The following are common terms used in electrical diagnostics and how they may affect the circuit and electrical components.

The term “OPEN CIRCUIT” means there is no voltage getting from the control point to the operating point. This means the wire carrying the voltage is open/broken and voltage cannot continue to flow. The effect is the operating component will not function.

The term “SHORT CIRCUIT” means there is voltage being lost to another component wire or to ground. This could result in the wrong component being operated or the blowing of the circuit protection device (fuse or breaker).

The term “GROUNDED CIRCUIT” means the voltage is going directly to ground and usually results in no component operation and/or blown fuse-breaker.

To test for an “OPEN CIRCUIT,” use a volt/ohm meter and check from one end of the wire to the other. If voltage is not present, trace the circuit from control point to operating point until the open is found.

To test for a “SHORT CIRCUIT,” use a volt/ohm meter and check for very low resistance in different parts of the circuit or continuity between the circuit wire and ground.

To test for a “GROUNDED CIRCUIT,” use a volt/ohm meter and check for continuity between the circuit wire and ground.

The following chart shows the abbreviations for the various wire colors used to identify the electrical circuits.

WIRE ABBREVIATIONS TO INDICATE WIRE COLOR

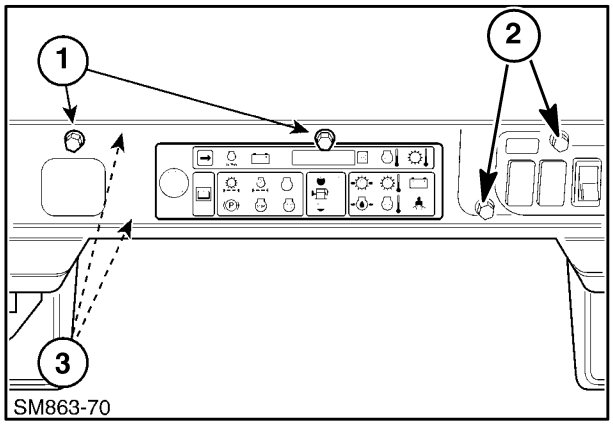
WIRE COLOR	DESIGNATION	WIRE COLOR	DESIGNATION
Black	B	White	W
Dark Blue	DKBL	Orange	O
Light Blue	LTBL	Pink	PK
Dark Brown	DKBR	Purple	PU
Gray	GY	Red	R
Dark Green	DKGN	Tan	T
Light Green	LTGN	Yellow	Y

Drilling Holes In Overhead Dash, Electronic Instrument Cluster (EIC) Board, and Ignition Switch Area

Always install the rearview mirrors as shown in the mirror instruction sheet. Otherwise, you must unhook the negative battery cable and remove the EIC board panel, 1, and ignition switch panel, 2, from the overhead dash. If holes and attaching screws are installed into the dash area, 3, make sure the screws will not contact the EIC board, the ignition switch, or wiring, as electrical system damage will occur.

IMPORTANT: *Failure to unhook the negative battery cable before removal of the EIC board or switch may result in an accidental grounding, causing component damage.*

IMPORTANT: *Retaining hardware contacting the EIC board or switch may cause an electrical short, damaging the skid steer electrical system.*

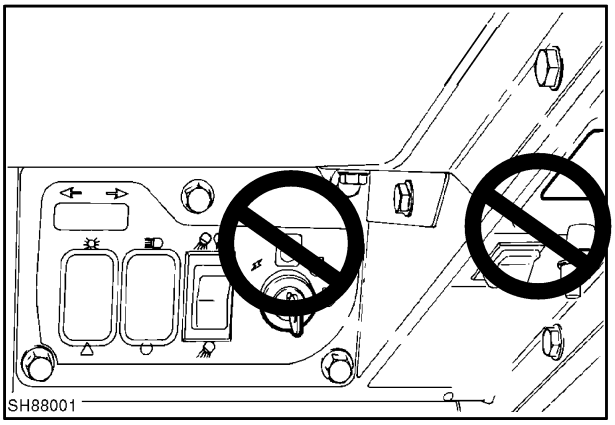


1

ADAPTING ATTACHMENTS REQUIRING 12V ELECTRICAL POWER

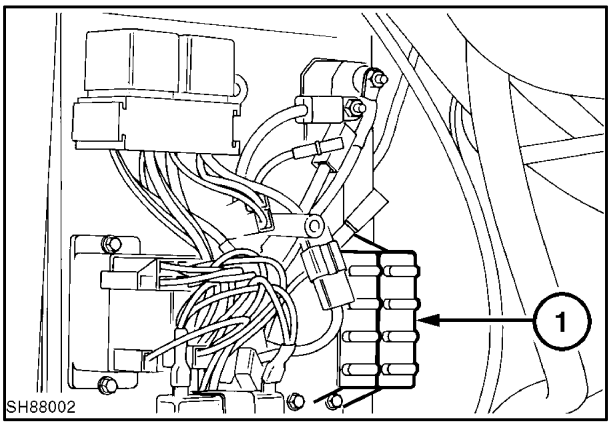
There are important rules that must be followed when adapting attachments that require 12 volt electrical power. Proper wiring of electrical devices and power and ground connections is very important to prevent other electrical component damage. Attaching electrical connections to locations other than recommended may allow electric current to feed back through the EIC board, creating false EIC board readings and warnings, or causing EIC board damage or failure.

1. ALWAYS FOLLOW the instructions for New Holland kit installation to ensure proper function and operation.
2. NEVER CONNECT an electrical device to any wires, fuses, switches or grounds inside the cab area. This includes any terminals of the ignition switch, fuse panel, or ground terminal.
3. NEVER INSTALL an electrical device, music radio, two-way radio, or unapproved New Holland attachment into the cab area.
4. ONLY USE the 12-volt accessory power outlet for attachments requiring less than 10 amps. The accessory outlet is connected to the engine fuse/relay panel and protected with a 15 amp fuse.



2

5. ALWAYS CONNECT new electrical attachments to the engine fuse/relay panel, 1, and connect the grounds to the engine bell housing. USE ONLY vacant connections and fuses not in use for specified attachments.



3

SPECIFICATIONS

Alternator ..... 55 amp

Tachometer output ..... 5 - 6.5 AC Volts

Battery ..... BCI PC31 - 12 volt - 625 amps @ –18 C (0° F) Top stud

System Ground ..... Negative (–)

Protection ..... Fuse blocks in cab and engine areas

Cab panel (standard)
- Fuel pump 7.5A
- Electronics ignition 5A
- Wiper 7.5A
- Lights (road/work) 15A

Engine panel (standard)
- Turn signals 10A
- Accessory 25A
- Electronic (EIC) 5A
- Key main 15A
- Preheat circuit breaker 50A/40A

Cab panel (optional equipment)
- Beacon light 7.5A

Engine panel (optional equipment)
- Heater 20A
- Spare 7.5A
- Attach/Horn 15A
- Backup alarm 5A

Electronic Instrument Cluster (EIC)
- Low voltage ..... EIC will fault at 11.9 volts (low)
- High voltage ..... EIC will fault at 16.5 volts (high)

Fuel gauge sensor resistance
- Full tank ..... 35 ohms
- Empty tank ..... 240 ohms

Fuel shutoff solenoid
- Pull-in amperage ..... 1.5 - 1.8 amps
- Hold-in amperage ..... 1.3 - 1.7 amps

Engine air filter sensor ..... Switch is normally closed
EIC will fault at 1.6″ Mercury or 22″ Water

Engine coolant temperature sensor ..... EIC will read “COLD” until 0° C (32° F)
EIC will fault at 102° C (216° F)

Engine coolant temperature sensor resistance ..... At 20° C (68° F) 2.21 - 2.69 K ohms
At 0° - 30° C (32° - 86° F) 1.65 - 5.88 K ohms

Engine crankcase oil pressure ..... EIC will fault at 0.3 bar (4.3 PSI)

NOTE: *The EIC will not alarm unless coolant temperature is above 64° F or two minutes have passed since starting.*

Hydraulic oil temperature sensor . . . . . EIC will read “COLD” until 0° C (32° F)
EIC will fault at 99° C (210° F)

Hydraulic oil temperature sensor resistance . . . . . At 20° C (68° F) 2.21-2.69 K ohms
At 0° - 30° C (32° - 86° F) 1.65 - 5.88 K ohms

Hydraulic oil filter sensor (differential between in/out) . . . . . Switch normally closed
EIC will fault at 2.7 ± 0.3 bar (40 ± 4 PSI)
EIC will reset at 2.0 bar (30 PSI)

NOTE: *This alarm is locked out until the oil temperature is at 110° F. The switch must be open for over 5 seconds to alarm.*

Hydrostatic charge pressure . . . . . EIC will fault at 3.4 bar (50 PSI)

Glow plug resistance . . . . . 55 ohms

Solenoid (boom and bucket spool lock) resistance . . . . . 15 - 18 ohms

Starter Switch . . . . . Key start and relay

Headlights and rear work lights . . . . . 37.5 watt halogen
NH#86533429

Taillights (road) . . . . . 37.5 watt halogen
NH#86505510

Amber Flasher lights . . . . . Sealed
NH#529068

Electronic Instrument panel indicator lamp . . . . . 0.080 amp C-2F
NH#86502182

ALTERNATOR SERVICE SPECIFICATIONS

Item	How Rated	Standard Or Service Limit
Normal Output	(V - A)	12 V - 55 A
Polarity		Negative ground
Weight	(kg, lbs)	3.7 kg (8.2 lbs)
Rotational direction (viewed from the pulley)		Clockwise
Load characteristics (cold)	Terminal voltage (V)	13.5 V
	Current (A)	Min. 30 A
	Revolution (RPM)	2500 RPM
Brush length	Original (mm-in)	18.5 mm (0.728″)
	Limit (mm-in)	5.0 mm (0.20″)
Brush spring tension	Original (g-lbs)	470 - 590 g (1.036 - 1.300 lbs)
	Limit (g-lbs)	270 g (0.60 lbs)
Slip ring diameter	Original (mm-in)	22.7 mm (0.0894″)
	Limit (mm-in)	22.1 mm (0.871″)
Field coil resistance	ohms at 20° C (68° F)	2.8Ω
Adjusting voltage	(V) at 5000 RPM	14.4 - 15.0 V

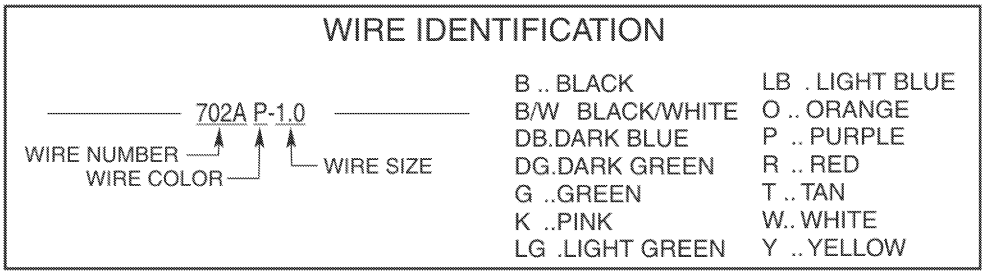
STARTER MOTOR SPECIFICATIONS

Rated voltage	12 volts
Output	2 kw
Motor type	Four-pole series wound motor
Engaging system	Magnetic shift
Rotation	Clockwise (viewed from pinion side)
Weight	Approximate 5 kg (11 lbs)

STARTER MOTOR SERVICE SPECIFICATIONS

Item	How Rated	Standard Or Service Limit
No load test	Volts (V)	11.5 V
	Current (A)	130 A Max.
	Rotating speed (RPM)	4000 RPM Min.
Commutator	Outer dia. (mm-in)	35 mm (1.38″)
	Service limit (mm-in)	34 mm (1.34″)
Brush	Length (mm-in)	15 mm (0.59″)
	Service limit (mm-in)	9 mm (0.35″)
Brush spring	Tension (kg-lbs)	2.7 - 3.6 kg (5.9 - 7.8 lbs)
	Service limit (kg-lbs)	2.2 kg (4.7 lbs)

ELECTRICAL DIAGRAM



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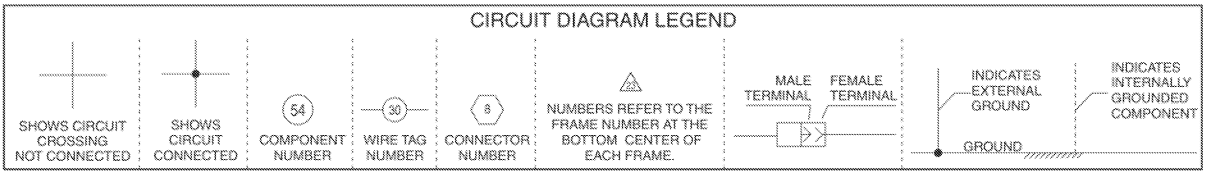

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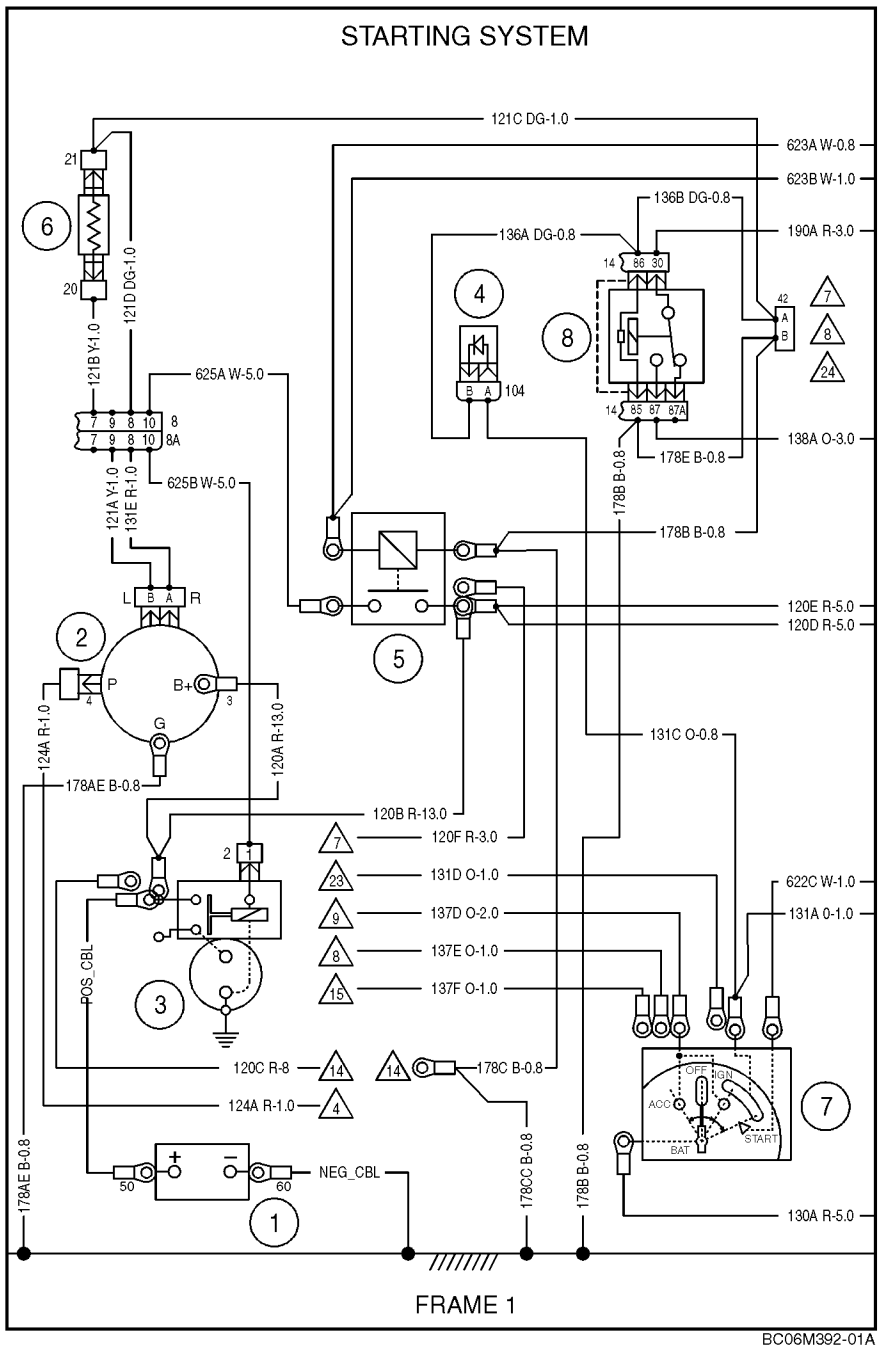
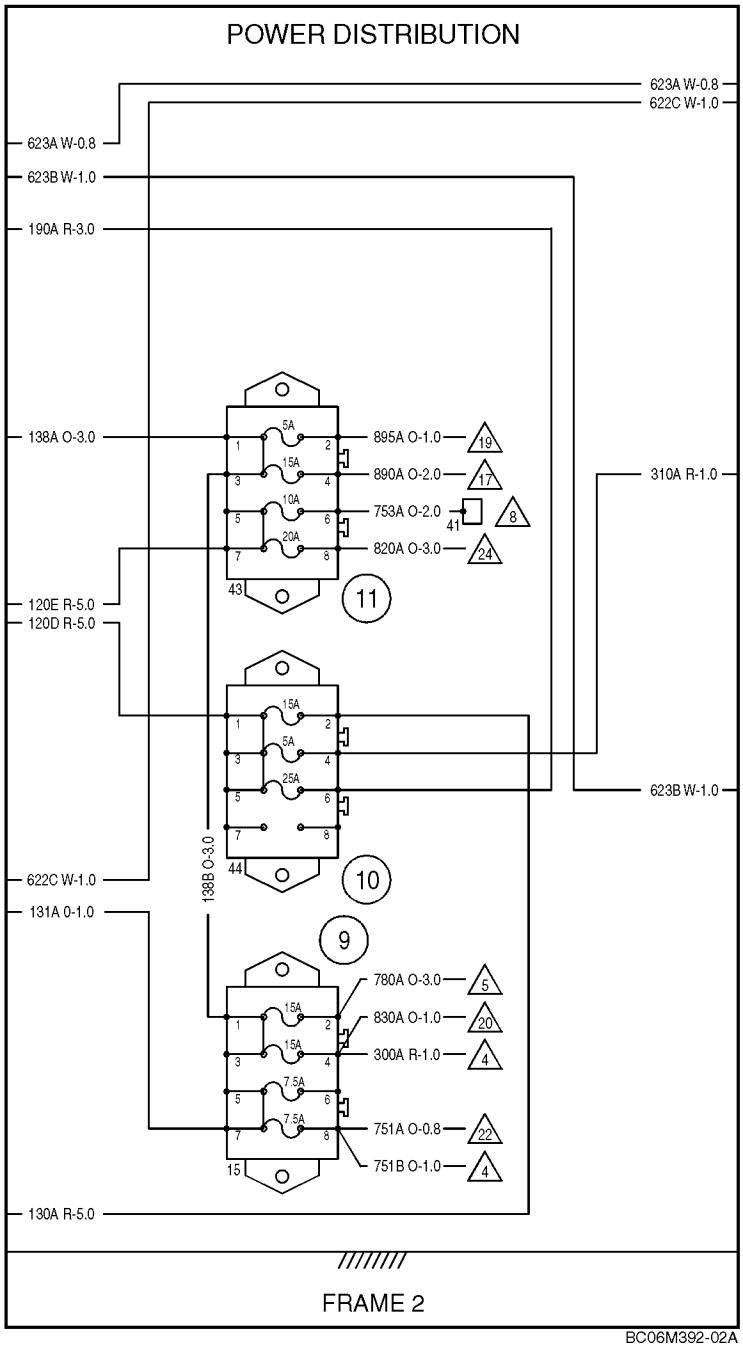


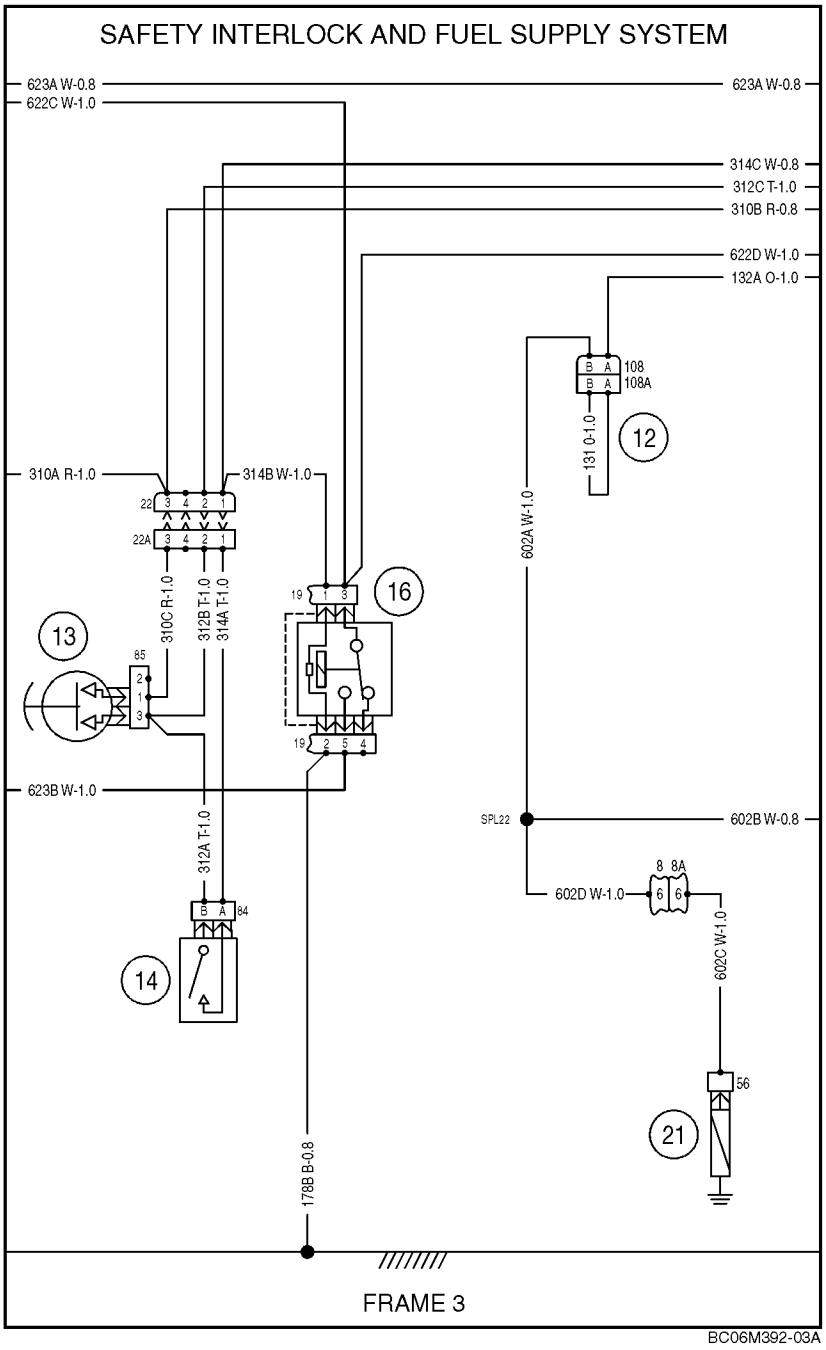
BC06M392-01A

1. BATTERY
2. ALTERNATOR
3. STARTER AND SOLENOID
4. REVERSE POLARITY DIODE
5. STARTER RELAY
6. RESISTOR
7. IGNITION SWITCH
8. RUN RELAY



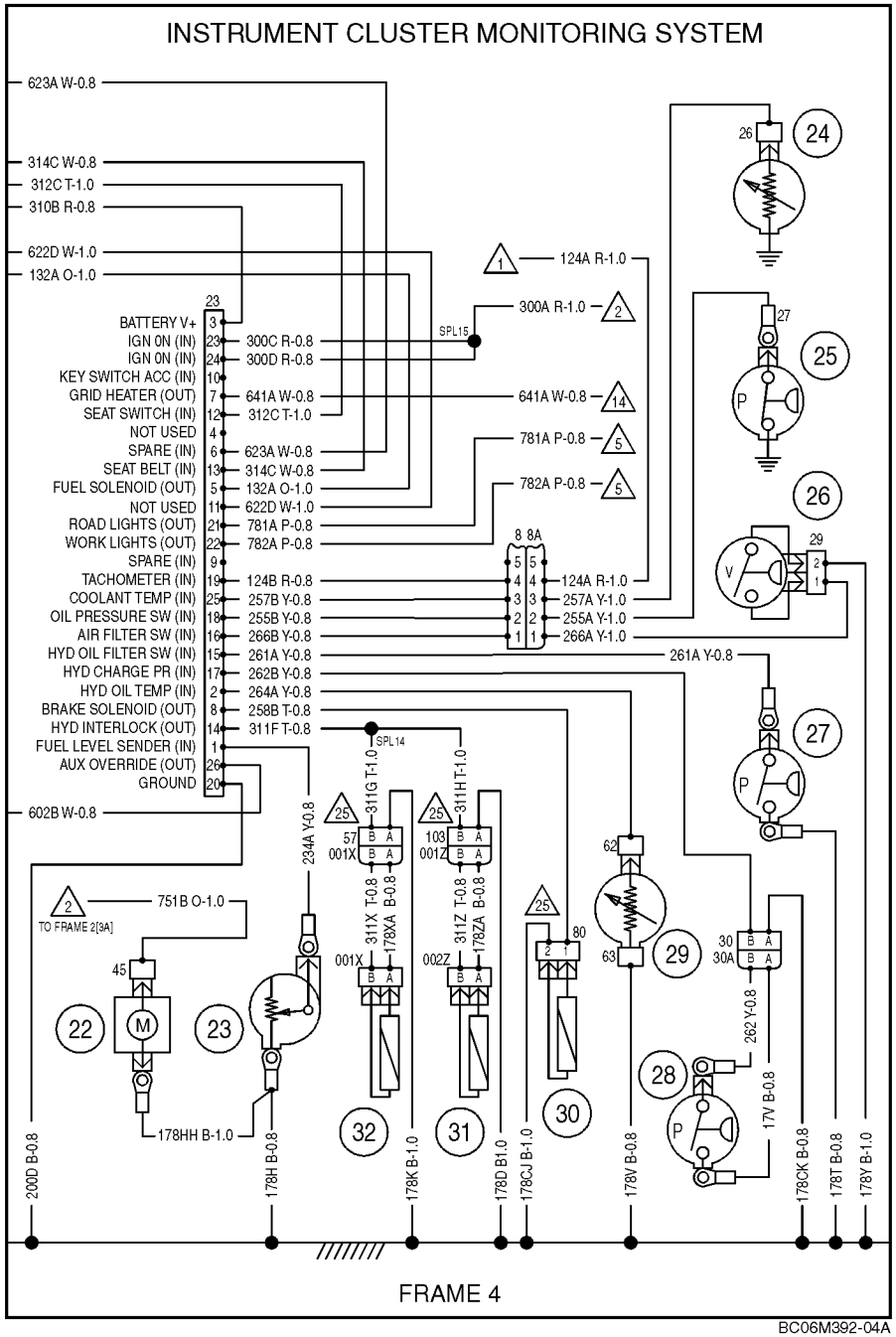
BC06M392-02A

9. CAB FUSE BLOCK
10. REAR FUSE BLOCK NO. 1
11. REAR FUSE BLOCK NO. 2



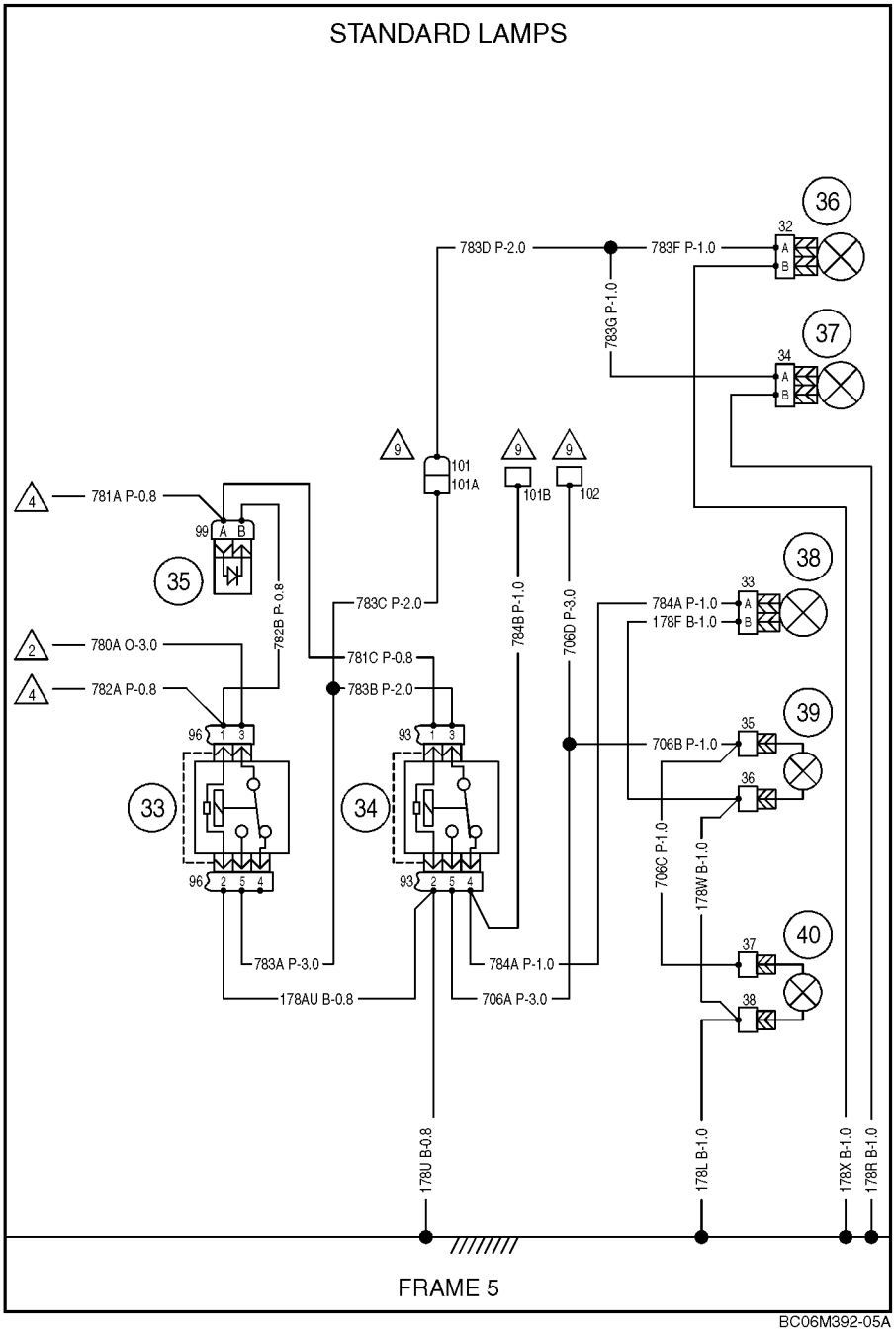
BC06M392-03A

12. JUMPER WIRE
13. SEAT SWITCH
14. SEAT BELT SWITCH
15. NOT USED
16. INTERLOCK START RELAY
17. NOT USED
18. NOT USED
19. NOT USED
20. NOT USED
21. FUEL HOLD-IN SOLENOID



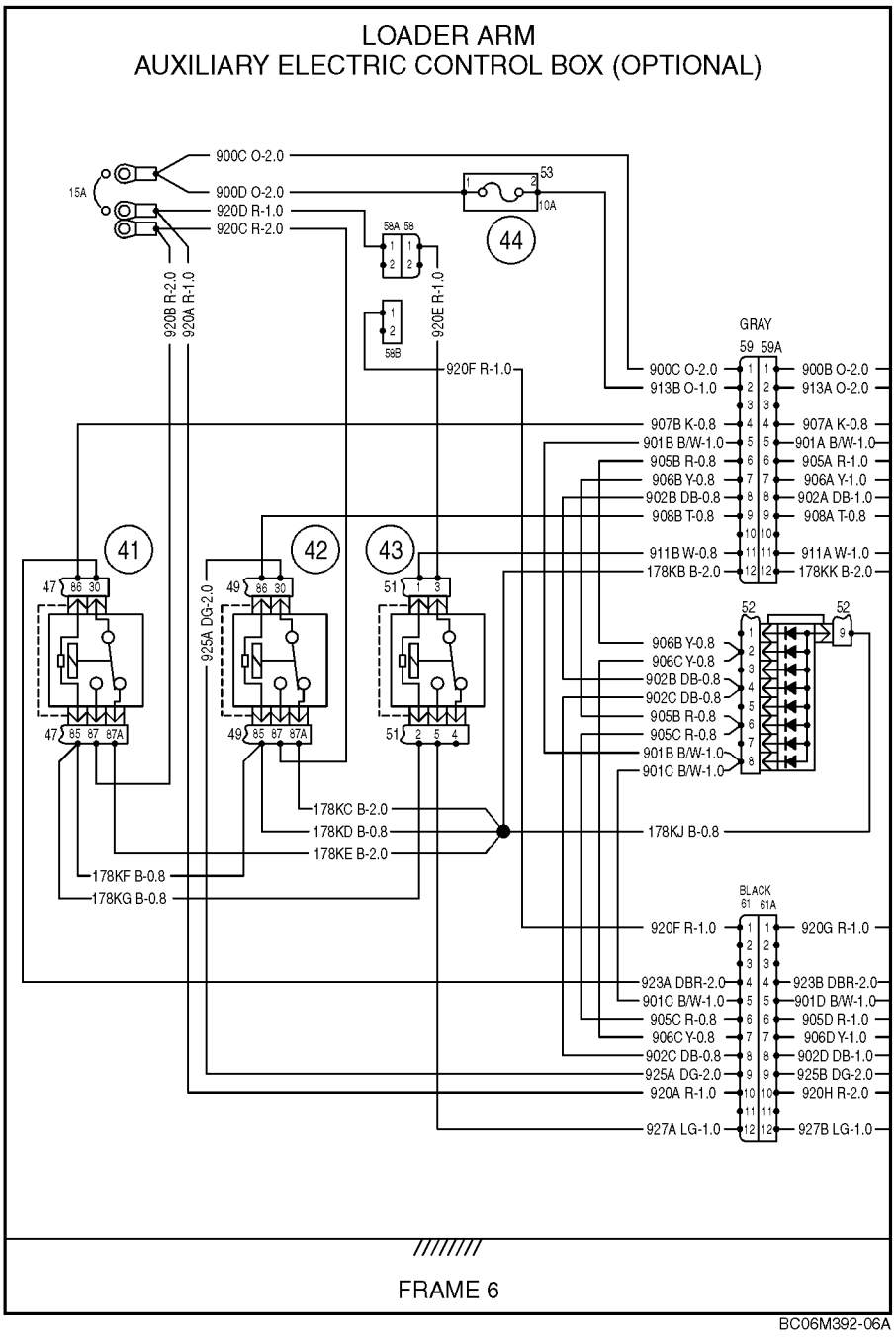
BC06M392-04A

22. FUEL PUMP (ISM ENGINE ONLY)
23. FUEL SENDER
24. ENGINE COOLANT TEMPERATURE SENDER
25. ENGINE OIL PRESSURE SWITCH
26. AIR FILTER RESTRICTION SWITCH
27. HYDRAULIC FILTER PRESSURE SWITCH
28. CHARGE PRESSURE SWITCH
29. HYDRAULIC OIL TEMPERATURE SWITCH
30. BRAKE RELEASE/TANDEM PUMP NEUTRAL OVERRIDE SWITCH
31. LOADER VALVE SOLENOID
32. LOADER VALVE SOLENOID



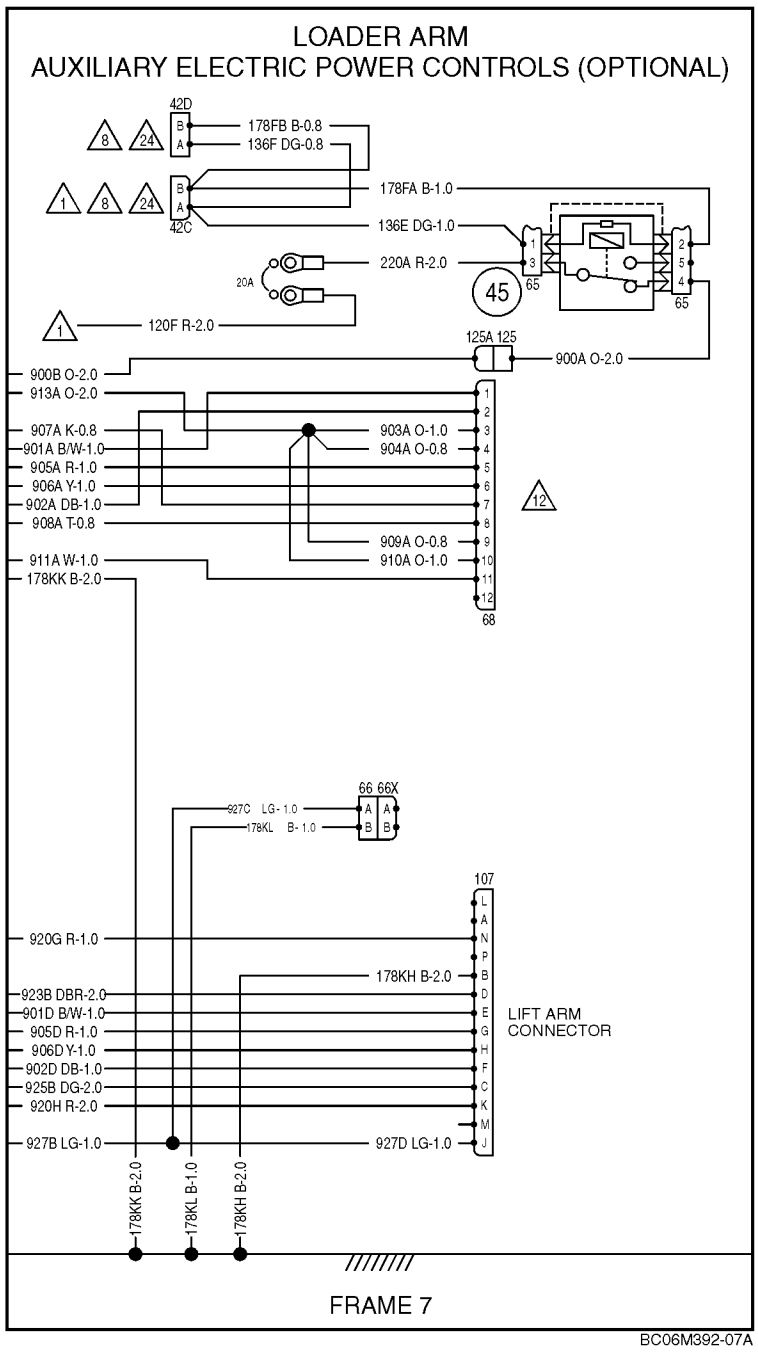
BC06M392-05A

33. LIGHT RELAY NO. 1
34. LIGHT RELAY NO. 2
35. DIODE
36. LEFT FRONT WORK LIGHT
37. RIGHT FRONT WORK LIGHT
38. REAR WORK LAMP
39. LEFT REAR INDICATOR LIGHT
40. RIGHT REAR INDICATOR LIGHT



