

distributors and message identification modules (operating theory of the message identification modules in conjunction with their respective transmitter distributors is covered in paragraphs 4-3.f. and g.). The electrical control rack mounts on a swivel mechanism, and can be rotated to a horizontal position for maintenance purposes when the dome is opened. Captive screws are provided to secure the rack in the horizontal or vertical position. Mounted on the pivoted electrical control rack are four fuses (one spare), an AC power switch and convenience receptacle, two AC power failure alarm relays, twelve rheostats (plus associated components) for control of marking and spacing current, six jacks (for insertion of a milliammeter into the signal lines) to monitor signal current adjustment, and terminal board facilities for cabinet wiring. See Figures 4-15 and 4-20.

(b) At the bottom of the cabinet are mounted four power factor correction capa-

itors, two on each side of the tape storage bin. Mounted below the tape storage bin is a rectifier power supply. The supply furnishes +48 volts DC at 7.0 amperes for operation of the message identification module control circuit. See Volume 2 of this bulletin for the appropriate schematic wiring diagram of the rectifier power supply.

f. MODEL 28 MESSAGE IDENTIFICATION MODULE

(1) GENERAL - There are six Model 28 Message Identification Modules mounted in a sliding frame assembly above the Multiple Transmitter Distributor Sets (Figure 4-16). Each module provides a means of automatically dispatching 12 identifying codes and 3 sequential numbers for transmission of 999 messages. The modules may be wired to control the transmitter distributor in either single transmission or tandem transmission operation. Each module consists of two basic assemblies, a base assembly and numbering assembly.

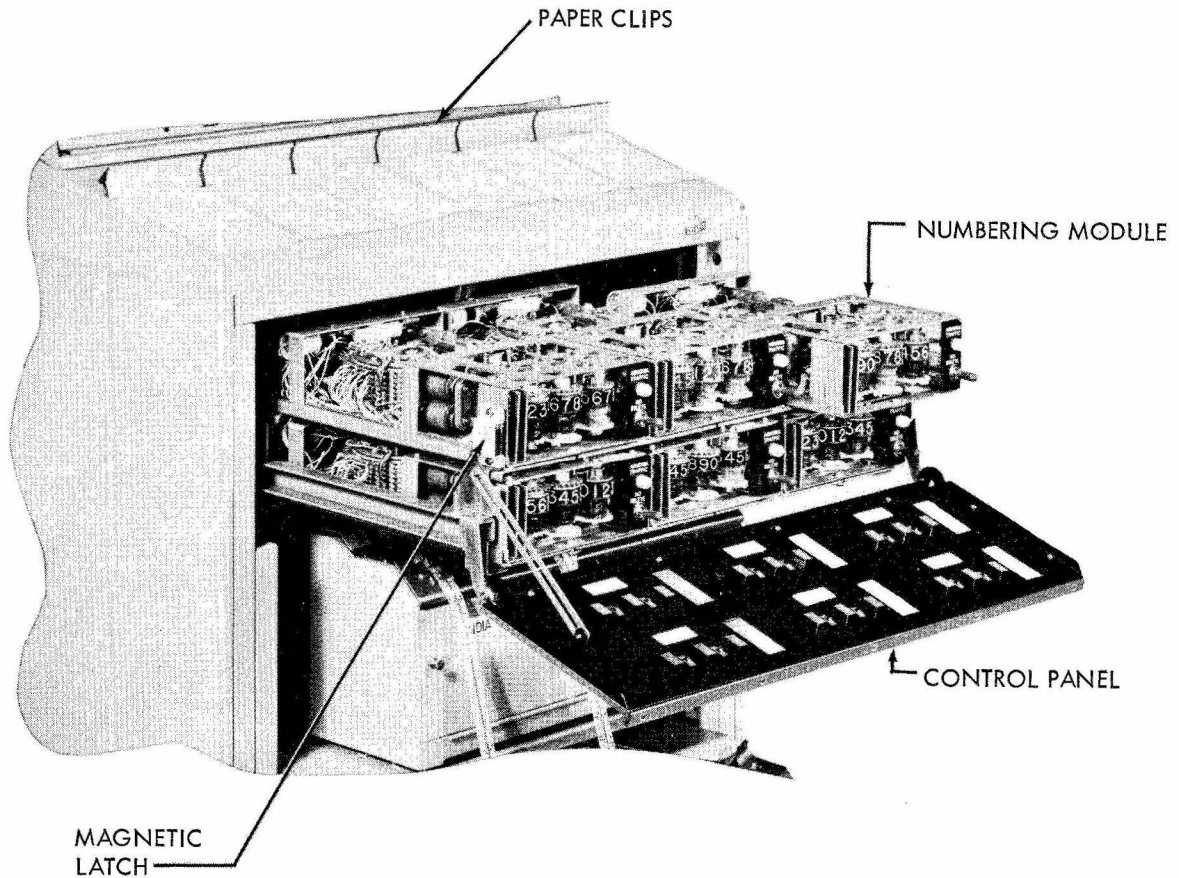


Figure 4-16. Model 28 Message Identification Modules (Drawer In Forward Position)

(2) **BASE ASSEMBLY** - The base assembly provides the means for automatically identifying each message transmitted from one transmitter (single transmitter operation) or two transmitters (tandem transmitter operation). To accomplish this, a stepping switch for storing the identifying code and two relays to provide for tandem operation are utilized. The stepping switch contains 8 levels, a set of self-interrupter contacts, and off-normal contacts (see Figures 1-21 and 1-22). Three of the switching levels (A, B, and C) are used for DC controls, and the remaining 5 levels (D, E, F, G, and H) are used for storage of the identifying and counter assembly number codes (Figures 4-18 and 4-19). An external transmitter distributor shaft is used for sequential transmission of the stored codes, the auxiliary contact on the distributor being utilized for synchronization between the stepping switch and the transmitter. The base assembly also mounts a MESSAGE IDENTIFICATION DELETE (M.I.D.) switch and ABNORMAL TRAFFIC lamp. When operated, the M.I.D. switch prevents the base assembly from carrying out its identifying sequence. The ABNORMAL TRAFFIC lamp is operated by 5.5 volt AC circuitry.

