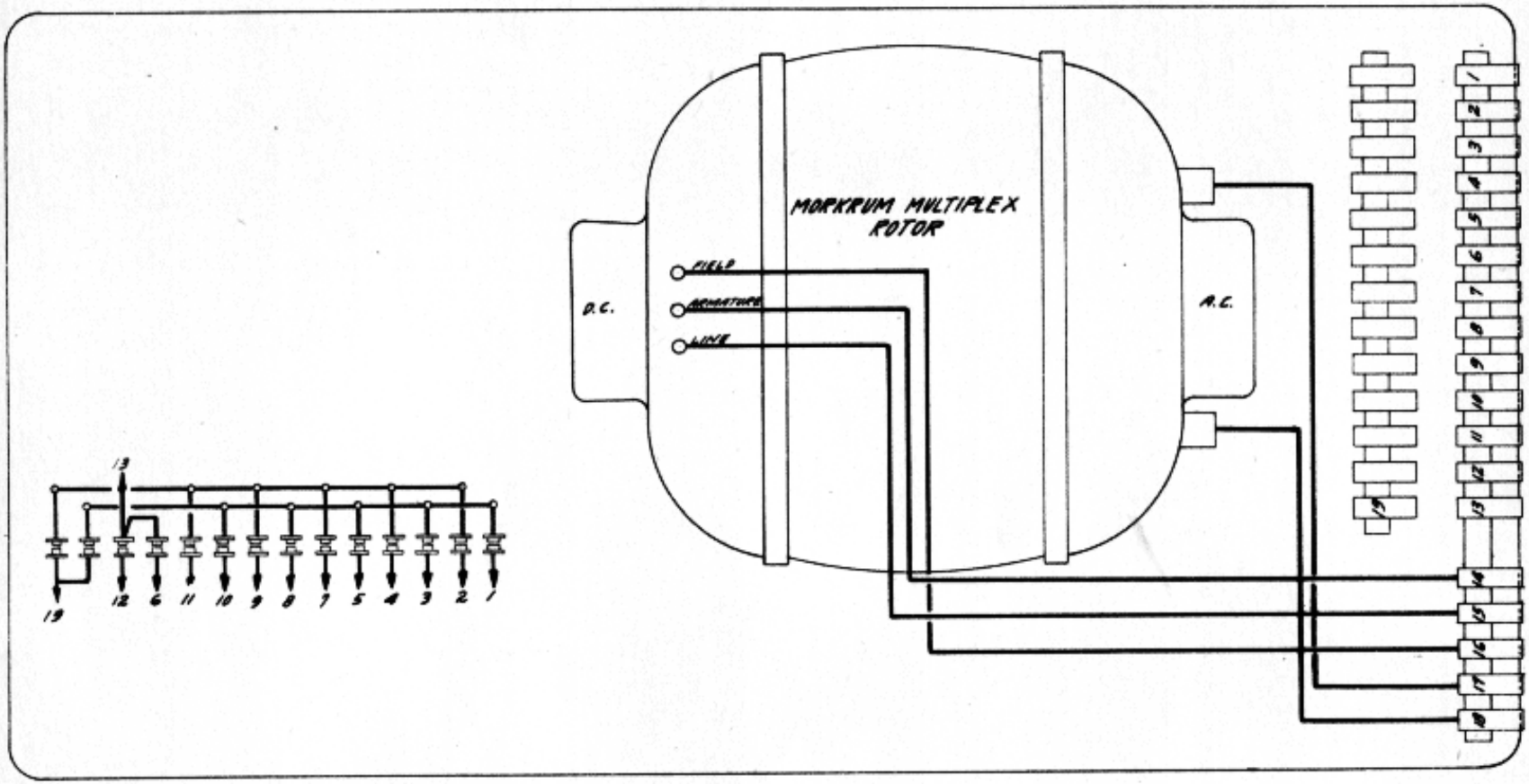
376

MAY-7-1920

REVISED AUG.11-1921 A.S.B

WIRING DIAGRAM COMBINATION WHEATSTONE RELAY (1A) TYPE 705 708 *RY6

DRAWN	A.S.B.
TRACED	
CHECKED	
ENG'R'D	A.S.B.
APPROVED	

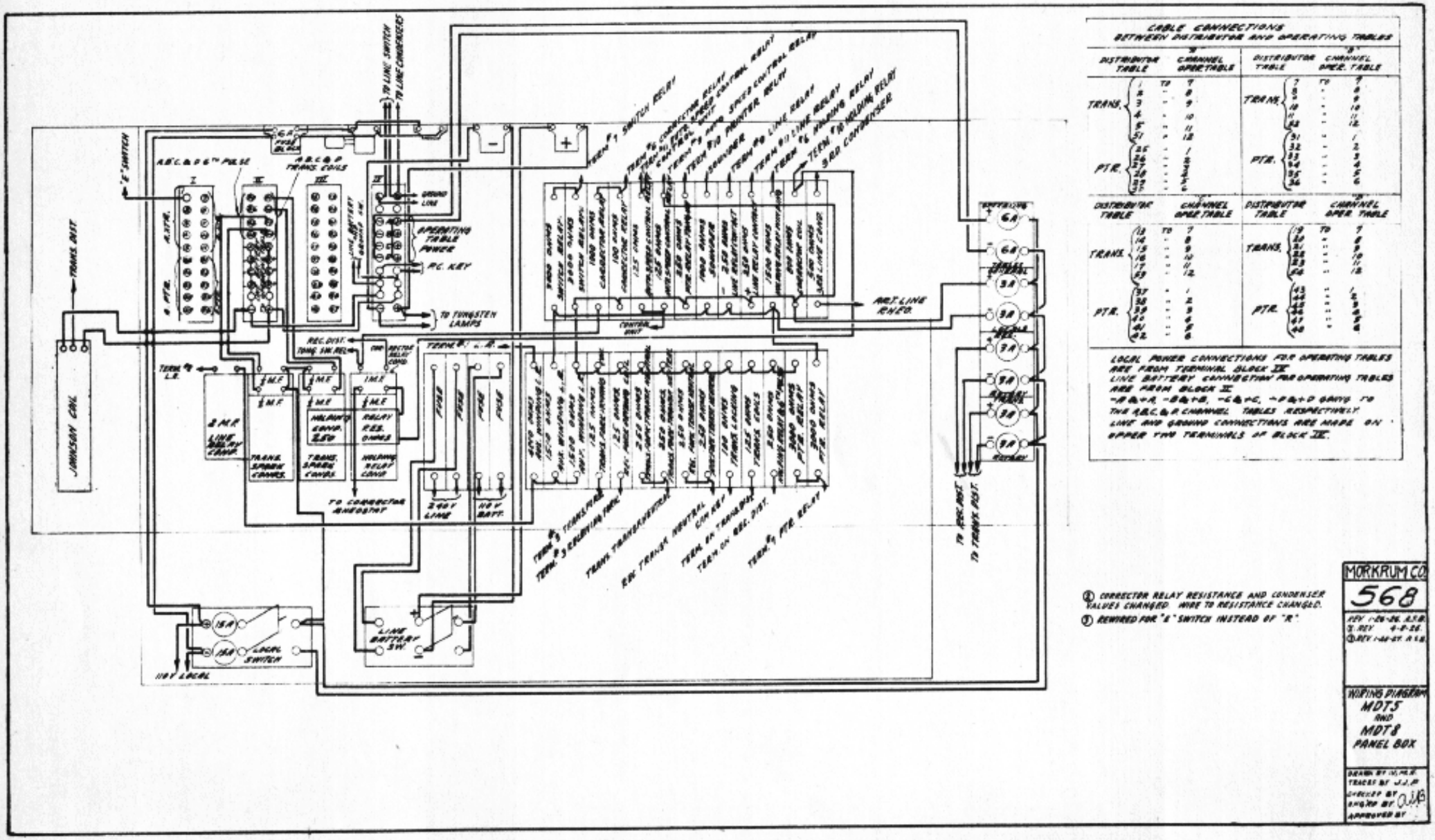


MORKRUM CO.

559
9-10-23

WIRING DIAGRAM
M2CXD3
DISTRIBUTOR

DRAWN A.S.E.
TRACED J.J.A.
CHECKED
ENG'R'D
APPROVED A.H.B.



CABLE CONNECTIONS BETWEEN DISTRIBUTOR AND OPERATING TABLES

DISTRIBUTOR TABLE		"B" CHANNEL OPER. TABLE
TRANS. 1	TO	7
2	"	8
3	"	9
4	"	10
5	"	11
51	"	12
PTR. 25	"	1
26	"	2
27	"	3
28	"	4
29	"	5
30	"	6

DISTRIBUTOR TABLE		"A" CHANNEL OPER. TABLE
TRANS. 1	TO	7
2	"	8
3	"	9
4	"	10
5	"	11
52	"	12
PTR. 31	"	1
32	"	2
33	"	3
34	"	4
35	"	5
36	"	6

DISTRIBUTOR TABLE		"B" CHANNEL OPER. TABLE
TRANS. 13	TO	7
14	"	8
15	"	9
16	"	10
17	"	11
53	"	12
PTR. 37	"	1
38	"	2
39	"	3