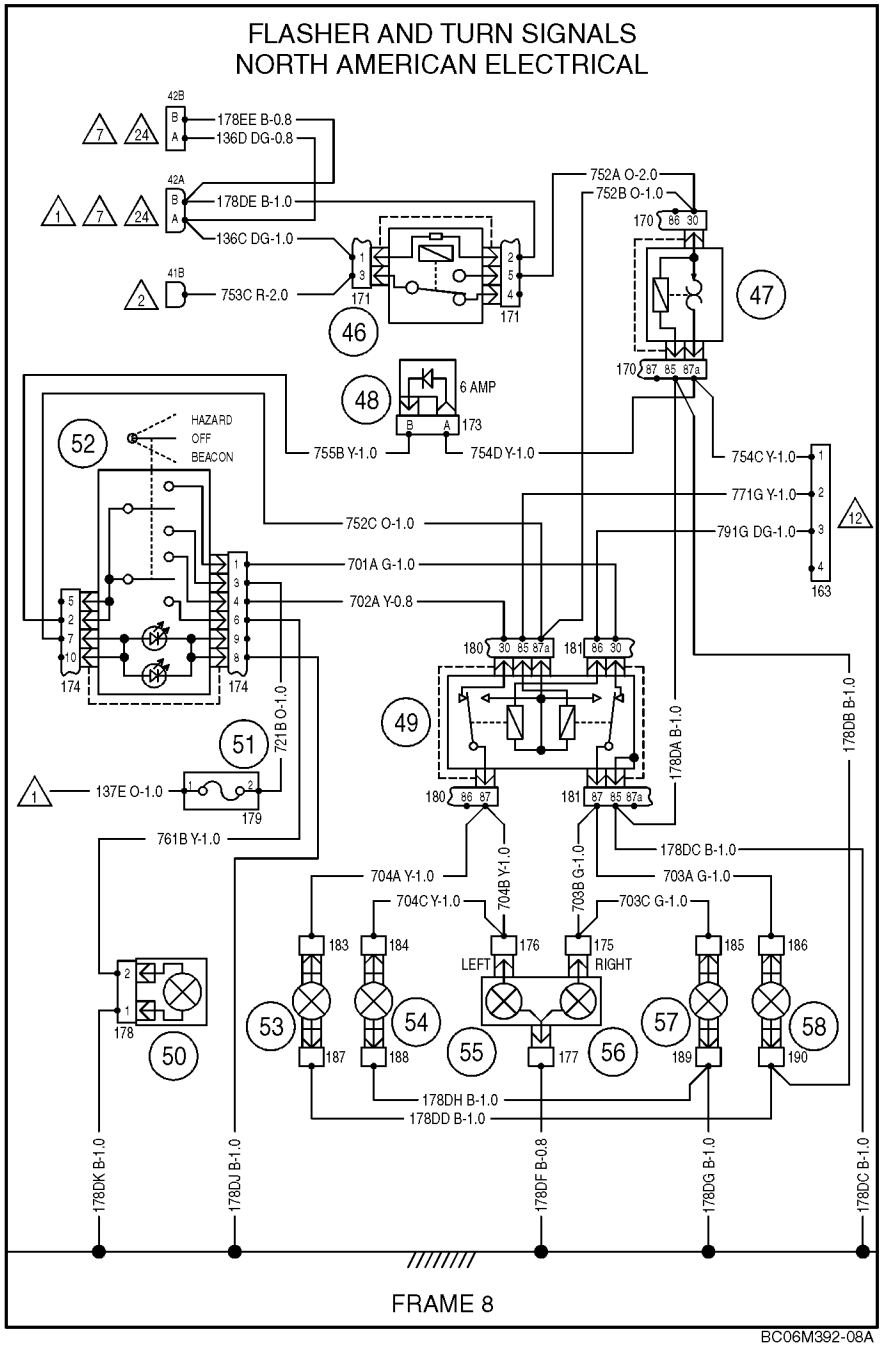
BC06M392-06A

41. MOTOR CONTROL LEFT RELAY
42. MOTOR CONTROL RIGHT RELAY
43. WIPER MOTOR RELAY
44. FUSE (10 AMP)



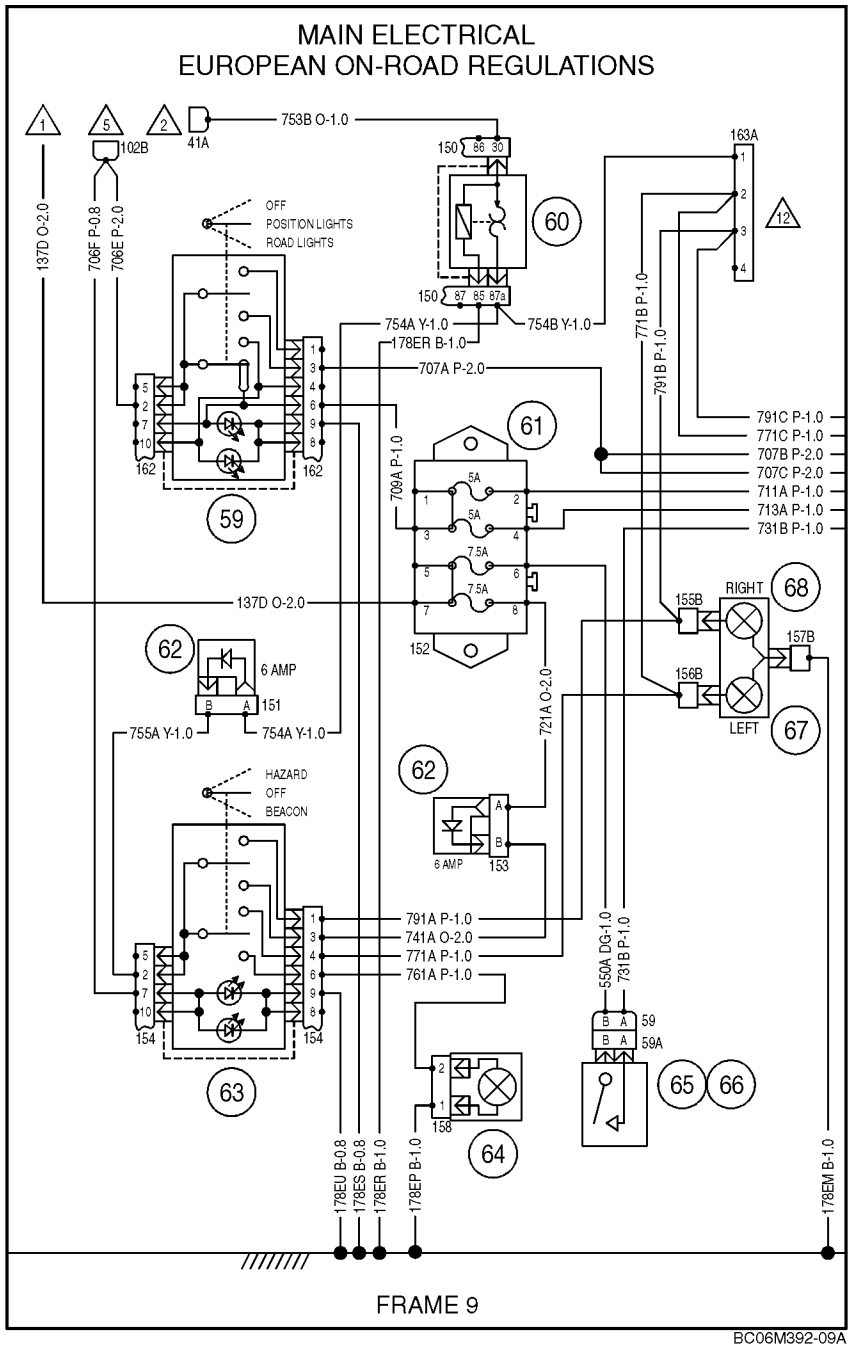
BC06M392-07A

45. ATTACHMENT RELAY



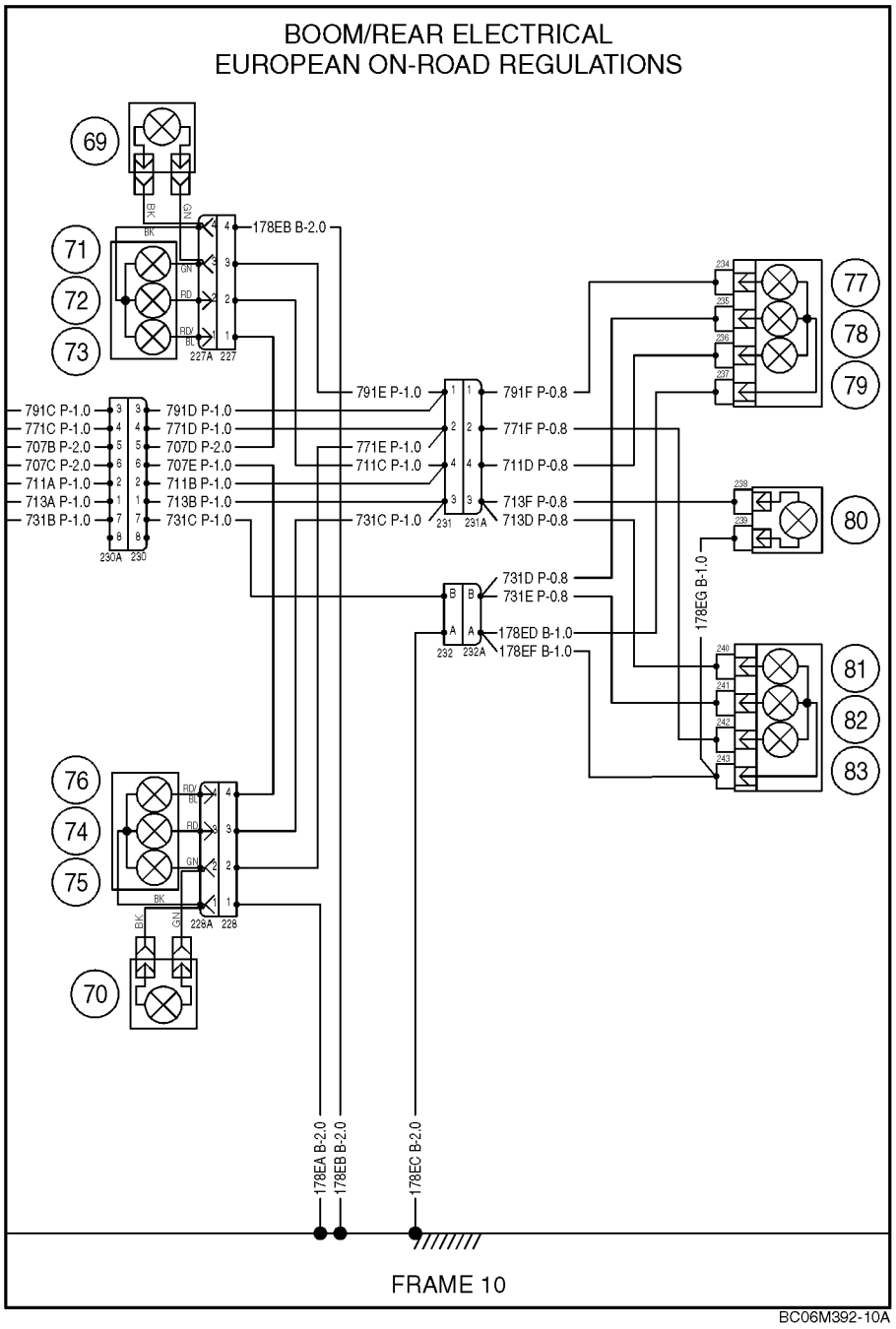
BC06M392-08A

46. HAZARD / TURN RELAY
47. FLASHER MODULE
48. DIODE (6 AMP)
49. TURN SIGNAL CONVERTER MODULE
50. BEACON
51. FUSE
52. HAZARD / BEACON SWITCH
53. LEFT FRONT FLASHING LAMP
54. LEFT REAR FLASHING LAMP
55. TURN INDICATOR LAMP (LEFT)
56. TURN INDICATOR LAMP (RIGHT)
57. RIGHT FRONT FLASHING LAMP
58. RIGHT REAR FLASHING LAMP



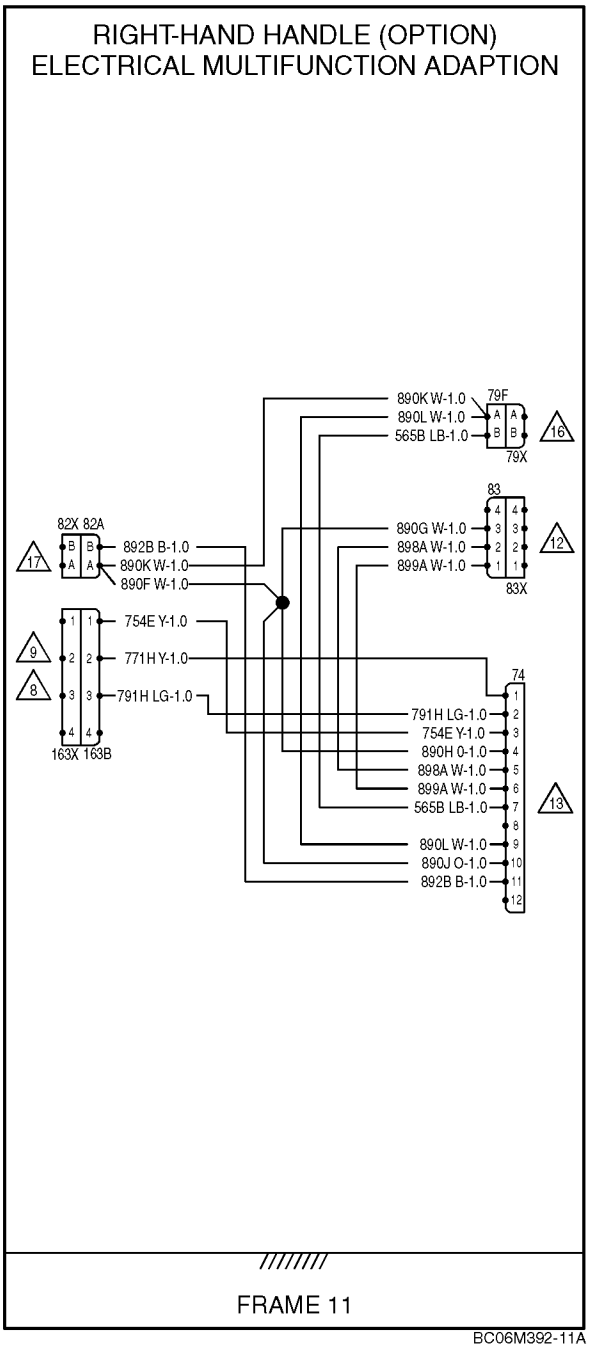
BC06M392-09A

59. ROAD LIGHT SWITCH (EURO)
60. FLASHER MODULE (EURO)
61. CAB FUSE BLOCK (EURO)
62. DIODE (6 AMP)
63. HAZARD / BEACON SWITCH (EURO)
64. BEACON (EURO)
65. BRAKE LAMP SWITCH (EURO)
66. BRAKE LAMP SWITCH (EURO)
67. TURN INDICATOR LAMP (LEFT) (EURO)
68. TURN INDICATOR LAMP (RIGHT) (EURO)

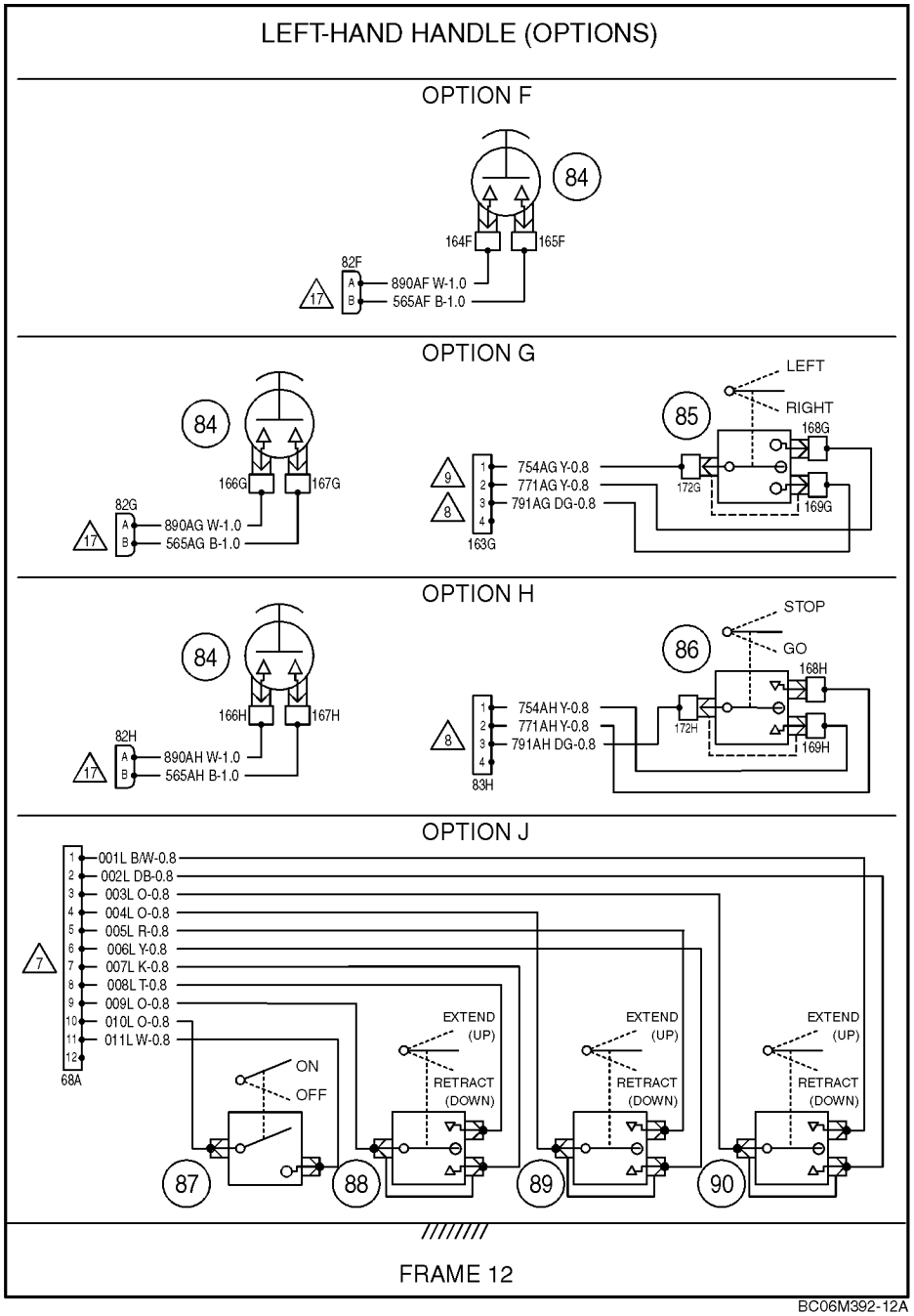


BC06M392-10A

69. OPTIONAL RIGHT TURN L;AMP (EURO)
70. OPTIONAL LEFT TURN L;AMP (EURO)
71. RIGHT FRONT TURN LAMP (EURO)
72. RIGHT FRONT POSITION LAMP (EURO)
73. RIGHT FRONT ROAD LAMP (EURO)
74. LEFT FRONT POSITION LAMP (EURO)
75. LEFT TURN LAMP (EURO)
76. LEFT FRONT ROAD LAMP (EURO)
77. RIGHT REAR TURN LAMP (EURO)
78. RIGHT REAR BRAKE LAMP (EURO)
79. RIGHT REAR POSITION LAMP (EURO)
80. LICENSE PLATE LIGHT
81. LEFT REAR POSITION LAMP (EURO)
82. LEFT REAR BRAKE LAMP (EURO)
83. LEFT REAR TURN LAMP (EURO)



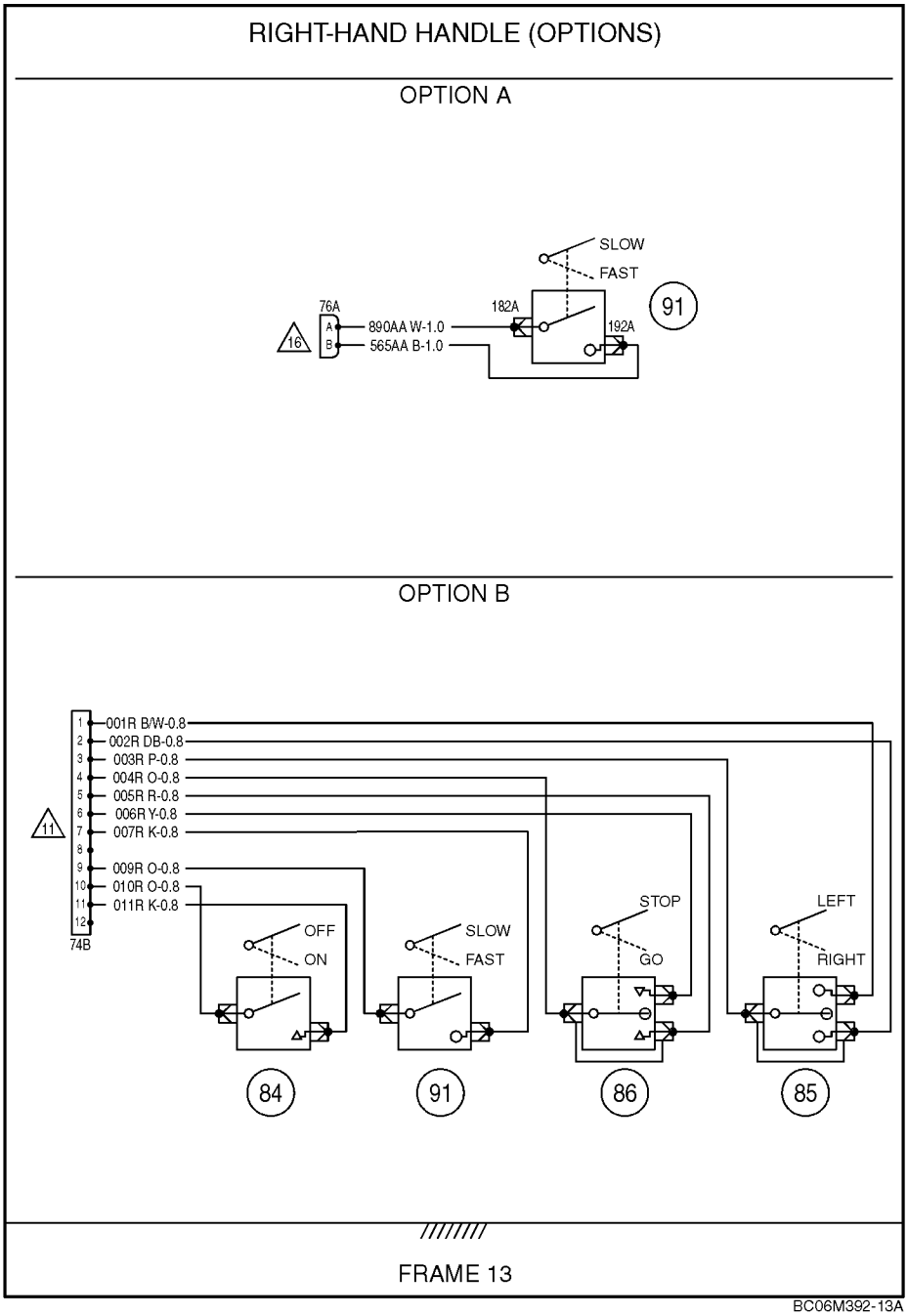
BC06M392-11A



BC06M392-12A

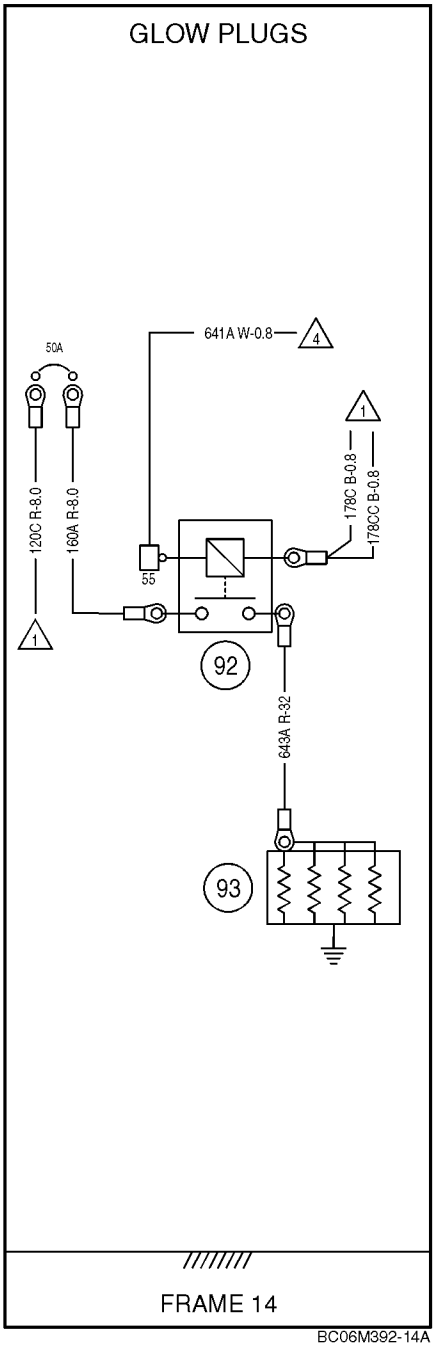
BC06M392-12A

84. HORN SWITCH
85. TURN SIGNAL SWITCH
86. AUXILIARY HYDRAULIC SWITCH
87. FRONT ELECTRIC CONTROL SWITCH NO. 1
88. FRONT ELECTRIC CONTROL SWITCH NO. 2
89. FRONT ELECTRIC CONTROL SWITCH NO. 3
90. FRONT ELECTRIC CONTROL SWITCH NO. 4



BC06M392-13A

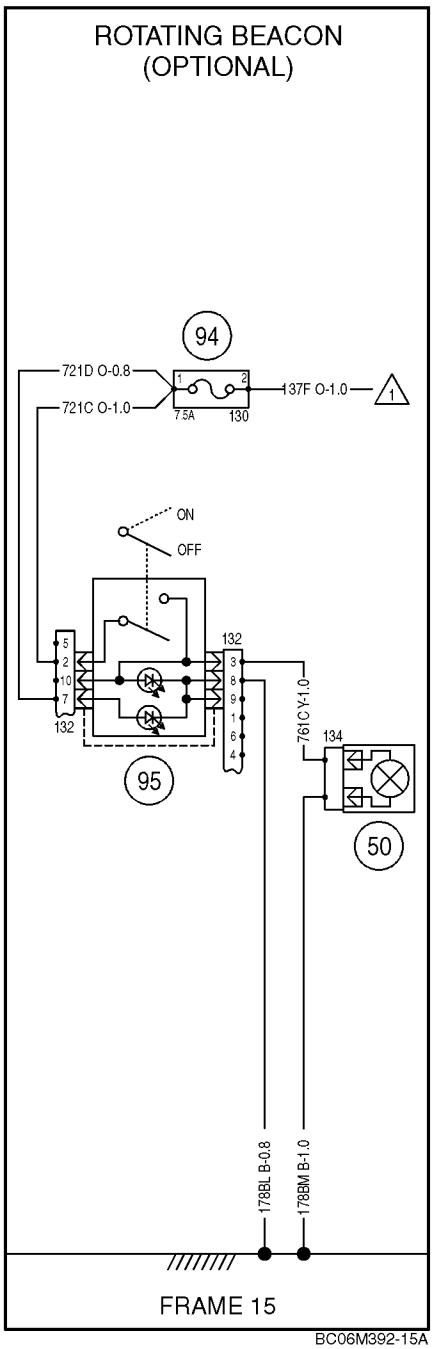
84. HORN SWITCH
85. TURN SIGNAL SWITCH
86. AUXILIARY HYDRAULIC SWITCH
91. TWO- SPEED SWITCH



BC06M392-14A

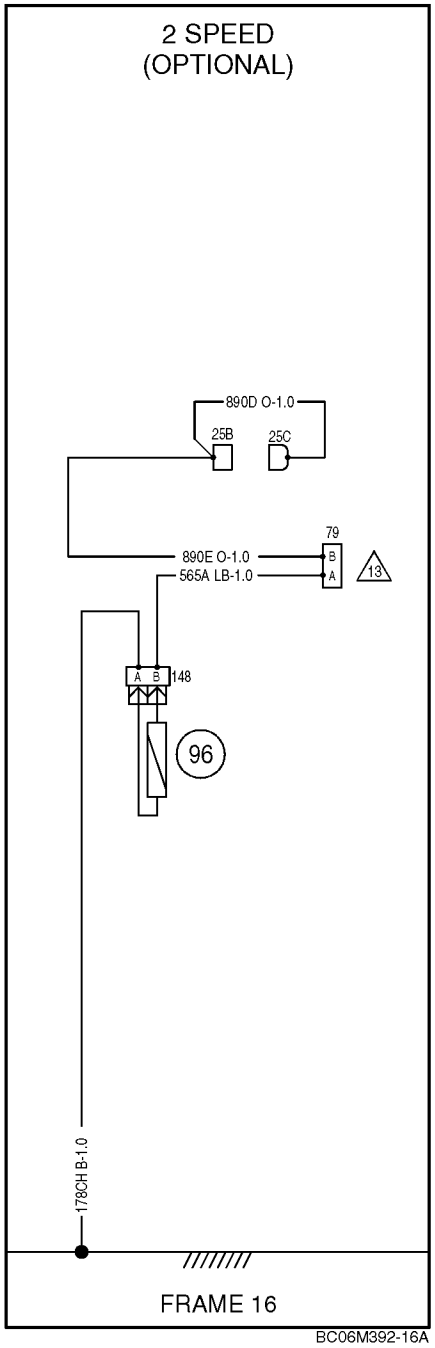
92. PRE-HEATER RELAY

93. GLOW PLUGS
(3 CYLINDER ENGINE = 3)
(4 CYLINDER ENGINE = 4



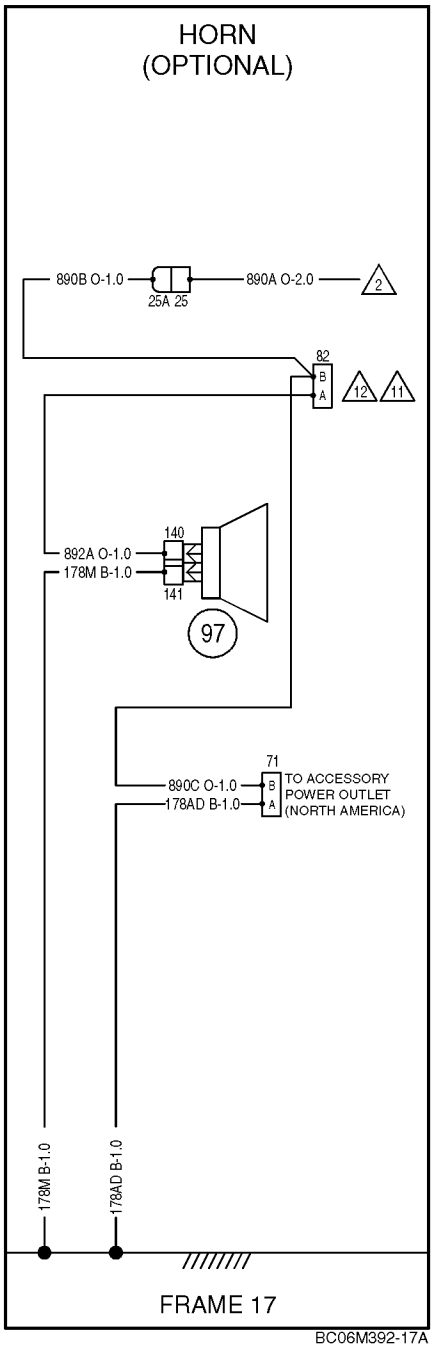
BC06M392-15A

94. FUSE (7.5 AMP)
95. BEACON SWITCH
50. BEACON



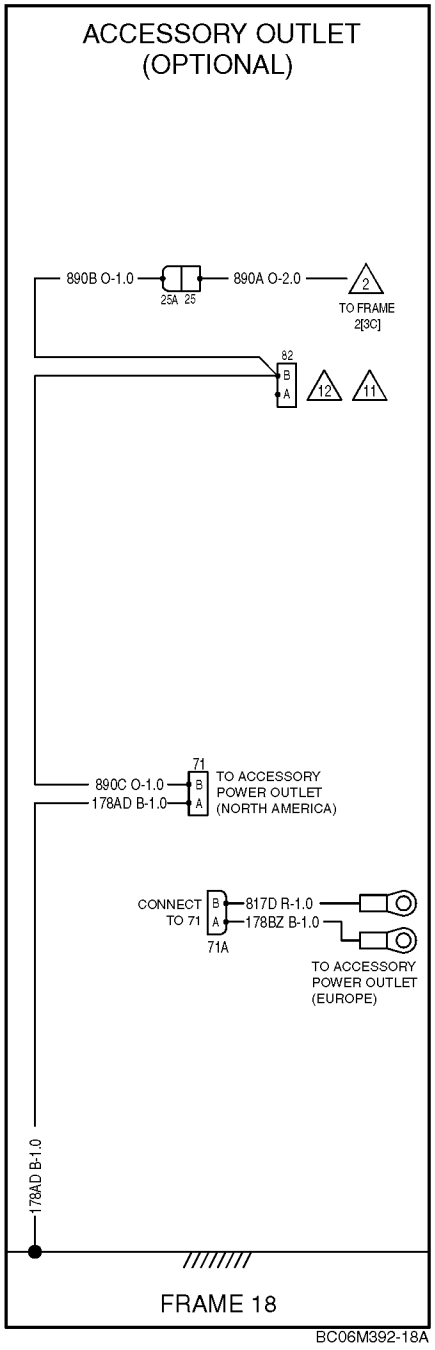
BC06M392-16A

96. TWO-SPEED SOLENOID

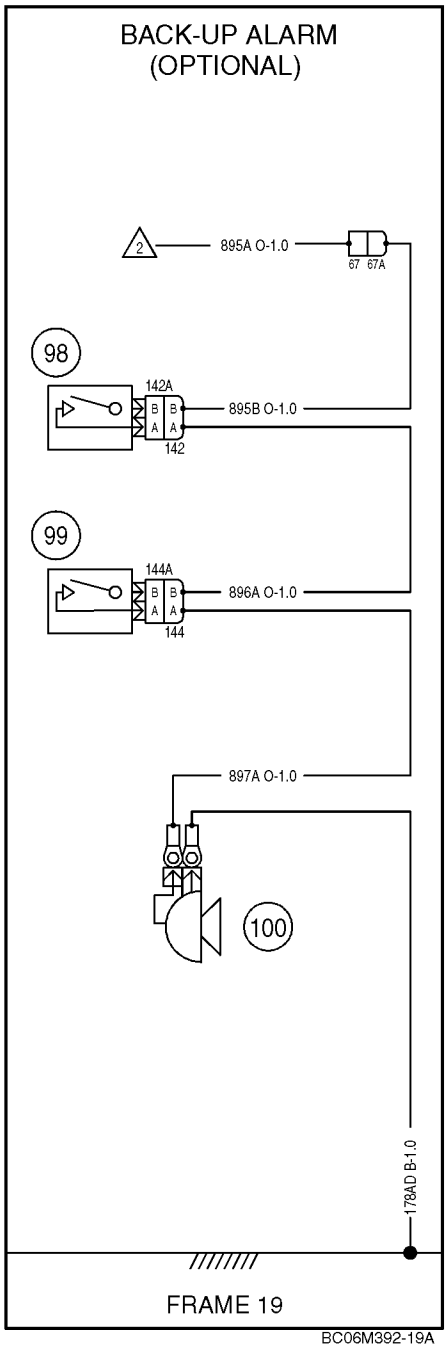


BC06M392-17A

97. HORN (OPTIONAL)

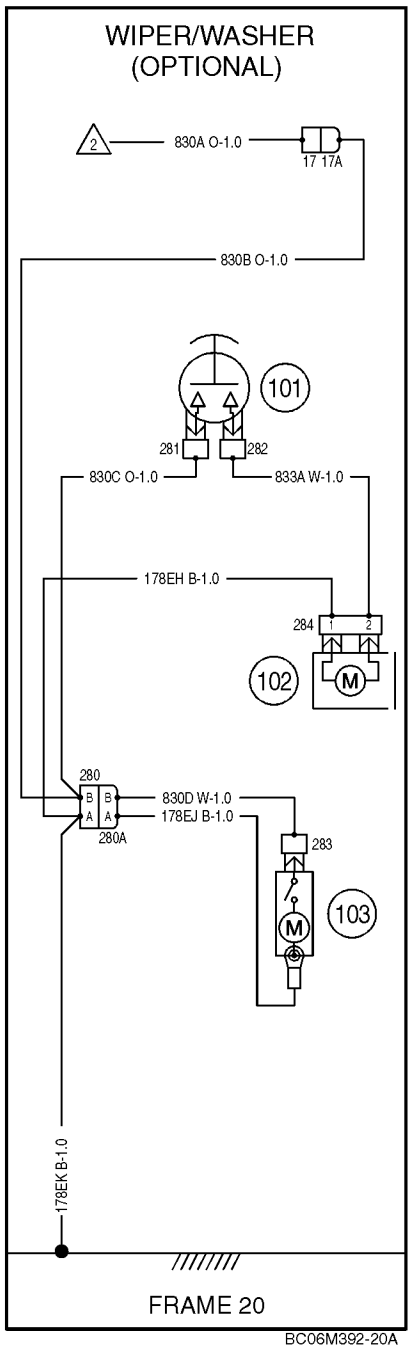


BC06M392-18A



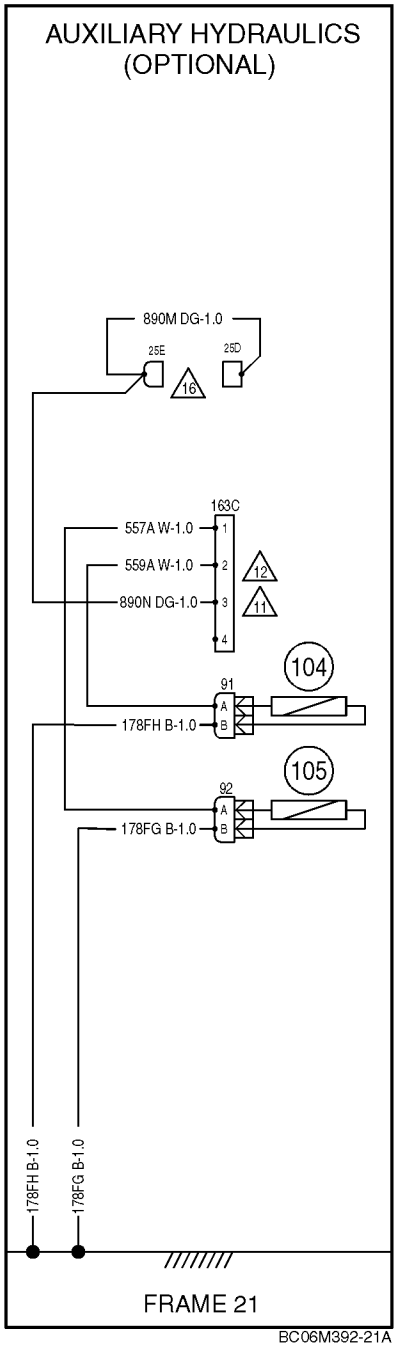
BC06M392-19A

98. BACK-UP ALARM SWITCH (LEFT) (OPTIONAL)
99. BACK-UP ALARM SWITCH (RIGHT) (OPTIONAL)
100. BACK-UP ALARM (OPTIONAL)



BC06M392-20A

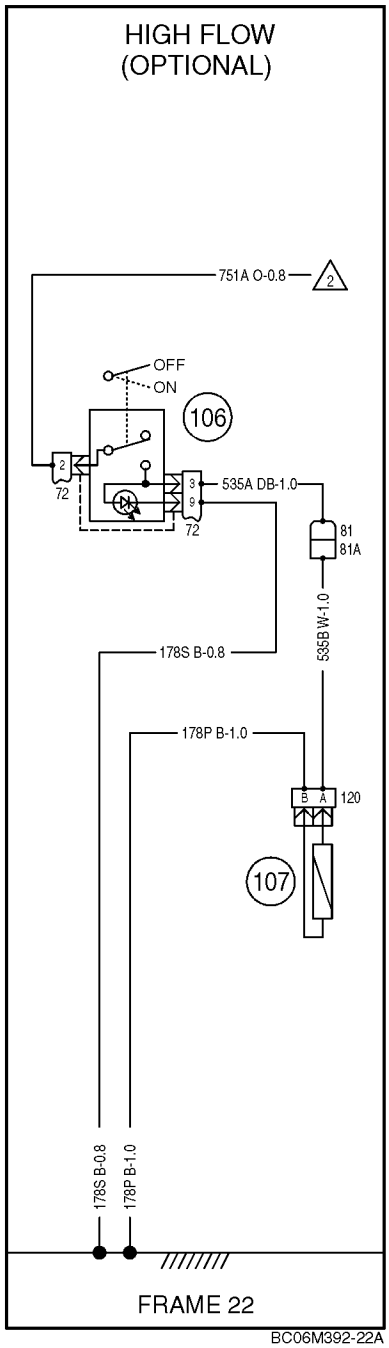
101.WIPER/WASHER SWITCH (OPTIONAL)
102.WASHER PUMP
103.WIPER MOTOR