(3) **NUMBERING ASSEMBLY** - The numbering assembly provides the means for counting and storing the number of messages (up to 999) transmitted from a transmitting channel, storing the baudot code associated with the numbers counted, and giving visual indication of the number counted. To accomplish this, a pair of counter magnets, associated armature feed pawl linkage, and three code drums with transfer type code reading contacts are used (see Figures 1-21 and 1-22). In addition, the assembly also mounts two switching type connectors (SW204 and 205, Figure 4-19) which accept a universal code card (Figure 4-17), and permit ready changeability of two identifying codes generated by the base assembly.

g. **MESSAGE IDENTIFICATION CONTROL CIRCUIT**

(1) **SUMMARY OF OPERATION**

(a) Inserting a tape in a transmitter distributor completes a relay flip-flop circuit between a stepping switch, the transmitter's distributor clutch magnet, and the auxiliary "C"

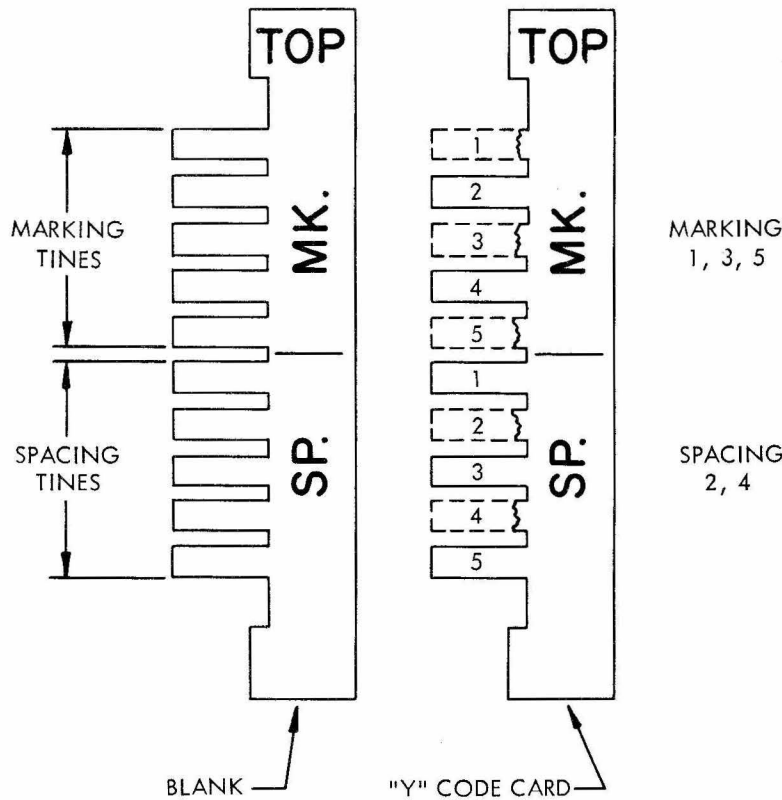


Figure 4-17. Universal Code Card

contact. The stepping switch stores a 5 wire baudot code, and the distributor will transmit it sequentially. An electromechanical counter is actuated which registers the message number and stores the associated code on three code reading contact assemblies. The stored number codes are also transmitted by the distributor.

(b) Upon completion of transmitting the identifying code (LTR) ZCZCABCDE (FIG.) 000 (LTR), the transmitter is permitted to read its message tape. While the first transmitter is operating, a second transmitter - wired in series on the same channel - can be loaded with a message tape. When the first transmission ceases, the second message tape will be automatically transmitted after its identifying code, (LTR) ZCZCABCDE (FIG.) 001 (LTR), has been transmitted. If desired, the entire message identification sequence can be omitted from the transmission by operation of the M.I.D. switch.

NOTE

The identifying code transmitted will differ with each message as follows:

(LTR) ZCZCABCDE (FIG.) 000 (LTR)
 (LTR) ZCZCABCDE (FIG.) 001 (LTR)
 through
 (LTR) ZCZCABCDE (FIG.) 999 (LTR)

The three number sequence following (FIG.) increases by one for each transmitted message when the message identification switch is in the NO DELETE position.

(2) SIGNAL LINE CIRCUIT (Figure 4-18)

(a) OUT - GOING SIGNAL LINE - Marking and spacing battery are routed through the transmitter distributor mark or space contacts, and the distributor stop contact to the distant station's selector or signal line relay to ground. Arc suppressors are connected across the distributor contacts and the signal line. All signal leads are shielded.

(b) STEPPING SWITCH LEVELS D, E, F, G, AND H.

1. The distributor contacts (1, 2, 3, 4, and 5) are connected directly to the SW206 stepping switch's D, E, F, G, and H levels, respectively. Mark and space signal line battery are connected to these levels so as to conform to the following code sequence.

STEP	CODE
1	LTR (customer option)
2	Z
3	C
4	Z
5	C
6	A (customer option)
7	B (customer option)
8	C (customer option)
9	D (customer option)
10	E (customer option)
11	FIG.
12	1 (any number 0 to 9)
13	2 (any number 0 to 9)
14	3 (any number 0 to 9)
15	LTR

As noted, the 1st, 6th, 7th, 8th, 9th, and 10th position codes are reserved for customer options. The 1st, 6th, 7th, and 8th position codes must be wired to SW206 by the customer; however, the 9th and 10th codes are established by use of universal code cards (Figure 4-17) and associated shorting type connector switches (SW204 and 205). The code cards are visually separated with a mark and space battery side. If mark battery for a particular code is desired, the mark line is broken off; conversely if space battery is desired, a space line is broken off.

2. The 12th, 13th, and 14th positions of the stepping switch are connected to the swingers of three, five unit transfer type code reading contact assemblies operated by counter drums on the numbering assembly. These transfer the baudot code of the number counted to the code reading contact swingers (see paragraph 4-3.g.(3)(a)4.b.). The normally open and closed contacts of the contact assemblies are wired, respectively, to space and mark signal line battery.

3. Due to the above electrical connections, the distributor contacts have mark or space battery applied to them from the 1st to 15th position of the stepping switch. The distributor will then transmit each position sequentially to the distant station upon rotation of the distributor cam.

(c) MESSAGE TAPE TRANSMISSION - The five levels (D, E, F, G, and H) on the 16th position of the stepping switch are connected to the swingers of the transmitter distributor code reading contacts. As in the case of the counter assemblies, the transmitter distributor code reading contacts are connected to

marking and spacing signal line battery, respectively. If the transmitter distributor is transmitting, the baudot codes on the tape are transferred through a mechanical linkage to the code reading contact swingers. The resultant voltages are applied to the distributor contacts, from which they will be sequentially transmitted to the distant station.

