SECTION 55 - ELECTRICAL

Chapter 2 - Schematics

CONTENTS

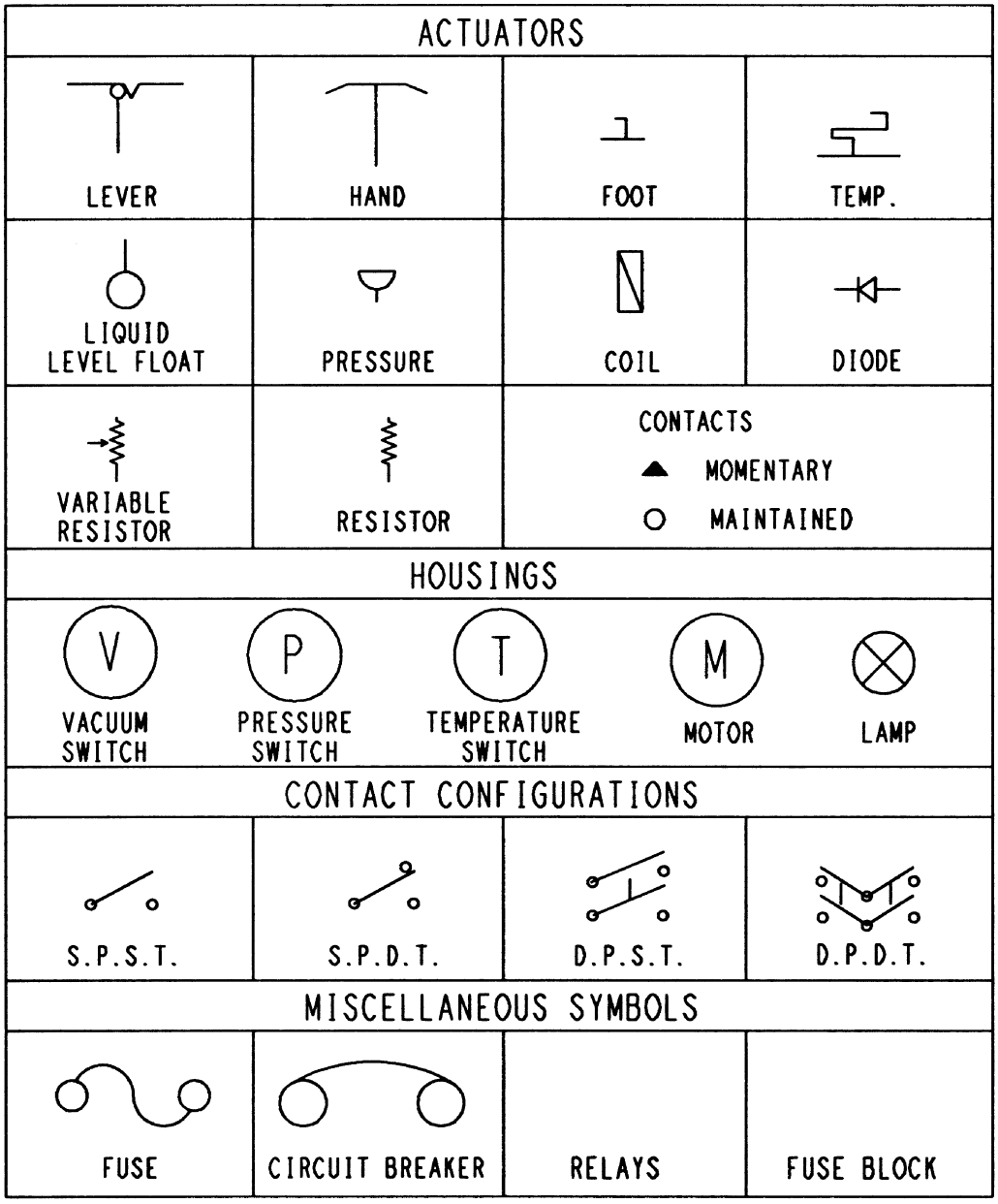
Section	Description	Page
	Complete Wiring Schematic	2
	Safety Start Circuit (Operator Present)	18
	Safety Start Circuit (Operator Not Present)	22
	Safe Operation Circuit (Operator Present)	26
	Safe Operation Circuit (Operator Not Present)	30
	Glow Plug Circuit	34
	Road Lights Circuit	38
	Work Lights Circuit	42
	Hazard Flasher Circuit	46
	Right Turn Signal Circuit	50
	Left Turn Signal Circuit	54
	PTO Indicator Light Circuit	58
	Engine Coolant Temperature Circuit	62
	Engine Low Oil Pressure Indicator Light Circuit	64
	Fuel Level Circuit	66
	Parking Brake Indicator Light Circuit	68
	Tachometer Circuit	70
	Auxiliary Power Socket Circuit	72
	Cruise Control Circuit (HST Transmission)	74
	HST Range “LOW” Shift Circuit	78
	HST Range “HIGH” Shift Circuit	82
	Charging Circuit	86

ELECTRICAL SCHEMATIC DIAGRAM 86404483
NEW HOLLAND CLASS 3 NAR COMPACT TRACTOR

CIRCUIT DESCRIPTION	PAGE
AUXILLARY POWER SOCKET	14
AUXILLARY WORK LIGHTS	13
CHARGING SYSTEM	6
CRUISE CONTROL	14
GLOW PLUG SYSTEM	7
GROUNDS	16
HAZARD MODULE/SWITCH	12
INSTRUMENTS	9,10
MAIN LIGHTS	11
RANGE SHIFT	15
SAFETY START	8
STARTING SYSTEM	7
WARNING/POSITION LIGHTS	13

NEW HOLLAND

PAGE 1


ACTUATORS
LEVER
HAND
FOOT
TEMP.
LIQUID LEVEL FLOAT
PRESSURE
COIL
DIODE
VARIABLE RESISTOR
RESISTOR
CONTACTS
MOMENTARY
MAINTAINED
HOUSINGS
V
VACUUM SWITCH
P
PRESSURE SWITCH
T
TEMPERATURE SWITCH
M
MOTOR
LAMP
CONTACT CONFIGURATIONS
S.P.S.T.
S.P.D.T.
D.P.S.T.
D.P.D.T.
MISCELLANEOUS SYMBOLS
FUSE
CIRCUIT BREAKER
RELAYS
FUSE BLOCK

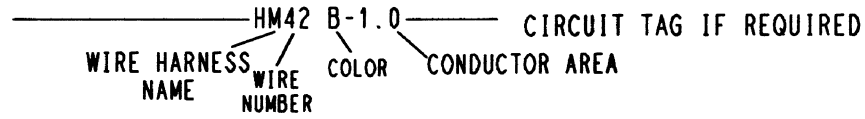
COLOR ABBREVIATIONS

ABBREVIATION	COLOR	ABBREVIATION	COLOR
R	RED	O	ORANGE
T	TAN	P	PINK
W	WHITE	V	VIOLET (PURPLE)
Y	YELLOW	DB	DARK BLUE
B	BLACK	LB	LIGHT BLUE
BR	BROWN	DG	DARK GREEN
G	GREY	LG	LIGHT GREEN

NOTES:
1. FOR ELECTRICAL SYSTEM INSTRUCTIONS SEE ES-A7384

2. DIAGRAM SHOWN WITH VEHICLE PARKED, POWER OFF, ALL CONTROLS IN NEUTRAL AND PARK BRAKE SET.

CIRCUIT DIAGRAM LEGENDS



——— COMMON TO GEAR AND HST

- - - - - - - - - - - HST ONLY

WIRE HARNESS NAME

ABBREVIATION	HARNESS	ABBREVIATION	HARNESS
HM	MAIN	HH	HOOD
HC	CHASSIS	BC	BATTERY CABLE

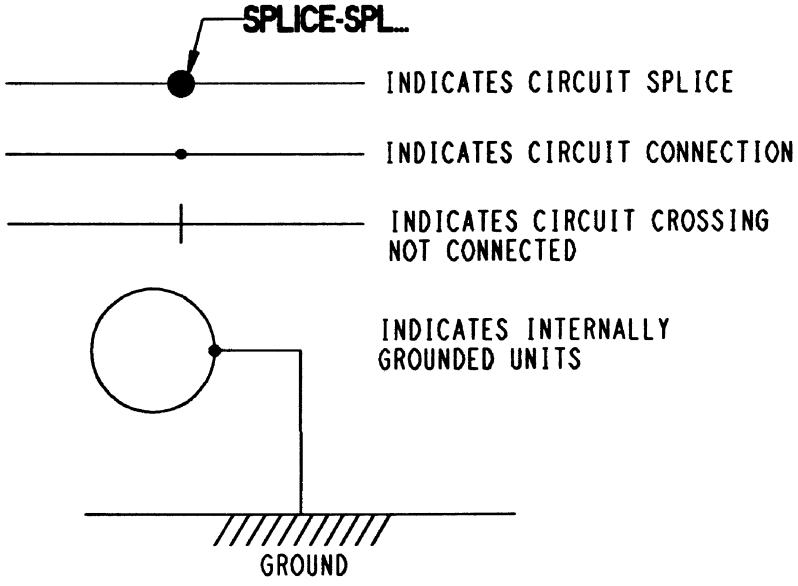


TABLE OF RELAYS

RELAY NUMBER	PAGE LOCATION	REF. DES.	FUNCTION
1	8	R1	FUEL SHUTOFF
2	7	R2	PTO SAFETY
3	10	R3	GLOW PLUG LAMP
4	12	R4	FLASHER CUTOFF
5	13	R5	AUXILLARY WORK LIGHTS
6	15	R6	RANGE HIGH SHIFT
7	15	R7	RANGE LOW SHIFT
8	14	R8	CRUISE LATCH RELAY
9	11	R8	FRONT LAMPS
10	7	R10	SAFETY START
11	7	R11	GLOW PLUG POWER
12	7	R12	GLOW PLUG TIMER RELAY

TABLE OF SPLICES

SPLICE NAME	PAGE LOCATION	HARNESS USED ON	CIRCUIT
SPL-1	6	MAIN	UNSW B+
SPL-2	7	MAIN	FUSED UNSW B+
SPL-3	8	CHASSIS	SAFETY START
SPL-4	16	MAIN	GROUND
SPL-5	16	CHASSIS	GROUND
SPL-6	12	MAIN	HAZARD/POSITION LIGHTS
SPL-7	9	MAIN	ICU SW B+
SPL-8	12	MAIN	FLASHER CUTOFF
SPL-9	16	MAIN	GROUND
SPL-10	12	MAIN	LH HAZARD LIGHT
SPL-11	13	MAIN	RH HAZARD LIGHT
SPL-12	12	MAIN	TURN SIGNALS
SPL-13	13	CHASSIS	POSITION LIGHTS
SPL-14	16	CHASSIS	GROUND
SPL-15	11	HOOD	LOW BEAM HEADLIGHTS
SPL-16	11	HOOD	HIGH BEAM HEADLIGHTS
SPL-17	11	HOOD	GROUND
SPL-18	11	HOOD	FRONT WORKLIGHTS
SPL-19	13	CHASSIS	AUX WORKLIGHTS

TABLE OF DIODES

DIODE NAME	PAGE LOCATION	HARNESS USED ON	CIRCUIT
DM1	15	MAIN	RANGE SHIFT
D2	14	MAIN	CRUISE CONTROL
D3	8	CHASSIS	SAFETY SYSTEM

TABLE OF CIRCUIT BREAKERS

CB ID	PAGE LOCATION	CIRCUIT IDENTIFICATION
1	8	FUEL SOL/SAFETY SYSTEM

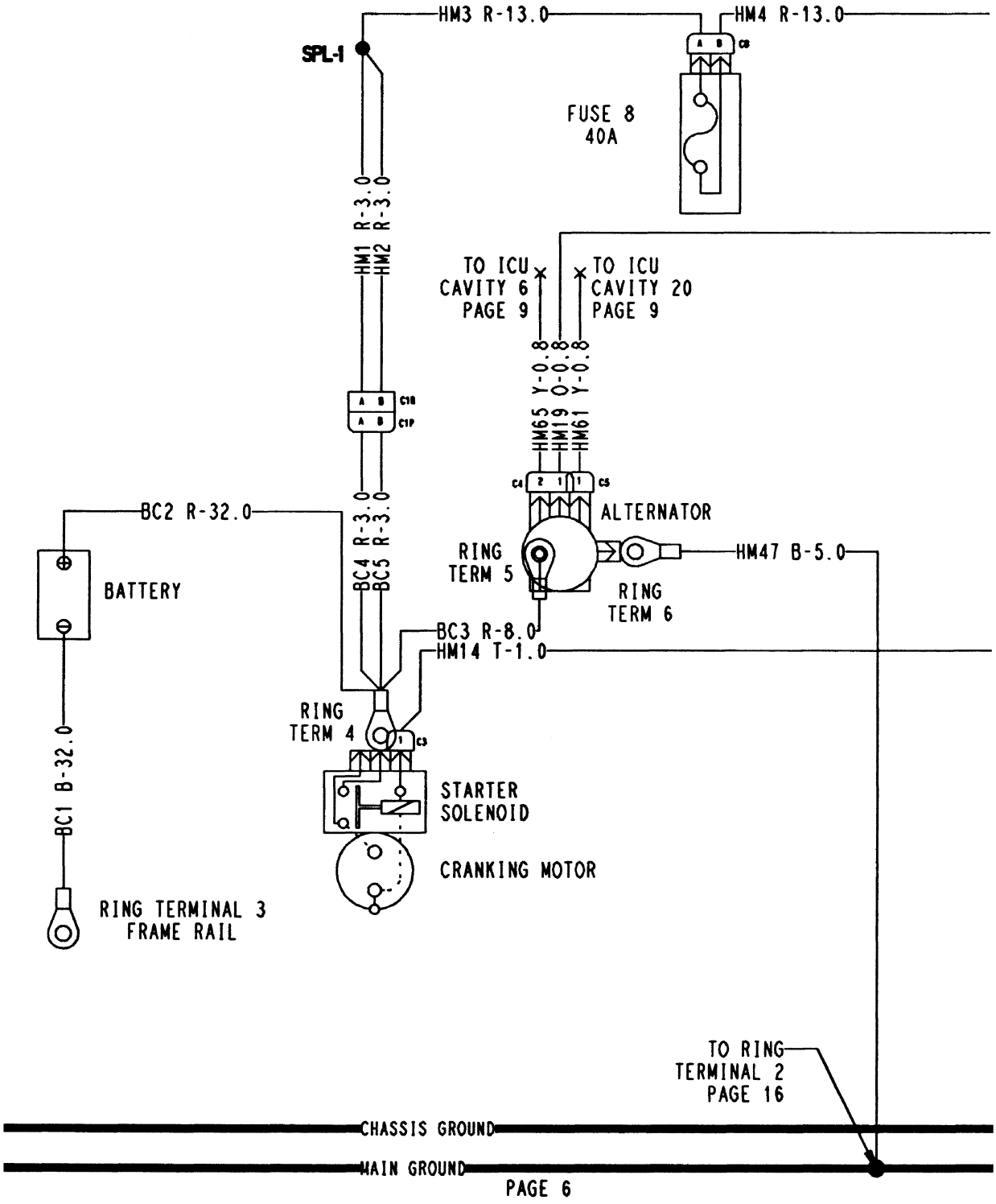
TABLE OF FUSES

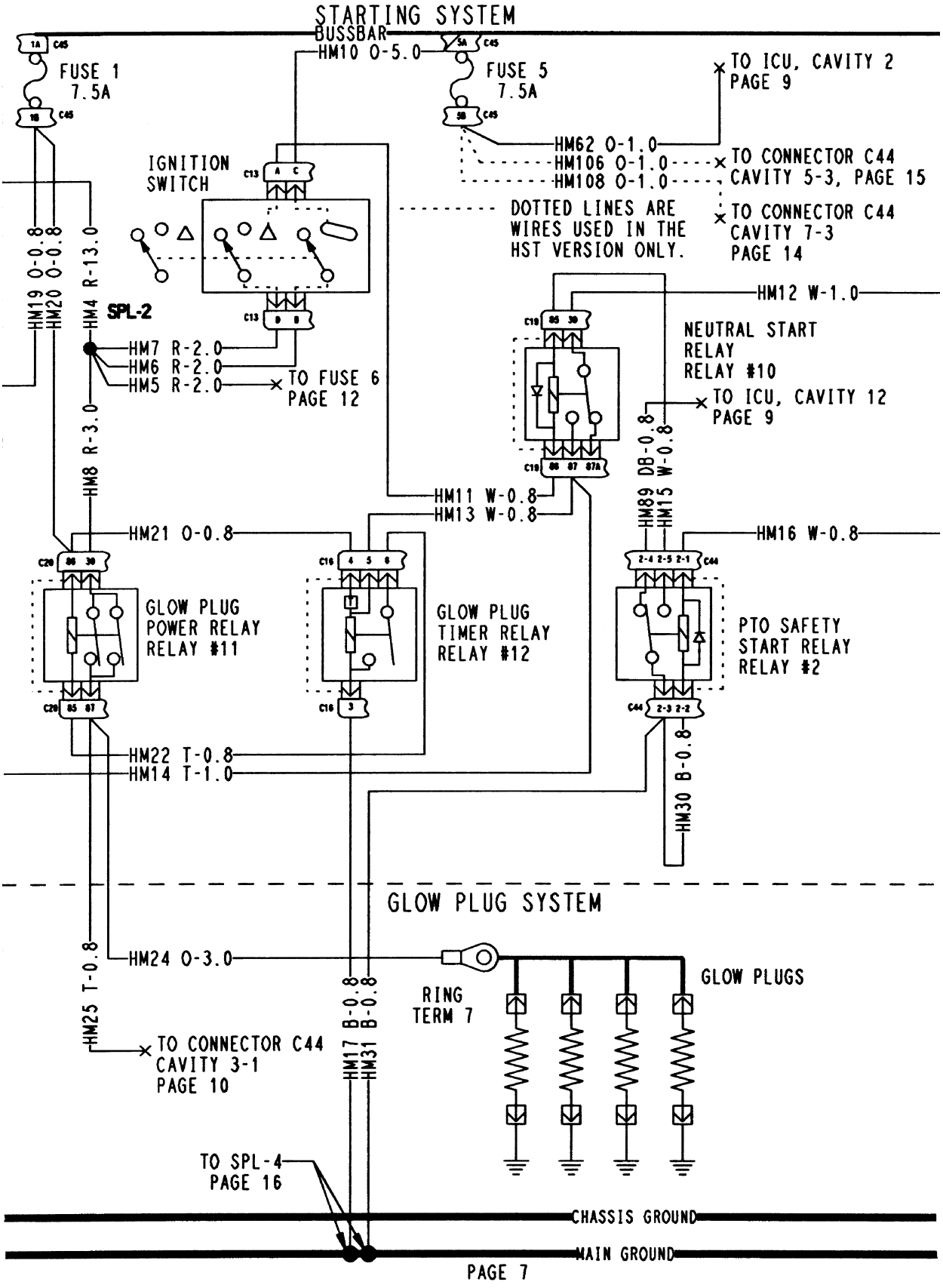
FUSE ID	PAGE LOCATION	CIRCUIT IDENTIFICATION
1	7	GLOW PLUG POWER
3	11	FLASHER CUTOFF/AUX WORKLIGHT
4	11	ICU/MAIN LIGHTS
5	7	CRUISE CONTROL/RANGE SHIFT
6	12	HAZARD/WARNING LIGHTS
7	12	WORK LAMPS/AUX POWER
8	6	MAIN FUSE

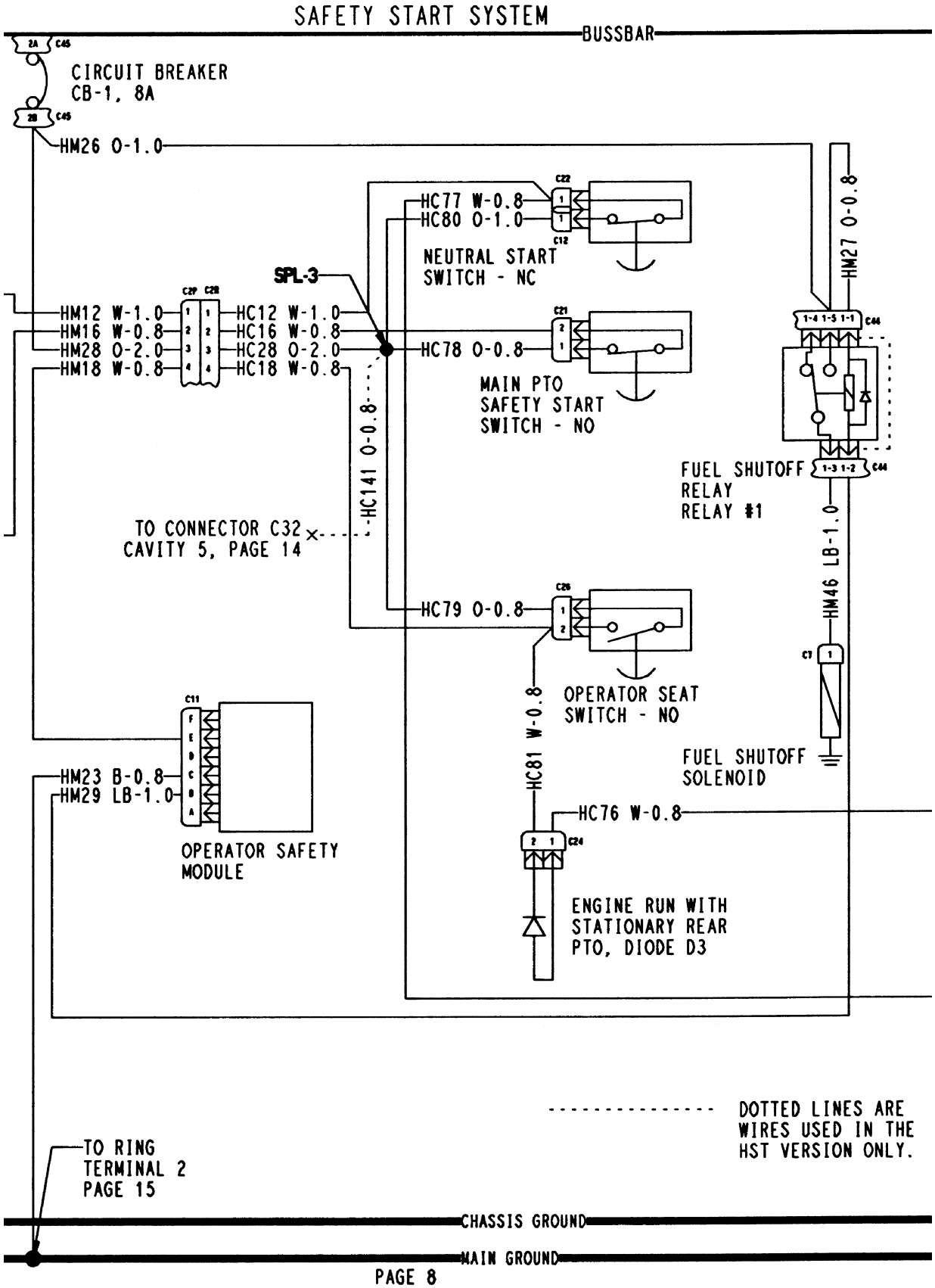
TABLE OF CONNECTOR LOCATIONS

REF. DES.	PAGE LOCATION	HARNESS USED ON	REF. DES.	PAGE LOCATION	HARNESS USED ON
C1P	6	BATTERY	C24	8	CHASSIS
C1R	6	MAIN	C25	11	CHASSIS
C2P	8-10,13	MAIN	C26	8	CHASSIS
C2R	8-10,13	CHASSIS	C27	15	CHASSIS
C3	6	MAIN	C28	14	CHASSIS
C4	6	MAIN	C29	9	CHASSIS
C5	6	MAIN	C30	14	CHASSIS
C6R	11	HOOD	C31	15	CHASSIS
C6P	11	MAIN	C32	14	CHASSIS
C7	8	MAIN	C33	15	CHASSIS
C8	6	MAIN	C34	12	MAIN
C9	11	MAIN	C35	13	CHASSIS
C10	12	MAIN	C36	13	CHASSIS
C11	8	MAIN	C37	10	CHASSIS
C12	8	CHASSIS	C38	10	MAIN
C13	7	MAIN	C39	15	CHASSIS
C14	9	MAIN	C40	11	HOOD
C15	12	MAIN	C41	11	HOOD
C16	7	MAIN	C42	11	HOOD
C17P	11,14,15	MAIN	C43	11	HOOD
C17R	11,14,15	CHASSIS	C44	7-9,12-15	MAIN
C18	11	MAIN	C45	7,8,11,12	MAIN
C19	7	MAIN	C46	11	MAIN
C20	7	MAIN	C47	14	CHASSIS
C21	8	CHASSIS	C48	14	CHASSIS
C22	8	CHASSIS	C49	14	MAIN
C23	9	CHASSIS	C50	11	CHASSIS