104.SECOND AUXILIARY HYDRAULIC SOLENOID NO. 1

105.SECOND AUXILIARY HYDRAULIC SOLENOID NO. 2

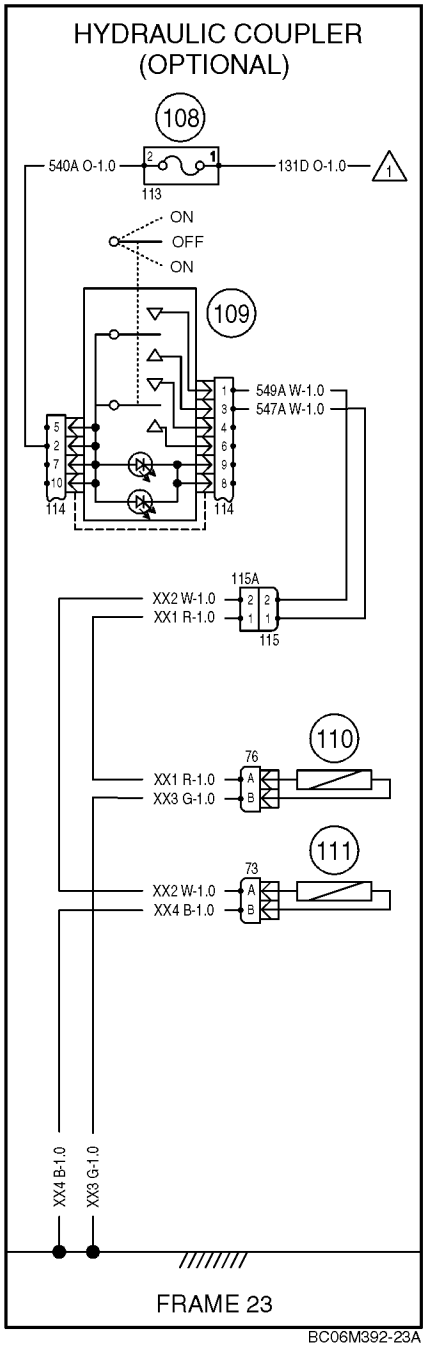
BC06M392-21A



BC06M392-22A

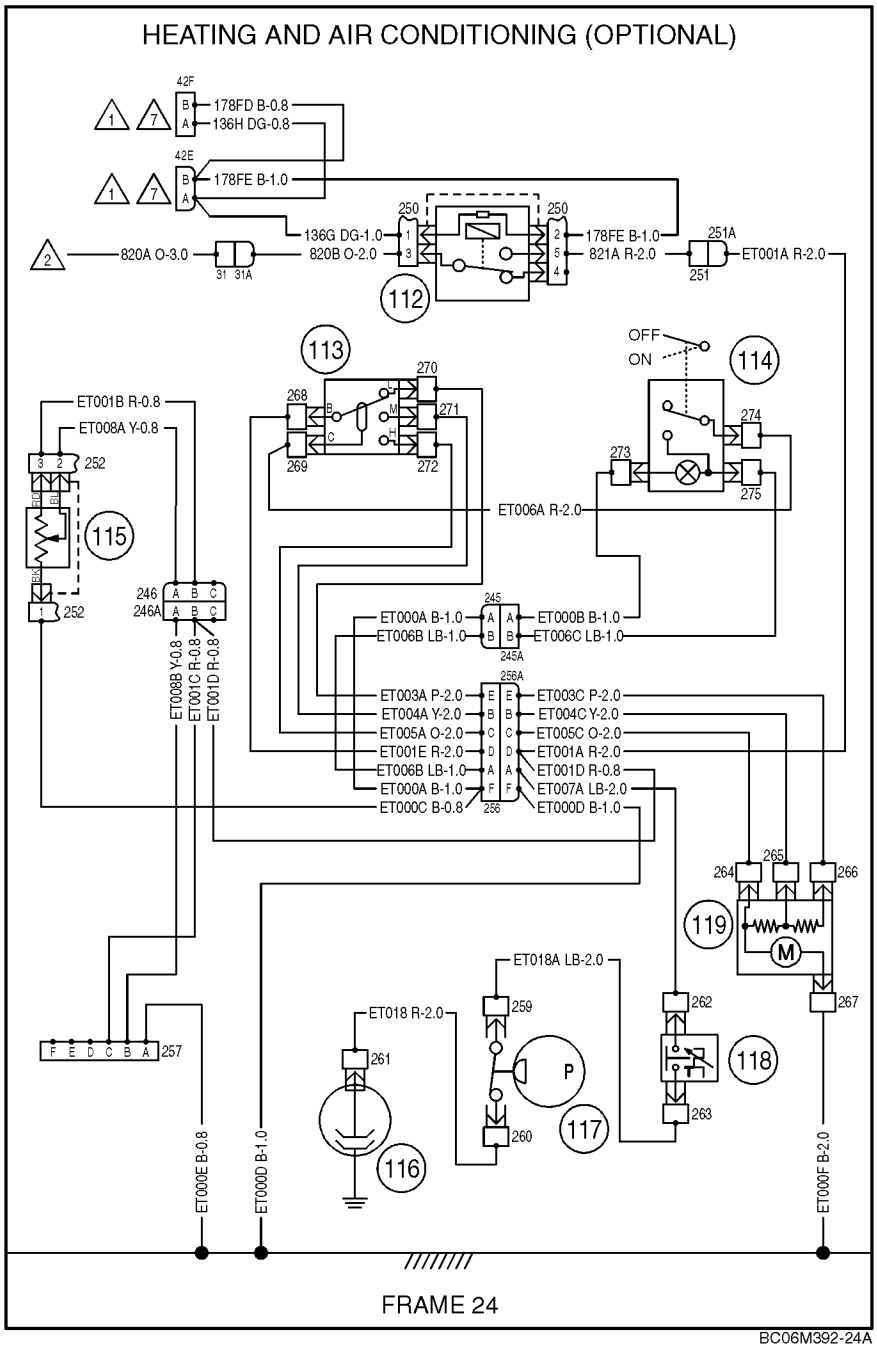
106.HIGH FLOW SWITCH (OPTIONAL)

107.HIGH FLOW SOLENOID (OPTIONAL)



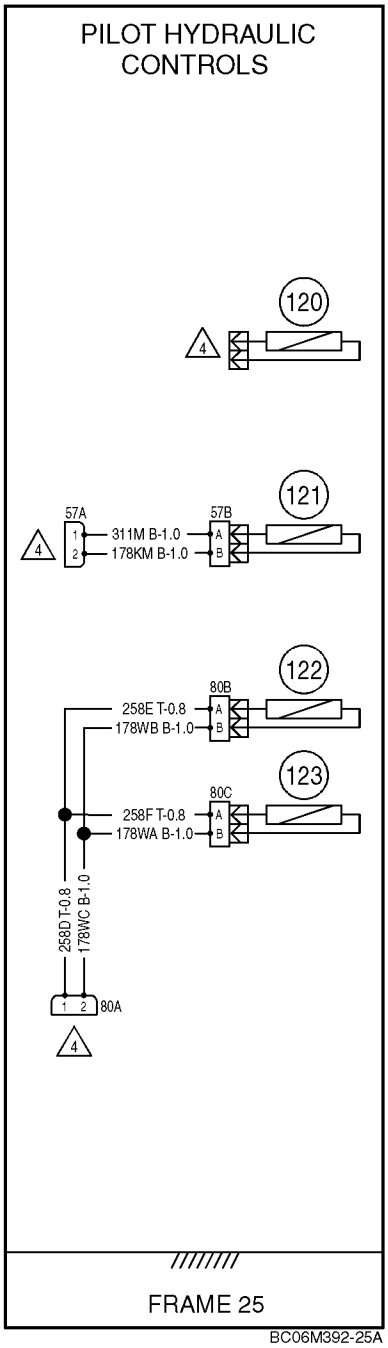
BC06M392-23A

108.FUSE
109.HYDRAULIC COUPLER SWITCH (OPTIONAL)
110.HYDRAULIC COUPLER RELEASE SOLENOID (OPTIONAL)
111.HYDRAULIC COUPLER ENGAGE SOLENOID (OPTIONAL)



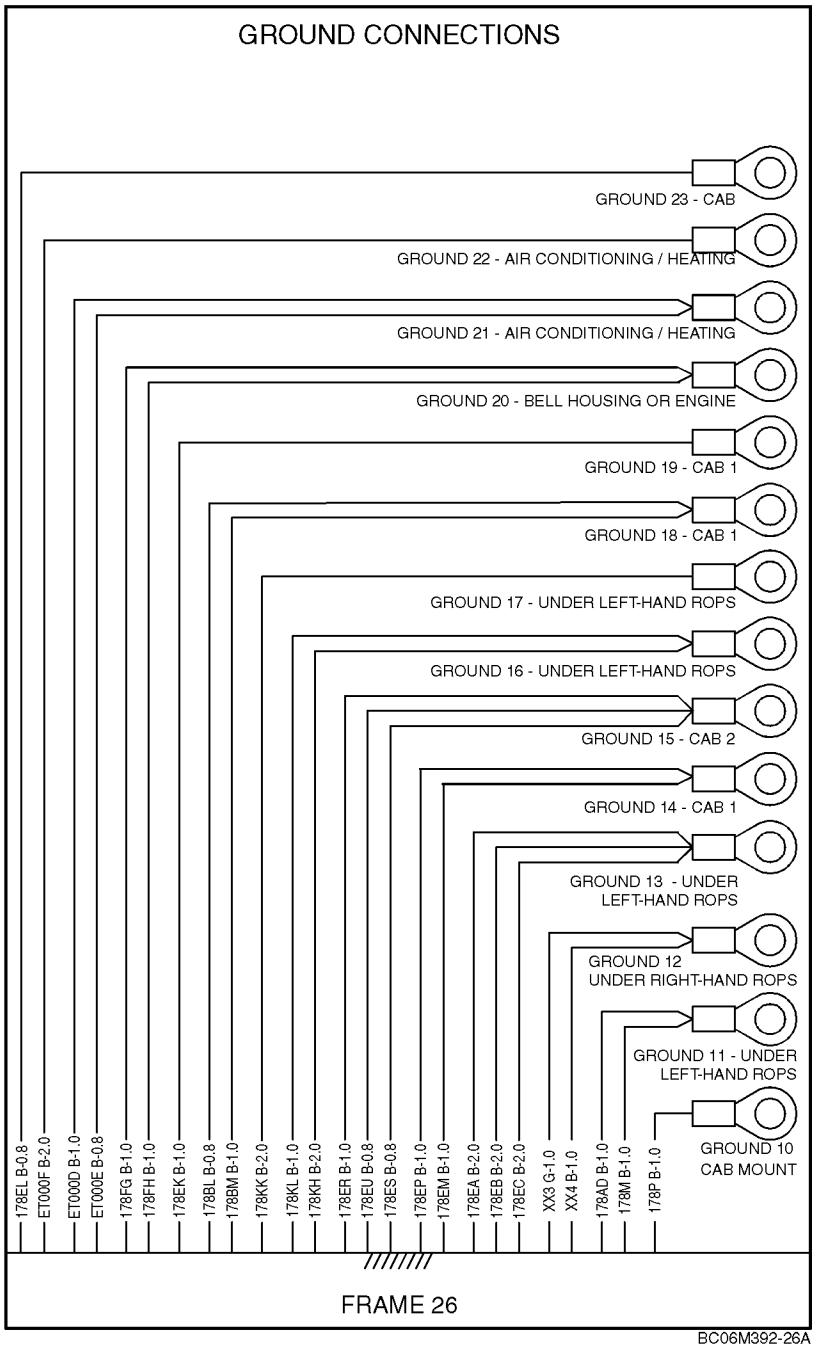
BC06M392-24A

112.HEATER/AIR CONDITIONER RELAY (OPTIONAL)
113.BLOWER SWITCH (OPTIONAL)
114.AIR CONDITIONER SWITCH (OPTIONAL)
115.HEATER CONTROL SWITCH (OPTIONAL)
116.COMPRESSOR CLUTCH
117.PRESSURE SWITCH
118.THERMOSTAT
119.BLOWER MOTOR

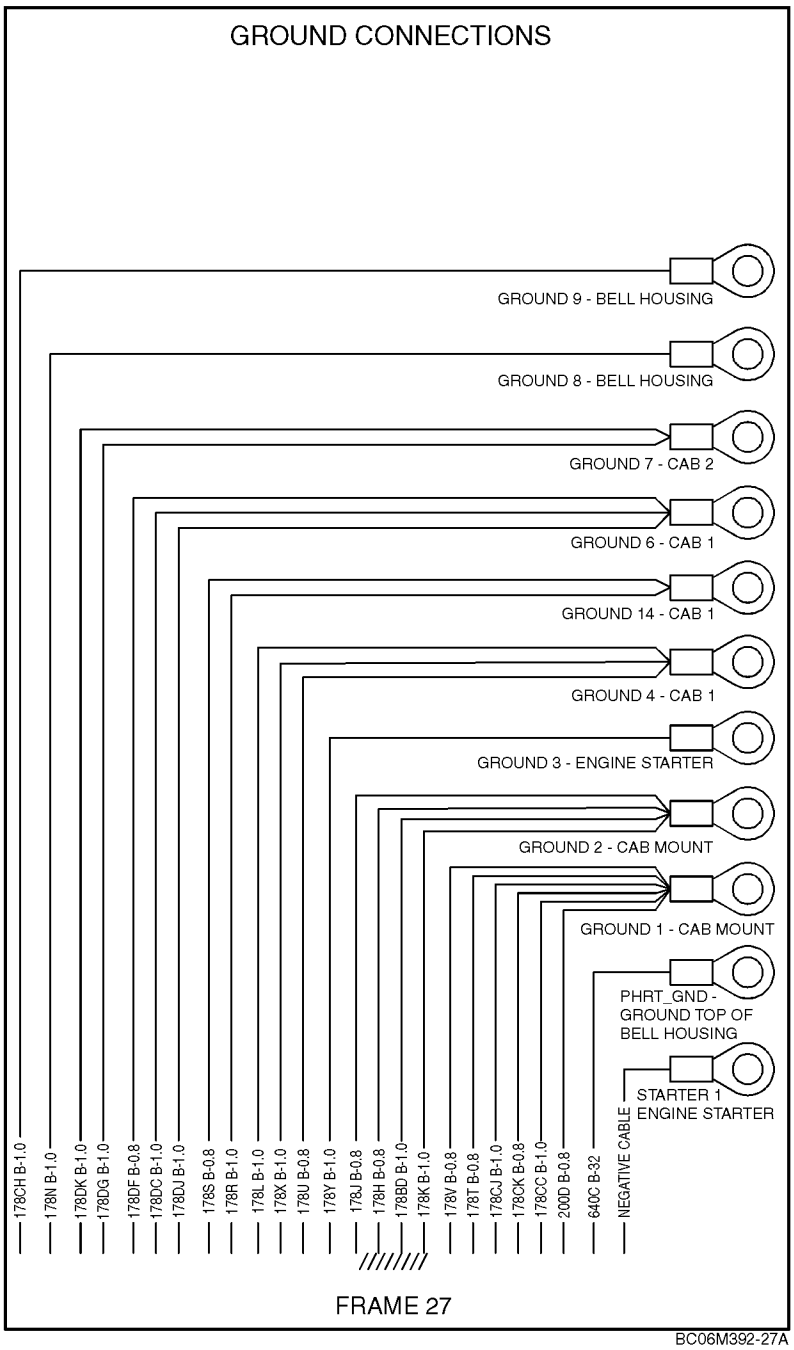


BC06M392-25A

120.LOADER CONTROL PRESSURE SOLENOID
121.MAGNETIC DETENT SOLENOID
122.GROUND DRIVE CONTROL PRESSURE SOLENOID
123.BRAKE VALVE SOLENOID



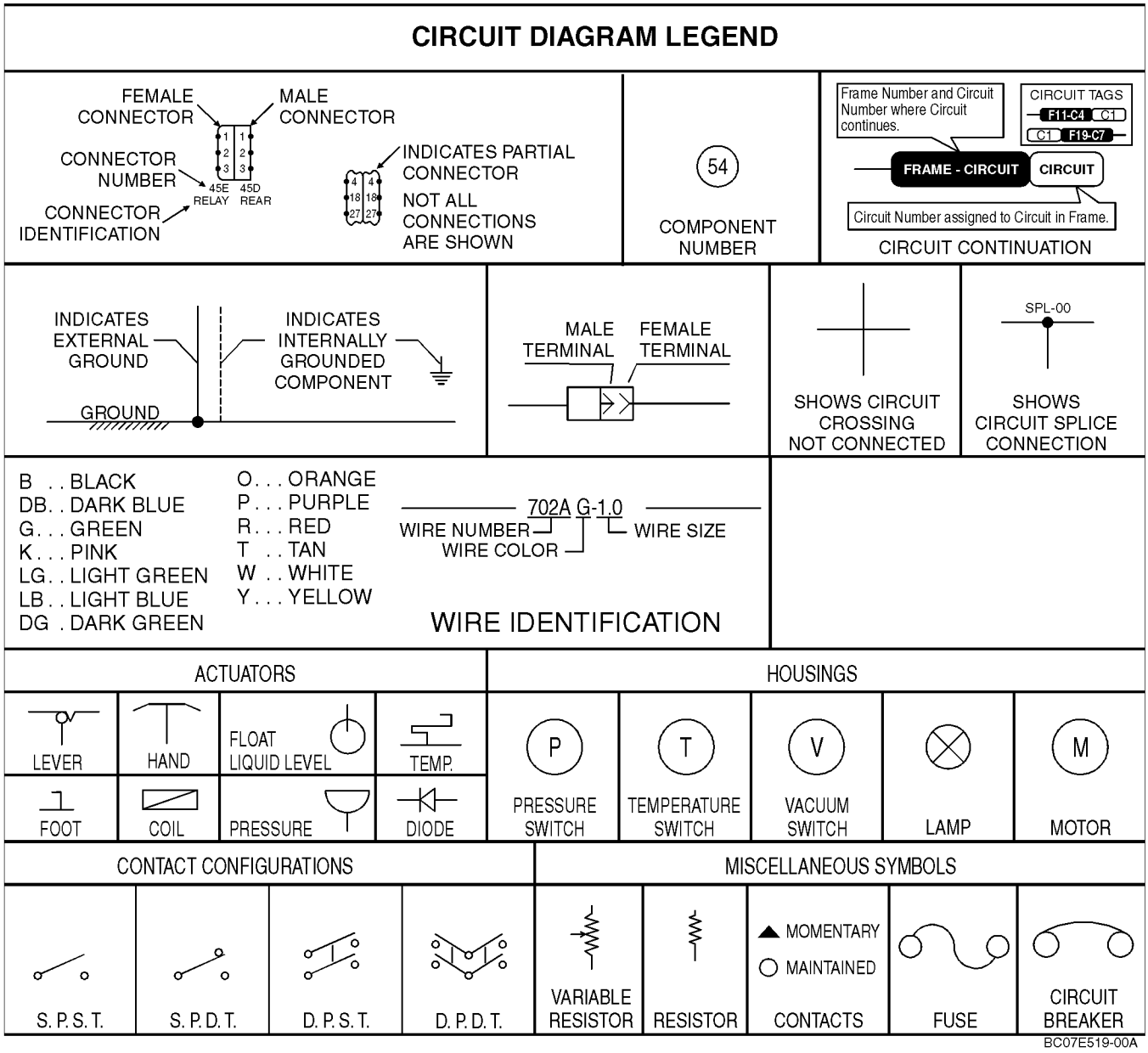
BC06M392-26A



BC06M392-27A

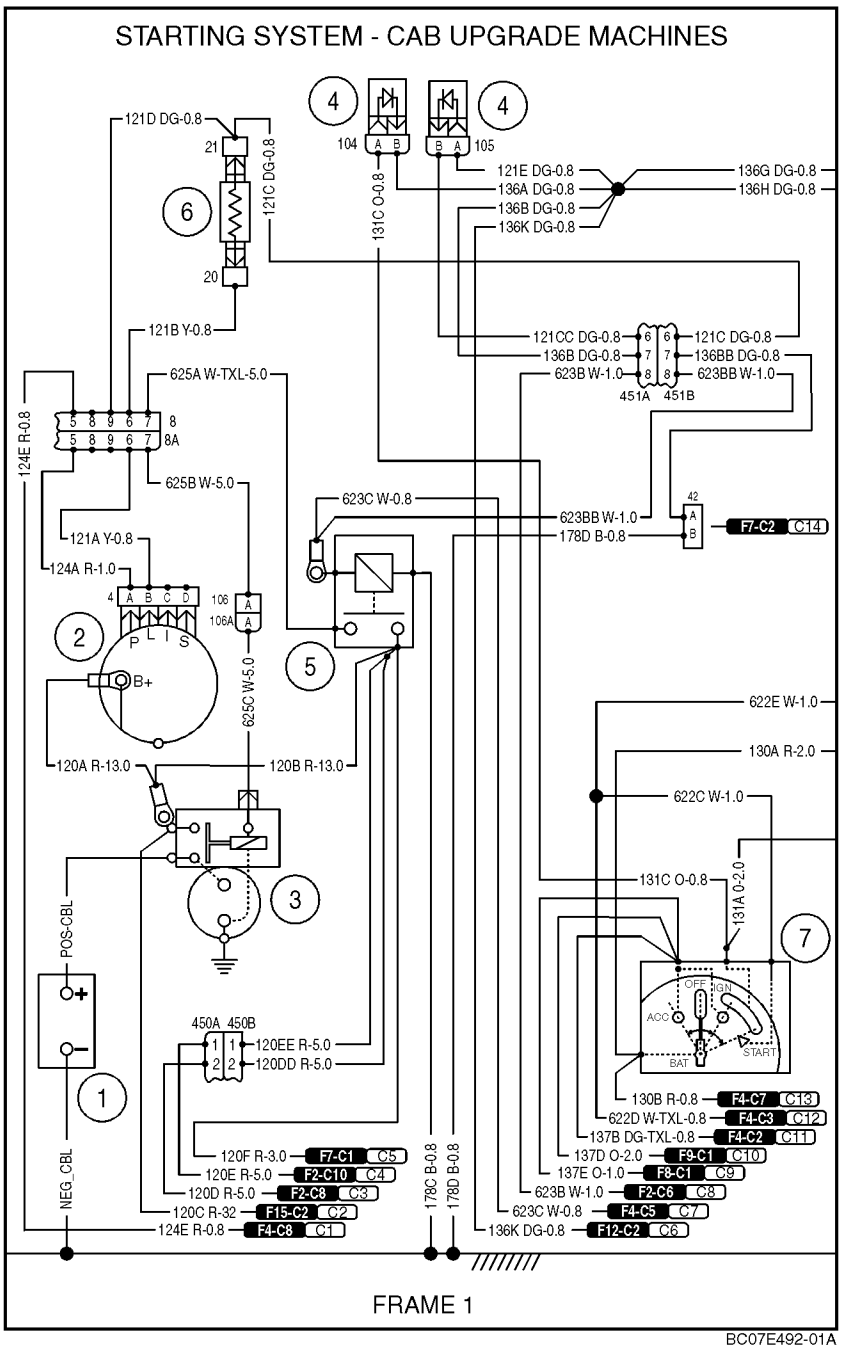
CAB UPGRADE MACHINES
Wire Identification and Circuit Diagram Legend

CIRCUIT DIAGRAM LEGEND



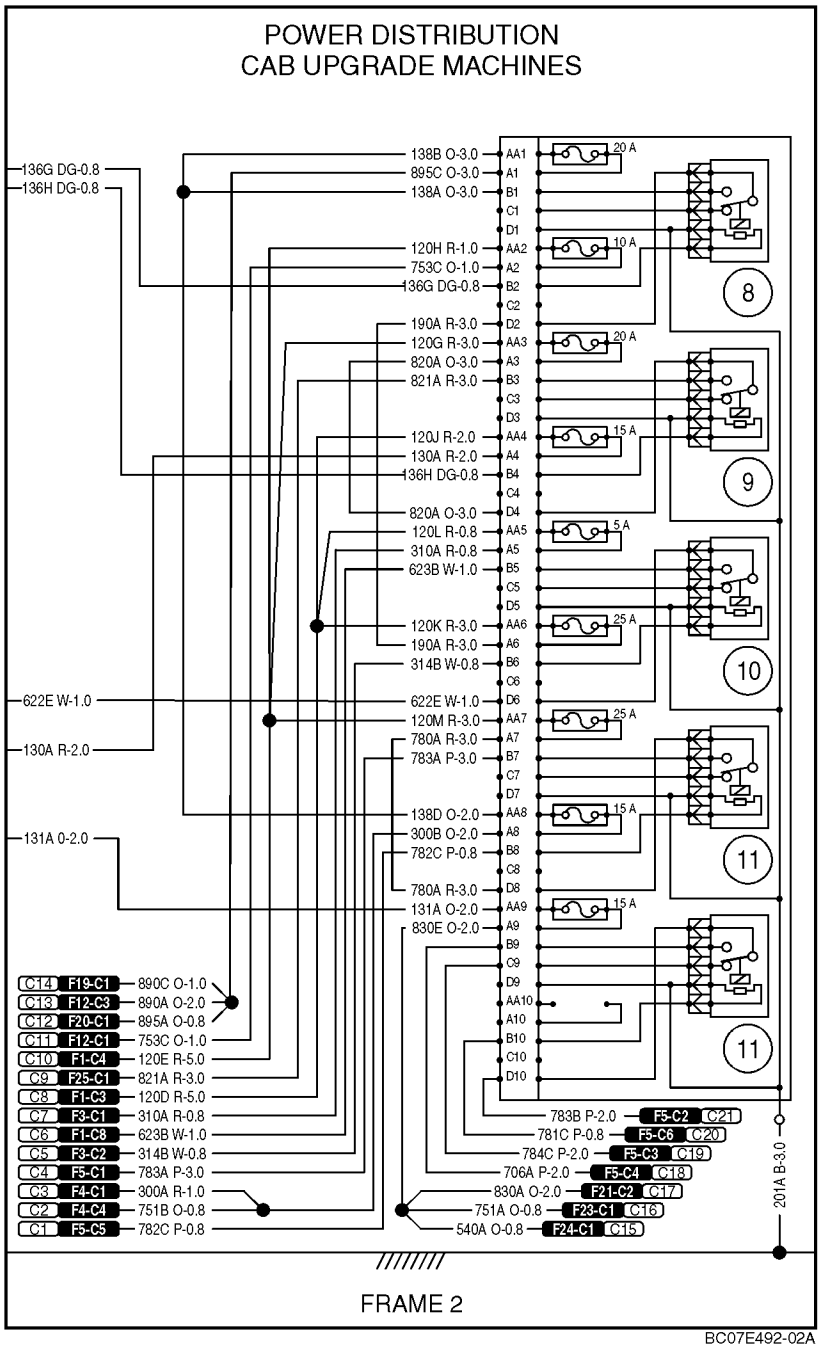
BC07E519-00A

BC07E519-00A



BC07E492-01A

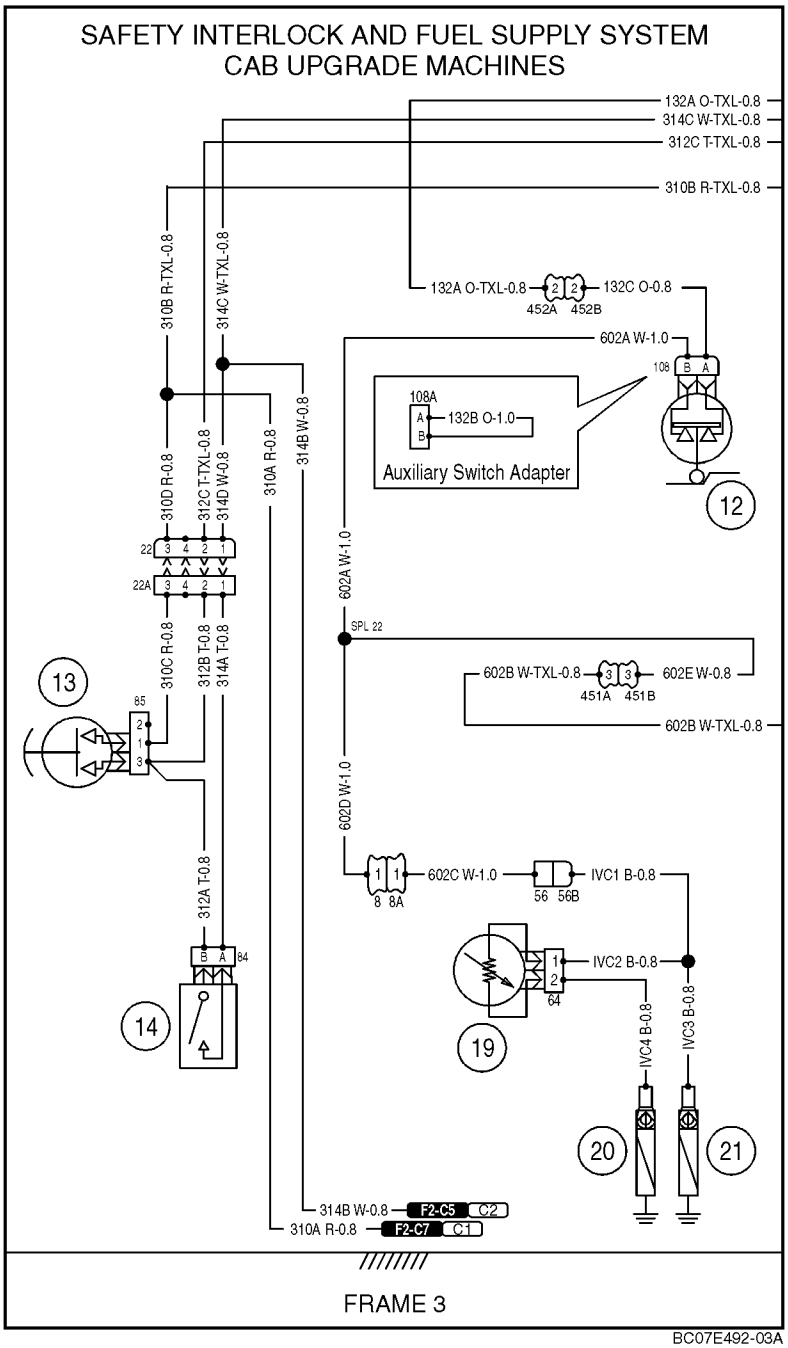
1. BATTERY
2. ALTERNATOR
3. STARTER AND SOLENOID
4. REVERSE POLARITY DIODE
5. STARTER RELAY
6. RESISTOR
7. IGNITION SWITCH



BC07E492-02A

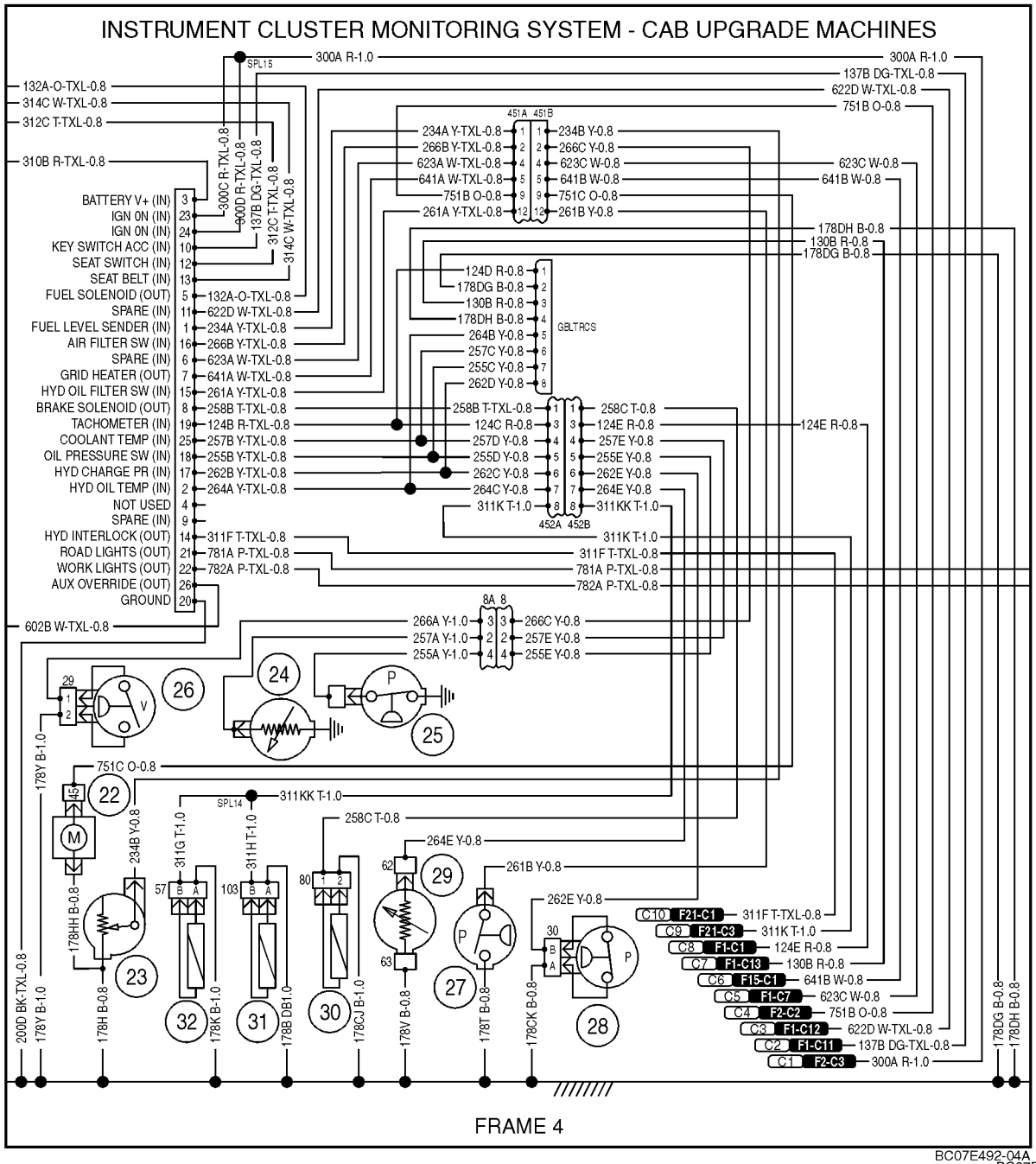
BC07E492-02A

8. ELECTRICAL ACCESSORY (RUN RELAY)
9. HVAC RELAY
10. STARTER RELAY
11. LAMP RELAY NO. 1
11. LAMP RELAY NO. 2

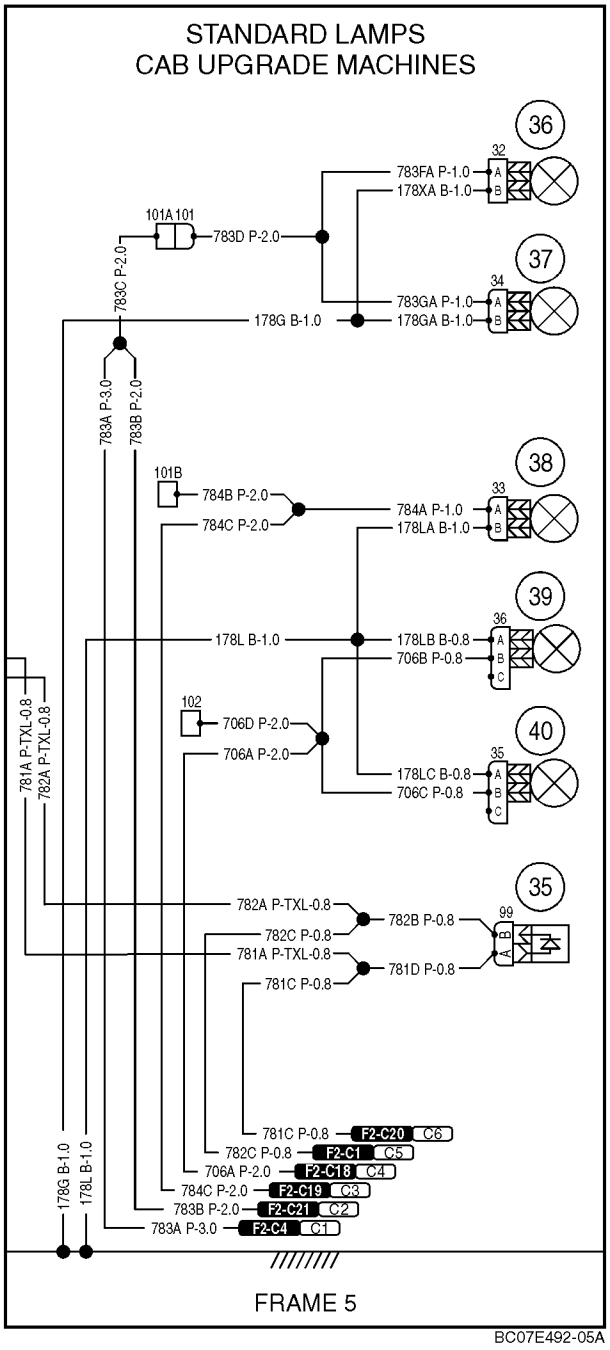


BC07E492-03A

12. AUXILIARY OVERRIDE SWITCH
13. SEAT SWITCH
14. SEAT BELT SWITCH
15. NOT USED
16. NOT USED
17. NOT USED
18. NOT USED
19. COLD START ADVANCE TEMPERATURE SENDER
20. COLD START ADVANCE SOLENOID
21. FUEL HOLD-IN SOLENOID