(3) CONTROL CIRCUIT (Figure 4-19)

(a) TANDEM TRANSMITTER OPERATION

1. START OPERATION -

The message identification control circuit relays and transmitter distributor clutch magnets are all de-energized when the transmitter distributors are in the STOP position, and the stepping switch (SW206) wipers are in the home position. When the operator inserts a tape in the transmitting head of the UPPER transmitter distributor, and places the bat handle in the START position, the TAPE OUT and START contacts are closed. Plus (+) 48 volts DC is then connected through the K202 control relay via the TAPE OUT contacts, the K203 (7R-8R) normally closed contacts, CR202, the normally closed OFF-NORMAL contacts, the upper START contacts, and the K201 normally closed contacts (5T-6T) to ground. This energizes the K202 control relay, and connects +48 volts DC through the M203 stepping magnet to ground via the magnets normally closed INTERRUPTER contacts, the normally open K202 (1F-2F) and (3F-4F) contacts, and the energizing circuit for the K202 control relay as explained above. Energizing the M203 stepping magnet results in opening its own normally closed INTERRUPTER contacts, breaking its energizing circuit and stepping SW206 to the first position. This initial stepping action opens the normally closed OFF - NORMAL contacts and breaks the initial control relay energizing circuit.

2. POSITION 1 - The K202 control relay is held energized by two holding circuits. One holding circuit applies ground to the control relay via the TAPE OUT contacts, the normally closed K203 (7R-8R) contacts, and the normally open K202 (5R-6R) contacts. This circuit is used for sensing "tape out" during message transmission. The second holding circuit assures circuit continuity during the numbering cycle. Ground is applied to the control relay via the normally open K202 (3R-4R) contacts, CR204, the 1st through 7th positions on level B of SW206, and then directly via the 8th through 15th positions on SW206 (B level).

3. POSITION 2 THROUGH 15

- When SW206 steps to the first position, +48

volts DC is applied to the UPPER transmitter distributor distributor clutch magnet via the A level of SW206 and the M.I.D. (message identification deletion) switch's normally closed contacts (3-4) to ground. This causes the distributor clutch magnet to energize, the distributor cam to rotate, and the five level code, (LTR) permanently wired to the D, E, F, G, and H levels of SW206 (refer to paragraph 4-3.g.(2)(b) 1.) to be transmitted to the distant station selector magnets or line relays. As the distributor cam rotates, its auxiliary "C" contact closes and allows the stepping relay to energize via the C level of SW206 and the normally closed M.I.D. (5-6) contacts. After transmission of the fifth pulse, the auxiliary "C" contact opens causing the stepping switch magnet to de-energize, and SW206 to step to the second position prior to the distributor arriving at the first pulse of the next stored code combination (Z). The above stepping - transmission - stepping action continues through the 15th position of SW206 to complete transmission of the 15 character message identification sequence (that is (LTR) ZCZCABCDE (FIG.) 123 (LTR).

4. MESSAGE NUMBERING

a. When SW206 stepped to the first position, an energizing circuit was completed for the K204 relay. The relay, when energized, provides an energizing path for the counter magnets via the K204 normally open (1L-1R) contacts. The counter magnet pulls the armature extension feed pawl forward so that the feed pawl leaves its backstop and engages a tooth on the 1 unit counter drum ratchet. The counter magnets remain energized from the 2nd through 7th position. When SW206 steps to the 8th position, the K204 energizing circuit is broken and the counter magnets de-energize. As the armature returns to its de-energized position, its feed pawl feeds the 1 unit counter drum ratchet one tooth (one digit) and locks the ratchet into position. When the 1 unit counter drum has made a complete revolution and moves again into the 0 position, the 1 unit counter disk notch (at the base of the counter drum) engages its mating spur gear tooth resulting in rotation of the 10 unit counter drum to its next position. An identical feeding takes place on the 100 unit drum when the 10 unit drum moves to the 0 position. All drums may be reset by simply turning the counting drums knurled disk to the left.

CAUTION

When resetting numbers, always change drums in the following order: One, ten, and one hundred units.

b. One leaf spring detent lever keeps the counting drum positioned on the counter drum shaft. The drums cannot be turned to the right due to the jamming action of the spring detent arm against the drum and the detent post. Five transfer type code reading contacts ride on each counter drum camming surface. The peaks of the cams represent a spacing code, and the valleys a marking code. These upper and lower dwells (space and mark) correspond to the baudot code of the numerical figure showing on the front of the drum face. The code is transferred to the D, E, F, G, and H levels of the stepping switch (SW206) via the swingers on the transfer type code reading contacts. The 12th position of SW206 is connected to the 100 unit code reading contact swingers, and the 13th and 14th positions are connected to the 10 and 1 unit drums, respectively. The stepping switch, when arriving at the 12th, 13th, and 14th positions, connects the respective contact swingers to the distributor contacts for transmission on the signal line.

5. MESSAGE TRANSMISSION (POSITION 16)

a. During transmission of the 15th character of the message identification sequence, the auxiliary "C" contact opens. This causes the stepping switch magnet to de-energize (refer to paragraph 4-3.g.(3)a.3.), and SW206 to step to its 16th (message) position. In this position, +48 volts DC is applied to the UPPER transmitter distributor READ clutch magnet via the A level of SW206, the K202 normally open (1R-2R) contacts, CR4, the UPPER transmitter distributor start contacts, and K201 (5T-6T) to ground. The READ clutch magnet, when energized, trips the sensing shaft clutch allowing the shaft to rotate, read and store the sensed character, and feed the message tape.

b. As the sensing shaft rotates, momentary closure of the auxiliary "B" contact results in energizing the UPPER distributor clutch magnet. The distributor shaft will then rotate, and transmit the stored code combination to the distant stations selector or line relay. The distributor contacts are connected to the reader storage contacts via the 16th step on levels D, E, F, G, and H of SW206 (refer to paragraph 4-3.g.(2)(c)).

c. At the end of the taped message transmission, the TAPE OUT contact will open and break the K202 control relay energizing circuit. De-energization of K202 results in disconnecting the READ clutch magnet circuit, and completing a stepping circuit for the stepping relay via the K202 (6F-7F) normally closed contacts, the UPPER and LOWER transmitter distributor auxiliary "A" contacts,

the normally closed K203 (6F-7F) contacts, the 16th position (C level) of SW206, and the auxiliary "C" contacts. The reader auxiliary "A" contacts close as the sensing shaft comes to rest, after which the auxiliary "C" contacts close and energize the stepping magnet. As the distributor shaft comes to rest, the auxiliary "C" contact opens, the stepping magnet de-energizes, and SW206 steps to the 17th position.

