SECTION 3 TROUBLESHOOTING

INTRODUCTION

The troubleshooting charts contained in the MM-5 Service Manual apply equally well to the MM-6. Due to electrical changes in the phonograph, the Sequence of Operation and several schematic and wiring diagrams for the MM-6 are different from the MM-5. Only schematic and wiring diagrams unique to the MM-6 are included in this section; all others which are identical to the MM-5 can be found in the MM-5 manual. The table below lists diagrams applicable to the MM-6 along with page numbers on which they appear. Diagrams not contained in this supplement are referenced to the appropriate pages in the MM-5 manual.

SEQUENCE OF OPERATION

A complete set of Sequence of Operation diagrams are contained in the following pages to facilitate troubleshooting and understanding of phonograph operation. The pricing slide switches which are used in place of rotary switches result in a slightly different appearance but are functionally the same.

FIG. NO.	TITLE	PAGE NO./MANUAL
3-1	MM-6 Phonograph Schematic Diagram	27/MM-6
3-2	50 Watt Power Amplifier Schematic Diagram	28/MM-6
3-3	Phonograph Harness Wiring Diagram	29/MM-6
3-4	Record Changer Wiring Diagram	3-28/MM-5
3-5	Preamplifier Schematic Diagram	30/MM-6
3-6	50 Watt Power Amplifier Wiring Diagram	31/MM-6
3-7	Selector Assembly Wiring Diagram	32/MM-6
3-8	100 Watt Power Amplifier Wiring Diagram	3-32/MM-5
3-9	100 Watt Amplifier Schematic Diagram	3-33/MM-5
3-10	Search Unit Wiring Diagram	3-34/MM-5
3-11	Transformer Package Schematic Diagram	3-35/MM-5
3-12	Transformer Package Wiring Diagram	3-36/MM-5
3-13	Credit and Pricing System Wiring Diagram	33/MM-6
3-14	Junction Box Wiring Diagram and Schematic	34/MM-6

SEQUENCE OF OPERATION

① Standby

1. Phonograph plugged into power receptacle.
2. Mechanism service switch set to ON position.
3. Cabinet lamps lit (not shown).
4. Amplifier mute relay energized by 30 V.D.C. Mute relay keeps amplifier quiet during record transfer cycle.

② Customer Inserts Quarter

1. Quarter passes through slug rejector.
2. Quarter operates 25¢ coin switch level closing 25¢ coin switch.
3. The coin switch applies 30 V.D.C. to credit coil and credit stop coil in credit unit through pricing switch.
4. Credit coil and adjustable credit stop coil advance credit wiper arm two steps on commutator board corresponding to a quarter.

③ Credit Established

1. Wiper assembly completes a circuit from the 25¢ two-step credit ring to the 30 V.D.C. ring to energize select pulse latch relay R1 through the letter pushbutton banks.
2. Premium price lamp connected to credit unit commutator board common ring; lamp lights.
3. Circuit completed through latch relay, contacts 7 and 8, to energize latch coil. Pushbuttons will latch into position when pressed.
4. If a letter button is depressed in each of the two letter switch banks, relay R1 and the latch coil will fall out unlatching all letter buttons. This is to insure that two letter buttons in the separate letter switch banks cannot be accidentally latched at the same time.

④ Customer Makes First Selection

1. Customer pushes letter pushbutton V and number pushbutton 8.
2. Letter pushbutton switch V completes a circuit to search unit commutator segment UV (rear side of board).
3. Number pushbutton switch 8 completes a circuit to search unit commutator segment 8 (front side of board).
4. Letter pushbutton switch V also opens the circuit to outside row select coil and closes the circuit to inside row select coil.
5. Letter pushbutton switch V and number pushbutton switch 8 complete a circuit to energize start relay R5.
6. Circuit to relay R1 is maintained through letter bank A-K.

⑤ Search Wipers Locate Number

1. When the number search unit wiper (front of commutator board) runs onto segment 8, a circuit is completed to energize sprag relay S1.
2. The sprag tooth on relay S1 stops rotation of search wipers and select coils.
3. Relay S1, contacts 1 and 2, complete a circuit to energize search unit relay R2.

⑥ Search Continues

1. Search unit relay R2, contacts 7 and 11, transfer the common side of the circuit from sprag relay S1 to sprag relay S2.
2. Search unit relay R2 holds itself in through contacts 8 and 12.
3. Search unit relay R2, contacts 5 and 9, transfer the positive side of the selection circuit from the number pushbutton switches to the letter pushbutton switches.
4. Sprag relay S1 drops out, contacts 3 and 4 energize search unit motor.
5. When the letter wiper runs onto the UV segment on the rear of the commutator board, sprag relay S2 is energized.

⑦ Selection Registered, Credit Removed, and Scan Control Operated

1. Sprag relay S2 locks the search wipers and select coils in place with the select coils aligned with pins representing selections U8 and V8.
2. Sprag relay S2, contacts 1 and 2, deenergize search unit motor.
3. Sprag relay S2 holds itself in through contacts 6 and 7.
4. Sprag relay S2, contacts 3 and 4, deenergize select pulse and latch relay R1.
5. Select pulse and latch relay R1, contacts 1 and 2, complete a circuit to common to energize scan coil, credit cancel coil and credit cancel stop coil in credit unit, inside row select coil, and total play counter.
6. Inside row select coil pushes pin into select position on the credit unit pinwheel assembly.
7. Credit cancel coil drives the credit wiper arm counterclockwise one step leaving credit for one standard selection.
8. Select pulse and latch relay R1 is held closed for a short time after being deenergized due to a diode connec
delay determin
to the scan coi
unit, and insi
time, search
are held clos
pushbutton cir

⑧ Pushbuttons

1. The time dela
relay R1 runs
fer. This ends
2. The latch coil i
3. The latch coil
and 8.
4. The circuit is
sprag relay S2,
drop out ending
5. The customer
price selection
6. When the scan
scan control ge
7. The scan switc
coil through m
tacts 1 and 9.
8. The amplifier
through cam sw

⑨ Customer M

1. After credit is
the credit wiper
first step.
2. Wiper assembl
step standard s
ring to energize
3. Standard price
commutator boa
4. Circuit complet
7 and 8, to en
will latch into p

⑩ Record Mag

1. Magazine deten
trips magazine
2. The magazine
zine.

is maintained through letter

Locate Number

search unit wiper (front of runs onto segment 8, a cir- energize sprag relay S1.

relay S1 stops rotation of select coils.

1 and 2, complete a circuit unit relay R2.

es

2, contacts 7 and 11, trans- de of the circuit from sprag elay S2.

holds itself in through con-

2, contacts 5 and 9, transfer the selection circuit from tton switches to the letter .

s out, contacts 3 and 4 ener- tor.

r runs onto the UV segment ommutator board, sprag re-

tered, Credit Removed, Scan Control Operated

the search wipers and se- with the select coils aligned ng selections U8 and V8.

ntacts 1 and 2, deenergize

ls itself in through contacts

cts 3 and 4, deenergize se- relay R1.

ch relay R1, contacts 1 and uit to common to energize ncel coil and credit cancel nit, inside row select coil, er.

coil pushes pin into select it unit pinwheel assembly.

drives the credit wiper arm e step leaving credit for one

ch relay R1 is held closed er being deenergized due to

a diode connected across the coil. This time delay determines the length of the select pulse to the scan coil, credit cancel coil in the credit unit, and inside row select coil. During this time, search unit relay R2 and start relay R5 are held closed through the letter wiper and pushbutton circuit.

(8) Pushbuttons Unlatch and Record Changer Starts

1. The time delay across select pulse and latch relay R1 runs out and the relay contacts transfer. This ends the select pulse.
2. The latch coil is deenergized.
3. The latch coil plunger releases pushbuttons V and 8.
4. The circuit is opened to search unit relay R2, sprag relay S2, and start relay R5. The relays drop out ending the selection cycle.
5. The customer can now make one more standard price selection. See sequence 9.
6. When the scan coil was energized, it tripped the scan control gear closed scan switch.
7. The scan switch energizes the magazine detent coil through mechanism control relay R, contacts 1 and 9.
8. The amplifier mute relay remains energized through cam switch CS-5.

(9) Customer Makes Second Selection

1. After credit is removed for the first selection, the credit wiper moves counterclockwise to the first step.
2. Wiper assembly completes circuit from one-step standard selection credit ring to 30 V.D.C. ring to energize select pulse latch relay R1.
3. Standard price lamp connected to credit unit commutator board common ring; lamp lights.
4. Circuit completed through latch relay, contacts 7 and 8, to energize latch coil. Pushbuttons will latch into position when pressed.

(10) Record Magazine Rotates

1. Magazine detent coil unlocks the magazine and trips magazine detent switch.
2. The magazine motor rotates the record magazine.

(11) Stop Switch Pawl Hits Selected Pin-Transfer Motor Starts

1. Inside row stop pawl hits selected pins (V-8).
2. Stop switch operates.
3. Stop switch completes a circuit to energize mechanism control relay R and hub shift coil.
4. Mechanism control relay R, contacts 1 and 9, open deenergizing magazine detent coil.
5. The magazine detent coil releases a linkage that locks the record magazine in position with record UV-8 aligned with the transfer arm.
6. Magazine detent coil linkage also operates magazine detent switch.
7. The magazine detent switch opens the circuit to the magazine motor.
8. Mechanism control relay R, contacts 6 and 10, 11 and 7, energize transfer motor.
9. The hub shift coil raises the turntable 45 rpm hub.
10. If the selection had been a left side or outside r row selection, the toggle shift coil would be energized through the left side switch and relay R contacts 5 and 9.