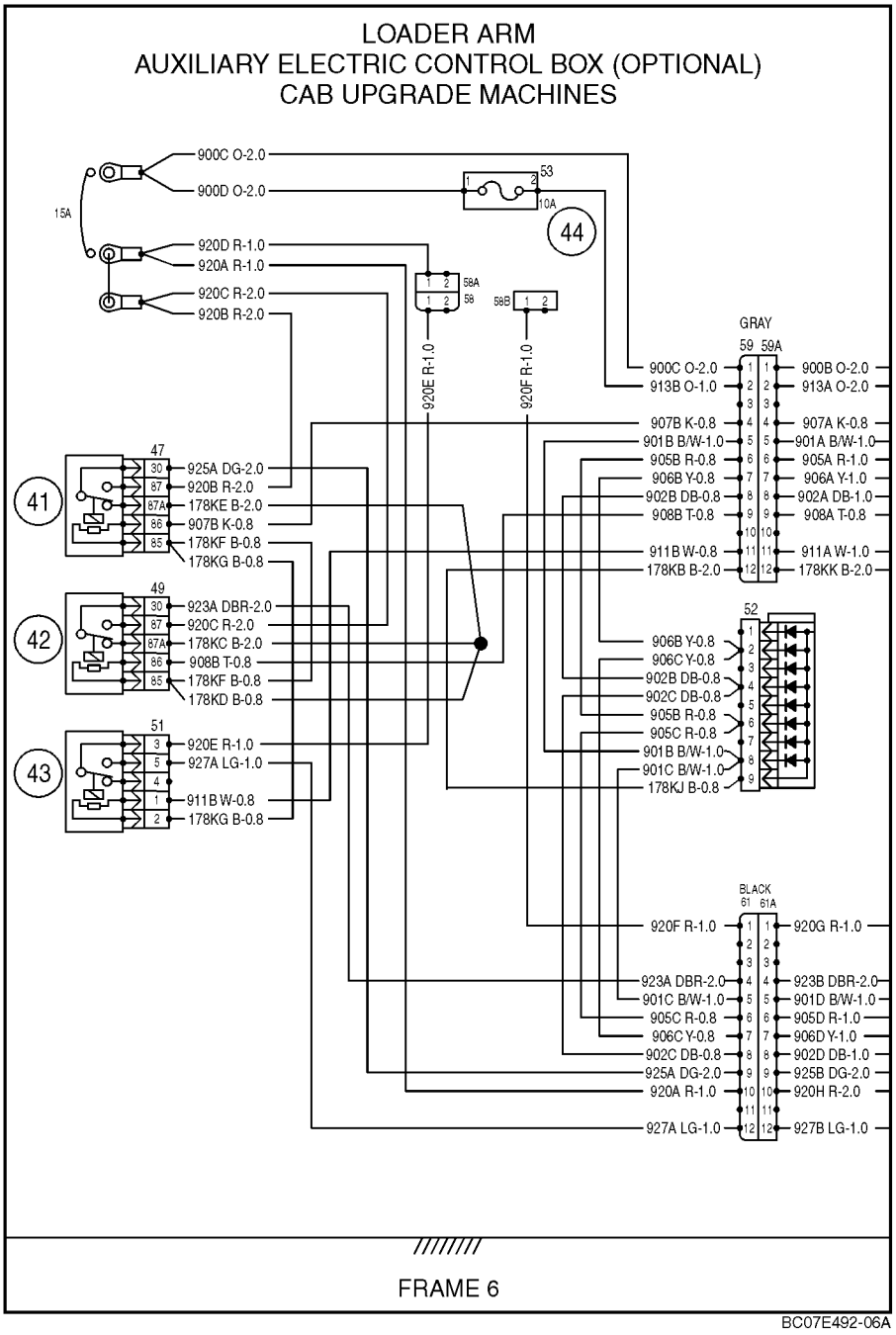


22. FUEL PUMP (ISM ENGINE ONLY)
23. FUEL SENDER
24. ENGINE COOLANT TEMPERATURE SENDER
25. ENGINE OIL PRESSURE SWITCH
26. AIR FILTER RESTRICTION SWITCH
27. HYDRAULIC FILTER PRESSURE SWITCH
28. CHARGE PRESSURE SWITCH
29. HYDRAULIC OIL TEMPERATURE SENDER
30. BRAKE RELEASE/TANDEM PUMP NEUTRAL OVERRIDE SWITCH
31. LOADER VALVE SOLENOID
32. LOADER VALVE SOLENOID



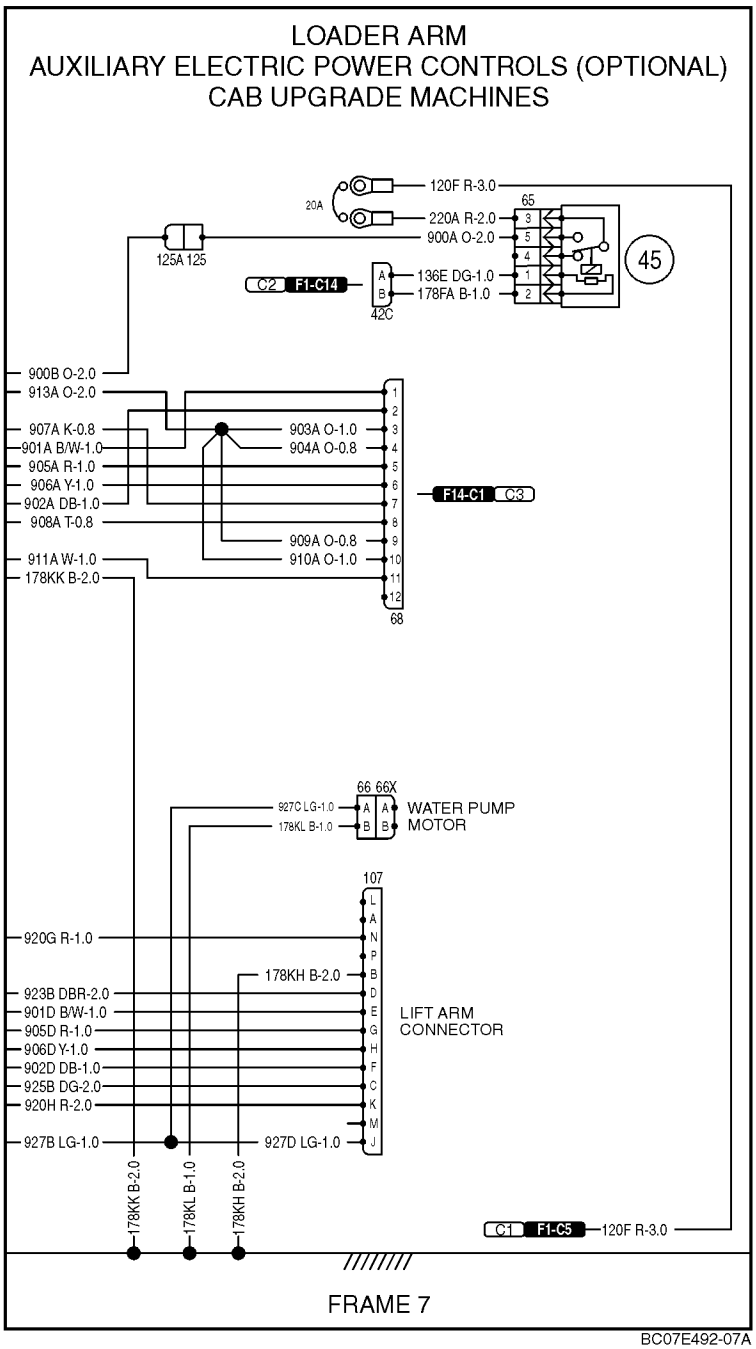
BC07E492-05A

33. NOT USED
34. NOT USED
35. DIODE
36. LEFT FRONT WORK LIGHT
37. RIGHT FRONT WORK LIGHT
38. REAR WORK LAMP
39. LEFT REAR INDICATOR LIGHT
40. RIGHT REAR INDICATOR LIGHT



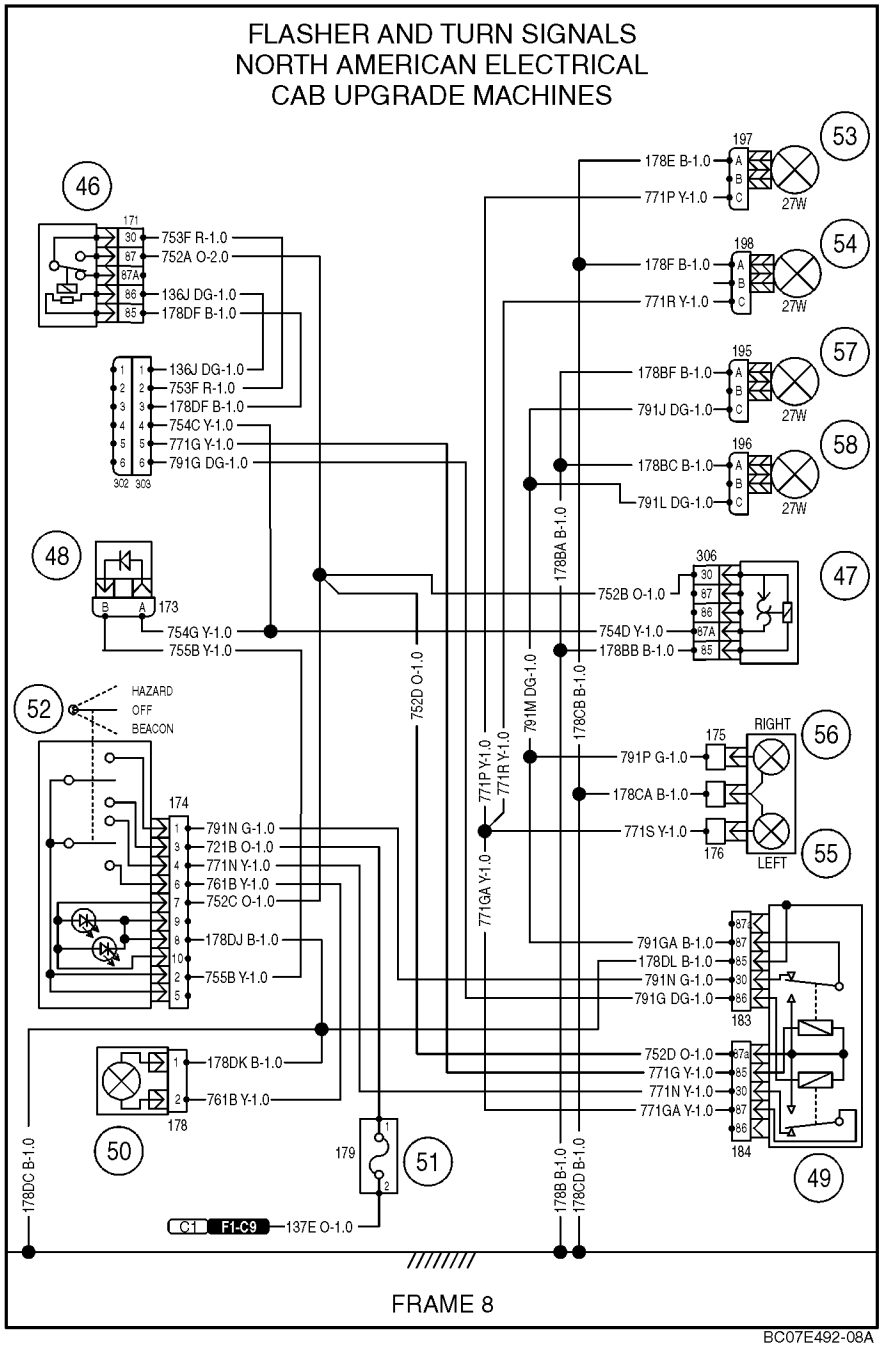
BC07E492-06A

41. MOTOR CONTROL LEFT RELAY
42. MOTOR CONTROL RIGHT RELAY
43. WIPER MOTOR RELAY
44. FUSE (10 AMP)



BC07E492-07A

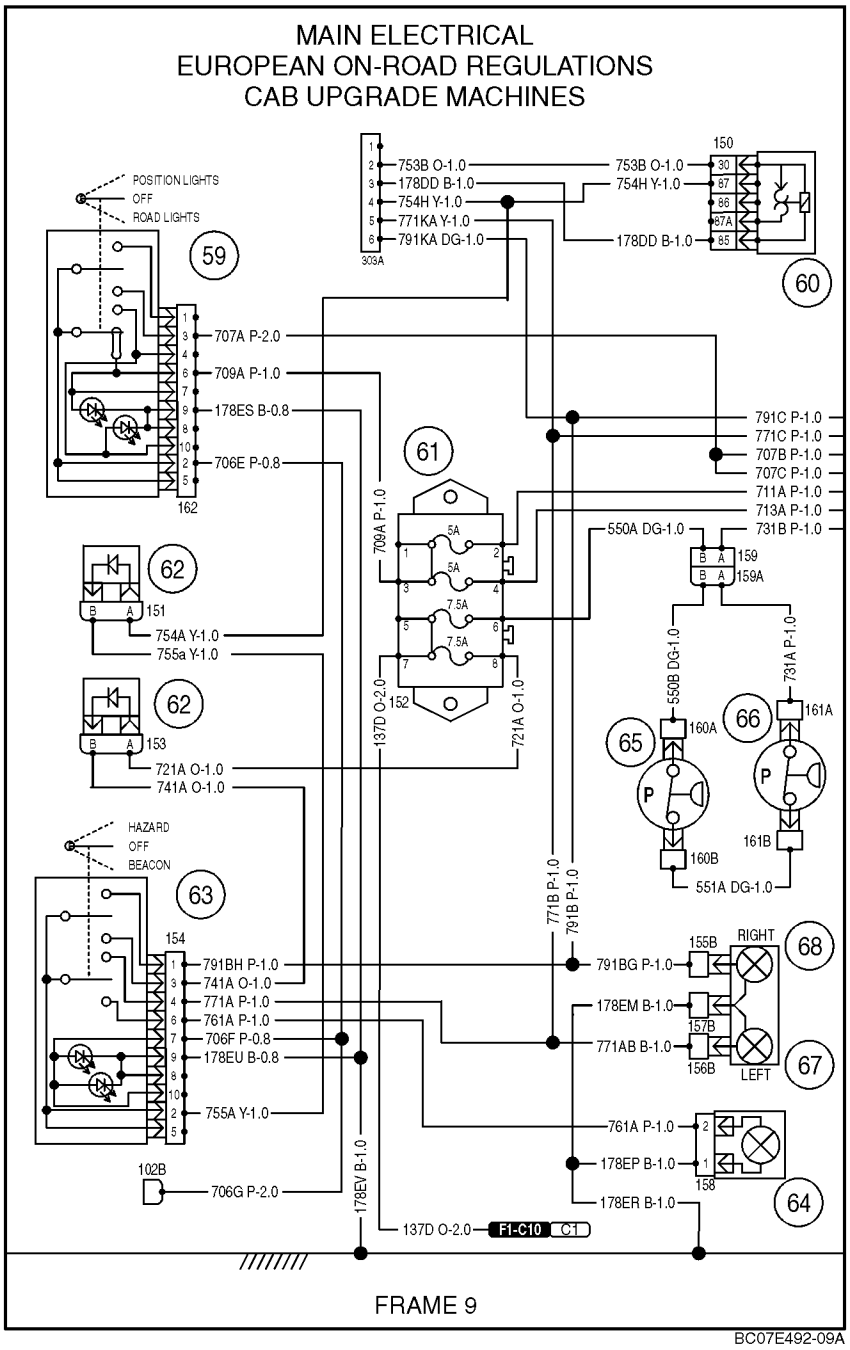
45. ATTACHMENT RELAY



BC07E492-08A

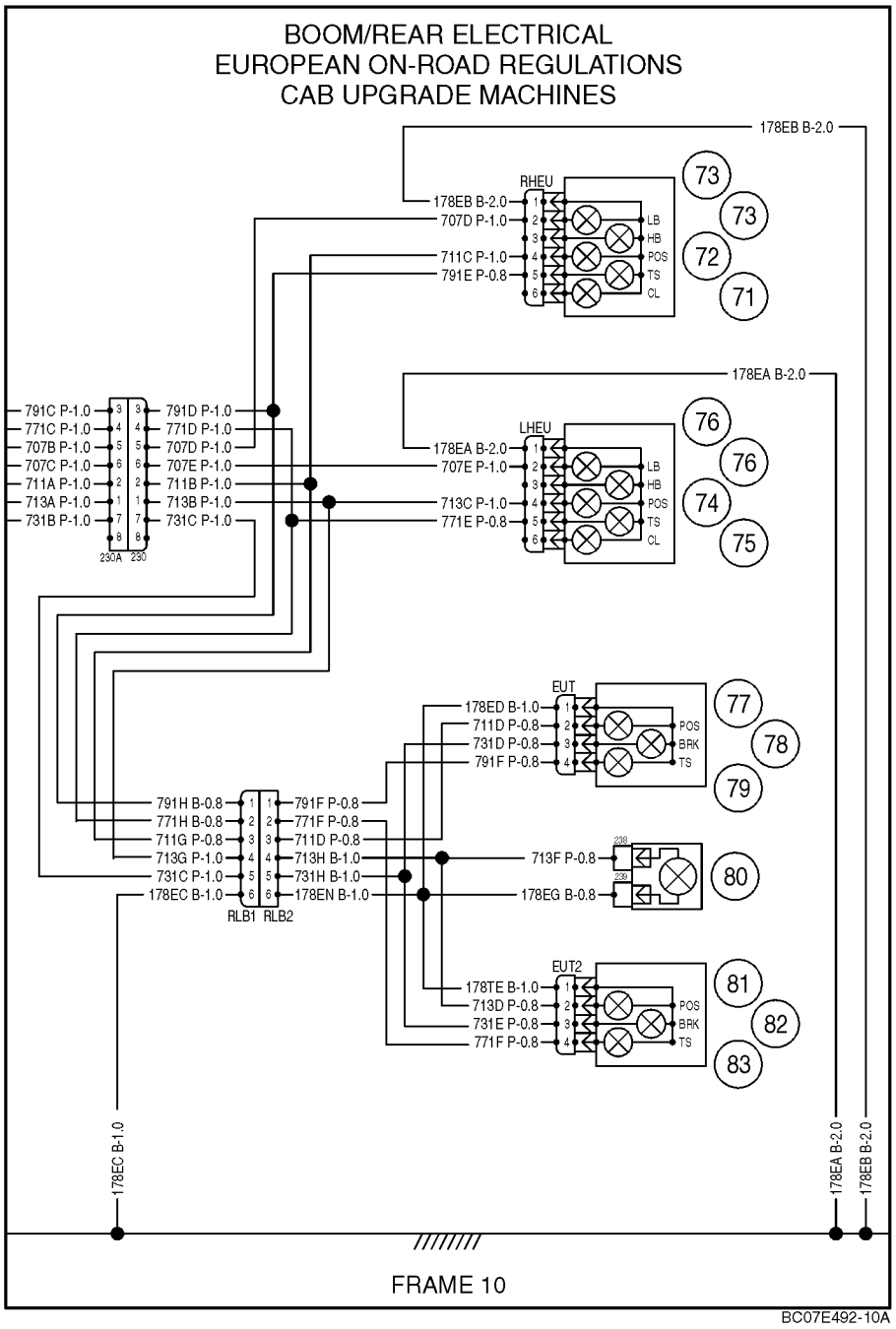
BC07E492-08A

46. HAZARD / TURN RELAY
47. FLASHER MODULE
48. DIODE (6 AMP)
49. TURN SIGNAL CONVERTER MODULE
50. BEACON
51. FUSE
52. HAZARD / BEACON SWITCH
53. LEFT FRONT FLASHING LAMP
54. LEFT REAR FLASHING LAMP
55. TURN INDICATOR LAMP (LEFT)
56. TURN INDICATOR LAMP (RIGHT)
57. RIGHT FRONT FLASHING LAMP
58. RIGHT REAR FLASHING LAMP



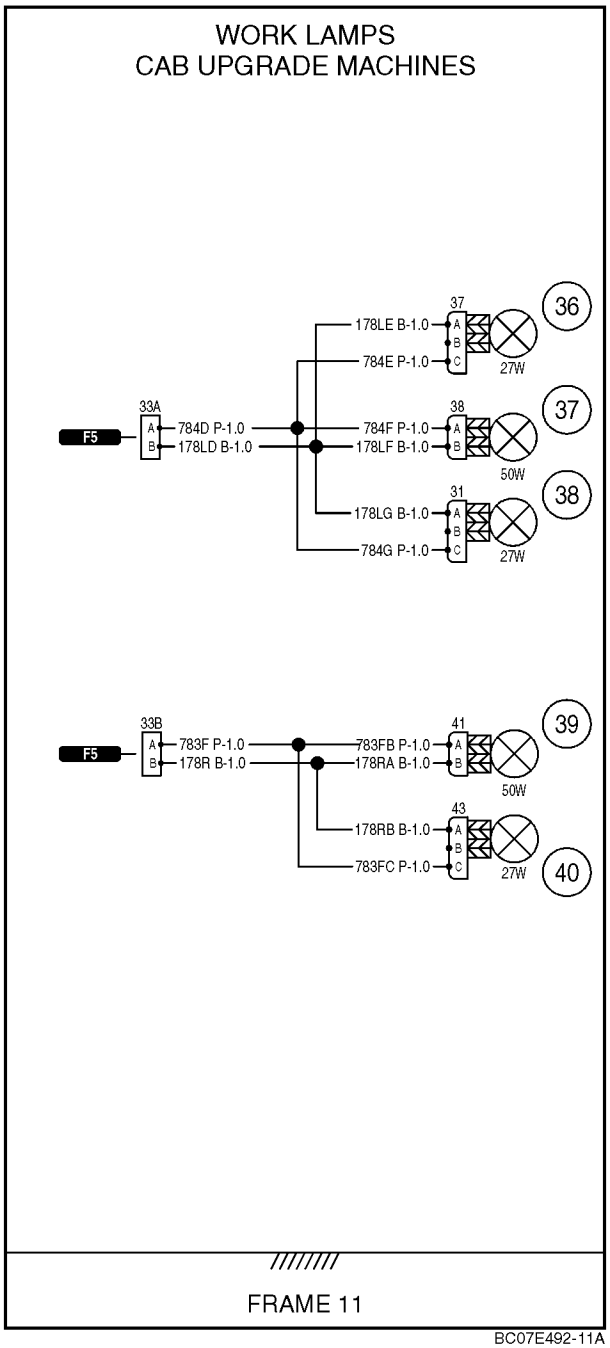
BC07E492-09A

59. ROAD LIGHT SWITCH (EURO)
60. FLASHER MODULE (EURO)
61. CAB FUSE BLOCK (EURO)
62. DIODE (6 AMP)
63. HAZARD / BEACON SWITCH (EURO)
64. BEACON (EURO)
65. BRAKE LAMP SWITCH (EURO)
66. BRAKE LAMP SWITCH (EURO)
67. TURN INDICATOR LAMP (LEFT) (EURO)
68. TURN INDICATOR LAMP (RIGHT) (EURO)
69. NOT USED
70. NOT USED



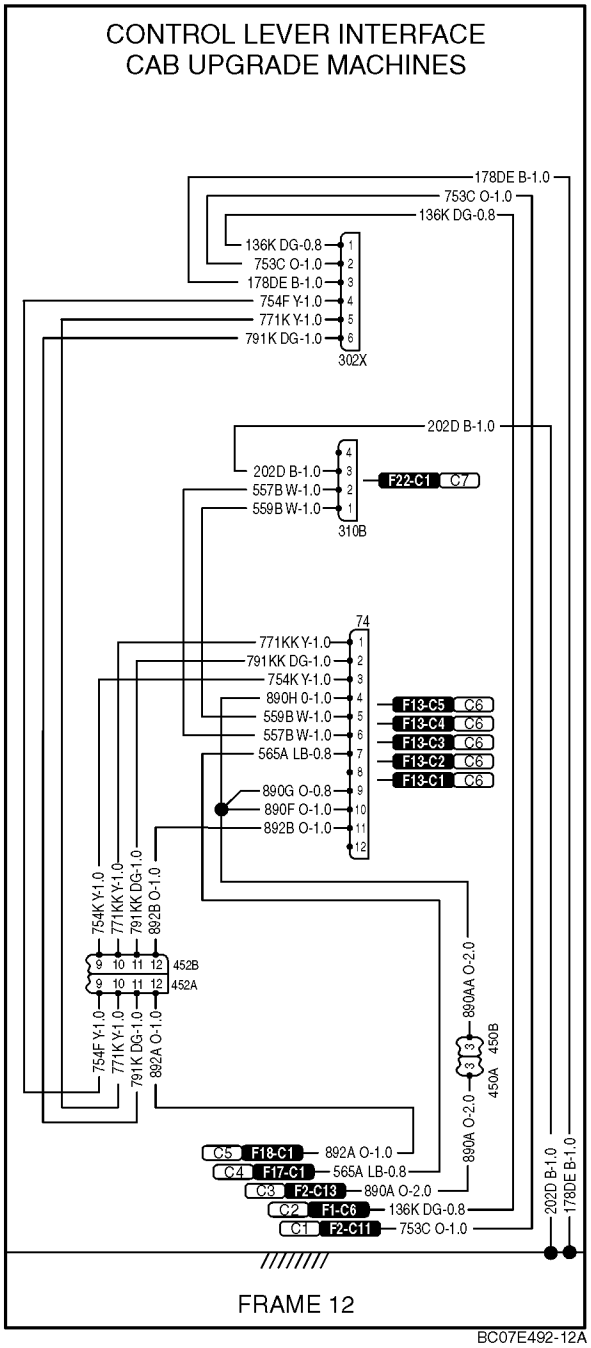
BC07E492-10A

71. RIGHT TURN LAMP (EURO)
72. RIGHT FRONT POSITION LAMP (EURO)
73. RIGHT FRONT ROAD LAMP (EURO)
74. LEFT FRONT POSITION LAMP (EURO)
75. LEFT TURN LAMP (EURO)
76. LEFT FRONT ROAD LAMP (EURO)
77. RIGHT REAR POSITION LAMP (EURO)
78. RIGHT REAR BRAKE LAMP (EURO)
79. RIGHT REAR TURN LAMP (EURO)
80. LICENSE PLATE LIGHT
81. LEFT REAR POSITION LAMP (EURO)
82. LEFT REAR BRAKE LAMP (EURO)
83. LEFT REAR TURN LAMP (EURO)

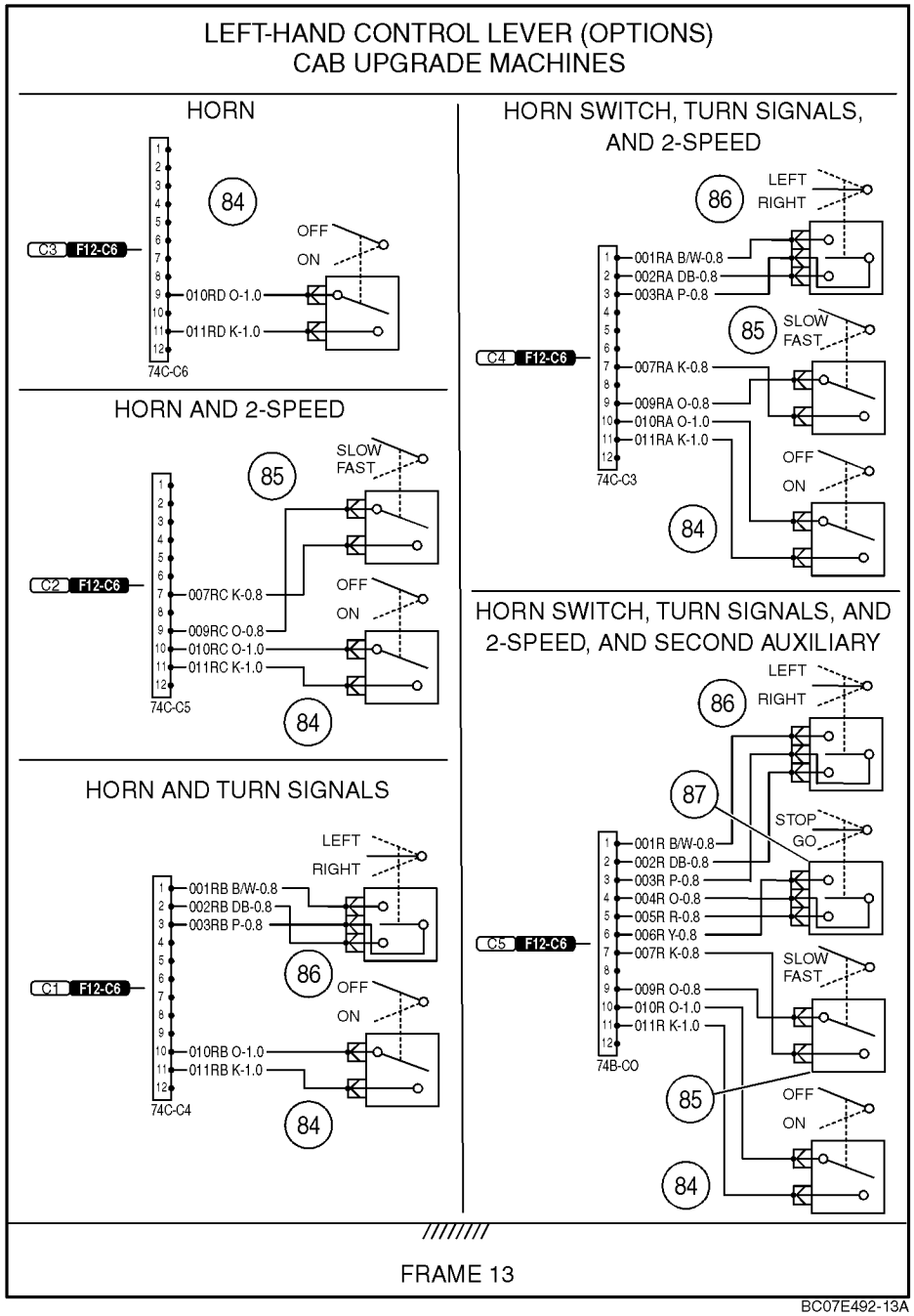


BC07E492-11A

36. OPTIONAL RIGHT REAR WORK LAMP
37. STANDARD RIGHT REAR WORK LAMP
38. OPTIONAL LEFT REAR WORK LAMP
39. STANDARD FRONT WORK LAMP
40. OPTIONAL FRONT WORK LAMP

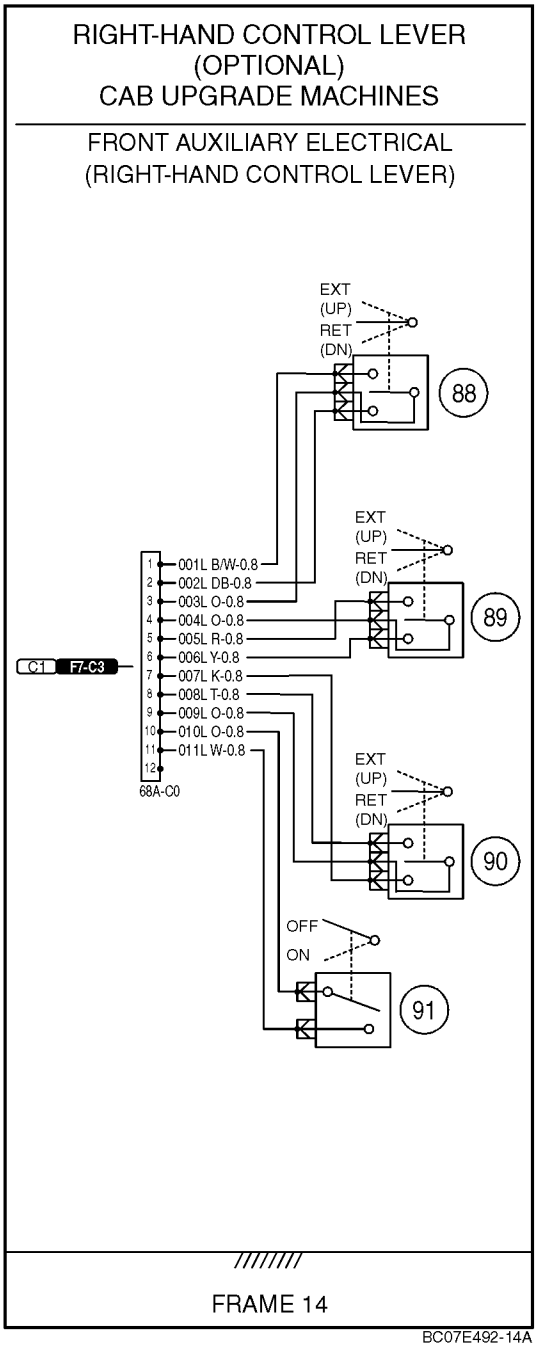


BC07E492-12A



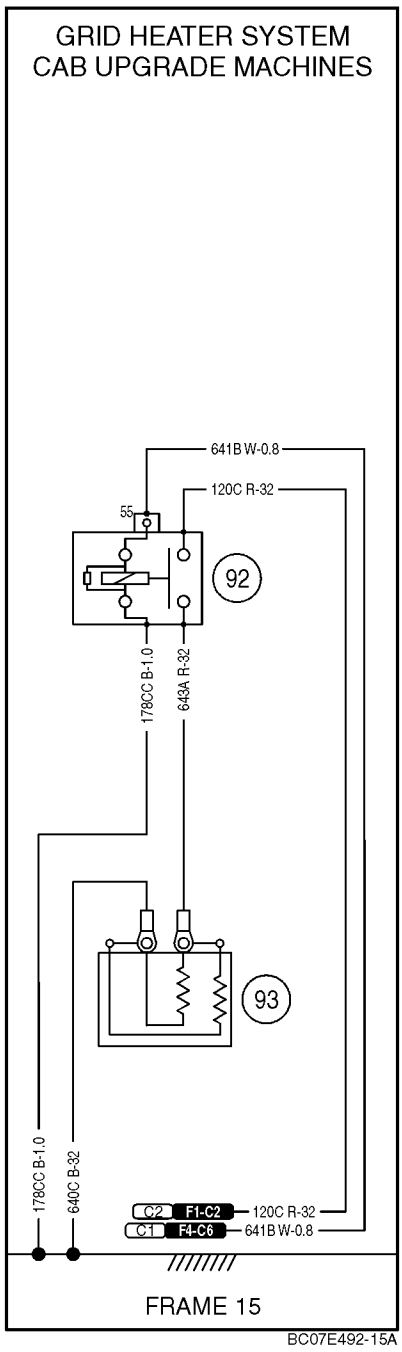
BC07E492-13A

84. HORN SWITCH
85. TWO- SPEED SWITCH
86. TURN SIGNAL SWITCH
87. AUXILIARY HYDRAULIC SWITCH



BC07E492-14A

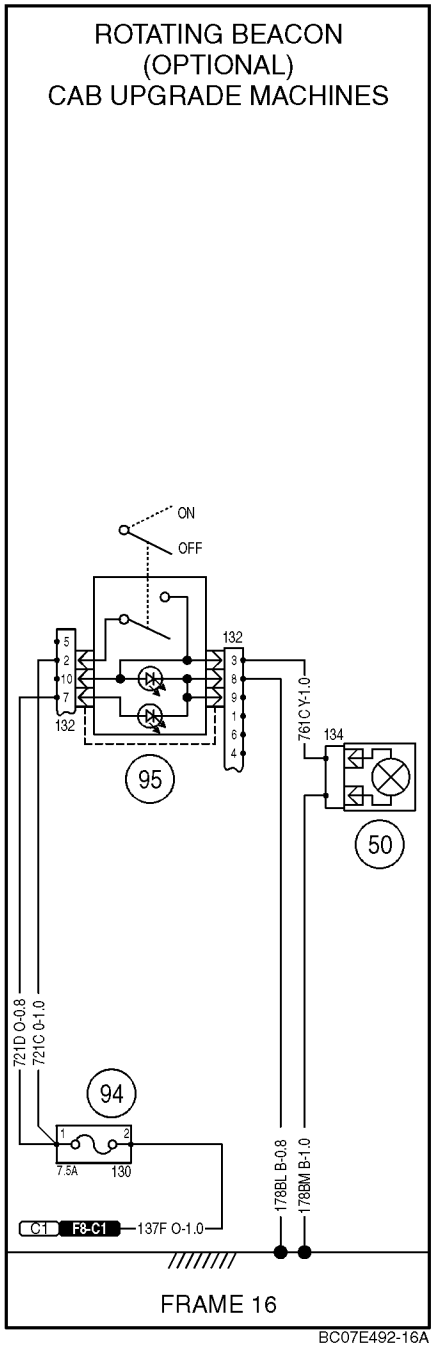
88. FRONT ELECTRIC SWITCH NO. 1
89. FRONT ELECTRIC SWITCH NO. 2
90. FRONT ELECTRIC SWITCH NO. 3
91. FRONT ELECTRIC SWITCH NO. 4