6. HOMING

a. When SW206 steps to the 17th position, a homing or zeroing circuit is completed. Plus (+) 48 volts DC is applied through the stepping switch relay (M203), its normally closed INTERRUPTER contacts, the normally closed M.I.D. (8-9) contacts, positions 17 and 18 (B level) of SW206, through the normally closed K201 (5B-6B) contacts, the 19th through 23rd steps of SW206, CR206, and 24th and 25th steps of SW206 to ground. SW206 automatically steps to the home or zero position through operation of the INTERRUPTER contacts.

b. When SW206 steps to the home (26th) position, the OFF-NORMAL contacts close and prepare the control circuit for numbering and transmission of another message. If the LOWER transmitter distributor has been loaded with a message tape (start lever in START position) prior to the end of transmission of the UPPER transmitter distributor message tape, the control circuit will automatically send out a new message identification sequence and allow transmission of the message. Tandem operation of the UPPER and LOWER transmitter distributors will continue as long as the transmitters are loaded with message tapes, and their start levers are placed in the START position. Only one message identification module is required to control operation of two transmitter distributors in tandem.

(b) MESSAGE IDENTIFICATION DELETION

CAUTION

To delete the message identification sequence, the operator must place the M.I.D. switch in the DELETE position before loading the desired transmitter distributor with tape. The M.I.D. switch should NOT be operated while the stepping switch is in the process of identifying a message.

1. IDENTIFICATION DELETION SEQUENCE AND MESSAGE TRANSMISSION

a. Loading a message tape in a transmitter distributor and placing the start lever in the START position, will energize the associated control relay as described in paragraph 4-3.g.(3)(a)1. When the operator places the M.I.D. switch in the DELETE position, a continuous stepping circuit to the 16th (message) position of SW206 is completed. Plus (+) 48 volts DC is routed through the M203 stepping magnet, its normally closed SELF INTERRUPTER contacts, the normally open M.I.D. (7-8) contacts, the 1st through 15th steps of SW206 (C level), the normally open M.I.D. (10-11) contacts, through CR208 and CR209 (depending upon which transmitter distributor is loaded), and the K202 (5R-6R) or K203 (5R-6R) contacts to ground. Operation of the INTERRUPTER contacts steps SW206 to position 16.

b. During the above stepping sequence, the distributor magnet energizing circuit (via level A of SW206, positions 1 through 14) and the counter magnet energizing circuit are broken, respectively, by contacts (3-4) and (1-2) of the M.I.D. switch. Also, the zeroing (homing) circuit from the 16th position (level C) is broken by contacts (8-9) of the M.I.D. switch. This assures that the next message is not transmitted without identification, should the M.I.D. switch be left in the DELETE position after message transmission.

c. Normal operation of the transmitter distributor is then initiated as described in paragraph 4-3.g.(3)(a)5.a. and b.

NOTE

The M.I.D. switch may be returned to its normal position when the transmitter distributor begins to read the message tape.

2. HOMING - When "tape-out" occurs, the ground circuit on the C level of SW206 is broken due to K202 or K203 de-energizing (depending upon which transmitter distributor is in operation). This re-establishes the stepping circuit combination of the auxiliary "A" contacts and auxiliary "C" contacts (see paragraph 4-3.g.(3)(a)5.c.), allowing SW206 to step to the 17th position. If the M.I.D. switch is left in the DELETE position, the zeroing (homing) circuit (see paragraph 4-3.g.(3)(a)6.) is broken and will not operate until the switch is returned to its normal position.

(4) ABNORMAL TRAFFIC

(a) GENERAL - In this equipment, circuitry is provided which allows an operator at some remote location to "seize" one or more signal lines for transmission of ABNORMAL

TRAFFIC. The message identification module may be conditioned to either transmit or not transmit a message identification sequence, from the remote location. An amber ABNORMAL TRAFFIC warning lamp is provided at the transmitting group to warn the operator that a particular transmitter distributor is locked out or "seized".

(b) LINE SEIZURE OPERATION WITH MESSAGE IDENTIFICATION

1. LINE SEIZURE - While a message tape is in process of transmission, an operator at a remote location may place the line seizure NUMBER - NO NUMBER switch in the NUMBER position. This prepares the K201 line seizure relay energizing circuit for operation. Plus (+) 48 volts DC is applied through the K201 coil, the normally open contact at the remote control area (furnished by customer), CR210, and the 26th (home), 25th, and 24th positions (B level) of SW206 (via CR205). Note that the circuit is not completed to ground, and will not be, until SW206 steps to "home" after message "tape-out" occurs. The blocking action of CR206 prevents K201 from energizing before the 24th position.

2. MESSAGE IDENTIFICATION TRANSMISSION

a. POSITIONS 1 THROUGH 15 - When "tape-out" occurs, and SW206 steps to "home", K201 will energize during positions 24, 25, and 26 (home). The normally closed contacts (5T-6T) of K201 will open, breaking the energizing circuits to the K202 and K203 control relays to prevent transmission of a new message tape. Since completion of the original energizing circuit to the stepping relay (M203) is dependent upon energization of either K202 or K203 (refer to paragraph 4-3.g.(3)(a)1.), another energizing circuit must be provided for ABNORMAL TRAFFIC operation. Plus (+) 48 volts DC is applied through M203, the SELF INTERRUPTING contacts, the normally closed M.I.D. (8-9) contacts, the normally open K201 (3T-4T) contacts, the normally open NUMBER switch, and the "home" position on the B level of SW206 to ground. This circuit will cause SW206 to step to position 1 and perform the normal message identification sequence operation. To assure circuit continuity during the numbering sequence, relay K201 is held operated by its own normally open (3B-4B) contacts, and the 1st through 15th position of SW206 (B level).

b. POSITIONS 16 THROUGH 19 - When SW206 steps to the 16th position, a stepping circuit is completed to M203 via the SELF INTERRUPTING contacts, the normally closed M.I.D. (8-9) contacts (to positions 17