40	"	4
41	"	5
42	"	6

DISTRIBUTOR TABLE		"A" CHANNEL OPER. TABLE
TRANS. 13	TO	7
14	"	8
15	"	9
16	"	10
17	"	11
54	"	12
PTR. 43	"	1
44	"	2
45	"	3
46	"	4
47	"	5
48	"	6

LOCAL POWER CONNECTIONS FOR OPERATING TABLES ARE FROM TERMINAL BLOCK III
LINE BATTERY CONNECTION FOR OPERATING TABLES ARE FROM BLOCK II
$-P$ & $+A$, $-B$ & $+B$, $-C$ & $+C$, $-P$ & $+D$ GAVE TO THE A.B.C. & R CHANNEL TABLES RESPECTIVELY
LINE AND GROUND CONNECTIONS ARE MADE ON UPPER TWO TERMINALS OF BLOCK III.

① CORRECTOR RELAY RESISTANCE AND CONDENSER VALUES CHANGED. HERE TO RESISTANCE CHANGED.
② REWIRED FOR "E" SWITCH INSTEAD OF "R"

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568
REV 1-26-26. A.S.B.
2. REV 4-9-26.
③ REV 1-26-27. A.S.B.

WIRING DIAGRAM
MDT5
AND
MDT8
PANEL BOX

DRAWN BY W.M.B.
TRACED BY J.J.P.
CHECKED BY
ENGR'D BY A.W.S.
APPROVED BY