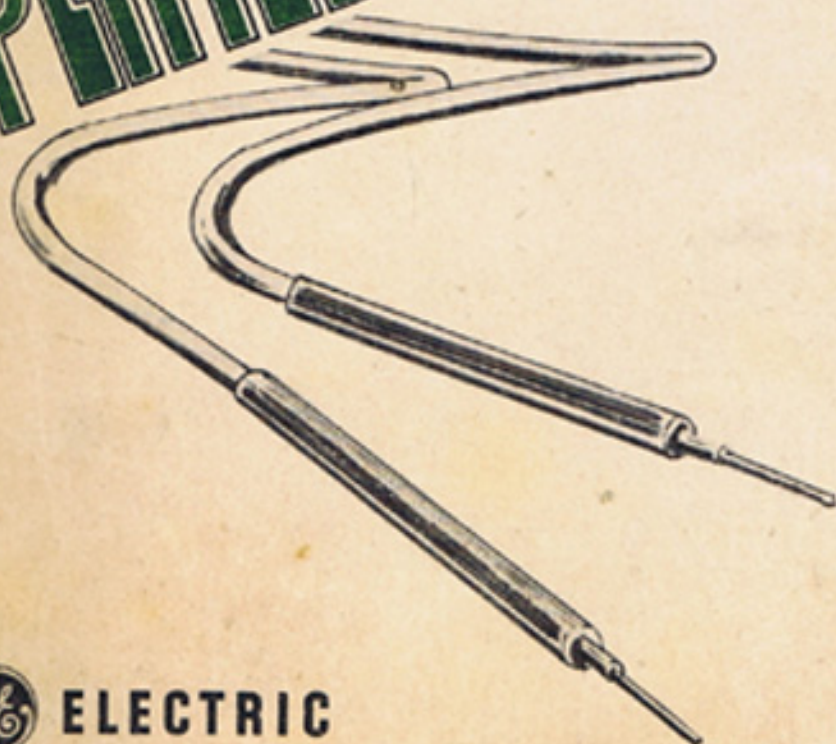




SIMPLIFIED TROUBLESHOOTING



INTRODUCTION

The Simplified Troubleshooting manual is designed to help Elec-Trak tractor service personnel locate faults in control circuitry. For details on servicing, troubleshooting, multitester use and parts information, refer to the Elec-Trak Product Service Manual.

The main function of the Simplified Troubleshooting manual is to illustrate where voltage drops occur in each of the speeds of the speed control. Positive voltage is shown by red wiring and negative voltage by green wiring. Components colored yellow are activated. A voltage reading will be indicated on the voltmeter if the red meter probe is placed on a red terminal or an uninsulated part of the red wiring. The black probe is placed on a green terminal or an uninsulated part of the green wiring. The multitester dial setting must be on 50-volts d-c. Tractors that have been operating and suddenly fail usually are wired correctly; however, all wire terminations should be rechecked for tightness. If the wiring to the components is correct, then troubleshooting simply consists of locating a defective component.

A voltage reading in a closed d-c circuit will appear across any coil or resistor. Examples of coils in the Elec-Trak circuitry are relay coils, contactor coils, drive motor field and armature coils. Examples of resistors in the Elec-Trak circuitry are field weakeners on Card # 3 and current limiters R1, R2, and R3.

When a switch, contact, circuit breaker, or fuse is open, a voltage drop exists across the terminals of that component and the multitester will register a reading. When a switch, contact, fuse, or circuit breaker is closed, no voltage potential exists across the terminals of the component and the multitester will not register a reading.

By referring to the Simplified Troubleshooting manual, one can easily determine the components which actuate each Elec-Trak speed or direction on each model tractor. By remembering how individual components work, a service man can easily find a defective component and replace it.

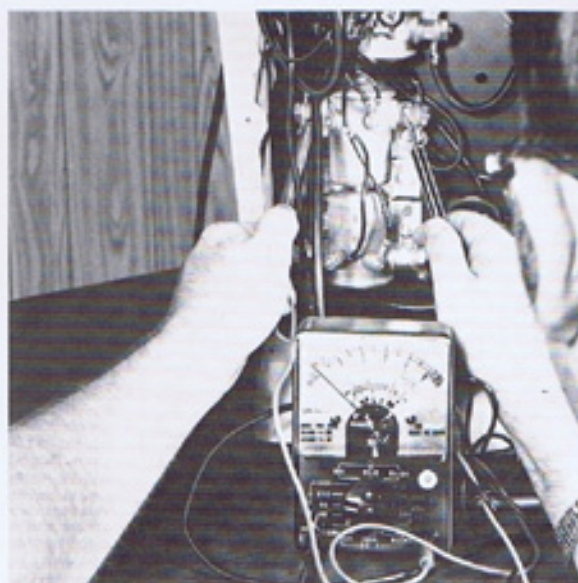
The following set of pictures illustrates component troubleshooting with a multitester on an E12 and should be used as a guide for troubleshooting all similar components on all model Elec-Trak tractors.

COMPONENTS TESTING

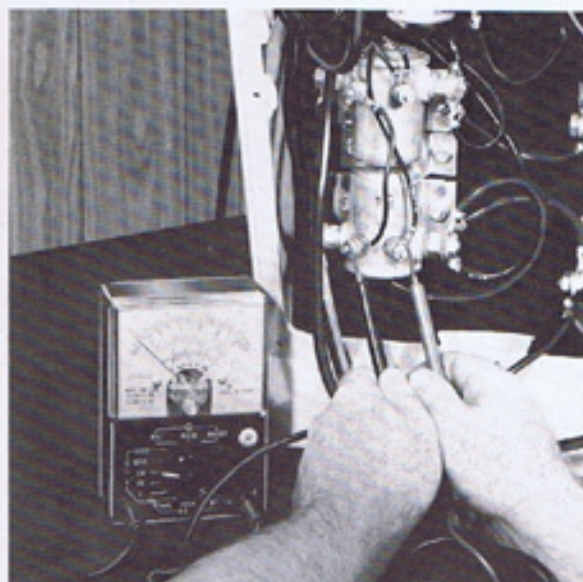
RELAY AND CONTACTOR TROUBLESHOOTING



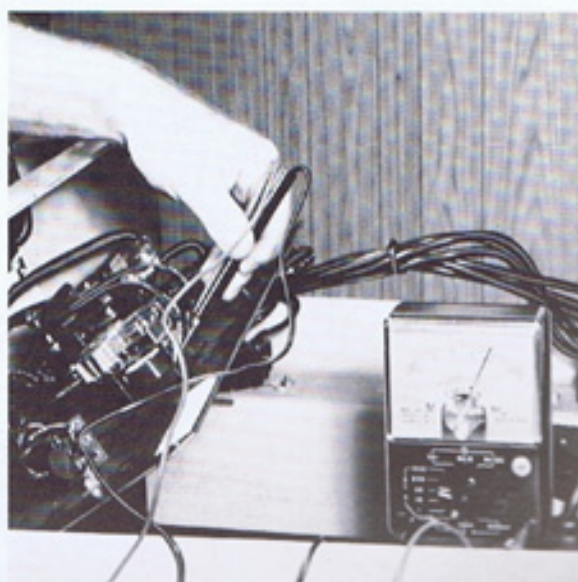
1. Multitester reads 36-volts at small studs (coils) of 1F contactor when speed control is pushed forward.



3. Multitester reads 0-volts at large studs (contacts) of 1F contactor when speed control is pushed forward. 0-volts indicates contacts of 1F contactor are closed. 36-volts in the same position indicates contacts open.

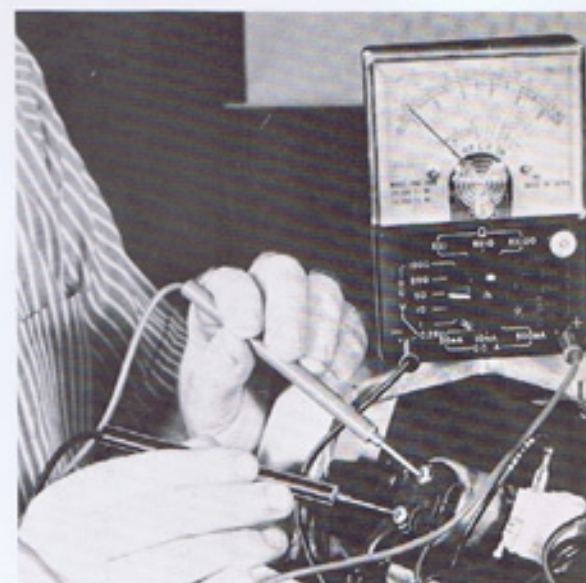


2. Multitester reads 0-volts at small studs (coil) of 2R contactor when speed control is pushed forward. 2R coil energizes only in reverse.

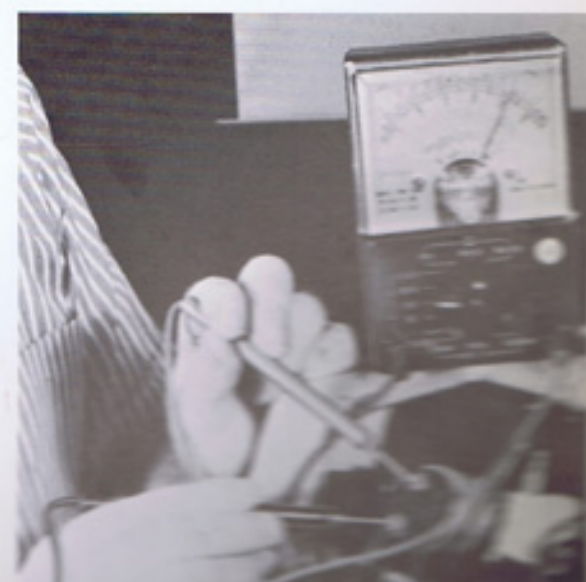


4. Multitester reads 36-volts on front terminals of the relay coil as soon as relay is energized.

SWITCHES, CIRCUIT BREAKERS AND FUSE TROUBLESHOOTING



5. Multitester reads 0-volts across key switch terminals when key switch is closed and tractor is in normal operating condition.



6. Multitester reads 36-volts across key switch terminals when key switch is open and tractor is in normal operating condition.



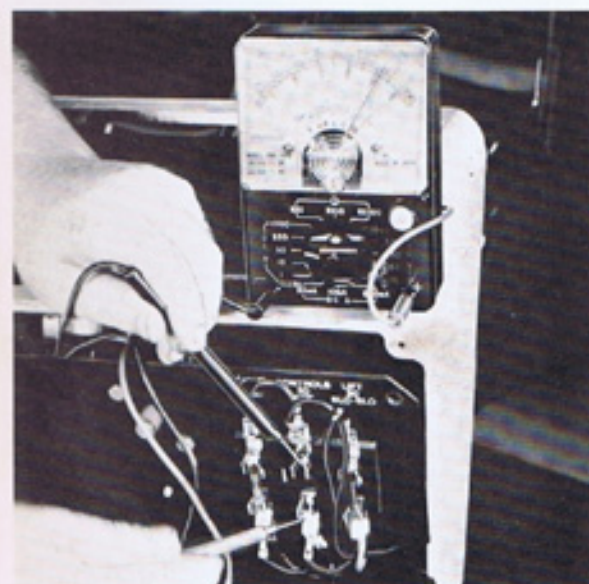
7. Multitester reads 0-volts across fuse holder when fuse is good and in the holder.



9. Multitester reads 0-volts across power disconnect terminals when power disconnect is engaged.



11. Multitester reads 36-volts across wires 16 and 41 to the reverse switch terminals when speed control is in a forward position (switch is open).



8. Multitester reads 36-volts across fuse holder when fuse is not in holder or bad.



10. Multitester reads 36-volts across power disconnect terminals when power disconnect is out.



12. Multitester reads 0-volts across wires 16 and 41 to the reverse switch terminals when speed control is in the reverse position (switch is closed).



13. Multitester reads 36-volts across the 1A switch terminals when speed control is in neutral or the first speed (switch is open).



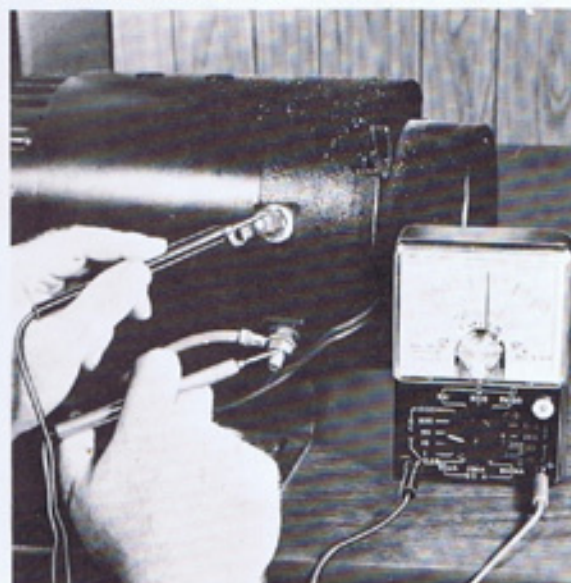
15. Multitester reads 0-volts across CB2 circuit breaker terminals (breaker is closed) when tractor is operating. Multitester would read 36-volts across CB2 circuit breaker terminals if it needed to be reset (breaker is open). Open only while recharging or using accessory receptacle.



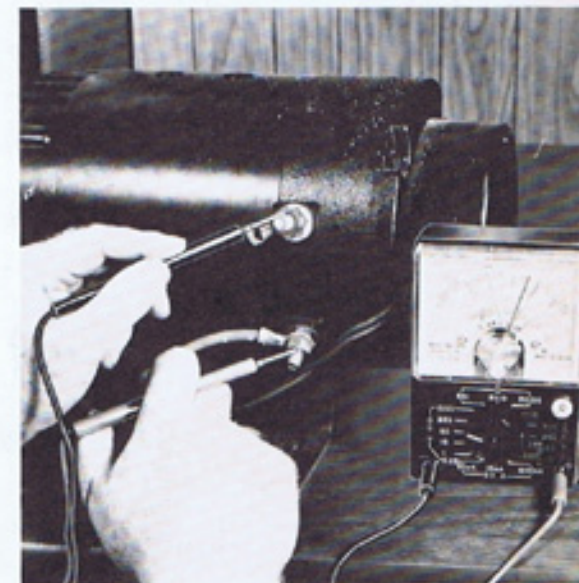
17. Multitester reads 32-volts across motor armature terminals in second speed.



14. Multitester reads 0-volts across the 1A switch terminals when speed control is in the second speed or third speed (switch is closed).



16. Multitester reads 28-volts across motor armature terminals in first speed.



18. Multitester reads 36-volts across motor armature terminals in third speed.

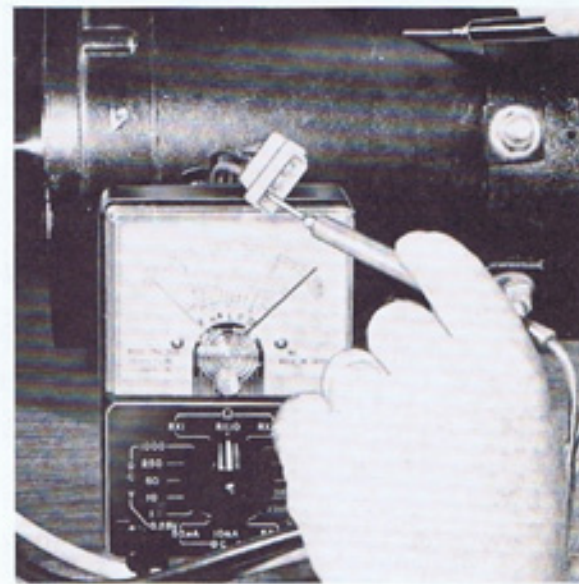
DRIVE MOTOR TROUBLESHOOTING



19. Multitester reads 36-volts in first three speeds on wires 62 and 22 on Plug 3 connecting the motor field.



21. Multitester set on RX10 wires disconnected from motor. Approximately 16 ohms reading on multitester from wire 62 to wire 22 on plug 3 connecting the motor field is normal.



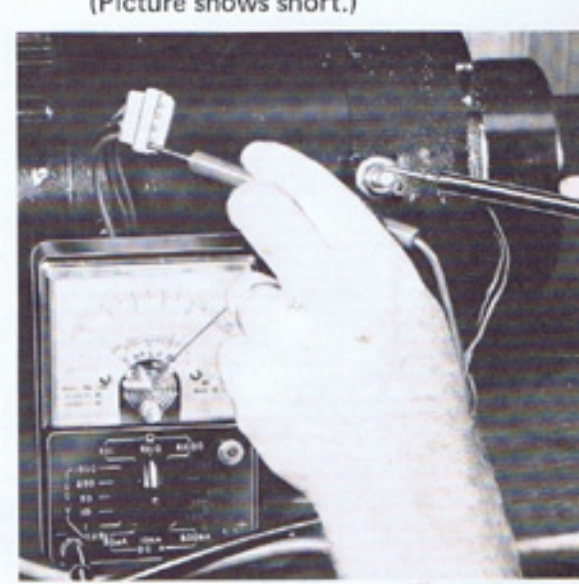
23. Multitester set on RX10 wires disconnected from motor. One probe placed on wires 62 or 22, connecting the motor field; the other probe placed on a scratched portion of the motor case. Approximately ∞ ohms reading on the multitester is normal. More than 1/2-scale deflection indicates the motor field is shorted to the motor case. (Picture shows short.)



20. Multitester set on RX10 wires disconnected from motor. Full-scale deflection on multitester across motor armature terminal is normal.



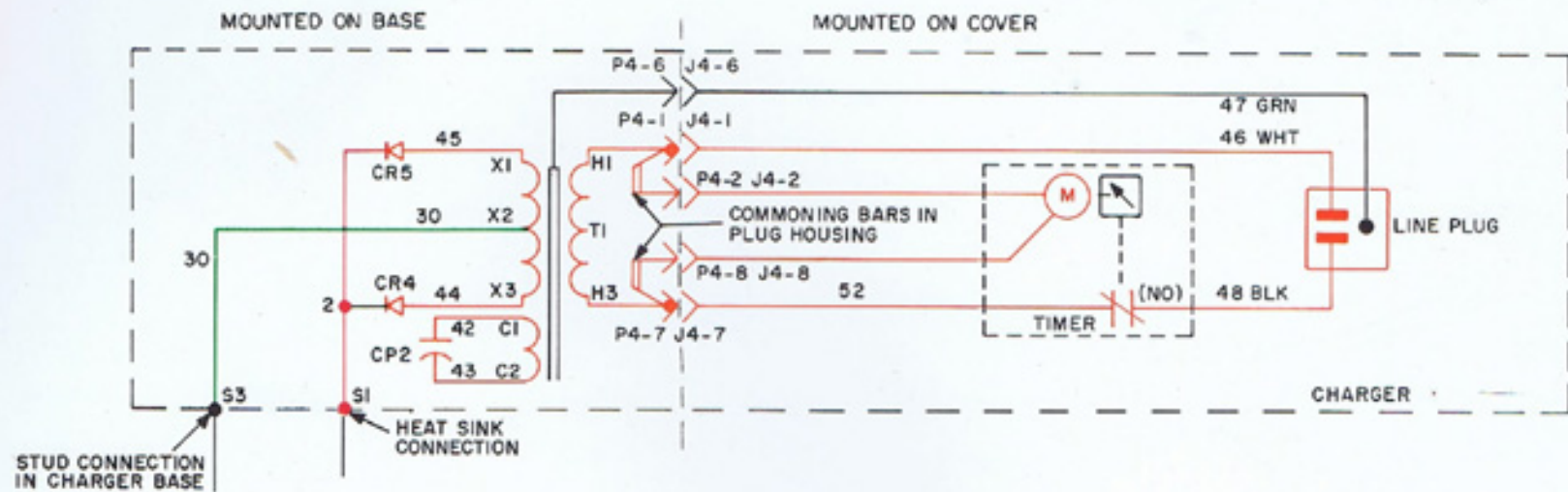
22. Multitester set on RX10 wires disconnected from motor. One probe placed on motor armature stud, the other probe placed on scratched portion of the motor case. Approximately ∞ ohms reading on the multitester is normal. More than 1/2-scale deflection indicates the motor armature shorted to the case. (Picture shows short.)



24. Multitester set on RX10 wires disconnected from motor. One probe placed on wires 62 or 22 connecting the motor field. The other probe placed on the motor armature stud. Approximately ∞ ohms reading on the multitester is normal. More than 1/2-scale deflection indicates the motor armature is shorted to the motor field. (Picture shows short.)

E12, E15, E20

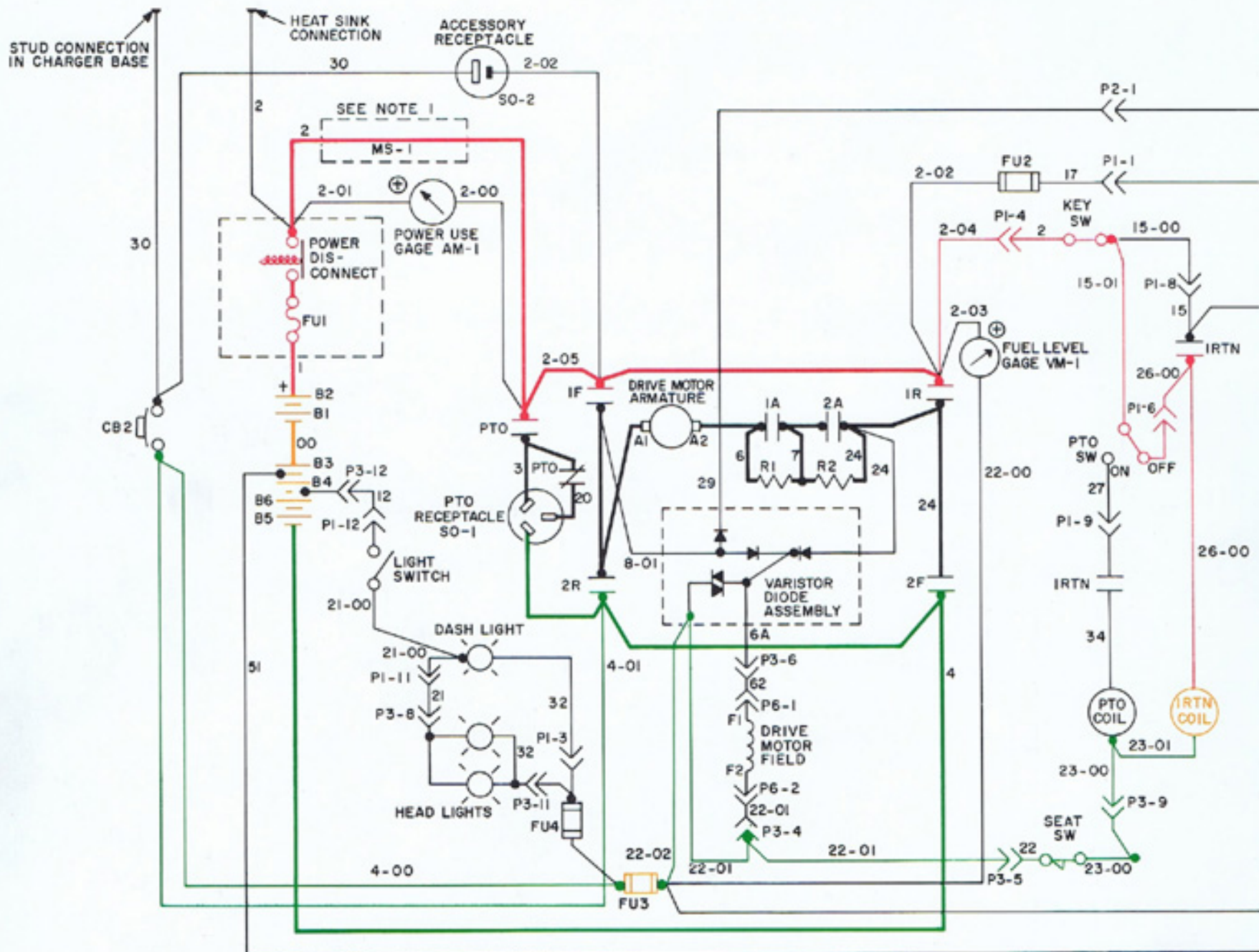
Timer Motor Turned On, Charger Cord Plugged In. Orange Line is A-C.



NOTE:

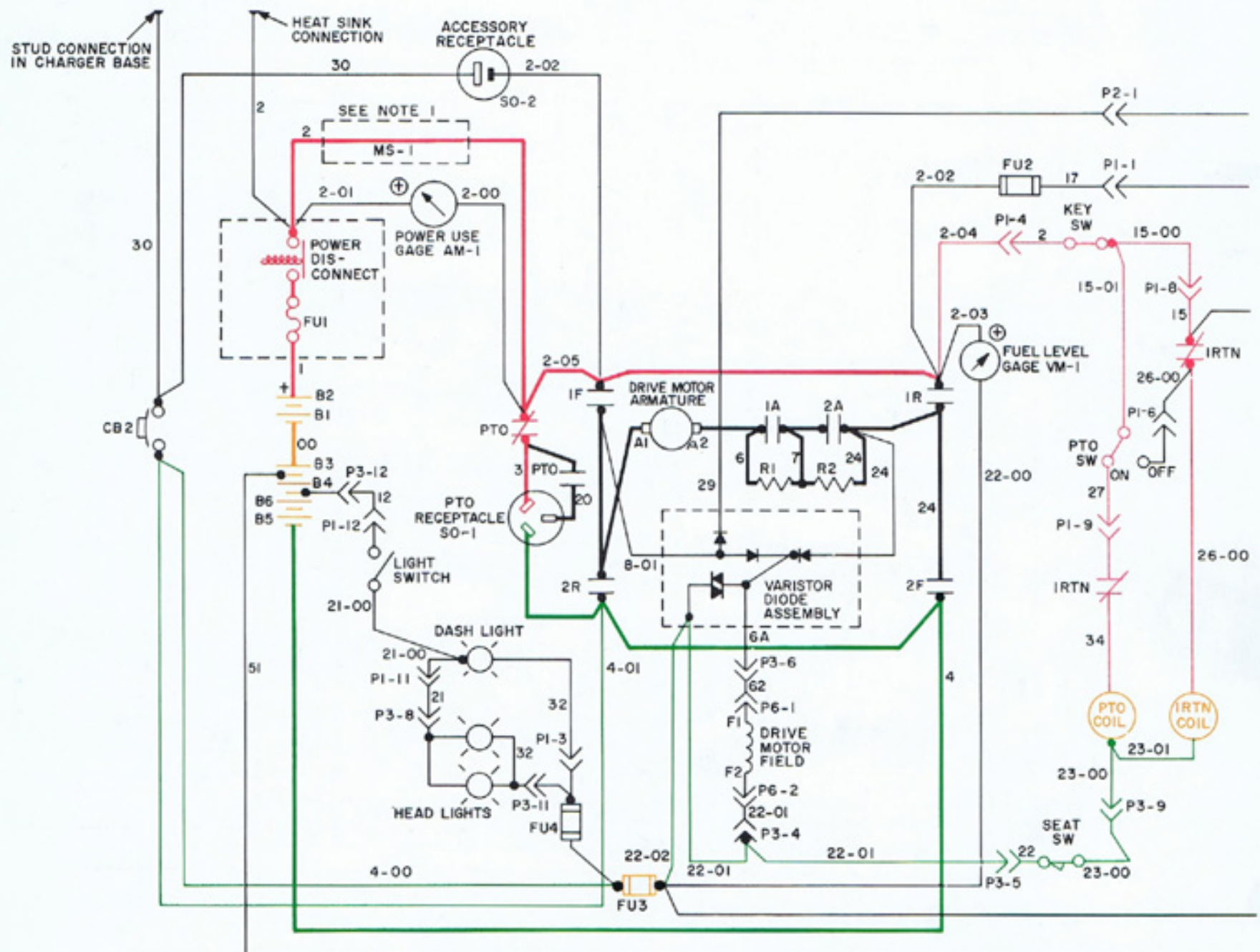
- (1) Transformer may have two H1 and two H3 wires, in which case commoning bars are not used.
- (2) Wire #45 to wire #30 and wire #44 to wire #30 read 40 to 44 volts a-c when line plug is inserted into 110-120 volts a-c receptacle.

E12, E20
Return-To-Neutral Function in PTO Circuit, PTO Switch OFF.