92. GRID HEATER RELAY

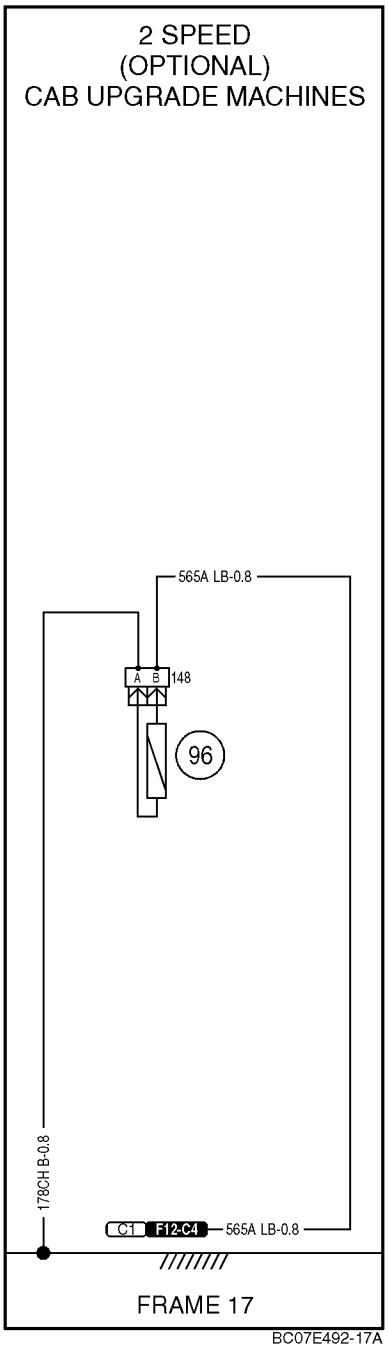
93. GRID HEATER

BC07E492-15A



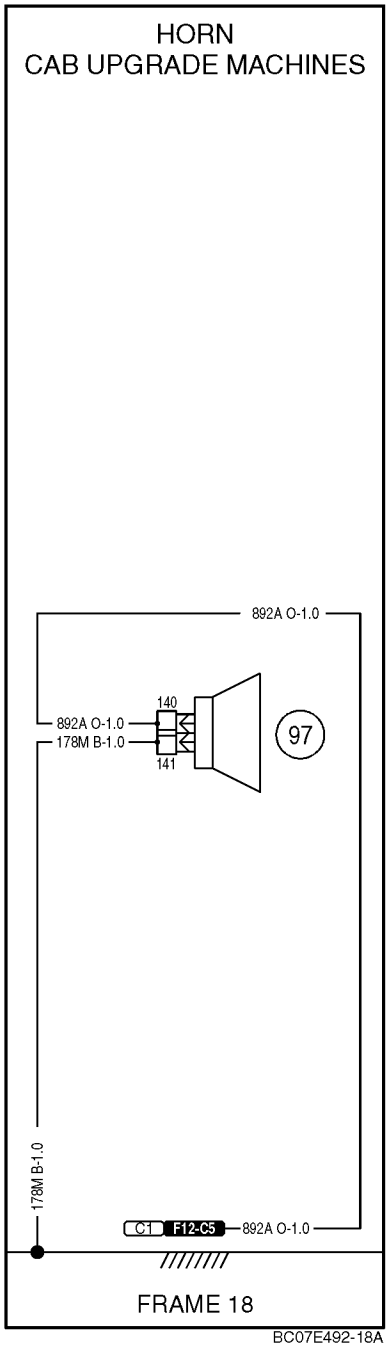
BC07E492-16A

50. BEACON
94. FUSE (7.5 AMP)
95. BEACON SWITCH



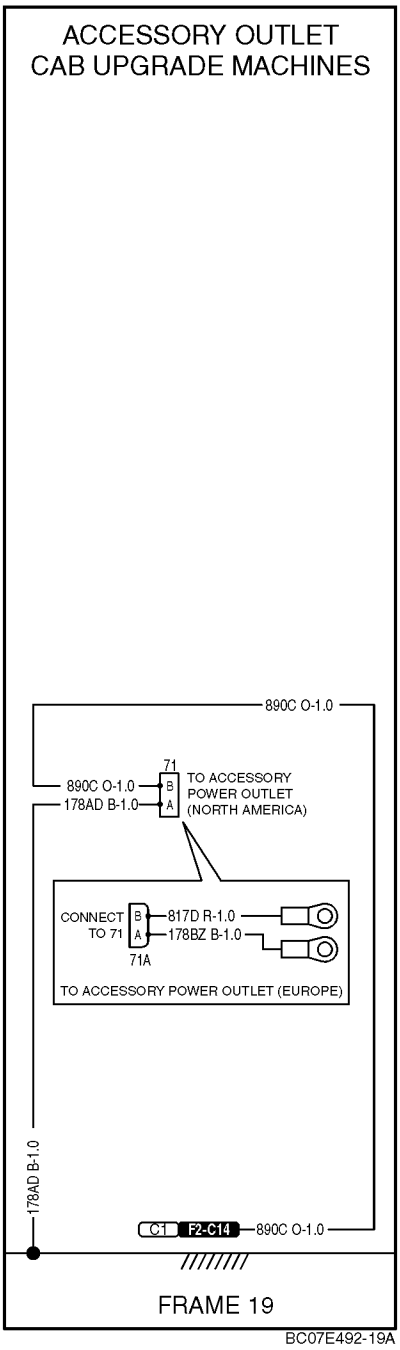
BC07E492-17A

96. 2 SPEED SOLENOID

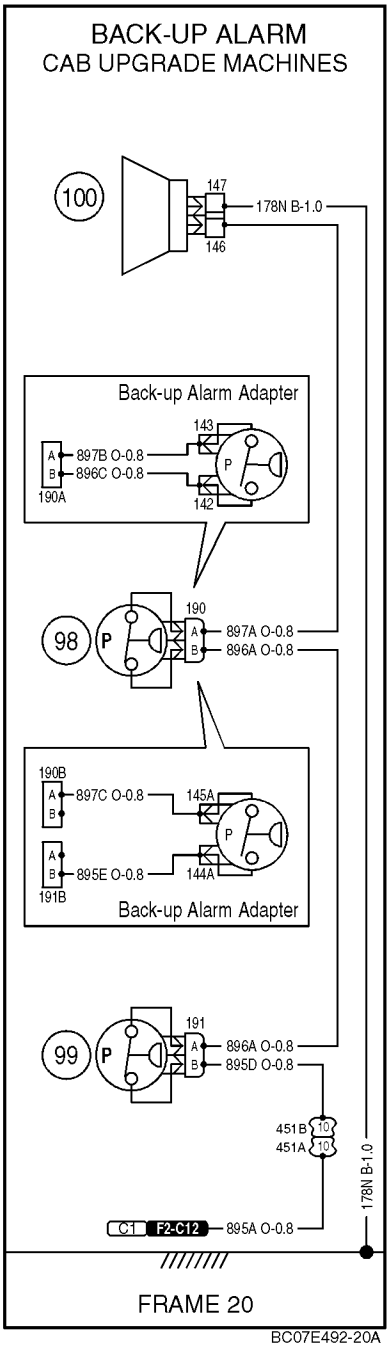


97. HORN

BC07E492-18A

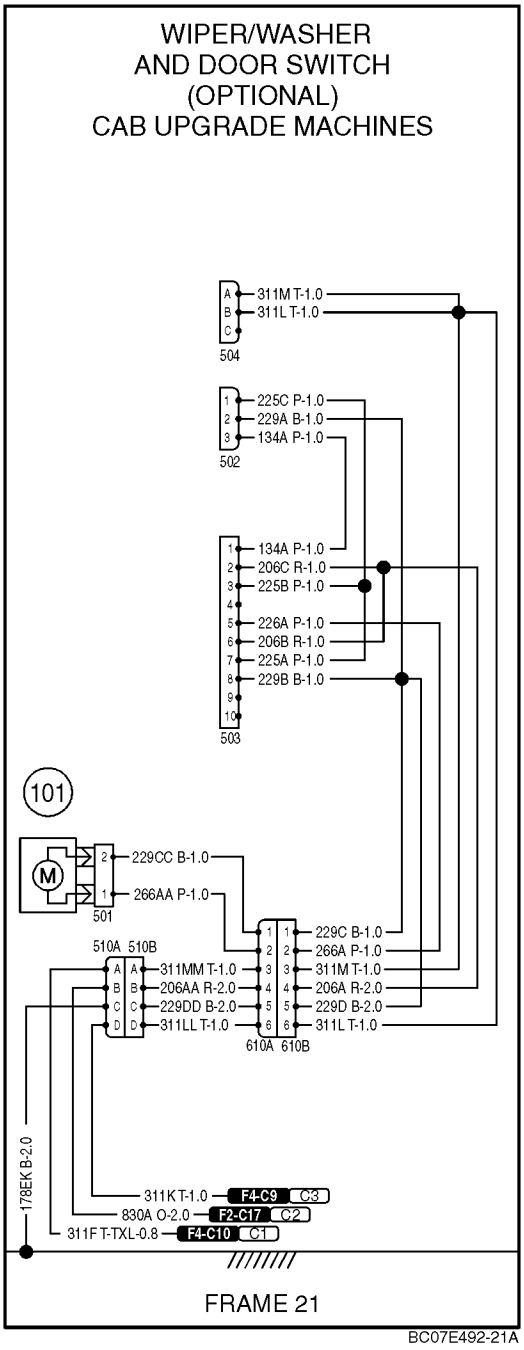


BC07E492-19A



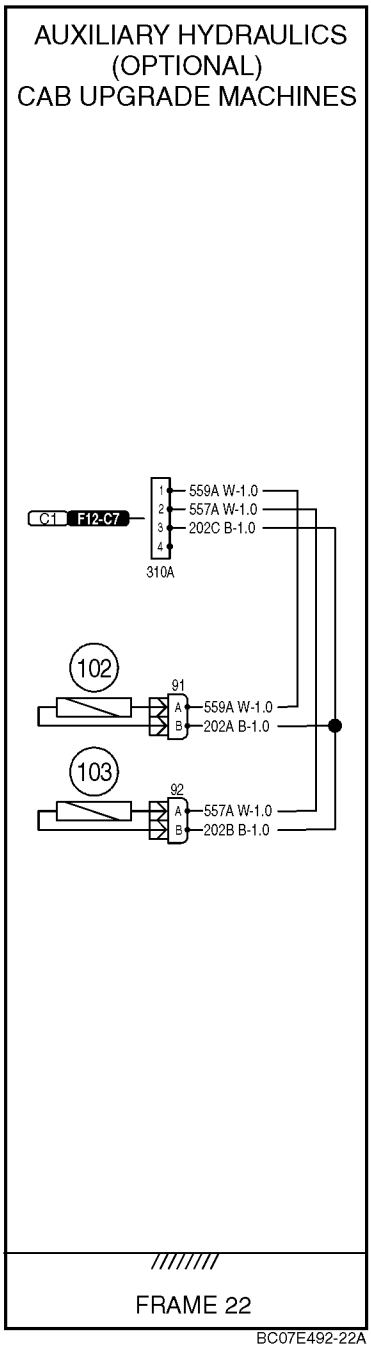
BC07E492-20A

98. BACK-UP ALARM SWITCH
99. BACK-UP ALARM SWITCH
100. BACK-UP ALARM



BC07E492-21A

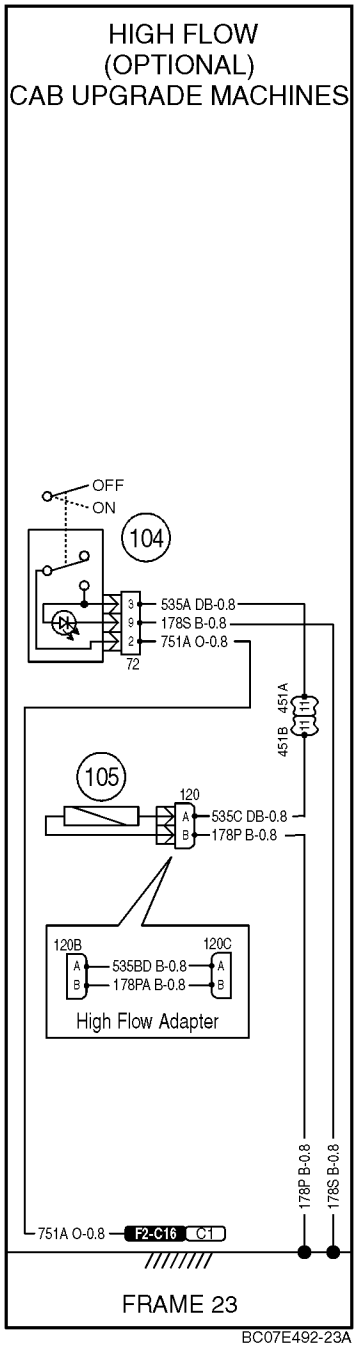
101.WASHER PUMP



102.SECOND AUXILIARY HYDRAULICS-SOLENOID NO. 1

BC07E492-22A

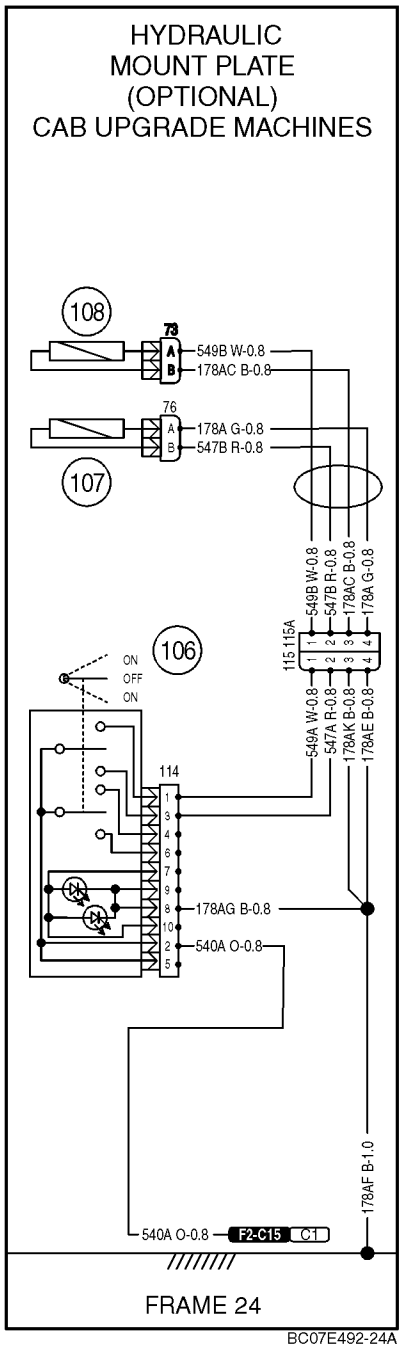
103.SECOND AUXILIARY HYDRAULICS-SOLENOID NO. 2



104.HIGH FLOW SWITCH (OPTIONAL)

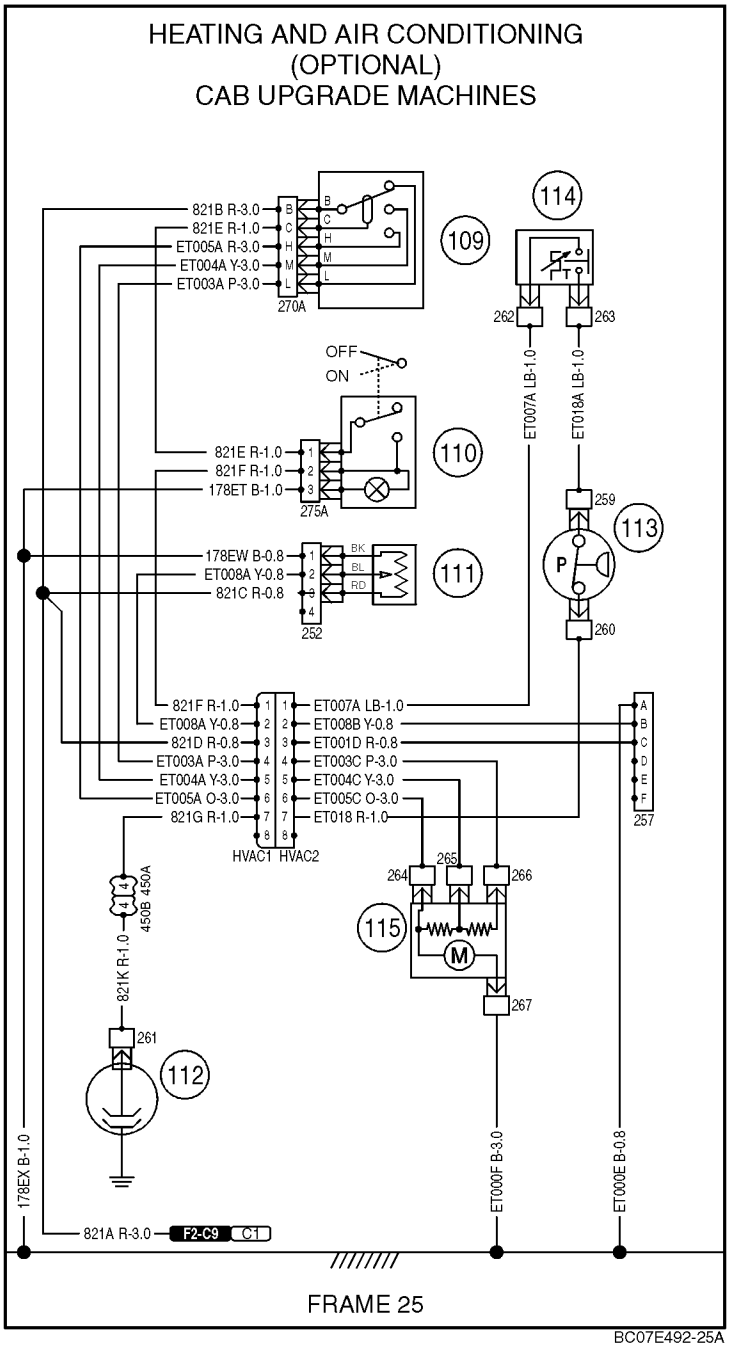
105.HIGH FLOW SWITCH SOLENOID (OPTIONAL)

BC07E492-23A



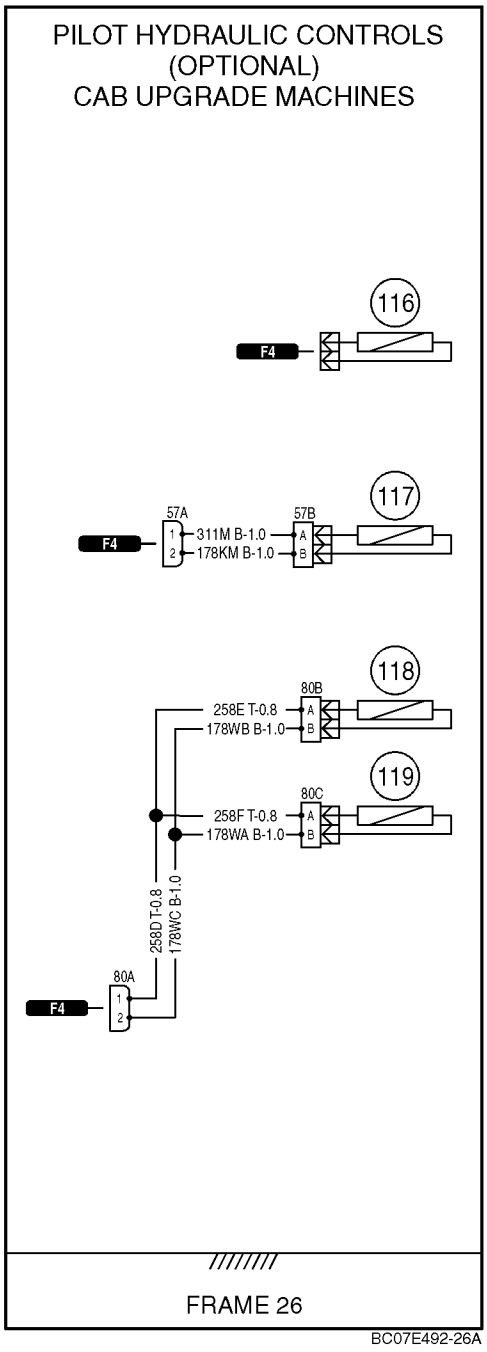
BC07E492-24A

106.HYDRAULIC MOUNT PLATE SWITCH (OPTIONAL)
107.HYDRAULIC MOUNT PLATE RELEASE SOLENOID (OPTIONAL)
108.HYDRAULIC MOUNT PLATE ENGAGE SOLENOID (OPTIONAL)



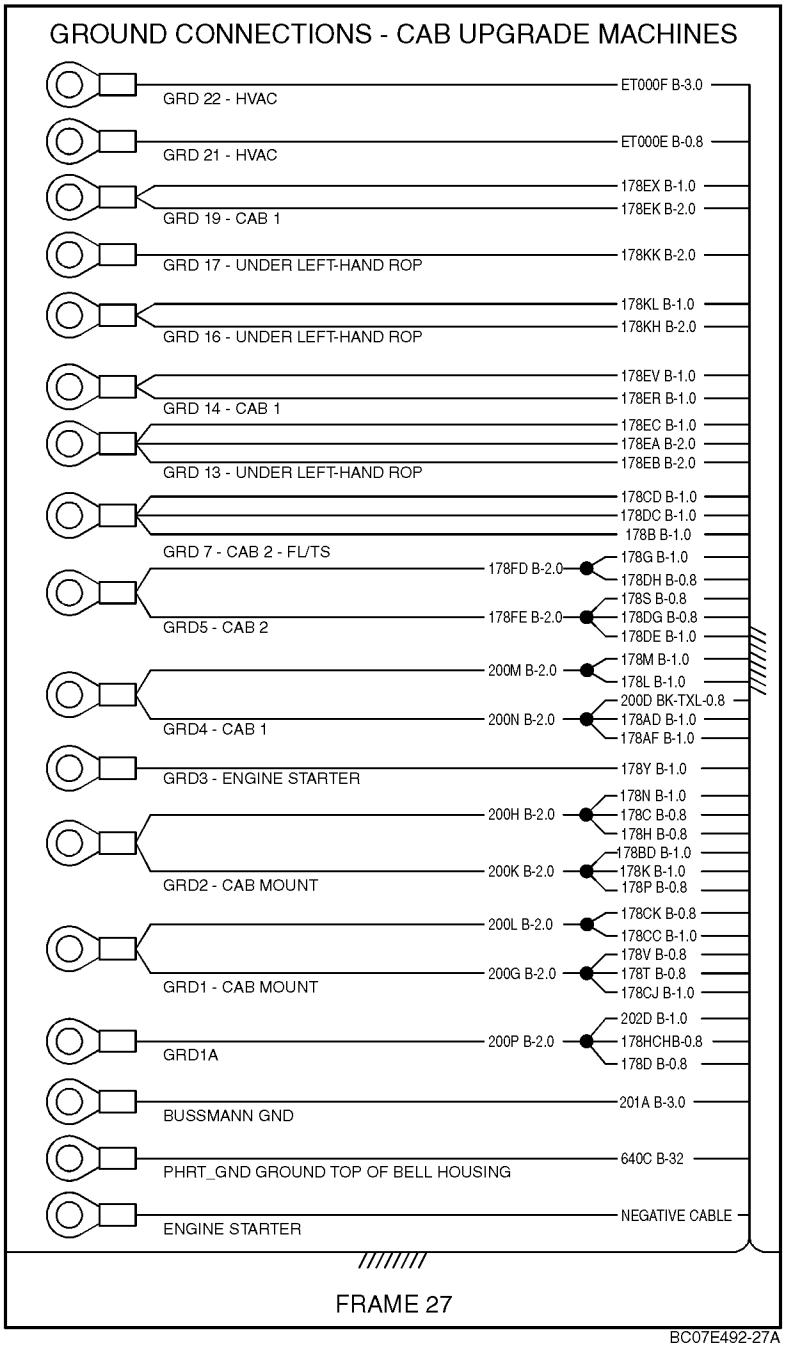
BC07E492-25A

109.BLOWER SWITCH (OPTIONAL)
110.AIR CONDITIONER SWITCH (OPTIONAL)
111.HEATER CONTROL SWITCH (OPTIONAL)
112.COMPRESSOR CLUTCH
113.PRESSURE SWITCH
114.THERMOSTAT
115.BLOWER MOTOR



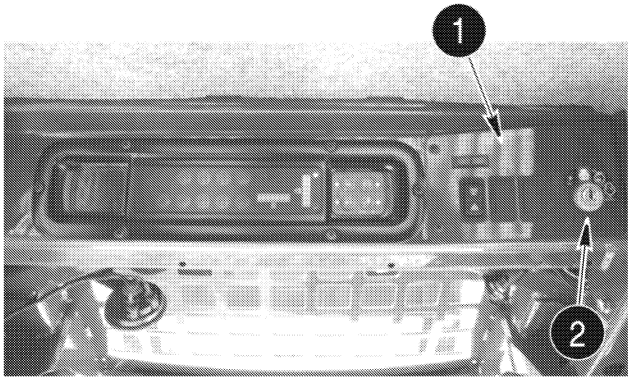
BC07E492-26A

116.LOADER CONTROL PRESSURE SOLENOID
117.MAGNETIC DETENT SOLENOID
118.GROUND DRIVE CONTROL PRESSURE SOLENOID
119.BRAKE VALVE SOLENOID



BC07E492-27A

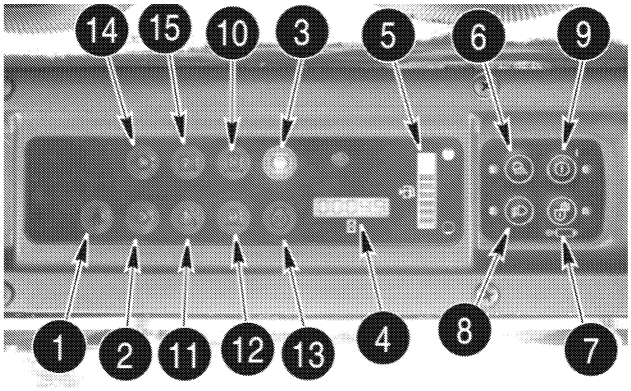
ELECTRONIC INSTRUMENT CLUSTER (EIC) PANEL



BD04H059

1. SWITCH PANEL
2. KEY SWITCH

INSTRUMENT CONSOLE

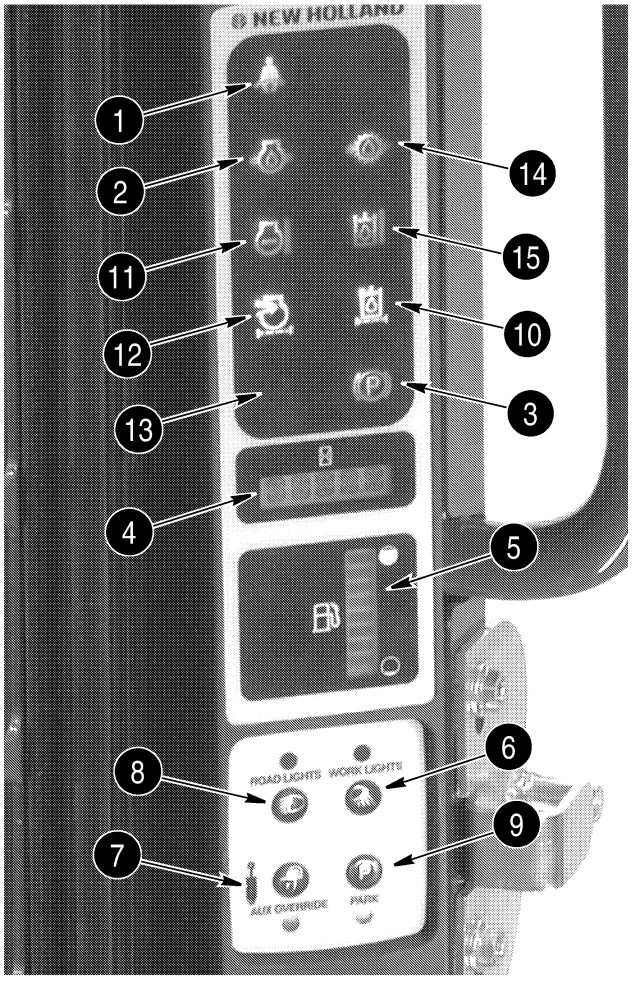


BD04E088

ELECTRONIC INSTRUMENT CLUSTER

1. SEAT BELT INDICATOR LAMP
2. ENGINE OIL PRESSURE INDICATOR LAMP
3. PARK BRAKE INDICATOR LAMP
4. HOURMETER
5. FUEL GUAGE
6. WORK LAMP SWITCH
7. AUXILIARY HYDRAULIC INTERLOCK OVERRIDE SWITCH
8. ROAD LAMP SWITCH
9. PARK BRAKE ON/OFF SWITCH
10. HYDRAULIC OIL FILTER WARNING LAMP
11. COOLANT TEMPERATURE WARNING LAMP AND ALARM
12. ENGINE AIR FILTER WARNING LAMP
13. ENGINE GRID HEATER LAMP (IF EQUIPPED)
14. CHARGE PRESSURE WARNING LAMP
15. HYDRAULIC OIL TEMPERATURE WARNING LAMP

ELECTRONIC INSTRUMENT CLUSTER (EIC) PANEL (CAB UPGRADE MACHINES ONLY)



BD07C137

ELECTRONIC INSTRUMENT CLUSTER

1. SEAT BELT INDICATOR LAMP
2. ENGINE OIL PRESSURE INDICATOR LAMP
3. PARK BRAKE INDICATOR LAMP
4. HOURMETER
5. FUEL GUAGE
6. WORK LAMP SWITCH
7. AUXILIARY HYDRAULIC INTERLOCK OVERRIDE SWITCH
8. ROAD LAMP SWITCH
9. PARK BRAKE / SYSTEM ENABLE ON/OFF SWITCH
10. HYDRAULIC OIL FILTER WARNING LAMP
11. COOLANT TEMPERATURE WARNING LAMP AND ALARM
12. ENGINE AIR FILTER WARNING LAMP
13. ENGINE PRE-HEATING LAMP (IF EQUIPPED)
14. CHARGE PRESSURE WARNING LAMP
15. HYDRAULIC OIL TEMPERATURE WARNING LAMP

Electronic Instrument Cluster (EIC) Operating Instructions

The EIC monitors and controls certain loader functions and engine parameters. When a monitored parameter limit is exceeded, the EIC issues audible and visual warnings to the operator.

Monitored functions and parameters:

1. Operator (in/out seat) – lighted indicator
2. Operator seat belt (buckled/unbuckled, NH brand), – lighted indicator (same as lighted indicator in (1).
3. Engine oil pressure (high/low) – lighted indicator.
4. Hydraulic charge pressure (high/low) – lighted indicator.
5. Hydraulic oil temperature (high/low) – lighted indicator.
6. Engine coolant temperature (high/low) – lighted indicator.
7. Hydraulic oil filter condition (free/restricted) – lighted indicator.
8. Engine air filter condition (free/restricted) – lighted indicator.
9. Parking brake state (ON/OFF) – lighted indicator.
10. Engine preheat state (ON/OFF) – lighted indicator.
11. Battery voltage (over/under) – displayed in place of engine hours when out of limits high/low.
12. Engine hours (accumulated to tenth hour) – character display.
13. Fuel level – eight element vertical bar graph.

Controlled Functions:

1. Hydraulic interlock solenoid output – inhibits boom/bucket movement when operator out of seat or seat belt unbuckled (NH brand) or seat bar raised.
2. Hydraulic brake output – prevents loader motion when operator out of seat, seat belt unbuckled (NH brand) This output is not connected for NH loaders with the manual brake.
3. Grid heat output (if equipped) – applies power to the grid heater relay for an interval of time determined by the temperature of the engine coolant each time the ignition key is turned from off to on.
4. Hydraulic auxiliary override – enables a continuous hydraulic flow to attachments when an operator leaves the seat to operate an attachment. If not pushed, provides a safety interlock during operator entry/exit of the loader.
   Additionally, a four push-button operator selector area located on the EIC provides the following functions during normal operation: (6) work lights (ON/OFF) (8) road lights (ON/OFF) (9) parking brake (SET/RELEASE) and (7) auxiliary hydraulic interlock override.

Push Button Functional Description:

Work lights and road lights – toggles the state of the lights indicated by an associated LED. Only works when the ignition key is ON.

Parking brake – for machines with hydraulically actuated brake, this button toggles the state of the parking brake. A back lighted symbol displays the state of the brake. At power up, loader motion, hydraulic flow to attachments and movement of the boom and bucket are inhibited until this button is pushed. At power up only, a flashing LED near this push button prompts the operator to release the brake to begin operation. Only works when the ignition key is ON.

Auxiliary hydraulic override – if pressed, the light next to the switch will turn on for thirty seconds. Within that period of time, an operator may leave the seat without interruption to attachment hydraulic flow. This feature is turned off or reset while the operator is in the seat and (1) the operator again pushes the button during the thirty seconds (2) automatically after thirty seconds or (3) leaves to operate the attachment and then sits back down in the seat at some later time. When the operator returns to the seat after using an implement for an extended period of time, the brake button must be pushed again to enable the loader hydraulic system and turn off the brake. The override feature is primarily used to support attachments such as a backhoe or other out-of-cab operated implements.

Restraint System: The New Holland version of the EIC contain logic to ensure operator safety. The EIC continually monitors the seat switch, seat belt switch (NH). If, during operation, any of these restraint devices indicates to the EIC that the operator has left the seat or is about to leave the seat, the EIC will inhibit hydraulic flow to the boom and bucket and will set the brake. Additionally, if the operator has not pressed the auxiliary hydraulic override push button, flow will be halted to attachments via hydraulic solenoid interlock or automatic engine shut down provided that the auxiliary control is displaced from neutral.

To prevent annoying attachment flow interruption and hydraulic brake activation due to operator-induced seat switch bounce, the NH brand implements a short seat switch time delay prior to halting auxiliary flow.

The New Holland brand logic requires that the seat belt must be unfastened prior to operation at power on. The New Holland brand also requires that the seat belt be unbuckled then buckled if the operator is out of the seat for more than two seconds.

The EIC will power up when an operator sits in the seat. This enables viewing of fuel level and engine hours without use of the ignition key. If the operator is in the seat for more than thirty seconds and the ignition key is not turned on, the EIC will turn itself off.

EIC Special Functions (Setup Menu):

Special machine setup features are available via the operator push button selector area. The EIC will display the word “SETUP” as a first menu item visual “anchor” message.

The choices available are (1) select engine type (for correct cold engine preheat profile) (2) select brake type: hydraulic, none or manual (NH only) (3) display EIC software revision level and (5) modify engine hours (coded entry required).

Push Button Definitions:

Any button: Any button may be depressed and held for six seconds to enter the setup mode. The seat must be unoccupied and the ignition key off during this time, but the operator may sit in the seat after the setup mode is entered.

Parking brake: Provides for editing the values that a setup menu item (engine type, brake type, engine hours) can have. When a value has been changed, this button is also used to save the value in memory. Verification of the saved value is automatic. The display will blank and go dark. Then, after a short delay time, the value will be retrieved from memory and shown again in the display. After this visual verification, the word “SETUP” will again appear in the display.

Road light: Used to view in succession all of the values that an item can have. When changing engine hours, this button increments a flashing digit value in a circular manner from 0 – 9.

Work light: Used to navigate to the next menu item. When changing engine hours, this button causes the flashing emphasis to move to the next digit to the right.

Auxiliary override: This button functions as an unconditional setup exit without save from any location in the menu. When this button is pushed, the EIC will turn off. If the operator is in the seat, the EIC will immediately power up normally. None of any changed information will be saved unless that information was first saved using the parking brake button and then verified.

To Exit the Setup Menu: (1) Leave the loader. After three seconds the EIC will automatically power down, (2) place the ignition key in either the ACC or the ON position or (3) push and release the auxiliary override button.

Special Feature Choices: (1) display/select engine type, (2) display/change brake type and (3) display/change engine hours are the only values that may be modified

NOTE: *For the following three descriptions, it is assumed that the operator has already placed the instrument cluster in the SETUP mode and is sitting in the seat. The word "SETUP" appears in the text display.*

Detailed Description of Setup Items:

Selecting an Engine Preheat Profile: To select an engine preheat profile (item 1), press and release the work light push button one time. The word "ENGIN" will be displayed. Then, push and release the park brake push button. The engine type "NH" (for NH brand) or "ISM" will be displayed depending on the profile currently stored in the EIC. Push and release the road light push button to switch between the engine types. When the desired engine type is displayed, push and release the park brake push button to store the new selection. After visual verification, the word "SETUP" will again appear in the display.

Changing Brake Type: To select a brake type (item 2), press and release the work light push button two times. The word "BRAKE" will be displayed. Then, push and release the park brake push button. The brake type "HYDRL" (for hydraulic) "NOBRK" (for no brake – to adjust drive neutral) or "MANUL" (for manual) will be displayed depending on the type currently stored in the EIC. Push and release the road light push button to switch between the brake types. When the desired type is displayed, push and release the park brake push button to store the new selection. After visual verification, the word "SETUP" will again appear in the display.

NOTE: ***You must contact your CNH Technical Services Advisor to obtain the UNLOCK CODE before the Engine Hourmeter can be changed.***

Changing Engine Hours: To change engine hours (item 4), press and release the work light push button four times until the word "HOUR" is displayed. Then, push and release the park brake push button. The word "UNLOCK" will be displayed for two seconds to prompt that an unlocking code must be entered to change engine hours. After the two second delay, the display will prompt for the entry of a four-digit code. The leftmost digit after the prompt ">" will flash, indicating a digit that can be changed. Using the road light push button to change the digit value and the work light push button to select the next digit, enter the unlocking code. Push and release the park brake push button to accept this unlocking code. Currently stored engine hour value will be retrieved and displayed and the leftmost digit will flash. Using the same technique outlined above, enter the desired engine hour value. Push and release the park brake push button to store the new engine hour value. After visual verification, the word "SETUP" will again appear in the display.
Exit the Setup Menu using one of the three methods described above.