(12) Record Picked Up

1. The transfer motor drives the transfer assembly and the cam that operates the cam switches.
2. As the transfer assembly begins to move, the cam closes cam switch CS-1 applying power to the turntable motor.
3. Cam switch CS-2 transfers to hold in hub shift coil and mechanism control relay R.
4. The transfer arm picks the record out of the magazine.

(13) Record Approaches Turntable

1. As the transfer motor continues to operate, cam switch CS-3 closes.
2. Cam switch CS-3 operates right side annunciator coil and right side reset coil.
3. Right side reset coil plunger resets pin V-8 in the search unit pinwheel assembly.
4. A short time later, cam switch CS-3 opens and cam switch CS-4 transfers to the position opposite that shown.
5. At this time, if selection had been left hand, the toggle shift coil would be deenergized and the left side reset and annunciator coils would be operated by cam switch CS-4.

ch Pawl Hits Selected Pin-Transfer Motor Starts

op pawl hits selected pins (V-8).

perates.

completes a circuit to energize ontrol relay R and hub shift coil.

ontrol relay R, contacts 1 and 9, izing magazine detent coil.

detent coil releases a linkage that cord magazine in position with re- igned with the transfer arm.

ent coil linkage also operates ma- switch.

detent switch opens the circuit to motor.

ontrol relay R, contacts 6 and 10, rgize transfer motor.

t coil raises the turntable 45 rpm

on had been a left side or outside r , the toggle shift coil would be en- gh the left side switch and relay R d 9.

cked Up

motor drives the transfer assem- m that operates the cam switches.

fer assembly begins to move, the am switch CS-1 applying power to motor.

CS-2 transfers to hold in hub shift anism control relay R.

arm picks the record out of the

proaches Turntable

er motor continues to operate, cam loses.

CS-3 operates right side annun- d right side reset coil.

set coil plunger resets pin V-8 in it pinwheel assembly.

later, cam switch CS-3 opens and CS-4 transfers to the position op- own.

if selection had been left hand, the oil would be deenergized and the et and annunciator coils would be am switch CS-4.

(14) Record Placed On Turntable

1. When the selected pin is reset by the reset coil, the stop switch returns to normal position de-energizing reset coil and right side annunciator coil.

2. Assuming that selection V-8 is a 33-rpm, 7-inch LP record, the center of the record strikes the hub switch sensing wire as the record is placed on the turntable. If V-8 was a 45-rpm record, the hub switch sensing wire would not be operated.

3. The hub switch sensing wire actuates the hub switch which deenergizes the hub shift coil and energizes the speed shift coil. This drops the large 45-rpm hub and changes turntable speed to 33-1/3 rpm.

4. When the transfer assembly operates far enough to release the record, cam switch CS-5 operates deenergizing mechanism control relay R and the amplifier mute relay.

5. Mechanism control relay R, contacts 6 and 10, 7 and 11, deenergize the transfer motor by disconnecting it from the common line.

6. The transfer linkage stops moving and the record plays.

(15) Record Ends

1. When the magnet on the underside of the tone arm operates the tone arm cutoff switch, as the tone arm tracks into the cutoff groove, the amplifier mute relay and mechanism control relay R are energized. The parallel capacitor and series resistor in the mechanism control relay circuit is to delay the pickup of the mechanism.

2. Mechanism control relay contacts 6 and 10, 7 and 11, complete a circuit to common to energize the transfer motor.

(16) Record Replaced In Magazine, Magazine Scans

1. As the transfer arm places the record in the magazine, the cam operates cam switches CS-1 and CS-2.

2. Cam switch CS-1 deenergizes the turntable motor.

3. Cam switch CS-2 deenergizes mechanism control relay R and the hub shift coil and operates the detent switch.

4. The magazine motor operates until the scan control switch or stop switch operates.

(17) Premium Price Credit and Selec

1. Assume that selections 8A through 8V a premium price. This is done by moving mium pricing slide #8 to premium price tion.

2. When the customer inserts a quarter, tw five cents credit is established as in seq 2 and 3.

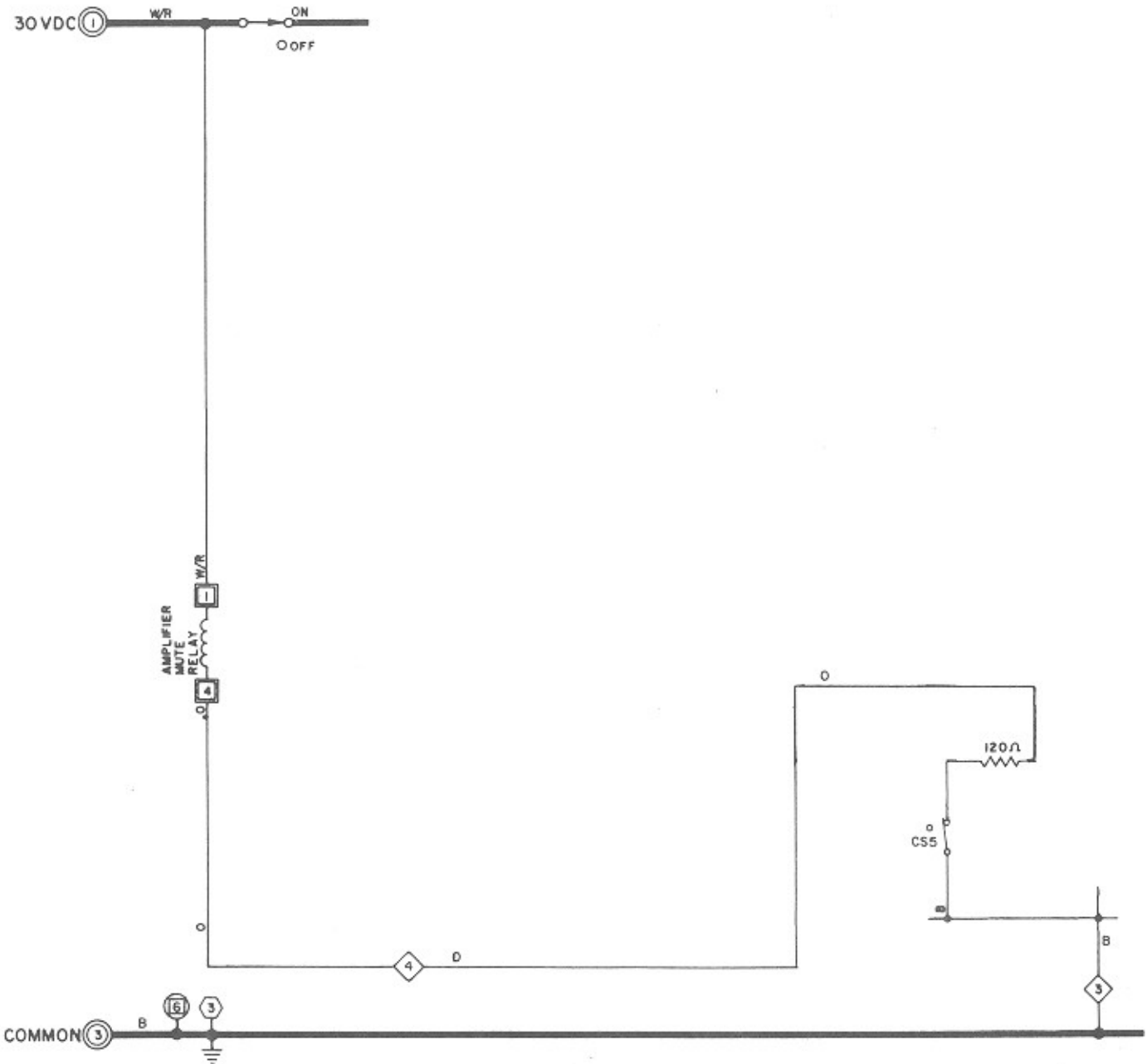
3. The positive line is connected at number button switch 1 direct to select pulse and relay R1.