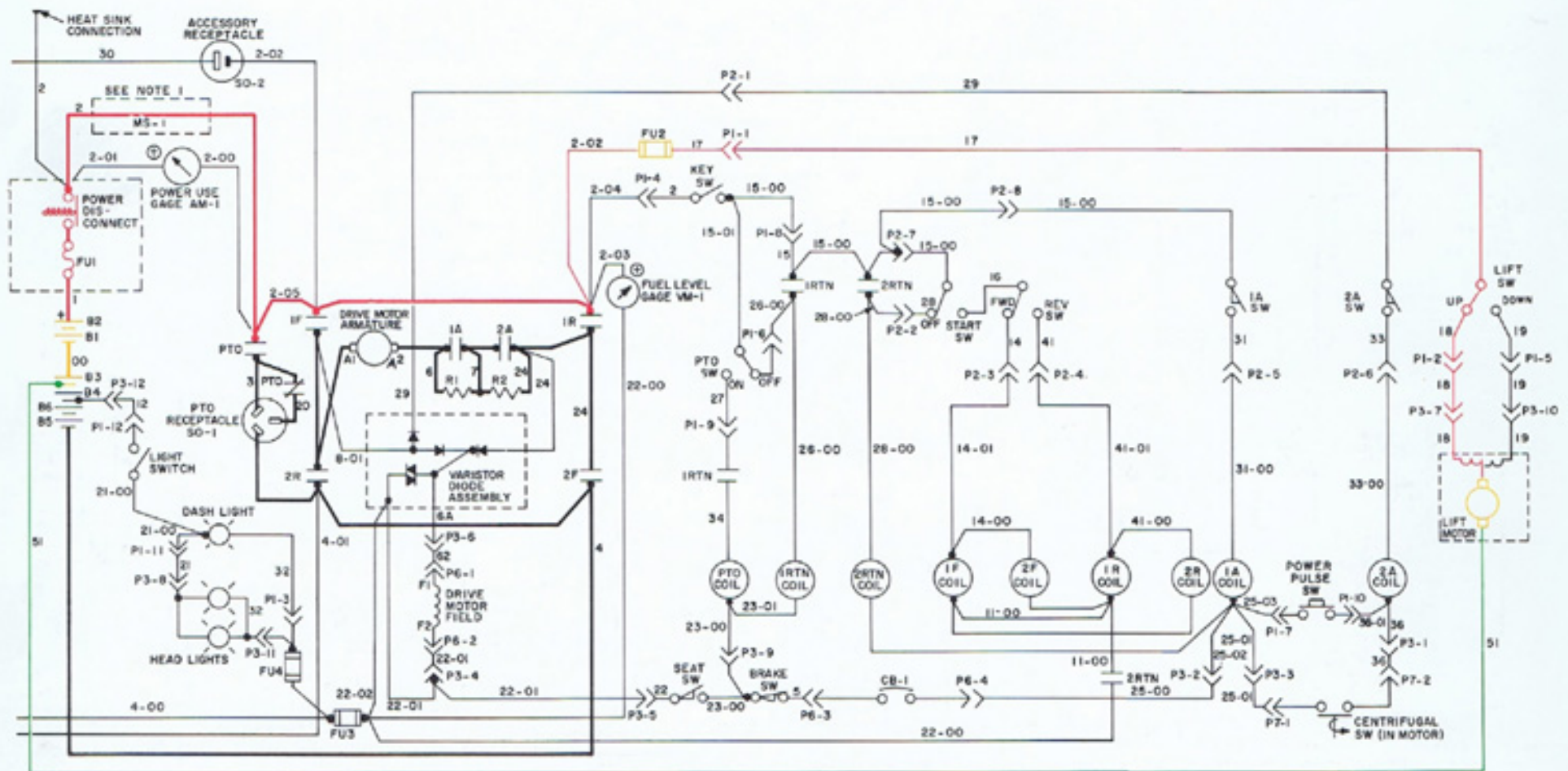


E12, E20

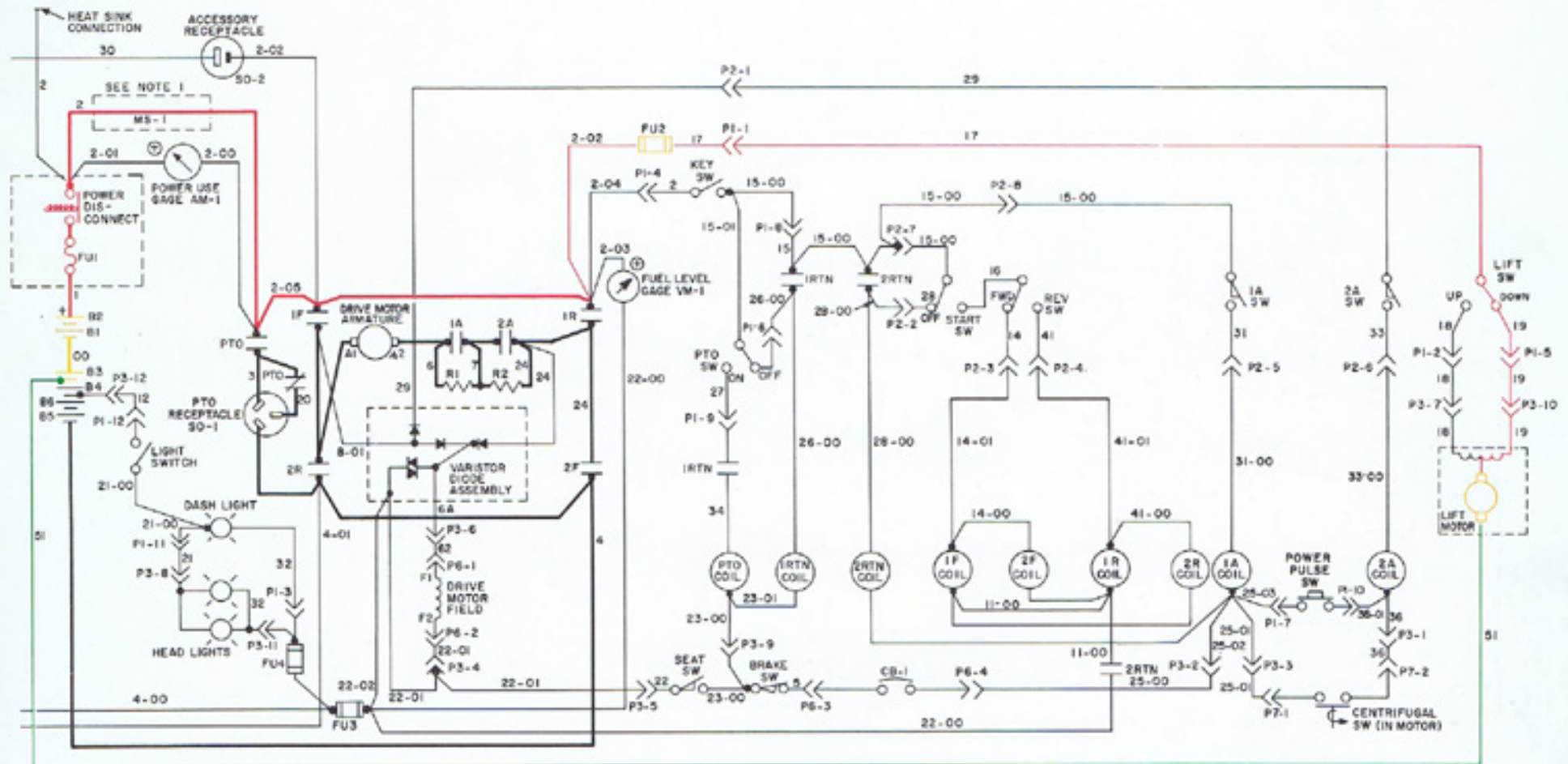
Return-To-Neutral Function in PTO Circuit, PTO Switch ON.



NOTES: SHUNT MS-1 IS A 20" LENGTH OF 6 AWG CABLE



E12, E15, E20
Lift Switch is in DOWN Position.

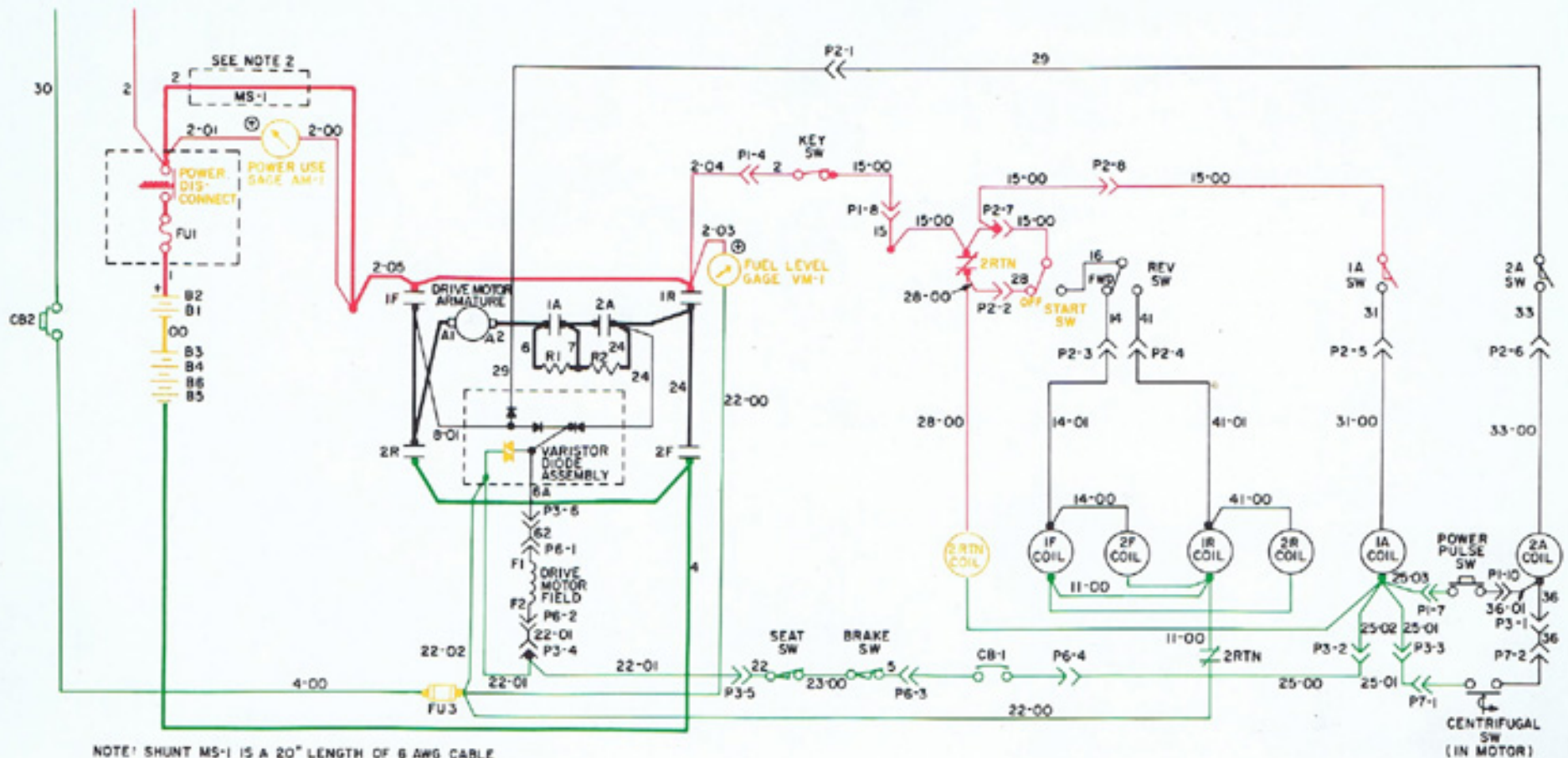


Lights Turned ON. Lights are 12-volt D-C.



E12

Speed Control in NEUTRAL, Key ON, Brake Disengaged, Seat Switch On, Power Disconnect Engaged.



CONTROL PANELS

SPEED POSITION

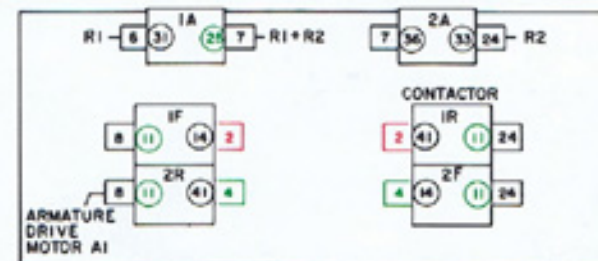
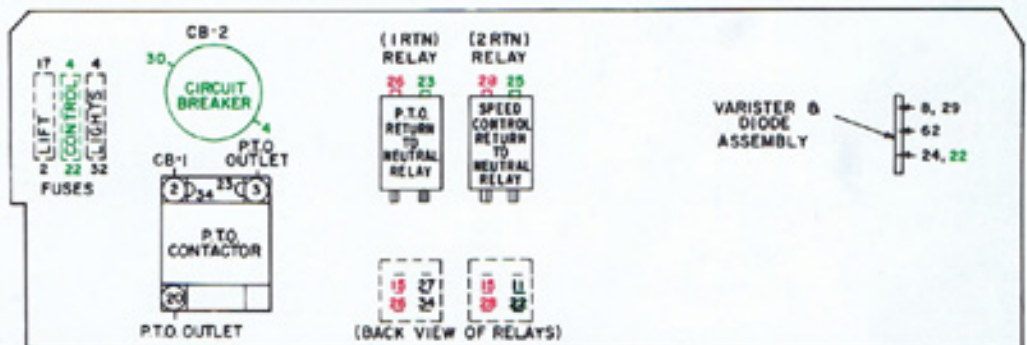
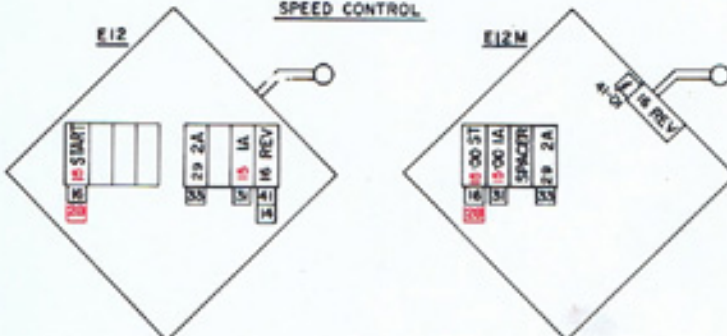
FORWARD

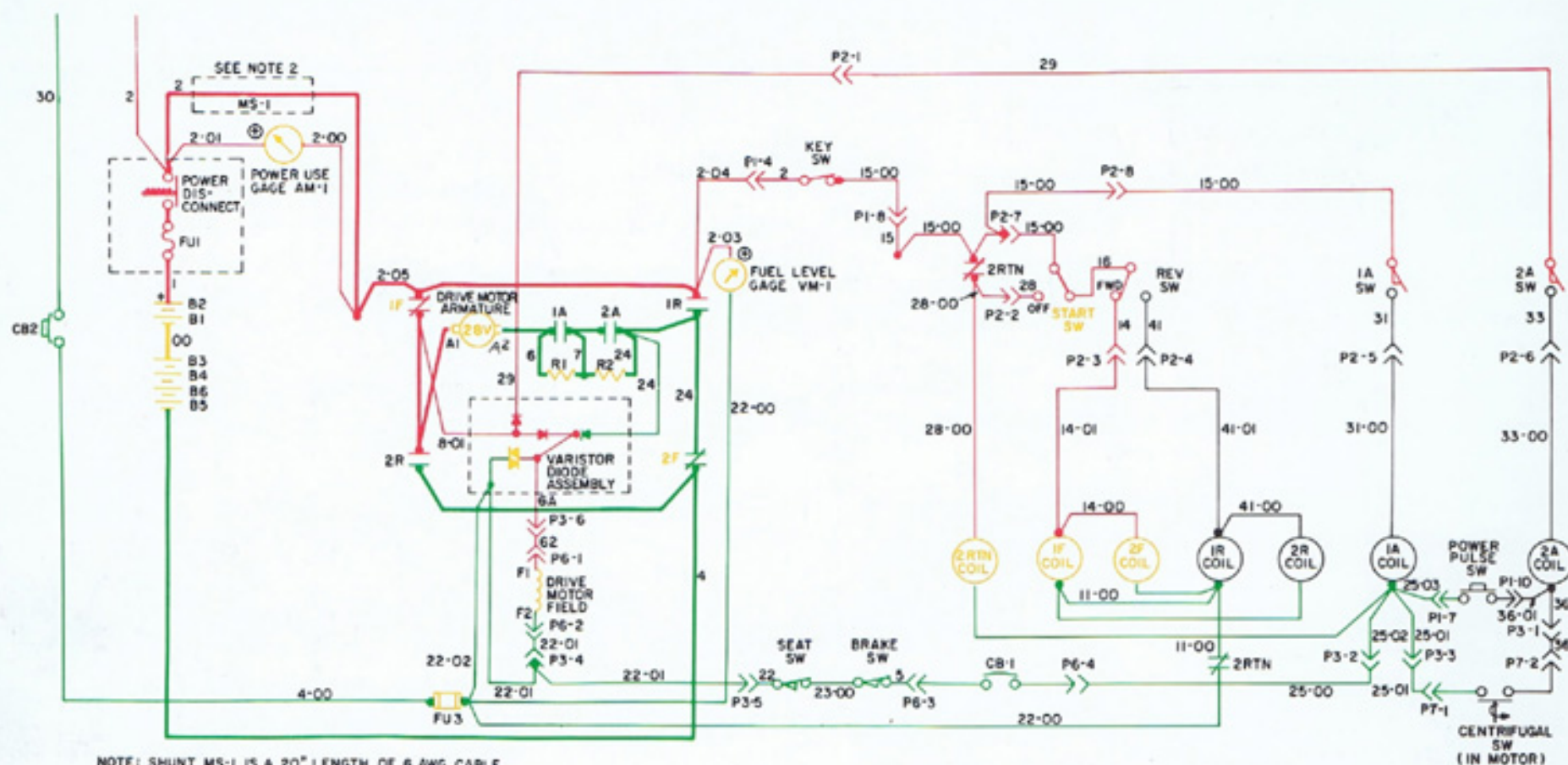
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED
3	2A	2A CONTACTS CLOSE, R2 BYPASSED

REVERSE

REV	REV SW	REV ARMATURE POLARITY
1	START	IR AND 2R CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED

SPEED CONTROL





CONTROL PANELS

SPEED POSITION

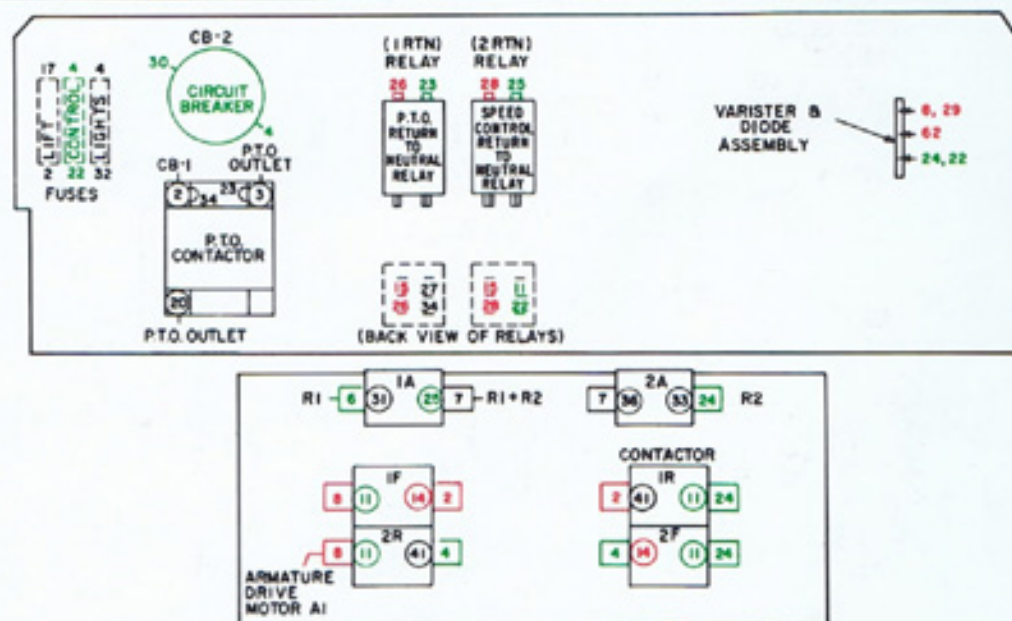
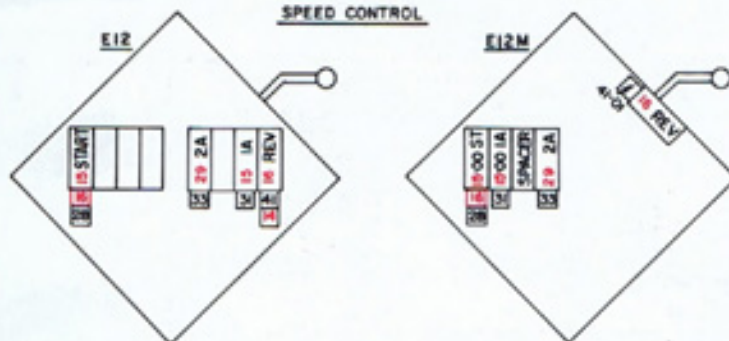
FORWARD

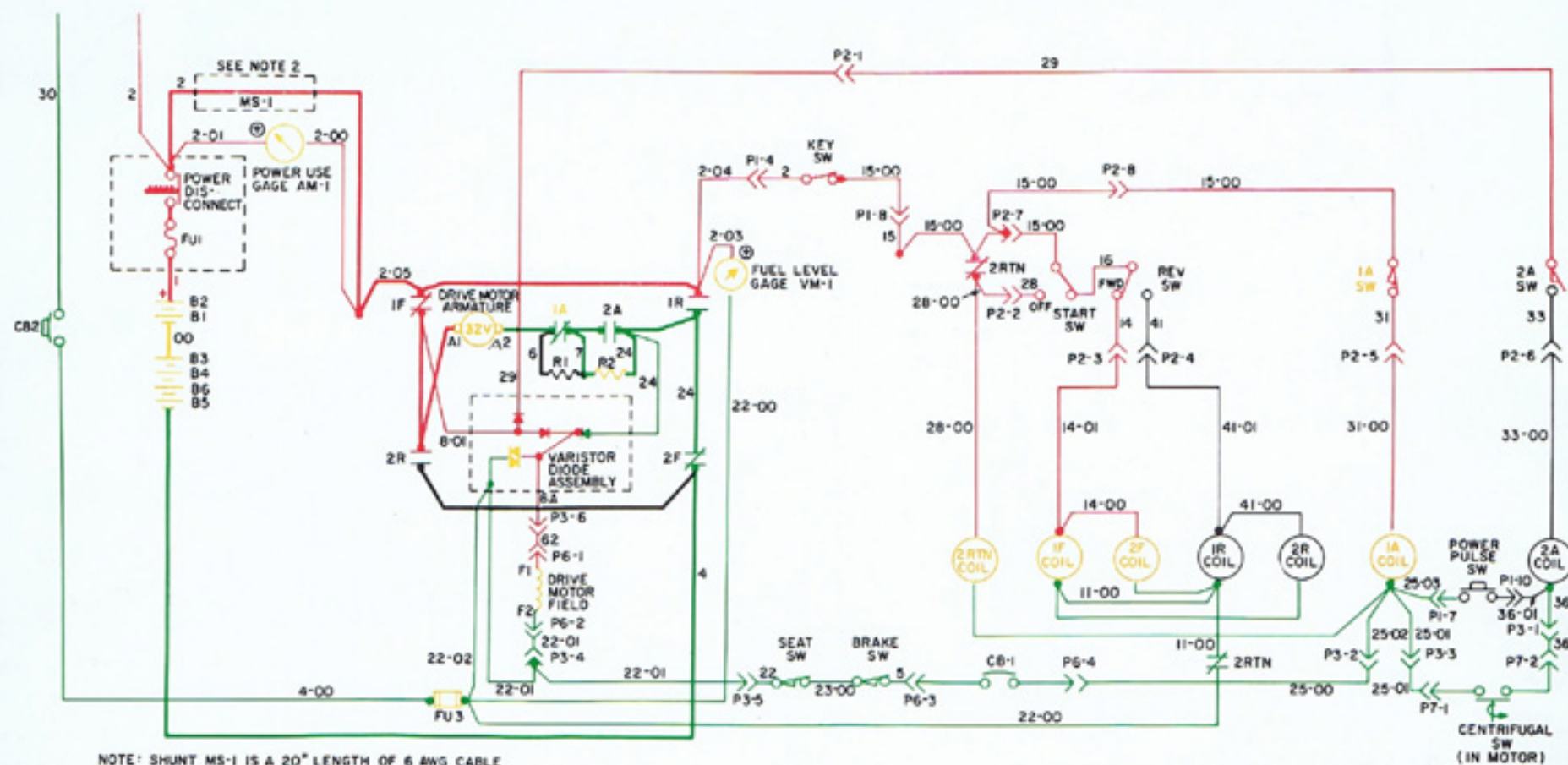
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED
3	2A	2A CONTACTS CLOSE, R2 BYPASSED

REVERSE

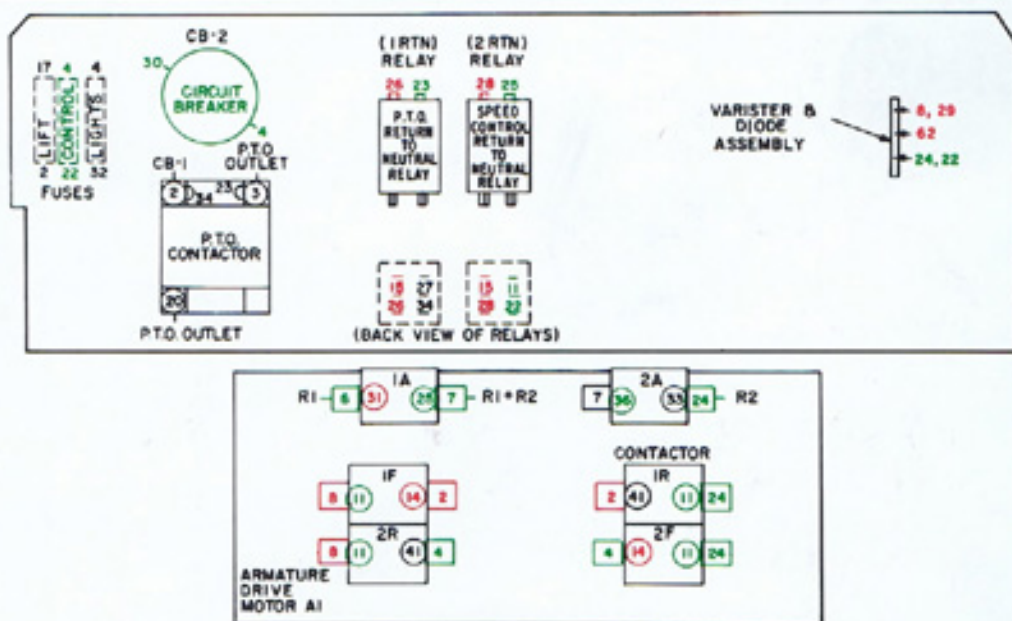
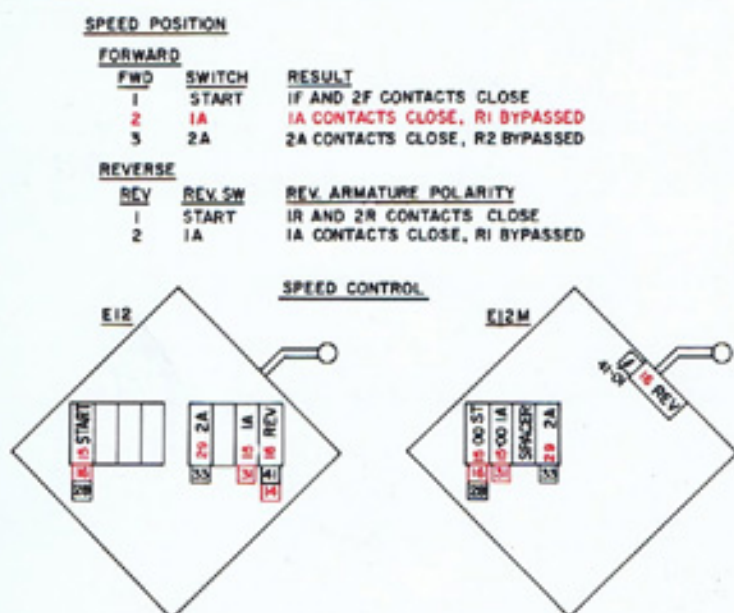
REV	REV SW	REV ARMATURE POLARITY
1	START	IR AND 2R CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED

SPEED CONTROL

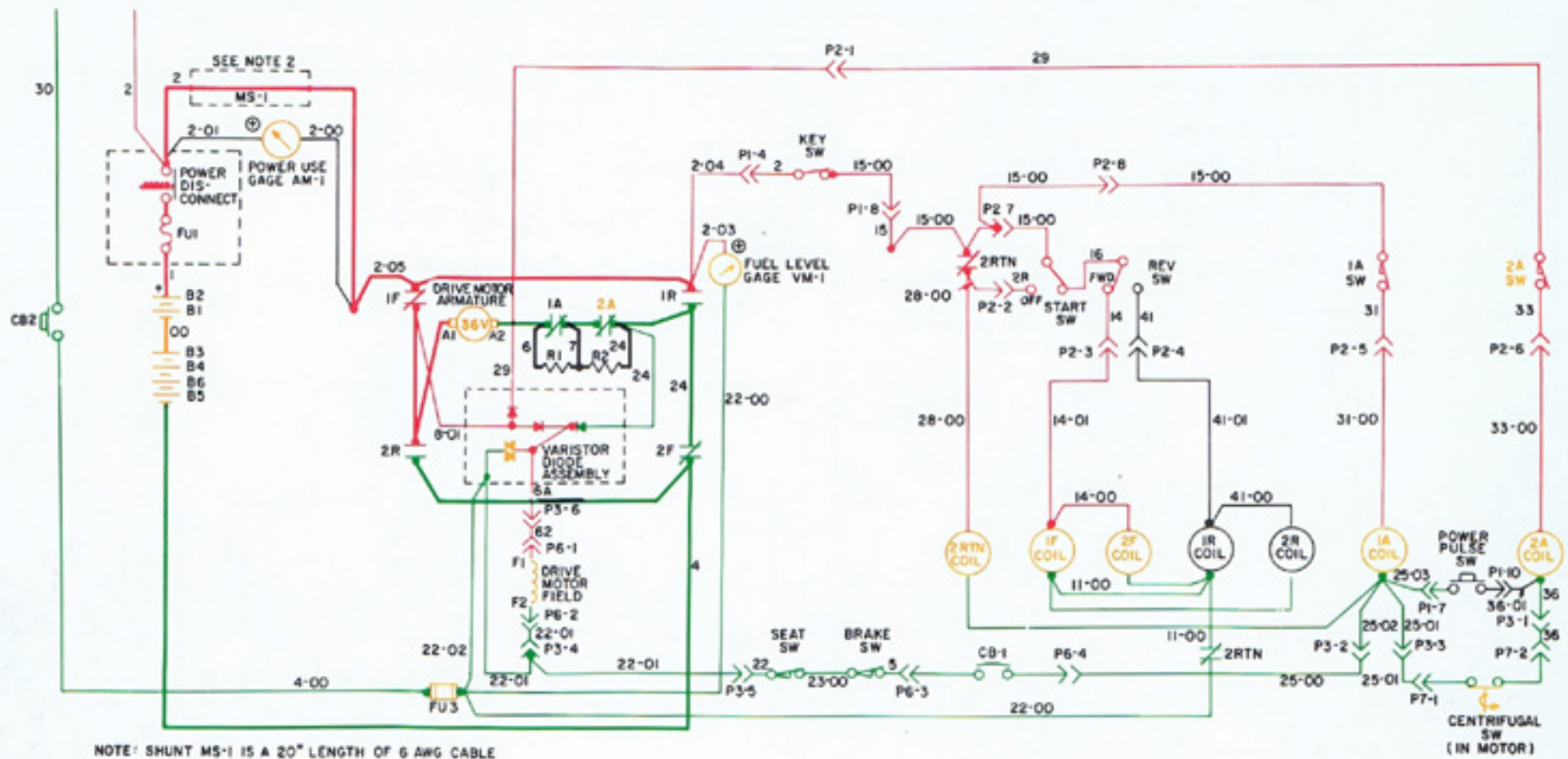




CONTROL PANELS



Speed Control in 3rd Speed, Forward. Centrifugal Switch Closed.