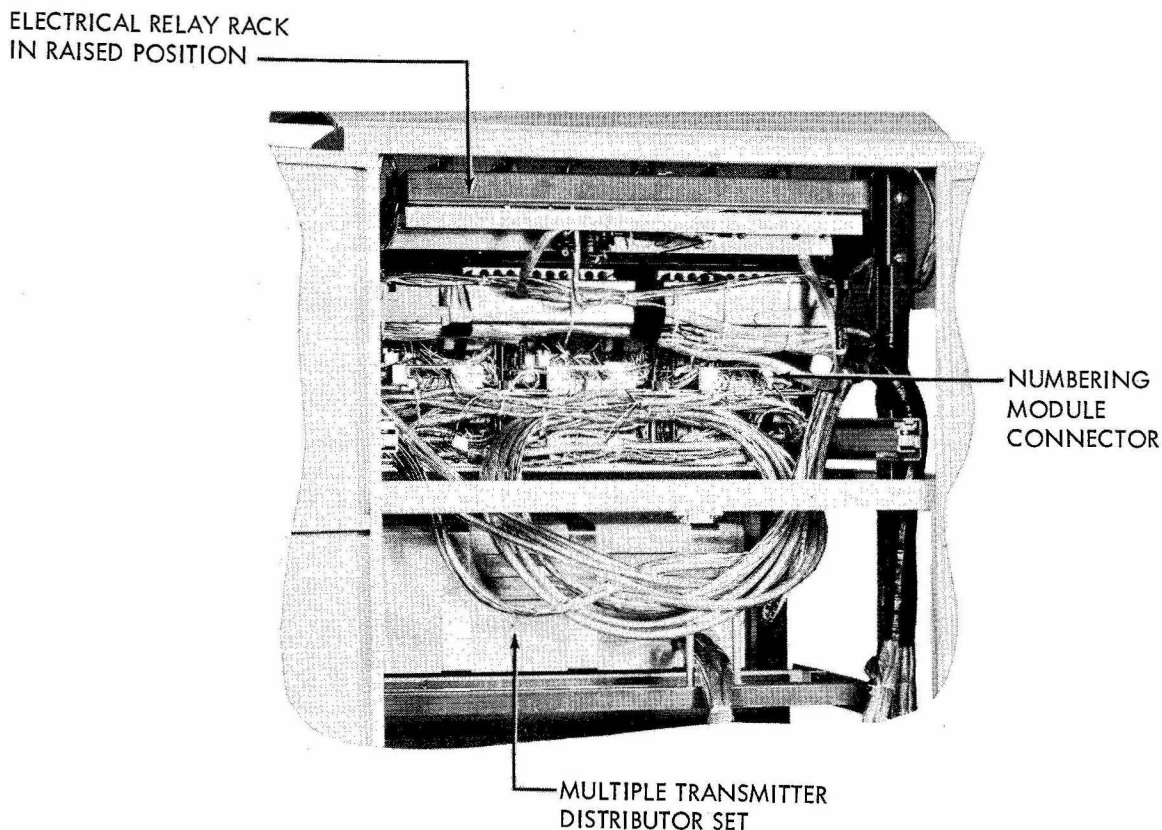


Figure 4-20. Model 28 Transmitter Group (Rear Doors Open)

and 18, B level of SW206), and the normally open K201 (5B-6B) contacts (to position 16, level B of SW206 to ground. The stepping switch (SW206) will continue to step, and stop at position No. 19 (contacts K201 (6B-7B) open. During the 16th, 17th, and 18th steps, K201 is held energized by the discharge of C202. When SW206 is in the 19th position, K201 is held energized via the normally open remote switch, the normally open K201 (1B-2B) contacts, and CR207 to ground.

c. END OF TRANSMISSION - After completion of the ABNORMAL TRAFFIC transmission, the operator at the remote location returns the line seizure switch to its mid position. This will break the K201 relay energizing circuit, allowing the stepping switch (SW206) to step to the "home" position. When SW206 reaches the "home" position, the control circuit will be conditioned to operate in the normal (tandem or single transmission) mode.

(c) LINE SEIZURE OPERATION WITHOUT MESSAGE IDENTIFICATION - While ORIGINAL

a message tape is in process of transmission, an operator may place the line seizure NUMBER - NO NUMBER switch to the NO NUMBER position. Plus (+) 48 volts DC is applied through the K201 line seizure relay, the normally open line seizure switch, CR210, and the home position of SW206 (B level) to ground, energizing K201. As explained in paragraph 4-3.g.(4)(b)2.a. the energizing circuits for the K202 and K203 control relays are broken. Since the message identification sequence is not required, no energizing circuit is completed to the M203 stepping relay.

(5) SINGLE TRANSMITTER OPERATION - The transmitter group cabinet can readily be converted from tandem transmitter operation (three signal channels) to single transmitter operation (six signal channels) with only simple strapping changes (refer to the applicable wiring diagram in Volume 2 of this manual). Operation of a transmitter distributor and numbering module wired for single transmitter operation is identical to the operation of one transmitter distributor wired in a tandem circuit (refer to paragraph 4-3.g.(3).