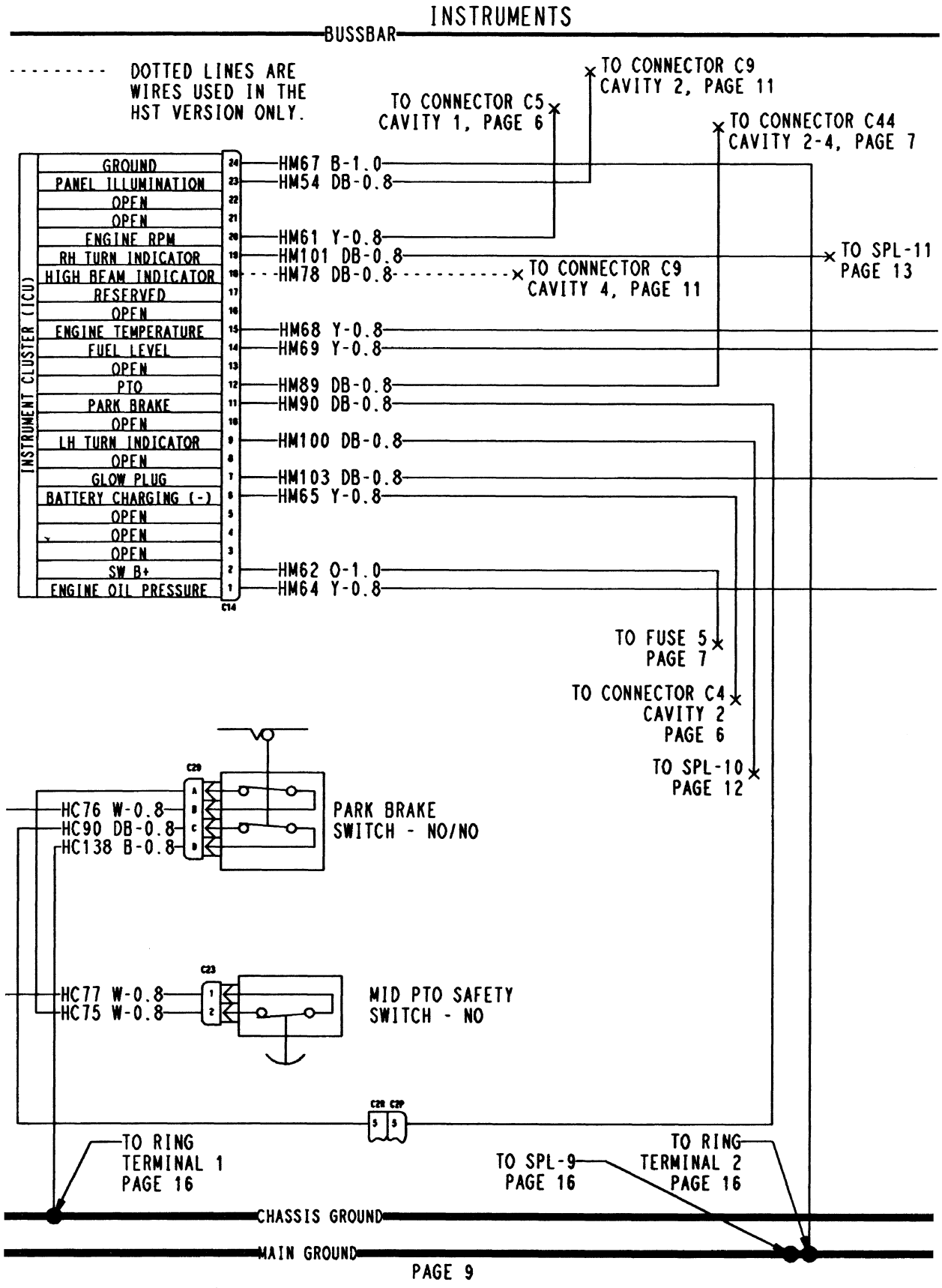
CHARGING SYSTEM

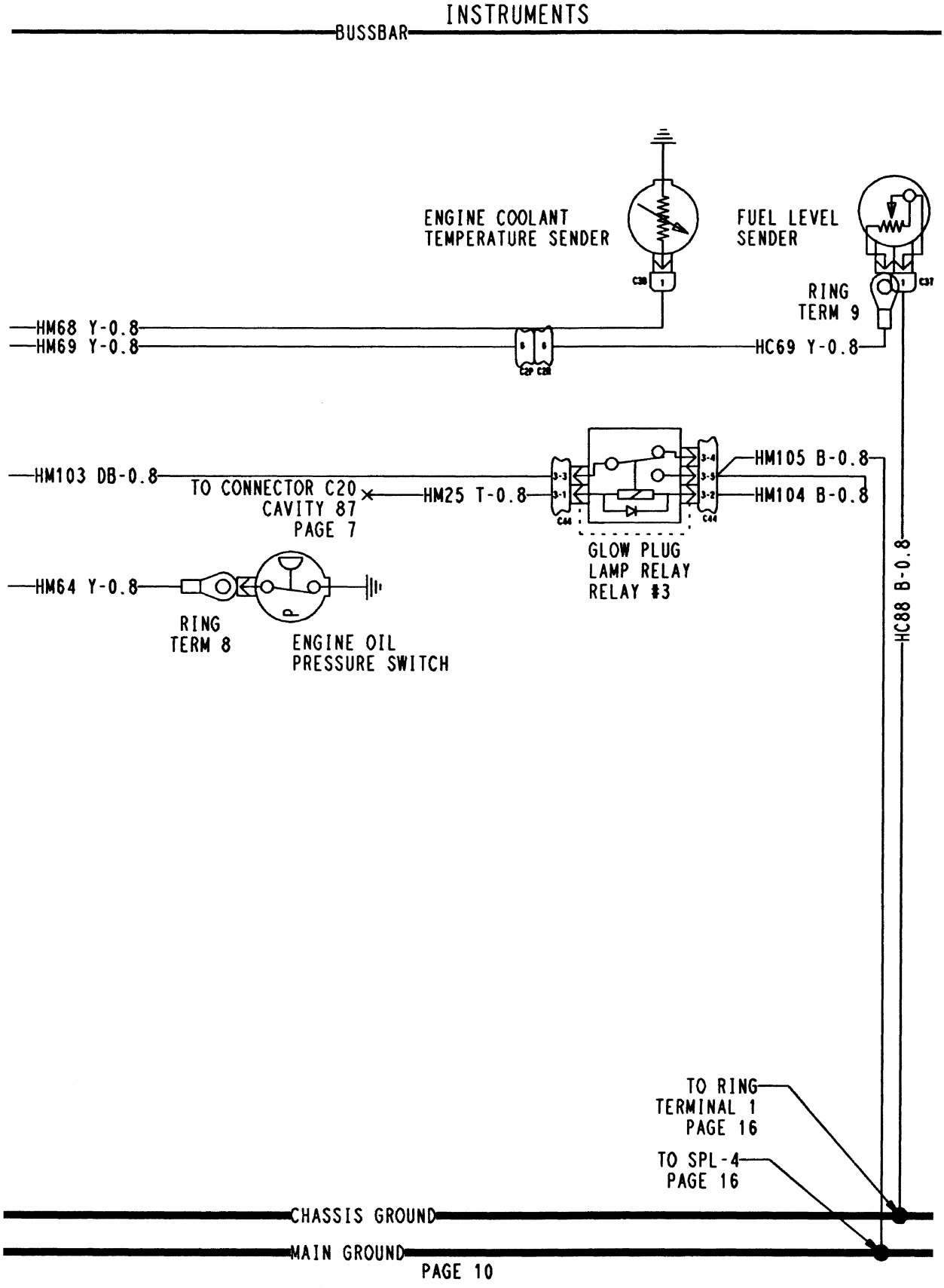


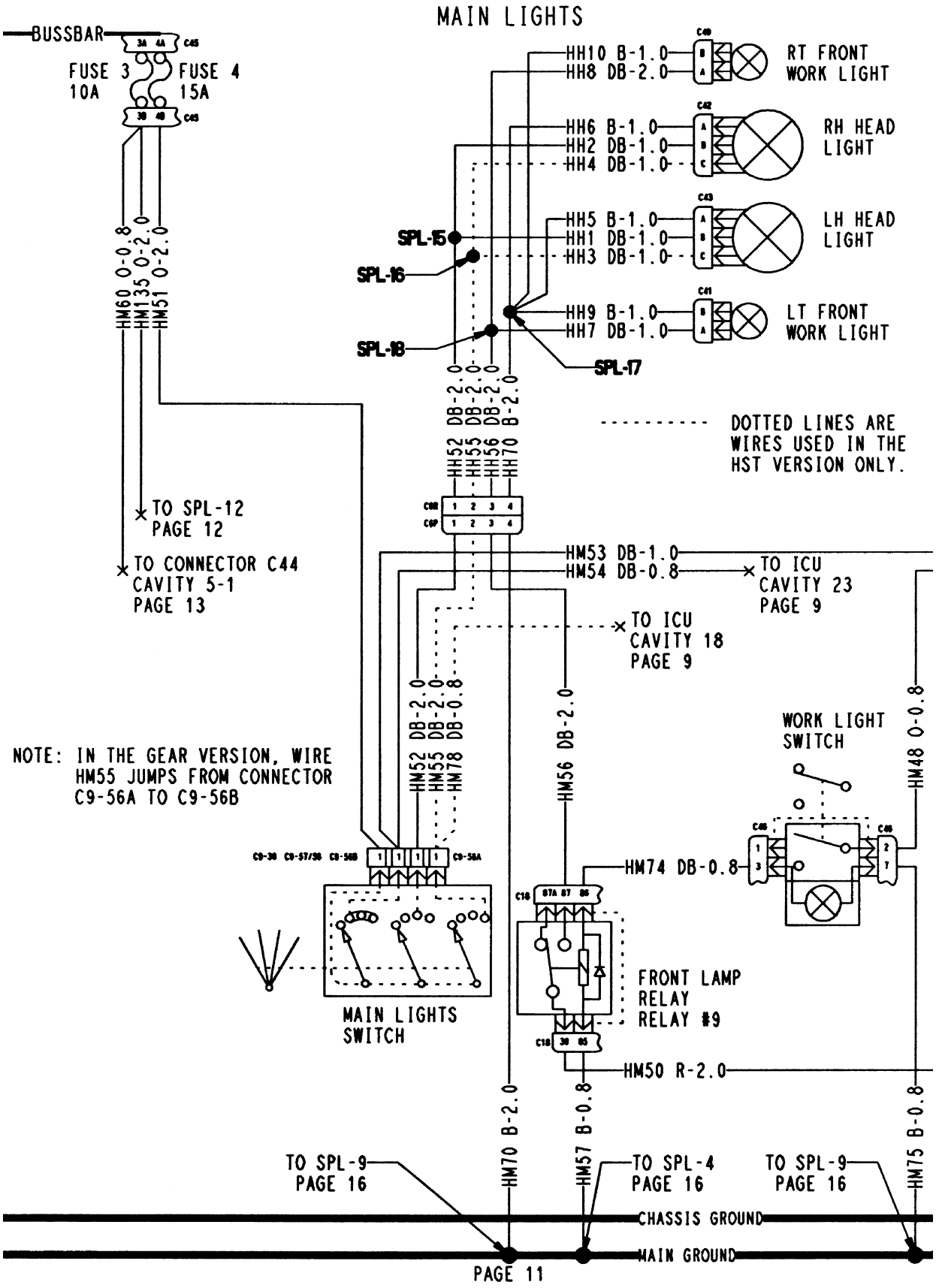

STARTING SYSTEM
BUSSBAR
HM10 O-5.0
FUSE 1
7.5A
FUSE 5
7.5A
TO ICU, CAVITY 2
PAGE 9
HM62 O-1.0
HM106 O-1.0
HM108 O-1.0
TO CONNECTOR C44
CAVITY 5-3, PAGE 15
TO CONNECTOR C44
CAVITY 7-3
PAGE 14
DOTTED LINES ARE
WIRES USED IN THE
HST VERSION ONLY.
IGNITION
SWITCH
HM19 O-0.8
HM20 O-0.8
HM4 R-13.0
SPL-2
HM7 R-2.0
HM6 R-2.0
HM5 R-2.0
TO FUSE 6
PAGE 12
HM12 W-1.0
NEUTRAL START
RELAY
RELAY #10
TO ICU, CAVITY 12
PAGE 9
HM89 DB-0.8
HM15 W-0.8
HM8 R-3.0
HM11 W-0.8
HM13 W-0.8
HM21 O-0.8
HM16 W-0.8
GLOW PLUG
POWER RELAY
RELAY #11
GLOW PLUG
TIMER RELAY
RELAY #12
PTO SAFETY
START RELAY
RELAY #2
HM22 T-0.8
HM14 T-1.0
HM30 B-0.8
GLOW PLUG SYSTEM
HM24 O-3.0
GLOW PLUGS
RING
TERM 7
HM25 T-0.8
TO CONNECTOR C44
CAVITY 3-1
PAGE 10
HM17 B-0.8
HM31 B-0.8
TO SPL-4
PAGE 16
CHASSIS GROUND
MAIN GROUND
PAGE 7

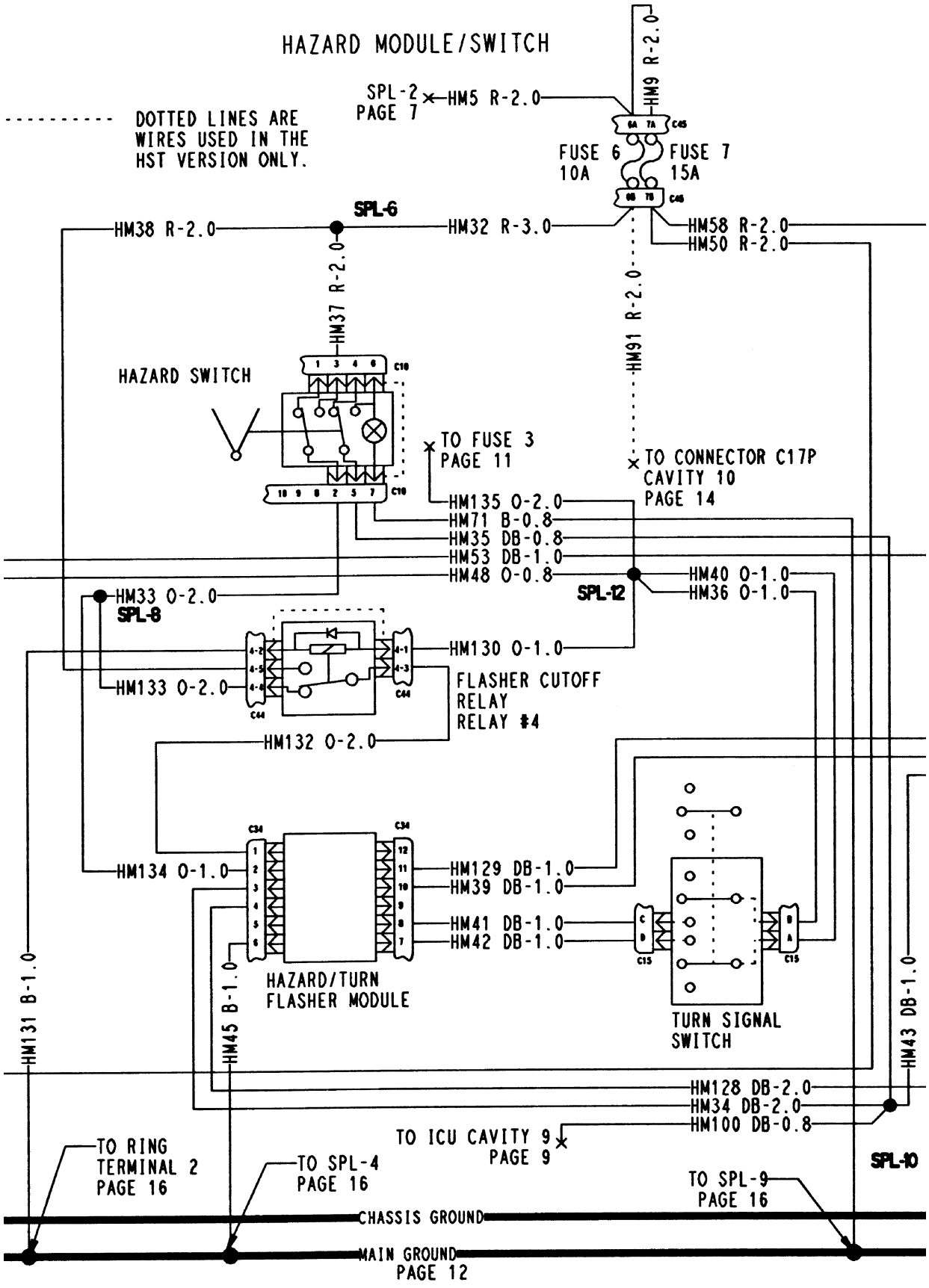

SAFETY START SYSTEM
BUSSBAR
CIRCUIT BREAKER
CB-1, 8A
HM26 O-1.0
HC77 W-0.8
HC80 O-1.0
NEUTRAL START
SWITCH - NC
SPL-3
HM12 W-1.0
HM16 W-0.8
HM28 O-2.0
HM18 W-0.8
HC12 W-1.0
HC16 W-0.8
HC28 O-2.0
HC18 W-0.8
HC78 O-0.8
MAIN PTO
SAFETY START
SWITCH - NO
HM27 O-0.8
FUEL SHUTOFF
RELAY
RELAY #1
HC141 O-0.8
TO CONNECTOR C32
CAVITY 5, PAGE 14
HC79 O-0.8
OPERATOR SEAT
SWITCH - NO
HM46 LB-1.0
HC81 W-0.8
FUEL SHUTOFF
SOLENOID
HM23 B-0.8
HM29 LB-1.0
OPERATOR SAFETY
MODULE
HC76 W-0.8
ENGINE RUN WITH
STATIONARY REAR
PTO, DIODE D3
DOTTED LINES ARE
WIRES USED IN THE
HST VERSION ONLY.
TO RING
TERMINAL 2
PAGE 15
CHASSIS GROUND
MAIN GROUND

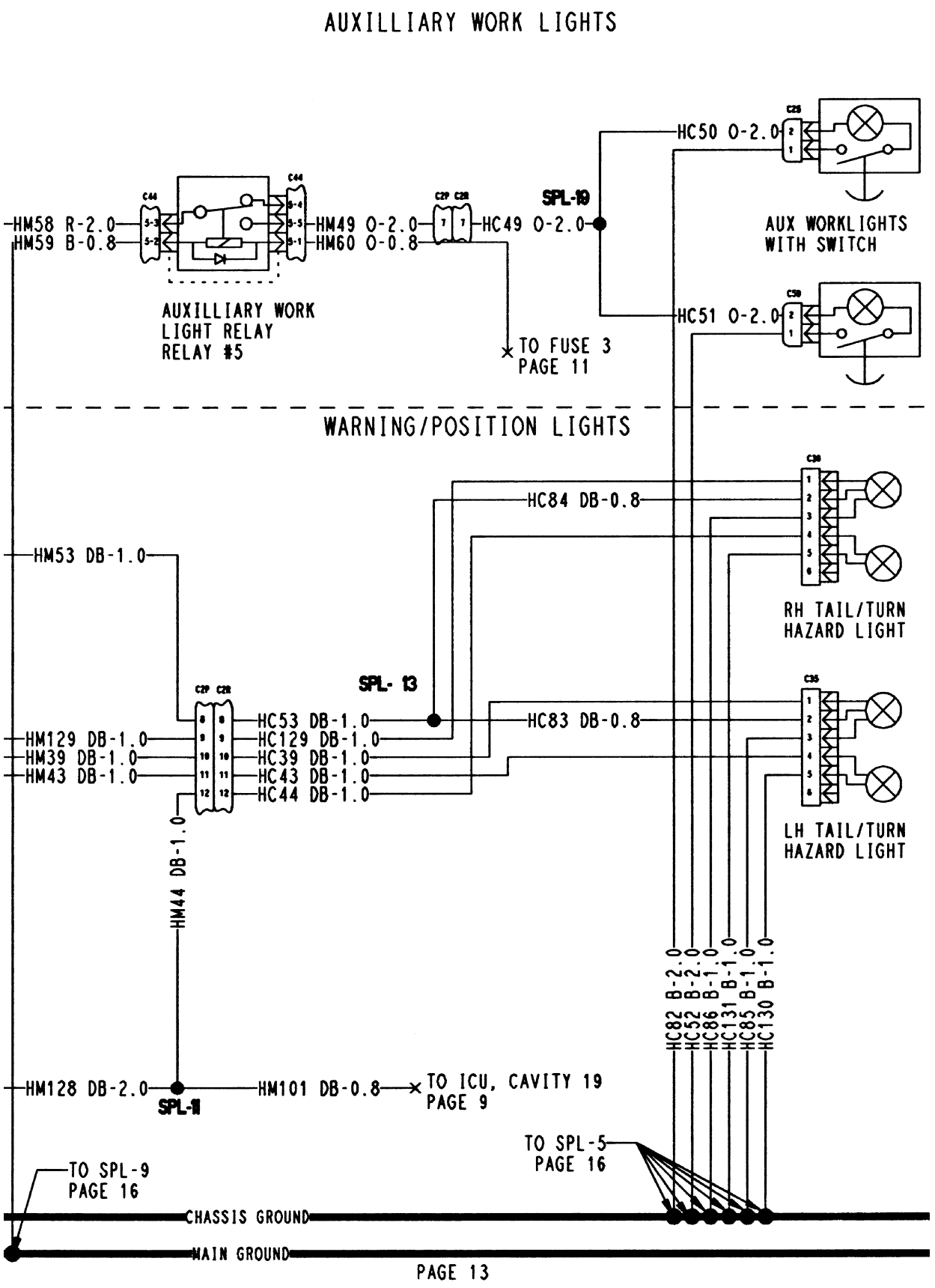
PAGE 8

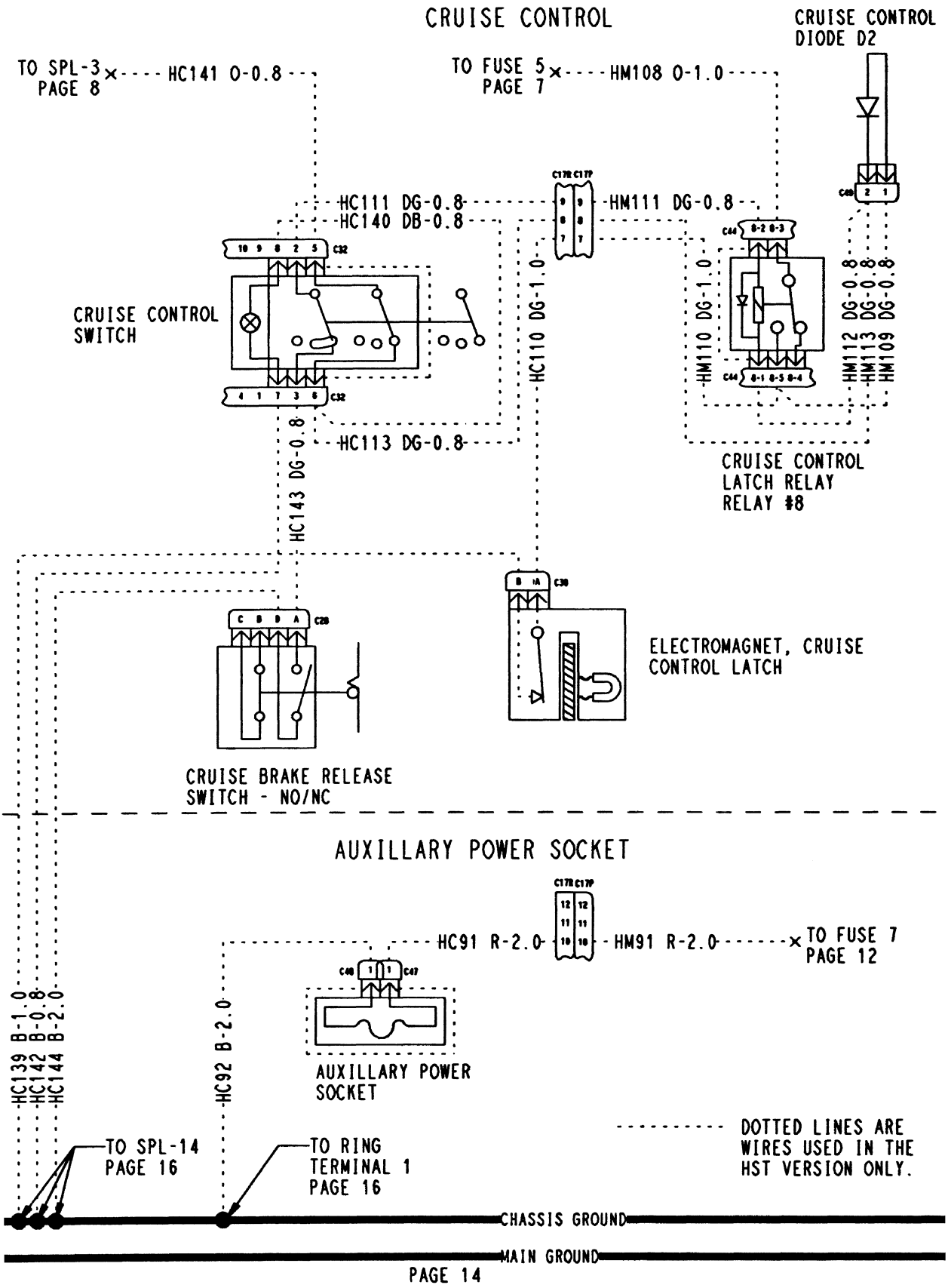

INSTRUMENTS
BUSSBAR
DOTTED LINES ARE WIRES USED IN THE HST VERSION ONLY.
TO CONNECTOR C9 CAVITY 2, PAGE 11
TO CONNECTOR C5 CAVITY 1, PAGE 6
TO CONNECTOR C44 CAVITY 2-4, PAGE 7
INSTRUMENT CLUSTER (ICU)
GROUND
PANEL ILLUMINATION
OPEN
OPEN
ENGINE RPM
RH TURN INDICATOR
HIGH BEAM INDICATOR
RESERVED
OPEN
ENGINE TEMPERATURE
FUEL LEVEL
OPEN
PTO
PARK BRAKE
OPEN
LH TURN INDICATOR
OPEN
GLOW PLUG
BATTERY CHARGING (-)
OPEN
OPEN
OPEN
SW B+
ENGINE OIL PRESSURE
C14
HM67 B-1.0
HM54 DB-0.8
HM61 Y-0.8
HM101 DB-0.8
HM78 DB-0.8
TO SPL-11 PAGE 13
TO CONNECTOR C9 CAVITY 4, PAGE 11
HM68 Y-0.8
HM69 Y-0.8
HM89 DB-0.8
HM90 DB-0.8
HM100 DB-0.8
HM103 DB-0.8
HM65 Y-0.8
HM62 O-1.0
HM64 Y-0.8
TO FUSE 5 PAGE 7
TO CONNECTOR C4 CAVITY 2 PAGE 6
TO SPL-10 PAGE 12
C20
HC76 W-0.8
HC90 DB-0.8
HC138 B-0.8
PARK BRAKE SWITCH - NO/NO
C23
HC77 W-0.8
HC75 W-0.8
MID PTO SAFETY SWITCH - NO
C20 C29
TO RING TERMINAL 1 PAGE 16
TO SPL-9 PAGE 16
TO RING TERMINAL 2 PAGE 16
CHASSIS GROUND
MAIN GROUND
PAGE 9