4. Selection occurs as in sequences 4 throug

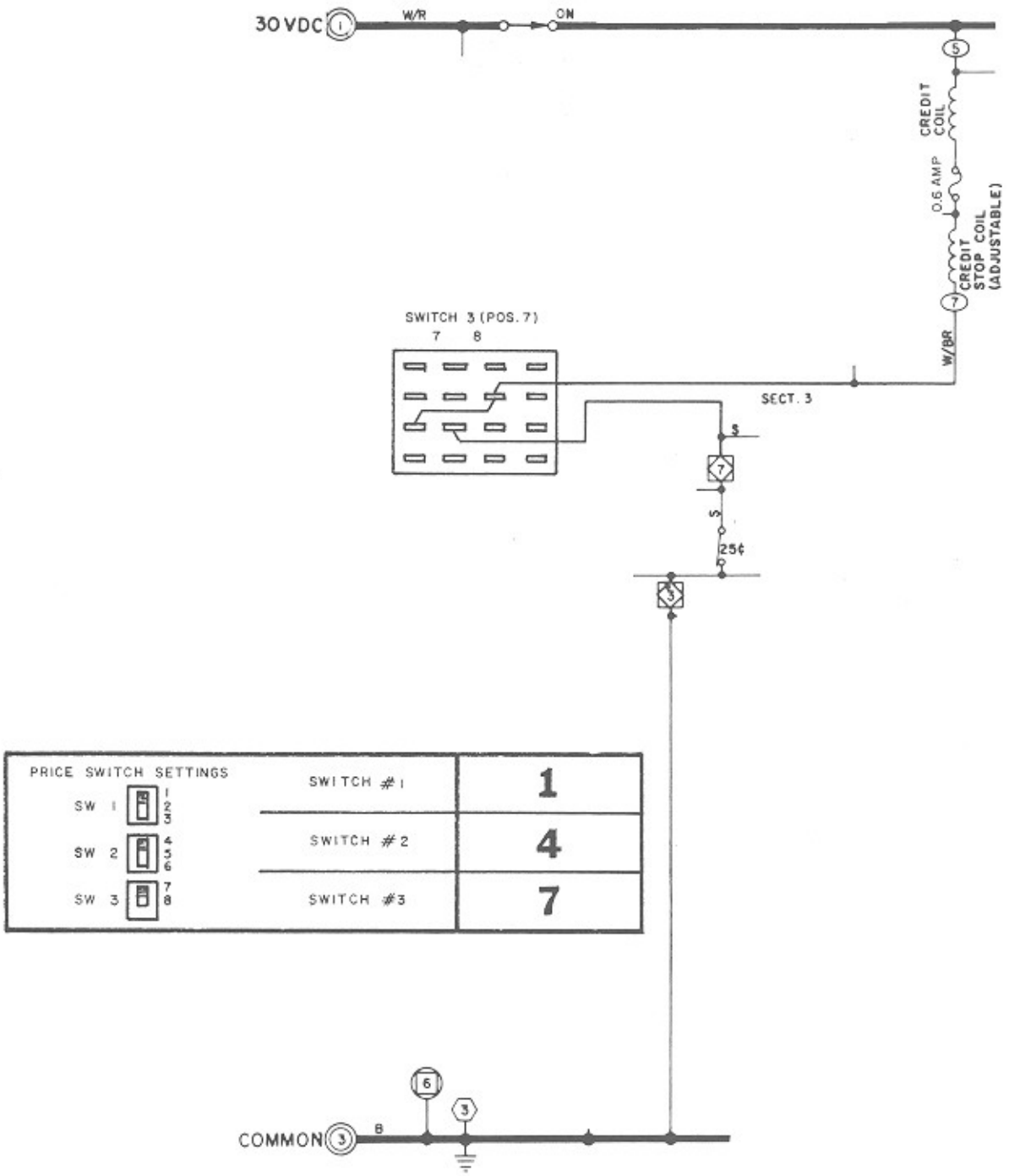
5. Credit removal bypasses cancel stop coil th premium price slide switch #8 and pushl switch 8, and two credits are removed.