CONTROL PANELS

SPEED POSITION

FORWARD

FWD	SWITCH
1	START
2	1A
3	2A

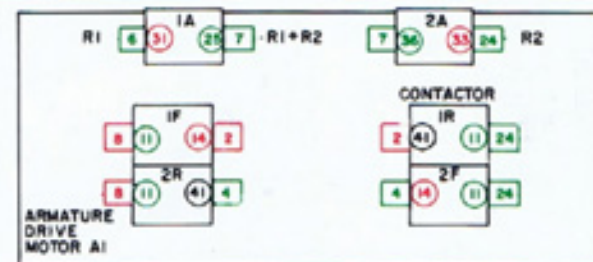
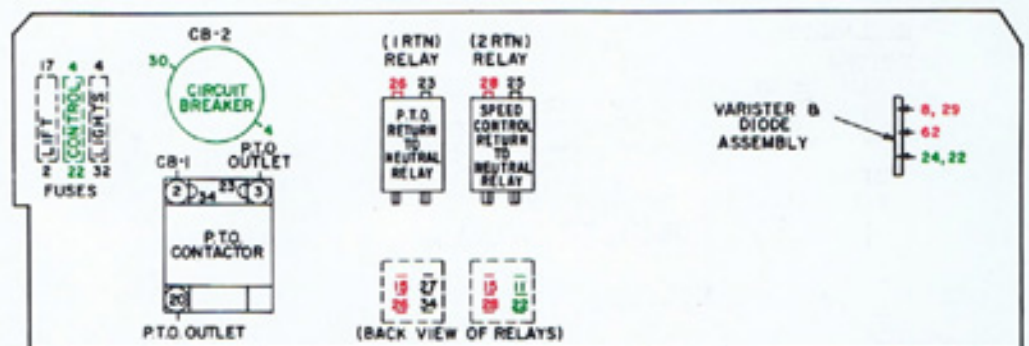
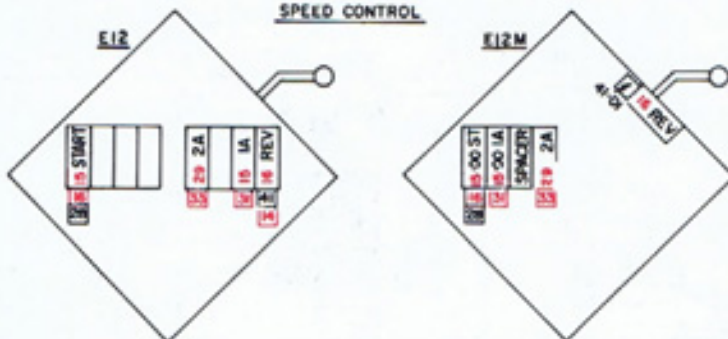
RESULT
IF AND 2F CONTACTS CLOSE
1A CONTACTS CLOSE, R1 BYPASSED
2A CONTACTS CLOSE, R2 BYPASSED

REVERSE

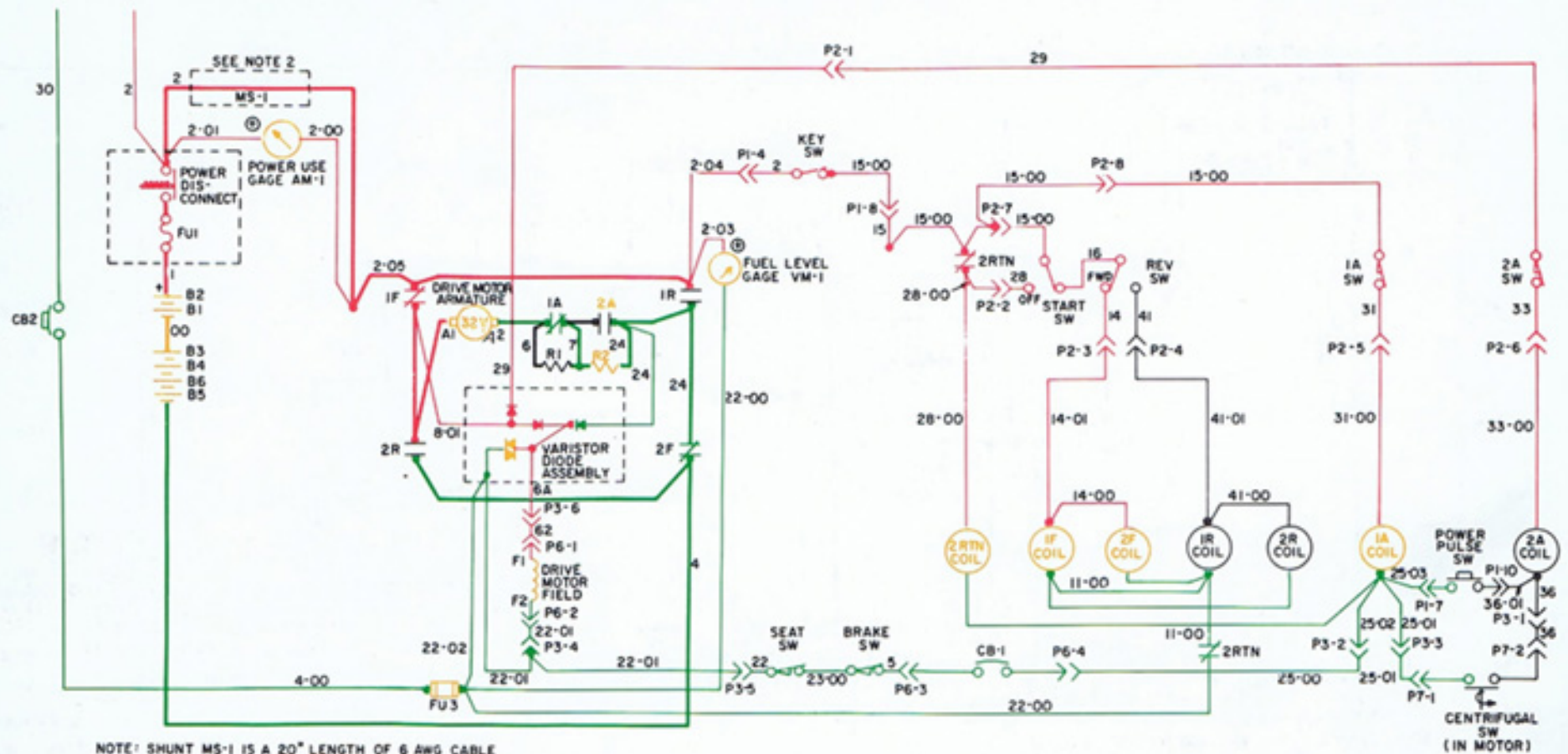
REV	REV SW
1	START
2	1A

REV. ARMATURE POLARITY
IR AND 2R CONTACTS CLOSE
1A CONTACTS CLOSE, R1 BYPASSED

SPEED CONTROL



Speed Control All The Way Forward, Motor Armature Under Heavy Load, Centrifugal Switch Open.



NOTE: SHUNT MS-1 IS A 20' LENGTH OF 6 AWG CABLE

CONTROL PANELS

SPEED POSITION

FORWARD

FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED
3	2A	2A CONTACTS OPEN, R2 ACTIVE

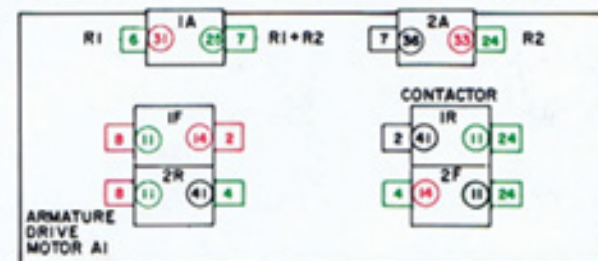
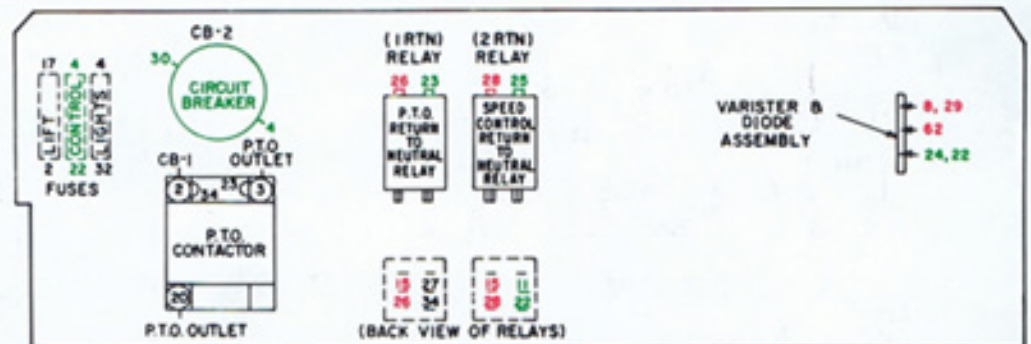
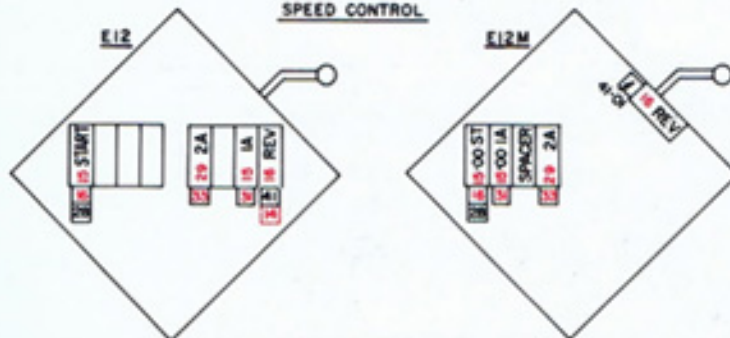
REVERSE

REV	REV SW	REV. ARMATURE POLARITY
1	START	IR AND 2R CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED

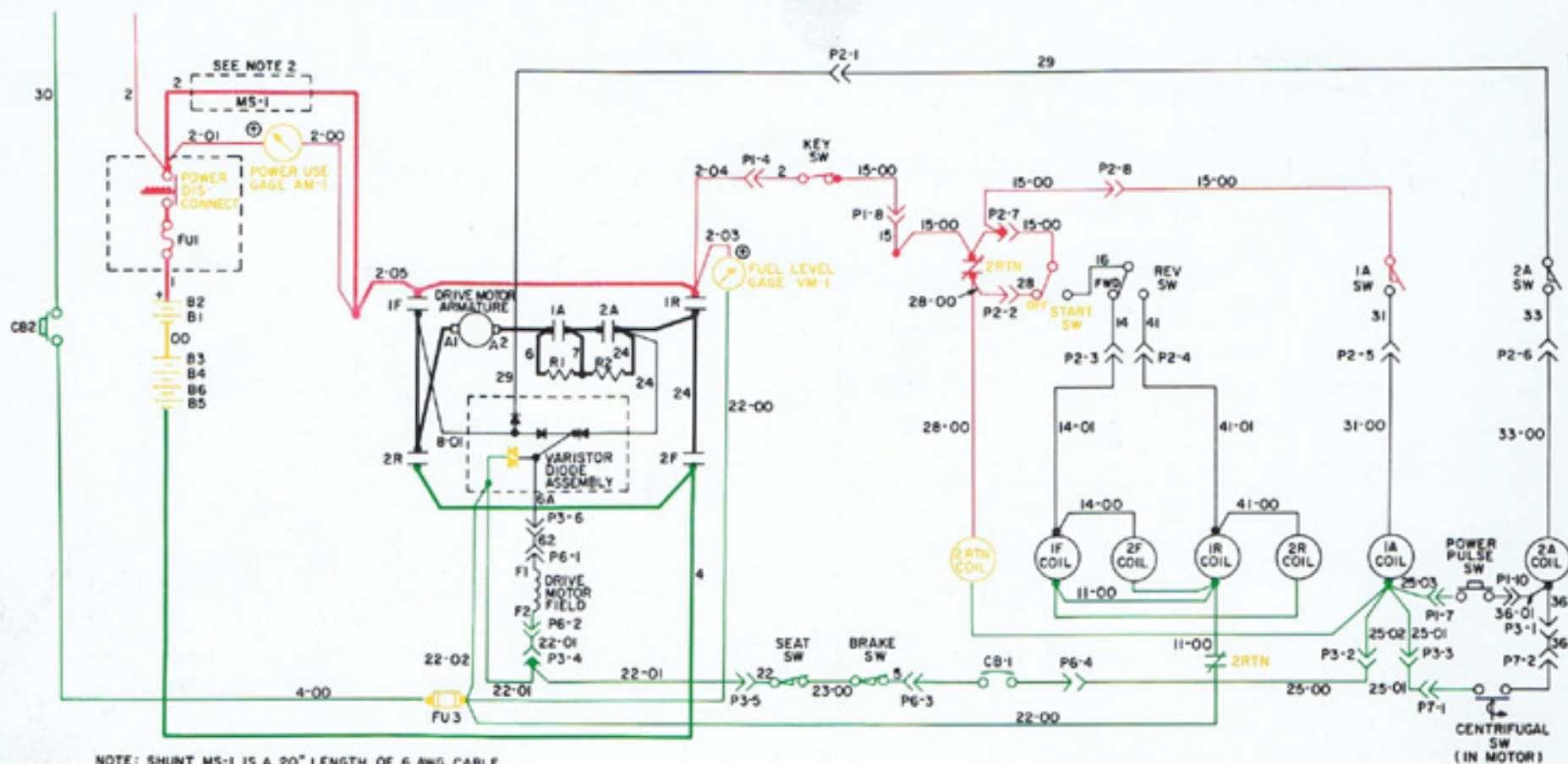
SPEED CONTROL

E12

E12M



Speed Control in NEUTRAL, Key ON, Brake Disengaged, Seat Switch On, Power Disconnect Engaged.



CONTROL PANELS

SPEED POSITION

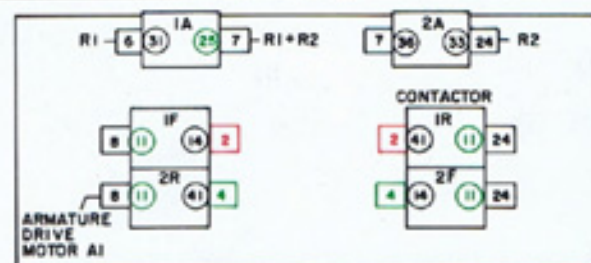
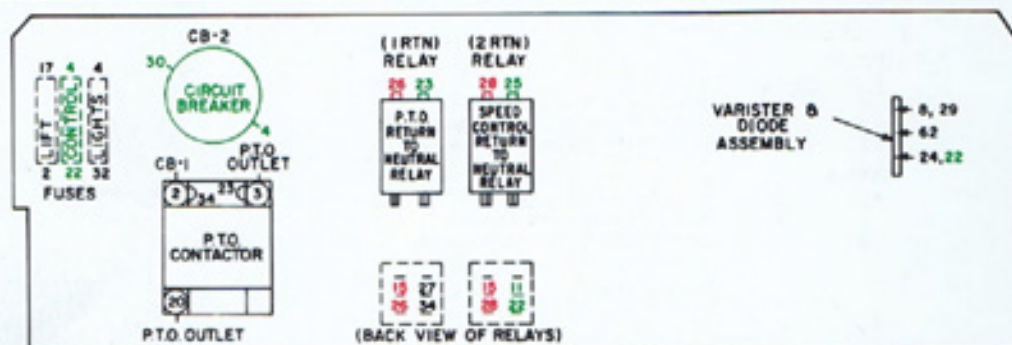
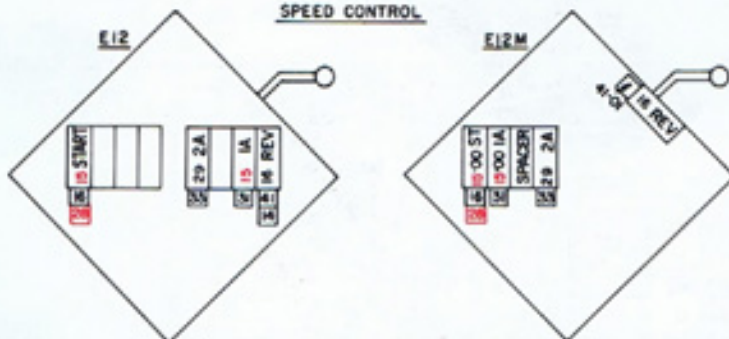
FORWARD

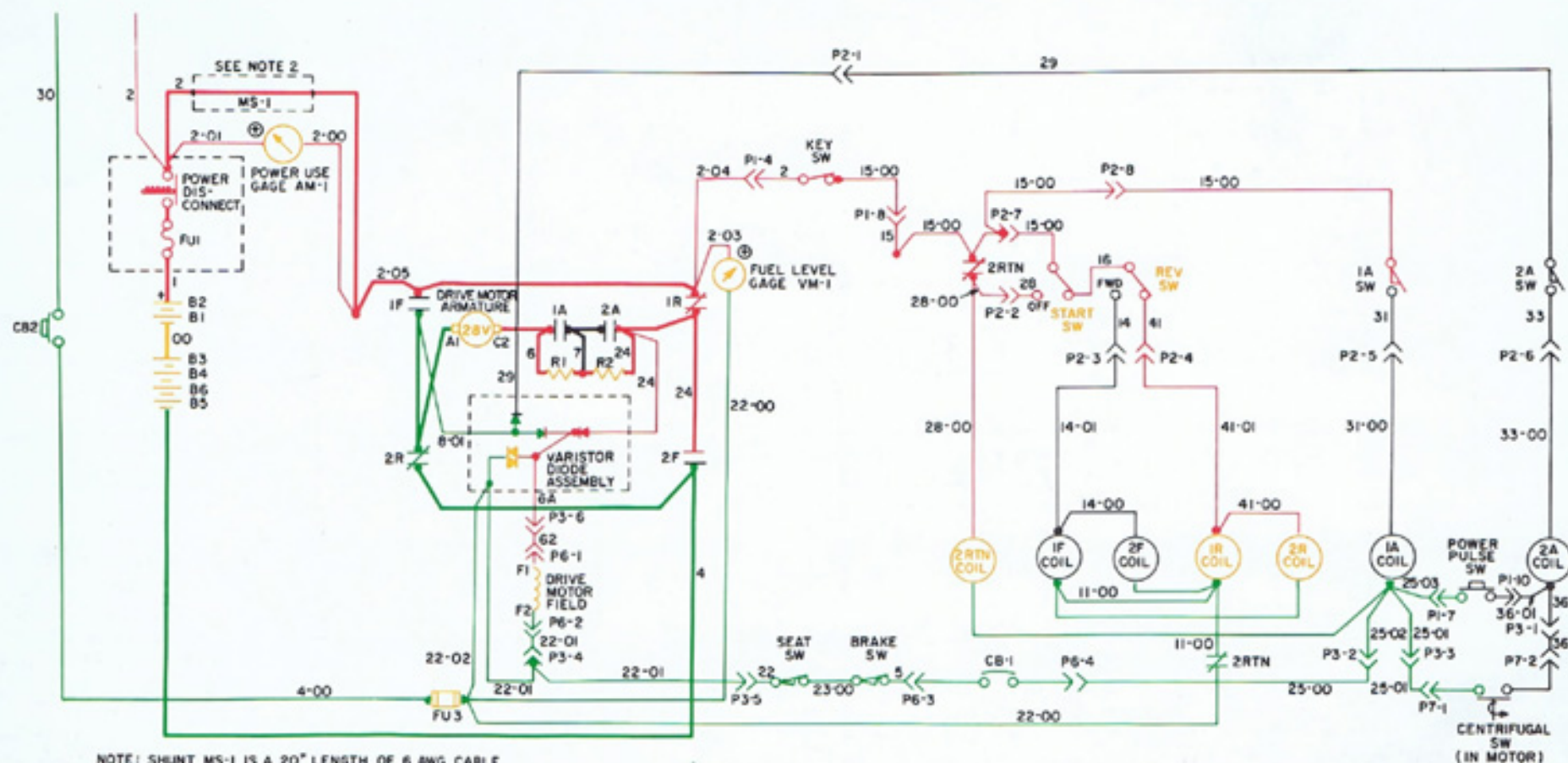
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED
3	2A	2A CONTACTS CLOSE, R2 BYPASSED

REVERSE

REV	REV SW	REV ARMATURE POLARITY
1	START	IR AND 2R CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED

SPEED CONTROL





CONTROL PANELS

SPEED POSITION

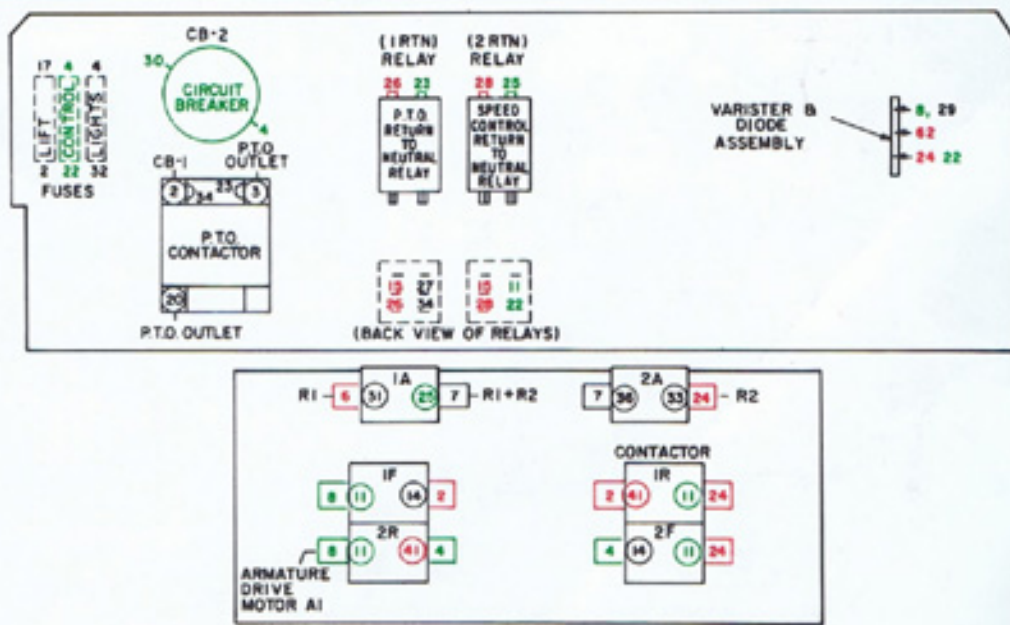
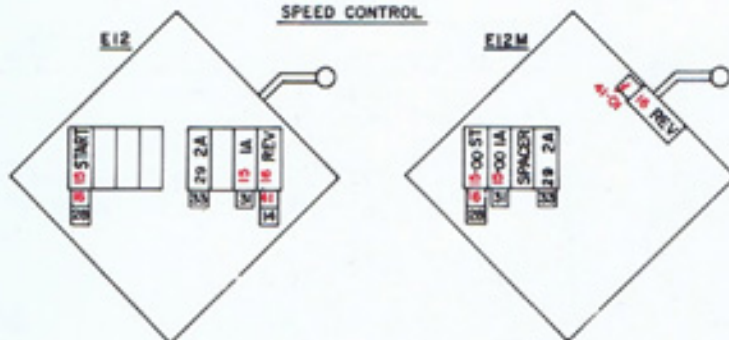
FORWARD

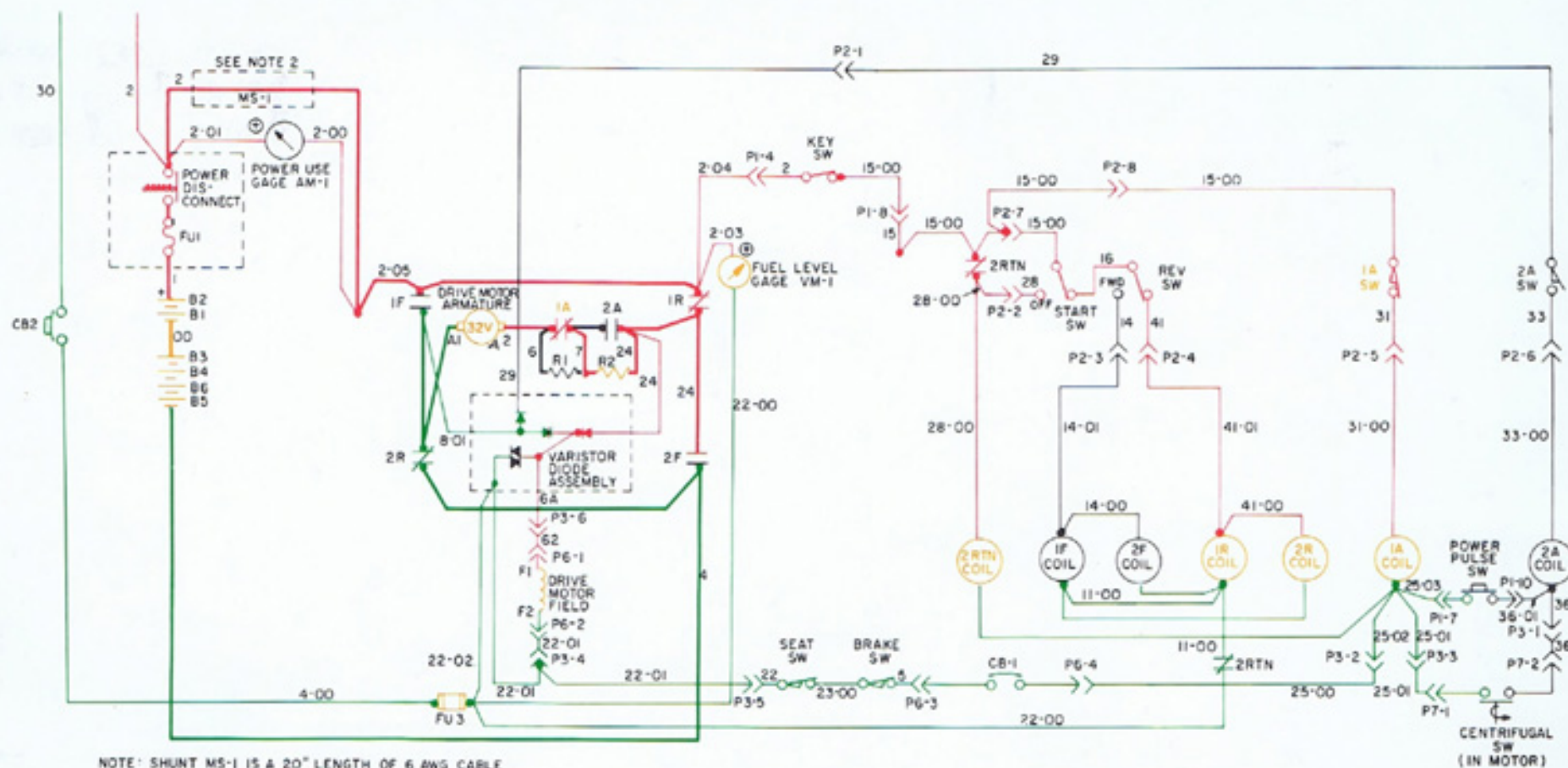
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED
3	2A	2A CONTACTS CLOSE, R2 BYPASSED

REVERSE

REV	REV SW	REV. ARMATURE POLARITY
1	START	IR AND 2R CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED

SPEED CONTROL





CONTROL PANELS

SPEED POSITION

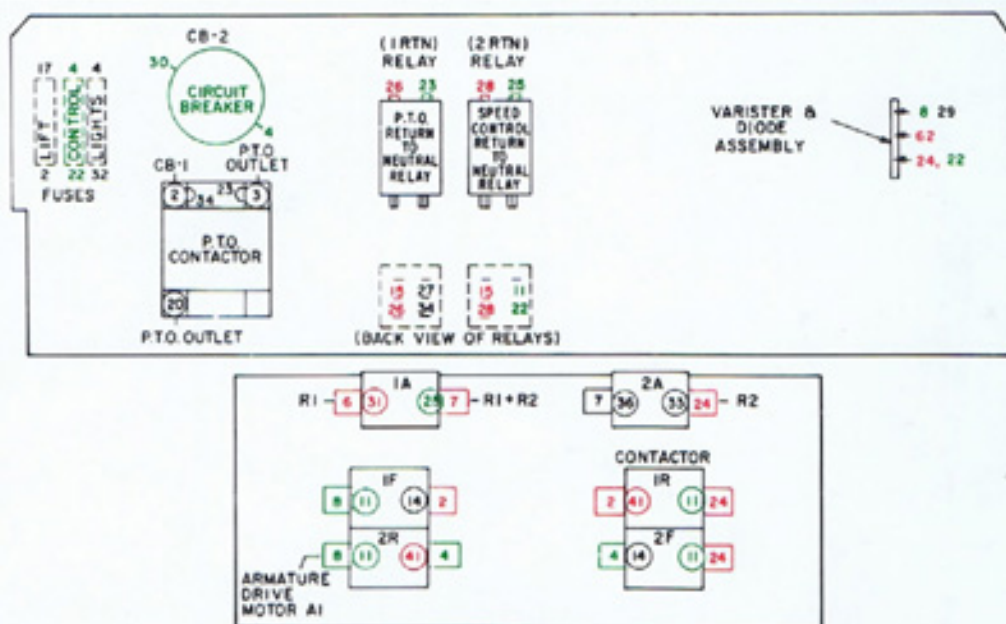
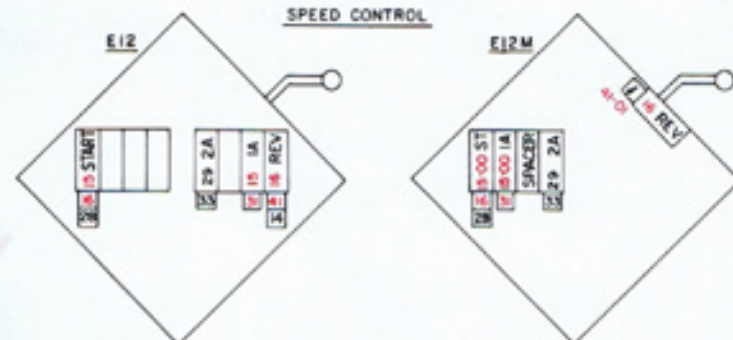
FORWARD

FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED
3	2A	2A CONTACTS CLOSE, R2 BYPASSED

REVERSE

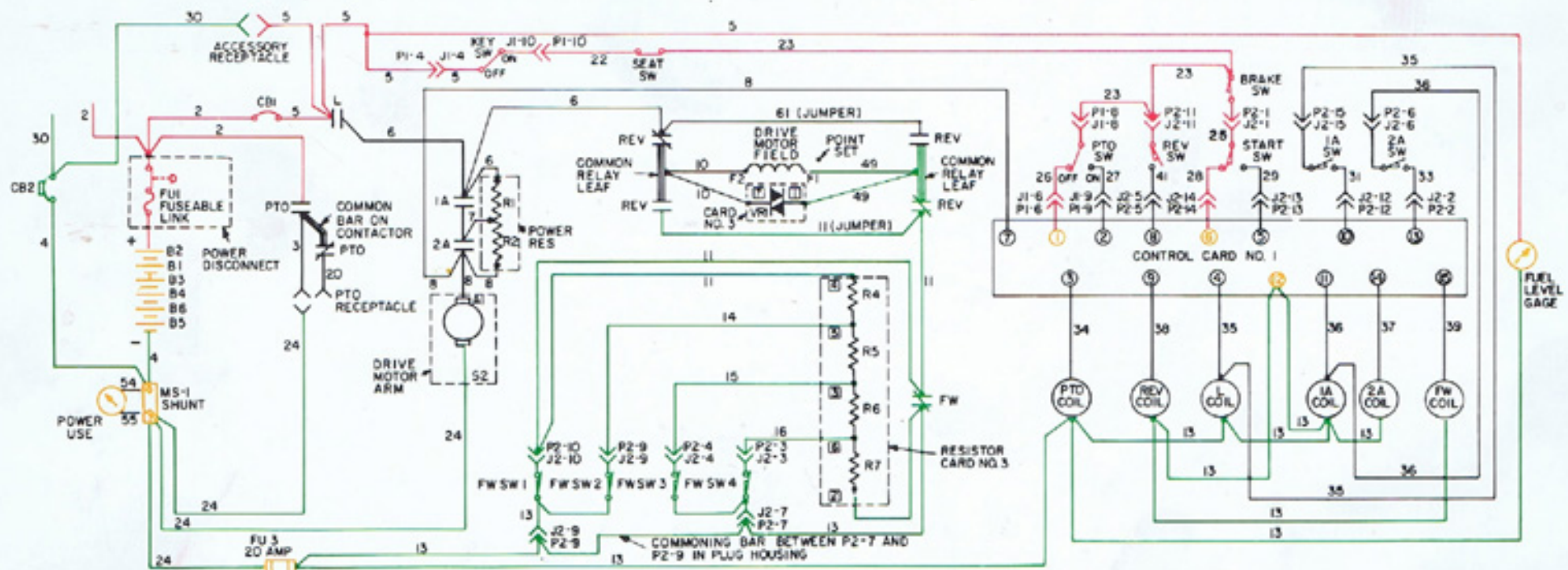
REV	REV SW	REV ARMATURE POLARITY
1	START	IR AND 2R CONTACTS CLOSE
2	1A	1A CONTACTS CLOSE, R1 BYPASSED

SPEED CONTROL



E15

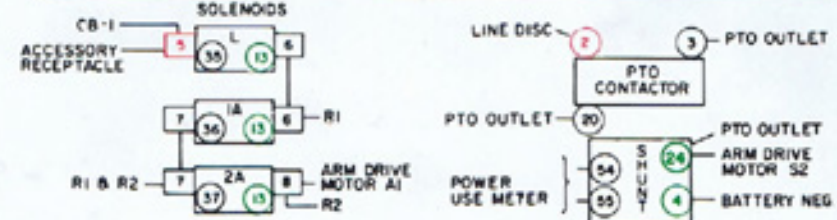
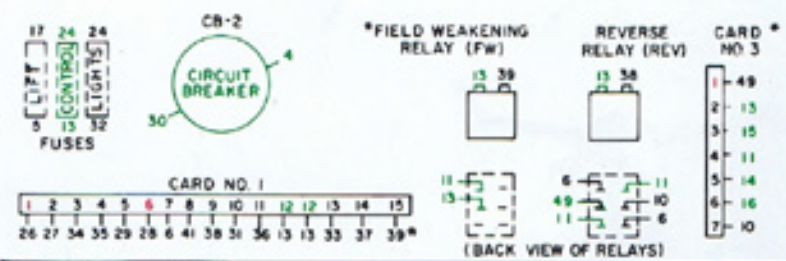
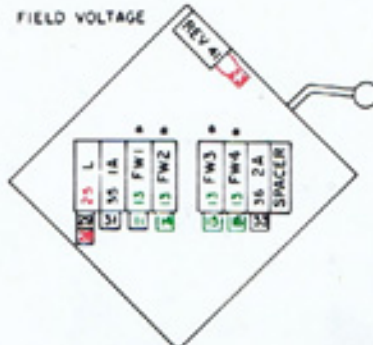
Speed Control in NEUTRAL, Key ON, Brake Disengaged, Power Disconnect In, Seat Switch Closed.