INSTRUMENTS
BUSSBAR
ENGINE COOLANT
TEMPERATURE SENDER
FUEL LEVEL
SENDER
RING
TERM 9
HM68 Y-0.8
HM69 Y-0.8
HC69 Y-0.8
HM103 DB-0.8
TO CONNECTOR C20
CAVITY 87
PAGE 7
HM25 T-0.8
HM105 B-0.8
HM104 B-0.8
GLOW PLUG
LAMP RELAY
RELAY #3
HC88 B-0.8
HM64 Y-0.8
RING
TERM 8
ENGINE OIL
PRESSURE SWITCH
TO RING
TERMINAL 1
PAGE 16
TO SPL-4
PAGE 16
CHASSIS GROUND
MAIN GROUND
PAGE 10

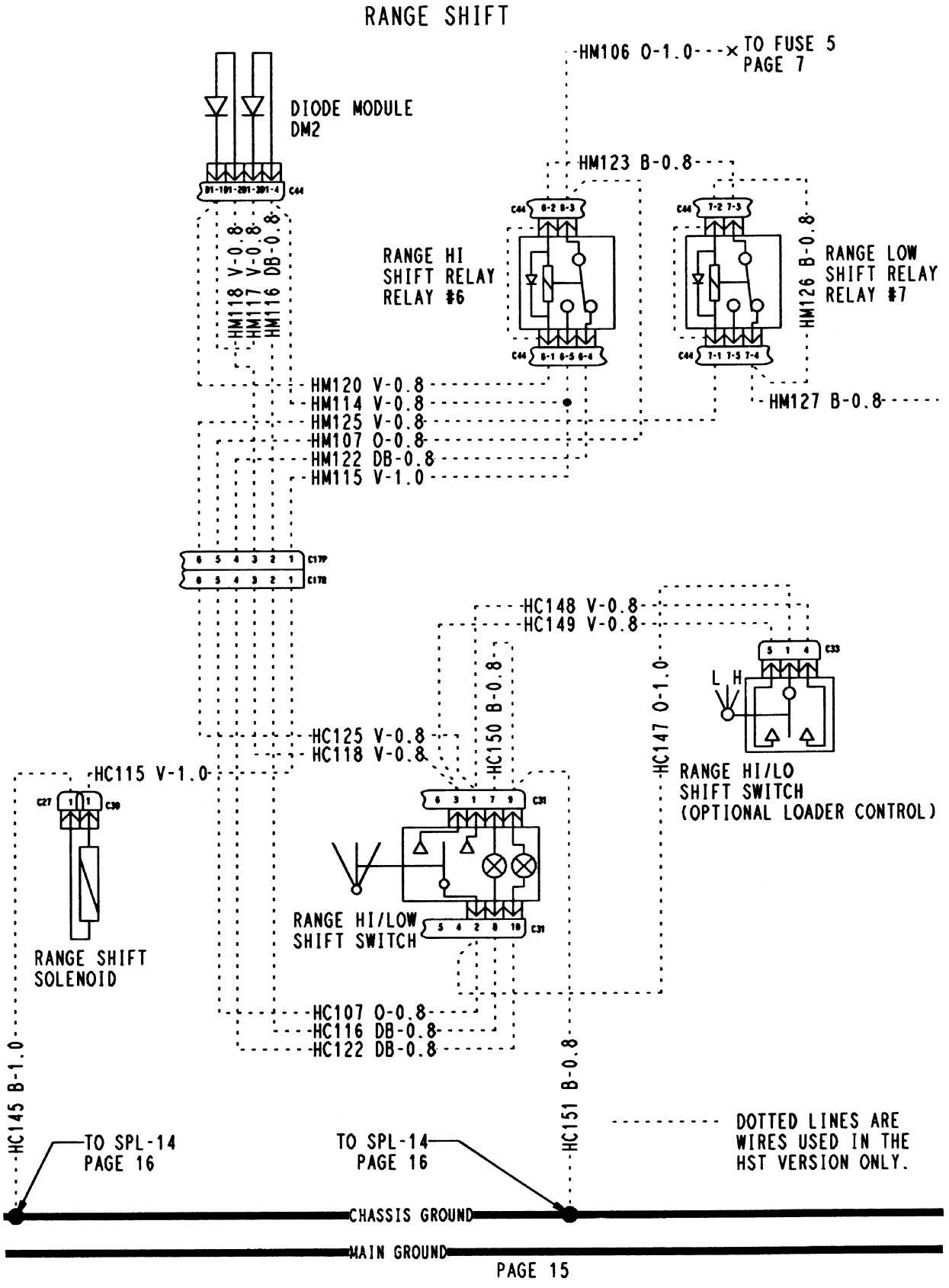

MAIN LIGHTS
BUSSBAR
FUSE 3
10A
FUSE 4
15A
HM60 O-0.8
HM135 O-2.0
HM51 O-2.0
HH10 B-1.0
HH8 DB-2.0
RT FRONT
WORK LIGHT
HH6 B-1.0
HH2 DB-1.0
HH4 DB-1.0
RH HEAD
LIGHT
HH5 B-1.0
HH1 DB-1.0
HH3 DB-1.0
LH HEAD
LIGHT
HH9 B-1.0
HH7 DB-1.0
LT FRONT
WORK LIGHT
SPL-15
SPL-16
SPL-18
SPL-17
HH52 DB-2.0
HH55 DB-2.0
HH56 DB-2.0
HH70 B-2.0
DOTTED LINES ARE
WIRES USED IN THE
HST VERSION ONLY.
TO SPL-12
PAGE 12
TO CONNECTOR C44
CAVITY 5-1
PAGE 13
HM53 DB-1.0
HM54 DB-0.8
TO ICU
CAVITY 23
PAGE 9
TO ICU
CAVITY 18
PAGE 9
NOTE: IN THE GEAR VERSION, WIRE
HM55 JUMPS FROM CONNECTOR
C9-56A TO C9-56B
HM52 DB-2.0
HM55 DB-2.0
HM78 DB-0.8
HM56 DB-2.0
WORK LIGHT
SWITCH
HM48 O-0.8
HM74 DB-0.8
MAIN LIGHTS
SWITCH
FRONT LAMP
RELAY
RELAY #9
HM50 R-2.0
HM70 B-2.0
HM57 B-0.8
HM75 B-0.8
TO SPL-9
PAGE 16
TO SPL-4
PAGE 16
TO SPL-9
PAGE 16
CHASSIS GROUND
MAIN GROUND
PAGE 11


HAZARD MODULE/SWITCH
DOTTED LINES ARE WIRES USED IN THE HST VERSION ONLY.
SPL-2 PAGE 7
HM5 R-2.0
HM9 R-2.0
FUSE 6 10A
FUSE 7 15A
SPL-6
HM38 R-2.0
HM32 R-3.0
HM58 R-2.0
HM50 R-2.0
HM37 R-2.0
HM91 R-2.0
HAZARD SWITCH
TO FUSE 3 PAGE 11
TO CONNECTOR C17P CAVITY 10 PAGE 14
HM135 O-2.0
HM71 B-0.8
HM35 DB-0.8
HM53 DB-1.0
HM48 O-0.8
SPL-12
HM40 O-1.0
HM36 O-1.0
HM33 O-2.0
SPL-8
HM130 O-1.0
HM133 O-2.0
FLASHER CUTOFF RELAY
RELAY #4
HM132 O-2.0
HM134 O-1.0
HM129 DB-1.0
HM39 DB-1.0
HM41 DB-1.0
HM42 DB-1.0
HAZARD/TURN FLASHER MODULE
TURN SIGNAL SWITCH
HM131 B-1.0
HM45 B-1.0
HM43 DB-1.0
HM128 DB-2.0
HM34 DB-2.0
HM100 DB-0.8
TO ICU CAVITY 9 PAGE 9
SPL-10
TO RING TERMINAL 2 PAGE 16
TO SPL-4 PAGE 16
TO SPL-9 PAGE 16
CHASSIS GROUND
MAIN GROUND PAGE 12

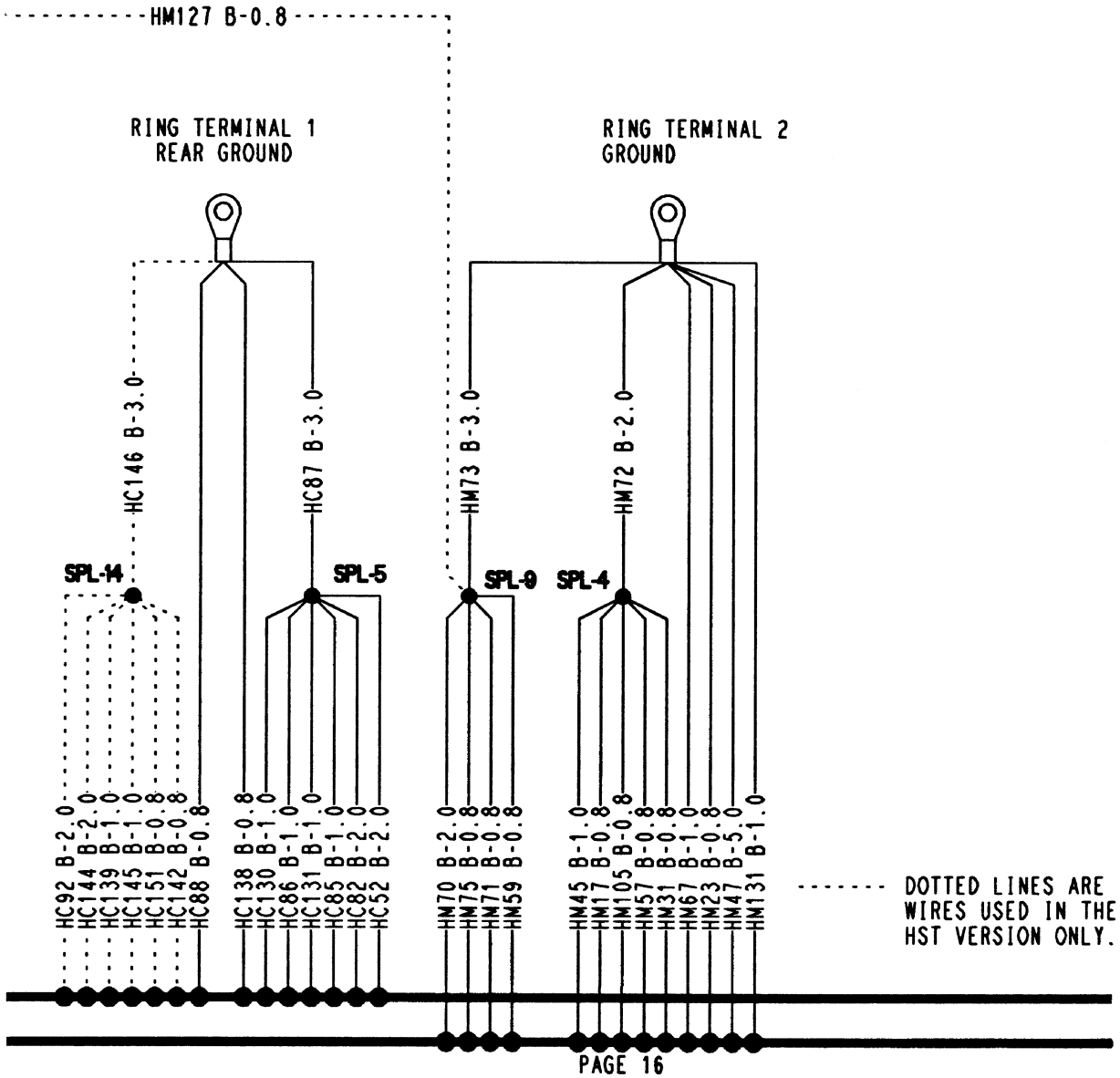

AUXILLIARY WORK LIGHTS
HM58 R-2.0
HM59 B-0.8
HM49 O-2.0
HM60 O-0.8
HC49 O-2.0
SPL-10
HC50 O-2.0
AUX WORKLIGHTS
WITH SWITCH
AUXILLIARY WORK
LIGHT RELAY
RELAY #5
TO FUSE 3
PAGE 11
HC51 O-2.0
WARNING/POSITION LIGHTS
HC84 DB-0.8
HM53 DB-1.0
RH TAIL/TURN
HAZARD LIGHT
SPL- 13
HC53 DB-1.0
HC129 DB-1.0
HC39 DB-1.0
HC43 DB-1.0
HC44 DB-1.0
HM129 DB-1.0
HM39 DB-1.0
HM43 DB-1.0
HC83 DB-0.8
LH TAIL/TURN
HAZARD LIGHT
HM44 DB-1.0
HC82 B-2.0
HC52 B-2.0
HC86 B-1.0
HC131 B-1.0
HC85 B-1.0
HC130 B-1.0
HM128 DB-2.0
SPL-11
HM101 DB-0.8
TO ICU, CAVITY 19
PAGE 9
TO SPL-5
PAGE 16
TO SPL-9
PAGE 16
CHASSIS GROUND
MAIN GROUND
PAGE 13


CRUISE CONTROL
CRUISE CONTROL DIODE D2
TO SPL-3 PAGE 8
HC141 O-0.8
TO FUSE 5 PAGE 7
HM108 O-1.0
HC111 DG-0.8
HC140 DB-0.8
HM111 DG-0.8
HC110 DG-1.0
HM110 DG-1.0
HM112 DG-0.8
HM113 DG-0.8
HM109 DG-0.8
CRUISE CONTROL SWITCH
HC113 DG-0.8
HC143 DG-0.8
CRUISE CONTROL LATCH RELAY RELAY #8
ELECTROMAGNET, CRUISE CONTROL LATCH
CRUISE BRAKE RELEASE SWITCH - NO/NC
AUXILLARY POWER SOCKET
HC91 R-2.0
HM91 R-2.0
TO FUSE 7 PAGE 12
HC139 B-1.0
HC142 B-0.8
HC144 B-2.0
HC92 B-2.0
AUXILLARY POWER SOCKET
TO SPL-14 PAGE 16
TO RING TERMINAL 1 PAGE 16
DOTTED LINES ARE WIRES USED IN THE HST VERSION ONLY.
CHASSIS GROUND
MAIN GROUND

PAGE 14

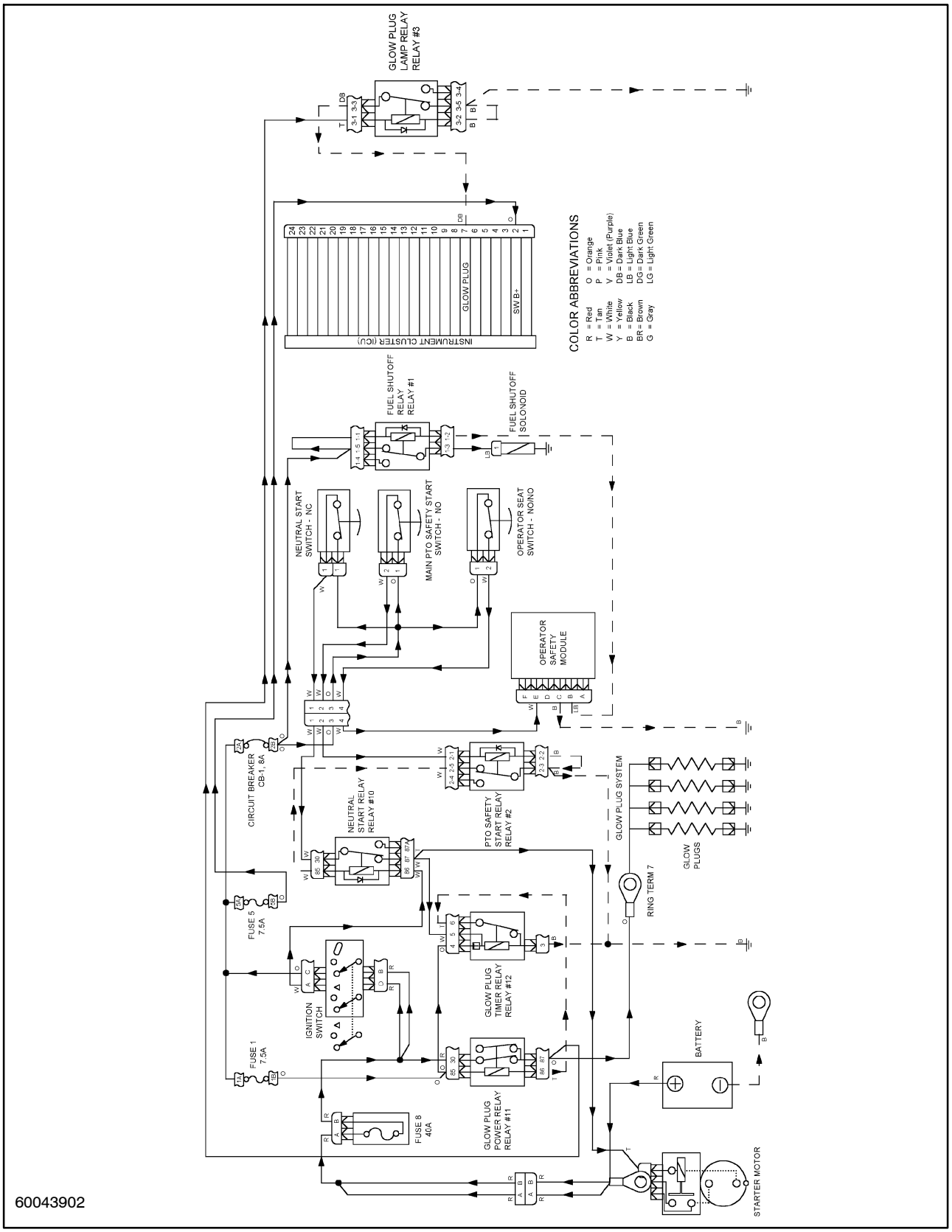

RANGE SHIFT
HM106 O-1.0
TO FUSE 5
PAGE 7
DIODE MODULE
DM2
HM123 B-0.8
RANGE HI
SHIFT RELAY
RELAY #6
RANGE LOW
SHIFT RELAY
RELAY #7
HM118 V-0.8
HM117 V-0.8
HM116 DB-0.8
HM126 B-0.8
HM120 V-0.8
HM114 V-0.8
HM125 V-0.8
HM107 O-0.8
HM122 DB-0.8
HM115 V-1.0
HM127 B-0.8
HC148 V-0.8
HC149 V-0.8
HC150 B-0.8
HC147 O-1.0
L H
RANGE HI/LO
SHIFT SWITCH
(OPTIONAL LOADER CONTROL)
HC125 V-0.8
HC118 V-0.8
HC115 V-1.0
RANGE HI/LOW
SHIFT SWITCH
RANGE SHIFT
SOLENOID
HC107 O-0.8
HC116 DB-0.8
HC122 DB-0.8
HC145 B-1.0
HC151 B-0.8
DOTTED LINES ARE
WIRES USED IN THE
HST VERSION ONLY.
TO SPL-14
PAGE 16
TO SPL-14
PAGE 16
CHASSIS GROUND
MAIN GROUND
PAGE 15

GROUNDS



PAGE 16

SAFETY START CIRCUIT (OPERATOR PRESENT)



1

SAFETY START CIRCUIT (OPERATOR PRESENT)

NOTE: *The starting circuit is shown with:*

- Operator in the seat
- Parking Brake “OFF”
- Transmission range lever in “NEUTRAL” position
- PTO modulation lever in the “OFF” position

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B and “D” terminals of the ignition switch
   - To terminal 30 of the glow plug power relay
3. When the ignition switch is placed in the “START” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals
   - “D” to “A” terminals

Terminal “A” of ignition switch

1. Current flows from the “A” terminal of the ignition switch to 86 terminal of the neutral start relay.

Terminal “C” of ignition switch

1. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the 8-amp circuit breaker.

Safety Switches Operation

1. From the 8-amp circuit breaker current travels to a wire splice which directs the current into three different safety switches:
   - Neutral start
   - Main PTO
   - Operator Seat Switch
2. When the transmission range gear selector is in the neutral position the neutral safety start switch contacts close, sending current to terminal #30 of the neutral start relay.
3. When the main PTO selector is placed in the “OFF” position the main PTO safety switch contacts close, sending current to the coil side of the PTO safety start relay.
4. When the operator is in the seat, the operator seat safety switch contacts close, sending current to terminal “E” of the operator safety module.
5. With current supplied to terminal “E” of the operator safety module, the module completes the ground path through terminals” B”& “C” of the module. Terminal “B” of module provides completes the ground path for the fuel shutoff relay.

Relays Operation

1. The PTO safety start relay has current provide to coil side of the relay by the main PTO safety switch. The ground path is provide by the main tractor ground. When current and ground source provided the relay energizes closing contacts 2-3 & 2-5. Terminal 2-5 provides the ground path to terminal # 85 of the neutral start relay.
2. When the ground source is provide to terminal #85 of the neutral start relay and current provide to terminal #86 from the "A" of the ignition switch, the relay latches terminals # 30 and #87. Terminal #87 provides current to terminal #5 of the glow plug timer relay and to the starter solenoid allowing the engine starter to rotate the engine.
3. Current is supplied to the fuel shutoff relay by the 8-amp circuit breaker and when the ground path is completed by the "B" terminal of the operator safety module, the fuel shutoff relay energizes, allowing current to flow to the fuel shutoff solenoid. When the solenoid is energized the solenoid plunger retracts and allows fuel to flow to the fuel injection pump.

Glow Plugs Operation

1. The glow plug power relay is provided with current to terminal # 85 from the #1 (7.5 amp fuse) and terminal #30 from 40-amp main fuse.
2. The glow plug timer relay has current supplied to terminal #5 and ground sourced to terminal #3, this energizes the relay and latches terminals #6 & #3.