6. The credit wipers are returned to zero position when sprag relay S2 is energized

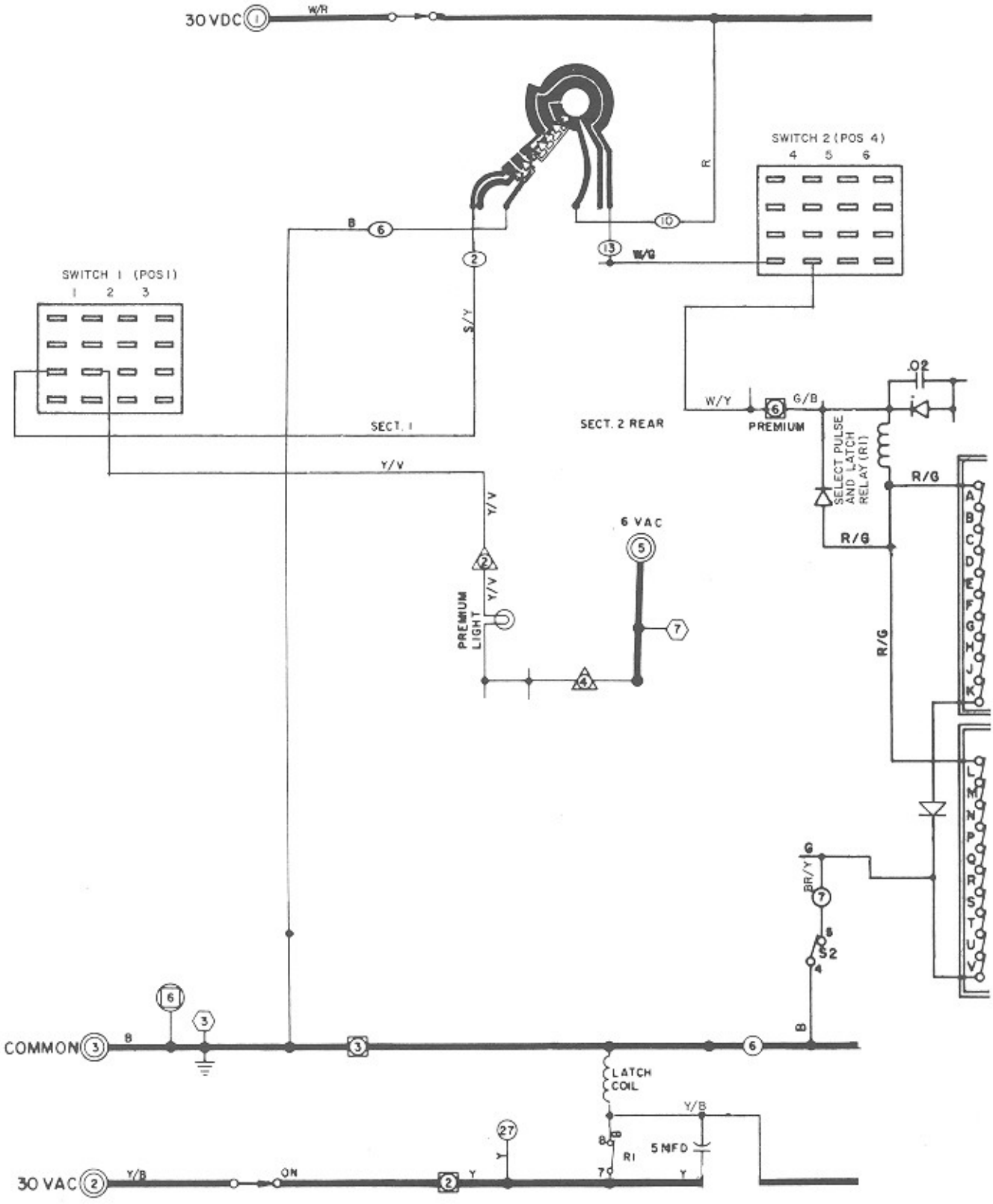
① STANDBY


30 VDC
1
W/R
ON
OFF
W/R
AMPLIFIER MUTE RELAY
2
4
O
120Ω
CS5
B
3
4
D
COMMON
3
B
6
3

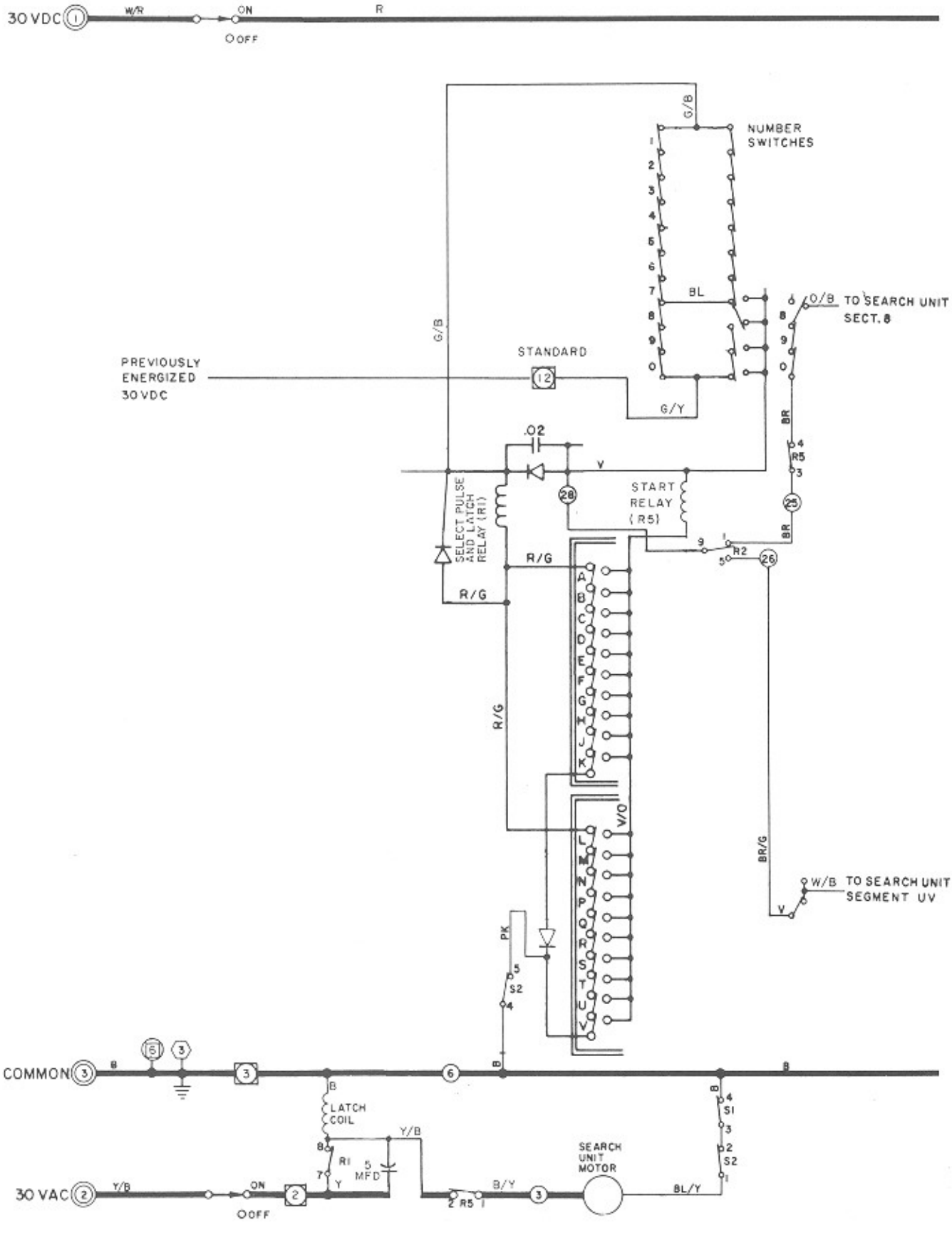