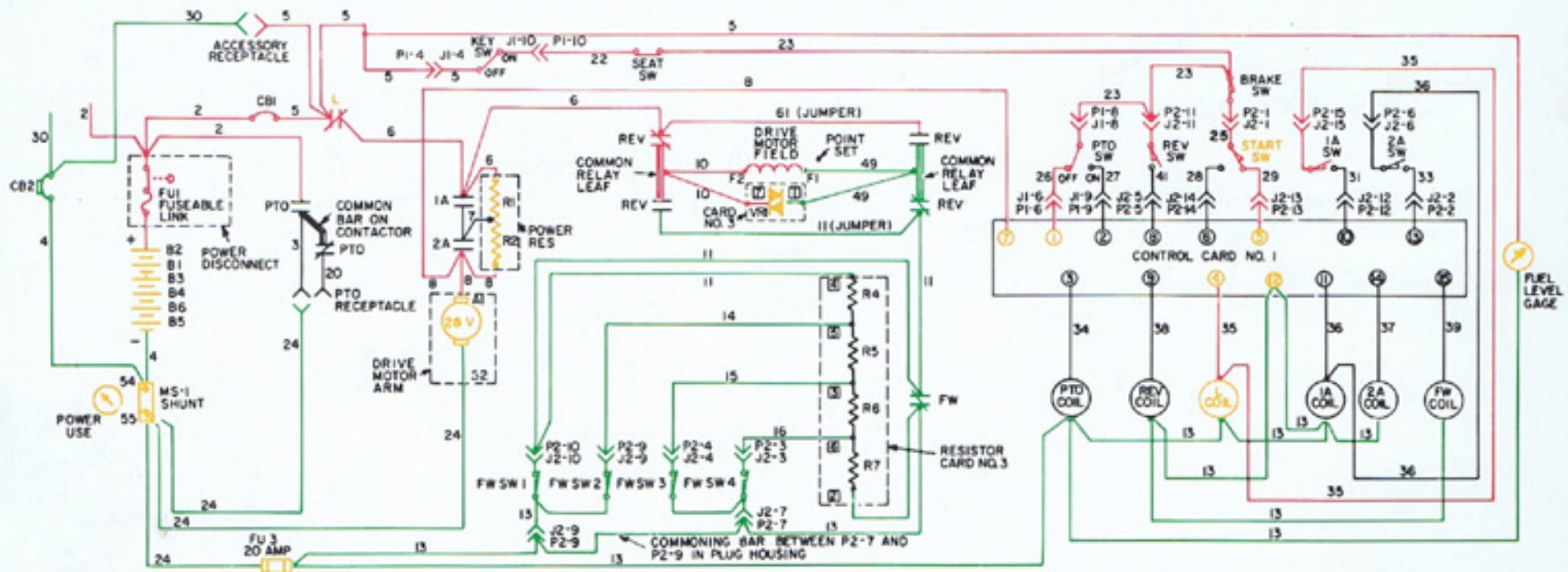


CONTROL PANELS

SPEED CONTROL

SPEED POSITION		
FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD
REVERSE	REV SWITCH	REV FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED

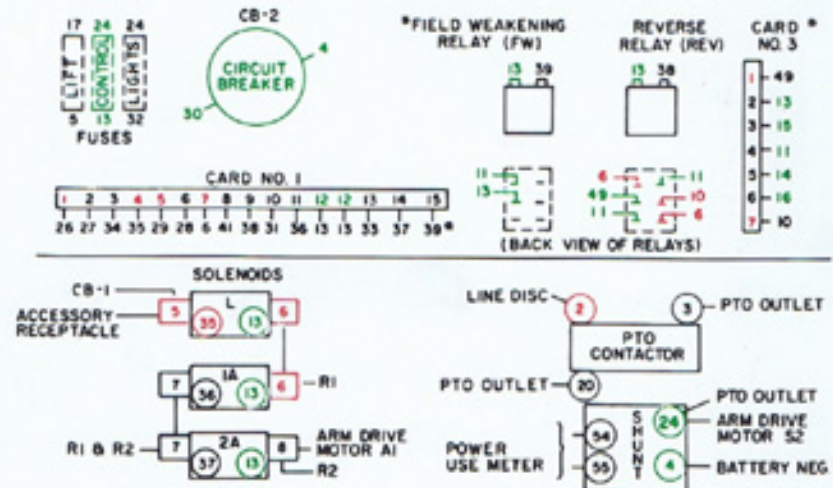
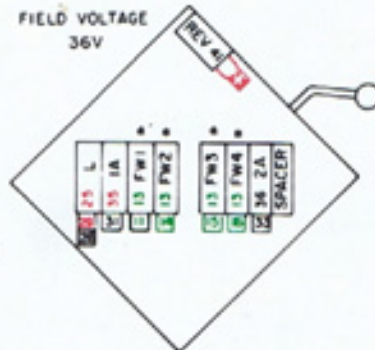


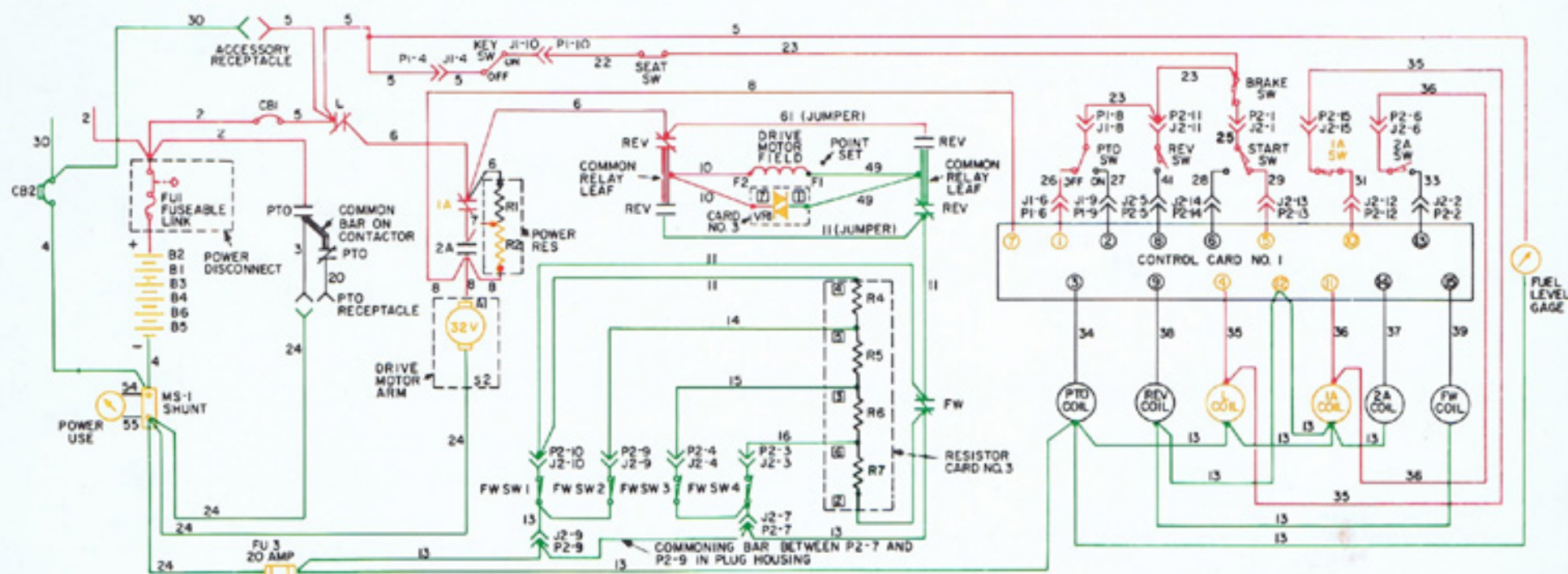


CONTROL PANELS

SPEED CONTROL

SPEED POSITION		
FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW TOPEN	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD
REVERSE	REV SWITCH	REV FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED





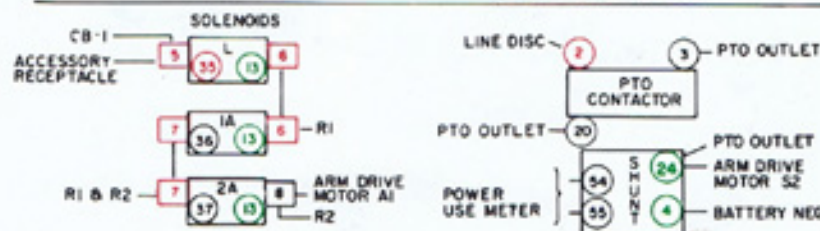
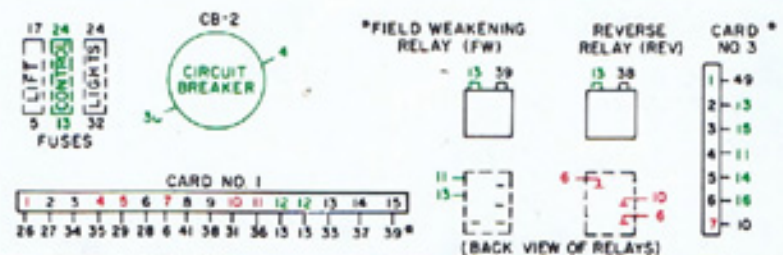
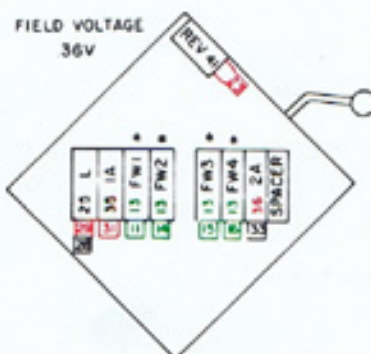
CONTROL PANELS

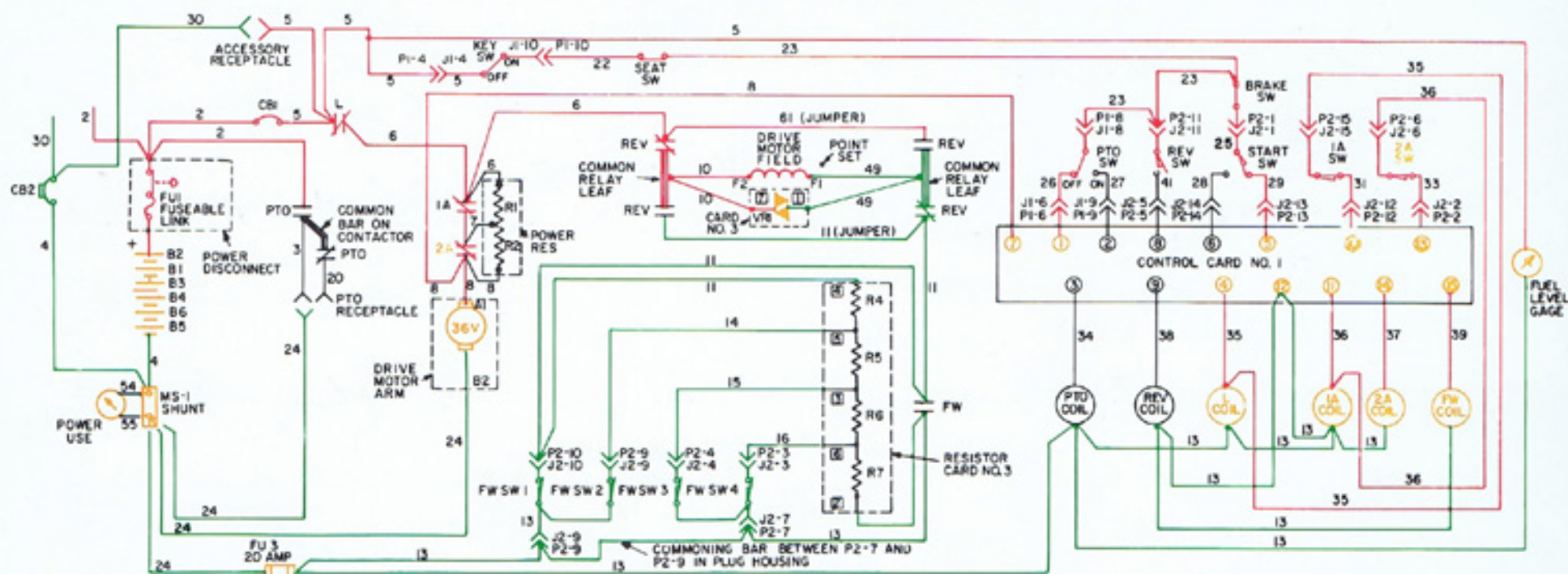
SPEED CONTROL

SPEED POSITION

FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW (OPENS)	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD

REVERSE	REV. SWITCH	REV. FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED





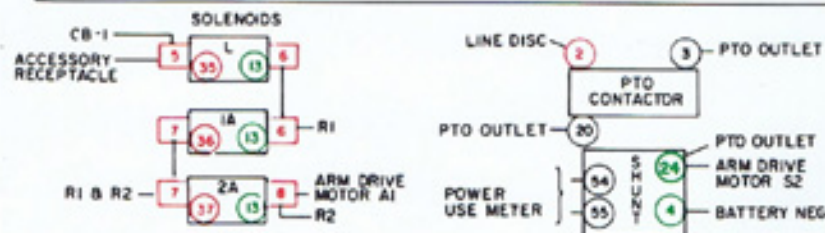
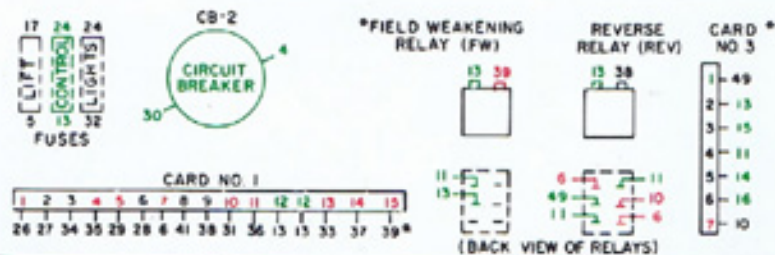
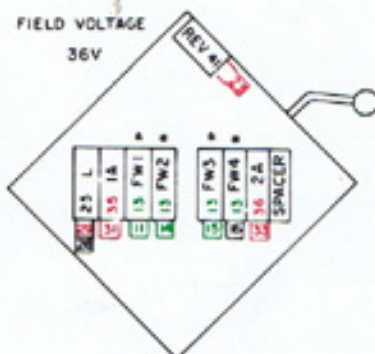
CONTROL PANELS

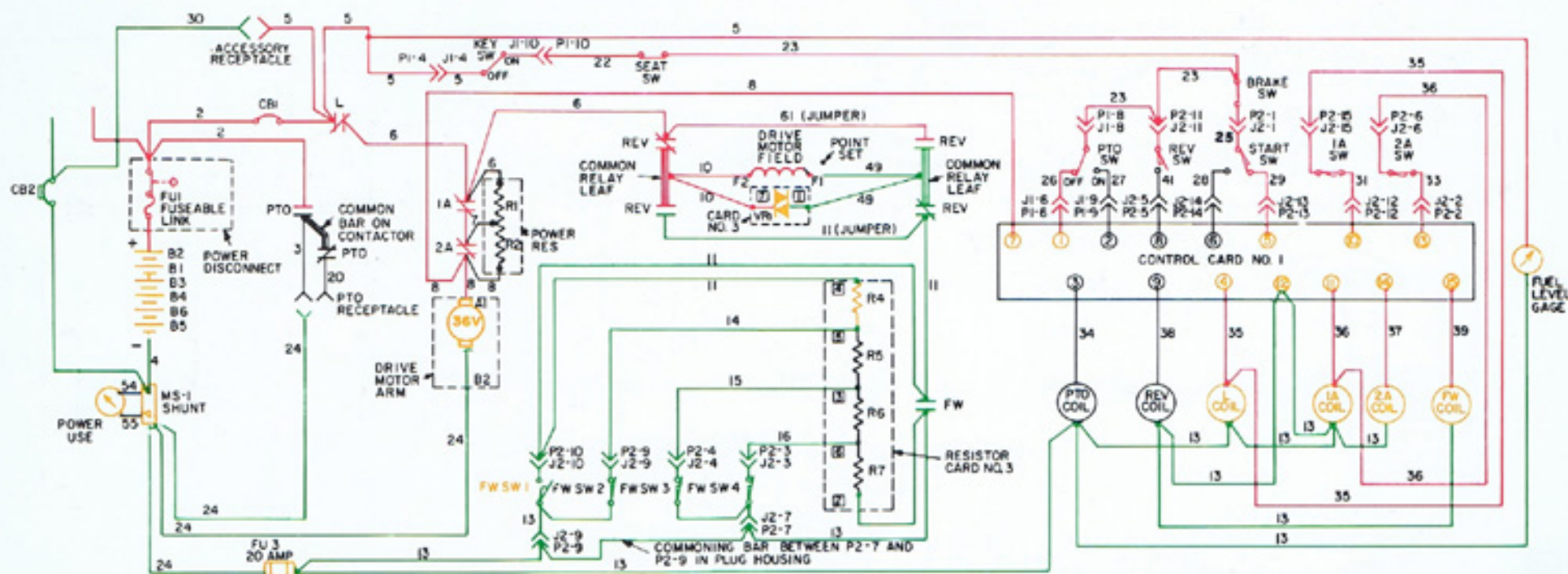
SPEED CONTROL

SPEED POSITION

FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW (OPENS) R2 BYPASSED	
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD

REVERSE	REV SWITCH	REV FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED

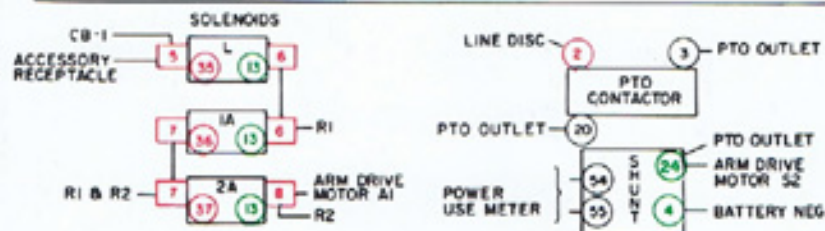
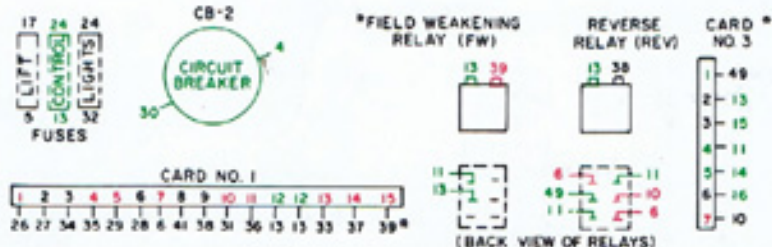
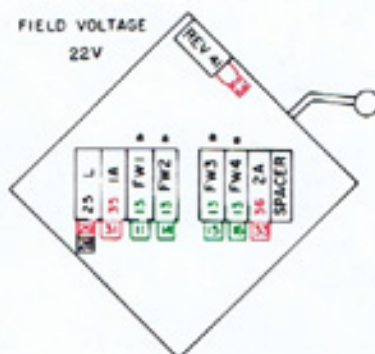


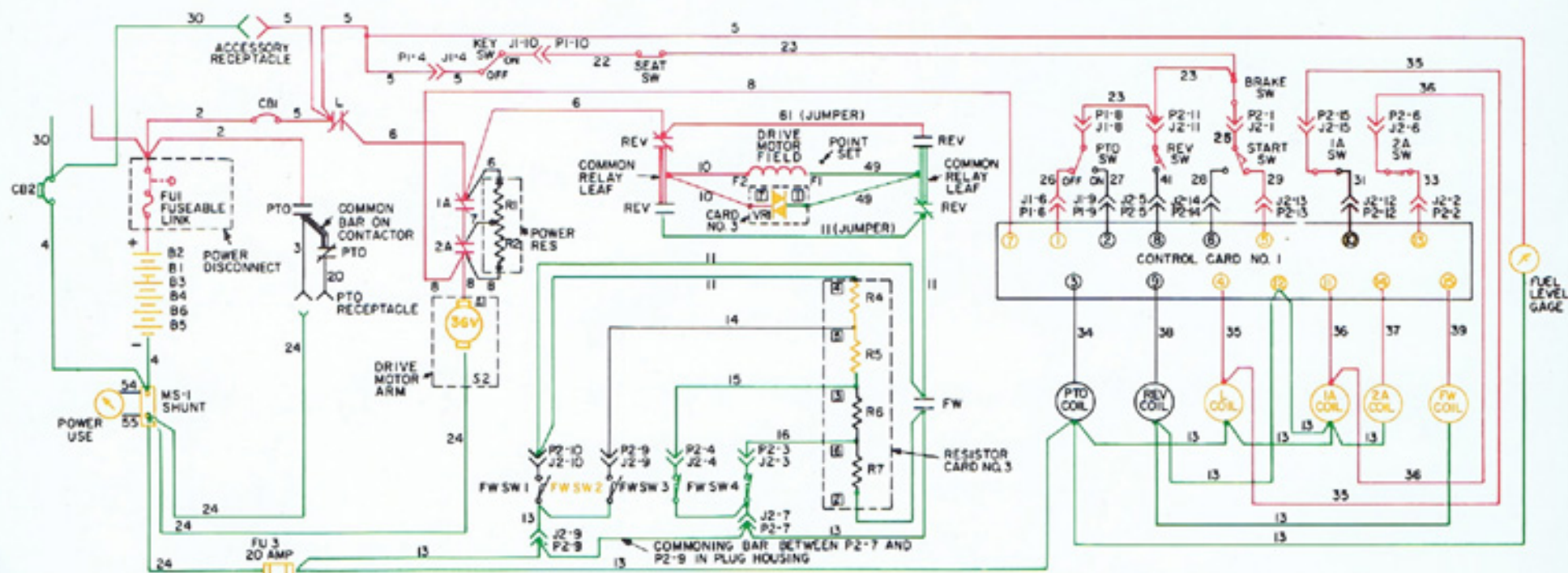


CONTROL PANELS

SPEED CONTROL

SPEED POSITION		
FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD
REVERSE		
REV	SWITCH	REV FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED

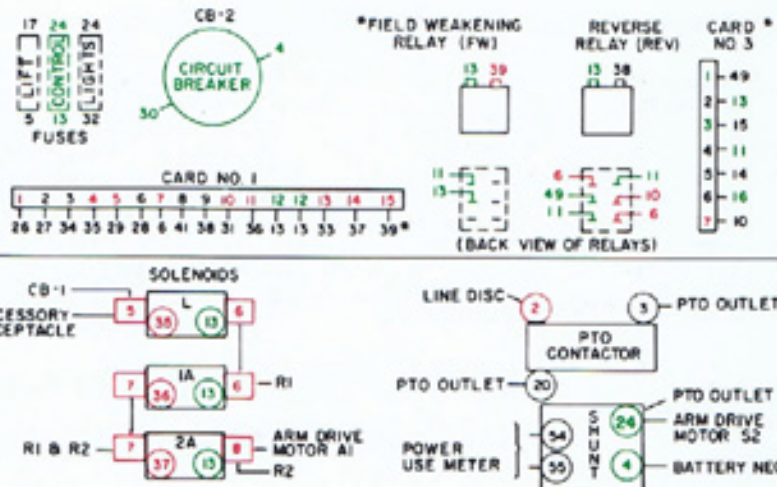
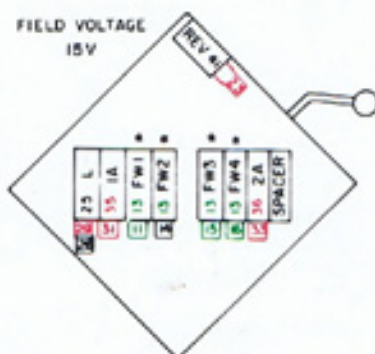


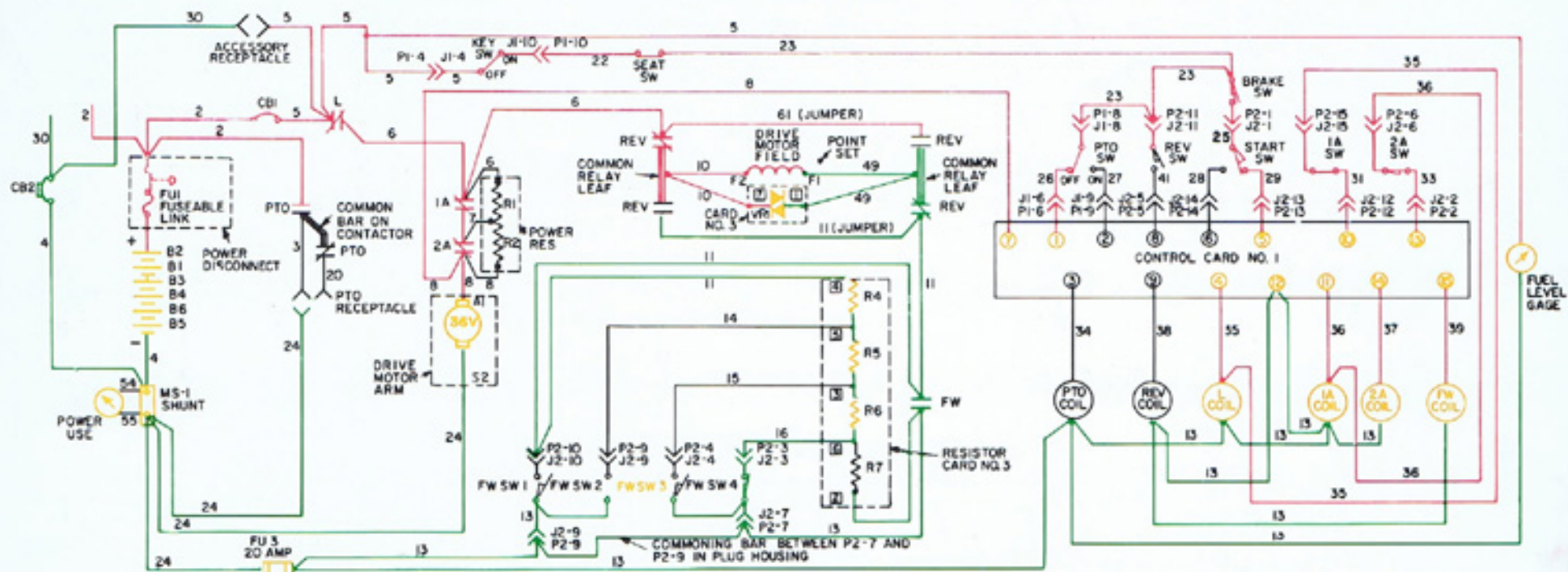


CONTROL PANELS

SPEED CONTROL

SPEED POSITION		
FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD
REVERSE	REV SWITCH	REV FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED