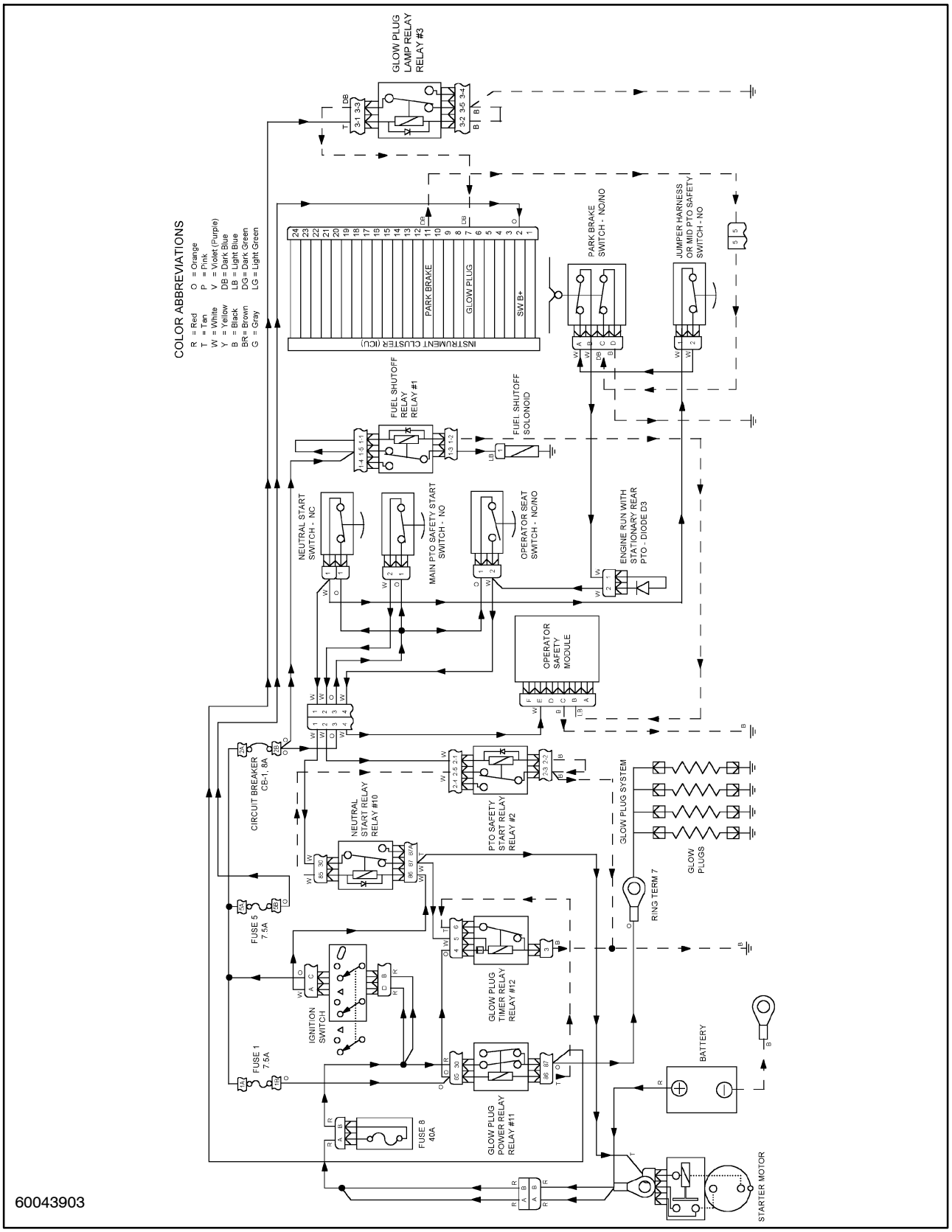
NOTE: *Terminal #5 is on the backside of the timer, glow plugs and indicator light will not be timed during starting cycle.*

3. The #6 terminal of the glow plug timer relay provides the ground source for terminal #86 of the glow plug power relay. With current provided to terminal #85 and ground to terminal #86, the glow plug power relay energizes latching terminals #30 and #87 of the relay. Terminal #87 provides current to the glow plugs, allowing the glow plugs to generate heat to aid in starting the engine.
4. Terminal #87 also provides current to the glow plug lamp relay. This current energizes the relay. When the relay is energized terminals 3-5 & 3-3 are latched completing the ground circuit for the glow plug indicator light in the instrument panel, terminal #7, and with the #5 (7.5 amp fuse) supplying current to terminal #2 of the instrument panel, allows the indicator light to illuminate.

SAFETY START CIRCUIT (OPERATOR PRESENT) TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Starter motor will not energize	Insufficient battery charge	Test battery. Charge, add water, or replace as necessary
	Defective 8-amp operator safety system circuit breaker	Inspect and replace circuit breaker as necessary
	Blown 40 amp main fuse	Inspect and replace main fuse as necessary
	Defective key switch	Test key switch and replace as necessary
	Defective PTO safety start or neutral start relay	Test relays and replace as necessary
	Malfunctioning safety start switch	Test neutral range, main PTO, mid PTO (if equipped) and seat safety start switches for adjustment, proper operation, and faulty ground circuits
	Malfunctioning starter motor	Test starter motor and repair or replace as necessary
Starter motor energizes, but fails to start engine (lacks exhaust smoke)	Defective operator safety module	Test module and replace as necessary
	Defective fuel shutoff relay	Test fuel shutoff relay and replace as necessary
	Malfunctioning fuel shutoff solenoid	Test fuel shutoff solenoid and replace as necessary
Glow plugs will not energize	Blown #1, 7.5 amp fuse	Inspect and replace 7.5 amp fuse as necessary
	Blown 40 amp main fuse	Inspect and replace main fuse as necessary
	Defective glow plug timer or power relay	Test relays and replace as necessary
	Corroded glow lug buss bar connection	Check connection repair as needed
	Defective glow plugs	Inspect and replace glow plugs as necessary
Glow plug indicator light will not illuminate	Blown #5, 7.5 amp fuse	Inspect and replace 7.5 amp fuse as necessary
	Defective glow plug power or lamp relay	Test relays and replace as necessary

SAFETY START CIRCUIT (OPERATOR NOT PRESENT)



SAFETY START CIRCUIT (OPERATOR NOT PRESENT)

NOTE: *The starting circuit is shown with:*

- Parking Brake “ON”
- Transmission range lever in “NEUTRAL” position
- PTO modulation lever in the “OFF” position

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B and “D” terminals of the ignition switch
   - To terminal 30 of the glow plug power relay
3. When the ignition switch is placed in the “START” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals
   - “D” to “A” terminals

Terminal “A” of ignition switch

1. Current flows from the “A” terminal of the ignition switch to 86 terminal of the neutral start relay.

Terminal “C” of ignition switch

1. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the 8-amp circuit breaker.

Safety Switches Operation

1. From the 8-amp circuit breaker current travels to a wire splice which directs the current into three different safety switches:
   - Neutral start
   - Main PTO
   - Parking Brake Switch
2. When the transmission range gear selector is in the neutral position the neutral safety start switch contacts close, sending current to terminal #30 of the neutral start relay.
3. When the main PTO selector is placed in the “OFF” position the main PTO safety switch contacts close, sending current to the coil side of the PTO safety start relay.
4. Current is sent from the neutral safety start switch to the mid PTO safety switch or jumper harness. With the mid PTO in the “OFF” position the mid PTO safety switch closes or (jumper harness) sending current to the park brake safety switch.
5. When the parking brake is “ON” the park brake safety switch is closed sending current to the stationary rear PTO diode, this diode sends current to terminal “E” of the operator safety module.
6. With current supplied to terminal “E” of the operator safety module, the module completes the ground path through terminals” B”& “C” of the module. Terminal “B” of module provides completes the ground path for the fuel shutoff relay.

Relays Operation

1. The PTO safety start relay has current provide to coil side of the relay by the main PTO safety switch. The ground path is provide by the main tractor ground. When current and ground source provided the relay energizes closing contacts 2-3 & 2-5. Terminal 2-5 provides the ground path to terminal # 85 of the neutral start relay.
2. When the ground source is provide to terminal #85 of the neutral start relay and current provide to terminal #86 from the "A" of the ignition switch, the relay latches terminals # 30 and #87. Terminal #87 provides current to terminal #5 of the glow plug timer relay and to the starter solenoid allowing the engine starter to rotate the engine.
3. Current is supplied to the fuel shutoff relay by the 8-amp circuit breaker and when the ground path is completed by the "B" terminal of the operator safety module, the fuel shutoff relay energizes, allowing current to flow to the fuel shutoff solenoid. When the solenoid is energized the solenoid plunger retracts and allows fuel to flow to the fuel injection pump.

Glow Plugs Operation

1. The glow plug power relay is provided with current to terminal # 85 from the #1 (7.5 amp fuse) and terminal #30 from 40-amp main fuse.
2. The glow plug timer relay has current supplied to terminal #5 and ground sourced to terminal #3, this energizes the relay and latches terminals #6 & #3.

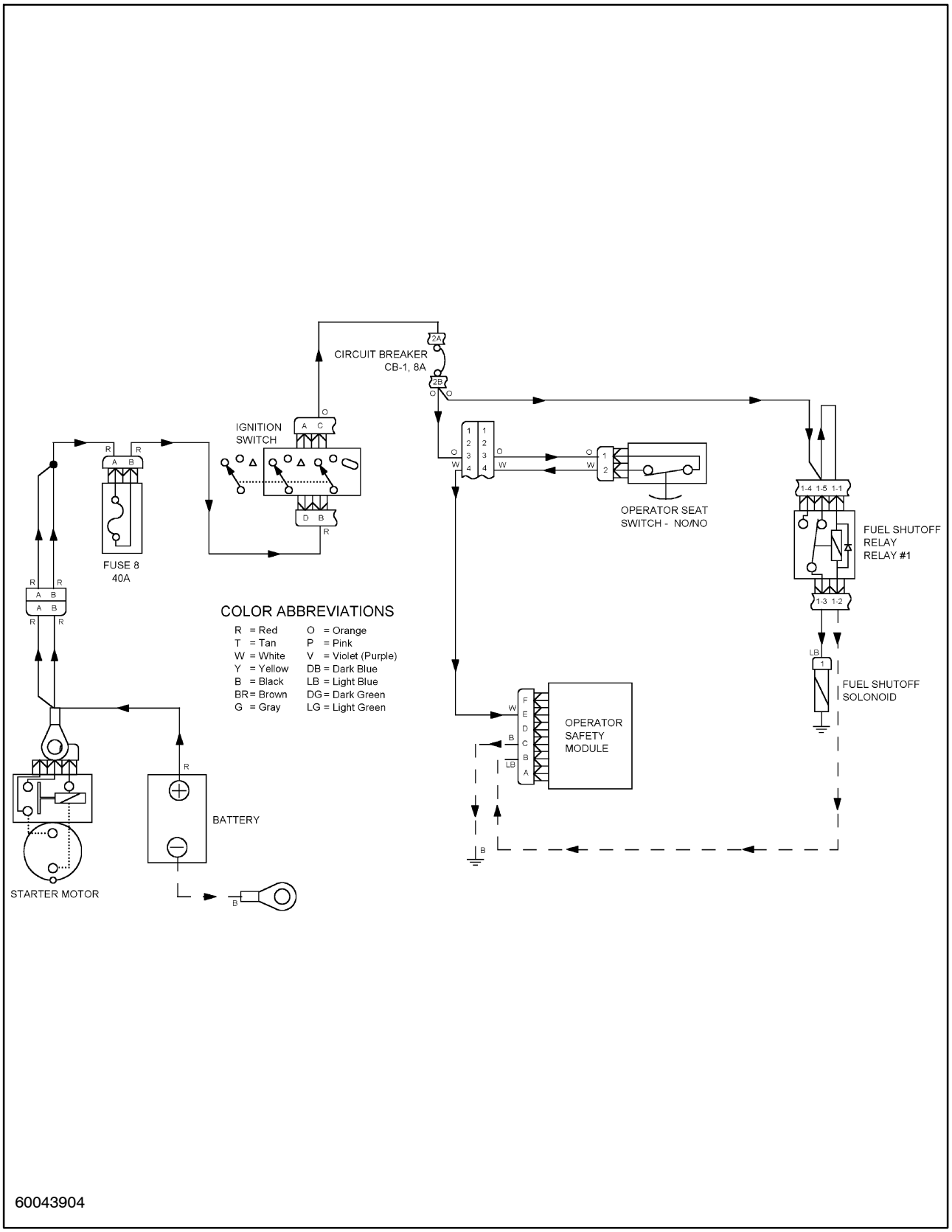
NOTE: *Terminal #5 is on the backside of the timer, glow plugs and indicator light will not be timed during starting cycle.*

3. The #6 terminal of the glow plug timer relay provides the ground source for terminal #86 of the glow plug power relay. With current provided to terminal #85 and ground to terminal #86, the glow plug power relay energizes latching terminals #30 and #87 of the relay. Terminal #87 provides current to the glow plugs, allowing the glow plugs to generate heat to aid in starting the engine.
4. Terminal #87 also provides current to the glow plug lamp relay. This current energizes the relay. When the relay is energized terminals 3-5 & 3-3 are latched completing the ground circuit for the glow plug indicator light in the instrument panel, terminal #7, and with the #5 (7.5 amp fuse) supplying current to terminal #2 of the instrument panel allows the indicator light to illuminate.

SAFETY START CIRCUIT (OPERATOR NOT PRESENT) TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Starter motor will not energize	Insufficient battery charge	Test battery. Charge, add water, or replace as necessary
	Defective 8-amp operator safety system circuit breaker	Inspect and replace circuit breaker as necessary
	Blown 40 amp main fuse	Inspect and replace main fuse as necessary
	Defective key switch	Test key switch and replace as necessary
	Defective PTO safety start or neutral start relay	Test relays and replace as necessary
	Malfunctioning safety start switch	Test neutral range, main PTO, mid PTO (if equipped) and brake safety start switches for adjustment, proper operation, and faulty ground circuits
	Defective start circuit diode	Test start circuit diode and replace as necessary. Operator must be out of seat for test.
	Malfunctioning starter motor	Test starter motor and repair or replace as necessary
Starter motor energizes, but fails to start engine (lacks exhaust smoke)	Defective operator safety module	Test module and replace as necessary
	Defective fuel shutoff relay	Test fuel shutoff relay and replace as necessary
	Malfunctioning fuel shutoff solenoid	Test fuel shutoff solenoid and replace as necessary
Glow plugs will not energize	Blown #1, 7.5 amp fuse	Inspect and replace 7.5 amp fuse as necessary
	Blown 40 amp main fuse	Inspect and replace main fuse as necessary
	Defective glow plug timer or power relay	Test relays and replace as necessary
	Corroded glow lug buss bar connection	Check connection repair as needed
	Defective glow plugs	Inspect and replace glow plugs as necessary
Glow plug indicator light will not illuminate	Blown #5, 7.5 amp fuse	Inspect and replace 7.5 amp fuse as necessary
	Defective glow plug power or lamp relay	Test relays and replace as necessary

SAFE OPERATION CIRCUIT (OPERATOR PRESENT)



SAFE OPERATION CIRCUIT (OPERATOR PRESENT)

NOTE: *The operating circuit is shown with:*

- Operator in the seat

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B” terminal of the ignition switch
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals

Terminal “C” of ignition switch

1. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the 8-amp circuit breaker.
2. The 8-amp circuit breaker supplies current to the operator safety seat switch and the fuel shutoff relay.

Seat switch and operator safety module

1. When the operator is in the seat, the seat switch closes and sends current to terminal “E” of the operator safety module.
2. When current is present at terminal “E” of operator safety module, the ground path is completed by terminals “B” and ”C” of module for the fuel shutoff relay.

Fuel shutoff relay

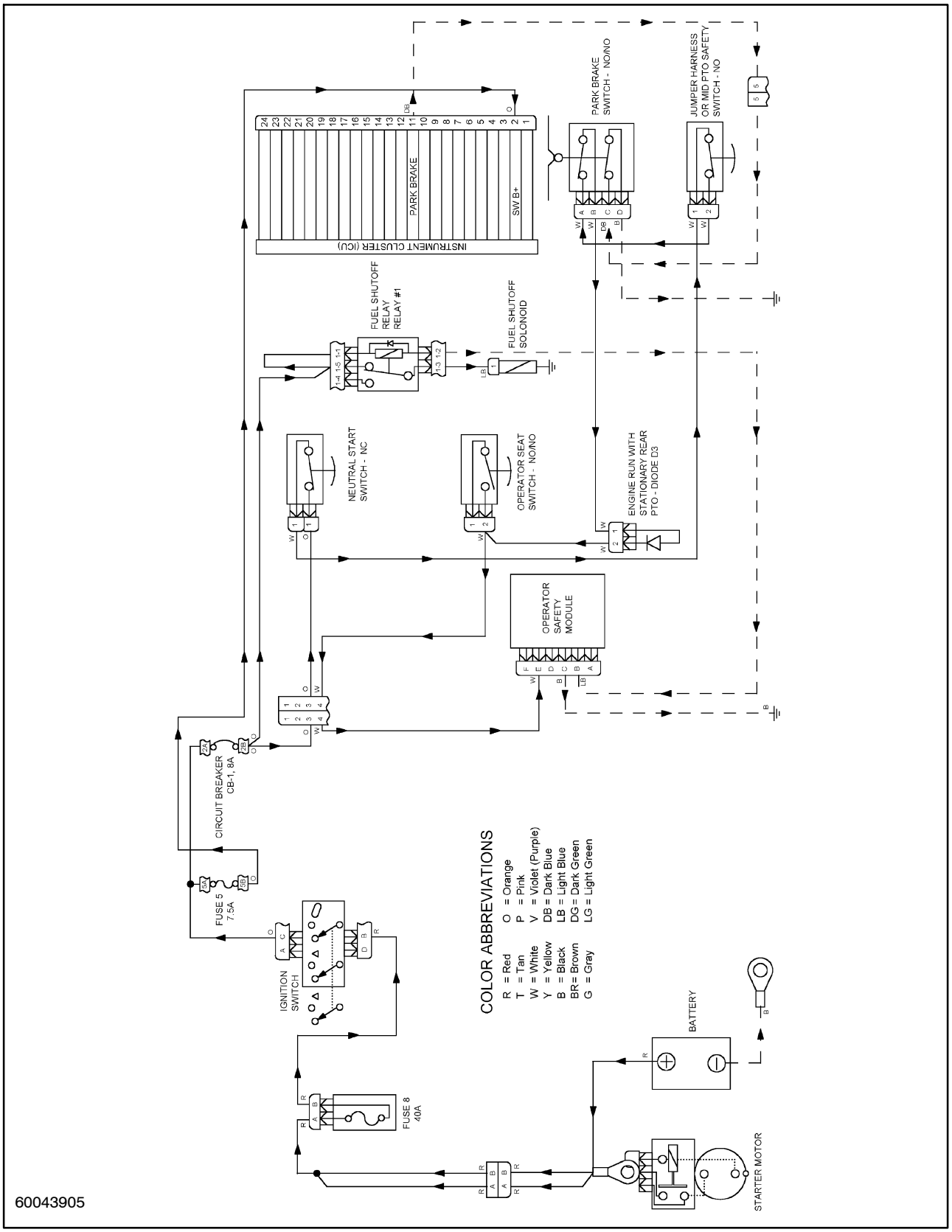
1. When current is provided to the fuel shutoff relay by the 8-amp circuit breaker and ground circuit is completed by the operator safety module, the fuel shutoff relay is energized.
2. When the fuel shutoff relay is energized terminals 1-5 and 1-3 are latched providing current to the fuel shutoff solenoid. When the solenoid is energized the solenoid plunger retracts and allows fuel to flow to the fuel injection pump. This allows the engine to remain operating.

SAFE OPERATION CIRCUIT (OPERATOR PRESENT) TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Engine does not continue to run while operator is seated	Defective seat safety switch	Test seat safety switch and replace as necessary
	Defective Fuel shutoff relay	Test relay and replace as necessary
	Malfunctioning fuel shutoff solenoid	Test fuel shutoff solenoid and replace as necessary
	Defective operator safety module	Test module and replace as necessary
	Defective 8-amp operator safety circuit breaker	Test circuit breaker and replace as necessary
	Open wiring in safe operation circuit	Check for loose connectors, grounds, and wiring damage
Engine continues to run after operator has left seat for more than two seconds and mid PTO and park brake is not engaged	Defective seat safety switch	Test seat safety switch and replace as necessary
	Defective operator safety module	Test operator safety module and replace as necessary
	Malfunctioning fuel shutoff solenoid	Test fuel shutoff solenoid and replace as necessary
	Short-circuit in wiring or faulty ground circuit	Check for loose safety switch connectors, grounds, and wiring harness for damage

PAGE LEFT BLANK

SAFE OPERATION CIRCUIT (OPERATOR NOT PRESENT)



4

SAFE OPERATION CIRCUIT (OPERATOR NOT PRESENT)

NOTE: *The operating circuit is shown with:*

- Transmission range lever in “NEUTRAL position
- Operator NOT in the seat
- Park Brake “ON”
- Mid PTO “OFF”

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B” terminal of the ignition switch
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals

Terminal “C” of ignition switch

1. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the 8-amp circuit breaker.
2. The 8-amp circuit breaker supplies current to the neutral start safety seat switch and the fuel shutoff relay.

Safety Switch Functions

1. With the range gear selector in neutral, the neutral start safety switch is closed and sends current to the mid PTO switch.
2. The mid PTO switch is closed when the mid PTO is in the “OFF” position. If the tractor is not equipped with a mid PTO the wiring harness will have a jumper harness installed to complete the circuit.
3. The mid PTO switch or jumper harness sends current to the park brake safety switch. With park brake “ON” the park brake safety switch is closed and transfers current to the engine run with stationary rear PTO diode.
4. The diode sends current to terminal “E” of the operator safety module
5. When current is present at terminal “E” of operator safety module, the ground path is completed by terminals “B” and ”C” of module for the fuel shutoff relay.

Fuel shutoff relay

1. When current is provided to the fuel shutoff relay by the 8-amp circuit breaker and ground circuit is completed by the operator safety module, the fuel shutoff relay is energized.
2. When the fuel shutoff relay is energized terminals 1-5 and 1-3 are latched providing current to the fuel shutoff solenoid. When the solenoid is energized the solenoid plunger retracts and allows fuel to flow to the fuel injection pump. This allows the engine to remain operating.

Park Brake Indicator Light

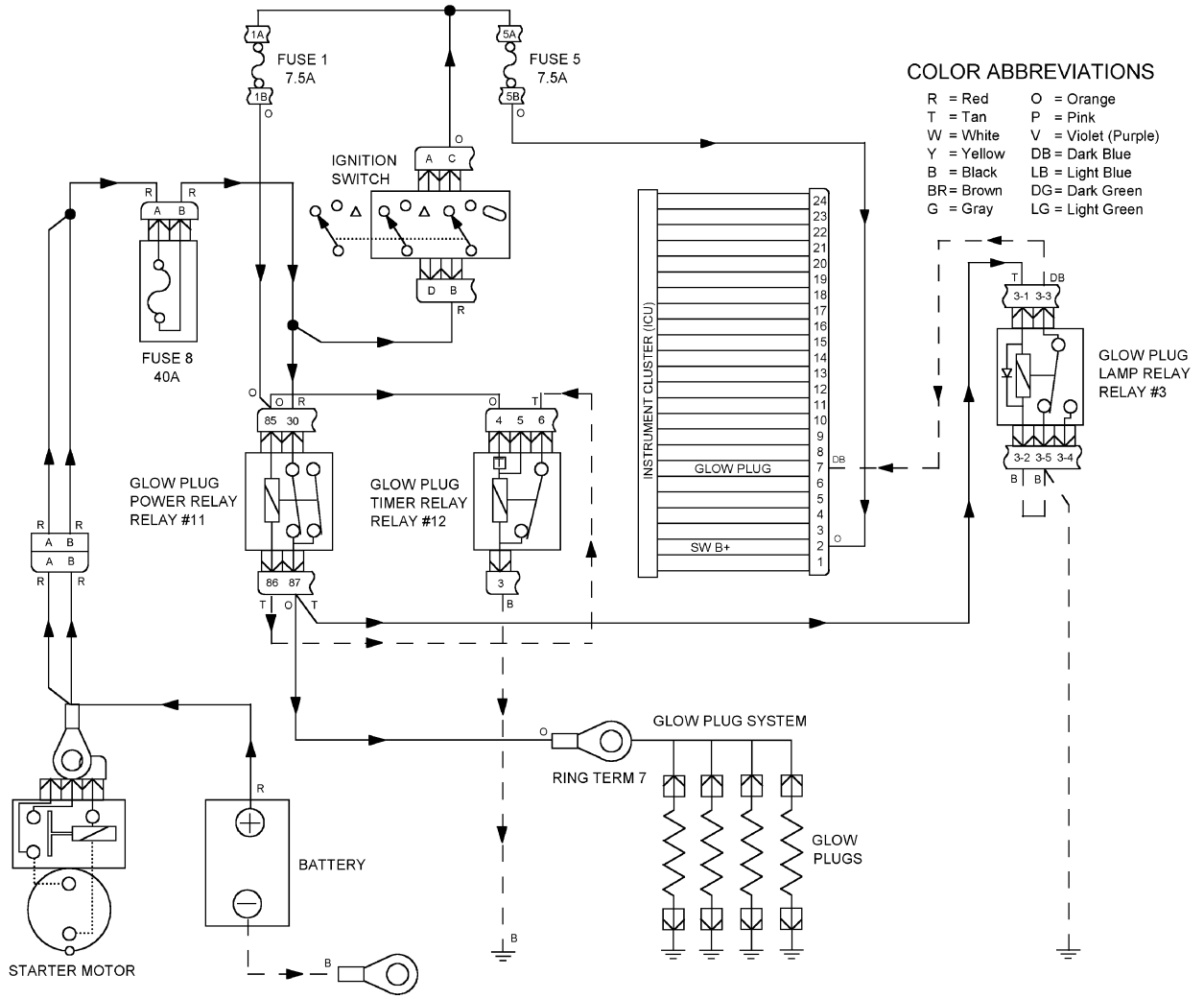
Terminal #2 of the instrument panel is provided with current by the #5, 7.5 amp fuse and terminal #11, park brake indicator light has the ground circuit completed by the park brake switch when the park brake is applied, allowing the park brake indicator light to illuminate.