(2) CUSTOMER INSERTS QUARTER



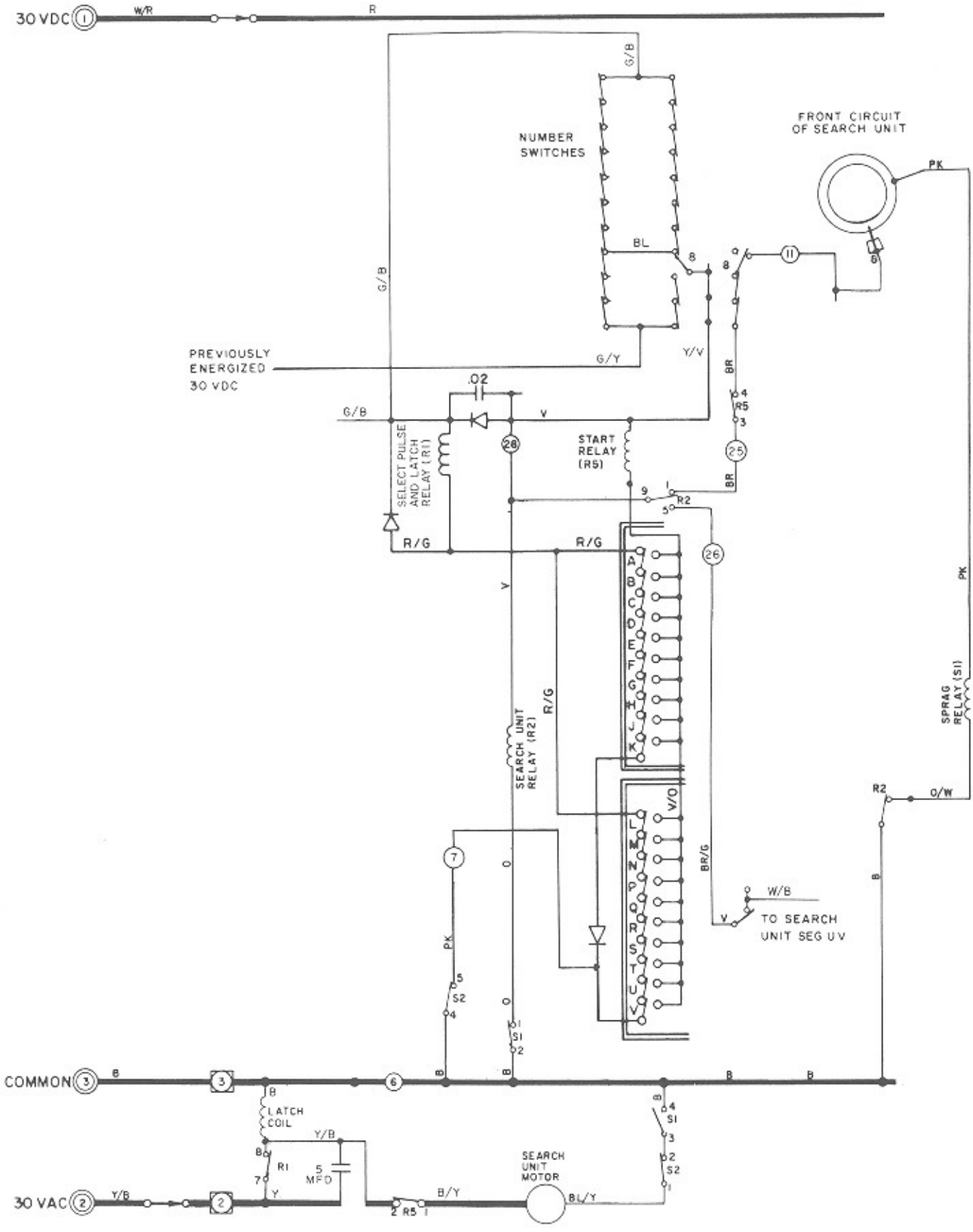
(3) CREDIT ESTABLISHED



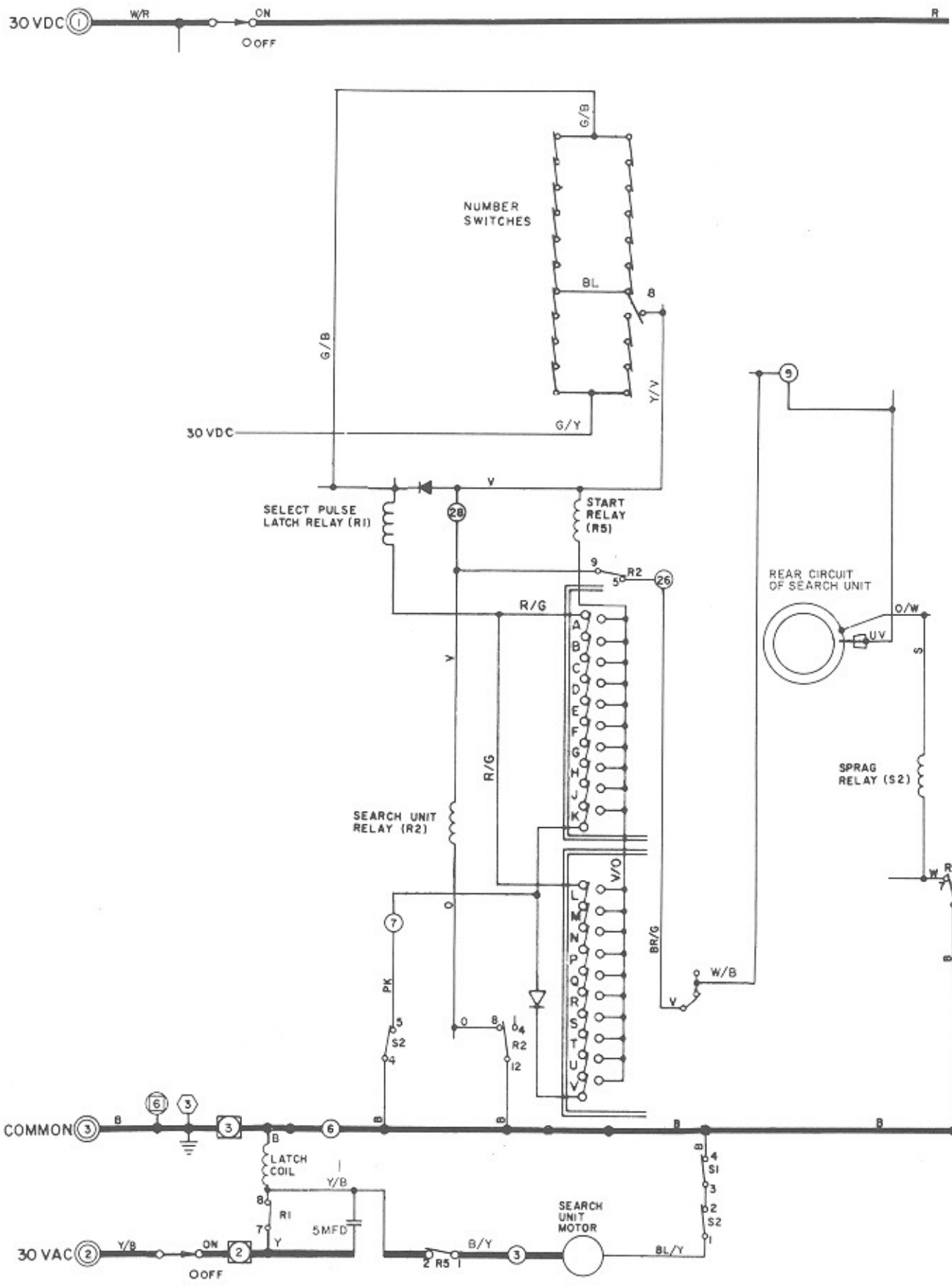
(4) CUSTOMER MAKES FIRST SELECTION



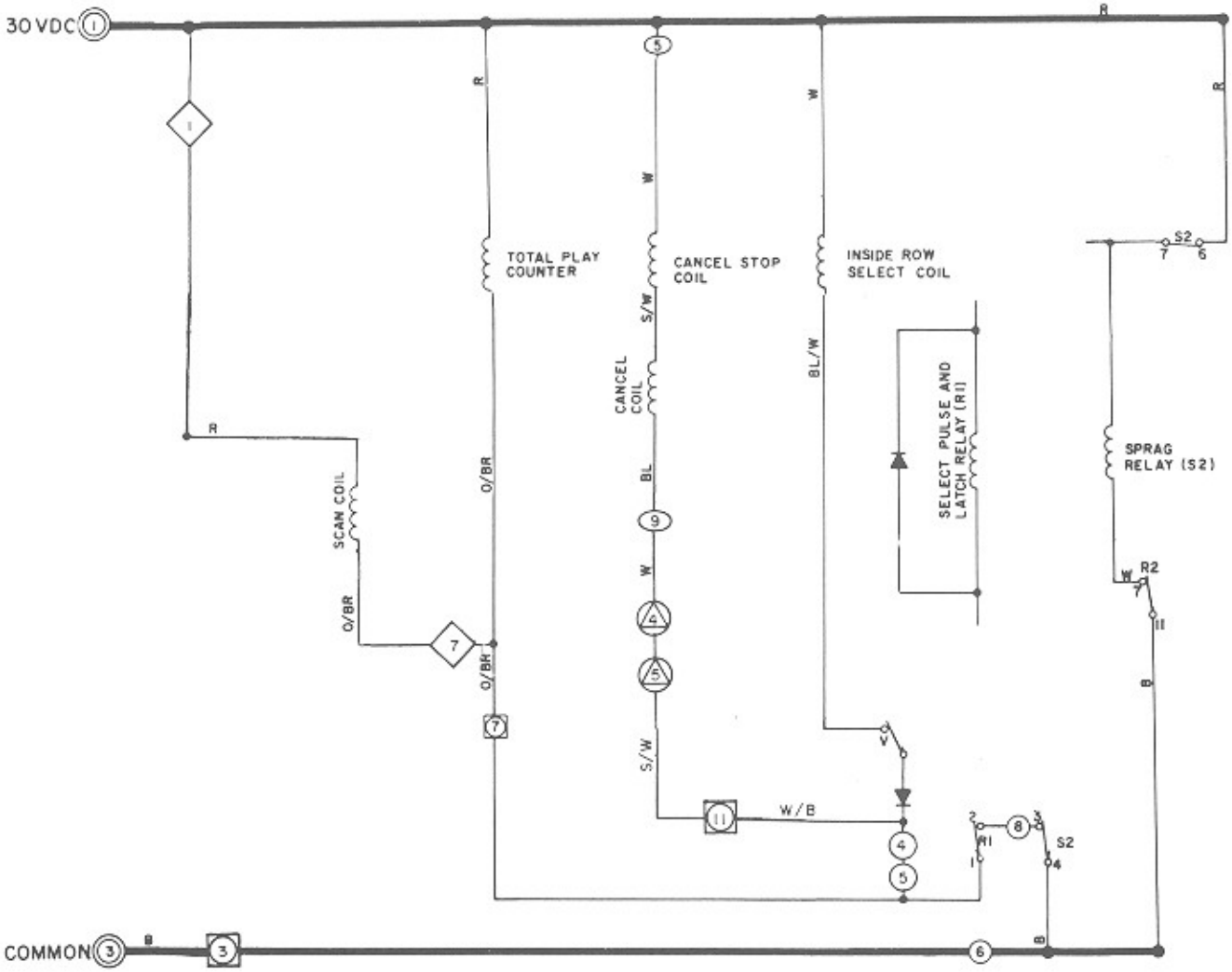
(5) SEARCH WIPERS LOCATE NUMBER



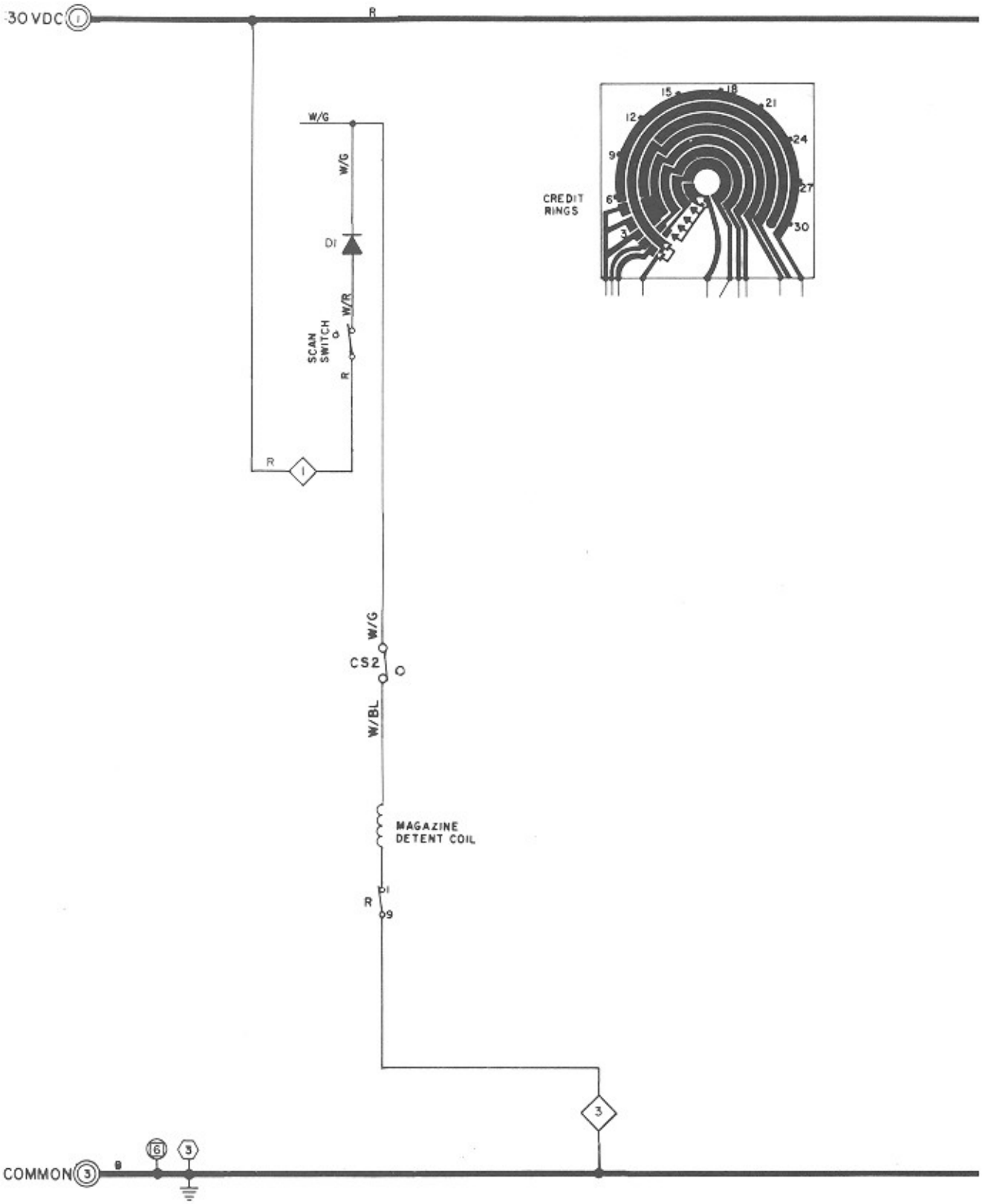