TROUBLESHOOTING

ELECTRONIC INSTRUMENT CLUSTER (EIC)

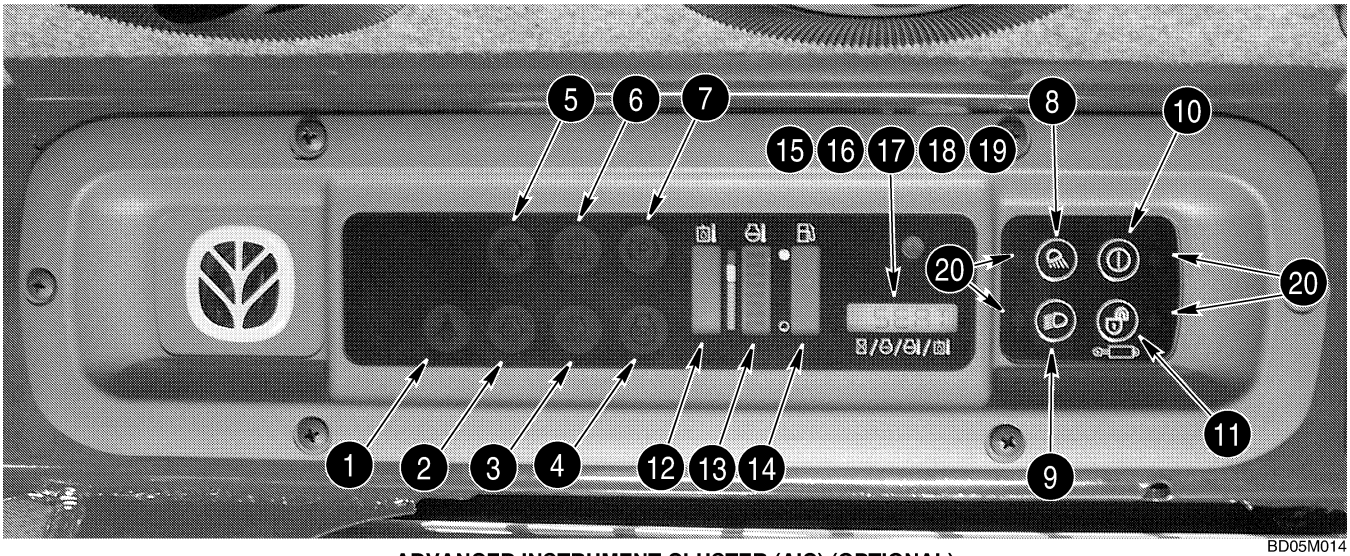
PROBLEM	POSSIBLE CAUSE	CORRECTION
EIC board will not light up when operator sits in the seat.		
	Faulty seat switch.	Replace switch
	No battery voltage to seat switch.	Blown 5 amp fuse electronic battery in engine panel, replace fuse. Open in power wire from 5 amp fuse from supply, check and/or replace battery No battery voltage to 5 amp fuse from supply, check and/or replace battery
	Blown 5 amp fuse (electronic battery) in engine panel.	Replace fuse.
	No battery voltage from seat switch to EIC board.	Open in power wire from seat switch to EIC board, repair open wire. Poor or no connection at EIC board, repair connection
	Battery voltage from seat switch to EIC board	If battery voltage from seat to board is OK, replace the EIC.
EIC backlighting is dim.	Brightness variations due to production differences between models and/or EIC board changes.	None -- overlay decal material variations cause differences in brightness.
	Backlights dim when the loader worklights are activated.	None -- EIC board circuitry automatically dims the backlighting when then worklights are on, to reduce the glare at night.
EIC board seat belt light will not go off with the seat belt fastened.	Seat belt not fastened.	Fasten the seat belt.
	Faulty seat belt buckle switch.	Replace seat belt assembly
	No battery voltage from seat switch to seat belt switch.	Open in wire from seat switch to seat belt switch, repair open.
	No battery voltage from seat belt switch to EIC board.	Open in wire from seat belt switch to EIC board, repair open. Poor or no connection at EIC board, repair connection.
	Battery voltage from seat belt switch to EIC board.	If voltage is OK, replace the EIC.

PROBLEM	POSSIBLE CAUSE	CORRECTION
EIC will not read correct Engine RPM, and varies more than ± 50 RPM.	Incorrect engine configuration.	Correct the engine configuration.
	No AC voltage at tachometer terminal at alternator.	Repair alternator.
	Loose or corroded connection at tachometer terminal at alternator.	Repair connection.
	No AC voltage at EIC board from alternator.	Open in wire from alternator to EIC board, repair connection.
	AC voltage from alternator to EIC board.	Repair loose or corroded connection at EIC board.
	Wire connection from alternator to EIC board.	If OK, replace EIC.
EIC will not unlock boom and bucket spool locks.		
	Seat belt not fastened.	Fasten seat belt.
	Faulty seat belt buckle.	Replace seat belt assembly.
	No battery voltage from seat belt switch to EIC.	Open in power wire from seat belt switch, repair open.
	No battery voltage from EIC to spool lock solenoids.	Open in power wire from EIC to solenoids, repair open.
	Battery voltage to lock solenoids.	If OK, check inoperative solenoids, check solenoid coils and repair or replace.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Engine will not start and/or run.	Seat belt not fastened.	Fasten seat belt.
	Incorrect Engine configuration. (EIC	Correct configuration.
	No battery voltage to start relay.	Open in power wire from key switch “START” to relay, or through seat/seatbelt circuits to relay, repair open
	No battery voltage from EIC to fuel solenoid.	Open in power wire from EIC to fuel solenoid, repair open.
	Open in W/O wire from the seat/seat belt plug to the start interlock relay.	Repair open in W/O wire.
	Inoperative start interlock relay.	Repair or replace.
	Fuel solenoid inoperative.	Repair or replace.
	Inoperative manifold heater system.	Incorrect Engine configuration, correct configuration.
	No power to manifold heater.	Manifold heater preheat relay or LTBL/B wire open, repair or replace.
	Inoperative manifold heater.	Replace manifold heater.
	No fuel in manifold heater.	Check fuel feed tube and fuel supply from injection pump.
Engine turns over, but will not start.	No power to fuel solenoid	Check 7.5 amp fuse in cab fuse block. Check interlock fuel solenoid relay. If equipped with auxiliary override switch, make sure switch is in neutral position
Engine will not turn over.	Inoperative seat switch or operator not present in seat.	Check seat switch.
	Inoperative seat belt switch or seat belt not fastened.	Check seat belt switch, fasten seat belt.
	No power to starter, no power to key switch.	Check key switch, seat switch, start interlock relay, battery. Check 5 amp fuse in engine fuse panel. Check 15 amp fuse in engine fuse panel.
Engine will start and run but boom and bucket will not move.	Seat belt not fastened.	Unfasten seat belt and then refasten.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Engine will start and run but boom and bucket will not move.	No power to control valve lockout solenoids.	Check for power at spool lockout solenoids. Check 15 amp fuse in cab fuse block. Replace EIC.
EIC will not read monitored circuits.	Incorrect engine configuration.	Correct engine configuration.
	Open or short in wire from sensor to EIC.	Repair open/short.
	Faulty sender or sensor.	Repair/replace sender or sensor.

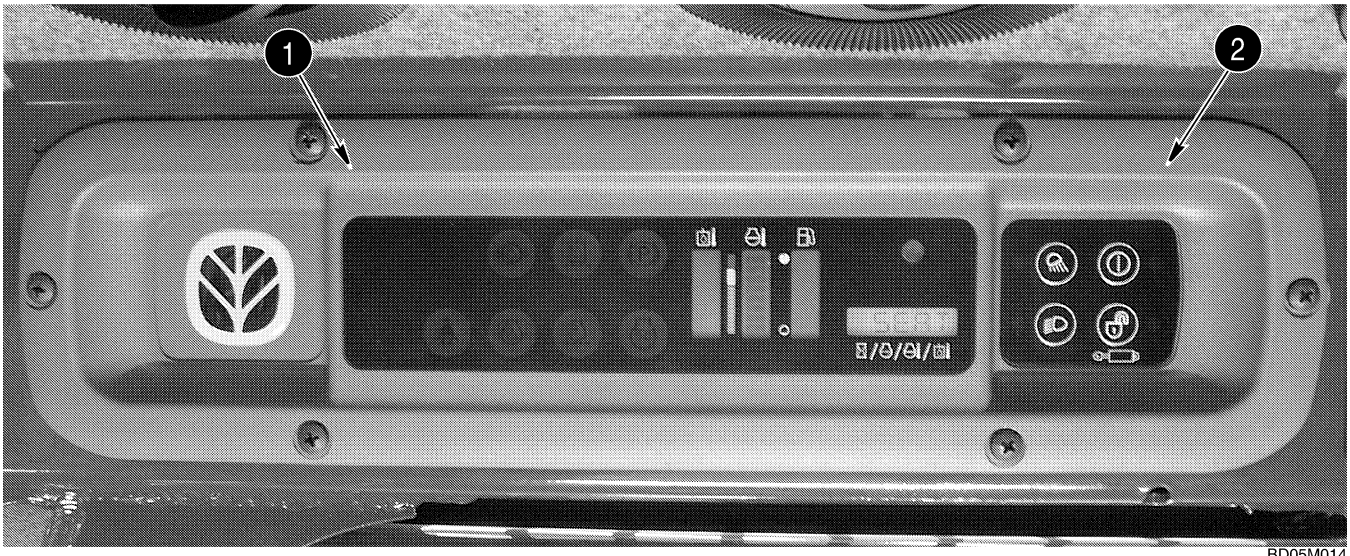
ADVANCED INSTRUMENT CLUSTER (AIC) PANEL (OPTIONAL)



BD05M014

ADVANCED INSTRUMENT CLUSTER (AIC) (OPTIONAL)

1. SEAT BELT INDICATOR LAMP
2. ENGINE OIL PRESSURE WARNING LAMP
3. ENGINE AIR FILTER WARNING LAMP
4. ENGINE GRID HEATER LAMP (IF EQUIPPED)
5. CHARGE PRESSURE WARNING LAMP
6. HYDRAULIC OIL FILTER WARNING LAMP
7. PARKING BRAKE INDICATOR LAMP
8. WORK LAMP SWITCH
9. ROAD LAMP SWITCH
10. SYSTEM ENABLE SWITCH
11. AUXILIARY HYDRAULIC OVERRIDE SWITCH
12. HYDRAULIC OIL TEMPERATURE BAR GRAPH DISPLAY
13. ENGINE COOLANT TEMPERATURE BAR GRAPH DISPLAY
14. FUEL GUAGE BAR GRAPH DISPLAY
15. TEXT DISPLAY
    (DISPLAYS THE FOLLOWING PARAMETERS) -
16. ENGINE HOURMETER -
17. ENGINE RPM -
18. ENGINE COOLANT TEMPERATURE
    (DISPLAYS TEMPERATURE IN DEGREES CELSIUS OR DEGREES FAHRENHEIT) -
19. HYDRAULIC OIL TEMPERATURE
    (DISPLAYS TEMPERATURE IN DEGREES CELSIUS OR DEGREES FAHRENHEIT)
20. LED INDICATOR LAMP

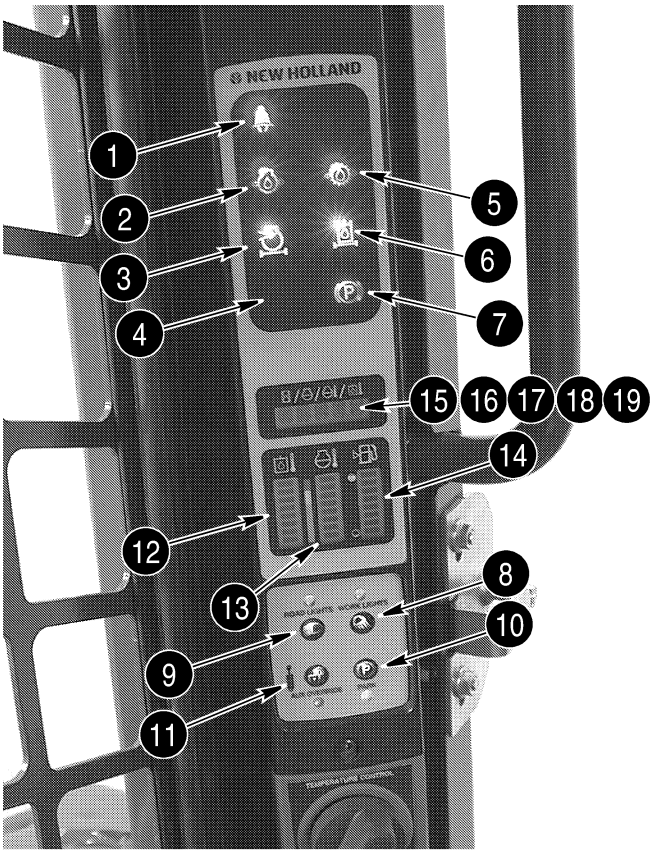


BD05M014

ADVANCED INSTRUMENT CLUSTER (AIC) (OPTIONAL)

1. DISPLAY AREA
2. SWITCH PANEL AREA

ADVANCED INSTRUMENT CLUSTER (AIC) PANEL (OPTIONAL) (CAB UPGRADE MACHINES ONLY)



BD07C016

ADVANCED INSTRUMENT CLUSTER (AIC) (OPTIONAL)

1. SEAT BELT INDICATOR LAMP
2. ENGINE OIL PRESSURE WARNING LAMP
3. ENGINE AIR FILTER WARNING LAMP
4. ENGINE PRE-HEATER LAMP (IF EQUIPPED)
5. CHARGE PRESSURE WARNING LAMP
6. HYDRAULIC OIL FILTER WARNING LAMP
7. PARKING BRAKE INDICATOR LAMP
8. WORK LAMP SWITCH
9. ROAD LAMP SWITCH
10. PARK BRAKE / SYSTEM ENABLE SWITCH
11. AUXILIARY HYDRAULIC OVERRIDE SWITCH
12. HYDRAULIC OIL TEMPERATURE BAR GRAPH DISPLAY
13. ENGINE COOLANT TEMPERATURE BAR GRAPH DISPLAY
14. FUEL GUAGE BAR GRAPH DISPLAY
15. TEXT DISPLAY
    (DISPLAYS THE FOLLOWING PARAMETERS) -
16. ENGINE HOURMETER -
17. ENGINE RPM -
18. ENGINE COOLANT TEMPERATURE
    (DISPLAYS TEMPERATURE IN DEGREES CELSIUS OR DEGREES FAHRENHEIT) -
19. HYDRAULIC OIL TEMPERATURE
    (DISPLAYS TEMPERATURE IN DEGREES CELSIUS OR DEGREES FAHRENHEIT)

Advanced Instrument Cluster (AIC) Operating Instructions

The AIC monitors and controls certain loader functions and engine parameters. When a monitored parameter limit is exceeded, the AIC issues audible and visual warnings to the operator.

Monitored functions and parameters description:

1. Operator seat belt (buckled/unbuckled), – (Red - lighted indicator).
2. Engine oil pressure warning (high/low) – (Red - lighted indicator).
3. Hydraulic charge pressure warning (high/low) – (Red - lighted indicator).
4. Hydraulic oil temperature (high/low) – (eight element vertical bar graph display).
5. Engine coolant temperature (high/low) – (eight element vertical bar graph display).
6. Hydraulic oil filter condition warning (free/restricted) – (Yellow - lighted indicator).
7. Engine air filter condition warning (free/restricted) – (Yellow - lighted indicator).
8. Parking brake state (ON/OFF) – (Red - lighted indicator).
9. Engine grid heater (ON/OFF) – (Yellow - lighted indicator).
10. Battery voltage (over/under) – (text displayed in place of engine hours when out of limits high/low).
11. Engine hours (accumulated to tenth hour) – (text character display).
12. Fuel level – (eight element vertical bar graph display).

The Advanced Instrument Cluster controls the power for a number of different circuits in the machine.

Controlled Functions:

1. **Seat/Seat Belt:**
   A. A first time seat switch closure at this input will power-up the AIC. At that time the AIC will allow for operator verification of all visual devices. All of the electrical power to the hydraulic enable solenoid controlling the boom and bucket must pass through this switch as a backup to the AIC. This will require an operator to be in the seat with the seat belt buckled in order for the boom and bucket to be enabled. At initial power-up the AIC will require the seat belt to be unbuckled to avoid the seat belt being buckled behind an operator at power-up. This switched input is closed during normal operation. If the operator unbuckles the seat belt or exits the operators seat at any time and the auxiliary override button has not been pushed, the park brake will enable and the boom and bucket will not function. If the switch is open for more than two seconds, the operator must re-fasten the seat belt to allow the boom and bucket to function again. If the switch closes within two seconds the seat belt does not need to be re-fastened. This delay is built into the AIC to avoid annoying attachment flow interruption and park brake activation due to operator- induced seat switch bounce during operation.
   B. If an object of sufficient weight is placed in the operators seat the AIC will power-up normally. If there is no subsequent activity for thirty seconds (seat belt fastened, etc.) the AIC will power down. Approximately every twenty seconds thereafter the AIC will wake up and display the message “SEAT” for one second. This feature is a troubleshooting aid in the event that a wiring harness short circuit exists so that it appears that an operator is in the seat.

2. **Engine Oil Pressure:**
   This switched input is driven by a sensor which is normally open. This switch will close if during normal operation the engine oil pressure drops. The AIC response to this fault is debounced to prevent erroneous occurrences; the fault must appear for 2.5 seconds before a warning is triggered. The operator is warned of low engine oil pressure by a flashing red backlit visual indicator and a beeping audible. Low engine oil pressure will also cause the AIC to shut down the engine. If engine oil pressure is lost, power will be removed from the fuel solenoid after thirty seconds. During that time a 30 second countdown will appear in the LCD text display. After the AIC shuts down the engine the operator my restart the unit any number of times. As long as the engine oil pressure is low, each time the engine is started the thirty second timer will countdown until the instrument cluster automatically shuts the engine off again. The ability to restart the engine for short periods of time will allow an operator to move a unit to a location more suitable for service. Each occurrence will increment the tally for this fault in the fault history in the SETUP menu.

3. **Engine Air Filter:**
   This switched input is driven by a sensor which is normally open. The switch will close during normal operation if the pressure differential across the air filter is too high, indicating the filter is clogged. The AIC response to this fault is delayed by a debounce time of 1.5 seconds to prevent erroneous warnings. The operator is warned of a clogged engine air filter by a flashing yellow backlit indicator and a beeping audible alarm. Each occurrence will increment the tally for this fault in the fault history in the SETUP menu.

4. **Engine Preheat:**
   When active (output voltage high), this output applies power to a grid heat relay to help start the loader in cold weather. This feature heats the engine for a time inversely proportional to the temperature of the engine coolant. Preheat is activated when the ignition key is turned from OFF to RUN. If preheat is needed the yellow backlit indicator will light continuously until preheat is finished. In addition, a countdown will be displayed in the LCD text window to indicate the amount of preheat remaining. If at any time the ignition key is turned to START preheat will be cancelled. The amount of preheat depends not only on the temperature but also the type of engine in the machine. The correct profile is selected manually in the SETUP menu during machine production. Preheat thresholds are included at the end of this overview.

5. **Hydraulic Charge Pressure:**
   This switched input is driven by a sensor which is normally open. The AIC response to this fault is debounced to prevent erroneous occurrences; the fault must appear for 2.5 seconds before a warning is triggered. The operator is warned of low hydraulic oil pressure by a flashing red backlit visual indicator and a beeping audible alarm. Since low hydraulic charge pressure is likely to cause an independent application of the hydraulic brake, then if the unit is equipped with a SAHR brake the red LED backlit ISO Park Brake symbol will also flash. Each occurrence will increment the tally for this fault in the fault history in the SETUP menu.

6. **Hydraulic Oil Filter:**
   This switched input is driven by a sensor which is normally open. The switch will close during normal operation if the pressure differential across it is too high, indicating the filter is clogged. The AIC response to this fault is delayed by a debounce time of 5 seconds to prevent erroneous warnings. The operator is warned of a clogged hydraulic filter by a flashing yellow backlit indicator and a beeping audible alarm. Each occurrence will increment the tally for this fault in the fault history in the SETUP menu.

7. **Parking Brake:**
   When not active (output voltage low), this output by default logic in the SAHR (Spring Applied Hydraulic Release) brake causes the brake to be set (brake ON). This output must be active high in order to release the brake. The brake may set independent of the instrument cluster in the even of low hydraulic charge pressure.

8. **Hydraulic Oil Temperature:**
   This proportional analog input is driven by a thermistor-type sensor. The operator is warned of high hydraulic oil temperature when the sensor reads above 99° C (210° F). When this fault occurs the hydraulic oil temperature LCD graph will display all 8 segments, the backlighting for the LCD will flash and the audible alarm will sound. The AIC will also replace the parameter being shown in the text display with a digital display of the current hydraulic oil temperature. Each occurrence will increment the tally for this fault in the fault history in the SETUP menu.

9. **Engine Coolant Temperature:**
   This proportional analog input is driven by a thermistor-type sensor. The operator is warned of high engine coolant temperature when the sensor reads above 109° C (228° F). When this fault occurs the engine coolant temperature LCD graph will display all 8 segments, the backlighting for the LCD will flash and the audible alarm will sound. The AIC will also replace the parameter being shown in the text display with a digital display of the current engine coolant temperature to the nearest degree. Each occurrence will increment the tally for this fault in the fault history in the SETUP menu.

10. **Voltage:**
    The AIC will warn the operator if the system voltage is out of limits. If the system voltage goes above 16.5 volts or falls below 11.5 volts, the operator will be warned. The cluster will replace the parameter being shown in the text display with a digital display of the current system voltage to the nearest tenth volt. The text window will display “VOLTS” and the actual voltage value alternately every half second. This will be accompanied by an audible alarm.

11. **Low Fuel:**
    This proportional analog input is driven by a rheostat-type sensor floating in the fuel tank. The cluster will warn the operator of low fuel level by displaying the single bottom element in the fuel level bar graph and blinking the LCD backlighting accompanied by an audible alarm. The audible alarm will sound for five beeps every ten minutes until the fuel level rises. The cluster may receive erroneous readings of higher fuel level due to fuel sloshing in the tank. To prevent the AIC from canceling the low fuel level warning the fuel level must rise above two bars on the LCD display before the warning is canceled and the LCD backlighting quits flashing. This means that once the AIC has registered a low fuel level the bar graph will blink with either one or two bars displayed. If the fuel level has dropped to two bars, but not yet to one bar, the graph will not blink.

NOTE: *A fuel level display of one bar does not indicate one-eighth the fuel remains in the unit. The sensor cannot reach to the bottom of the fuel tank, so the AIC cannot give a linear display from full to empty.*

12. **Accessory:**
    If the AIC is turned off and the ignition key is inadvertently switched to ACCESSORY, the instrument cluster will display the backlit message “ACC” for several seconds in the text window. Subsequently, the backlight will turn off, but the “ACC” message will remain indefinitely.

13. **Hydraulic Solenoid:**
    When active (output voltage high), this output enables the hydraulic circuit which provides fluid flow to the boom and bucket.

14. **Fuel Solenoid:**
    When active (output voltage high), this output provides current to the fuel flow solenoid. The cluster will remove power from this output after a 30 second countdown to stop the engine when the engine oil pressure drops below a critical value.

Switch Panel:

Push Button Functional Description:

System Enable- Pushing initially will enable hydraulic loader functions (boom and bucket) and, if the unit is equipped with hydraulic brakes, will disengage the SAHR brake. Any subsequent push of the system enable button will toggle a SAHR brake on and off, but will have no effect on the hydraulic loader functions. A flashing yellow LED to the right of the button prompts the user to push the button at startup to enable the hydraulic system.

Work lights- Pushing turns on a unit’s work lights. A green LED indicates when work lights are activated. Activating the work lights will dim the lights on the display panel. Pushing and holding for two (2) seconds will silence a beeping audible alarm. Any subsequent fault alarm will not be muted.

Road lights - Pushing turns on a unit’s road lights. A green LED indicates when road lights are activated. Activating the road lights will dim the lights on the display panel. Pushing and holding for two (2) seconds will silence a beeping audible alarm. Any subsequent fault alarm will not be muted.

Auxiliary Hydraulic Override:

A. Pushing allows operator to exit loader without the engine shutting off automatically. Boom and bucket functions are disengaged and a SAHR brake is activated, but the auxiliary hydraulics are still operational to allow for use of certain attachments. After pushing this button the operator is given thirty (30) seconds to exit the loader. At the end of thirty seconds, if the operator has not left the seat, the override will be cancelled. The override will also be cancelled if the operator pushes the button a second time before leaving the seat, or when, after leaving the seat, the operator sits back down in the seat.

B. Pushing and holding for approximately two (2) seconds allows the operator to change the parameter shown in the text display without entering the SETUP menu. A text description of the parameter currently displayed will appear in the display when this button is pushed and held for at least two seconds. Then within three seconds, if the button is released and pushed repeatedly, all of the viewing options will be shown in a circular manner. A three second period of inactivity on the push button will cause the AIC to save the last item shown as the parameter to be displayed during normal operation.

C. Pushing and holding while turning the ignition key to the OFF position will activate the security lockout feature if a code has been established in the SETUP menu. The security feature will be explained in more detail later.

NOTE: *The functions detailed above for the push buttons apply during normal operating conditions. The buttons will have different functions when used within the SETUP menu; these will be described later.*

AIC Special Functions (Setup Menu):

The Advanced Electronic Instrument Cluster stores settings and machine information for the user to view and/or modify. By entering the setup menu, a user can change machine and user interface parameters and use information and tools to aid in troubleshooting the electrical system. The following information will help the user navigate the setup menu, and describes in detail what information and options are available for the user to view and change.

To Enter the Setup Menu:

A. With the key off, remove all weight from the seat (the cluster should display nothing)

B. Push and hold any cluster push button for 5 seconds until “SETUP” appears in the text display

C. Sit in the seat

The push buttons in the switch panel of the Advanced Electronic Instrument Cluster are used to navigate through and make selections in the SETUP menu. These buttons have functions in the SETUP menu different from their normal operating functions.

System Enable Switch:

When at the top-level menu, pushing the System Enable button will select the top-level item currently displayed in the text window and enter into the sub-menu options.

For sub-menu options that can be changed the System Enable button is used to save the option to memory and return to the SETUP prompt.

Work Light Switch:

When at the top-level menu, pushing the Work Light button will increment to the next top-level item.

When in a sub-menu, pushing and holding this button will exit the user from the sub-menu and increment to the next top-level menu item. Any changes made in the sub-menu will not be saved if this button is used to exit and move on.

Certain menus will prompt the user to enter an access code or allow the user to change a numerical value. Pushing the Work Light button at such a prompt will increment to the next digit.

Road Light Switch:

Certain menus will prompt the user to enter an access code or allow the user to change a numerical value. Pushing the Road Light button at such a prompt will increment the digit.

Certain menus contain multiple settings or parameters a user my view or select. Push the Road Light button to cycle through these sub-menu options.

Auxiliary Override Switch:

Pushing and holding for about three (3) seconds at any time anywhere in the SETUP menu will exit the user completely out of SETUP and return the AIC to normal operation. The cluster and machine will behave as if an operator just sat down in the seat.

After entering the Setup Menu the following items may be displayed:

SETUP:

SETUP is the first term displayed in the setup menu. This item tells the user when he/she has entered the menu and is used as a reference as the operator navigates through other menu items. No information or parameters are maintained by this item. The user is returned to this menu anchor after selecting and saving parameters in other menus.

LOCK:

The advanced instrument cluster allows the user to lock the machine so the engine cannot be started without first entering a four-digit pass-code. The LOCK category in the setup menu is where a user may set or modify the four-digit code. The code is itself pass-code protected to prevent unauthorized altering of the lockout code. When a user enters the lock menu the prompt “UNLOC” will appear in the text display for a few seconds to remind him/her to enter the lockout menu code, “2430”, in order to reset the machine lockout code. “>0000” then appears in the text display. Use the work light and road light buttons to enter the code “2430”. Press the system enable button to enter the code and proceed to the saved machine lockout code. Use the work and road light buttons to enter the desired machine lockout code. Press the system enable button to save the new lockout code in memory. The instrument cluster text display will go dark as it saves the new value to memory. It will then retrieve the machine lockout code and display it in the text display to confirm the correct value has been saved. The user will then return automatically to the SETUP anchor.

REVLV:

This menu displays the software revision installed on the instrument cluster.

FAULT:

The fault menu allows an operator to view the accumulated history of the faulted parameters since the last time the fault history was cleared or until the fault buffer is full. Viewing fault history will highlight the appropriate icon or graph and display the number of accumulated faults in the text display. As the work light switch is exercised, each fault icon is backlighted and accompanied by the fault count in the display. When a fault history is being displayed, pressing and holding the road light button will set the accumulated fault total being displayed to zero. When “CLEAR” is displayed in the text display, pressing the system enable button will set all accumulated fault totals to zero. The maximum number of faults the instrument cluster can record is 256.

The Fault Items in Order Are:

- Hydraulic Charge Pressure (LED backlighted symbol)
- Engine Oil Pressure (LED backlighted symbol)
- Hydraulic Oil Filter (LED backlighted symbol)
- Engine Air Filter (LED backlighted symbol)
- Hydraulic Oil Temperature (bar graph highlighted)
- Engine Coolant Temperature (bar graph highlighted)

dIAGI:

The input diagnostic menu allows a user to verify the function of the wiring harness and instrument cluster from the connection of input switches and sensors to the display on the instrument cluster. To verify continuity in the wire harness and correct processing by the cluster, the text screen will display the name of the switch or sensor when a transition is seen by the cluster.

Input Diagnostics:

“PUSHB” – Instrument cluster push buttons pushed.

“KEYAC” – Ignition key transition from OFF to ACCESSORY, or back.

“KEYON” – Ignition key transition from OFF to ON, or back.

“EOILP” – Engine oil pressure switch.

“CPrES” – Hydraulic charge pressure switch.

“AIrFL” – Engine air filter switch.

“OILFL” – Engine oil filter switch.

“SEATb” – Seat belt switch.

“SEATS” – Seat switch.

“KEYST” – Ignition key transition from ON to START, or back.

“FULST” – Fuel solenoid status.

“00000” – Engine coolant temperature sensor resistance.

“00000” – Hydraulic oil temperature sensor resistance.

“00000” – Fuel level sender resistance.

dIAGO:

The output diagnostic menu allows a user to confirm the function of the wiring harness and instrument cluster from the cluster to various devices in the skid steer loader. To verify continuity in the wire harness and correct processing by the cluster, the text screen will display the name of the output device while sending a signal to the device. Press the road light button to toggle through the output diagnostic functions. Confirm 12 volts is seen at the correct output pin of the instrument cluster and at the connector to the electrical device.

Output Diagnostics:

”HYdEN” – Hydraulic enable of loader valve solenoids.

“PHEAT” – Output to preheat relay.

“bRAKE” – Hydraulic brake solenoid.

“WLITE” – Output to work light relay.

“RLITE” – Output to road light relay.

“AUXOV” – Output of auxiliary hydraulic override to the fuel solenoid..

UNITS:

The units menu allows the user to choose to display temperatures in the Fahrenheit or Celsius scale. When in the units menu, press the road light button to toggle between “FAHR” and “CELC”. Press the system enable button to save the selection. This will return the user to the SETUP placeholder.

dSPLY:

The display menu allows the user to select the parameter shown in the text display during normal operation. When in the display menu, press the road light button to select the desired display parameter and press the system enable button to save the choice. This will return the user to the SETUP anchor.

Parameter to Display During Normal Operation:

“ENHRS” – Engine hours.

“ENRPM” – Engine RPMs.

“COOLT” – Engine coolant temperature.

“HOILT” – Hydraulic oil temperature.

“CYCLE” – Cycles continuously through all four of the above options.

JTIMR:

The job timer menu allows a user to view and clear a timer independent of the engine hour timer. When entering the job timer menu the text screen will display the current count of the job timer to the nearest one-tenth of an hour. Pressing the road light button will toggle to “ERASE”. Pressing the system enable button at “ERASE” will clear the job timer count to zero.

TROUBLESHOOTING

ADVANCED INSTRUMENT CLUSTER (AIC)

PROBLEM	POSSIBLE CAUSE	CORRECTION
AIC board will not light up when operator sits in the seat.	Faulty seat switch.	Replace switch
	No battery voltage to seat switch.	Open in power wire from 5 amp fuse from supply, check and/or replace battery No battery voltage to 5 amp fuse from supply, check and/or replace battery
	Blown 5 amp fuse (electronic battery) in engine panel.	Replace fuse.
	No battery voltage from seat switch to AIC board.	Open in power wire from seat switch to AIC board, repair open wire. Poor or no connection at AIC board, repair connection
	Battery voltage from seat switch to AIC board	If battery voltage from seat to board is OK, replace the AIC.
AIC backlighting is dim.	Brightness variations due to production differences between models and/or AIC board changes.	None -- overlay decal material variations cause differences in brightness.
	Backlights dim when the loader worklights are activated.	None -- AIC board circuitry automatically dims the backlighting when then worklights are on, to reduce the glare at night.
AIC board seat belt light will not go off with the seat belt fastened.	Seat belt not fastened.	Fasten the seat belt.
	Faulty seat belt buckle switch.	Replace seat belt assembly
	No battery voltage from seat switch to seat belt switch.	Open in wire from seat switch to seat belt switch, repair open.
	No battery voltage from seat belt switch to AIC board.	Open in wire from seat belt switch to AIC board, repair open. Poor or no connection at AIC board, repair connection.
	Battery voltage from seat belt switch to AIC board.	If voltage is OK, replace the AIC.

PROBLEM	POSSIBLE CAUSE	CORRECTION
AIC will not read correct Engine RPM, and varies more than ± 50 RPM.	Incorrect engine configuration.	Correct the engine configuration.
	No AC voltage at tachometer terminal at alternator.	Repair alternator.
	Loose or corroded connection at tachometer terminal at alternator.	Repair connection.
	No AC voltage at AIC board from alternator.	Open in wire from alternator to AIC board, repair connection.
	AC voltage from alternator to AIC board.	Repair loose or corroded connection at AIC board.
	Wire connection from alternator to AIC board.	If OK, replace AIC.
AIC will not unlock boom and bucket spool locks.	Seat belt not fastened.	Fasten seat belt.
	Faulty seat belt buckle.	Replace seat belt assembly.
	No battery voltage from seat belt switch to AIC.	Open in power wire from seat belt switch, repair open.
	No battery voltage from AIC to spool lock solenoids.	Open in power wire from AIC to solenoids, repair open.
	Battery voltage to lock solenoids.	If OK, check inoperative solenoids, check solenoid coils and repair or replace.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Engine will not start and/or run.	Seat belt not fastened.	Fasten seat belt.
	Incorrect Engine configuration. (AIC	Correct configuration.
	No battery voltage to start relay.	Open in power wire from key switch “START” to relay, or through seat/seatbelt circuits to relay, repair open
	No battery voltage from AIC to fuel solenoid.	Open in power wire from AIC to fuel solenoid, repair open.
	Open in W/O wire from the seat/seat belt plug to the start interlock relay.	Repair open in W/O wire.
	Inoperative start interlock relay.	Repair or replace.
	Fuel solenoid inoperative.	Repair or replace.
	Inoperative manifold heater system.	Incorrect Engine configuration, correct configuration.
	No power to manifold heater.	Manifold heater preheat relay or LTBL/B wire open, repair or replace.
	Inoperative manifold heater.	Replace manifold heater.
	No fuel in manifold heater.	Check fuel feed tube and fuel supply from injection pump.
Engine turns over, but will not start.	No power to fuel solenoid	If equipped with auxiliary override switch, make sure switch is in neutral position. Open in wire from AIC pin 5 to fuel solenoid. Repair open.
	Fuel solenoid inoperative	Repair or replace.
Engine will not turn over.	Inoperative seat switch or operator not present in seat.	Check seat switch.
	Inoperative seat belt switch or seat belt not fastened.	Check seat belt switch, fasten seat belt.
	No power to starter, no power to key switch.	Check key switch, seat switch, start interlock relay, battery. Check 5 amp fuse in engine fuse panel. Check 15 amp fuse in engine fuse panel.
Engine will start and run but boom and bucket will not move.		Unfasten seat belt and then refasten.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Engine will start and run but boom and bucket will not move.	No power to control valve lockout solenoids.	Check for power at spool lockout solenoids. Check 15 amp fuse in cab fuse block. Replace AIC.
AIC will not read monitored circuits.	Incorrect engine configuration.	Correct engine configuration.
	Open or short in wire from sensor to AIC.	Repair open/short.
	Faulty sender or sensor.	Repair/replace sender or sensor.

Op. 55 100

REMOVAL, INSTALLATION AND WIRING OF ELECTRICAL COMPONENTS

This section will show and explain the correct wiring of switches and relays, and when and where battery voltage should be with the key switch (ignition) “ON” or “OFF” for the electrical components.

This section will also explain the removal and installation of the switches, relays, EIC board, and main wire harness.

Before servicing, changing or adding any electrical components, read the following precautionary statements.

IMPORTANT: *Do not connect any power or ground electrical circuits at the ignition key switch, the cab electrical fuse panel, or the cab ground terminal in the fuse panel area unless there are written instructions from New Holland telling you to do so or damage and false readings with the EIC board may occur.*

IMPORTANT: *If any servicing or adjustments require the battery to be disconnected, or welding is required on the skid-steer loader, disconnect the negative (–) ground cable. Failure to disconnect the battery may result in damage to the EIC (Electronic Instrument Cluster) monitoring system and other electrical components.*

IMPORTANT: *If the EIC requires removal from the dash area of the skid-steer loader, disconnect the negative (–) ground battery cable. This will shut off power to the EIC and prevent damage to the EIC board or blowing the 5-amp fuses if the board is accidentally grounded.*

IMPORTANT: *Do not service the EIC board with magnetized tools (wrenches, screwdriver, etc.) or magnets. Severe damage to the EIC board may occur.*

BATTERY

Op. 55 301 40

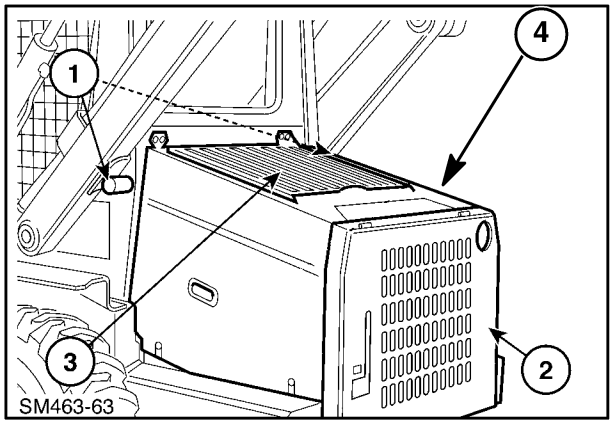
REMOVAL

1. Raise the boom and rest it on the boom lock pins, 1.

⚠ CAUTION ⚠

Never work under a raised boom unless it is properly supported by the boom lock pins.

2. Open the rear door, 2, raise the top hood, 3, and remove the right engine side shield, 4, to access the battery.
3. Disconnect the negative (–) battery cable, 1.
4. Disconnect the positive (+) battery cable, 2.
5. Loosen the top muffler support hardware at 3, and remove the lower support hardware at 4, and pivot the support in towards the engine.
6. Remove the battery hold-down hardware, 5, and remove the battery from the loader.