SAFE OPERATION CIRCUIT (OPERATOR NOT PRESENT) TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Engine does not continue to run while operator is not seated	Defective park brake safety switch	Test seat safety switch and replace as necessary
	Defective range neutral or fuel shutoff relay	Test relays and replace as necessary
	Malfunctioning fuel shutoff solenoid	Test fuel shutoff solenoid and replace as necessary
	Defective operator safety module	Test module and replace as necessary
	Defective 8-amp operator safety circuit breaker	Test circuit breaker and replace as necessary
	Open wiring in safe operation circuit	Check for loose connectors, grounds, and wiring damage
Engine continues to run after operator has left seat for more than two seconds and mid PTO and park brake is not engaged	Defective seat safety switch	Test seat safety switch and replace as necessary
	Defective operator safety module timer	Test operator safety module and replace as necessary
	Defective park brake or mid PTO (if equipped) switch	Test switches and replace as necessary
	Defective range neutral or fuel shutoff relay	Test relays and replace as necessary
	Malfunctioning fuel shutoff solenoid	Test fuel shutoff solenoid and replace as necessary
	Defective operator safety module	Test module and replace as necessary
	Short-circuit in wiring or faulty ground circuit	Check for loose safety switch connectors, grounds, and wiring harness for damage
Engine does not continue to run when operator is not in seat, transmission is in neutral, Mid PTO is off, and park brake is engaged	Defective range neutral switch, Mid PTO switch, park brake switch, or start circuit diode	Test components and replace as necessary

PAGE LEFT BLANK

GLOW PLUG CIRCUIT



GLOW PLUG CIRCUIT

The engine glow plugs warm the engine pre-combustion chambers to assist in starting the engine in colder temperatures.

The engine glow plug circuit is shown with :

- Ignition switch in the “ACC/RUN” position
- Glow plug indicator light illuminated
- Glow plugs activated

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B” terminal of the ignition switch
   - Terminal # 30 of the glow plug power relay
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals
4. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #1, 7.5-amp fuse.
5. Current is supplied by the #1 fuse to terminal #85 of the glow plug power relay and terminal #4 of the glow plug timer relay

Relay Functions

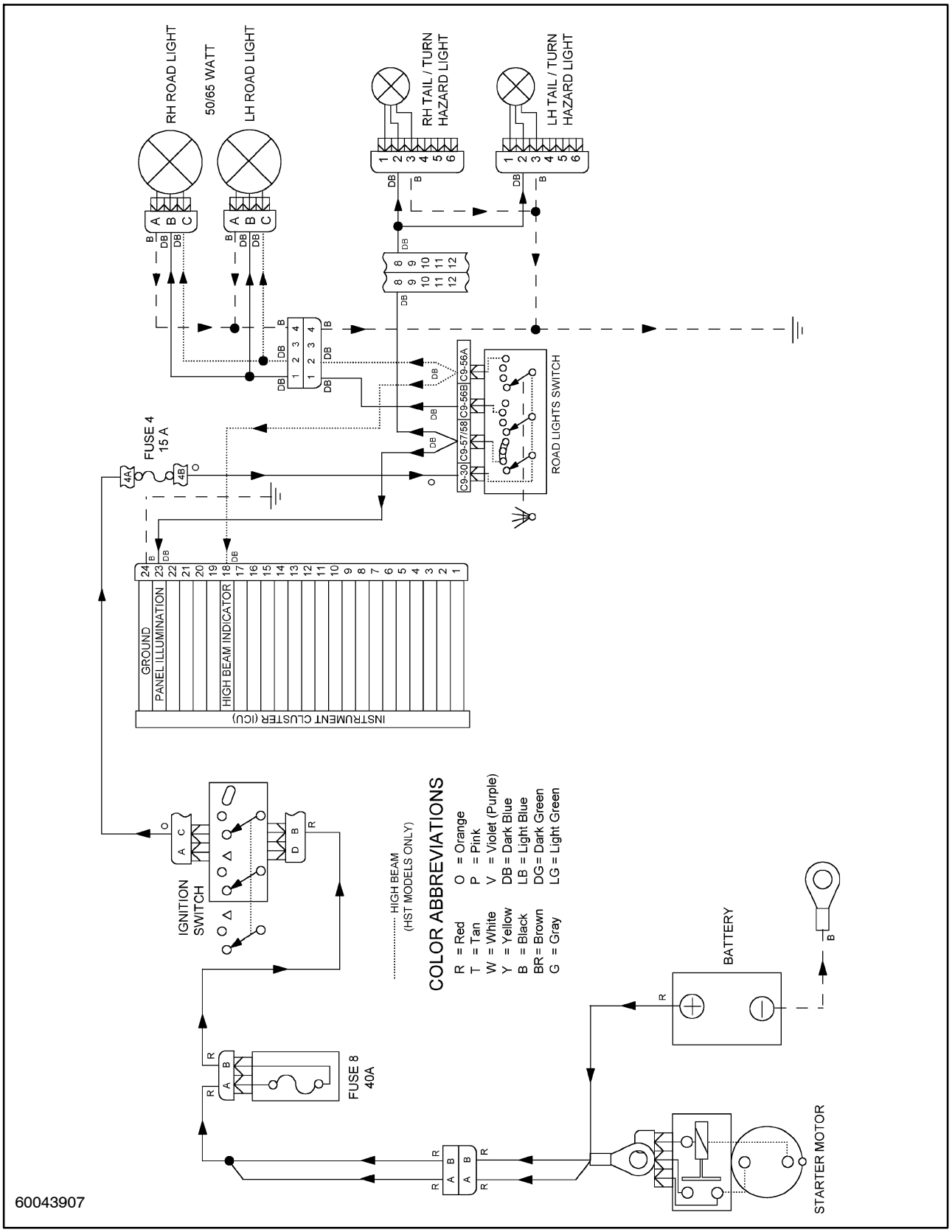
1. When the glow plug timer relay has current provided to terminal #4 and ground source to terminal #3, the relay is activated, latching terminals #3 and #6.
2. Terminal #6 of the glow plug timer relay provides the ground source for terminal #86 of the glow plug power relay. When ground source is provided to terminal #86 , the glow plug power relay is activated, latching terminals #30 and #87.
3. Terminal #87 of the glow plug power relay provides current to the glow plugs until the glow plug timer relay cuts of the ground source to the glow plug power relay.
4. Terminal #87 also supplies current to terminal 3-1 of the glow plug lamp relay.
5. The glow plug lamp relay has a ground source provide to terminals 3-2 and 3-5 by the tractor main ground.
6. With current provide to terminal 3-1 and ground to terminal 3-2 the glow plug lamp relay is activated , latching terminals 3-3 and 3-5. Terminal 3-3 provides the need ground source for terminal #7 of the instrument panels and the glow plug indicator light illuminates. Terminal #2 of the instrument panel provides the current from the # 5, 7.5-amp fuse. The glow plug indicator light will illuminate until, the glow plug timer relay cuts off the ground source to the glow plug power relay which provides current to the glow plug lamp relay.

GLOW PLUG CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Engine glow plugs will not heat	Insufficient battery charge	Test battery. Charge, add water, or replace as necessary
	Blown 40 amp main fuse	Inspect main fuse and replace as necessary
	Blown #1, 7.5 amp glow plug circuit fuse	Inspect fuse and replace as necessary
	Defective key switch	Test key switch and replace as necessary
	Corroded electrode buss bar connection	Remove buss bar, clean bar and glow plug electrodes
	Defective glow plug(s)	Test glow plug(s) and replace as necessary
	Defective glow plug power relay	Test relay and replace as necessary
Glow plug indicator light will not illuminate while key switch is in "ACC/RUN/HEAT" or "START" position	Insufficient battery charge	Test battery. Charge, add water, or replace as necessary
	Main fuse	Inspect main fuse and replace as necessary
	Defective key switch	Test key switch and replace as necessary
	Defective glow plug power relay	Test relay and replace as necessary
	Faulty glow plug indicator bulb	Check glow plug indicator light and replace as necessary
	Defective glow plug indicator light timer	Test timer and replace as necessary
	Glow plug indicator light circuit open	Check circuit connections, grounds, and wires
	Defective glow plug lamp relay	Test relay and replace as necessary
	Blown #5, 7.5-amp glow plug circuit or instrument panel fuse	Inspect and replace fuses as necessary
Glow plug indicator light remains illuminated after 5 seconds when keys switch is in "ACC/RUN" position	Defective glow plug indicator light timer relay	Test timer relay and replace as necessary
	Short circuit between the glow plug indicator light and terminal "3-3" of the glow plug lamp relay.	Check wiring between the instrument panel and timer

PAGE LEFT BLANK

ROAD LIGHTS CIRCUIT



6

ROAD LIGHTS CIRCUIT

NOTE: *The front road lights are controlled by the rotary switch located on the dashboard. On gear model tractors the road lights are a single beam 50 watt bulb and on HST tractors the road lights are a dual element 50/65 watt bulb.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current to:
   - To the “B terminal of the ignition switch
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals
4. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #4, 15-amp fuse.
5. The #4, 15-amp fuse provides current to terminal C9-30 terminal of the road lights switch.

Rotary Switch Positions

- 1st position current is transferred from C9-30 to C9-57/58 Terminal, C9-57/58 provides current to taillights and instrument panel illumination
- 2nd position current is transferred from C9-30 to C9-57/58 and C9-56B, roads lights (low beam HST model)
- 3rd position current is transferred from C9-30 to C9-57/58 and C9-56B, roads lights (low beam HST models) also C9-56A (high beam HST model

High Beam Indicator Light (HST Model Only)

1. Terminal # C9-56A of the road light switch sends current to terminal #18 of the instrument panel, terminal # 24 of instrument panel is provided with a ground source, which causes the blue high beam indicator light to illuminate.

Ground Source

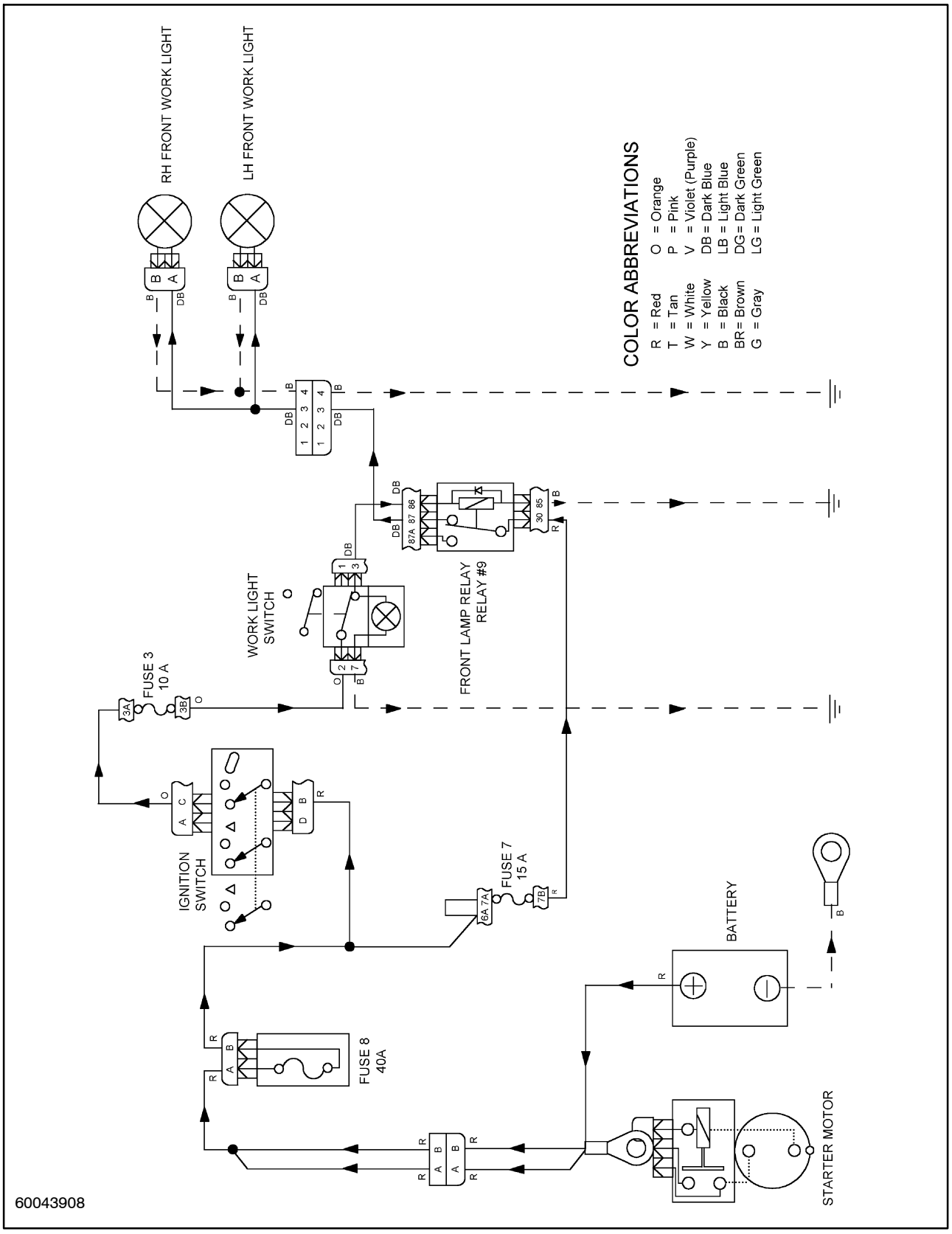
1. Ground source for front road lights is provide by main tractor ground, located at engine starter mounting bolt.

ROAD LIGHTS CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Front road lamps will not illuminate or is dim	Insufficient battery charge	Test battery. Charge, add water, or replace as necessary
	Road lamp bulb faulty	Check and replace bulb as necessary
	Blown 40-amp main fuse	Inspect main fuse and replace as necessary
	Blown #4, 15-amp fuse	Replace fuse as necessary.
	Defective light switch	Test light switch and replace as necessary.
	Improper connection at work lamp terminals or headlight socket	Check connections and lamp socket. Repair or replace as necessary.
	Improper ground connection	Check ground connections and repair as necessary.
Rear taillights will not illuminate or are dim	Insufficient battery charge	Test battery. Charge, add water, or replace as necessary
	Taillight bulb fault	Check and replace bulb as necessary
	Blown 40-amp main fuse	Inspect main fuse and replace as necessary
	Blown #5, 15-amp fuse	Replace fuse as necessary.
	Defective road light switch	Test light switch and replace as necessary.
	Improper connection at taillight lamp terminals or lamp socket	Check connections and lamp socket. Repair or replace as necessary.
	Improper ground connection	Check ground connections and repair as necessary.
Instrument panel illumination light not illuminated or is dim	Insufficient battery charge	Test battery. Charge, add water, or replace as necessary
	Instrument panel illumination bulb burnt out	Check and replace bulb as necessary
	Blown #4, 15-amp fuse	Replace fuse as necessary.
	Defective road light switch	Test light switch and replace as necessary.
	Improper connection at instrument panel terminals or light socket	Check connections and socket. Repair or replace as necessary.
	Improper ground connection	Check ground connections and repair as necessary.

PAGE LEFT BLANK

WORK LIGHTS CIRCUIT



WORK LIGHTS CIRCUIT

NOTE: *The front work lights are controlled by the toggle switch located on the dashboard. On all model tractors the work lights are a single beam 50 watt bulb.*

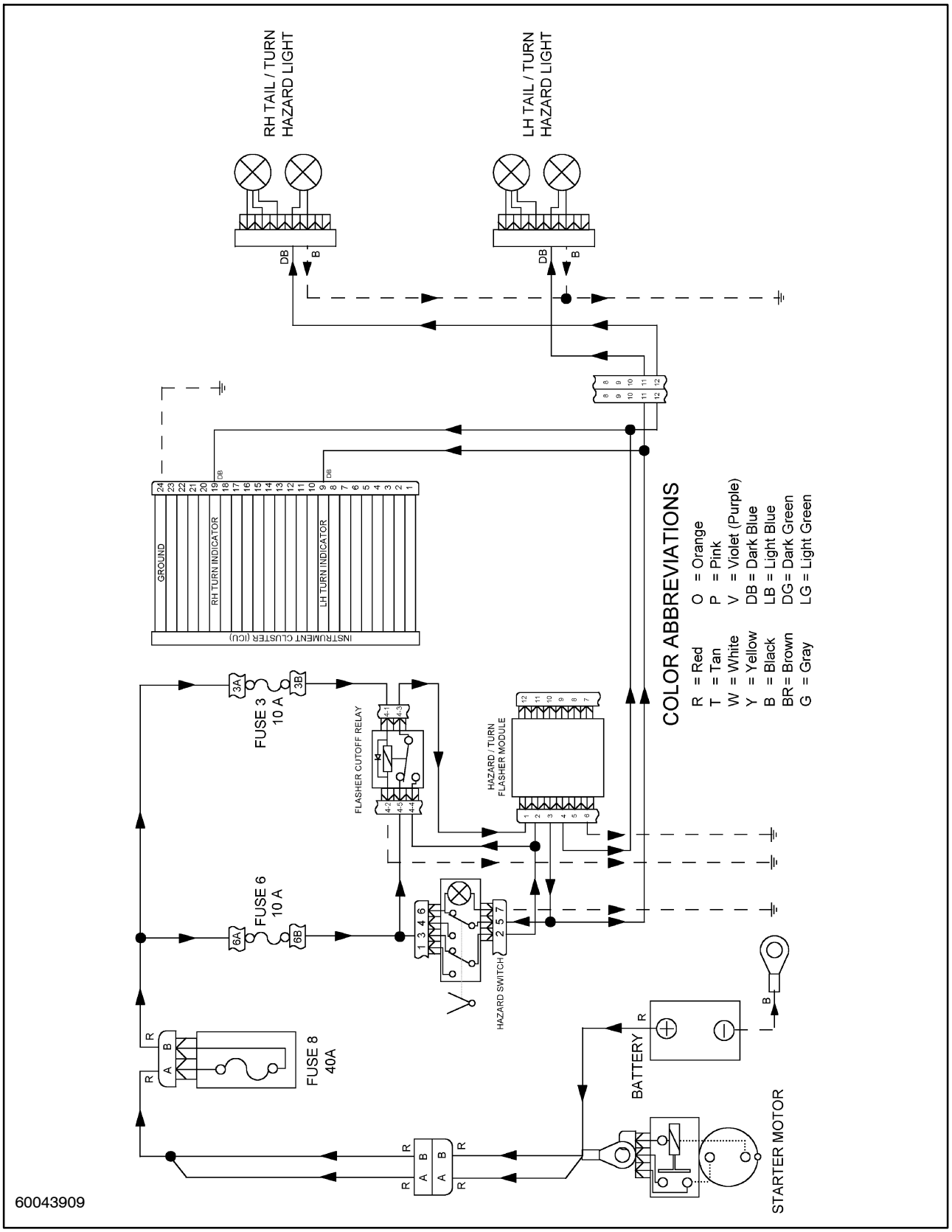
1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current to:
   - To the “B terminal of the ignition switch
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals
4. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #3, 10-amp fuse.
5. The #3,10-amp fuse provides current to terminal # 2 of the work light switch.
6. When the work light switch is placed in the “ON” position current is transferred from terminal #2 to terminal # 3 of the switch. Terminal # 3 provides current to the switch internal indicator light and terminal #7 provides the ground circuit and the internal light illuminates.
7. Terminal #30 of the front lamp relay is provided with current by the #7, 15-amp fuse.
8. Terminal #3 of the work light switch provides current to terminal # 86 and terminal #85 is provided with a ground source for the front lamp relay. This allows the relay to activate and latch terminals 30 and 87 of the relay.
9. Terminal #87 sends current to the two front work lights. The ground source source for front road lights is provide by main tractor ground, located at engine starter mounting bolt and the works lights illuminate.

WORK LIGHTS CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Front work lamps will not illuminate or is dim	Insufficient battery charge	Test battery. Charge, add water, or replace as necessary
	Work lamp bulb faulty	Check and replace bulb as necessary
	Blown 40-amp main fuse	Inspect main fuse and replace as necessary
	Blown #3, 10-amp fuse	Replace fuse as necessary.
	Blown #7, 15-amp fuse	Replace fuse as necessary.
	Defective work light switch	Test light switch and replace as necessary.
	Defective light relay	Test relay and replace as necessary
	Improper connection at work lamp terminals or headlight socket	Check connections and lamp socket. Repair or replace as necessary.
	Improper ground connection	Check ground connections and repair as necessary.

PAGE LEFT BLANK

HAZARD FLASHER CIRCUIT



HAZARD FLASHER CIRCUIT

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current to:
   - Fuse #6, 10-amp
3. The #6, 10-amp fuse provides current to :
   - Terminal #3 of the hazard light switch
   - Terminal 4-5 of the flasher cutoff relay

Hazard light switch

1. When the hazard light switch is placed in the “ON” position current is transferred from terminal #3 to terminal #2 .
2. Terminal #2 of the hazard light switch provides current to:
   - Terminal # 4-4 of flasher cutoff relay
   - Terminal # 2 of the hazard/turn flasher module.

Flasher Cutoff Relay

1. Fuse #3 10-amp, provides current to terminal # 4-1 (coil side of relay) Ground source is provided to terminal # 4-2 by tractor main ground located at the engine starter mounting bolt. This allows the relay to energize and latch terminals # 4-3 and 4-5.
2. Terminal # 4-3 of the flasher cutoff relay provides current to terminal #1 of hazard/turn flasher module.

Hazard/Turn Flasher Module

1. With current provide to terminals # 1 and #2 of module and a ground source provided to terminal #6 the module energizes. Allowing pulsating current to be sent out of terminals #3 and #4.
2. Terminal #3 of module sends pulsating current to hazard light switch internal bulb; left side rear hazard light and left turn indicator light terminal # 9 of instrument panel. Allowing lights to flash on and off.
3. Terminal #4 of module sends pulsating current to right side rear hazard light and terminal # 19 of the instrument panel. Allowing lights to flash on and off.

Ground Circuit

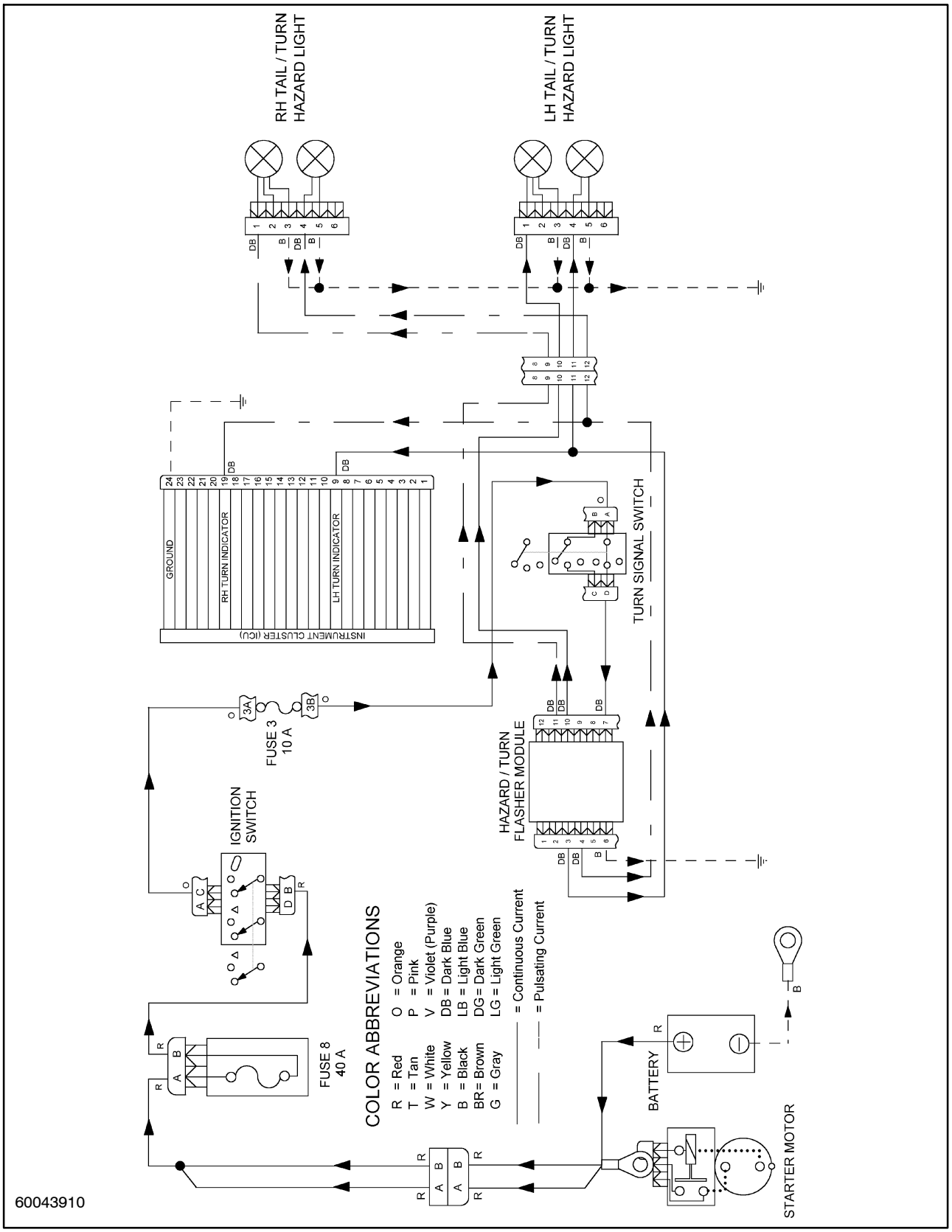
1. Ground source for rear hazard lights is provided by ground located at the left side of the HPL cover.
2. Ground for instrument panel terminal # 24 is provide by main ground, located at the engine starter mounting bolt.