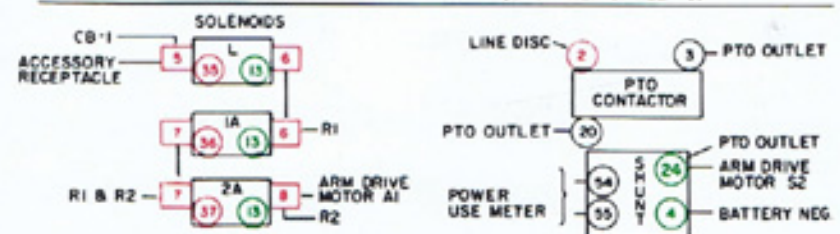
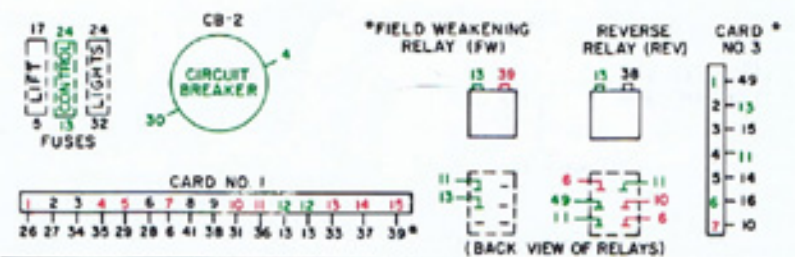
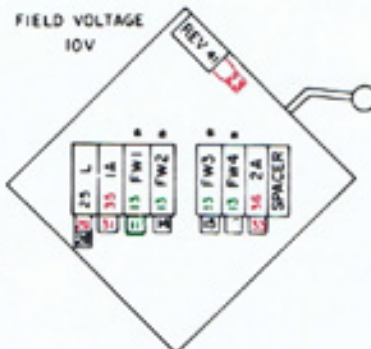
CONTROL PANELS

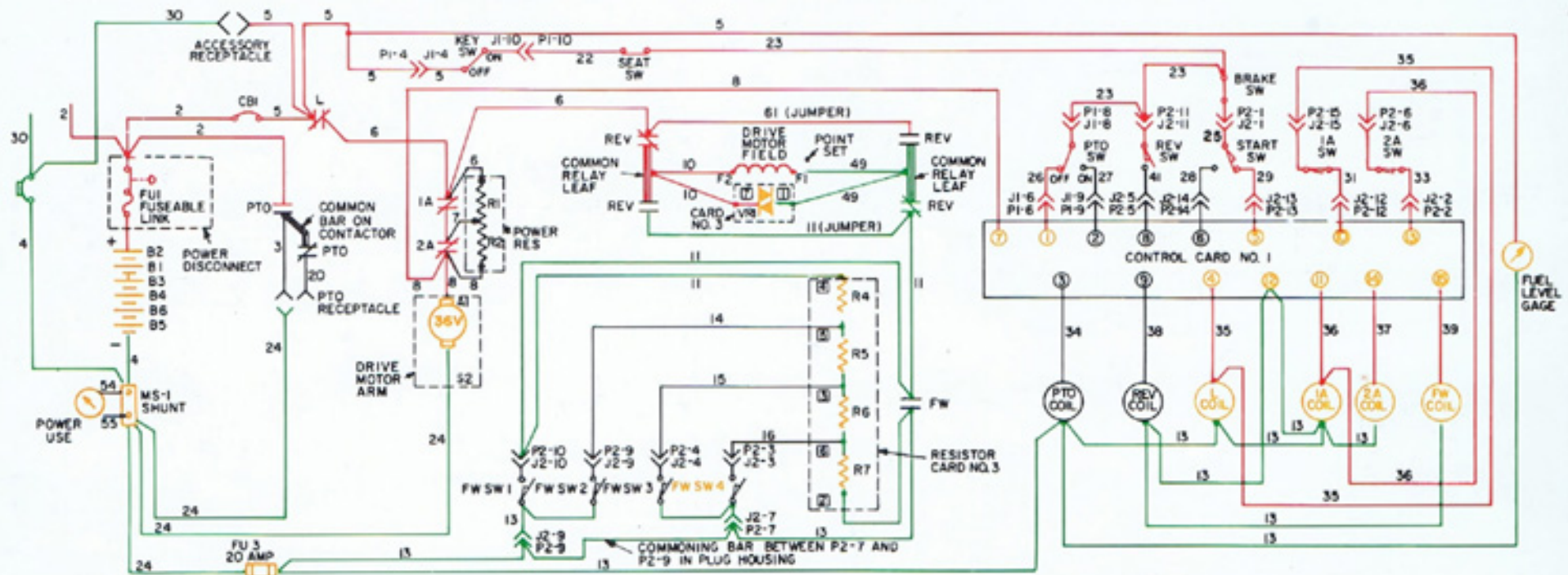
SPEED CONTROL

SPEED POSITION

FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW (OPENS)	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD

REVERSE	REV SWITCH	REV. FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED

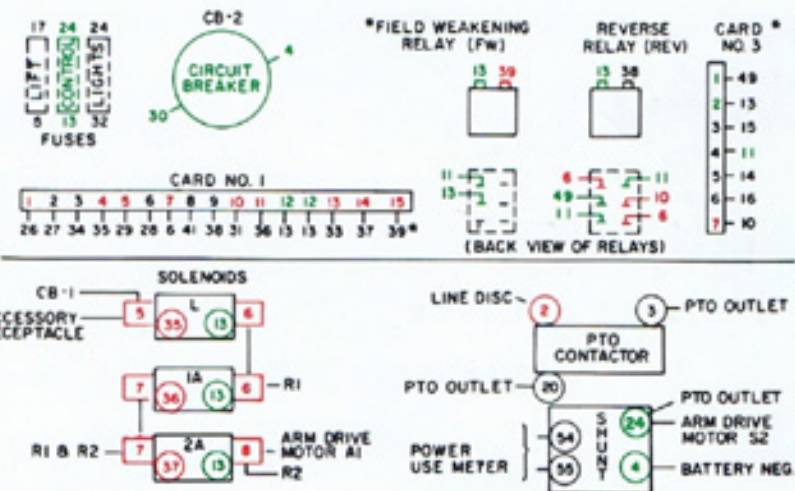
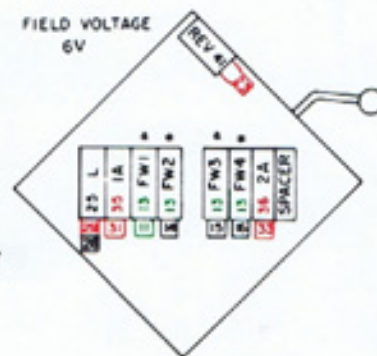




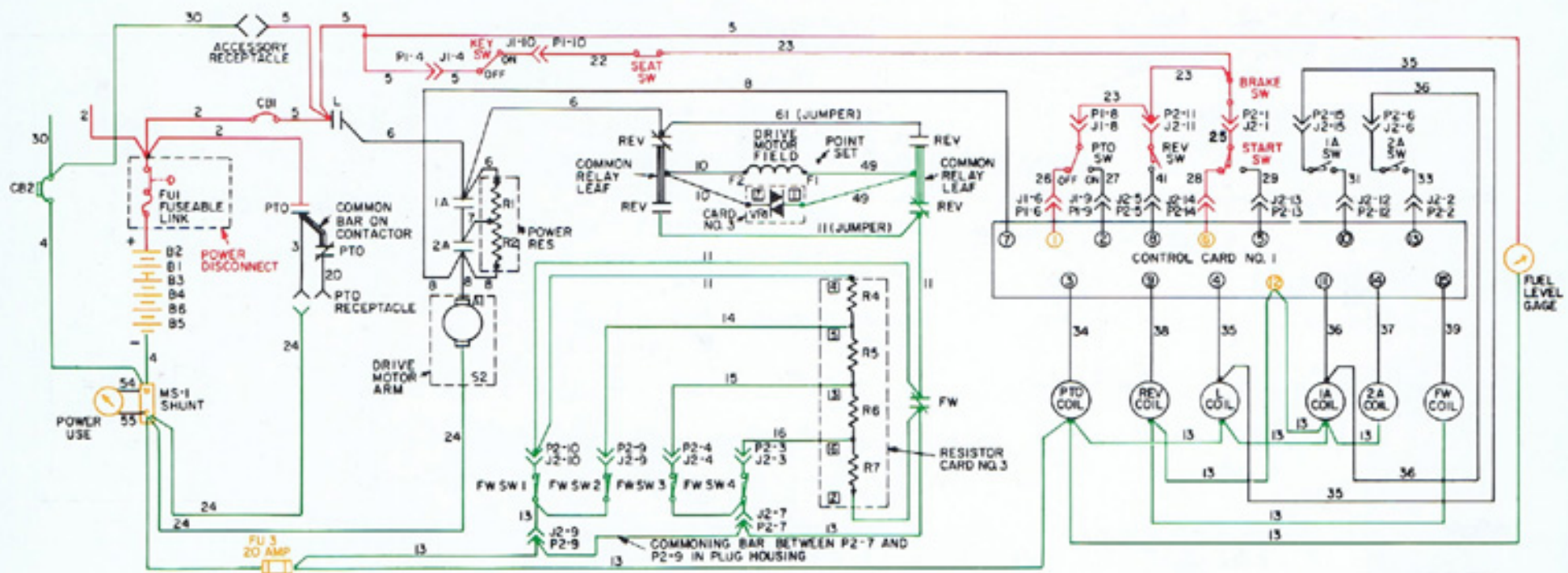
CONTROL PANELS

SPEED CONTROL

<u>SPEED POSITION</u>		
<u>FORWARD</u>	<u>SWITCH</u>	<u>RESULT</u>
1	L	START
2	1A	R1 BYPASSED
3	2A, FW OPEN	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD
<u>REVERSE</u>	<u>REV SWITCH</u>	<u>REV FIELD POLARITY</u>
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED



Speed Control in NEUTRAL, Key ON, Brake Disengaged, Power Disconnect In, Seat Switch Closed.



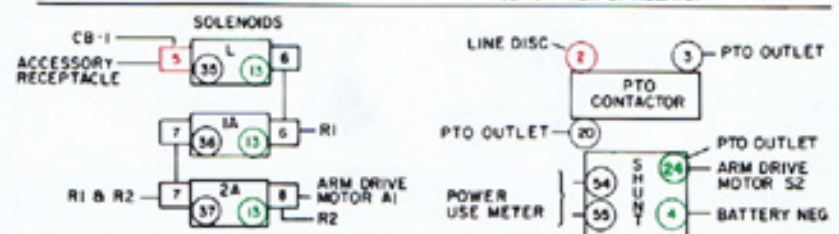
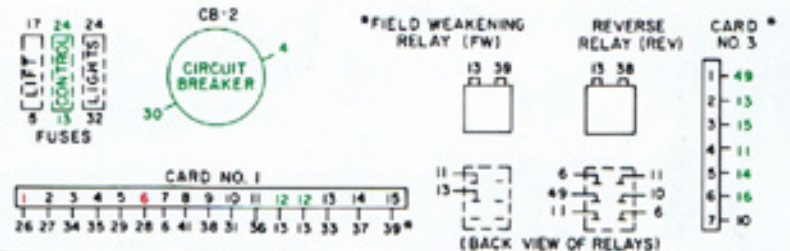
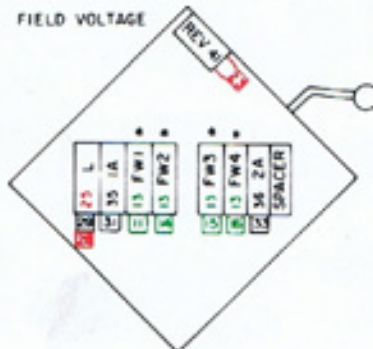
CONTROL PANELS

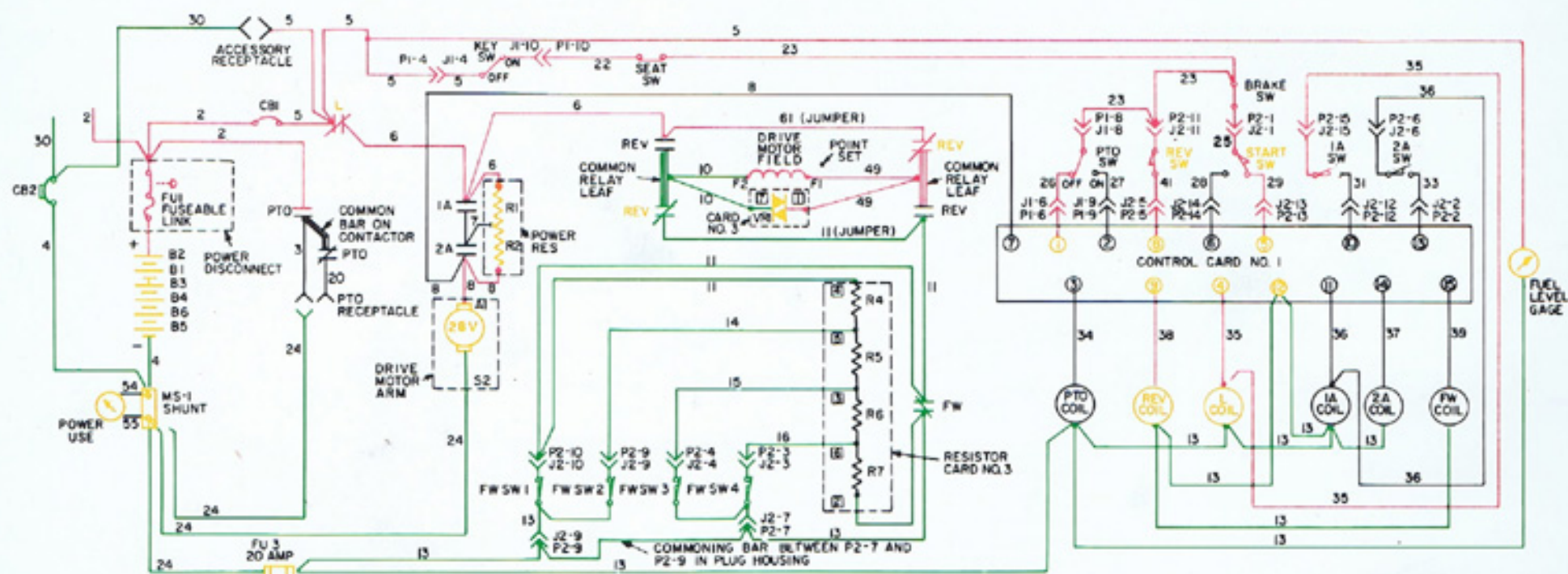
SPEED CONTROL

SPEED POSITION

FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD

REVERSE	REV SWITCH	REV FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED

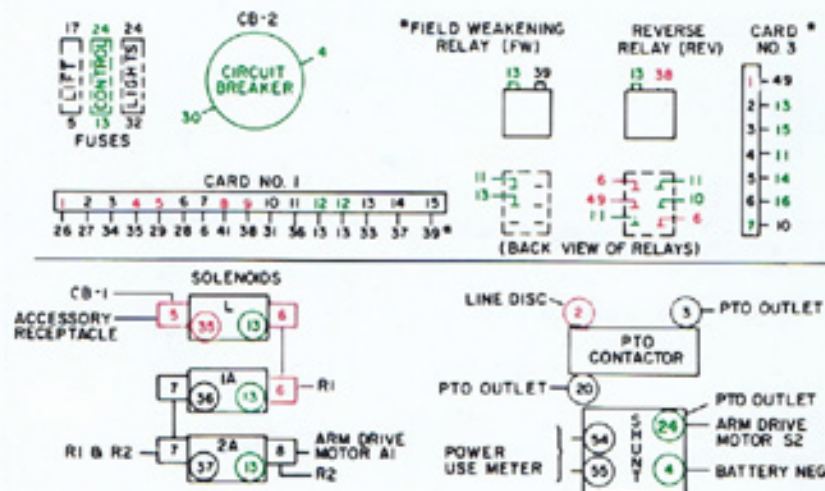
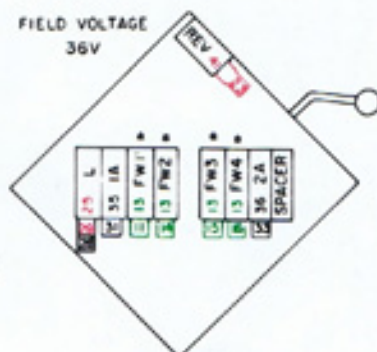


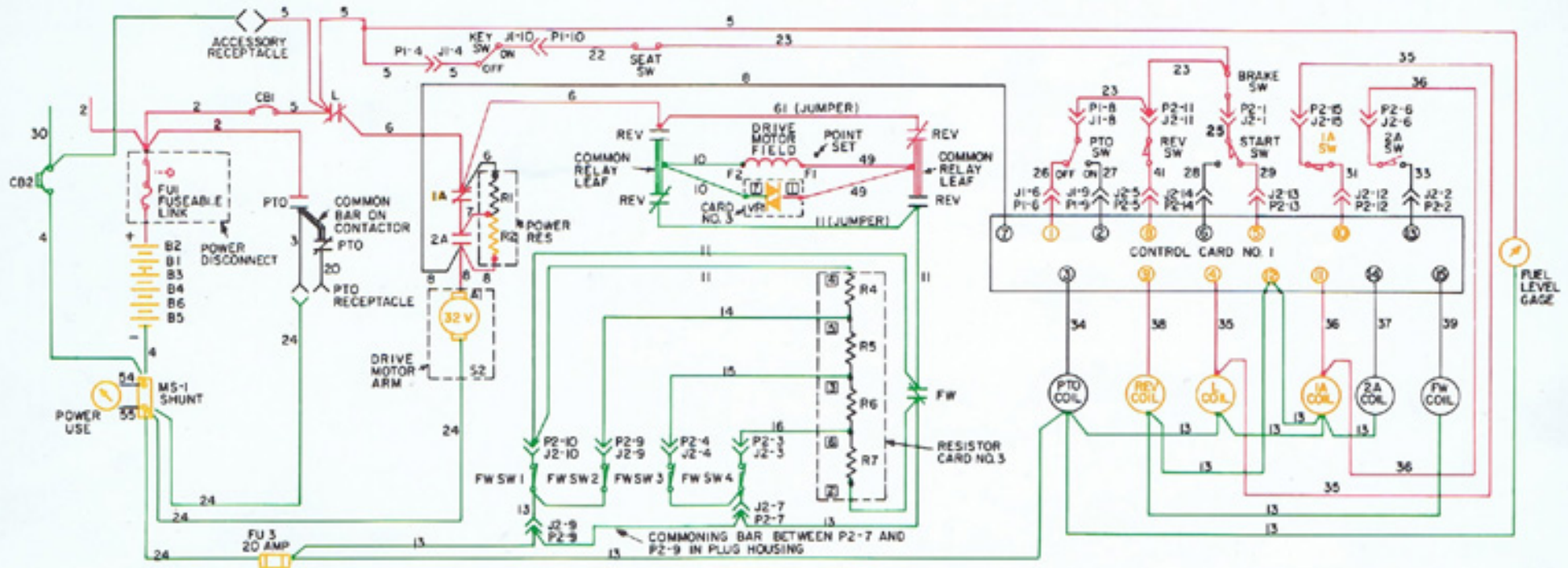


CONTROL PANELS

SPEED CONTROL

SPEED POSITION		
FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW (OPENS)	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD
REVERSE		
REV SWITCH	REV FIELD POLARITY	
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED

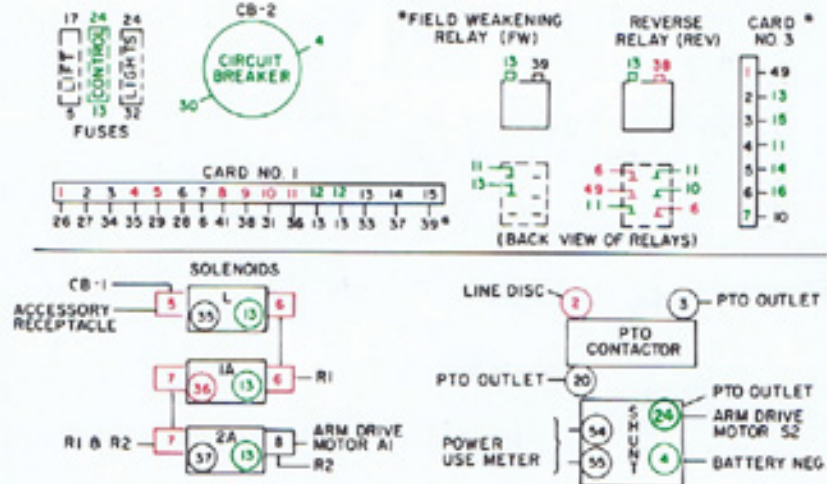
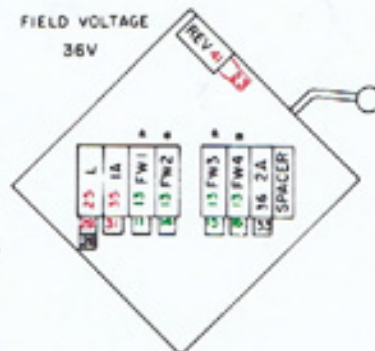


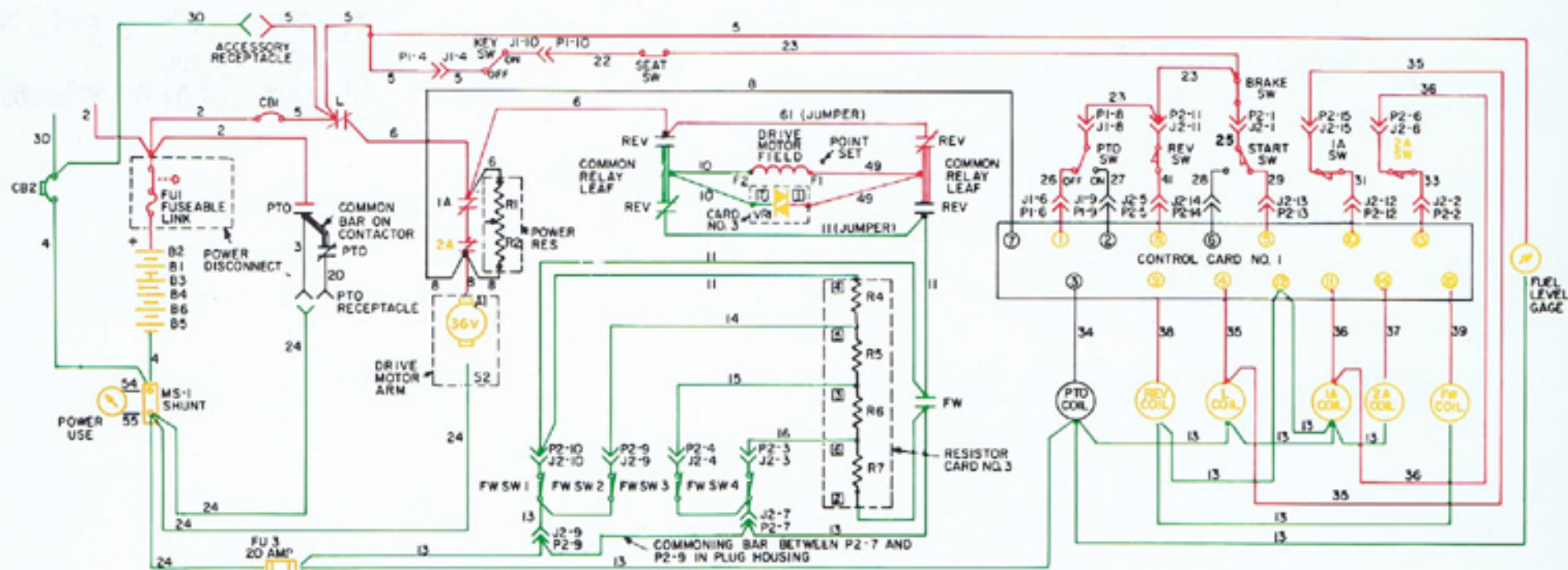


CONTROL PANELS

SPEED CONTROL

SPEED POSITION		
FORWARD	SWITCH	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A	FW1 OPENS R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD
REVERSE	REV SWITCH	REV FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED





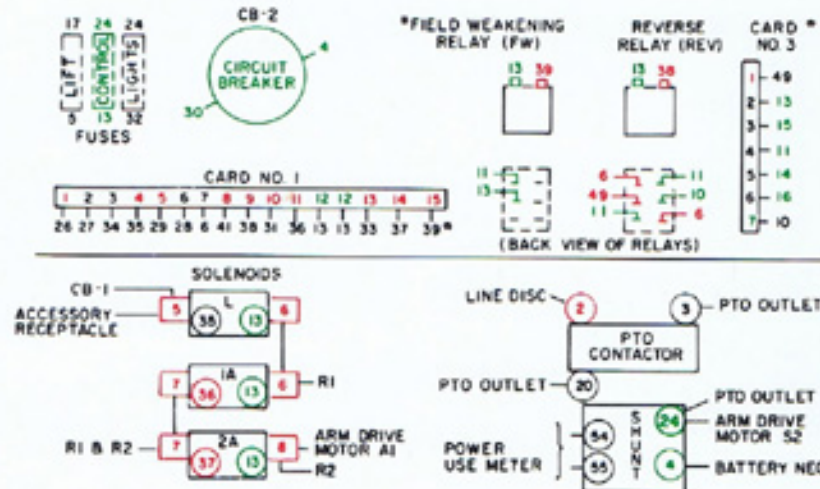
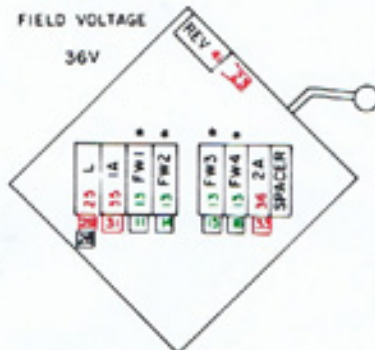
CONTROL PANELS

SPEED CONTROL

SPEED POSITION

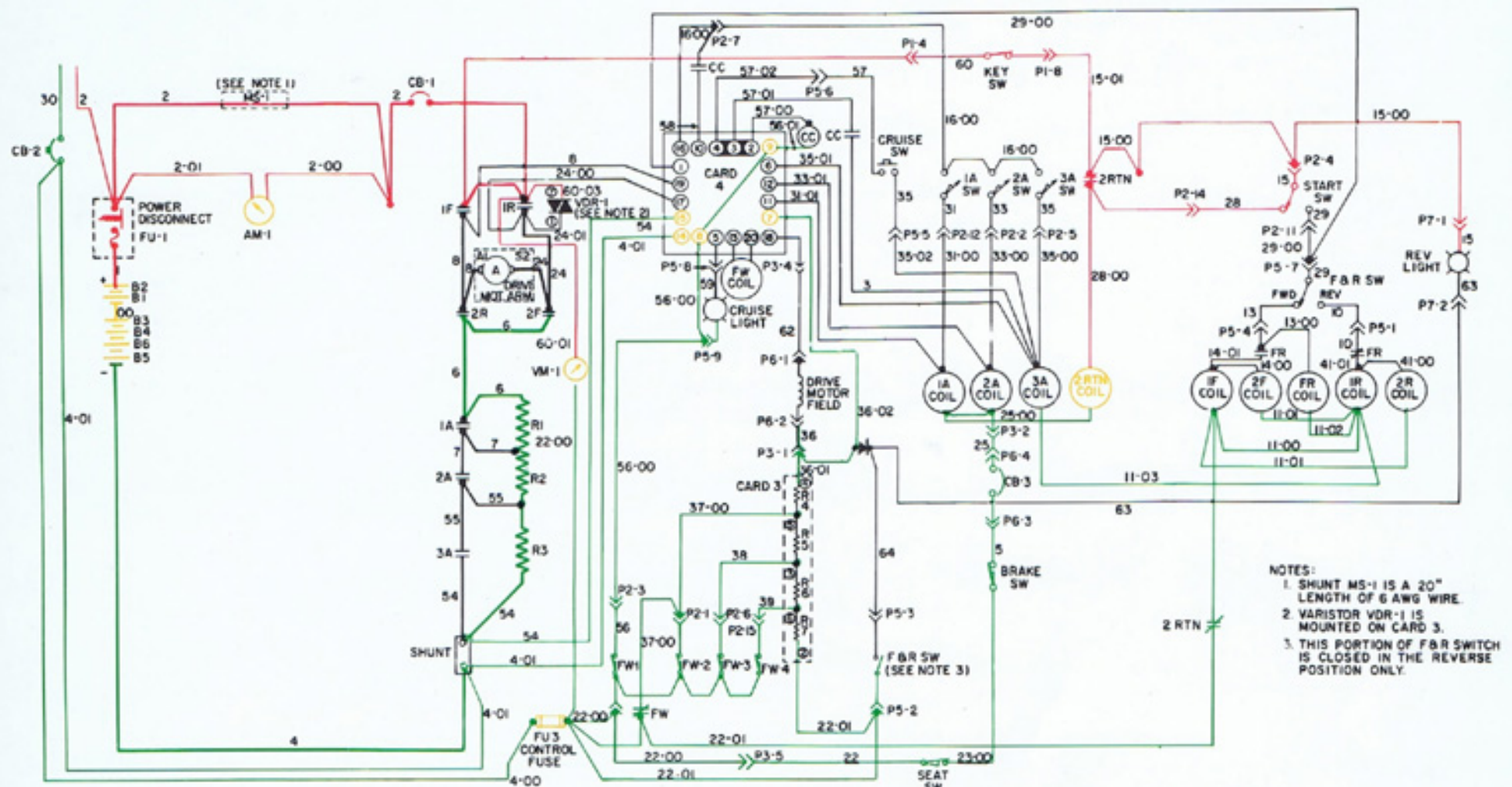
FORWARD	Switch	RESULT
1	L	START
2	1A	R1 BYPASSED
3	2A, FW (OPENS)	R2 BYPASSED
4*	FW1	R4 IN FIELD
5*	FW2	R5 IN FIELD
6*	FW3	R6 IN FIELD
7*	FW4	R7 IN FIELD

REVERSE	REV SWITCH	REV FIELD POLARITY
1	L	START
2	1A	R1 BYPASSED
3	2A	R2 BYPASSED



E20

Key Switch ON, Power Disconnect In, Speed Control In NEUTRAL, Brake Disengaged, Seat Switch ON, Forward and Reverse Switch On In FORWARD.



- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

SPEED CONTROL

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

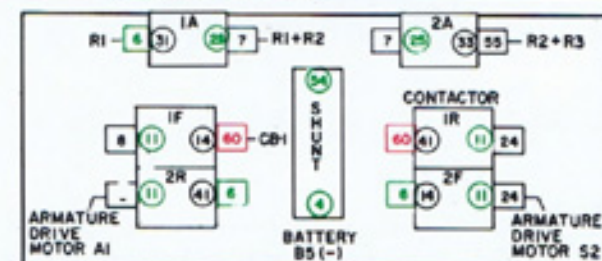
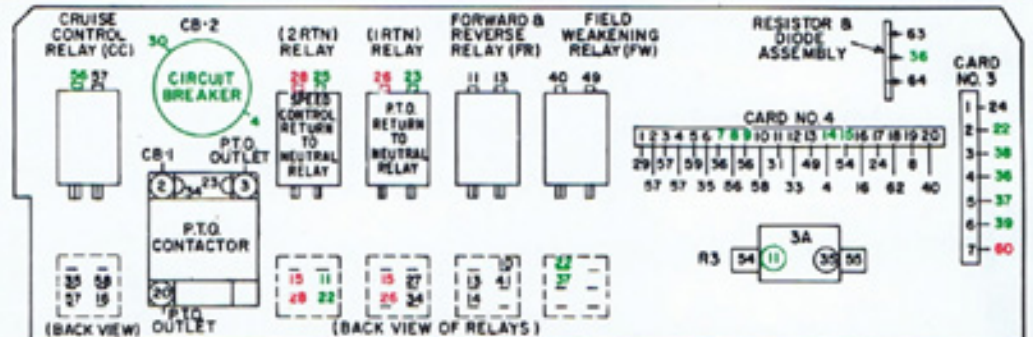
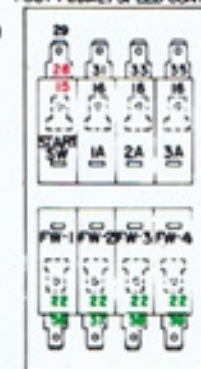
SWITCH	RESULT
1 START	IF AND 2F CONTACTS CLOSE
2 1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3 2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4 3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5 FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6 FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7 FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8 FW-4 (OPENS)	R7 IN FIELD CIRCUIT

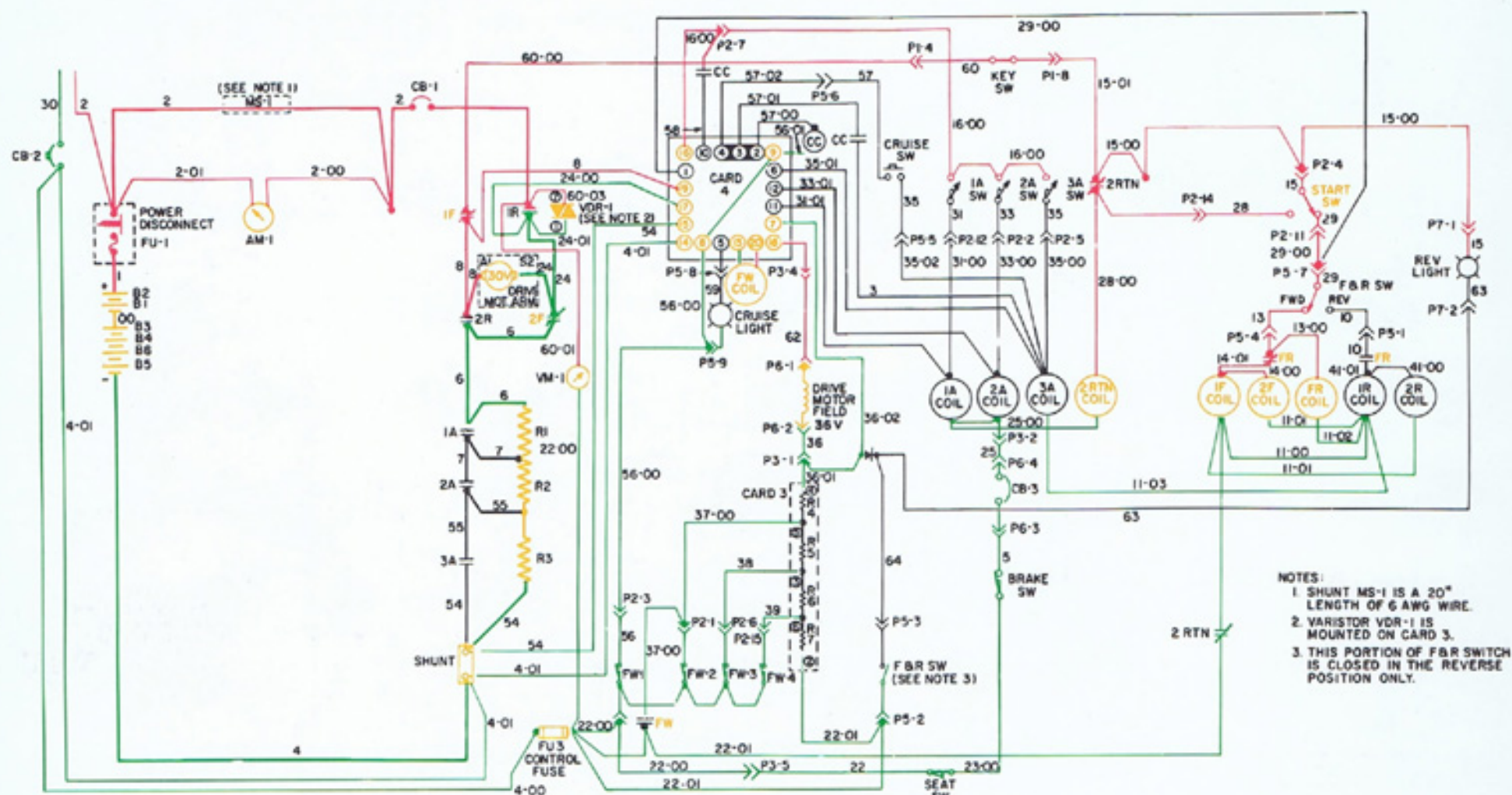
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSSES.)

SWITCH	RESULT
1 START	1R AND 2R CONTACTS CLOSE
2 1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3 2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4 3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL / SPEED CONTROL





- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

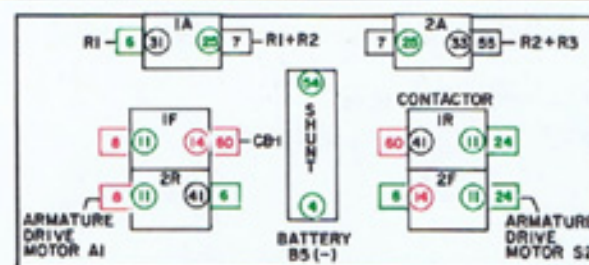
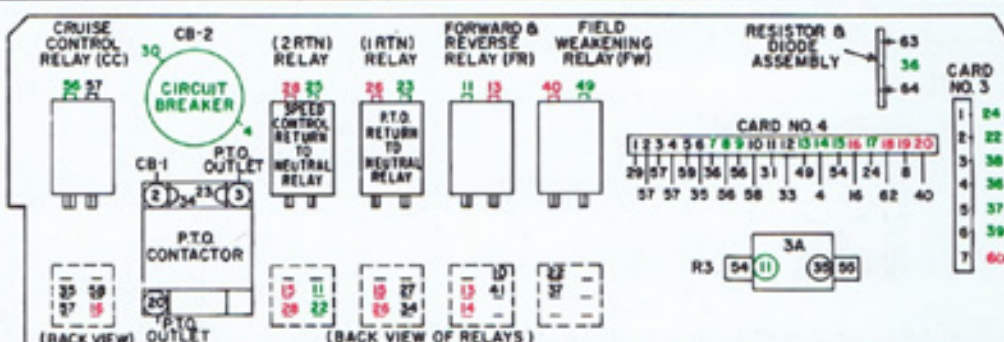
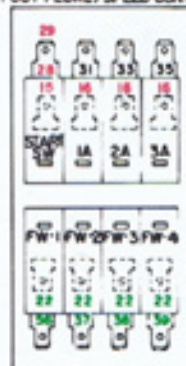
SWITCH	RESULT
1 START	IF AND 2F CONTACTS CLOSE
2 1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3 2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4 3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5 FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6 FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7 FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8 FW-4 (OPENS)	R7 IN FIELD CIRCUIT

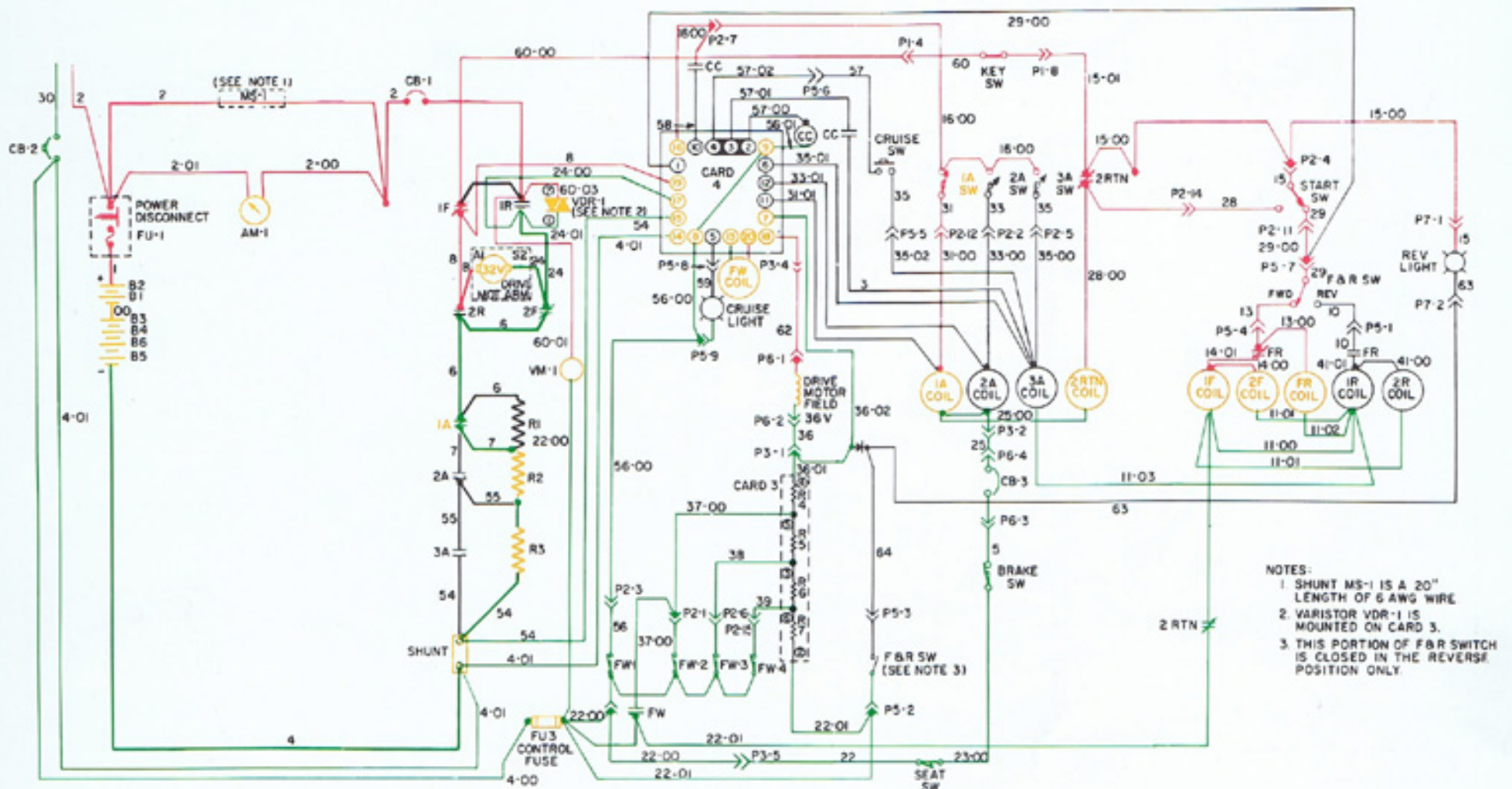
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSSES.)

SWITCH	RESULT
1 START	1R AND 2R CONTACTS CLOSE
2 1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3 2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4 3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL/SPEED CONTROL





CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

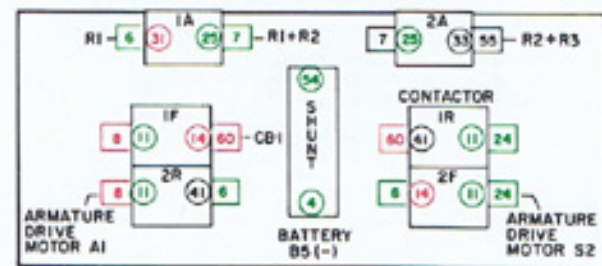
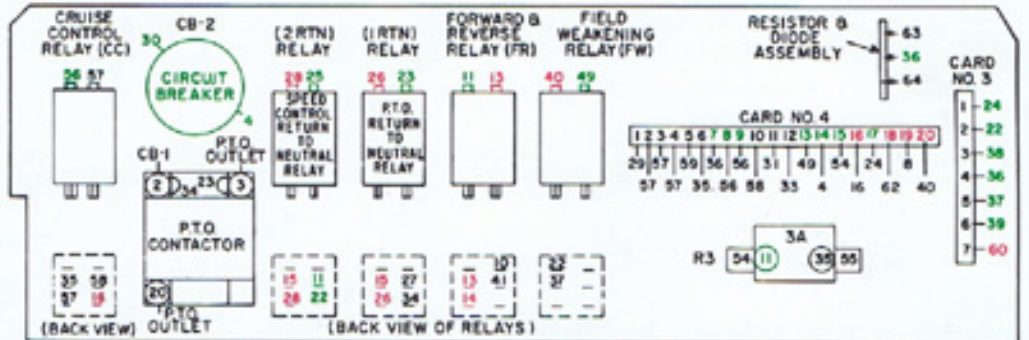
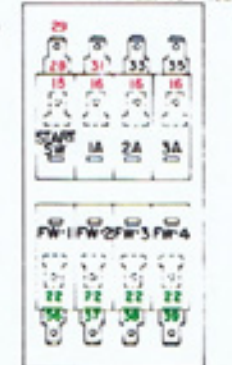
REVERSE

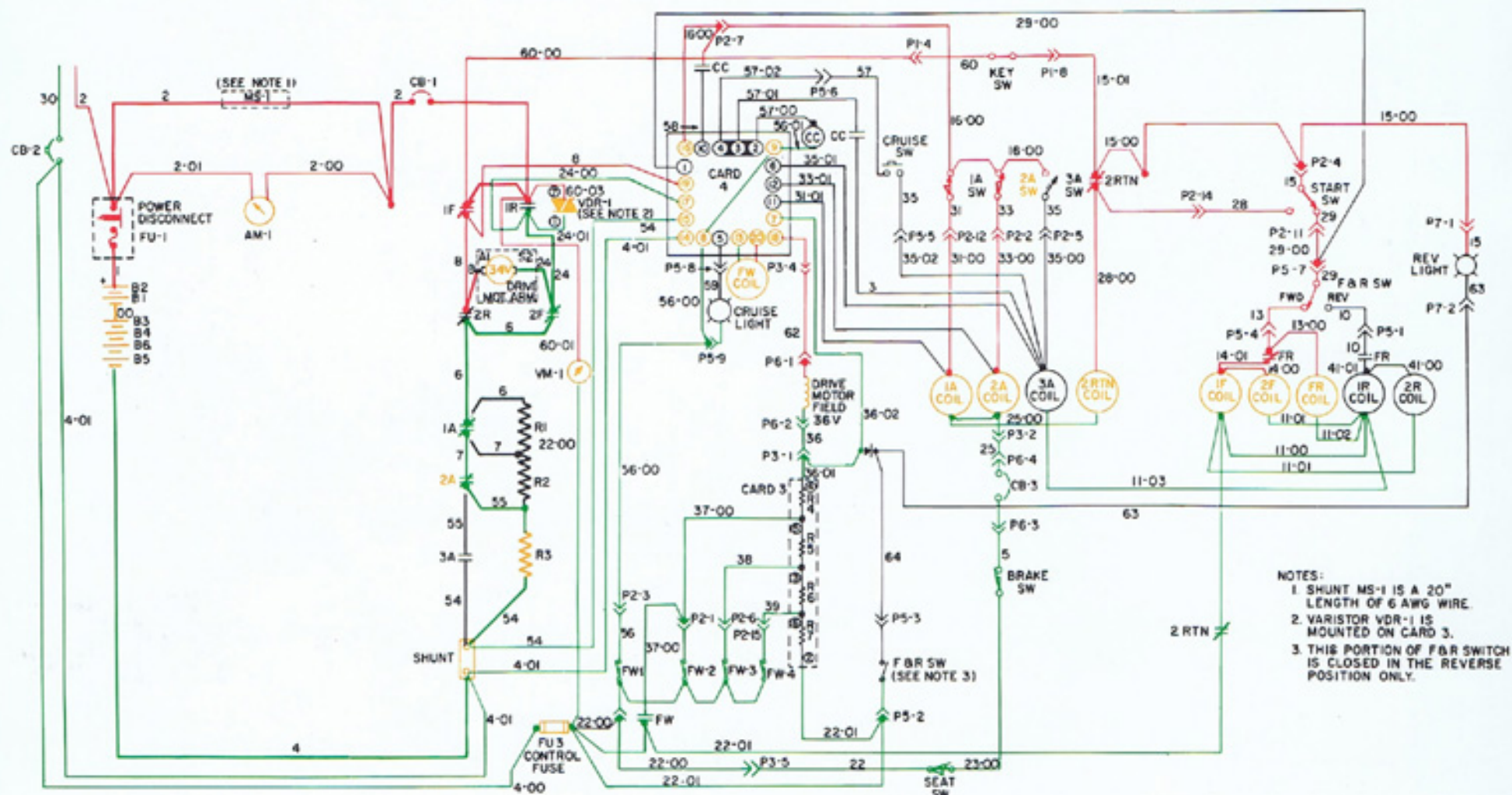
(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION.
F & R SWITCH CLOSSES.)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

SPEED CONTROL

FOOT PEDAL / SPEED CONTROL





CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

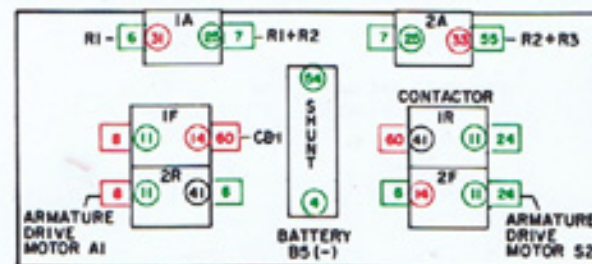
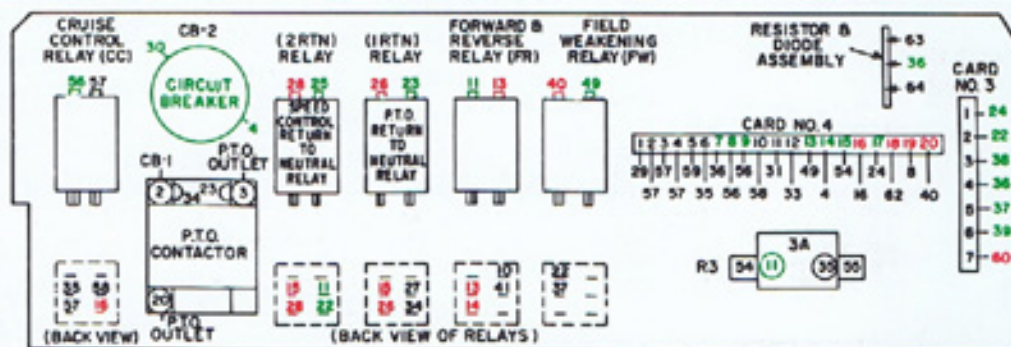
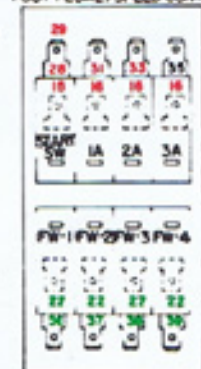
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

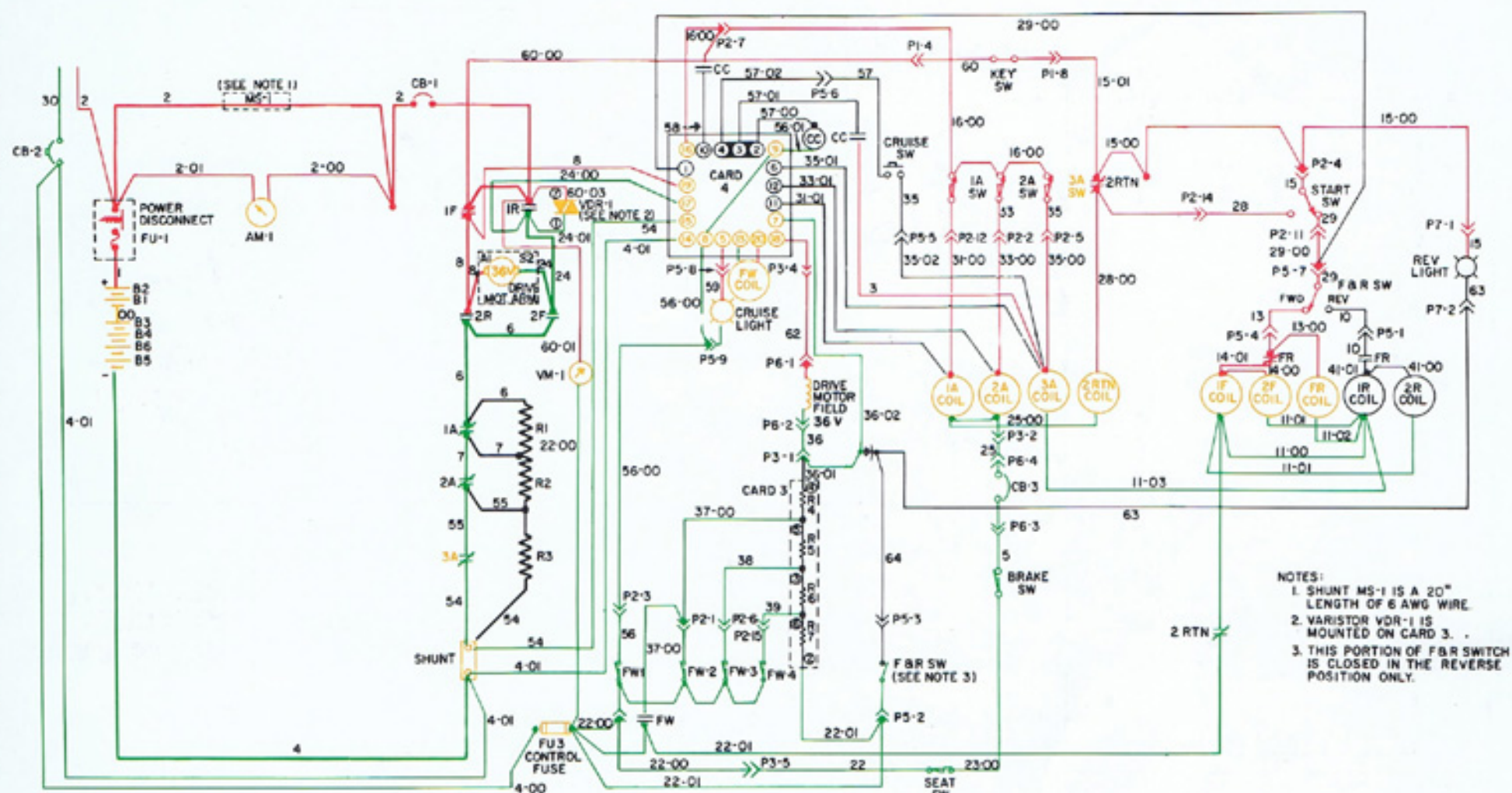
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSSES)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL/SPEED CONTROL





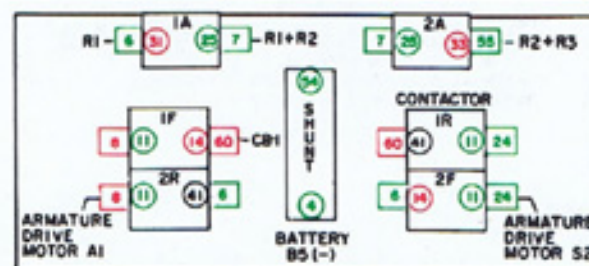
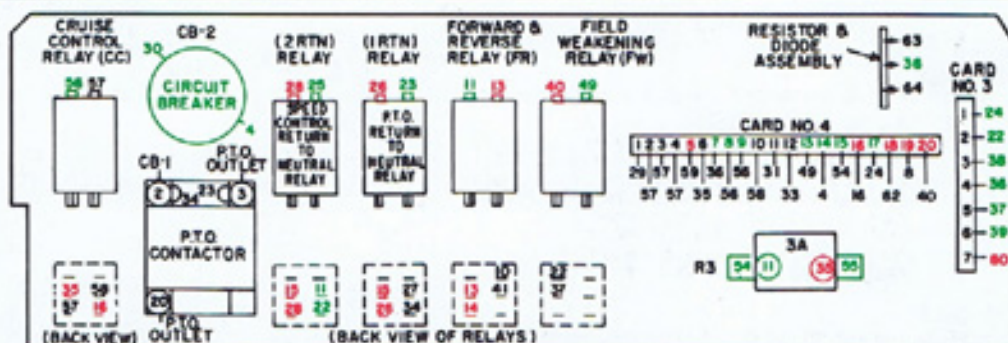
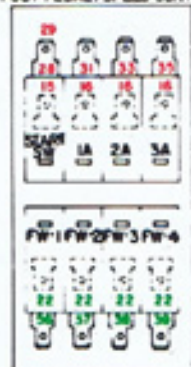
CONTROL PANELS

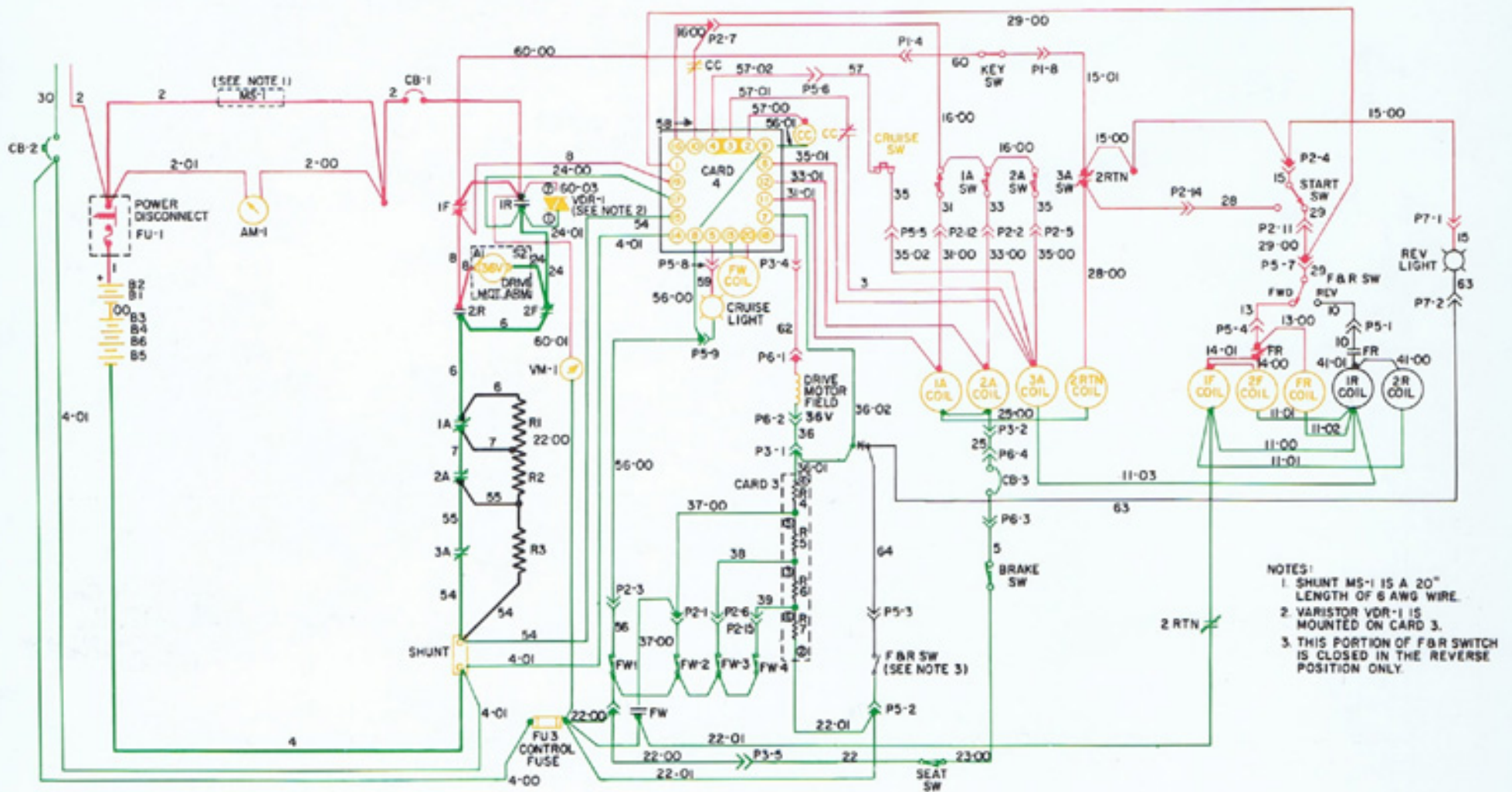
SPEED POSITION

FORWARD (FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)		
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

REVERSE (FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOS)		
REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL / SPEED CONTROL





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1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARIATOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

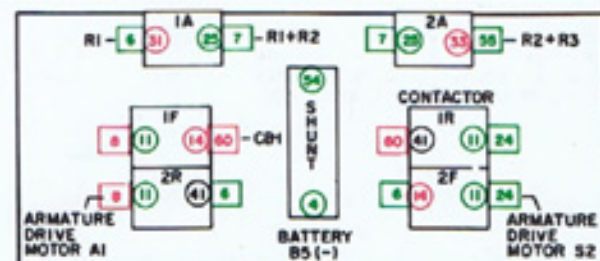
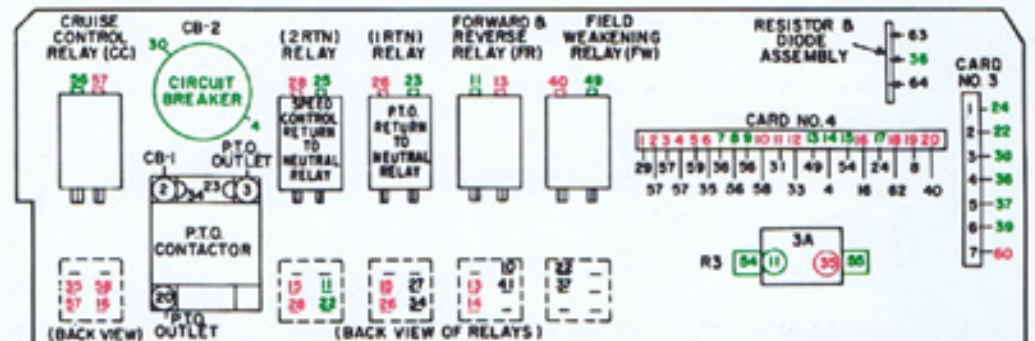
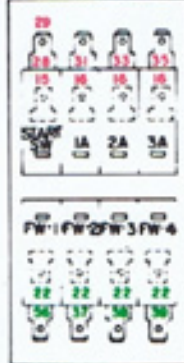
SPEED POSITION