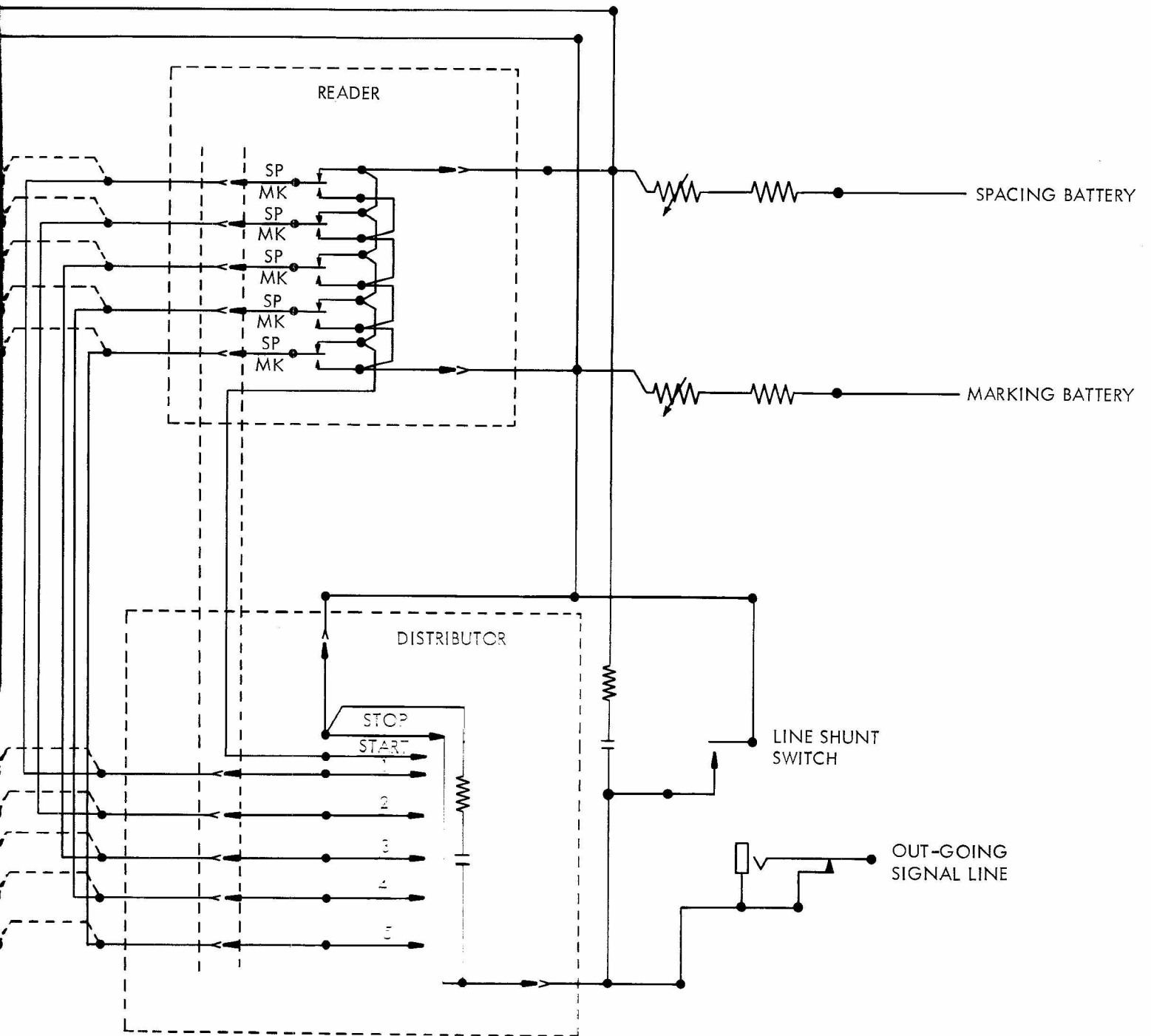
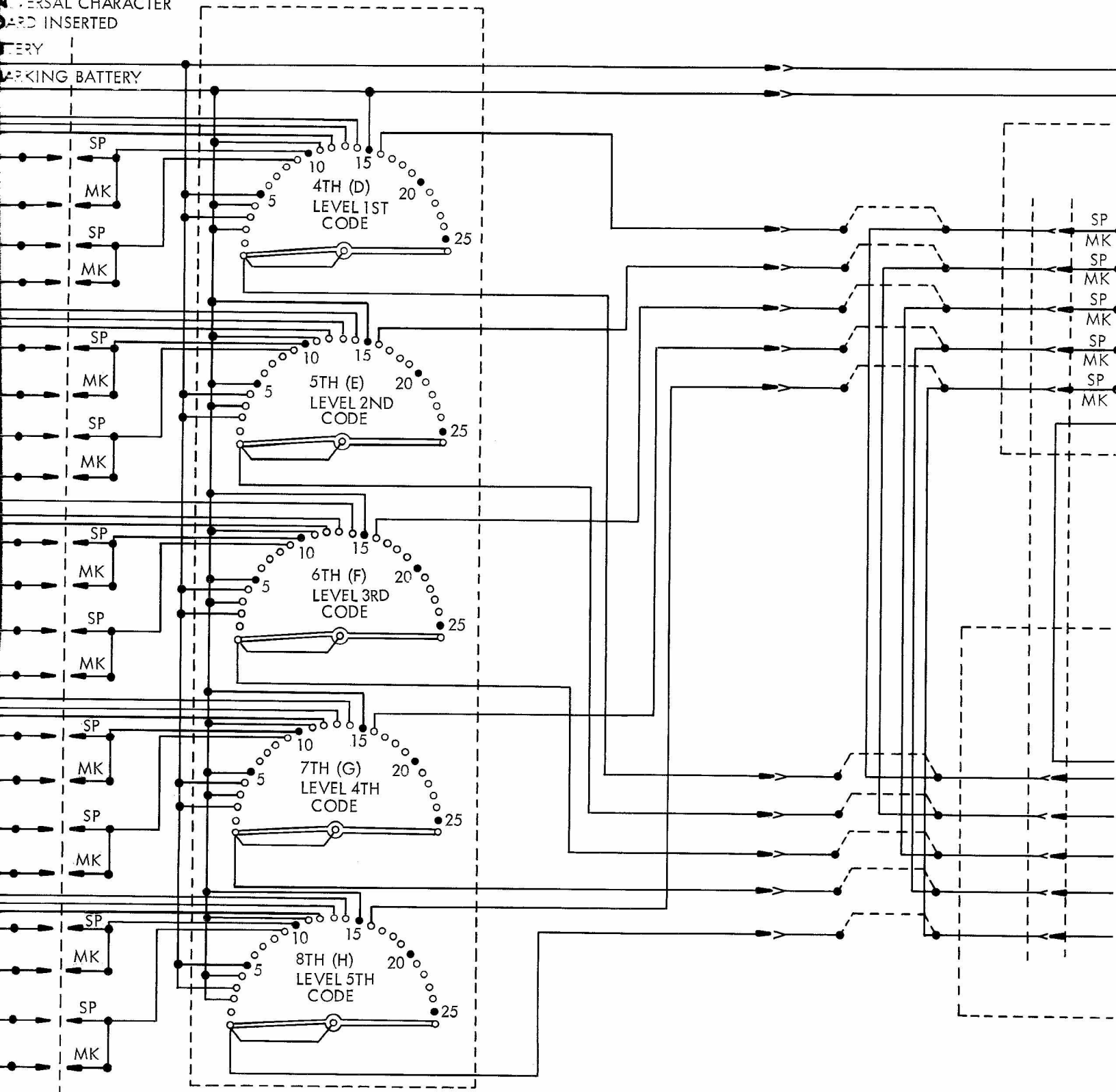


Figure 4-16. Transmitter Group Simplified Control System Schematic Wiring Diagram