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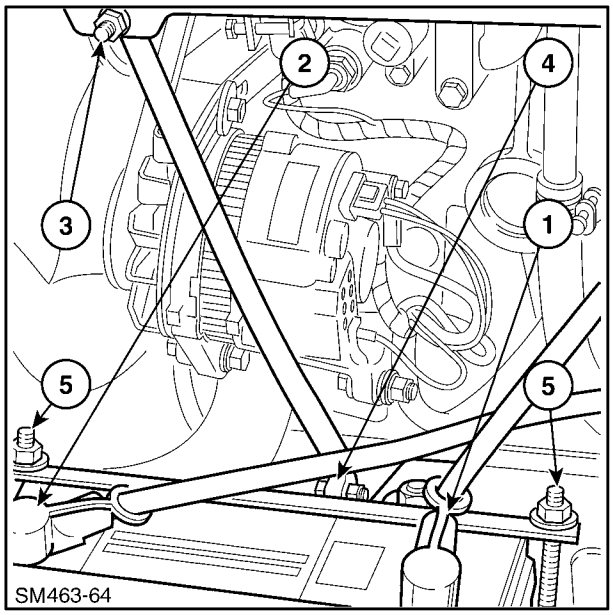

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INSTALLATION

1. Orient the battery with the positive post, 2, toward the rear of the loader. Install the battery and the hold-down strap and hardware. Position the hold-down strap to clear other components.
2. Connect the positive (+) RED cable to positive (+) terminals and negative (–) BLACK cable to negative (–) terminals. Do not over tighten. Observe the tightening specifications on the battery label.

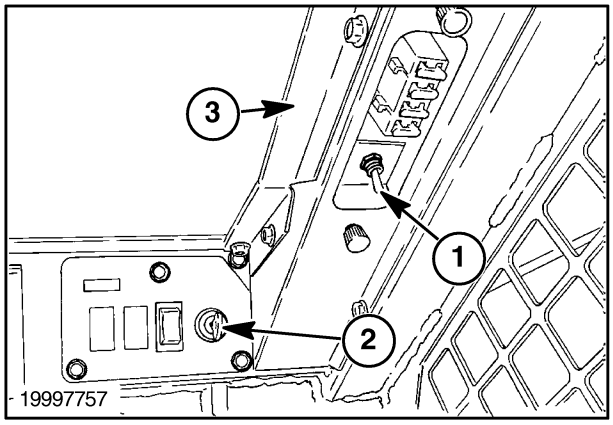
IMPORTANT: *Crossing of terminals may cause damage to the electrical system, alternator and Advanced Warning System (EIC).*

3. Install protective caps over the battery terminals and cable connections.

CAB FUSE BLOCK AND PANEL REMOVAL

1. Disconnect the negative (–) battery cable.
2. Remove the panel retaining hardware, 2, and lower the panel, 1. Removal of the headline support, 3, will give more access.
3. Unplug the wires from the fuse block.
4. Remove the fuse block retaining hardware.

NOTE: *The standard fuse block is part of the main harness and cannot be completely removed from the main wire harness and replaced separately.*



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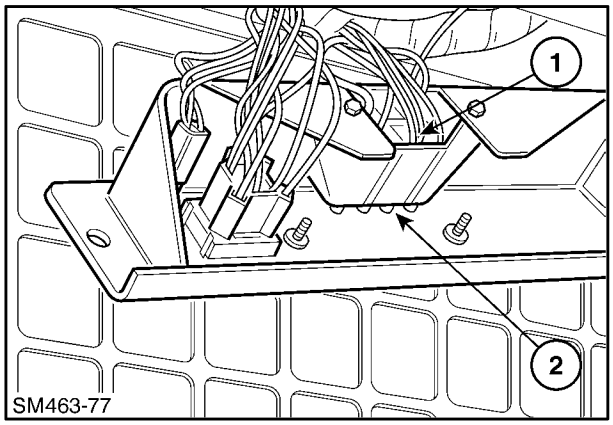
CAB FUSE BLOCK AND PANEL INSTALLATION

1. Attach the wires to the proper side of the fuses as shown at 1, and as shown in the “CAB FUSE PANEL WIRING” figure above. Check that the fuses, 2, are in their proper slots.
2. Reinstall the block retaining hardware.
3. Reinstall the panel to the support.
4. Reinstall headliner support, if removed.
5. Reconnect the negative (–) battery cable.



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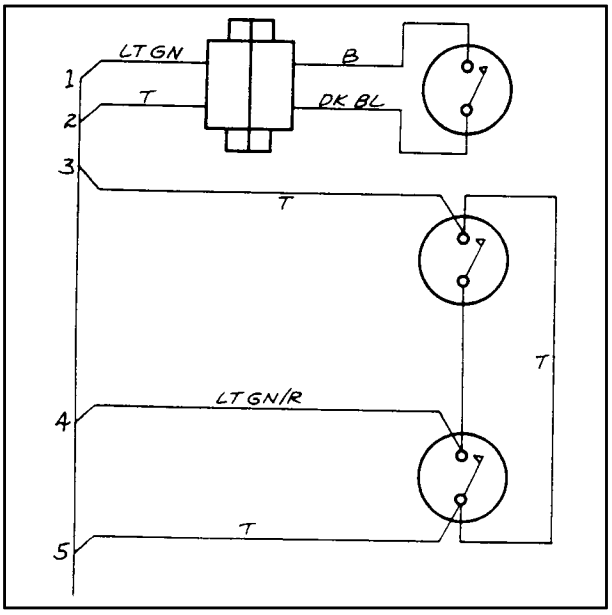
SEAT AND SEAT BELT SWITCH WIRING

Ref	Color	Destination	Battery Voltage
1	LTGN	To EIC Board Pin #11 (large connector)	Seat Belt Buckled
2	T	From Seat Switch(es)	Sit in Seat
3	T	To Seat Belt switch	Sit in Seat
4	LTGN/R	From Electronics 5A Fuse (engine panel)	All Times
5	T	To Service/Run Switch	Sit in Seat



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Op. 55 201 15

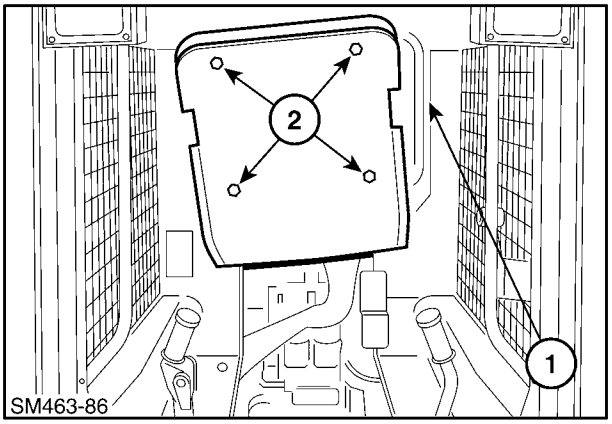
SEAT SWITCH REMOVAL

1. Disconnect the negative (–) battery cable.
2. Slide the seat to the most rearward position. Raise the seat and securely latch in the raised latched position, 1.

⚠ CAUTION ⚠

Never work under a raised seat unless it is securely latched in the raised position.

3. Remove the seat retaining hardware, 2.
4. Holding the seat in place, lower the seat pan and seat and unplug the seat switch(es).
5. Remove the seat from the loader.
6. Disconnect the wire harness from the switch(es) by releasing the latch away from the switch.
7. Remove the switch(es) from the seat pan. The standard seat uses one switch, 1, and the deluxe seat uses two switches, 2.



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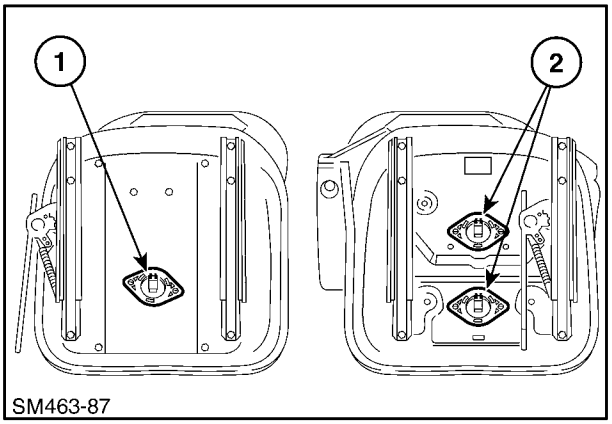

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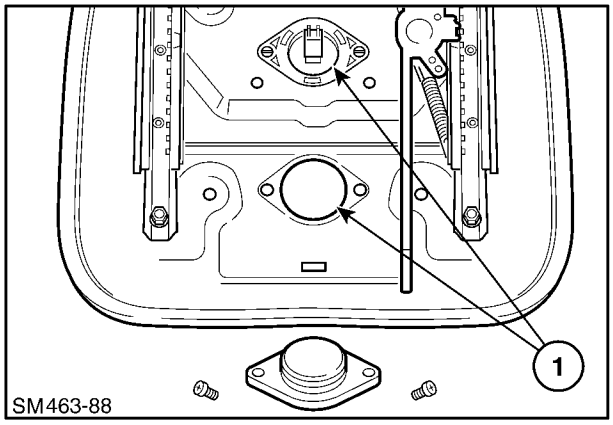
SEAT SWITCH INSTALLATION

1. Install the switch(es) into the seat pan, making sure the switch is seated into the hole in the seat pan, 1.

IMPORTANT: *If the switch is not seated properly when the retaining hardware is tightened, the switch flange will be broken.*

2. Reconnect the wire harness to the switch(es) and reinstall the seat retaining hardware. Make sure the harness connector latches are engaged.
3. Reconnect the negative (–) battery cable.



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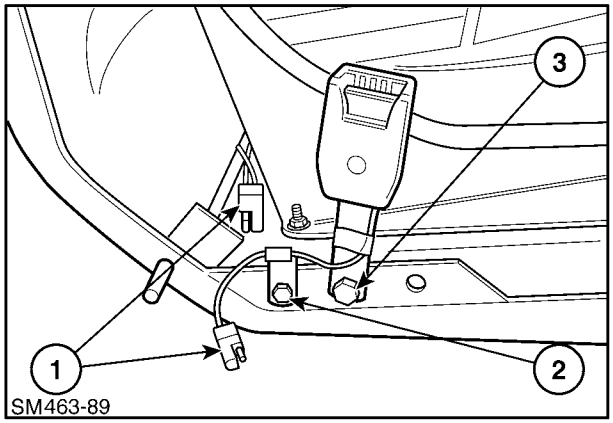
Op. 55 201 14

SEAT BELT BUCKLE AND SWITCH ASSEMBLY REMOVAL

1. Disconnect the negative (–) battery cable.
2. Unplug the seat belt wire harness, 1.
3. Remove the clamp hardware and clamp, 2, and save for reuse.
4. Remove the seat belt retaining hardware, 3.

SEAT BELT BUCKLE INSTALLATION

1. Reinstall the seat belt buckle retaining hardware. Tighten the locknut to hold the belt in position that will allow the belt assembly to move front or rearward.
2. Reconnect the wire harness.
3. Reinstall clamp holding harness above seat track.
4. Reconnect the negative (–) battery cable.



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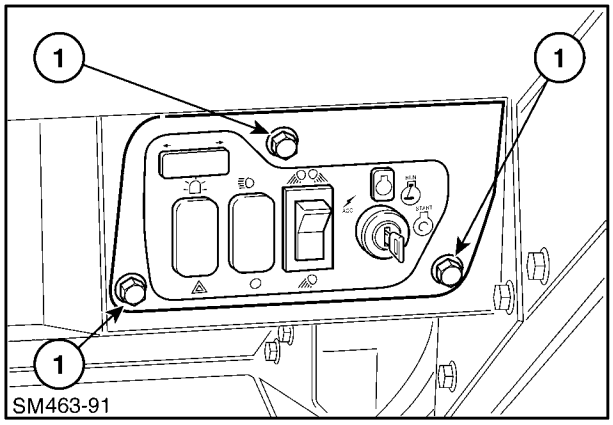
Op. 55 404 20

ROAD LIGHT AND WORK LIGHT SWITCH REMOVAL

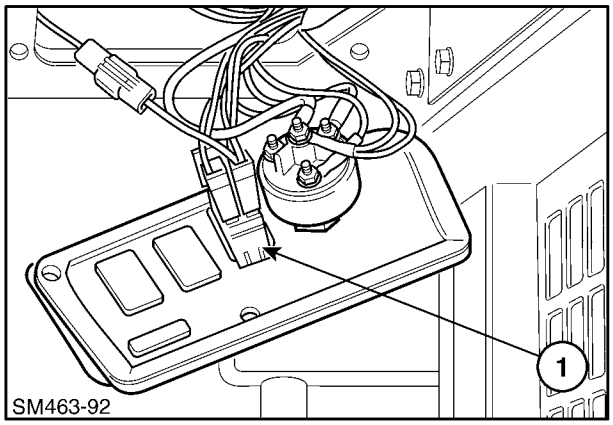
1. Disconnect the negative (–) battery cable.
2. Remove the switch panel retaining hardware, 1, and lower the panel.
3. Remove the wires and connector from the switch terminals.
4. Press in the switch retaining tabs and remove the switch from the panel.



100

ROAD LIGHT AND WORK LIGHT SWITCH INSTALLATION

1. Insert the switch into the panel and insure the locking tabs secure the switch, 1.
2. Reconnect the wires and connector to the proper terminals with the PK/B and PK wires toward the top of the panel.
3. Reattach the switch panel to the overhead dash.
4. Reconnect the negative (–) battery cable.



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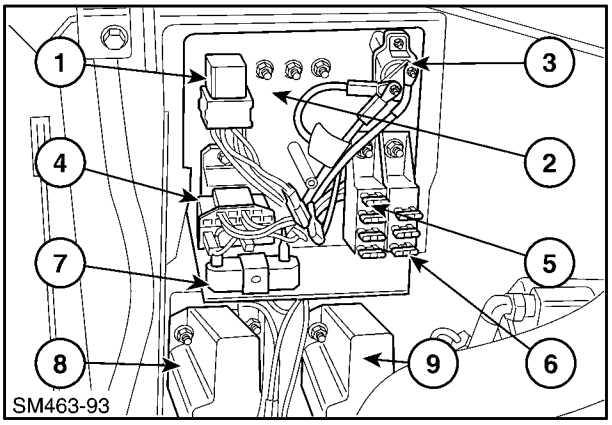
ENGINE FUSE AND RELAY PANEL

The engine panel electrical components are shown here:



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1. Accessory relay
2. Heater power relay (if equipped, not shown)
3. Preheat circuit breaker
4. Start interlock relay
5. Optional equipment fuse block
6. Standard fuse block
7. Alternator excite resistor
8. Start relay
9. Preheat relay

To access the electrical components in the engine compartment, raise the boom and rest it on the boom lock pins.

⚠ CAUTION ⚠

Never work under a raised boom unless it is properly supported by the boom lock pins.

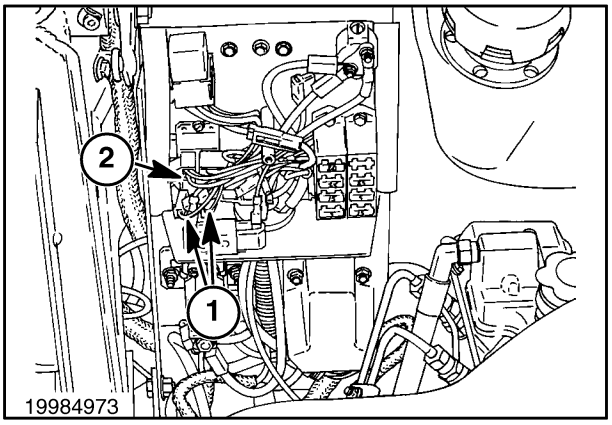
Op. 55 100 34

START INTERLOCK RELAY REMOVAL

1. Disconnect the negative (–) battery cable.
2. Disconnect the wires from the terminals, 1.
3. Remove the interlock relay, 2, retaining hardware.

START INTERLOCK RELAY INSTALLATION

1. Reinstall the retaining hardware.
2. Reconnect the wires to the proper terminals as shown in the “START INTERLOCK RELAY WIRING” figure above.
3. Reconnect the negative (–) battery cable.



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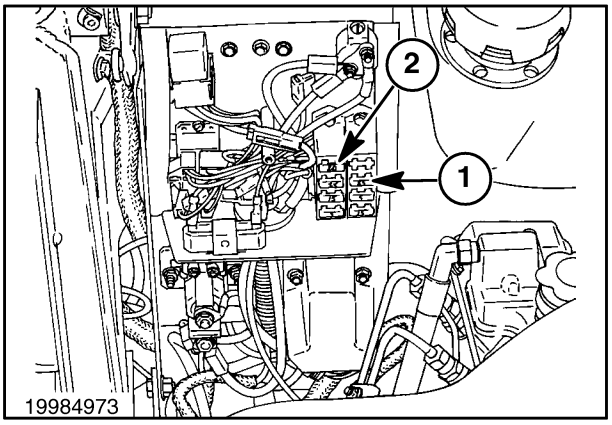
ENGINE FUSE BLOCK REMOVAL

1. Disconnect the negative (–) battery cable.
2. Remove the fuse block retaining hardware.

NOTE: *The standard fuse block, 1, is part of the main harness and cannot be completely removed from the main wire harness and replaced separately.*

3. The optional equipment fuse block , 2, locks into the standard fuse block. Insert a 1/4″ blade screwdriver at the center of the fuse block bases and twist to release the lock. Slide the optional block up past the fuses on the standard block to separate.
4. Unplug the wires from the fuse block assembly.



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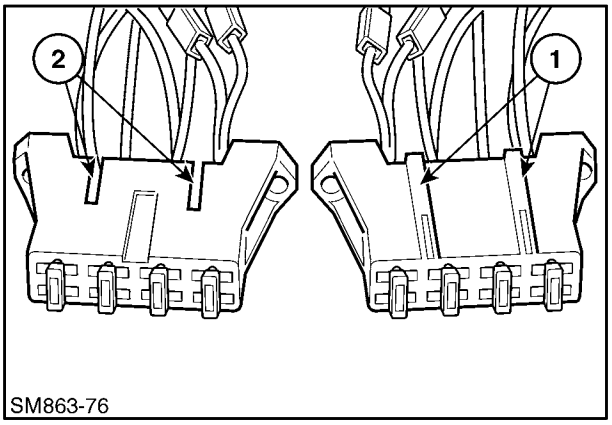
ENGINE FUSE BLOCK INSTALLATION

1. Insert the lock tabs, 1, into slots, 2, and slide the two blocks together to lock securely as shown.

NOTE: *The optional equipment fuse block slides down over the standard block guides and is positioned toward the center of the panel.*



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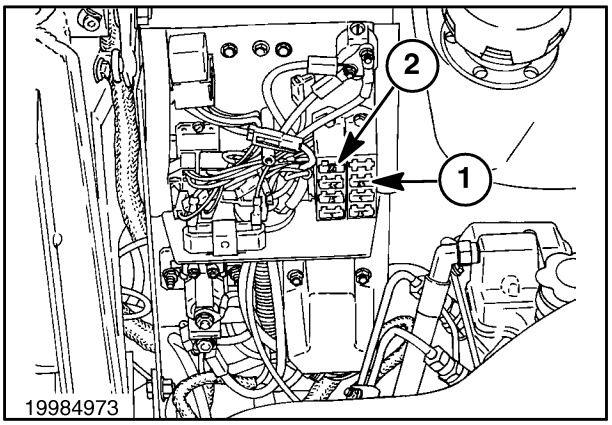
2. Attach the wires to the proper side of the fuses as shown in the “ENGINE FUSE PANEL WIRING” figure above.
   1 Standard fuse block
   2 Optional equipment fuse block
3. Reinstall the block retaining hardware.
4. Reconnect the negative (–) battery cable.



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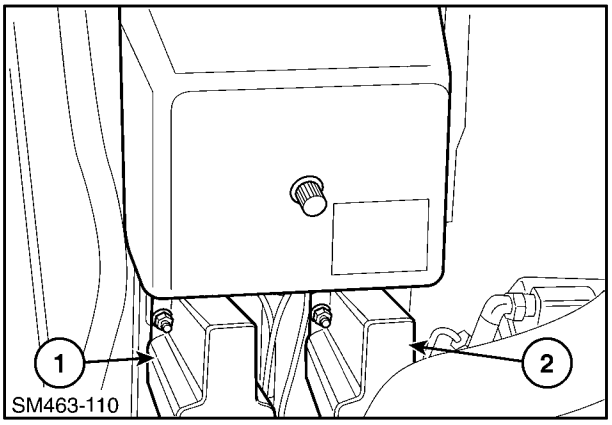
Op. 55 100 34

PREHEAT RELAY REMOVAL

1. Disconnect the negative (–) battery cable.
2. Remove the relay cover, 2, attaching hardware and cover.
3. Remove the wires from the relay terminals.
4. Remove the relay retaining hardware.
5. Remove the barrier from between the large terminals and install on new relay.

NOTE: *The start relay, 1, and the preheat relay, 2, may be wired in either position. Check wire colors for proper relay location.*



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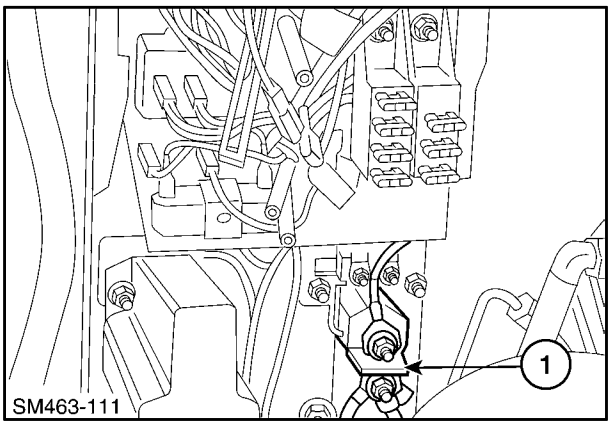
PREHEAT RELAY INSTALLATION

1. Reattach the relay, 1, to the support.
2. Reconnect the wires to the proper relay terminals.
3. Reinstall the relay cover.
4. Reconnect the negative (–) battery cable.



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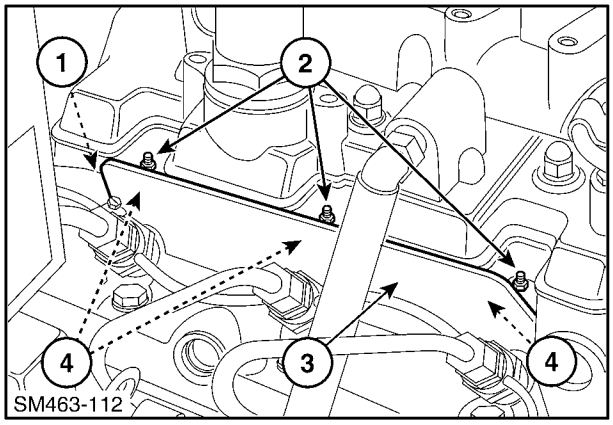
Op. 55 201 76

PREHEAT GLOW PLUG REMOVAL

1. Disconnect the negative (–) battery cable.
2. Disconnect the LTBL/B wire, 1, from the glow plug bus bar.
3. Remove the bus bar retaining nuts, 2, and remove the bus bar, 3, from the glow plugs.
4. Remove glow plugs, 4, from the head.

PREHEAT GLOW PLUG INSTALLATION

1. Install the glow plugs into the head and, using new sealing washers, torque to 15 - 19 N·m (11 - 14 ft. lbs.).
2. Reinstall the bus bar to the glow plugs.
3. Reconnect the LTBL/B wire to the glow plug bus bar.
4. Reconnect the negative (–) battery cable.



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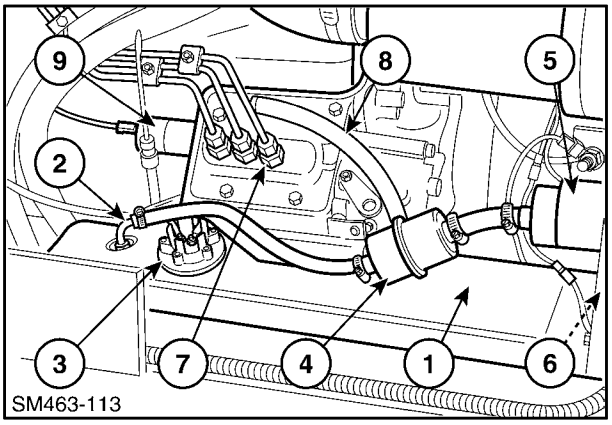
FUEL SYSTEM COMPONENTS

The fuel system consists of a fuel tank located in the left side of the engine compartment at 1; fuel tank pickup tube, 2; fuel tank sending unit, 3; inline fuel filter, 4; electric fuel pump, 5; fuel filter (water), 6; injection pump, 7; and return fuel line, 8, from the injector bleed off to the tank. The fuel flow is controlled by an electric fuel solenoid, 9, which is controlled by the EIC (Electronic Instrument Cluster).



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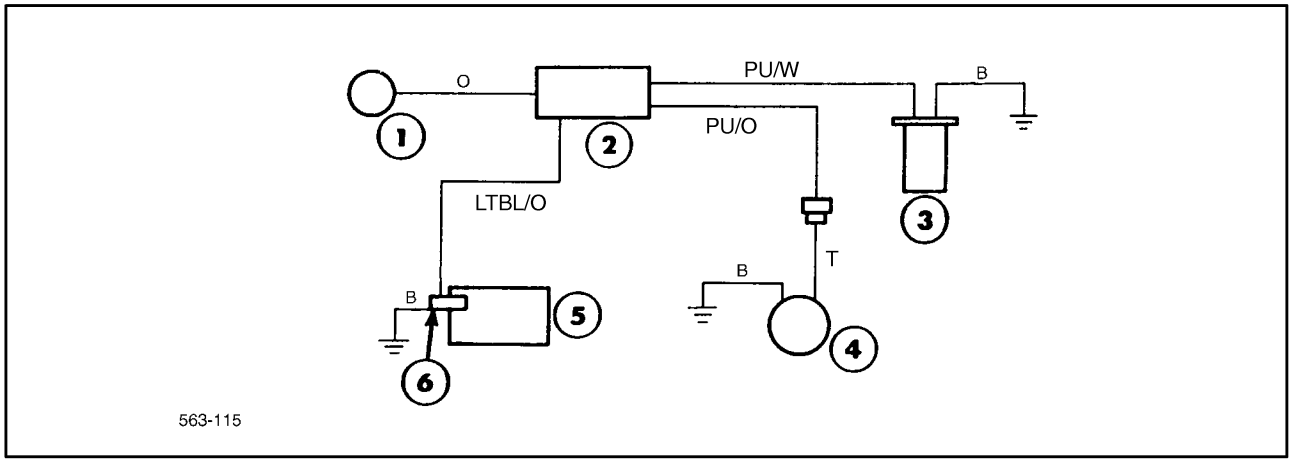
FUEL GAUGE

In the center of the EIC panel is the fuel gauge, implemented as a vertical 10-segment green LED bar graph. The lowest segments will flash when the fuel level is low. An audible alarm will accompany the flashing light for about 5 seconds.

FUEL TANK SENDING UNIT (Fuel level)

STEP	PRETEST INSTRUCTIONS	TEST	RESULT	PROBABLE CAUSE AND CORRECTION
1	Loader on level with parking brake engaged, key “ON” position Symptom: No bars lit	EIC gauge and sender operation Jumper wire from one terminal to other at sender	NO bars light up YES (bars light up)	Check wires from sender to EIC board, if OK, replace EIC board Replace sender
2	Symptom: Fuel level does not read lower on gauge (too many bars lit)	Disconnect PU/W wire	Bars stay lit Bars go out	Check for PU/W wire shorted to ground. If OK, replace EIC board. Replace sender

FUEL SYSTEM ELECTRICAL DIAGRAM



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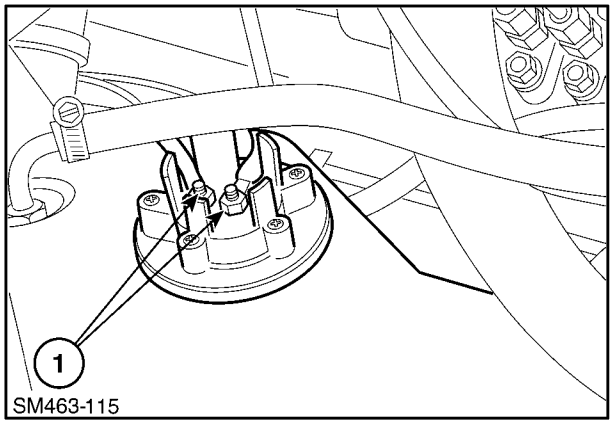
1. Key switch
2. EIC board
3. Fuel level sender
4. Electric fuel pump
5. Injector pump
6. Fuel shutoff solenoid

TESTING FUEL GAUGE IN DIAGNOSTIC MODE

Use a jumper wire and connect sender terminals, 1, and the EIC board will light and beep. If the EIC board lights and beeps, the EIC and circuit wires to the sender are OK. If the EIC board fails to light, check the wires to the EIC board.

If the fuel gauge is not working and the wiring and the fuel sender are found to be good, the complete EIC board will require replacement.



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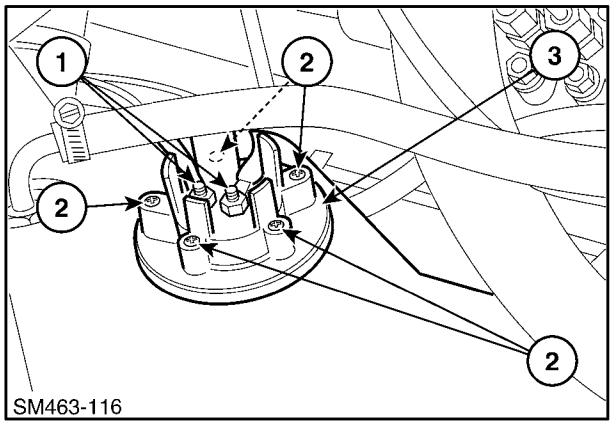
Op. 55 410 80

REMOVAL OF FUEL LEVEL SENDER

1. Support the boom on the boom lock pins.
2. Open the rear door and remove the left engine side shield.
3. Disconnect the wires from the sender, 1.
4. Remove the sender retaining screws, 2, and remove the sender, 3, assembly from the tank.



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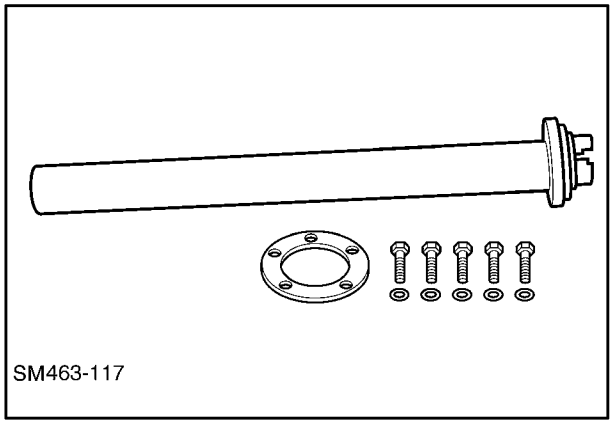
TESTING OF THE FUEL LEVEL SENDER

Using a volt/ohmmeter, put one lead on one terminal and the second lead on the other terminal. Rotate the sender from full tank to empty tank, and the ohms reading should be between 35 ohms full and 240 ohms empty.

If the fuel gauge is not working and the wiring and the fuel sender are found to be good, the complete EIC board will require replacement.



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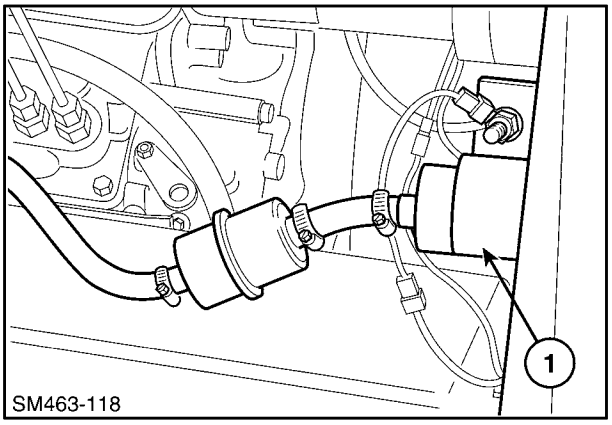
ELECTRIC FUEL PUMP

The electric fuel pump, 1, is located in the left side of the engine compartment.



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ELECTRIC FUEL PUMP TESTING

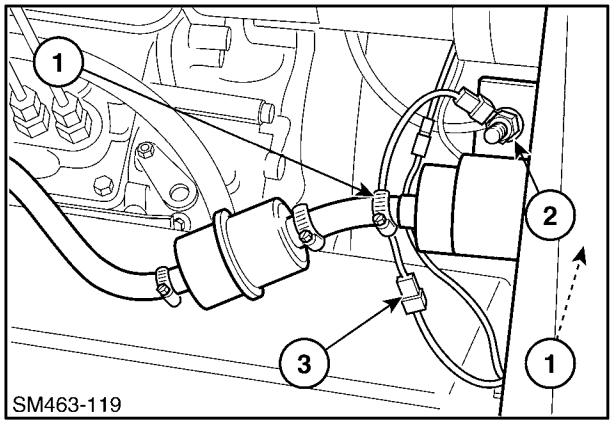
STEP	PRETEST INSTRUCTIONS	TEST	RESULT	PROBABLE CAUSE AND CORRECTION
1	Loader on level with parking brake engaged, key “OFF” position	Fuel level in tank	NO YES	Add fuel and bleed system Go to next step
2	Key “ON” position	Fuel pump operating	NO YES	Check power supply (5-amp fuse in cab panel). If OK, check ground; if OK, replace pump Go to next step
3	Key “ON” position	Fuel pump operating but not pumping fuel	NO YES	Check line to tank, air leak, fuel level, tank pickup tube; if OK, replace pump Go to next step
4	Key “ON” position	Fuel pump operating and pumping fuel	NO YES	Replace pump Replace fuel line at injector pump and bleed system; if OK, go to next step
5	Key “ON” position	Fuel pump operating and pumping fuel	YES	Check fuel shutoff solenoid for operation

NOTE: *Always check fuel level in tank. Always check fuel filters.*

Op. 10 210 21

ELECTRIC FUEL PUMP REMOVAL

1. Support the boom on the boom lock pins.
2. Open the rear door and remove the left engine side shield.
3. Remove the hose clamps, 1, from the pump and hoses.
4. Remove the pump support hardware, 2, ground wire, and unplug the power wire, 3.
5. Upon reinstallation of the pump, make sure the pump wires are placed to prevent getting damaged. Make sure the ground wire is making good contact.



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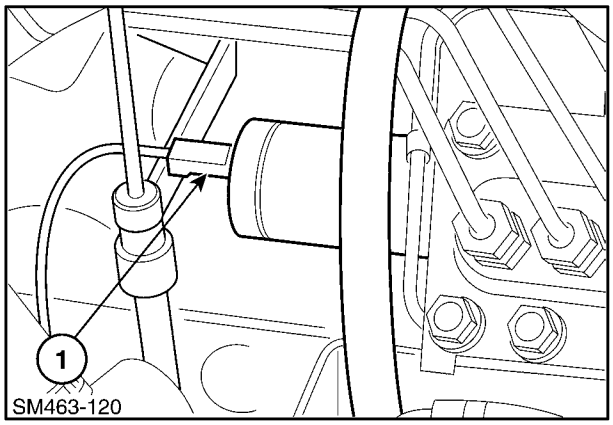
Op. 10 223

FUEL SHUTOFF SOLENOID

The fuel shutoff solenoid is located at the injection pump at 1. The solenoid is controlled through the starting circuit during cranking. After the engine is started, the EIC takes control of the solenoid for normal operation.

If a fault occurs in either the engine oil pressure or the hydrostatic charge pressure circuits, the EIC will remove power from the solenoid, stopping the engine within 30 seconds.



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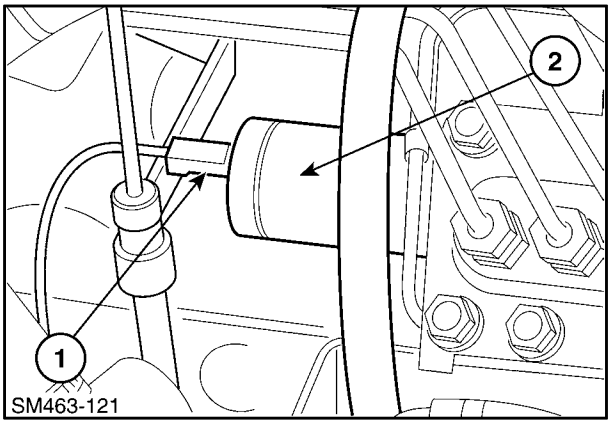
FUEL SHUTOFF SOLENOID TESTING

STEP	PRETEST INSTRUCTIONS	TEST	RESULT	PROBABLE CAUSE AND CORRECTION
1	Loader on level with parking brake engaged, key "ON" position, service "RUN" switch in "RUN" position	Battery voltage to solenoid	NO YES	Check power wire from EIC to solenoid for open; if OK, go to next step Replace solenoid
2	Key "ON" position, service "RUN" switch in "SERVICE" position	Battery voltage to solenoid	NO YES	Check power wire from service/run switch to fuel solenoid; if OK, go to next step Replace solenoid
3	Key "ON" position, "SERVICE/RUN" switch in "RUN" position	Check EIC board operation	NO YES	Check power to EIC board. Check 5-amp electronics Ign. fuse in cab fuse panel. Replace EIC board

Op. 10 223 10

REPLACEMENT OF FUEL SHUTOFF SOLENOID

1. Support the boom on the boom lock pins.
2. Open the rear door and remove the left engine side shield.
3. Remove the power wire from the solenoid, 1.
4. Remove the solenoid, 2, from the injection pump.
5. Solenoid pull-in amperage: 1.5 - 1.8 amps. Solenoid hold-in amperage: 1.3 - 1.7 amps.
6. Reinstall the solenoid and tighten securely. Reinstall the power wire.



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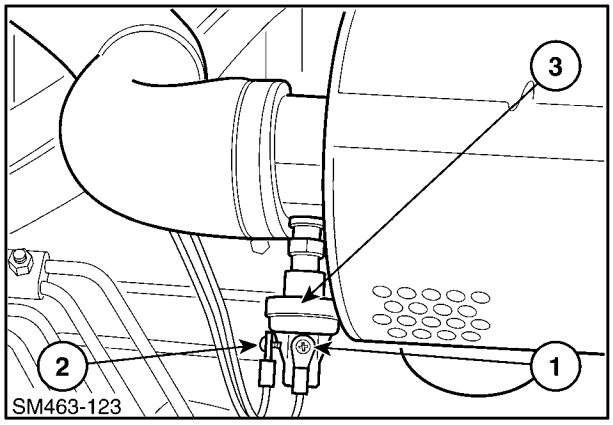
AIR FILTER RESTRICTION INDICATOR SWITCH

Op. 55 414 14

REMOVAL

1. Support the boom on the boom lock pins.
2. Open the rear door and remove the left engine side shield to access the sender.
3. Remove the B/Y, 1, and B, 2, wires from the sender.
4. Remove the sender, 3, from the air cleaner tube.