FORWARD		
(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)		
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

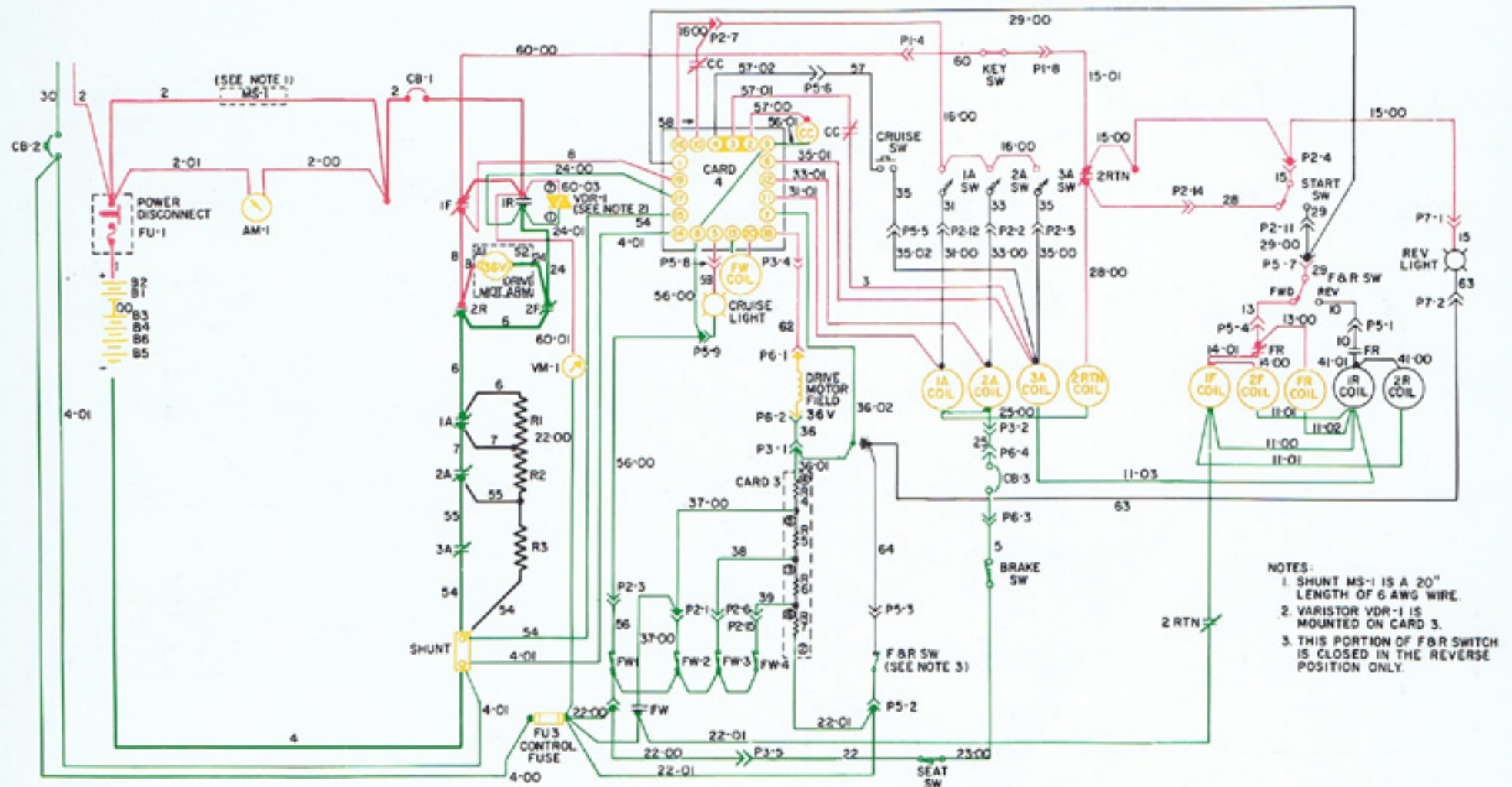
REVERSE
(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION F&R SWITCH CLOSSES)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL/SPEED CONTROL



Tractor Operating in Cruise Control, Cruise Control Button Out.
Foot Off Foot Pedal.



NOTES:

1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

SPEED CONTROL

FORWARD

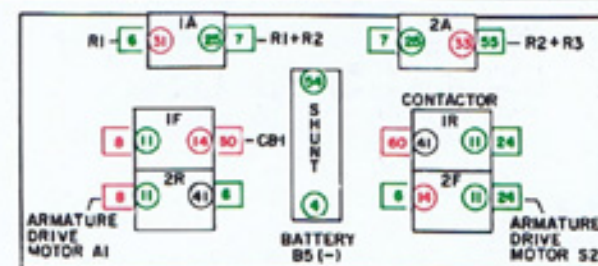
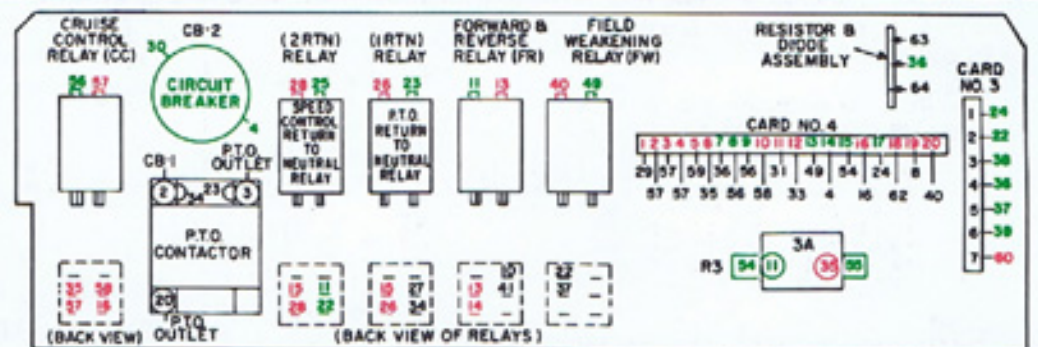
(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

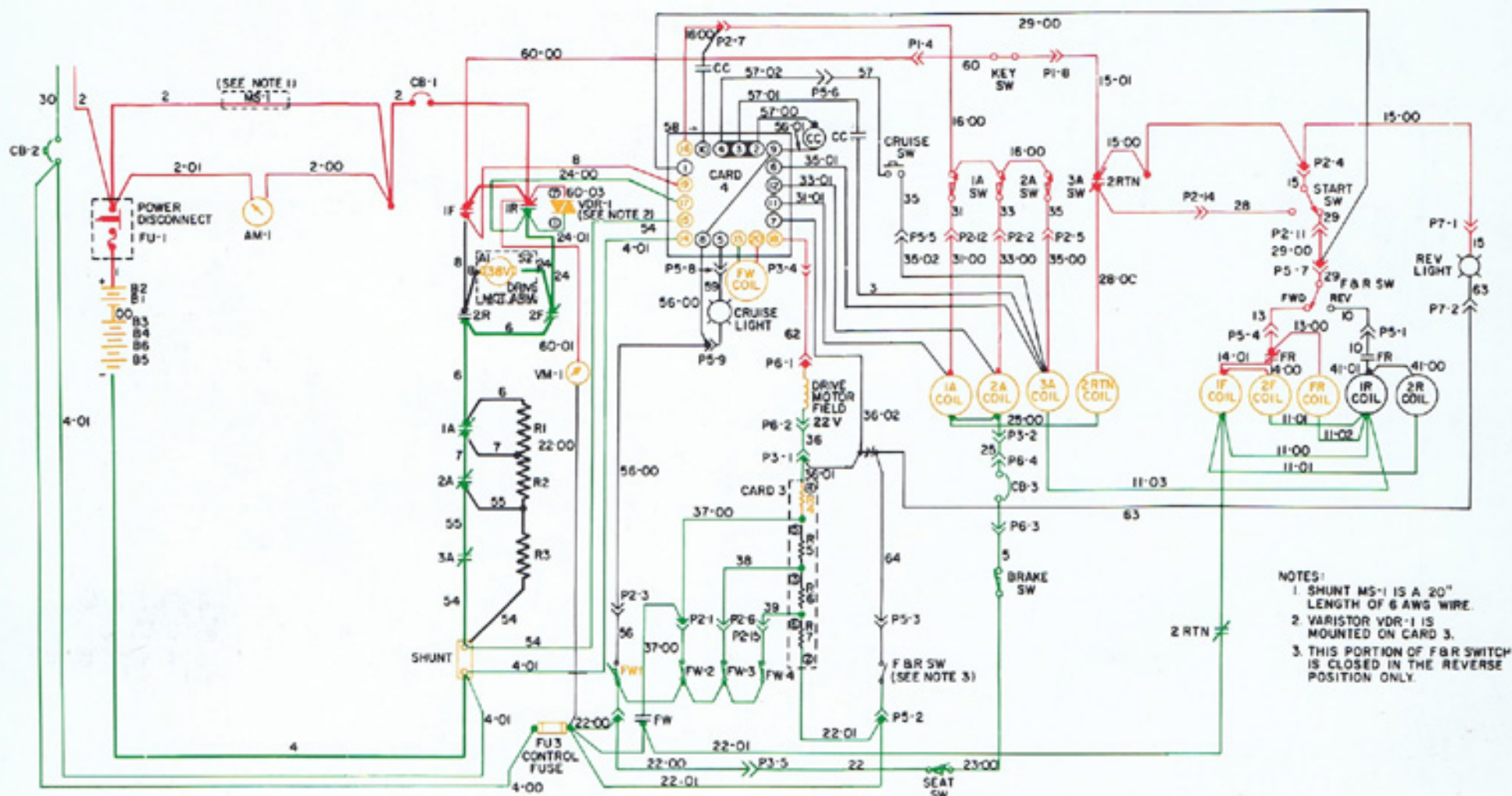
FWD	SWITCH	RESULT
1	START	1F AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION.
F & R SWITCH CLOSES)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED





- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

FORWARD
(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

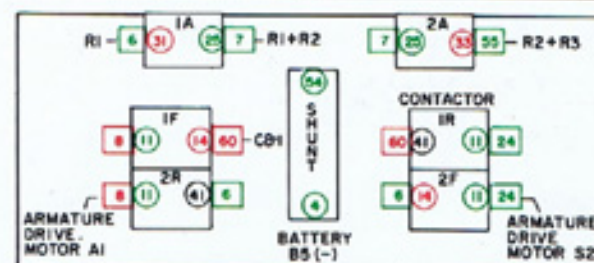
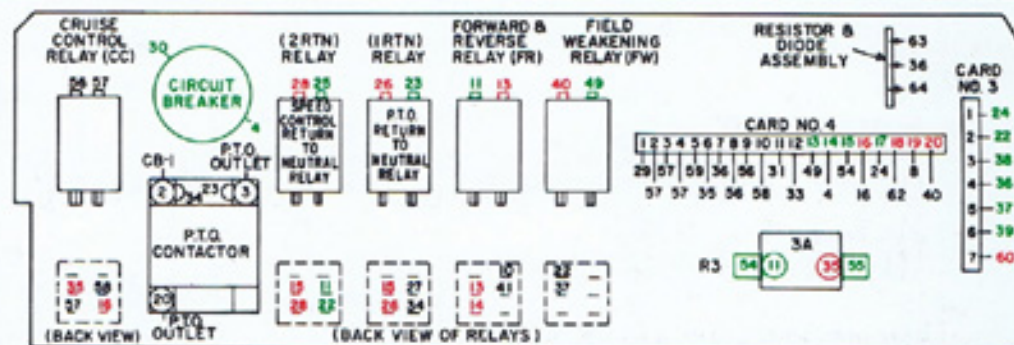
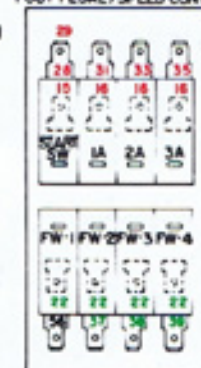
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

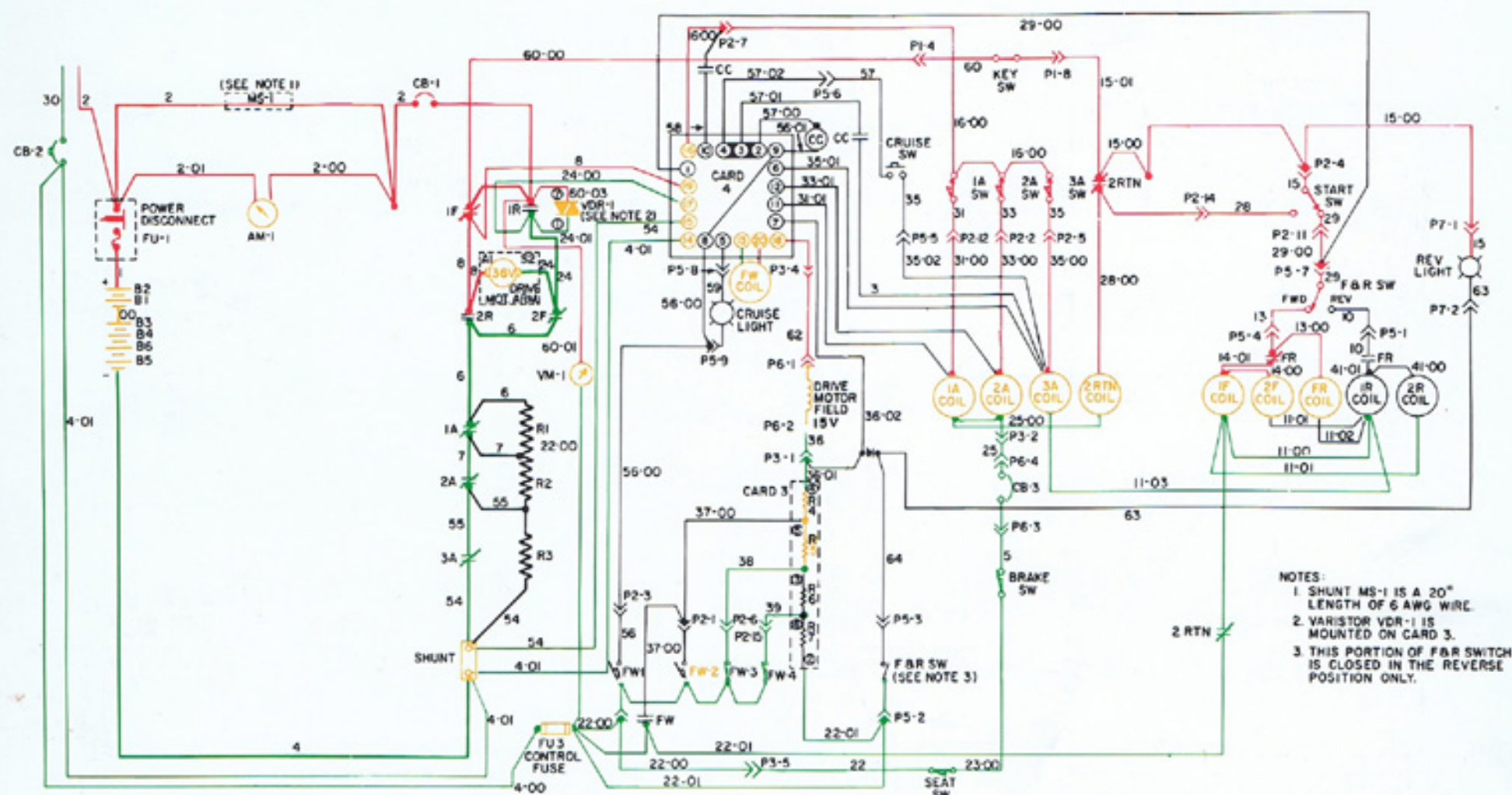
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION, F&R SWITCH CLOSING)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL/SPEED CONTROL





- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

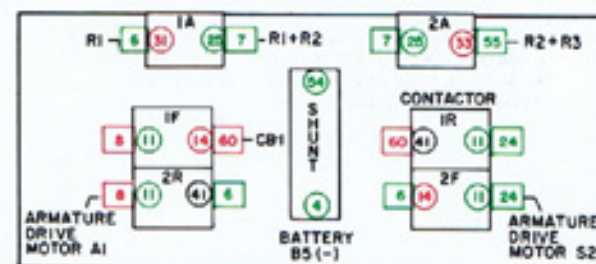
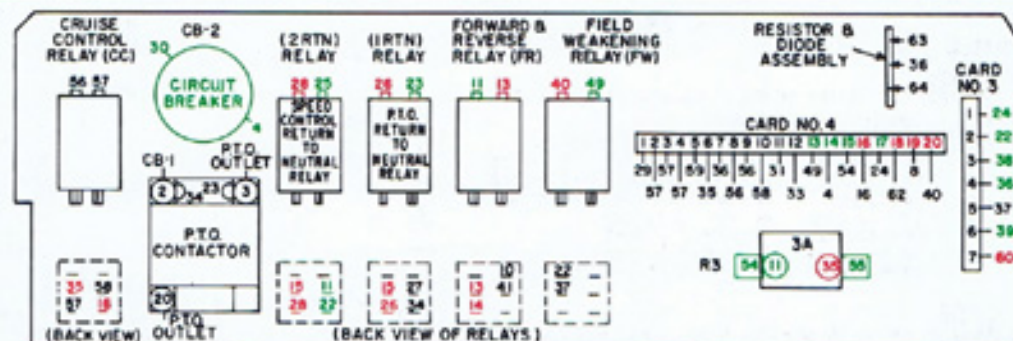
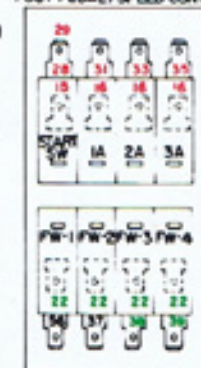
SW	SWITCH	RESULT
1	START	1F AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

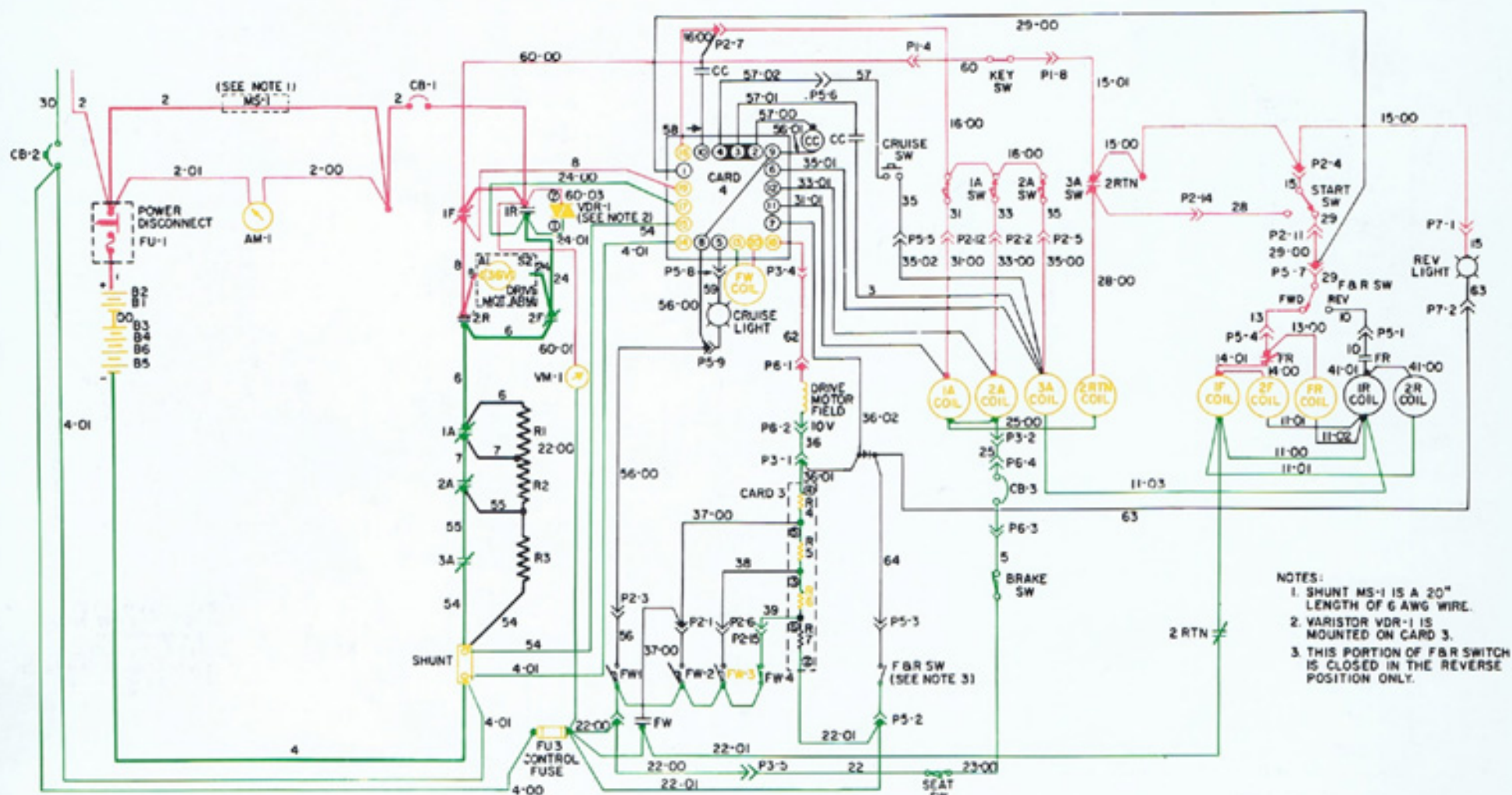
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOS)

SW	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL/SPEED CONTROL





- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

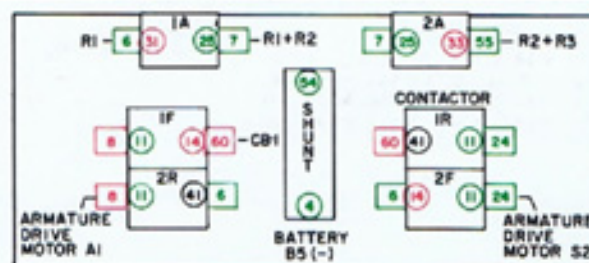
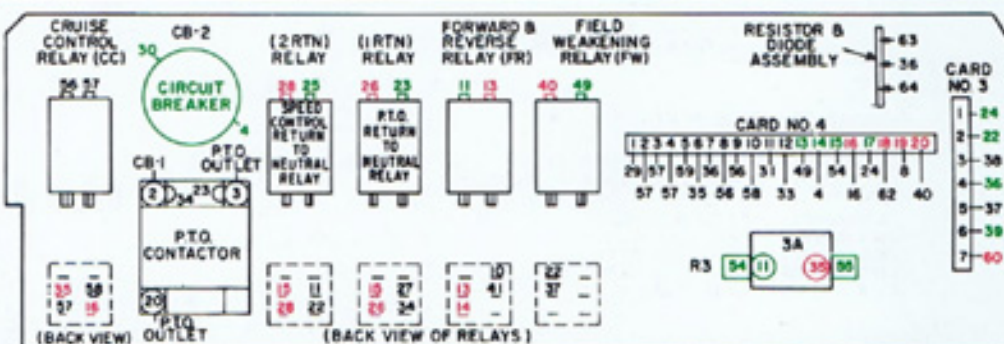
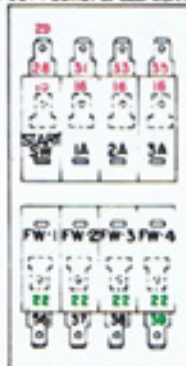
SWITCH	RESULT
1 START	IF AND 2F CONTACTS CLOSE
2 1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3 2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4 3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5 FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6 FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7 FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8 FW-4 (OPENS)	R7 IN FIELD CIRCUIT

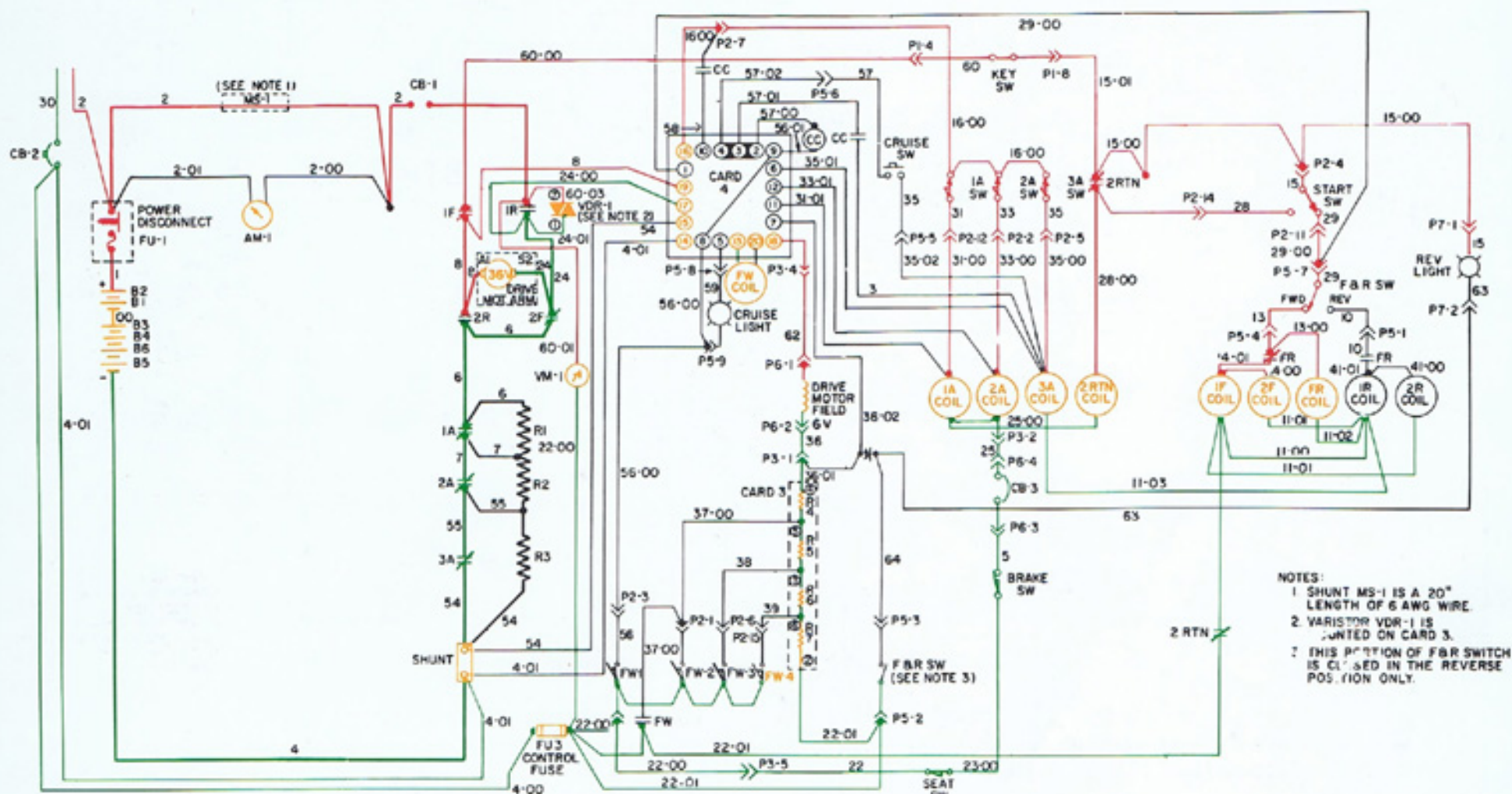
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSSES)

SWITCH	RESULT
1 START	1R AND 2R CONTACTS CLOSE
2 1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3 2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4 3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL / SPEED CONTROL





- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

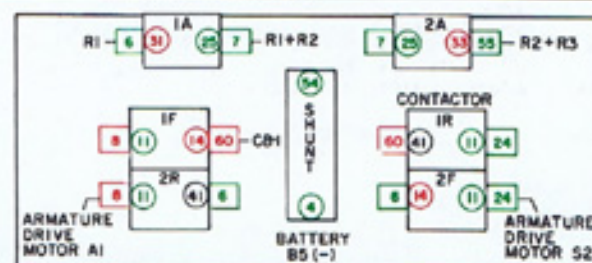
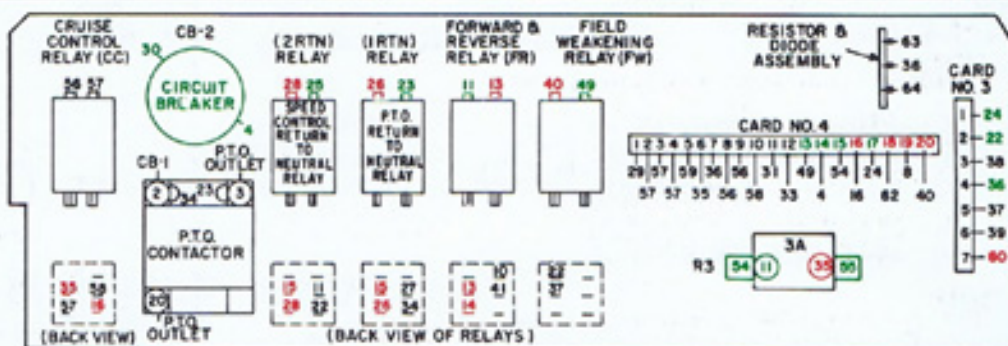
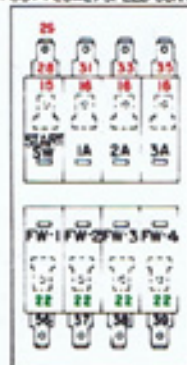
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

REVERSE

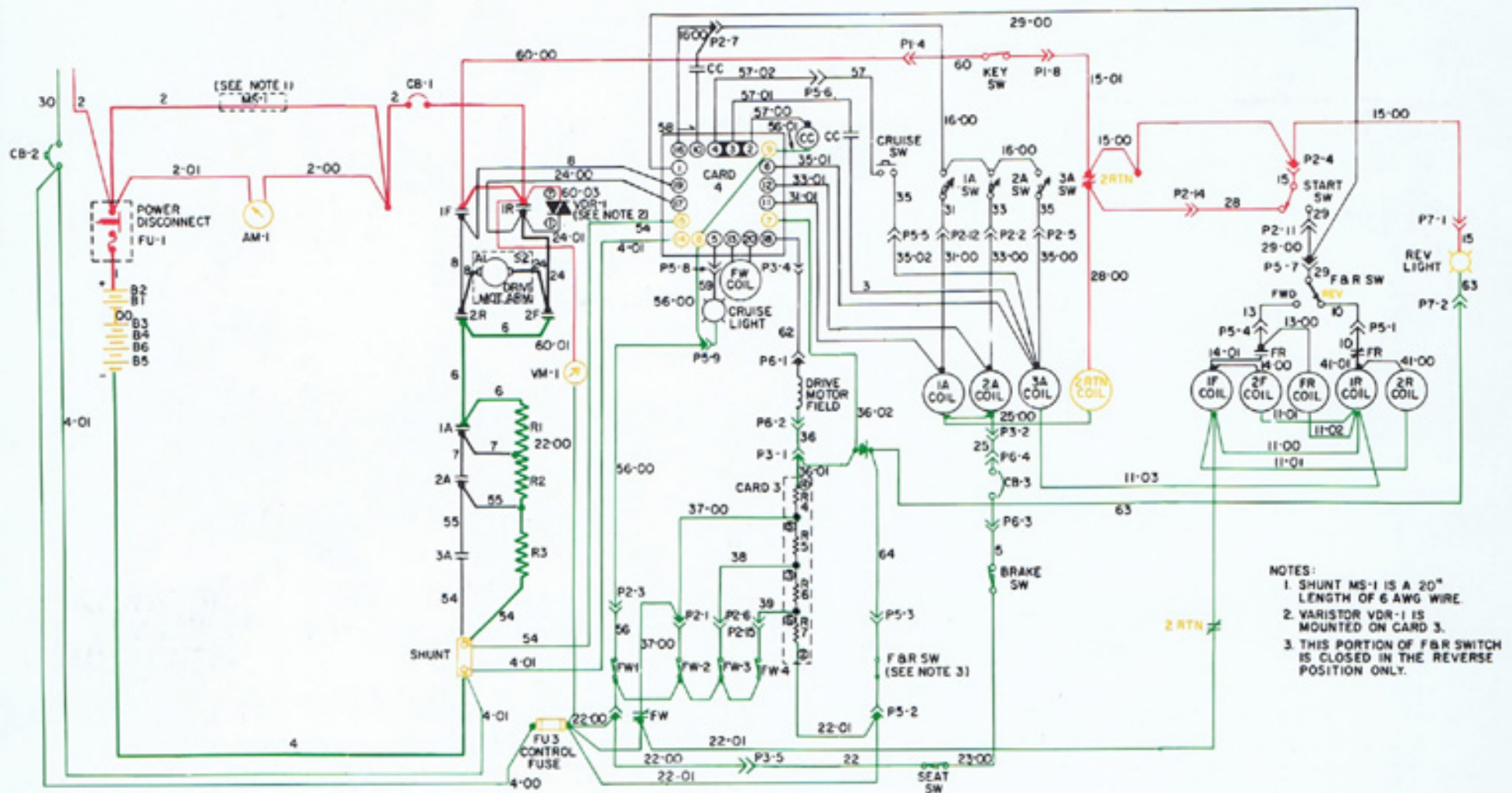
(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSES)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL / SPEED CONTROL



Key Switch ON, Power Disconnect In, Speed Control In NEUTRAL, Brake Disengaged, Seat Switch ON, Forward and Reverse Switch On In REVERSE.



- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

SPEED CONTROL

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

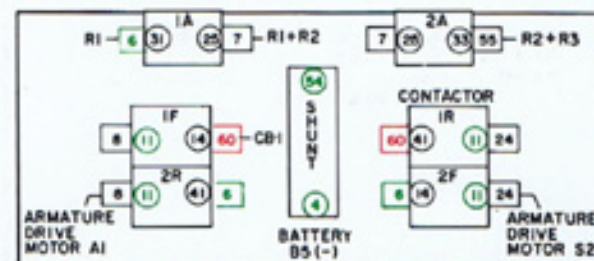
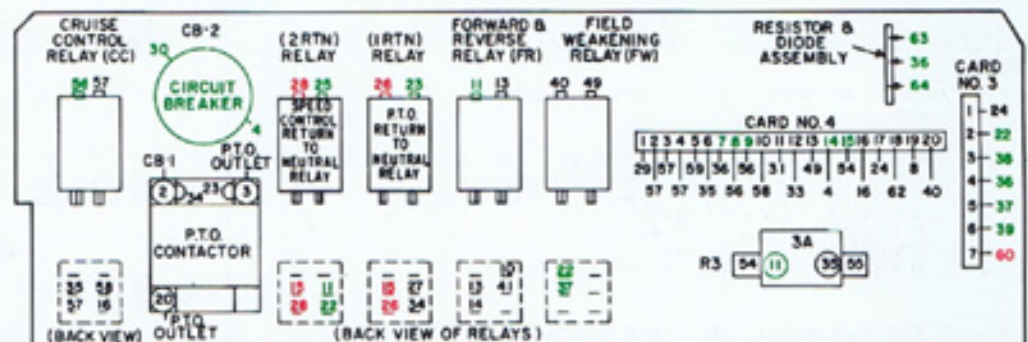
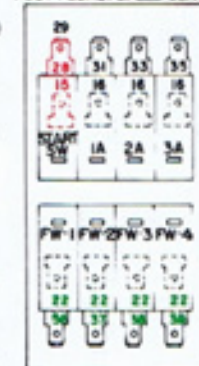
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

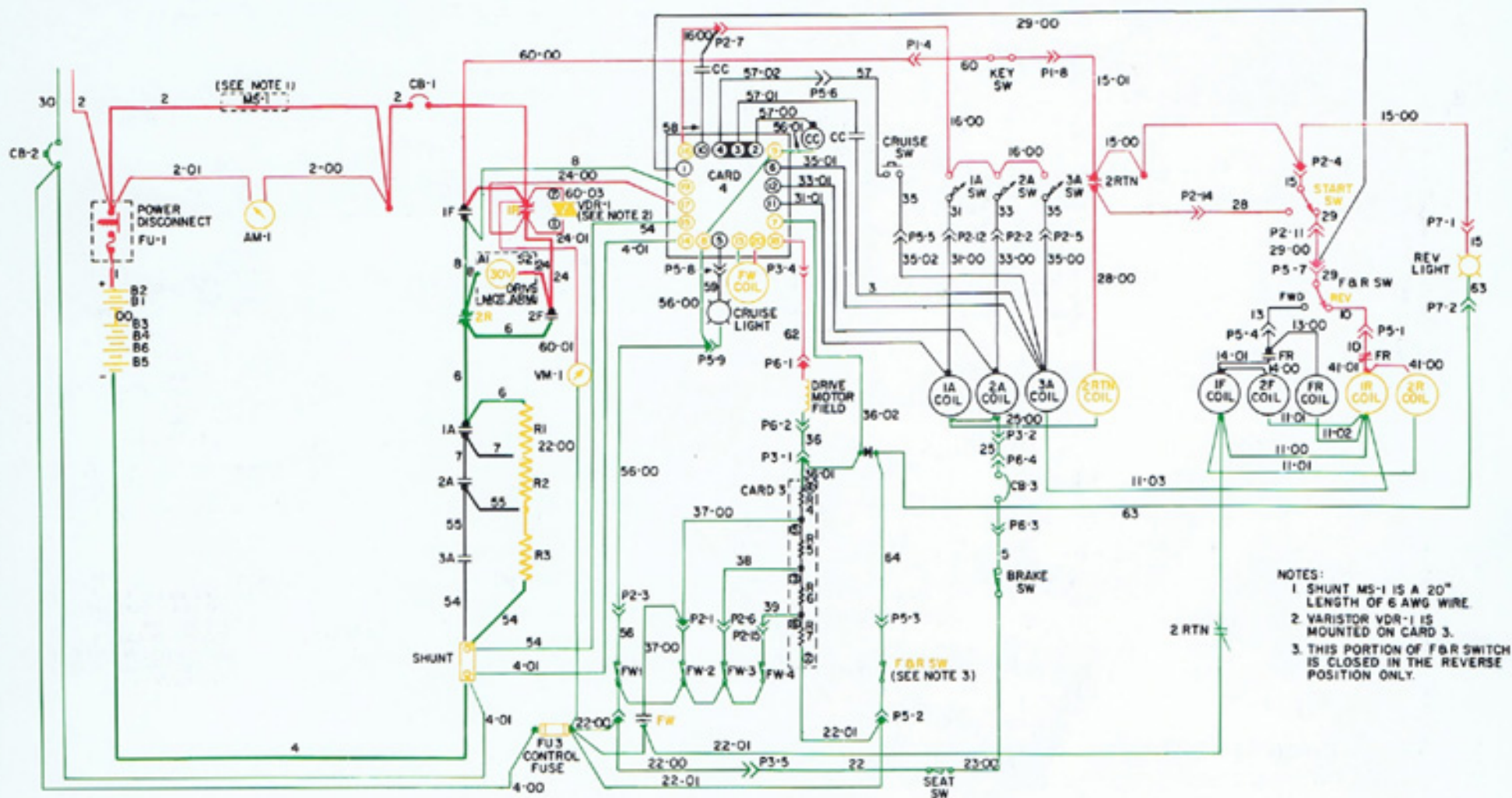
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSSES)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL / SPEED CONTROL





- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

SPEED CONTROL

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

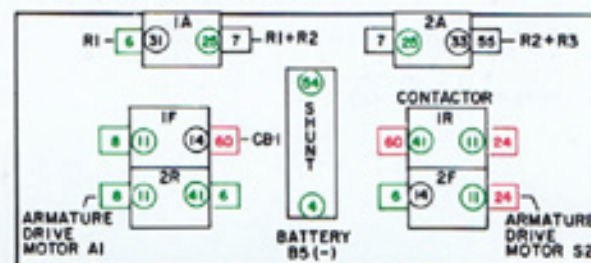
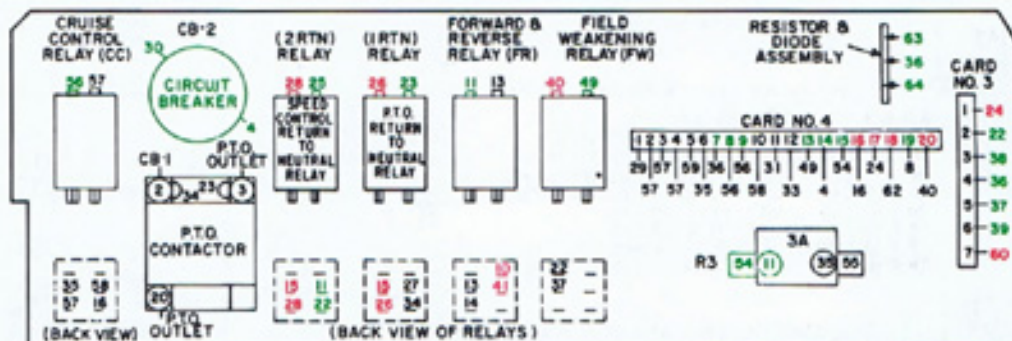
FWD	SWITCH	RESULT
1	START	1F AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

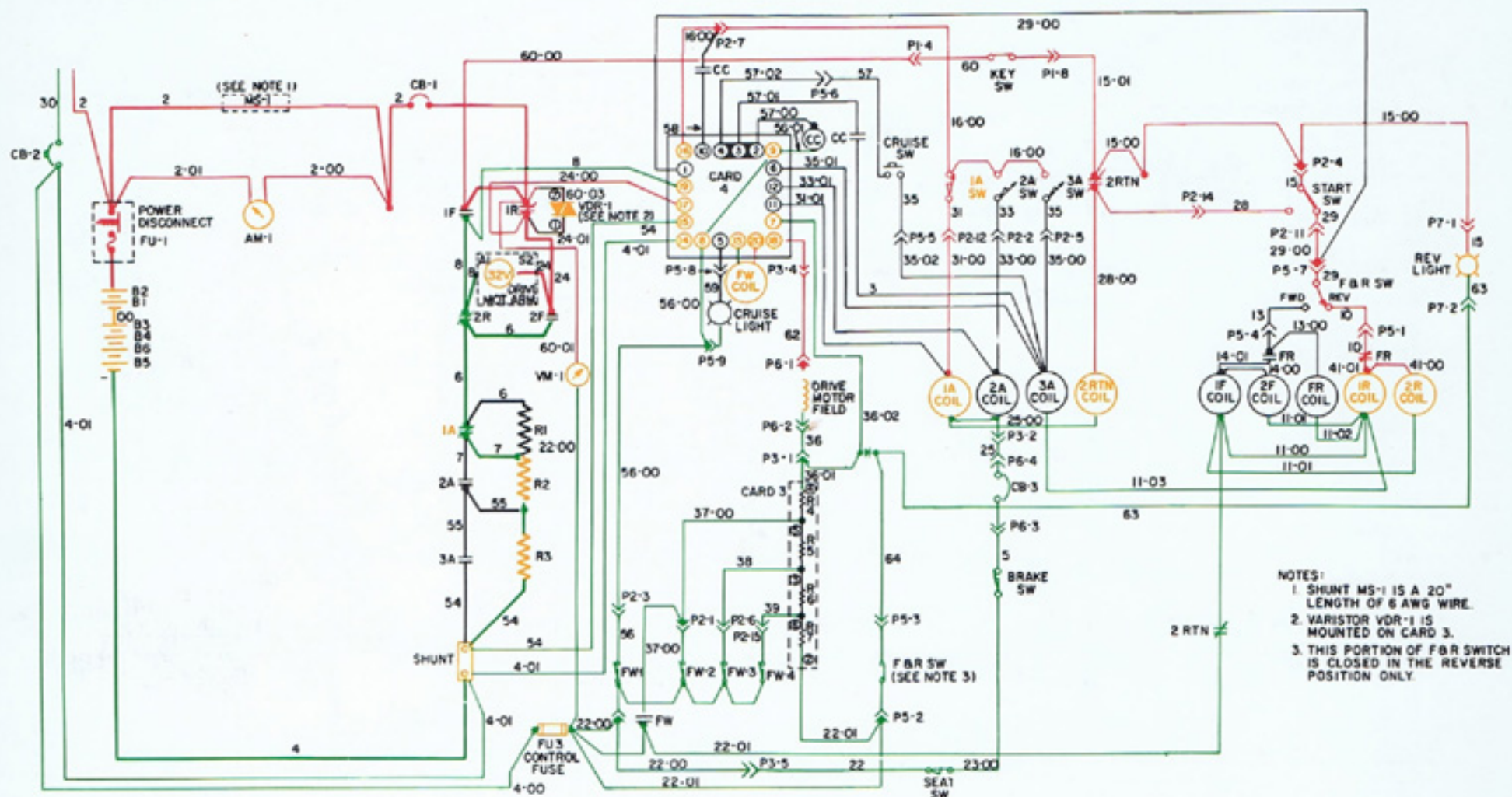
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSSES.)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL/SPEED CONTROL





CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

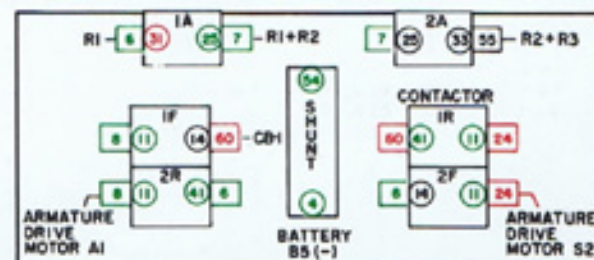
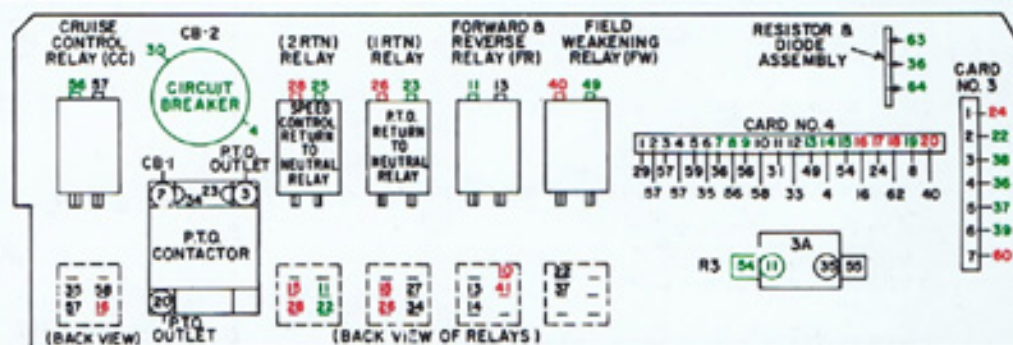
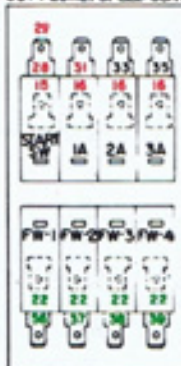
FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

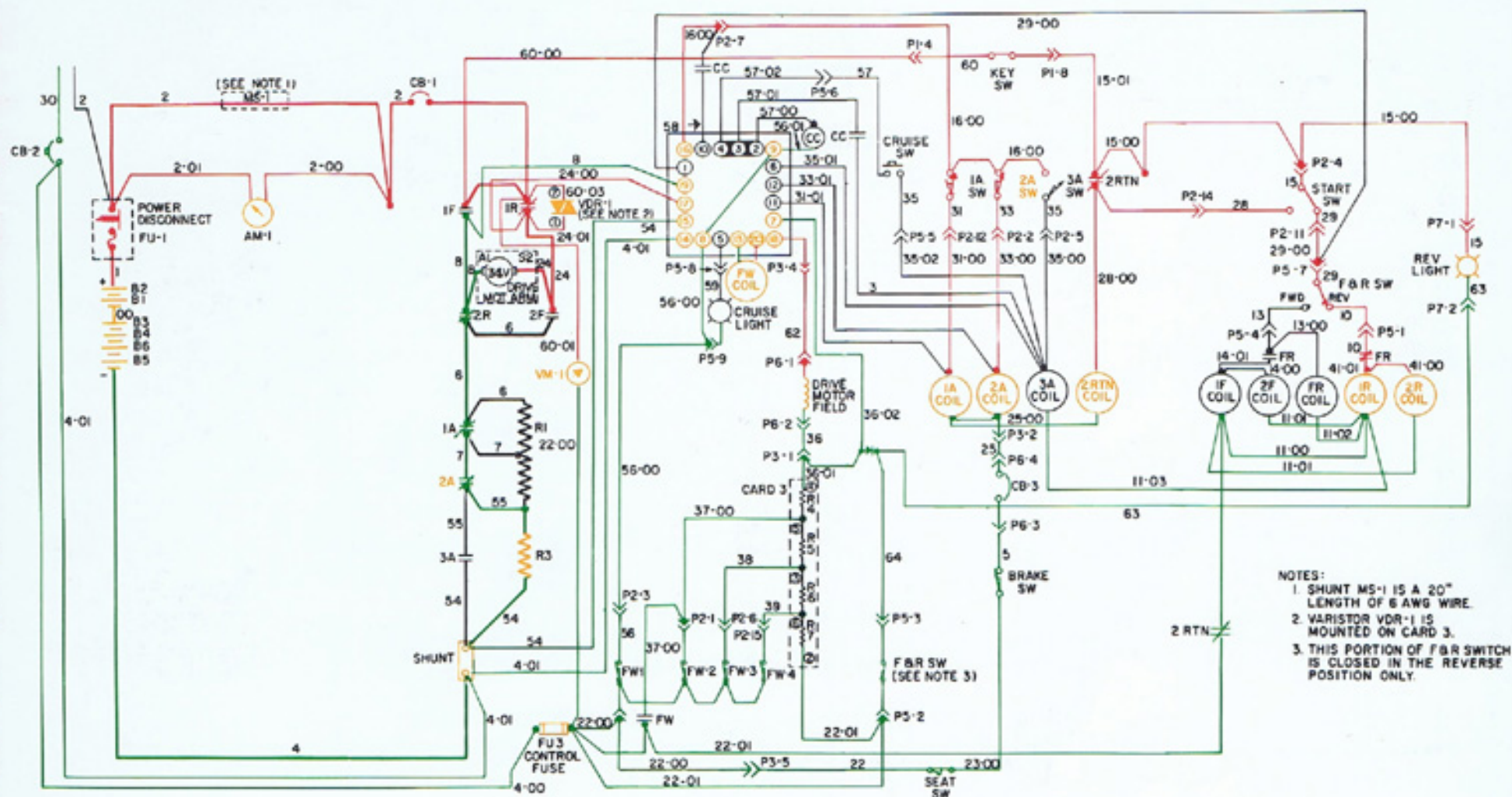
REVERSE

(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSSES.)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL/SPEED-CONTROL





CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

FWD	SWITCH	RESULT
1	START	IF AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

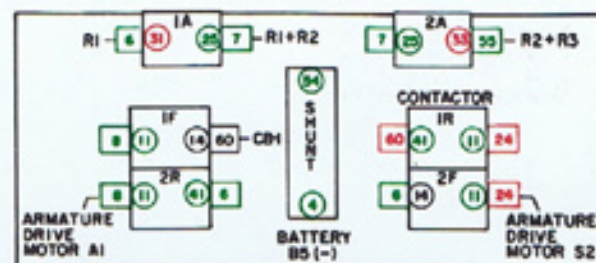
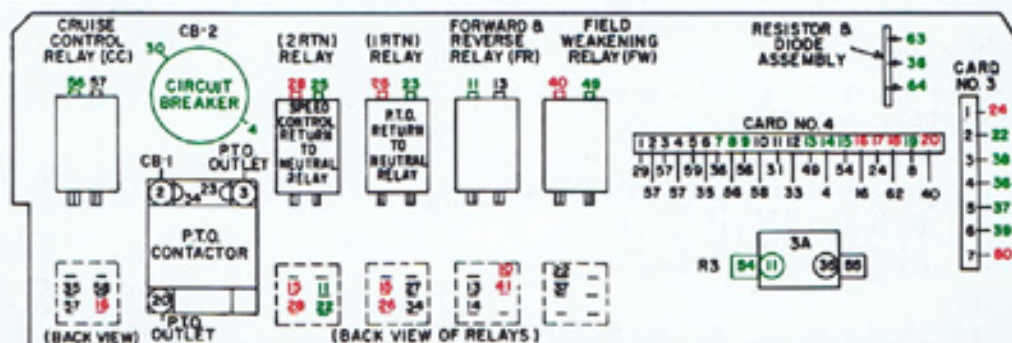
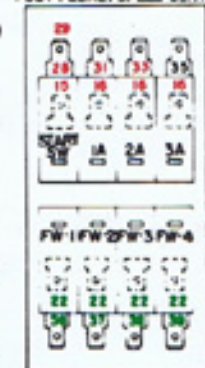
REVERSE

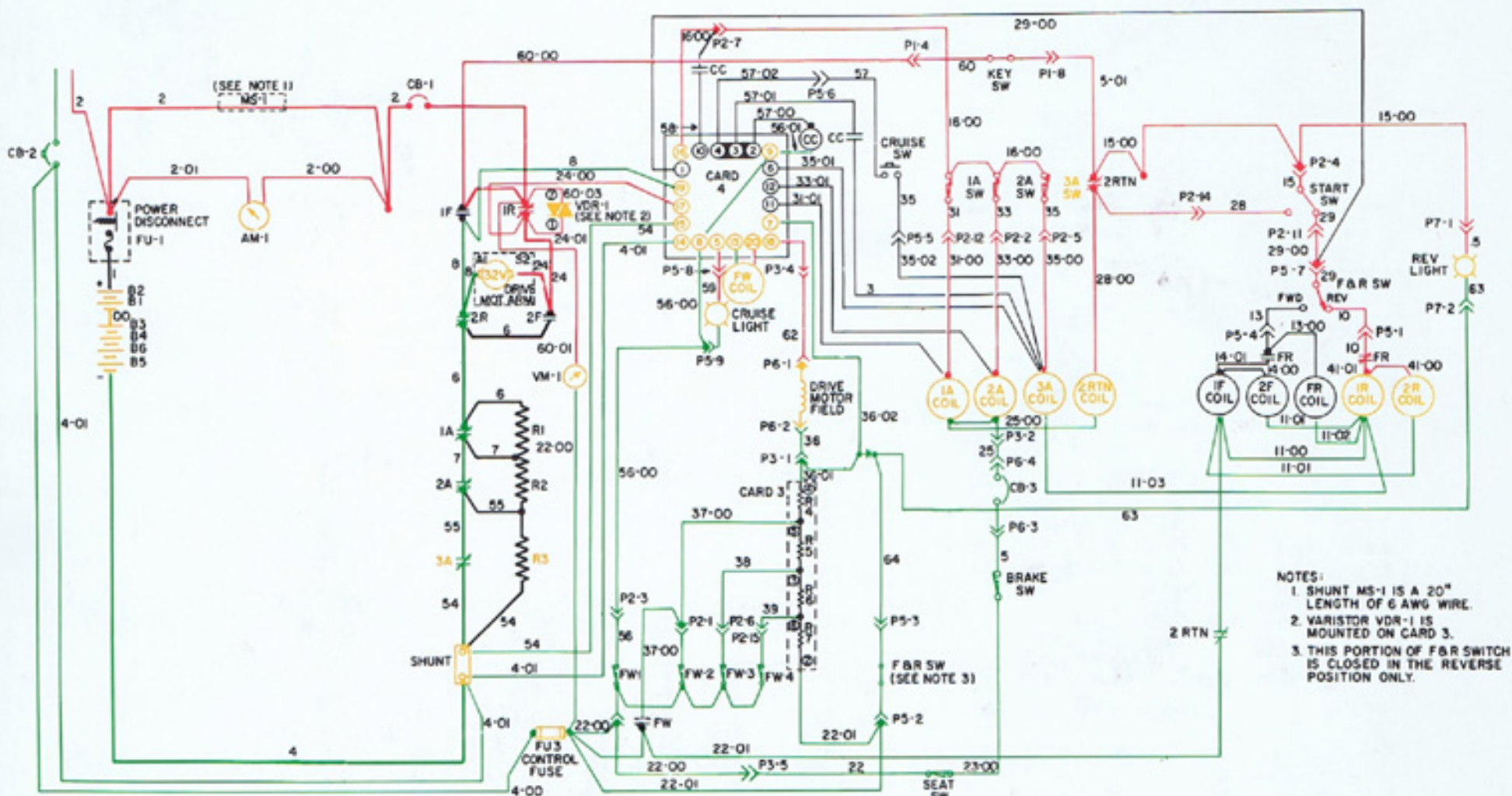
(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION.
F&R SWITCH CLOSSES.)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

SPEED CONTROL

FOOT PEDAL / SPEED CONTROL





- NOTES:
1. SHUNT MS-1 IS A 20" LENGTH OF 6 AWG WIRE.
 2. VARISTOR VDR-1 IS MOUNTED ON CARD 3.
 3. THIS PORTION OF F&R SWITCH IS CLOSED IN THE REVERSE POSITION ONLY.

CONTROL PANELS

SPEED POSITION

FORWARD

(FWD/REV SWITCH ON CONTROL PANEL IN FORWARD POSITION)

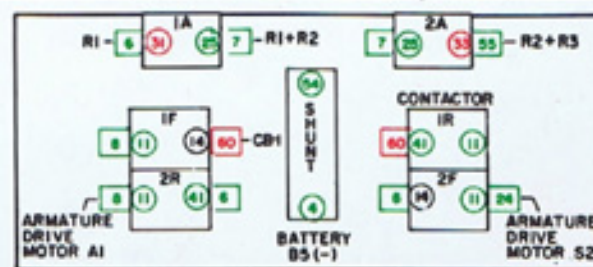
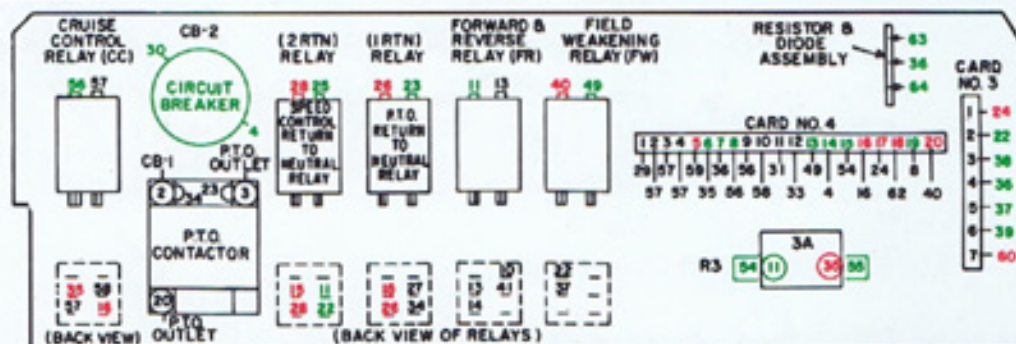
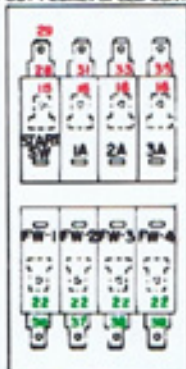
FWD	SWITCH	RESULT
1	START	1F AND 2F CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED
5	FW-1 (OPENS)	R4 IN FIELD CIRCUIT
6	FW-2 (OPENS)	R5 IN FIELD CIRCUIT
7	FW-3 (OPENS)	R6 IN FIELD CIRCUIT
8	FW-4 (OPENS)	R7 IN FIELD CIRCUIT

REVERSE

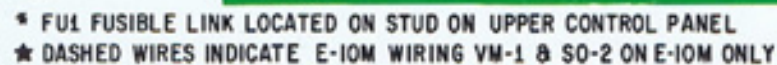
(FWD/REV SWITCH ON CONTROL PANEL IN REVERSE POSITION. F&R SWITCH CLOSSES)

REV	SWITCH	RESULT
1	START	1R AND 2R CONTACTS CLOSE
2	1A (CLOSES)	1A CONTACTS CLOSE, R1 BYPASSED
3	2A (CLOSES)	2A CONTACTS CLOSE, R2 BYPASSED
4	3A (CLOSES)	3A CONTACTS CLOSE, R3 BYPASSED

FOOT PEDAL / SPEED CONTROL



Key ON, Motor Running, Clutch Off, PTO Switch in RUN.



General Electric Company
Outdoor Power Equipment Operation
Corporations Park, Bldg. 702
Schenectady, N.Y. 12345

GENERAL  ELECTRIC