204 AND SW205
CAN WITH
UNIVERSAL CHARACTER
CARD INSERTED
BATTERY
MARKING BATTERY

SW206



NOTES

1	SP - SPACE MK - MARK
2	FOR ACTUAL SCHEMATIC DRAWING, SEE APPROPRIATE WIRING DIAGRAM IN VOLUME 2 OF THIS MANUAL

SPAC
MAR

SW201
1 UNIT
COUNTER

SPAC
MAR

SW202
10 UNIT
COUNTER

SPACE
MARK

SW203
100 UNIT
COUNTER


COUNTIN
CAM

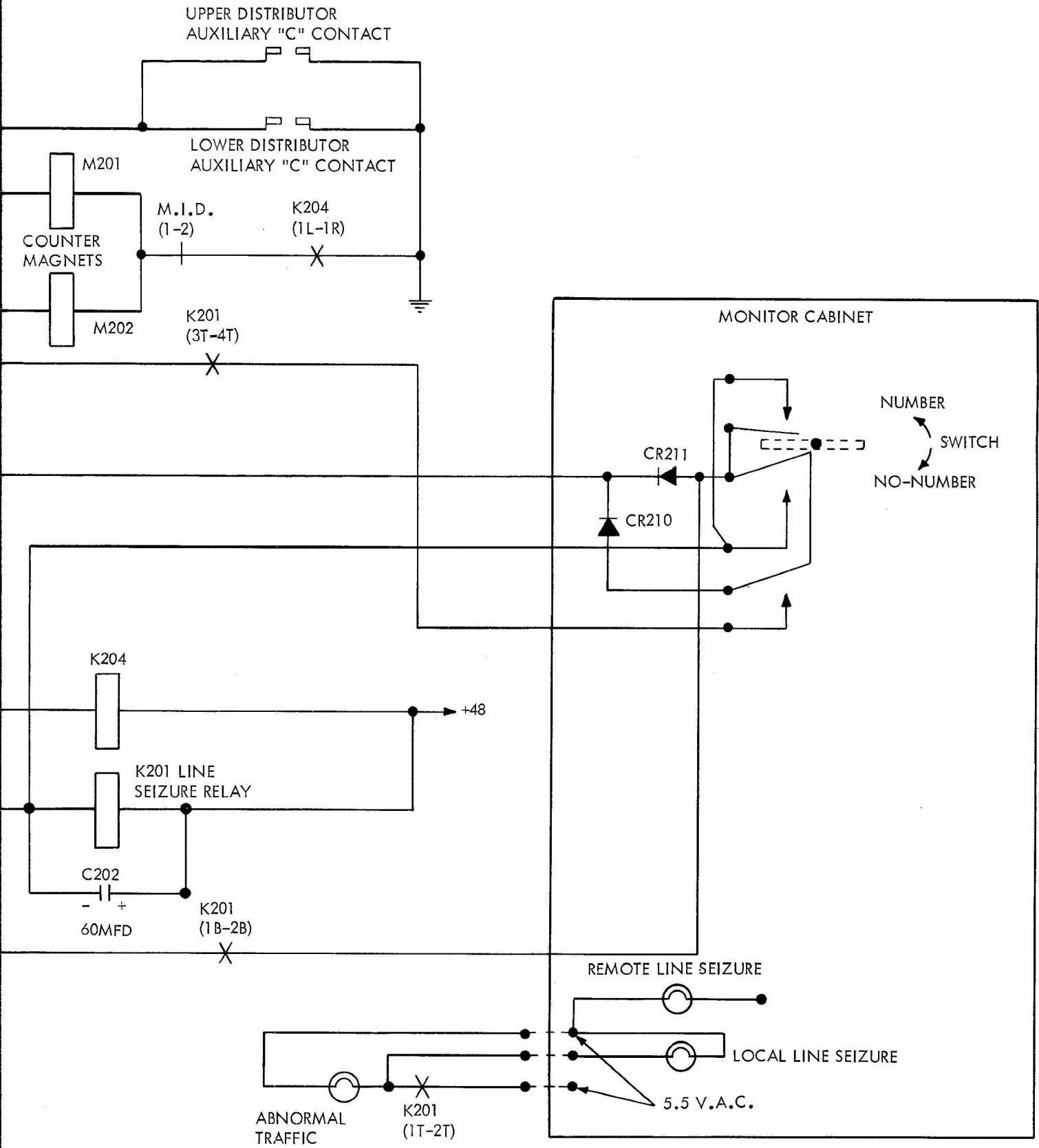
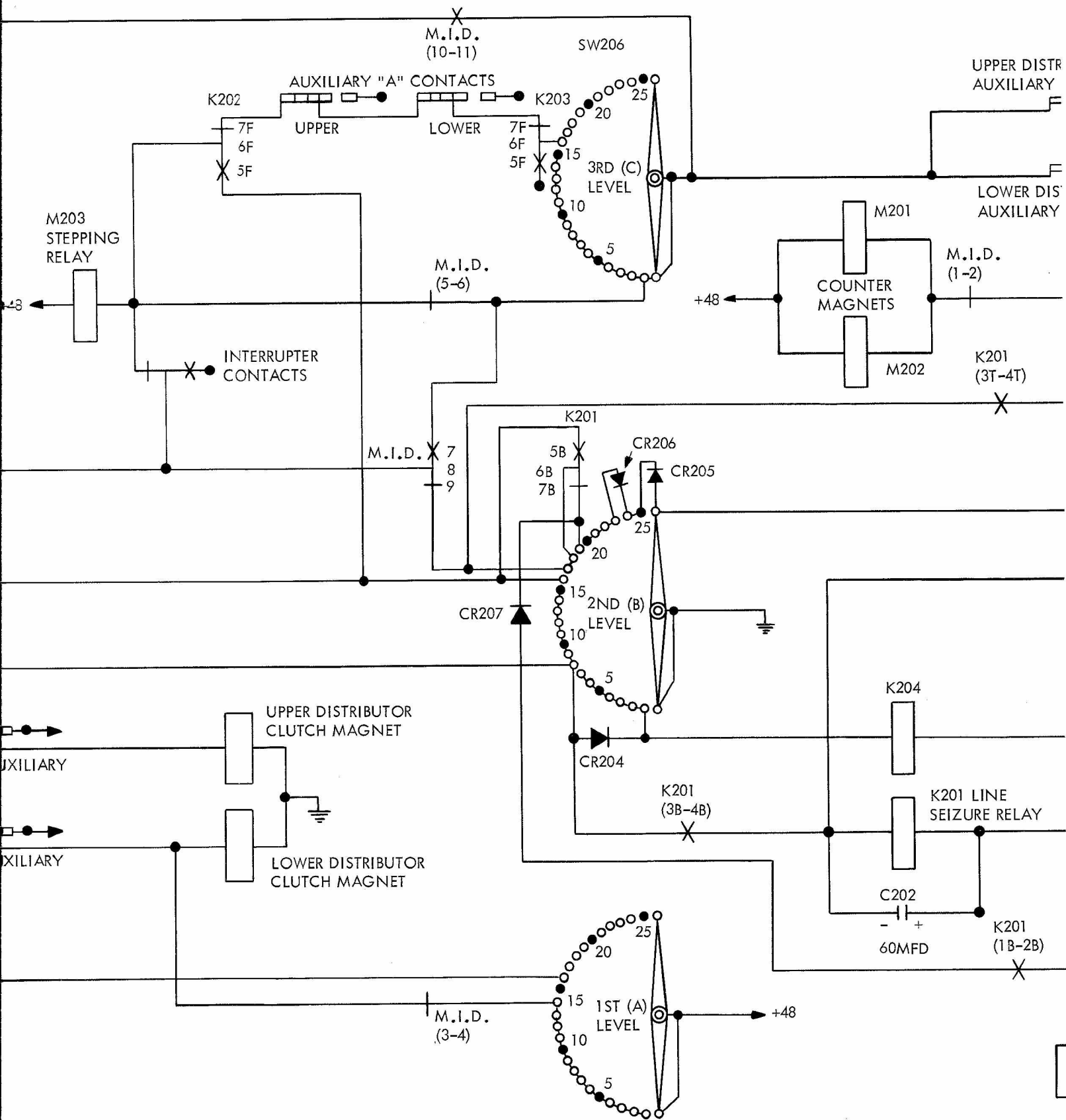
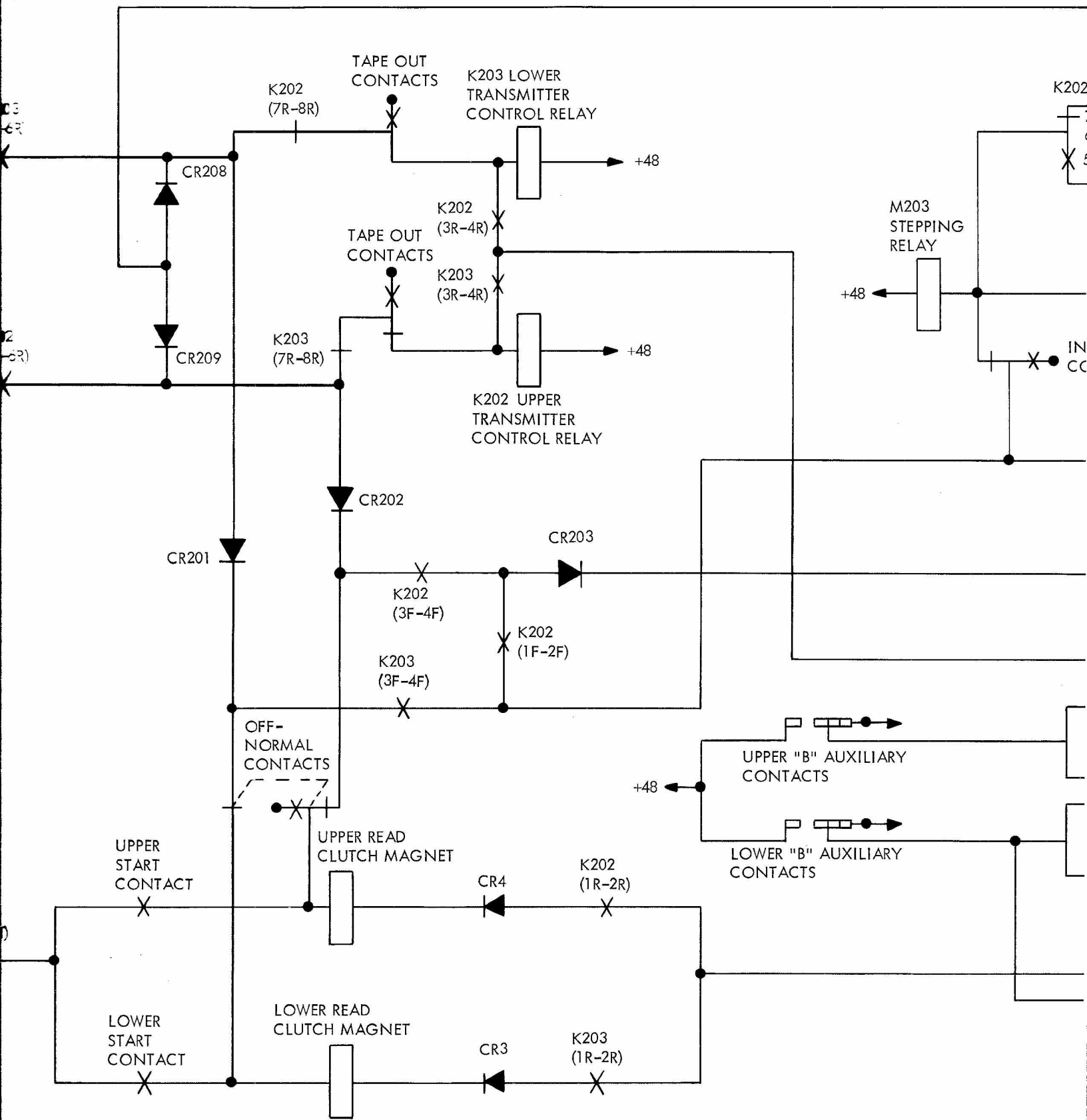


Figure 4-19. Transmitter Group Simplified Control System Schematic Wiring Diagram



AB TR.

OR.



NOTES	
1.	⊕ NORMALLY CLOSED CONTACT
2.	⊗ NORMALLY OPEN CONTACT
3.	⊕ ⊗ — TRANSFER CONTACT
4.	ALL COMPONENTS SHOWN IN THEIR NORMAL POSITION WHEN SENDING APPARATUS IS IN IDLE, STOP, OR HOME POSITION.
5.	R - REAR CONTACTS F - FRONT CONTACTS T - TOP CONTACTS B - BOTTOM CONTACTS
6.	FOR ACTUAL SCHEMATIC SEE APPROPRIATE WIRING DIAGRAM IN VOLUME 2 OF THIS MANUAL
7.	FOR STRAPPING CHANGES TO CONVERT FROM TANDEM TO SINGLE TRANSMITTER OPERATION, SEE ACTUAL SCHEMATIC WIRING DIAGRAM.