(6) SEARCH CONTINUES



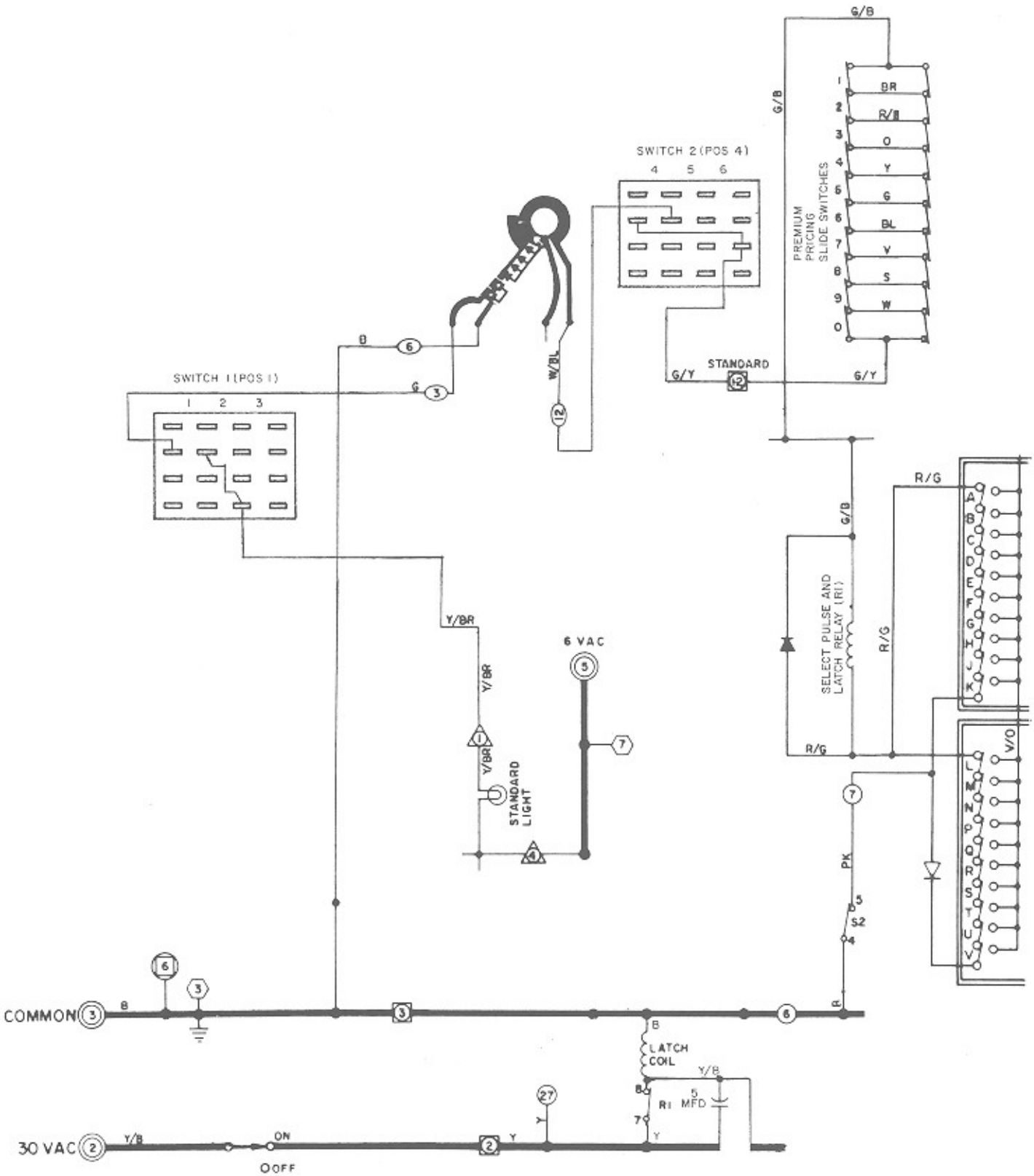
(7) SELECTION REGISTERED, CREDIT REMOVED, AND SCAN CONTROL OPERATED



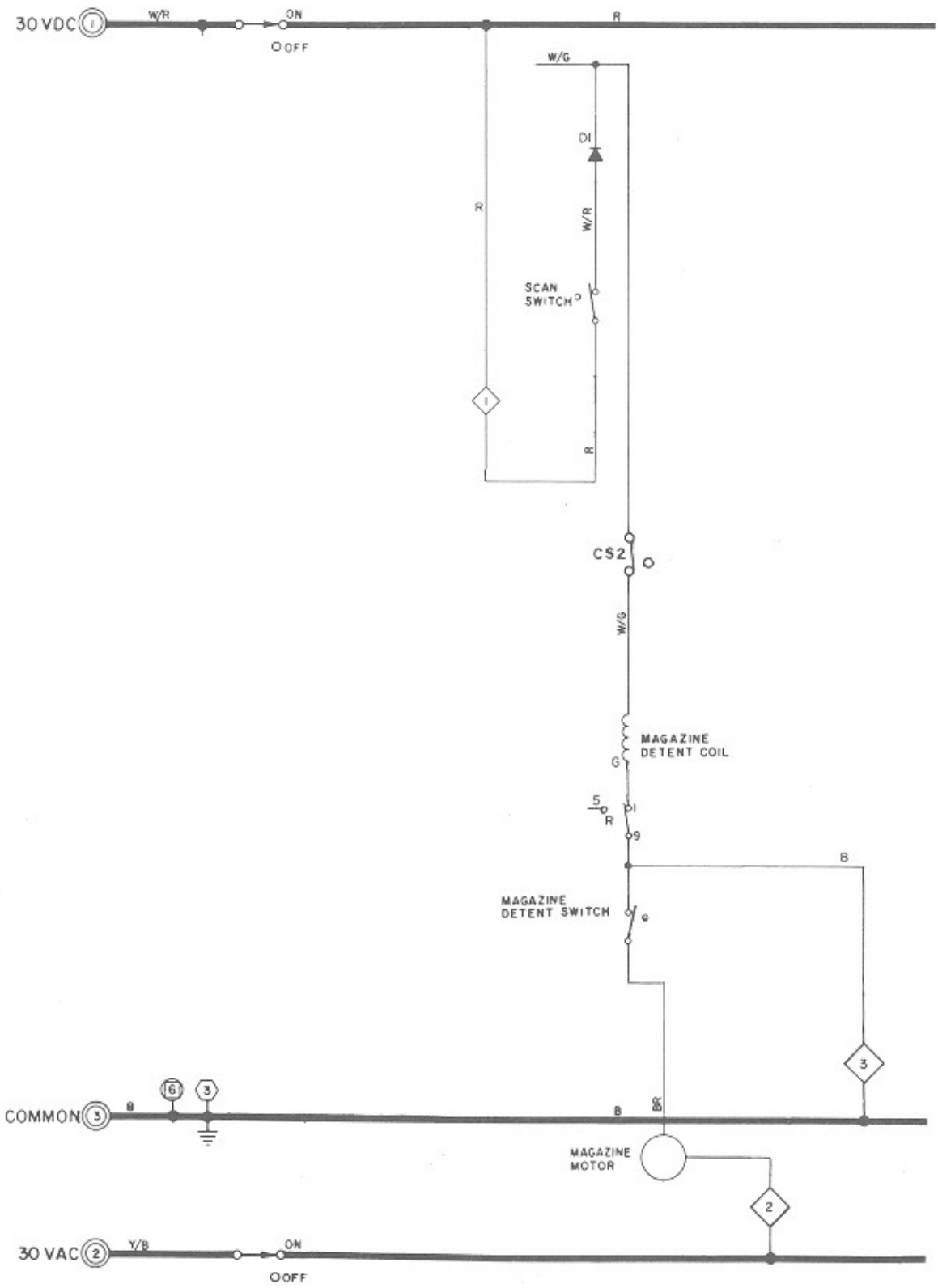
(8) PUSHBUTTONS UNLATCH AND RECORD CHANGER STARTS



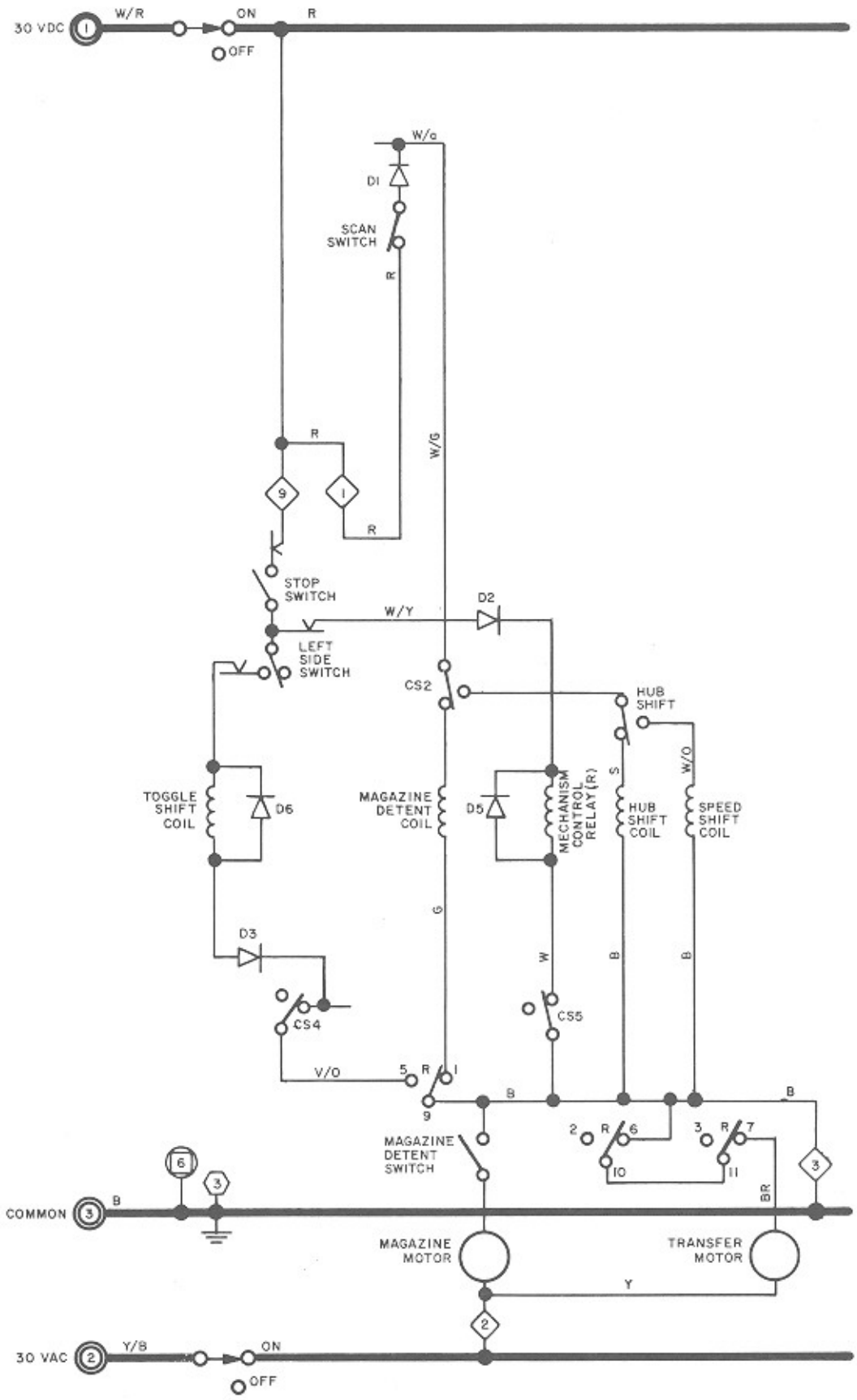