HAZARD FLASHER CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Hazard Signal Lights will not illuminate or flash	Blown #3, 10-amp hazard signal fuse	Inspect fuse and replace as necessary
	Blown #6, 10-amp fuse	Inspect fuse and replace as necessary
	Hazard signal bulb(s) burnt out	Inspect bulb(s) and replace as necessary
	Defective hazard switch	Test switch and replace as necessary
	Defective flasher cutoff relay	Test flasher relay by using a known functioning flasher relay and replace as necessary
	Defective hazard/turn flasher module	Test module and replace as necessary
	Faulty wiring or ground connection	Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed
Instrument panel hazard indicator(s) does not illuminate	Indicator bulb(s) burnt out	Inspect bulb and replace as necessary
	Faulty wiring or ground connection	Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed

PAGE LEFT BLANK

RIGHT TURN SIGNAL CIRCUIT



9

RIGHT TURN SIGNAL CIRCUIT

NOTE: *The right turn signal circuit is shown with the turn signal in the "Right" position.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current to:
   - To the "B terminal of the ignition switch
3. When the ignition switch is placed in the "ACC/RUN" position current is transferred across the following ignition switch terminals:
   - "B" to "C" terminals
4. Current flows from the "C" terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #3, 10-amp fuse.
5. The #3,10-amp fuse provides current to terminal "A" of the turn signal switch.

Turn Signal switch /Flasher Module

1. When the turn signal switch is place in the "RIGHT TURN" position current is transferred from terminal "A" to terminal "D" of the switch.
2. Current from terminal "D" of the turn signal switch is sent to terminal #7 of the hazard/turn flasher module.
3. When current is present at terminal #7 and ground source present to terminal #6 the flasher module is energized. When energized the following terminal functions are:
   - Terminal #3 left taillight continuous illumination
   - Terminal #4 right taillight pulsating illumination
   - Terminal #10 left hazard light continuous illumination
   - Terminal #11 right hazard light pulsating illumination

Instrument Panel

1. Terminal #19 of the instrument panel is supplied pulsating current by terminal # 4 of the flasher module.
2. Terminal #9 of the instrument panel is supplied continuous current by terminal terminal #3 of the flasher module.
3. Terminal #24 is the ground source for the instrument panel.

Ground Sources

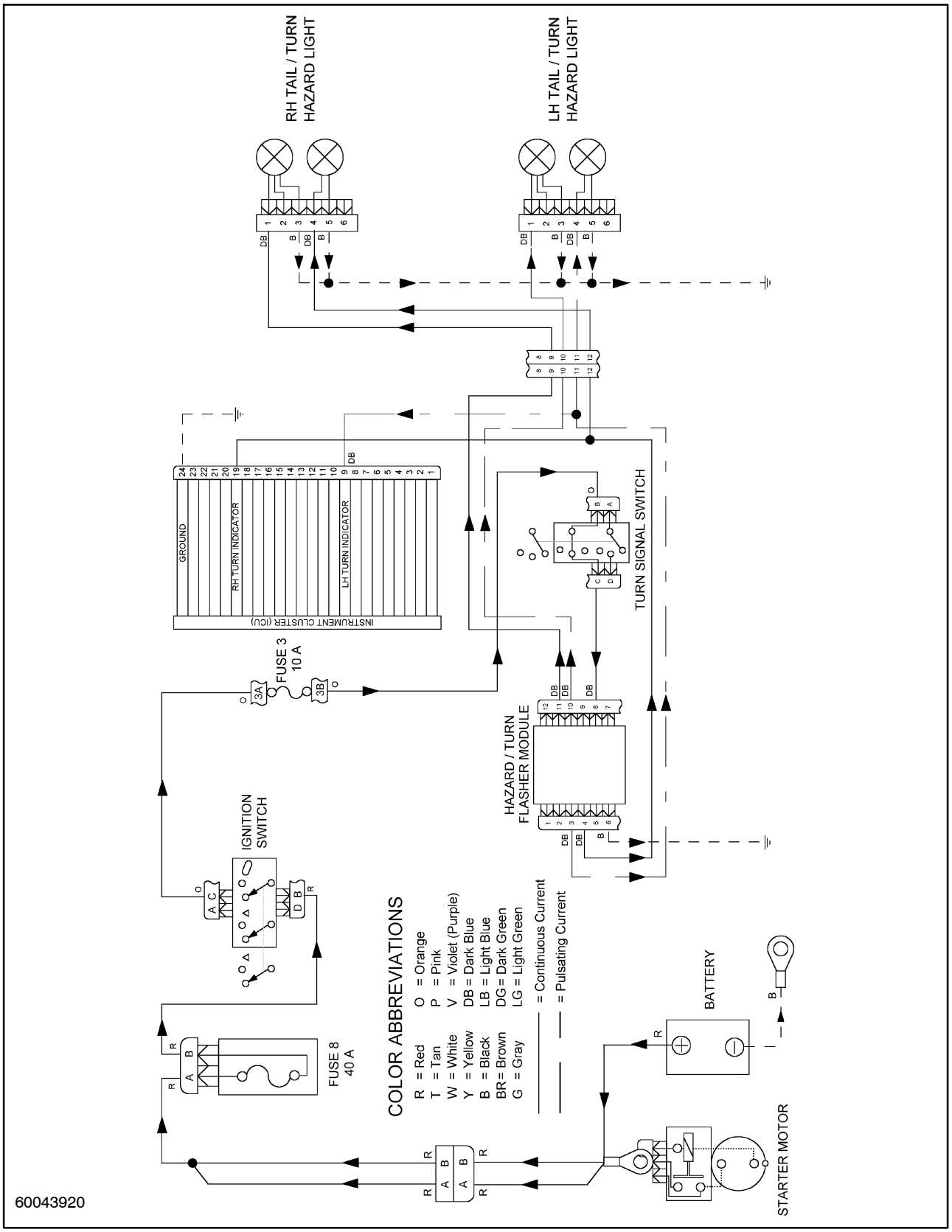
1. Ground source for the flasher module and the instrument panel is the main tractor ground,. located at the engine starter mounting bolt.

RIGHT TURN SIGNAL CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Directional signal will not illuminate or flash	Blown #3, 10-amp hazard or directional signal fuse	Inspect fuse and replace as necessary
	Directional signal bulb burnt out	Inspect bulb and replace as necessary
	Defective hazard switch or directional signal switch	Test switches and replace as necessary
	Defective hazard/turn flasher module	Test module and replace as necessary
	Faulty wiring or ground connection	Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed
Instrument panel turn indicator does not illuminate	Indicator bulb burnt out	Inspect bulb and replace as necessary
	Faulty wiring or ground connection	Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed

PAGE LEFT BLANK

LEFT TURN SIGNAL CIRCUIT



LEFT TURN SIGNAL CIRCUIT

NOTE: *The left turn signal circuit is shown with the turn signal in the "Left" position.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current to:
   - To the "B terminal of the ignition switch
3. When the ignition switch is placed in the "ACC/RUN" position current is transferred across the following ignition switch terminals:
   - "B" to "C" terminals
4. Current flows from the "C" terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #3, 10-amp fuse.
5. The #3,10-amp fuse provides current to terminal "B" of the turn signal switch.

Turn Signal switch /Flasher Module

1. When the turn signal switch is place in the "LEFT TURN" position current is transferred from terminal "B" to terminal "C" of the switch.
2. Current from terminal "C" of the turn signal switch is sent to terminal #8 of the hazard/turn flasher module.
3. When current is present at terminal #8 and ground source present to terminal #6 the flasher module is energized. When energized the following terminal functions are:
   - Terminal #3 left taillight pulsating illumination
   - Terminal #4 right taillight continuous illumination
   - Terminal #10 left hazard light pulsating illumination
   - Terminal #11 right hazard light continuous illumination

Instrument Panel

1. Terminal #9 of the instrument panel is supplied pulsating current by terminal terminal #3 of the flasher module.
2. Terminal #19 of the instrument panel is supplied continuous current by terminal # 4 of the flasher module.
3. Terminal #24 is the ground source for the instrument panel.

Ground Sources

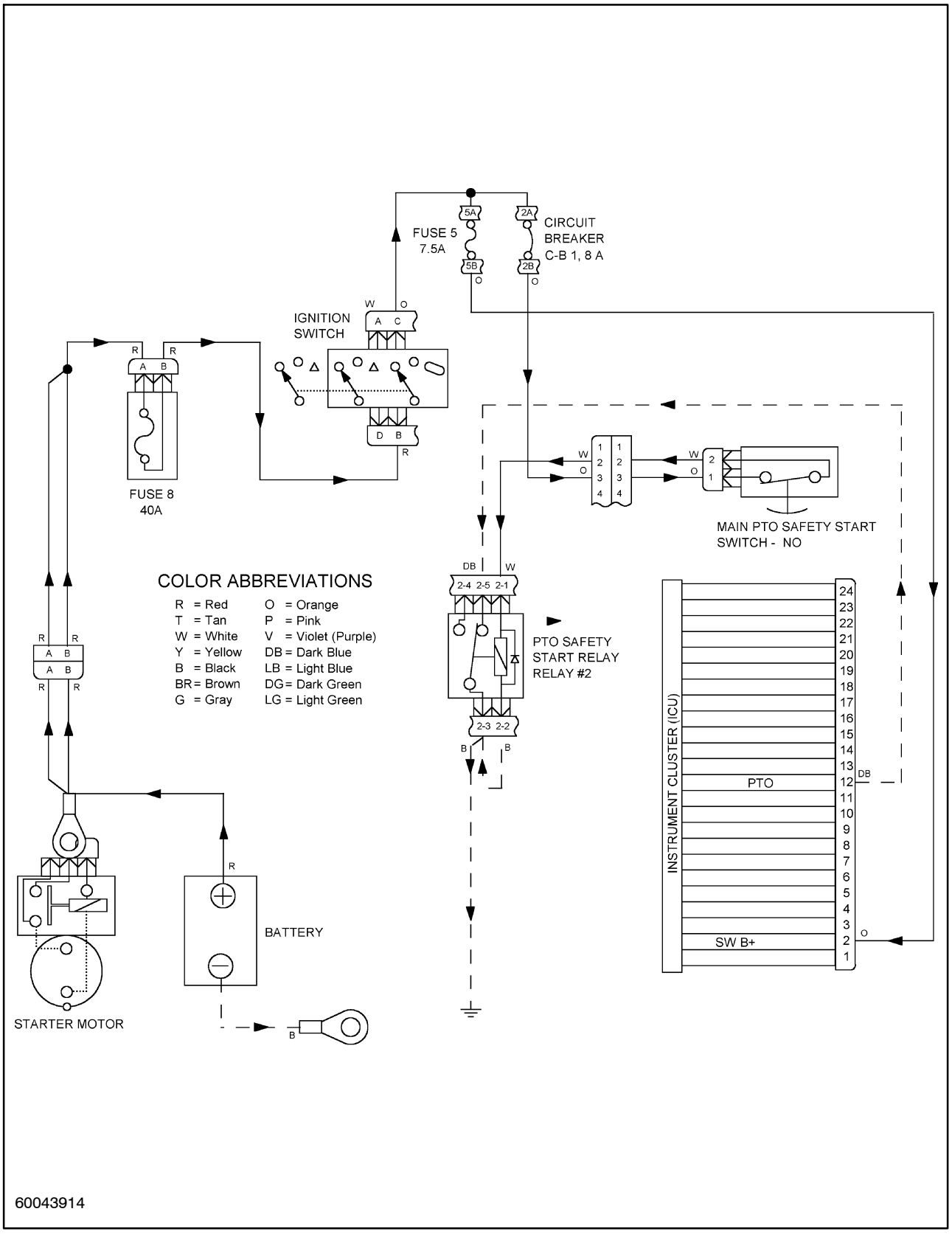
1. Ground source for the flasher module and the instrument panel is the main tractor ground,. located at the engine starter mounting bolt.

LEFT TURN SIGNAL CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Directional signal will not illuminate or flash	Blown #3, 10-amp hazard or directional signal fuse	Inspect fuse and replace as necessary
	Directional signal bulb burnt out	Inspect bulb and replace as necessary
	Defective hazard switch or directional signal switch	Test switches and replace as necessary
	Defective hazard/turn flasher module	Test module and replace as necessary
	Faulty wiring or ground connection	Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed
Instrument panel turn indicator does not illuminate	Indicator bulb burnt out	Inspect bulb and replace as necessary
	Faulty wiring or ground connection	Inspect the tractor's wiring harness and ground terminals for damage, corrosion, and short circuits. Repair or replace as needed

PAGE LEFT BLANK

PTO INDICATOR LIGHT CIRCUIT



PTO INDICATOR LIGHT CIRCUIT

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B” terminal of the ignition switch
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals

Terminal “C” of ignition switch

1. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the 8-amp circuit breaker.
2. The 8-amp circuit breaker supplies current to the main PTO safety start switch.

PTO Safety Switch/ PTO Safety Start Relay

1. When the PTO is in the “ON” position, the PTO safety start switch is closed, sending current to terminal # 2-1 of the PTO safety start relay.
2. When current is provided at terminal # 2-1 and ground source provided to terminal # 2-2 the relay is energized, latching terminals # 2-3 and # 2-5.
3. Terminal # 2-5 of the relay provides the ground source for terminal #12 of the instrument panel .
4. When a ground source is provide to terminal #12 and current is provide to terminal #2 of the instrument panel, by the #5 7.5 amp fuse the PTO indicator light illuminates, warning the operator the PTO is in operation.

Ground Sources

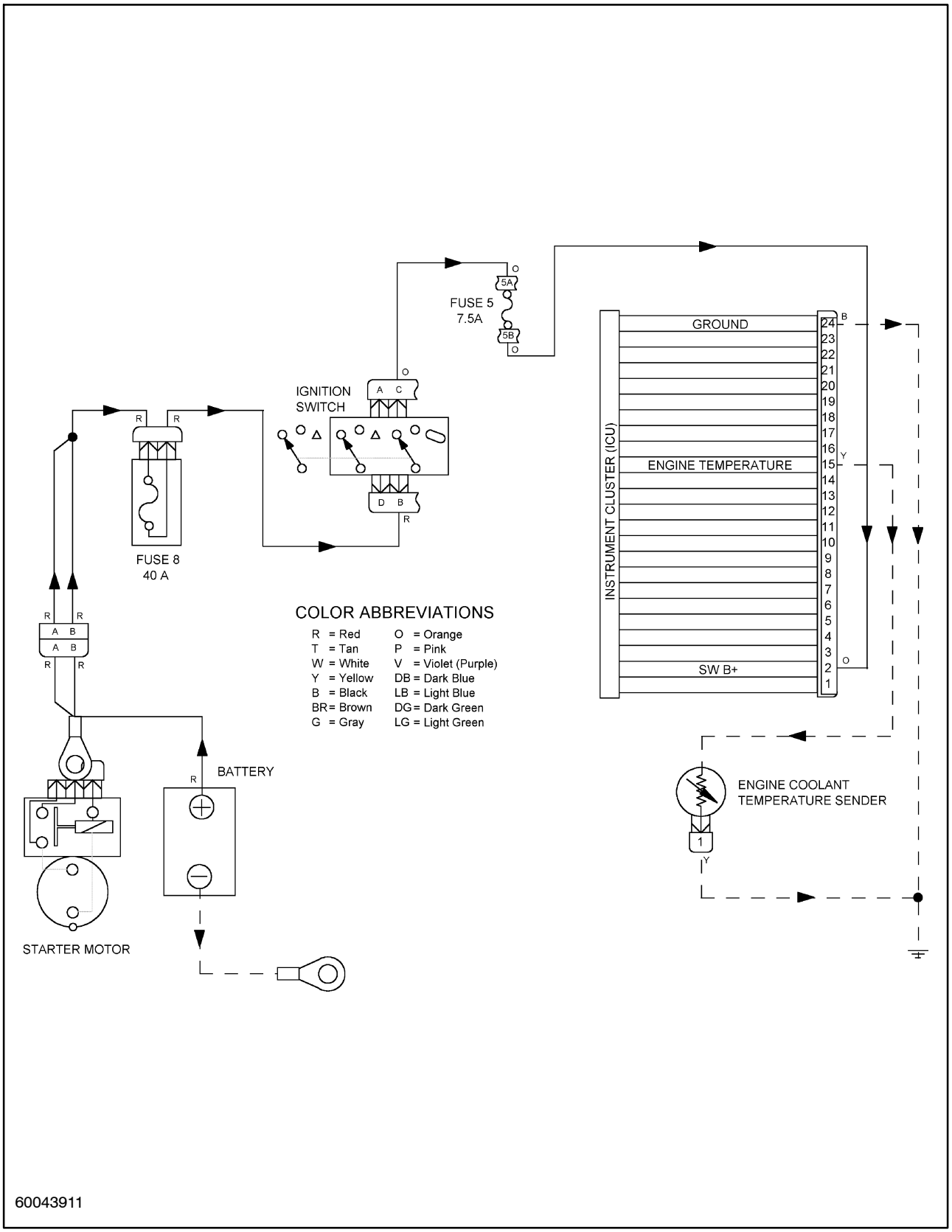
1. Ground source for the PTO safety start relay is the main tractor ground, located at the engine starter mounting bolt.

PTO INDICATOR LIGHT CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
PTO light will not illuminate	Blown, #5, 7.5-amp instrument panel fuse	Inspect and replace fuse as needed
	Malfunctioning 8-amp operator safety system circuit breaker	Test circuit breaker and replace as necessary
	PTO indicator bulb faulty	Inspect bulb and replace as necessary
	Faulty wiring or ground terminal	Inspect tractor wiring harness and ground terminals for damage, corrosion, loose connectors, or short circuits. Repair or replace as necessary.
	Faulty main PTO switch	Test switch and replace as necessary
	Faulty PTO safety start relay	Test relay and replace as necessary
	Malfunctioning Instrument Panel	Test instrument panel and replace as necessary
PTO indicator light remains illuminated	Main PTO switch improperly adjusted	Check switch adjustment
	Defective PTO safety start relay	Test relay and replace as necessary
	Faulty wiring or ground terminal	Inspect tractor wiring harness and ground terminals for damage, corrosion, loose connectors, or short circuits. Repair or replace as necessary.

PAGE LEFT BLANK

ENGINE COOLANT TEMPERATURE CIRCUIT



ENGINE COOLANT TEMPERATURE CIRCUIT

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B” terminal of the ignition switch
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals

Terminal “C” of ignition switch

1. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5 7.5-amp fuse.
2. The #5 7.5-amp fuse supplies current to terminal #2 of the instrument panel.

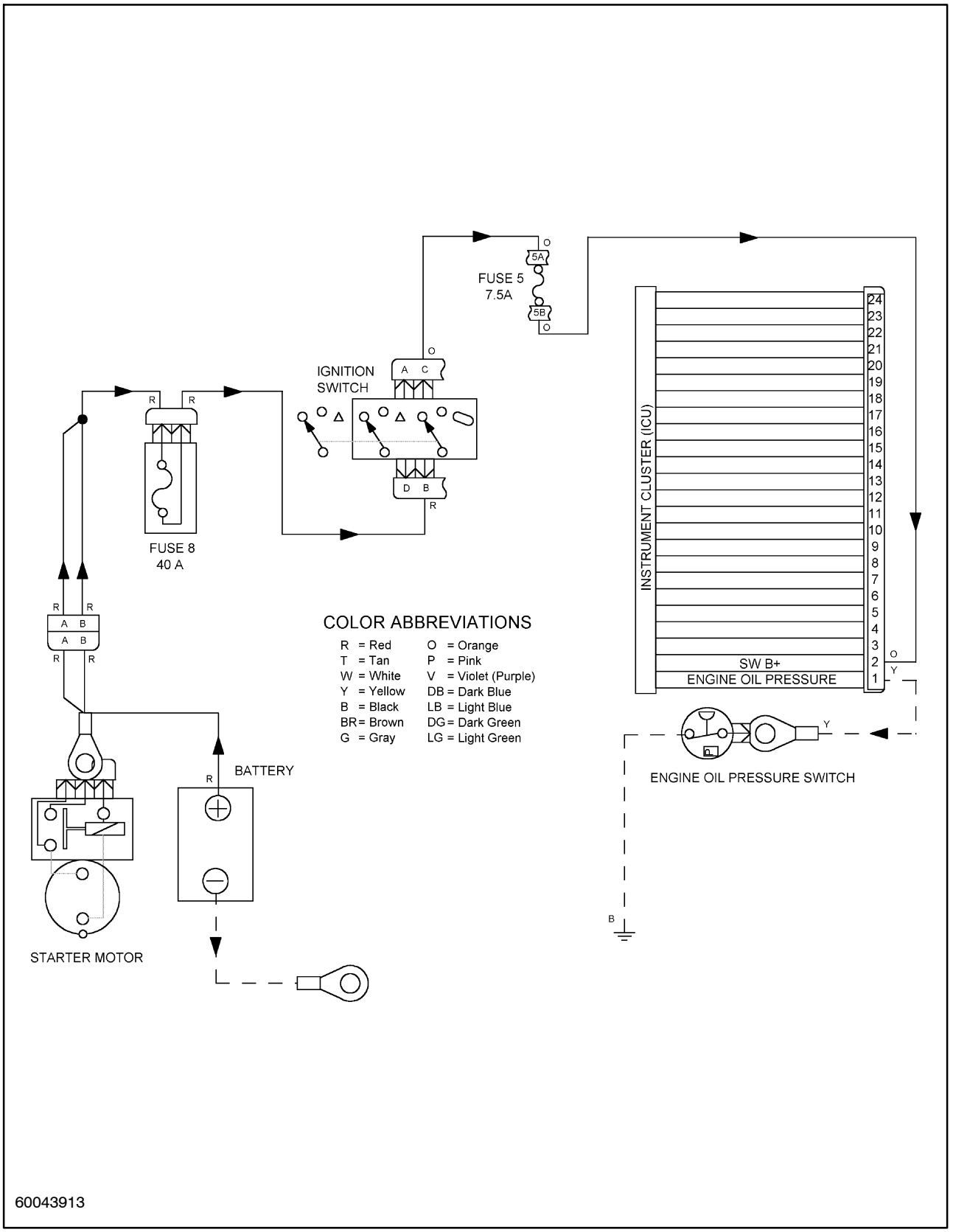
Temperature Gauge

1. Two ground paths allow the engine coolant temperature gauge to function.
2. The first ground source is provide by terminal #24 of the instrument panel. This is a constant ground source provided by the tractor main ground, located at the engine starter mounting bolt.
3. The needle within the temperature gauge is controlled by the second ground path. The second ground path exists the gauge at terminal #15 of the instrument panel to travel to the engine coolant temperature sending unit. At the sending unit, the resistance to ground changes as the engine temperature rises or lowers. The temperature gauge translates this resistance into movement of the gauge needle. The greater the resistance the less needle movement and the lesser the resistance the more the needle movement.