(9) CUSTOMER MAKES SECOND SELECTION



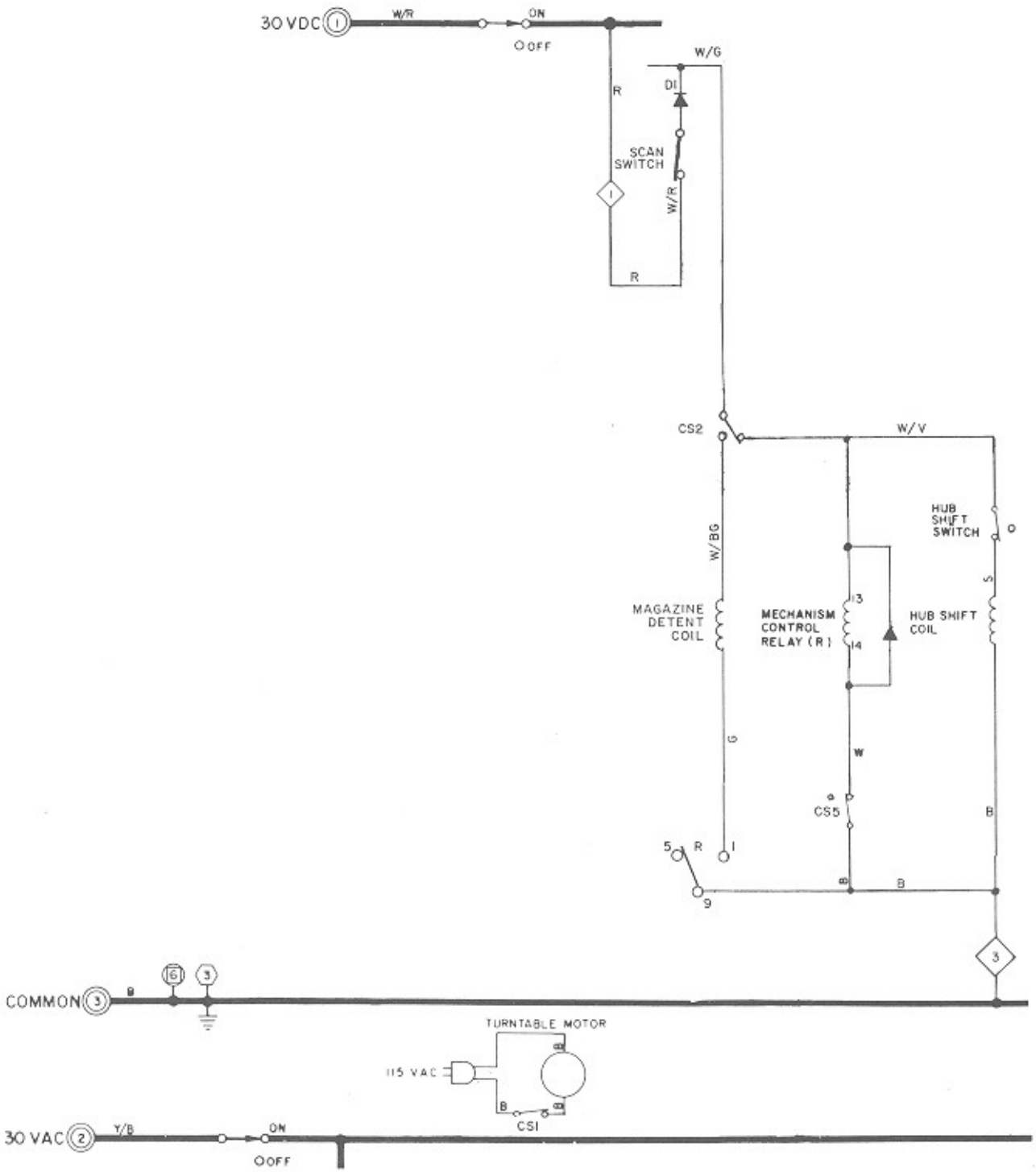
(10) RECORD MAGAZINE ROTATES



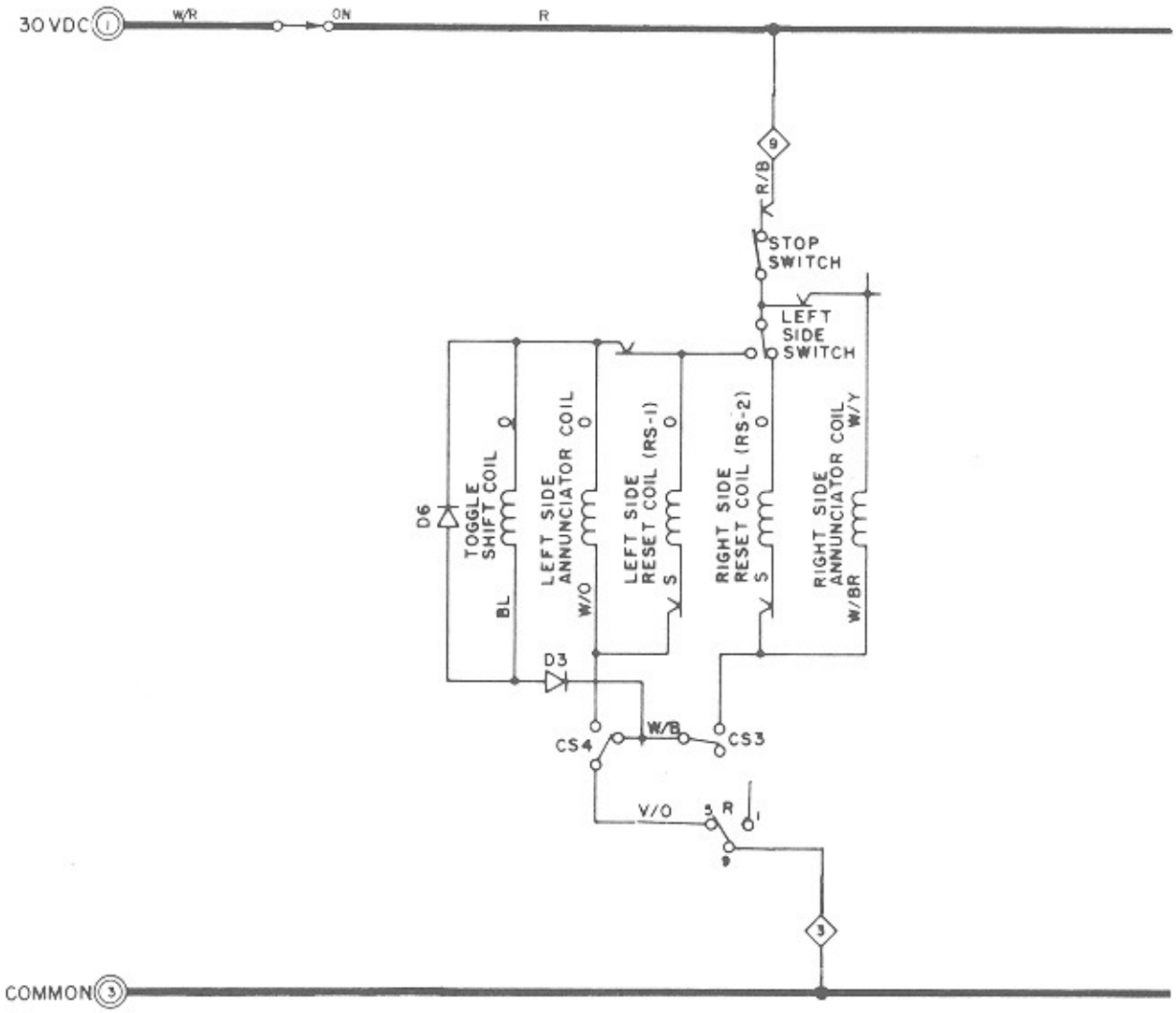
(11) STOP SWITCH PAWL HITS SELECTED PIN-TRANSFER MOTOR STARTS



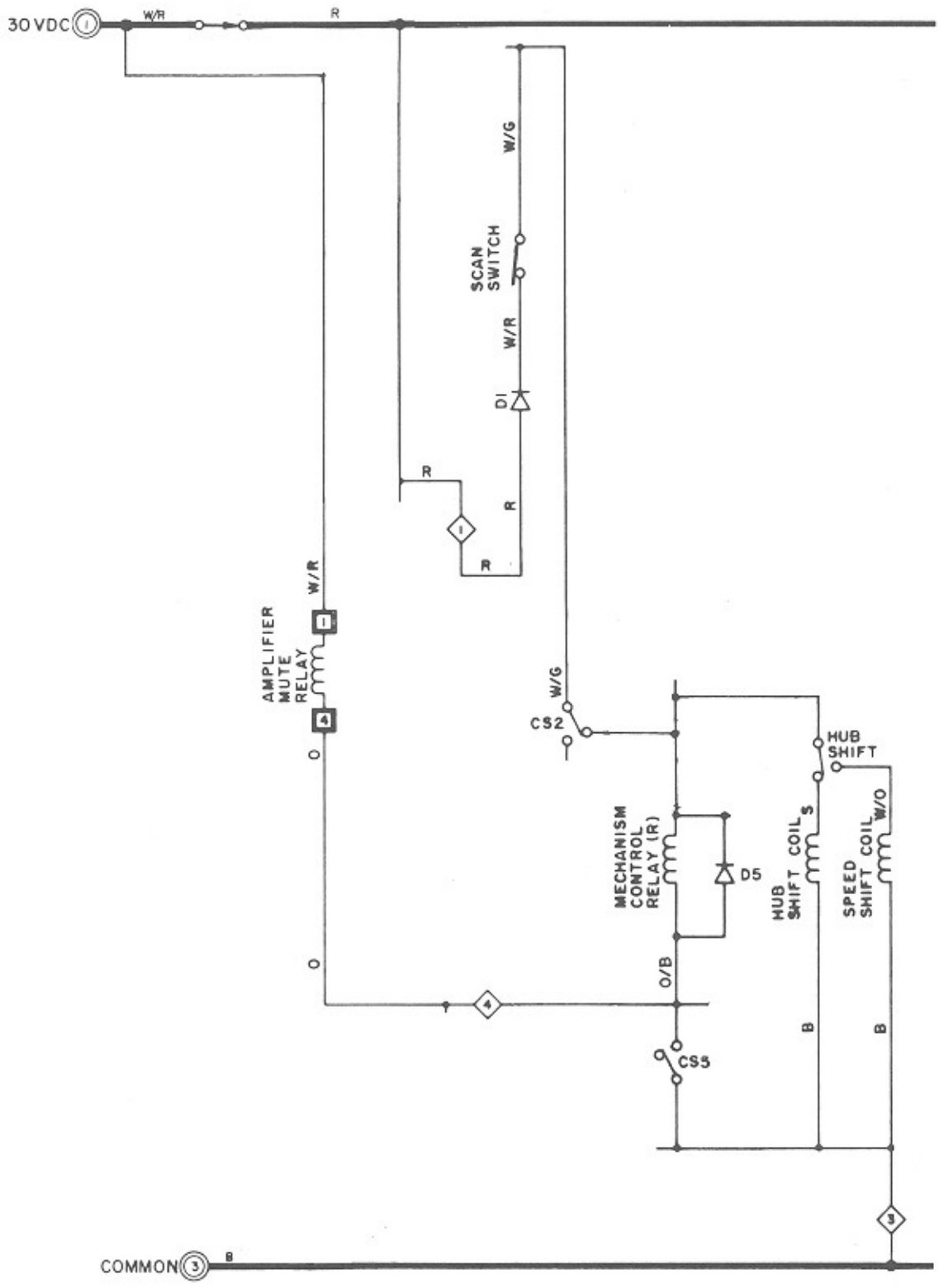
(12) RECORD PICKED UP



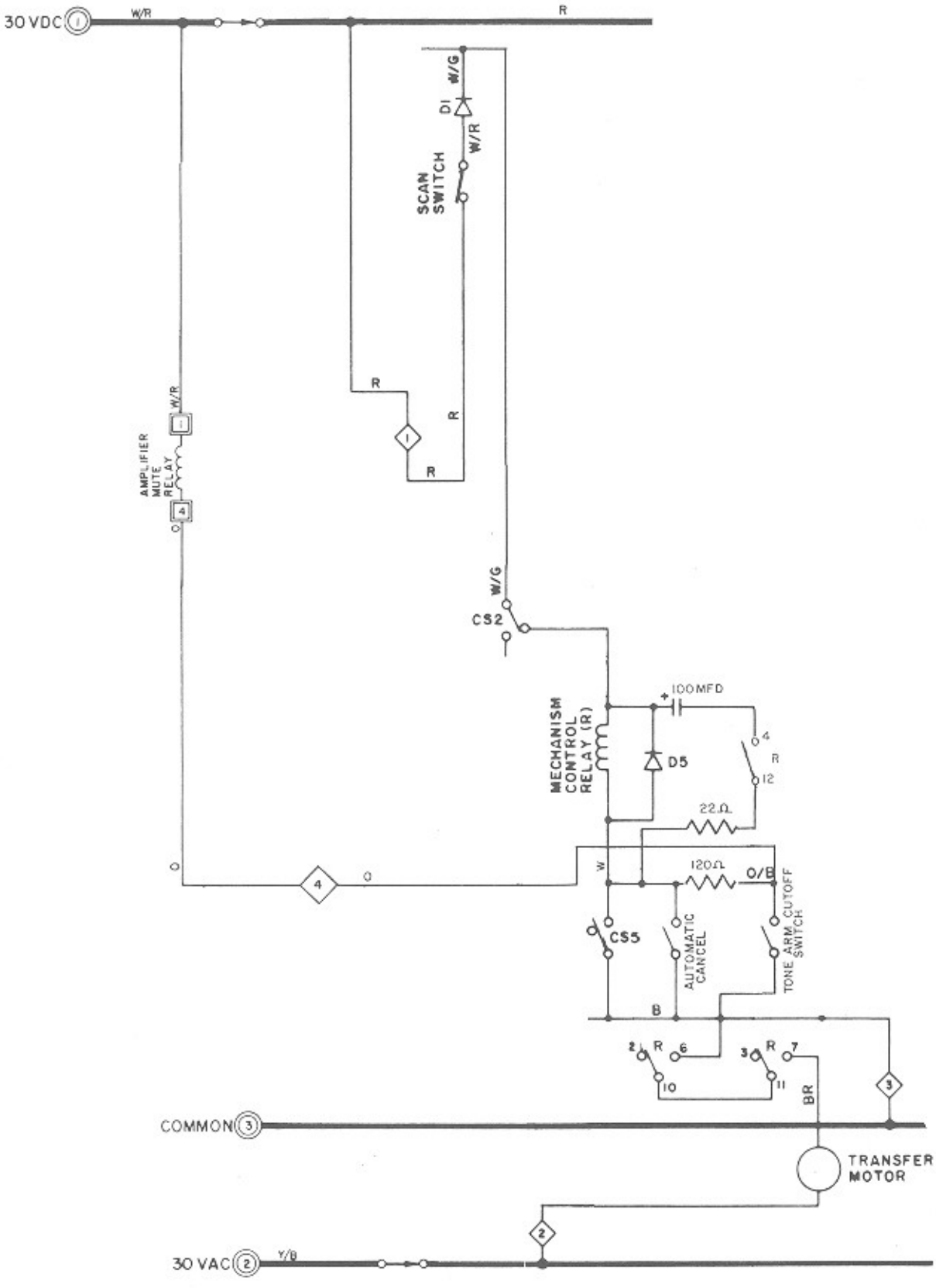
(13) RECORD APPROACHES TURNTABLE



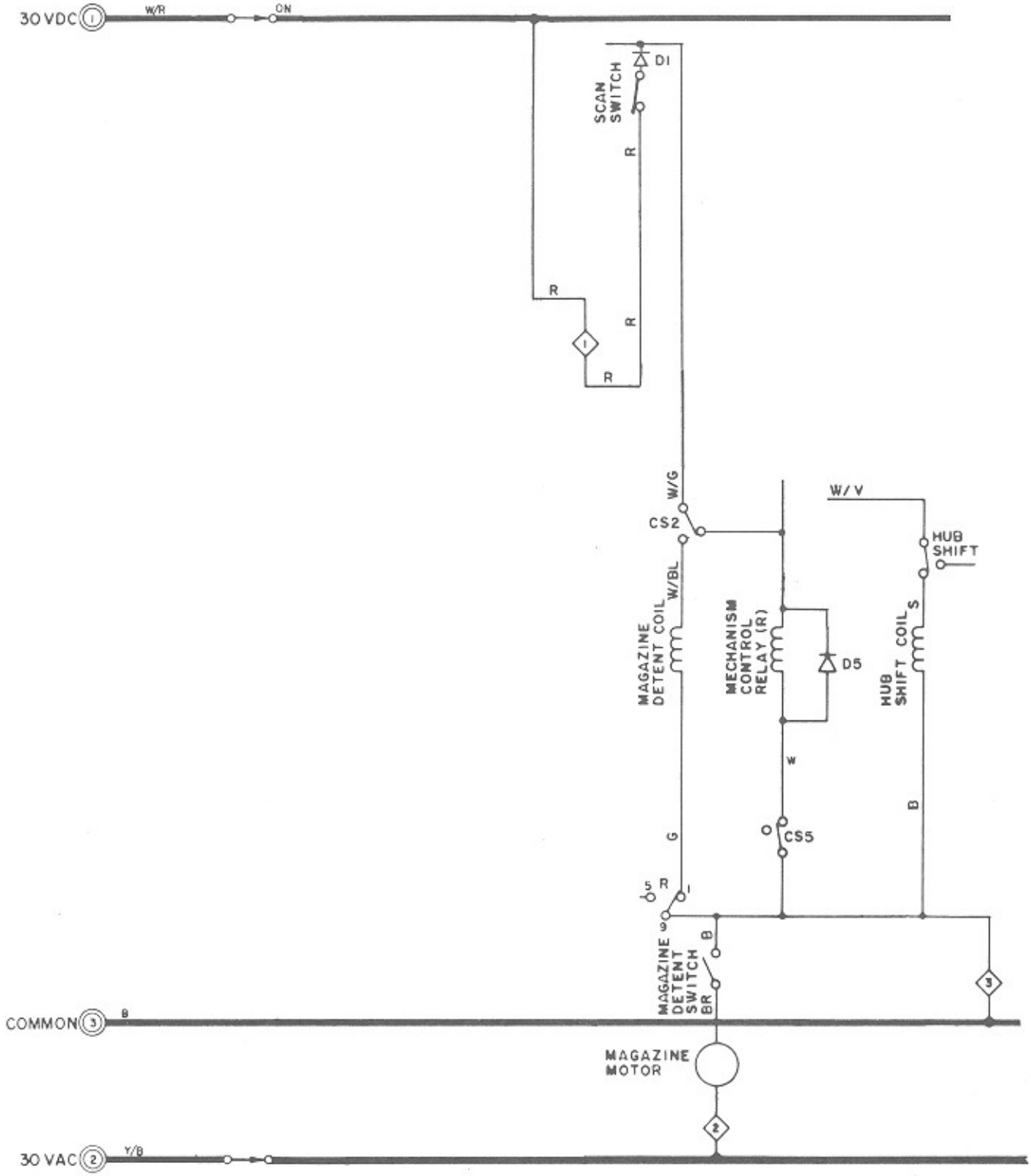
(14) RECORD PLACED ON TURNTABLE



(15) RECORD ENDS



(16) RECORD REPLACED IN MAGAZINE, MAGAZINE SCANS



(17) PREMIUM PRICE CREDIT AND SELECTION