ENGINE COOLANT TEMPERATURE CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Inoperative temperature gauge	Blown #5, 7.5-amp instrument panel fuse	Check 7.5-amp fuse and replace as necessary
	Defective coolant temperature sending unit	Test coolant temperature sending unit and replace as necessary
	Defective temperature gauge	Test temperature gauge, replace instrument panel as necessary
	Faulty ground for temperature gauge	Check ground terminal at starter bolt. Repair as necessary

ENGINE LOW OIL PRESSURE INDICATOR LIGHT CIRCUIT



13

ENGINE LOW OIL PRESSURE INDICATOR LIGHT CIRCUIT

NOTE: *The engine low oil pressure indicator light circuit shows the ignition switch in The "ACC/RUN" position and the tractor engine in a low oil pressure condition.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the "B" terminal of the ignition switch
3. When the ignition switch is placed in the "ACC/RUN" position current is transferred across the following ignition switch terminals:
   - "B" to "C" terminals

Terminal "C" of ignition switch

1. Current flows from the "C" terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5 7.5-amp fuse.
2. The #5 7.5-amp fuse supplies current to terminal #2 of the instrument panel.

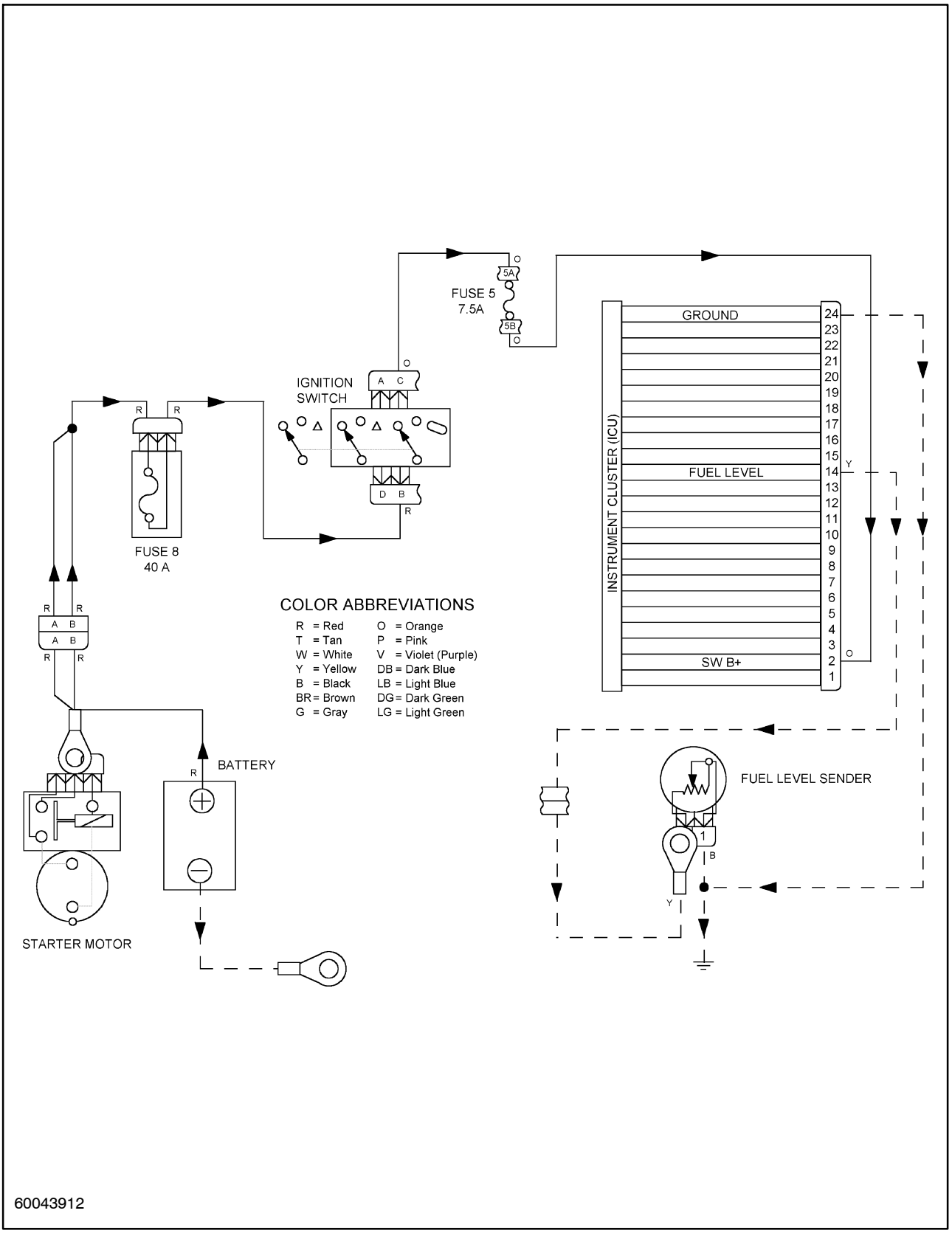
Instrument Panel/Indicator Light

1. The instrument panel is provide with current to terminal #2 and the ground source for the indicator light is provided by terminal #1. The ground path for the indicator light travels through the engine oil pressure switch which is grounded directly to the engine cylinder head. When the engine oil pressure drops below 6 psi the switch closes to complete the ground path to terminal #1 of the instrument panel. This allows the low oil pressure indicator light to illuminate, warning the operator of a potential engine problem.

ENGINE LOW OIL PRESSURE INDICATOR LIGHT CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Oil pressure warning light remains illuminated	Low engine oil pressure	Test engine lubrication system and repair as necessary
	Defective oil pressure switch	Test oil pressure switch and replace as necessary
	Oil pressure circuit is short-circuited	Check oil pressure switch, ground and wires for short circuit
	Defective instrument panel	Test instrument panel and replace as necessary
Oil pressure warning light will not illuminate	Blown #5, 7.5-amp instrument panel fuse	Replace fuse as necessary
	Faulty oil pressure warning bulb	Inspect warning bulb and replace as necessary
	Oil pressure circuit open	Check oil pressure switch connections and wires

FUEL LEVEL CIRCUIT



FUEL LEVEL CIRCUIT

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B” terminal of the ignition switch
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals

Terminal “C” of ignition switch

1. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5 7.5-amp fuse.
2. The #5 7.5-amp fuse supplies current to terminal #2 of the instrument panel.

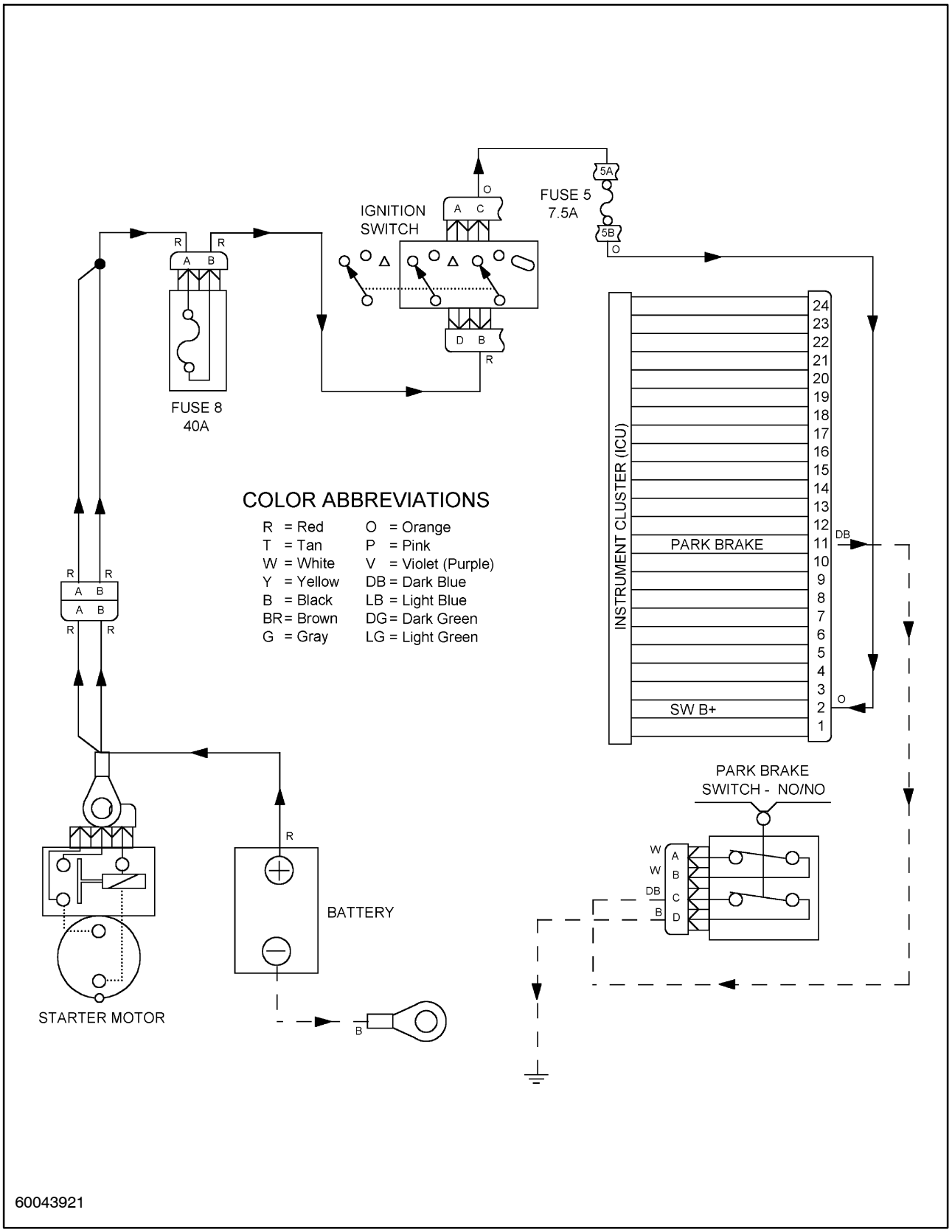
Fuel Gauge

1. Two ground paths allow the fuel gauge to function.
2. The first ground source is provide by terminal #24 of the instrument panel. This is a constant ground source provided by the tractor main ground, located at the engine starter mounting bolt.
3. The needle within the fuel gauge is controlled by the second ground path. The second ground path exists the gauge at terminal #14 of the instrument panel to travel to the fuel level unit. At the sending unit, the resistance to ground changes as the fuel level rises or lowers. The fuel gauge translates this resistance into movement of the gauge needle. The greater the resistance the less needle movement and the lesser the resistance the more the needle movement.

FUEL LEVEL CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Inoperative fuel level gauge	Blown #5, 7.5-amp instrument panel fuse	Check fuse and replace as necessary
	Malfunctioning fuel level sending unit	Test fuel level sending unit and replace as necessary
	Improper ground circuit	Check fuel level sending unit connections and circuit grounds and repair as necessary
	Malfunctioning fuel gauge	Test fuel gauge and replace instrument panel as necessary

PARK BRAKE INDICATOR LIGHT CIRCUIT



15

PARK BRAKE INDICATOR LIGHT CIRCUIT

NOTE: *The park brake indicator light circuit shows the ignition switch in the "ACC/RUN" position and the parking brake applied.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the "B" terminal of the ignition switch
3. When the ignition switch is placed in the "ACC/RUN" position current is transferred across the following ignition switch terminals:
   - "B" to "C" terminals

Terminal "C" of ignition switch

1. Current flows from the "C" terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5 5.7-amp fuse.
2. The #5 7.5-amp fuse supplies current to terminal #2 of the instrument panel.

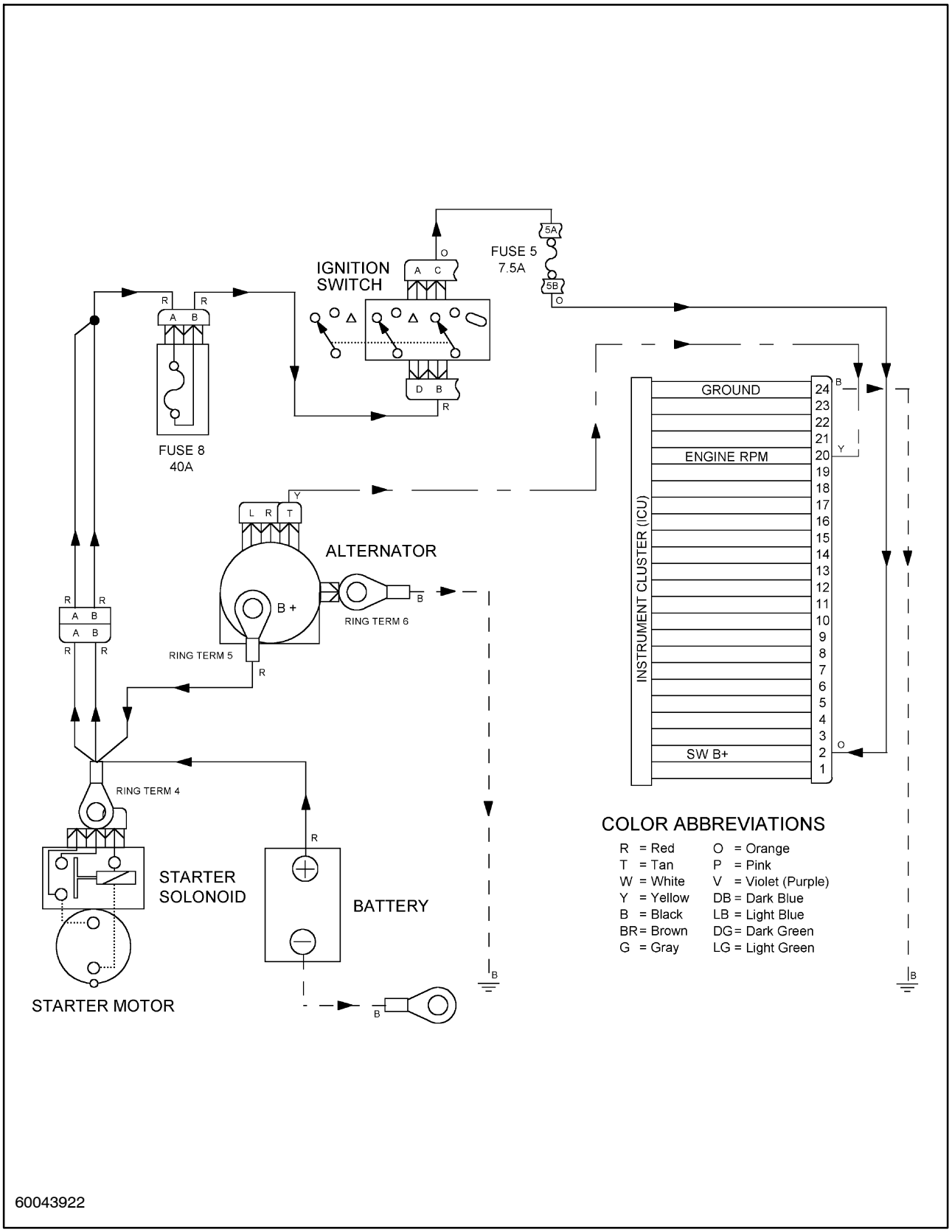
Instrument Panel/Indicator Light

1. The instrument panel is provide with current to terminal #2 and the ground source for the indicator light is provided by terminal #11. The ground path for the indicator light travels through the park brake switch which is grounded by the chassis ground located at the left side of the HPL cover. When the park brake is applied the switch closes to complete the ground path to terminal #11 of the instrument panel. This allows the park brake light to illuminate warning the operator the park brake is applied.

PARK BRAKE INDICATOR LIGHT CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Park brake indicator light will not illuminate	Blown #5, 7-amp fuse	Inspect and replace fuse as needed.
	Indicator bulb faulty	Inspect bulb and replace as necessary
	Faulty wiring or ground terminal	Inspect tractor wiring harness and ground terminals for damage, corrosion, loose connectors or short circuits. Repair or replace as necessary
	Faulty Park Brake switch	Test switch replace as necessary
Park brake indicator light remains illuminated	Faulty Park Brake switch	Test switch replace as necessary
	Faulty wiring or ground terminal	Inspect tractor wiring harness and ground terminals for damage, corrosion, loose connectors or short circuits. Repair or replace as necessary

TACHOMETER CIRCUIT



TACHOMETER CIRCUIT

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the “B” terminal of the ignition switch
3. When the ignition switch is placed in the “ACC/RUN” position current is transferred across the following ignition switch terminals:
   - “B” to “C” terminals

Terminal “C” of ignition switch

1. Current flows from the “C” terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5 7.5-amp fuse.
2. The #5 7.5-amp fuse supplies current to terminal #2 of the instrument panel.

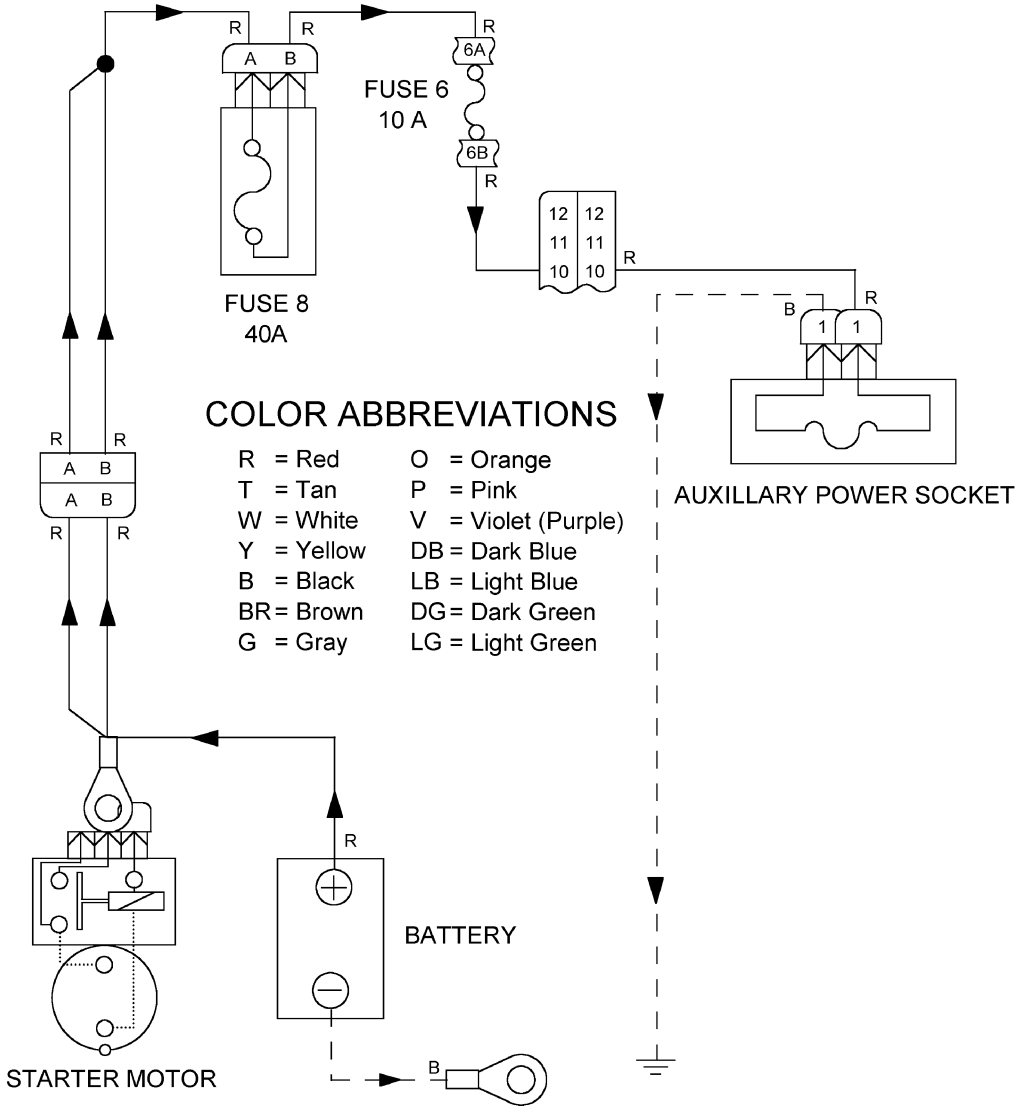
Alternator/Instrument Panel

1. Two supplied currents allow the tachometer to function.
2. First current is supplied to terminal #2 of the instrument panel by the #5 7.5-amp fuse
3. Terminal “T” of the alternator (HM61 coded wire) provides a signal current to terminal #20 of the instrument panel. This current controls the tachometer’s RPM reading
4. The ground source is provide by terminal #24 of the instrument panel. This is a constant ground source provided by the tractor main ground, located at the engine starter mounting bolt.

TACHOMETER CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Tachometer does not operate when tractor engine is running	Blown #5, 7.5-amp instrument panel fuse	Inspect and replace fuse as necessary
	Defective tachometer	Test tachometer and replace instrument panel as necessary
	Tachometer pick-up wire damaged, corroded, disconnected or short-circuited	Inspect tachometer pick-up, repair or replace as necessary
	Faulty tachometer gauge ground	Inspect and repair ground wire as necessary
	Defective alternator component	Test alternator and components, repair or replace as necessary
Inaccurate tachometer reading	Malfunctioning tachometer	Test tachometer and replace instrument panel as necessary
	Loose alternator belt	Adjust belt tension

AUXILIARY POWER SOCKET CIRCUIT



60043915

17

AUXILIARY POWER SOCKET CIRCUIT

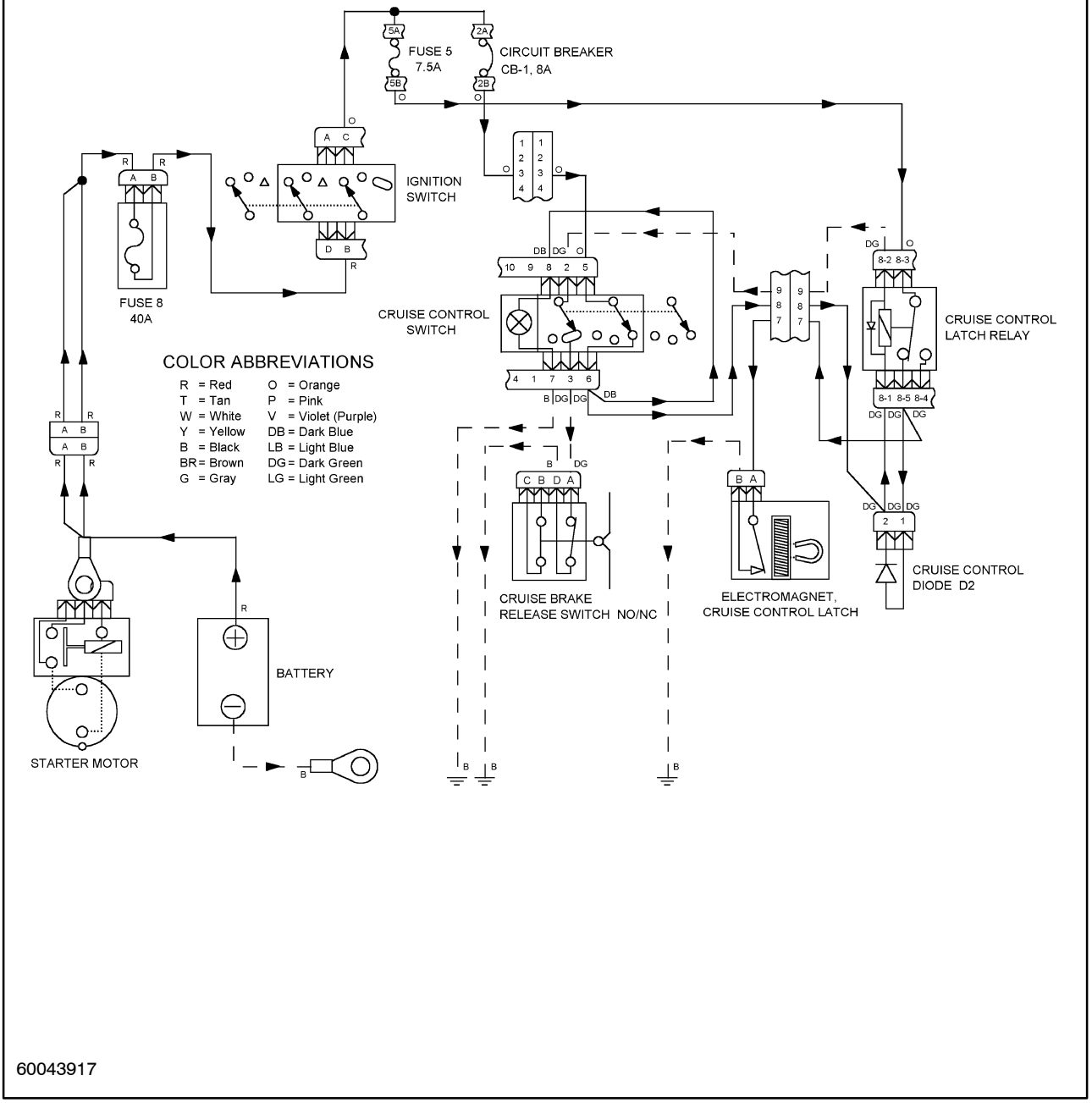
NOTE: *The auxiliary power socket has current provided in any ignition key position. The power socket has a 10-amp maximum load rating.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current to:
   - Fuse #6, 10-amp
3. Fuse #6 10-amp provides current to the power socket,
4. Ground source to the power socket is provided by the chassis ground, located at the left side of the HPL housing.

AUXILIARY POWER SOCKET CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Power socket does not have current present.	Blown #6, 10–amp fuse	Inspect and replace fuse as needed.
	Blown 40–amp main fuse	Inspect and replace fuse as needed.
	Faulty wiring or ground terminal	Inspect tractor wiring harness and ground terminals for damage, corrosion, loose connectors or short circuits. Repair or replace as necessary
	Corroded power socket	Check socket for corrosion, repair or replace as necessary

CRUISE CONTROL CIRCUIT (HST TRANSMISSION)



60043917

CRUISE CONTROL CIRCUIT (HST TRANSMISSION)

NOTE: *The cruise control circuit is shown with the cruise control switch in the "SET" position and the brakes not applied.*

NOTE: *The cruise control circuit can be activated with the HST linkage either in the forward or reverse position.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the "B" terminal of the ignition switch
3. When the ignition switch is placed in the "ACC/RUN" position current is transferred across the following ignition switch terminals:
   - "B" to "C" terminals

Terminal "C" of ignition switch

1. Current flows from the "C" terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5 7.5-amp fuse and the 8-amp circuit breaker.
2. The #5 7.5-amp fuse supplies current to terminal #8-3 of the cruise control relay.
3. The 8-amp circuit breaker provides current to terminal # 5 of the cruise control switch.

Cruise Control Switch

1. When the cruise control switch is placed in the "SET" position current is transferred from the #5 terminal to the #6 terminal.

NOTE: *The cruise control switch is a momentary type switch.*

2. Current travels from the #6 terminal of the cruise control switch to terminal # 8-1 of the cruise control latch relay also terminal #6 supplies terminal #8 of the switch for the internal light bulb of the switch.

Cruise Control Latch Relay

1. The ground circuit for the coil side of the relay is provided by terminal #8-2 of the relay. The ground circuit is completed when the cruise control switch is placed in the "SET" position, this latches terminal #2 and #3 of the cruise switch. Terminal #3 of the cruise switch is provided with a ground source when the cruise brake switch is in the closed position (brake not applied) connecting terminals "A" and "D" of the brake switch. The ground source is proved by the chassis ground located on the left side of the HPL housing.
2. When terminal #8-1 is provide with current and terminal 8-2 is has a ground source, the relay is energized, latching terminals #8-3 and #8-5 of the relay.
3. Terminal #8-5 of the relay provides current to:
   - Cruise control diode
   - Cruise control magnet
4. The Cruise control diode creates a "loop" circuit for the cruise relay, current is sent through the diode to terminal # 8-1 of the relay, allowing the relay to stay energized and latched.

Cruise Control Magnet

1. When terminal “A” of the magnet is provide with current from terminal # 8-5 of the cruise relay and terminal “B” of the magnet is provided with a ground source from the chassis ground. The magnet energizes and locks the HST linkage in the desired location.
2. The magnet can be deactivated by either:
    - Placing the cruise control switch in the “OFF” position
    - Depressing the BOTH brake pedals

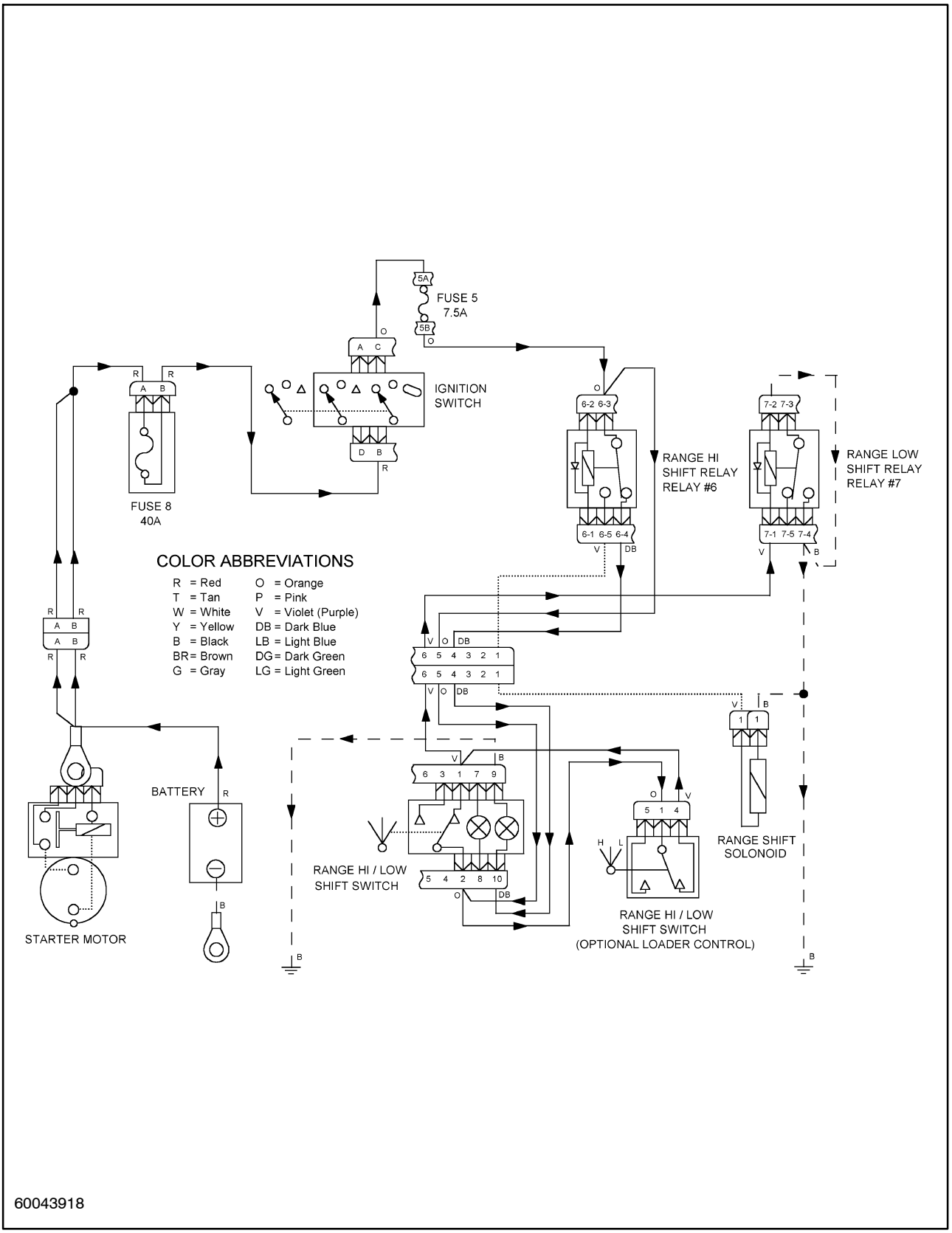
Either one of these actions will interrupt the current to the magnet causing the magnet to deactivate and release the HST linkage.

NOTE: *When the brake pedals are locked together the cruise control will deactivate. Depressing only the right or left brake pedals will not affect the cruise circuit.*

CRUISE CONTROL CIRCUIT (HST TRANSMISSION) TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Cruise will not activate	Blown #5, 7.5-amp fuse	Inspect and replace the 7.5-amp fuse as necessary
	Defective 8-amp cruise control/operator safety system circuit breaker	Test and replace circuit breaker as necessary
	Defective cruise control switch	Test switch and replace as necessary
	Defective cruise control relay	Test cruise control relay and replace as necessary.
	Defective or stuck brake release switch	Test brake release switch. Replace as necessary.
Cruise control activates, but does not remain in “ON” position	Defective cruise control switch	Test cruise switch and replace as necessary.
	Defective cruise control diode	Test diode and replace as necessary
	Defective cruise control relay	Test cruise control relay and replace as necessary
Cruise control magnet will not hold hydrostatic transmission linkage in position	Cruise control magnet bracket is loose or improperly adjusted	Adjust or tighten cruise control magnet as necessary.
	Defective cruise control magnet	Test cruise control magnet and replace as necessary.
	Excessive HST return spring pressure	Reduce spring pressure

HST RANGE "LOW" SHIFT CIRCUIT



60043918

HST RANGE "LOW" SHIFT CIRCUIT

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the "B" terminal of the ignition switch
3. When the ignition switch is placed in the "ACC/RUN" position current is transferred across the following ignition switch terminals:
   - "B" to "C" terminals

Terminal "C" of Ignition Switch

1. Current flows from the "C" terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5, 7.5-amp fuse.
2. The #5, 7.5-amp fuse supplies current to:
   - Terminal # 6-3 High Range Shift Relay
   - Terminal #2 of High /Low Range Shift Switch (Standard)
   - Terminal #1 of High/Low Range shift Switch (Optional Switch loader control valve handle)

High/Low Switch (s)

1. When the range shift switch is placed in the "LOW" position, current flows out of terminal # 1 of the (standard) or terminal # 4 of the (optional) switch. This current from the switch flows to terminal # 7-1 of the "LOW" shift relay.

Low Shift Relay

1. When current is supplied to terminal #7-1 and a ground source to terminal # 7-2 (ground source provided by main ground, located at engine starter mounting bolt.) The relay energizes, latching terminals #7-3 and 7-5 of the relay. This cuts off the ground circuit to the High shift relay.
2. When the Low shift relay is energized, the range shift solenoid does not receive current and is not activated. This allows the hydrostatic motor to stay in "LOW" range.
3. When the High shift relay is not energized, terminals #6-3 and 6-4 are latched. Terminal #6-4 provides current to terminal # 10 of the High/low Switch, terminal #9 of the switch is provided with a ground source and the internal light bulb of the switch illuminates.

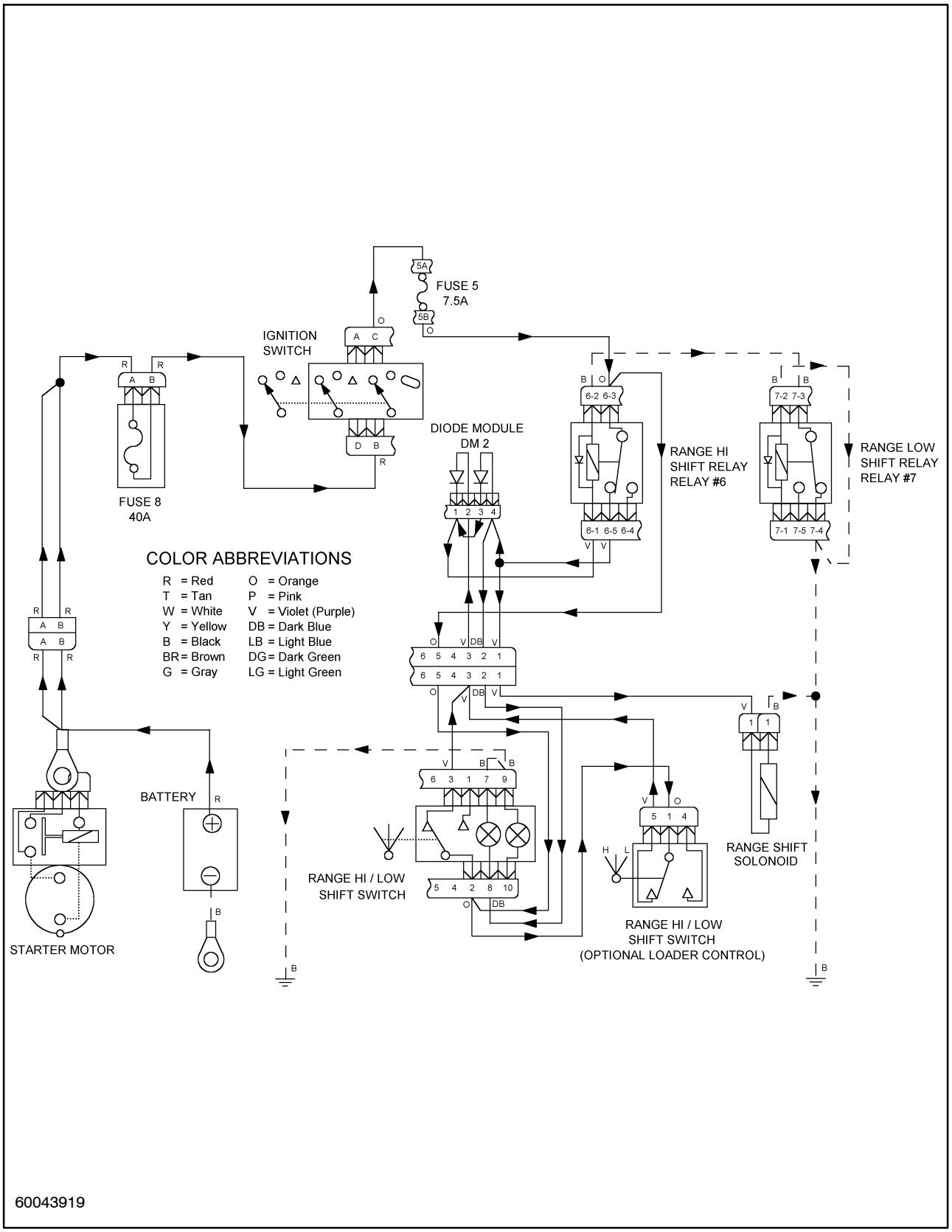
NOTE: *"LOW" range is the default setting for the tractor hydrostatic system. When the tractor electrical system is shutdown and reactivated the hydrostatic system will default to the "LOW" range.*

HST RANGE "LOW" SHIFT CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Tractor will not switch into "LOW" range	Faulty range shift rocker switch	Test and replace switch as necessary
	Defective "HIGH" or "LO" shift relay	Test relays and replace as necessary
	Defective range shift solenoid	Test solenoid and replace as necessary
	Fault in wiring or ground terminal	Inspect wiring harness and ground terminal for damage, corrosion, and short circuits. Repair or replace as necessary.
Tractor will not switch out of "LOW" range	Blown #5, 7.5-amp shift control	Inspect and replace the 7.5-amp fuse as necessary
	Faulty range shift rocker switch	Test and replace switch as necessary
	Defective "HIGH" or "LO" shift relay	Test relays and replace as necessary
	Defective range shift solenoid	Test solenoid and replace as necessary
	Fault in wiring or ground terminal	Inspect wiring harness and ground terminal for damage, corrosion, and short circuits. Repair or replace as necessary
"LOW" range bulb fails to illuminate, but tractor shifts into "LOW" range	Defective "LOW" range bulb	Replace range shift switch

PAGE LEFT BLANK

HST RANGE "HIGH" SHIFT CIRCUIT



HST RANGE "HIGH" SHIFT CIRCUIT

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the "B" terminal of the ignition switch
3. When the ignition switch is placed in the "ACC/RUN" position current is transferred across the following ignition switch terminals:
   - "B" to "C" terminals

Terminal "C" of Ignition Switch

1. Current flows from the "C" terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5, 7.5-amp fuse.
2. The #5, 7.5-amp fuse supplies current to:
   - Terminal # 6-3 High Range Shift Relay
   - Terminal #2 of High /Low Range Shift Switch (Standard)
   - Terminal #1 of High/Low Range shift Switch (Optional Switch loader control valve handle)

High/Low Switch (s)

1. When the range shift switch is placed in the "HIGH" position, current flows out of terminal # 3 of the (standard) or terminal # 5 of the (optional) switch. This current from the switch flows to terminal #2 of diode module, through the diode module, to terminal #1 of module then to terminal # 6-1 of the high shift relay.

High Range Relay

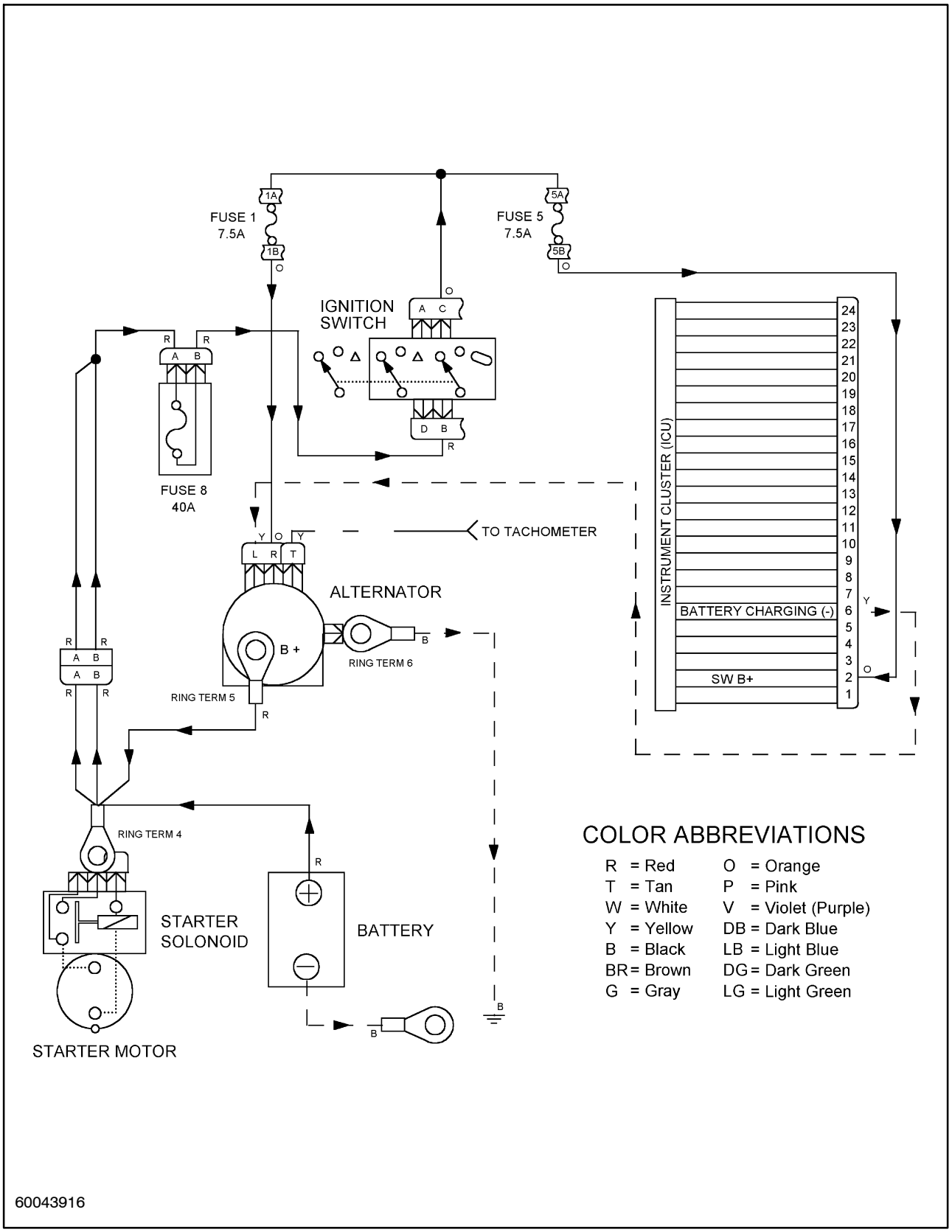
1. When current is supplied to terminal #6-1 and a ground source to terminal # 6-2, the relay energizes, latching terminals #6-3 and 6-5 of the relay. (Ground source provided through terminal #7-3 and 7-4 of the low shift relay by main ground, located at engine starter mounting bolt.)
2. When the high shift relay is energized, terminals #6-3 and 6-5 latch.
3. Terminal # 6-5 supplies current into two different paths:
   - One path sends current to the range shift solenoid, the solenoid is grounded by the chassis ground, which is located on the left side of the HPL housing. This allows the solenoid to energize and shift the hydrostatic motor into "HIGH" range.
   - The other path flows to terminal #4 of the diode module through the diode module and exists out terminal #3. From terminal #3 current travels to terminal #1 of diode module, the diode blocks current to terminal #2 of module. This diode forces current to travel to terminal #6-1 of high shift relay, this current allows the relay to remain energized and keep the hydrostatic transmission in "HIGH" range.
   - Terminal #4 of the diode module also supplies current to terminal #8 of the High/Low switch. Terminal #7 of the switch is supplied with a ground source provide by the chassis ground located on the left side of the HPL housing. This allows the internal bulb in the switch to illuminate.

HST RANGE "HIGH" SHIFT CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Tractor will not switch into "HIGH" range	Blown #5, 7.5-amp shift control	Inspect and replace fuse as necessary
	Faulty range shift rocker switch	Test and replace switch as necessary
	Defective "HIGH" or "LO" shift relay	Test relays and replace as necessary
	Defective range shift solenoid	Test solenoid and replace as necessary
	Defective range shift diode(s)	Test diode(s) and replace as necessary
	Fault in wiring or ground terminal	Inspect wiring harness and ground terminal for damage, corrosion, and short circuits. Repair or replace as necessary
	Low charge pressure	Check HST charge pressure relief valve
Tractor will not switch out of "HIGH" range	Faulty range shift rocker switch	Test and replace switch as necessary
	Defective "HIGH" or "LO" shift relay	Test relays and replace as necessary
	Defective range shift solenoid	Test solenoid and replace as necessary
	Fault in wiring or ground terminal	Inspect wiring harness and ground terminal for damage, corrosion, and short circuits. Repair or replace as necessary
"HIGH" range bulb fails to illuminate, but tractor shifts into "HIGH" range	Defective "HIGH" range bulb	Replace range shift switch

PAGE LEFT BLANK

CHARGING CIRCUIT



21

CHARGING CIRCUIT

NOTE: *The charging circuit is shown with the ignition switch in the "ACC/RUN" position and the engine running.*

1. Current starts at the battery, and flows through the positive (+) battery cable to the engine starter motor.
2. From the starter motor, current is split into two paths:
   - "B" terminal of the alternator
   - 40 amp main fuse
3. Current flows through the 40-amp fuse to a wire splice. The wire splice sends current into two directions:
   - To the "B" terminal of the ignition switch
4. When the ignition switch is placed in the "ACC/RUN" position current is transferred across the following ignition switch terminals:
   - "B" to "C" terminals

Terminal "C" of ignition switch

1. Current flows from the "C" terminal of the ignition switch to the fuse panel bussbar, from the bussbar current travels through the #5 7.5-amp fuse and #1, 7.5-amp fuse.
2. The #5 7.5-amp fuse supplies current to terminal #2 of the instrument panel.
3. The #1 7.5-amp fuse provides current to the "R" terminal of the alternator.

Alternator/Indicator Light

1. If the tractor engine is not running or the alternator is not producing a sufficient amount of charge, (with key switch in the "ACC/RUN" position) the charge light will illuminate.
   - The current for the indicator light is provided by terminal #2 of the instrument panel.
   - The ground source for the indicator light is provided by terminal #6 of the instrument panel. From terminal #6 the ground path passes through a diode which is an internal part of the instrument panel circuitry, then to the "L" terminal of the alternator. The ground source for the "L" terminal is provided by the alternator field coil.
   - When the ground circuit is complete to terminal #6 and current is provided to terminal #2 by the #5, 7.5-amp fuse, the charge indicator light will illuminate.
2. When the tractor engine is running with the alternator rotating and the ignition switch in the "ACC/RUN" position, the alternator produces an increased regulated voltage to the battery.
   - When the alternator is producing current, the ground circuit, through the "L" terminal, for the charge indicator light is disrupted, causing the indicator light to not illuminate.
   - The "R" regulator terminal controls the voltage output from the alternator. If current is not present at the "R" terminal the alternator will not produce current.
   - The "B" terminal of the alternator is the output connection between the alternator and the battery.

CHARGING CIRCUIT TROUBLESHOOTING

CONDITION	POSSIBLE CAUSE	REMEDY
Charge light remains illuminated	Faulty alternator component	Test alternator and repair a necessary
	Short circuit to ground between alternator and warning lamp	Check wiring and repair as necessary
Charge light does not illuminate	Blown #5, 7.5-amp instrument panel fuse	Inspect 7.5-amp fuse and replace as necessary
	Faulty charge indicator bulb	Inspect indicator bulb and replace as necessary
	Open charge light circuit	Inspect connections, grounds, and wiring for charge circuit and repair as necessary
Insufficient or no battery charge, hard starting, or dim indicator light	Battery charge less than 75%	Test battery. Charge, add water, or replace as necessary
	Fan belt slipping	Check fan belt tension, adjust as necessary
	Loose wiring connections	Check wiring connections for charge circuit, repair as necessary
	Continuity fault in external wiring	Check wiring harness and repair as necessary
	Blown #1, 7.5-amp alternator excitation fuse	Inspect 7.5-amp fuse and replace as necessary
Battery failure, frequent burnout of lamps and fuses	Overcharge condition	Check alternator voltage output and repair as necessary
	Ground circuit for alternator short-circuited	Check alternator wiring and connections and repair as necessary