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INSTALLATION

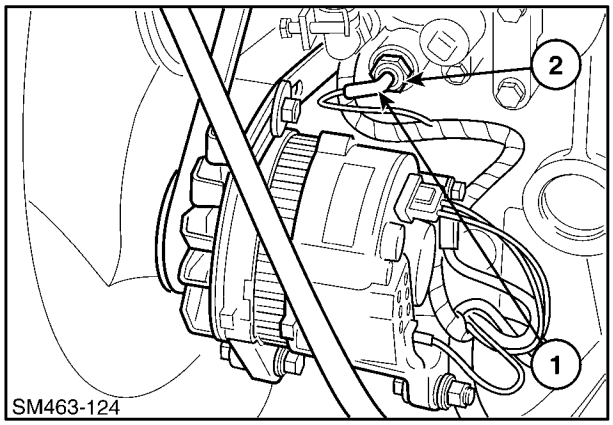
Install the sender and reinstall the B/Y and B wires to the sender terminals.

ENGINE COOLANT TEMPERATURE SENDER

Op. 55 414 10

REMOVAL

1. Support the boom on the boom lock pins.
2. Open the rear door and raise and remove the top engine shield; remove the right engine shield to access the sender.
3. Remove the PU/LTGN wire, 1, from the sender terminal.
4. Drain the cooling system down below the sender level to prevent loss of coolant.
5. Remove the sender, 2, from the engine block.



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INSTALLATION

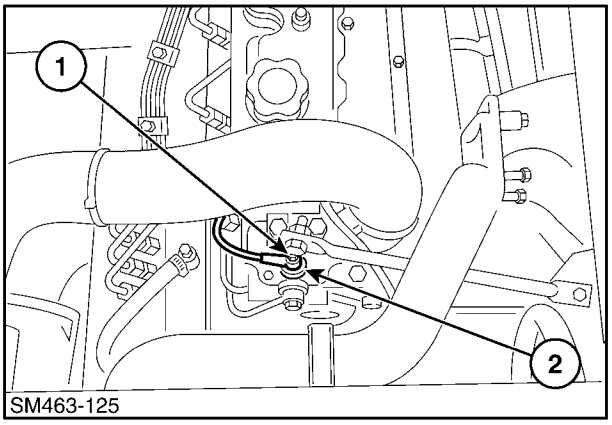
1. Remove and clean the engine block thread area.
2. Apply pipe sealant to the threads of the sender.
3. Install the sender into the engine block.
4. Reinstall the PU/LTGN wire to the sender terminal.
5. Refill the cooling system with coolant previously removed or a 50/50 mixture of a permanent-type antifreeze.
6. Operate the unit to remove air from the cooling system and recheck the coolant level.
7. Reinstall and latch all shields that were removed.

ENGINE OIL PRESSURE SWITCH

Op. 55 414 12

REMOVAL

1. Support the boom on the boom lock pins.
2. Open the rear door and raise the top engine shield to access the switch.
3. Remove the Y/B wire, 1, from the switch terminal.
4. Remove the switch, 2, from the engine head.



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INSTALLATION

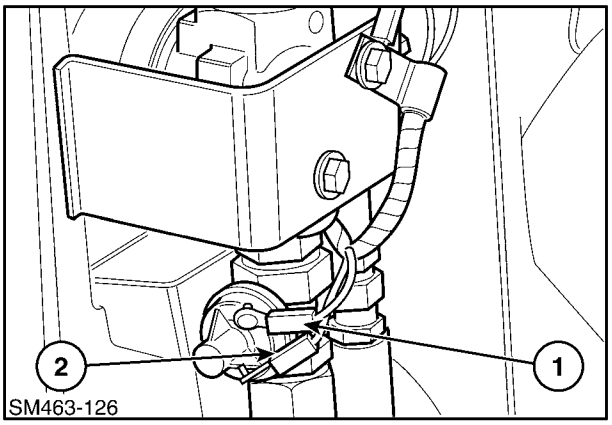
1. Install the switch.
2. Attach the Y/B wire to the switch terminal.

HYDROSTATIC CHARGE PRESSURE SWITCH

Op. 55 414 28

REMOVAL

1. Support the boom on the boom lock pins.
2. Remove the left fender or raise the seat and latch in the raised position to access the switch.
3. Remove the Y/GY wire, 1, and B wire, 2.
4. Remove the charge pressure switch, 3, from the hose.



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INSTALLATION

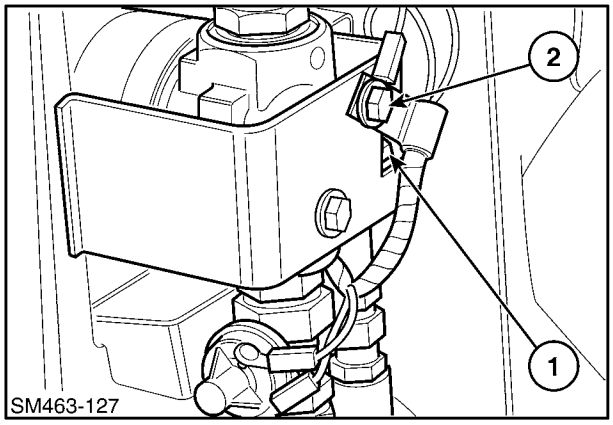
1. Install the charge pressure switch into the hose.
2. Reinstall the Y/GY and B wires to the switch.
3. Reinstall the fender if removed for access.

HYDRAULIC OIL FILTER RESTRICTION SWITCH

Op. 55 414 24

REMOVAL

1. Support the boom on the boom lock pins.
2. Open the rear door, raise the top engine shield and remove the right engine side shield to access the switch.
3. Remove the DKGN/O wire, 1.
4. Remove the restriction switch, 2, from the filter base.



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INSTALLATION

1. Install the switch into the filter base.
2. Attach the DKGN/O wire to the switch terminal.

HYDRAULIC OIL TEMPERATURE SENDER

Op. 55 414 20

REMOVAL

1. Remove any attachment from the boom face plate and support the boom on the boom lock pins.

⚠ CAUTION ⚠

Never work under a raised boom unless it is properly supported by the boom lock pins.

2. Raise the operator's seat and latch in the raised latched position.

⚠ CAUTION ⚠

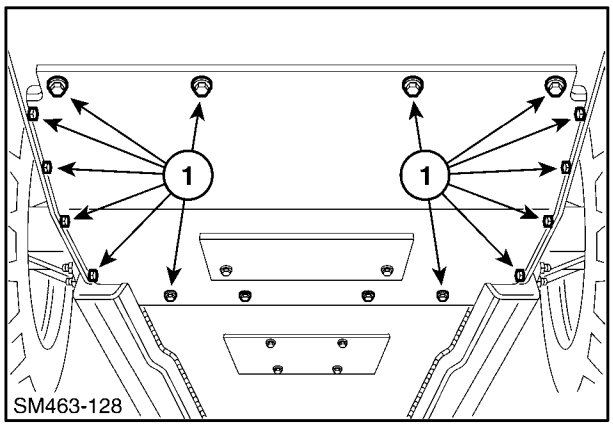
Never work under a raised seat unless it is securely latched in the raised position.

3. Drain the hydraulic reservoir.

   Remove the rear engine belly pan hardware, 1, and lower the pan from the loader.

⚠ CAUTION ⚠

Use a floor jack to support the belly pan and prevent serious injury.



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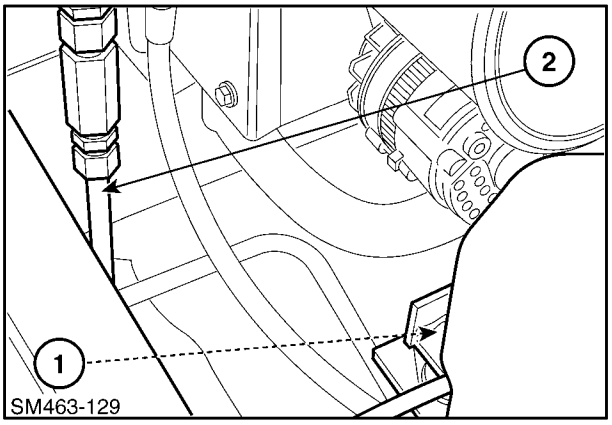
4. Loosen the return line clamp at 1.
5. Remove the return line at 2, and rotate the line so the oil drains into a clean suitable pan for reuse.
6. After the reservoir is drained, reconnect the return lines and tighten all fittings and connections.



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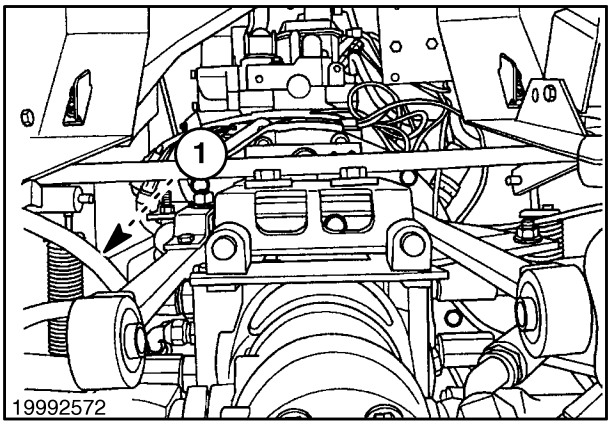
7. Remove the PU/LTBL wire and B wire from the sender, 1.
8. Remove the sender from the reservoir by rotating the sender counterclockwise.
9. Remove the grounding ring and washer from the old sender.



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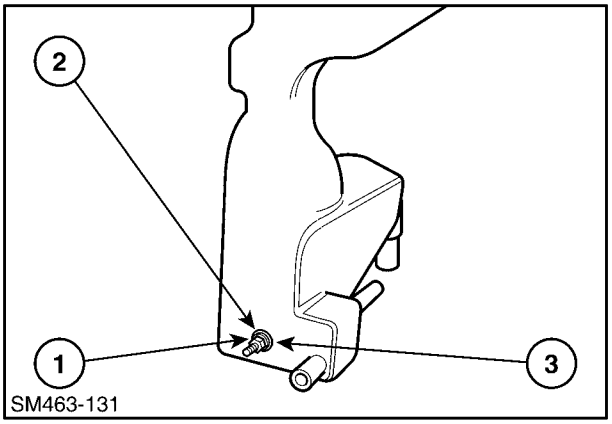
INSTALLATION

1. Install grounding ring, 1, and washer, 2, over threads of sender, 3.

IMPORTANT: *The grounding ring and washer must be threaded all the way onto the sender before installing the sender into the reservoir.*

2. Use hydraulic thread sealant on the sender threads and install the sender, 3, into the reservoir.

IMPORTANT: *Do not over tighten the sender or damage to the reservoir threads may occur resulting in oil leakage.*



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3. Reconnect the sender wires, B wire on the ground blade, and the PU/LTBL wire to the center sender terminal.
4. Refill the hydraulic reservoir with the oil previously removed or new SAE 10W/30 API Service SG-CF motor oil.
5. Reinstall the engine belly pan, and tighten the retaining hardware.
6. Operate the unit and check for leaks. Repair if required.

BOOM/BUCKET CONTROL VALVE SPOOL LOCK SOLENOIDS

Op. 35 724 90

REMOVAL

1. Remove any attachment from the loader attaching plate.
2. Raise the boom and support on the boom lock pins.
3. Stop the engine, turn the ignition key to the "RUN" position and operate the boom and bucket controls to relieve pressure in the boom and bucket circuits. Turn "OFF" the key.

⚠ CAUTION ⚠

Never work under a raised boom unless it is properly supported by the boom lock pins.

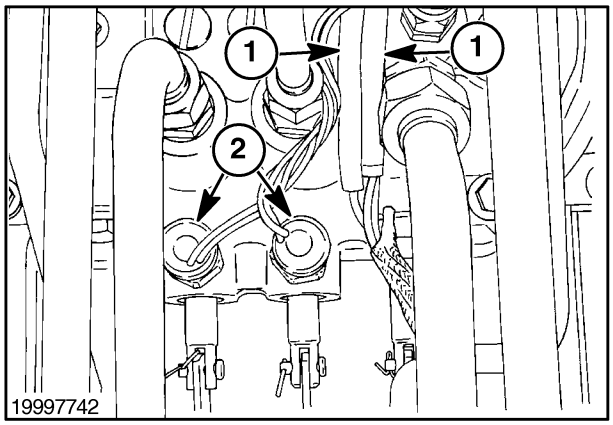
Never work under a raised boom with an attachment. Always remove the attachment from the loader.

4. Raise the operator's seat and latch in the raised latched position.

⚠ CAUTION ⚠

Never work under a raised seat unless it is securely latched in the raised position.

5. Remove the step shield to access the control valve area.
6. Clean the control valve solenoid area to prevent contamination of solenoid coil blocks and valve spools.
7. Unplug the solenoid coil wires, 1, and remove the coils, 2, from the control valve spool by rotating the coils counterclockwise.



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INSTALLATION

1. Thoroughly clean the control valve block.
2. Install the solenoid coil into block, and tighten the coils to 15 N·m (11 ft. lbs.).
3. Reconnect the coil wires to the main wire harness.
4. Reinstall the step shield.
5. Lower the seat to the operate position and securely latch.

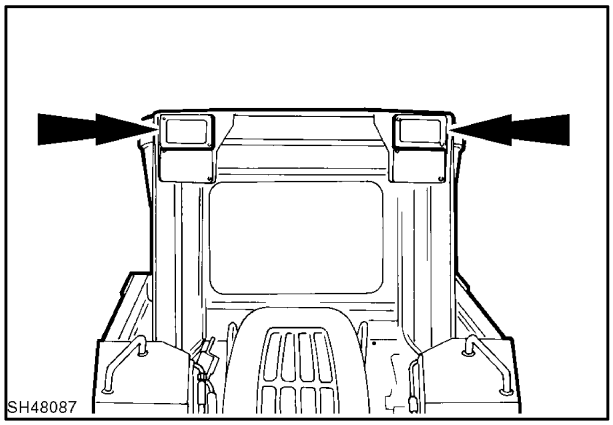
⚠ CAUTION ⚠

Do not operate the loader unless the seat/seat support is properly latched in the latched position.

Op. 55 404

ROAD/WORK LIGHTS

The road and work lights provide illumination for road travel and work operations. The rear work lights are not recommended for road travel.



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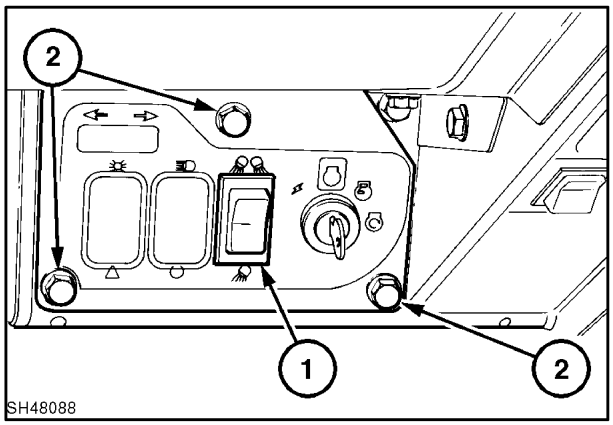
Road/work light switch, 1, is located in the ignition key switch panel in the upper right corner of the overhead dash. To remove the switch, disconnect the negative (–) ground battery cable. Remove the key switch panel hardware, 2, and tilt the panel down.



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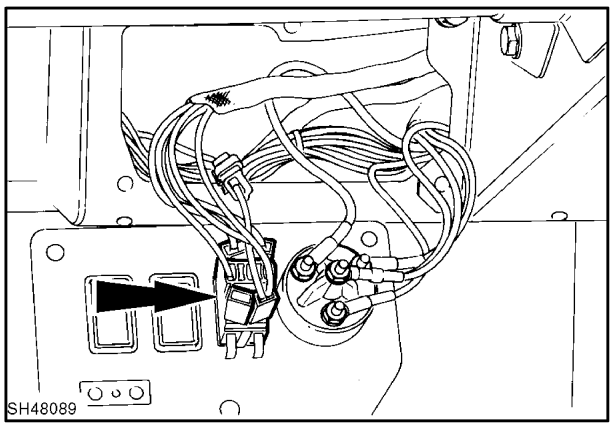
Disconnect wires from the switch, squeeze the switch retaining tabs in, and remove the switch from the panel.



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Bulb Replacement
Clear lens with bulb #86533429

Bulb only (clear) #86533428

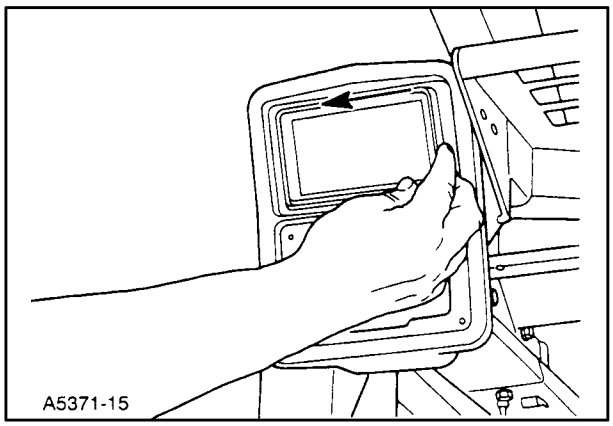
Red lens with bulb #9829515

Bulb only (red) #C6AB13465A

Op. 55 404 10

Front Road/Work Light

1. Facing the lens of the light assembly, push the lens assembly to the left and lift the right side of the assembly from the support.



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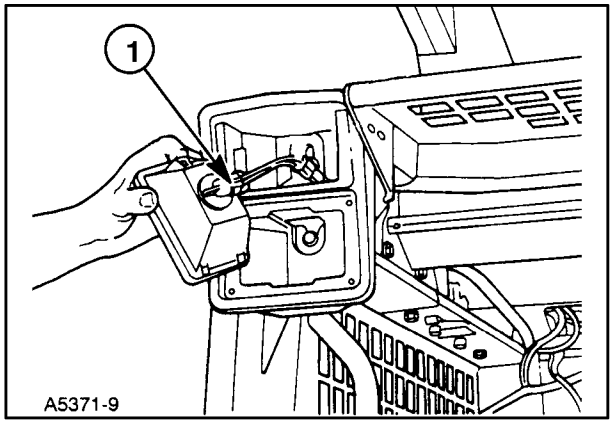
2. Unplug the wire harness from the bulb, unlatching the connector at 1, and sliding the harness from the bulb.



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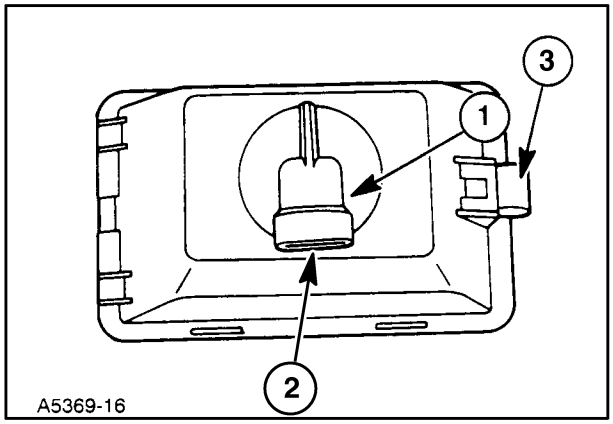
3. Facing the back of the assembly, rotate the bulb holder, 1, counterclockwise and remove the bulb from the support.
4. Position the bulb so when it is locked in position the connector, 2, is pointed down with the clip, 3, to the right.

IMPORTANT: *DO NOT touch the bulb during removal and installation. The bulb may become damaged or a premature failure may occur.*



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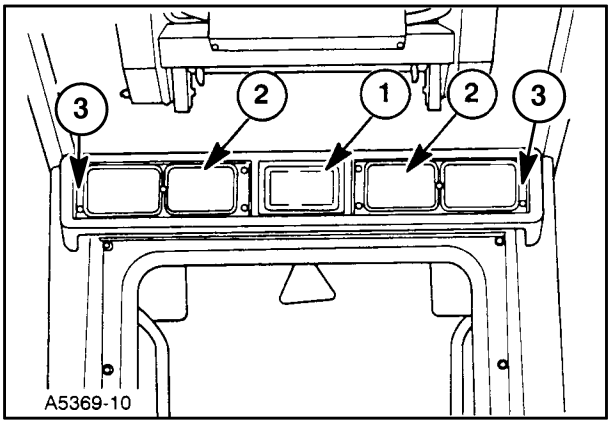
Op. 55 404 10

Rear Work and Taillight

1. Remove the center work light, 1, by pushing the lens assembly to the left and lift the right side of the assembly from the support.
2. Remove the red taillight lamps, 2, by unscrewing the bezel self-tapping screws, and removing the bezels, 3.
3. Unplug the wire harness from the bulb, unlatching the connector, and sliding the harness from the bulb.



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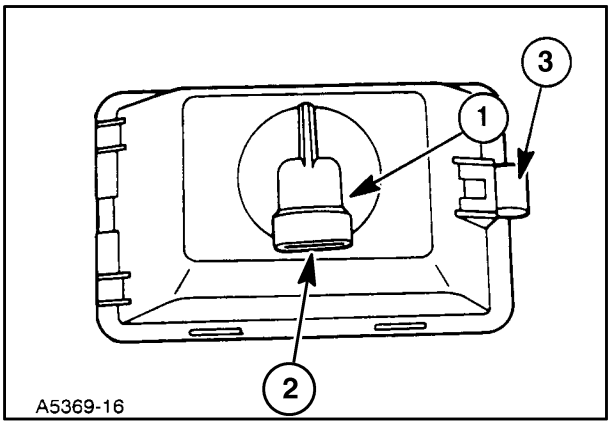
4. Facing the back of the assembly, rotate the bulb holder, 1, counterclockwise and remove the bulb from the support. Replace the bulb.
5. For the clear rear work lamp, position the bulb so when it is locked in position the connector, 2, is pointed down with the clip, 3, to the right.

IMPORTANT: *DO NOT touch the bulb during removal and installation. The bulb may become damaged or a premature failure may occur.*



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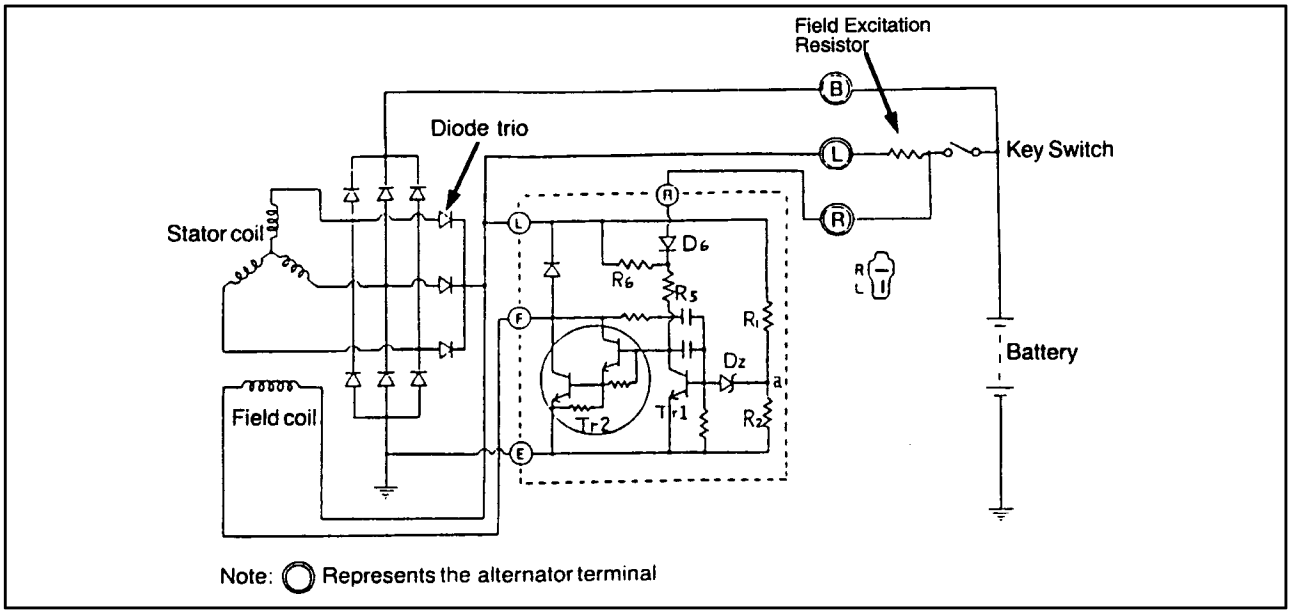

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Op. 55 301

ALTERNATOR (55 AMP VERSION)

CHARGING CIRCUIT

Description

1. The charging circuit and internal connections are shown here. The charging system consists of an alternator with built-in Integrated Circuit (IC) regulator, a battery and connecting wires. Because of the alternator's integrated circuitry, the voltage regulator is very compact and able to be built into the alternator.

2. The field current flows directly from the diode trio to the field coil without passing through the external circuit. Consequently, there are no voltage drops caused by the key switch or wiring as with conventional vibrating-contact regulators mounted separately from the alternator. To provide field excitation voltage when the engine is started, the field current is supplied through the EIC from the battery.

3. The output at the "P" terminal is an AC voltage with a frequency 1/10 that of the rotational speed of the alternator. The EIC uses this signal as an engine speed signal for engine RPM display.

Principle of the Integrated Circuit Regulator

The basic circuit of the IC regulator is shown here. The portion enclosed by the dashed line represents the regulator.

The basic function of the IC regulator is to ensure a constant output terminal voltage by detecting generated voltage and increasing/decreasing field current in response. This is no different than the function of a vibrating contact regulator.

The regulator consists of two basic sections: a voltage control circuit and an output circuit to modulate the field current. The voltage control circuit includes a voltage divider network (R1, R2), a Zener diode (DZ) for voltage reference, and a signal amplifying transistor (Tr1). The output circuit is a power transistor (Tr2), which is placed in series with the alternator field coil and ground.

Transistor Tr1 senses the generated voltage and switches transistor Tr2 on and off many times per second most of the time the engine is running.

The basic operating principles are explained as follows:

1. When the key switch is closed, current from the battery flows through the field excitation resistor and resistor R6, which are in parallel, to the field coil.

   The current continues to flow on through the field coil to ground, completing the circuit back to the battery.

   Battery — Key Switch < Field Excitation Resistor / Terminal R-Resistor R6

   Alternator terminal L — Field Coil — Tr2 — Ground

2. When the alternator begins to rotate, A.C. voltage is generated in the stator coil. The diodes in the rectifier assembly change the stator A.C. voltage to a D.C. voltage which appears between the ground and terminal, B.

   The stator also supplies D.C. field current through the diode trio, the field coil, Tr2, and then ground.

   Diode trio — Field Coil — Tr2 — Ground

3. When the generated voltage is low, no current flows in the Zener diode (DZ) since the voltage at point A is lower than the Zener voltage.

4. As the speed and voltage increases, the voltage at point A also increases until it reaches the limiting value set by the factory. As the Zener diode (DZ) breaks down, current flows through R1, DZ, and the base-emitter circuit of Tr1 to ground. This renders Tr1 conductive, so that much of the current flows through the collector-emitter circuit of Tr1. This reduces the base current of Tr2 thereby reducing the field current. This means that Tr1 turns on and Tr2 turns off.

   Regulator Terminal L — R1 — DZ > Tr1 — Ground

   Regulator Terminal R — R6 — R5 > Tr1

5. When the generated voltage decreases, the Zener diode (DZ) again turns off and Tr1 also turns off.

   This cycle then repeats many times per second and the alternator output voltage is, therefore, regulated within a narrow limit.

   In other words, the action is similar to the conventional vibrating-contact regulator, in that current to the field coil is varied to limit the output voltage, but in place of the voltage coil and spring system, there is a potential divider (R1 and R2) and a Zener diode.

ALTERNATOR SERVICE SPECIFICATIONS

Item	How Rated	Standard Or Service Limit
Normal Output	(V - A)	12 V - 40 A
Polarity		Negative ground
Weight	(kg, lbs)	3.7 kg (8.2 lbs)
Rotational direction (viewed from the pulley)		Clockwise
Load characteristics (cold)	Terminal voltage (V)	13.5 V
	Current (A)	Min. 30 A
	Revolution (RPM)	2500 RPM
Brush length	Original (mm-in)	18.5 mm (0.728″)
	Limit (mm-in)	5.0 mm (0.20″)
Brush spring tension	Original (g-lbs)	470 - 590 g (1.036 - 1.300 lbs)
	Limit (g-lbs)	270 g (0.60 lbs)
Slip ring diameter	Original (mm-in)	22.7 mm (0.0894″)
	Limit (mm-in)	22.1 mm (0.871″)
Field coil resistance	ohms at 20° C (68° F)	2.8Ω
Adjusting voltage	(V) at 5000 RPM	14.4 - 15.0 V

ALTERNATOR - SYSTEM TESTING AND TROUBLESHOOTING

NO CHARGING

FAULT LOCATION	POSSIBLE CAUSE	CORRECTION
Wiring	Loose connection, short circuit	Repair
Alternator	Loose connection, no ground, short circuit	Repair or replace
	Defective rectifier	Replace
	Loose connection of RF resistor	Replace
Regulator	Defective regulator	Replace
	Loose connection of alternator or regulator	Repair or replace

INSUFFICIENT CHARGING

FAULT LOCATION	POSSIBLE CAUSE	CORRECTION
Wiring	Loose connection or short circuit	Repair
Alternator	Loose drive belt	Repair
	Short in rotor coil	Replace
	Short in stator coil	Replace
	Defective rectifier	Replace
	Insufficient brush contact	Repair or replace
Regulator	Defective regulator	Replace
	Loose connection of alternator and regulator	Repair
Battery	Defective battery	Replace

OVERCHARGE

FAULT LOCATION	POSSIBLE CAUSE	CORRECTION
Battery	Internal short	Replace
Regulator	Defective regulator	Replace

UNSTABLE CHARGING CIRCUIT

FAULT LOCATION	POSSIBLE CAUSE	CORRECTION
Wiring	Loose connection or open wire	Repair or replace
Alternator	Loose drive belt	Repair
	Short in rotor coil	Replace
	Short in stator coil	Replace
	Insufficient brush contact	Repair or replace
	Broken brush or spring	Replace
	Loose connections	Repair
Regulator	Defective regulator	Replace
	Loose connection at alternator and regulator	Repair or replace

ABNORMAL NOISE OF ALTERNATOR

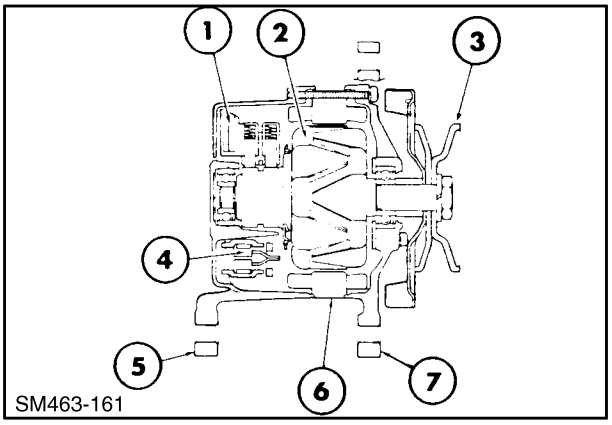
FAULT LOCATION	POSSIBLE CAUSE	CORRECTION
Alternator	Loose mounting hardware	Repair
	Defective bearings	Repair or replace
	Rotor core and stator in contact	Replace
	Defective diode	Replace
	Short in stator coil	Replace

Alternator Construction

The principal components of the IC alternator are the IC voltage regulator, 1, the rotor, 2, the pulley, 3, the rectifier assembly, 4, the rear support bracket, 5, the stator, 6, and the front support bracket, 7.

The rectifier assembly consists of two diode heat sinks, one positive and one negative, and a diode trio. The diode trio is used as a field supply diode and is connected to the field coil and terminal L on the alternator.

The built-in Integrated Circuit regulator is a solid state unit which can only be serviced as an assembly.



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SERVICE PRECAUTIONS

Observe the following service precautions to avoid damage to the charging system:

- NEVER make or break any of the charging system connections, including the battery, when the engine is running.
- NEVER short any of the charging system components to ground.
- ALWAYS disconnect the battery negative cable when charging the battery in the machine with a battery charger.
- ALWAYS observe correct polarity when installing the battery or when using a booster battery to start the engine.

  CONNECT POSITIVE TO POSITIVE AND NEGATIVE TO NEGATIVE.

Preliminary Checks

Prior to electrical testing, thoroughly inspect the charging and electrical system.

Check all leads for continuity and tightness.

1. Check the battery

   Using a voltmeter on a sealed battery, or a hydrometer on an unsealed battery, check that the battery is at least 75% charged before further testing. The voltmeter reading should be 12.4 volts minimum. The hydrometer reading should be 1.240 minimum.

2. Check the drive belt

   Inspect the alternator drive belt and pulley, ensuring that both are clean, free from oil and grease and in good condition.

   The drive belt should be tightened such that a force of 1 kg (2 lbs), applied at the center of the longest span, will not deflect the belt more than 3 mm (1/8″).

INITIAL TESTS

Certain initial tests may be performed without removing any of the charging components from the loader.

These allow the following items to be checked:

- Alternator wire connections.
- Alternator charging current and controlled voltage.
- Alternator charging circuit voltage drops.
- Alternator maximum output performance.

Test equipment required:

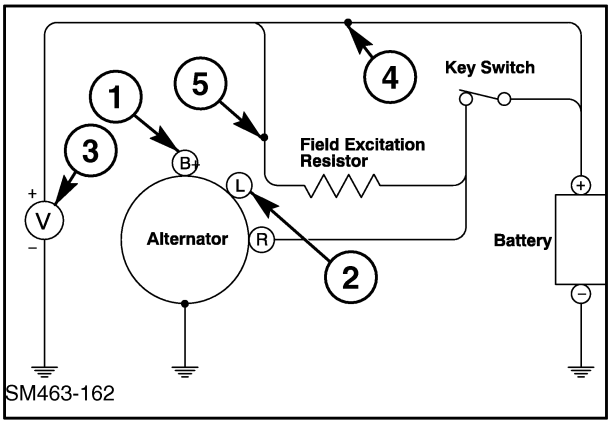
- Voltmeter (0-1 and 0-20 volt scales).
- Ammeter (0-60 amp minimum scale).
- Carbon pile variable load resistor.

NOTE: *Most commercial test equipment incorporates several test functions in a single unit. Follow the manufacturer's instructions when using such a tester.*

Alternator wiring connections test

1. Disconnect the battery negative cable.
2. Disconnect the B+ cable (Red/ Dark Blue) from the alternator B+ post, 1, and Field Excitation lead (Light Green/Blue), from the alternator L post, 2.
3. Reconnect the battery and turn the key start switch on. Do not start the engine. Connect a voltmeter, 3, between each of the disconnected leads, 4 and 5, and ground. Battery voltage should be indicated at both of the leads (voltage at the Field Excitation lead will be slightly less than battery).

   If battery voltage is not indicated at both leads, a continuity fault exists which must be traced and corrected.
4. Disconnect the battery and reconnect the removed leads to the alternator. Reconnect the battery.



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Charging Current and Controlled Voltage Tests

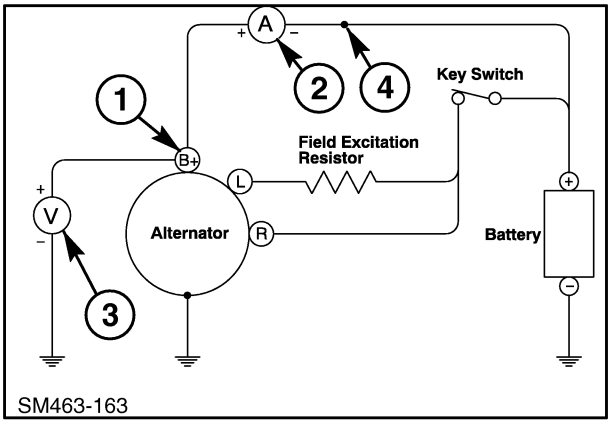
1. Switch off all electrical components. Disconnect the battery negative cable.
2. Disconnect the B+ terminal, 1, at the alternator. Connect an ammeter, 2, between the removed (Red/Dark Blue) wire, 4, and the B+ terminal of the alternator.
3. Connect a voltmeter, 3, between the alternator B+ terminal and ground.
4. Start and run the engine at 2000 RPM and observe the voltmeter and ammeter readings.

   The voltmeter should register in excess of battery voltage at 2000 RPM. When the ammeter reading falls below 10 amps the voltmeter reading should stabilize at 13.4 - 14.4 volts.

   If the voltmeter reading exceeds 14.4 volts, the regulator is faulty and must be replaced. After replacement, repeat the charging current and controlled voltage tests.

   If the voltmeter reading is below 13.4 volts, the alternator is faulty or there is a high resistance fault in the external portion of the charging system.

   If the ammeter registers zero amperes, a faulty alternator is indicated. Turn off the engine and conduct the “alternator component tests” as detailed in this chapter.



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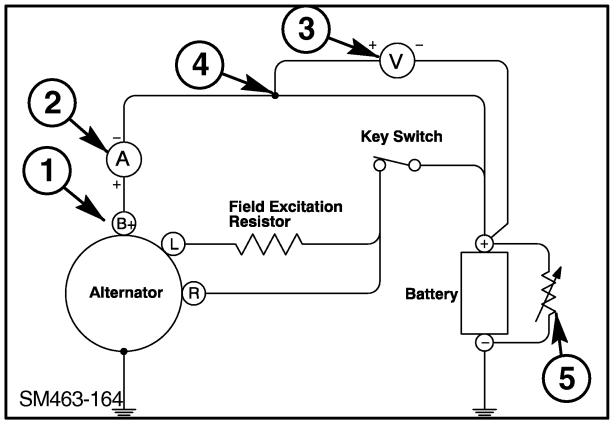
Charging Circuit Voltage Drop Tests

Insulated Side Voltage Drop Tests

1. With the key start switch in the “off” position, disconnect the battery negative cable and the B+ cable from the alternator B+ terminal, 1.
2. Connect a voltmeter, 3, with a low voltage scale between the battery positive terminal and the free end of the B+ cable, 4. The voltmeter positive lead connects to the B+ cable while the negative lead connects to the battery positive terminal.
3. Connect an ammeter, 2, of 60 amp minimum capacity between the B+ post of the alternator and the B+ cable (ammeter positive lead to alternator).
4. Reconnect the battery negative cable. Connect a variable discharge rate (carbon pile) load tester, 5, across the battery terminals. Adjust the tester for minimum draw (maximum resistance) before connection.
5. Start the engine and increase speed to 2000 RPM. Slowly increase the current draw until the ammeter reads 40 amps.
6. When the ammeter reads 40 amps, the voltmeter should not read more than 0.4 volts.
7. Stop the engine.

   If the ammeter reading exceeds 0.4 volts, there is a high resistance fault in the insulated side of the circuit.

   If maximum output is less than 40 amps and the voltmeter reading is less than 0.4 volts, proceed to the Ground Side Voltage Drop Test.



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Ground Side Voltage Drop Test

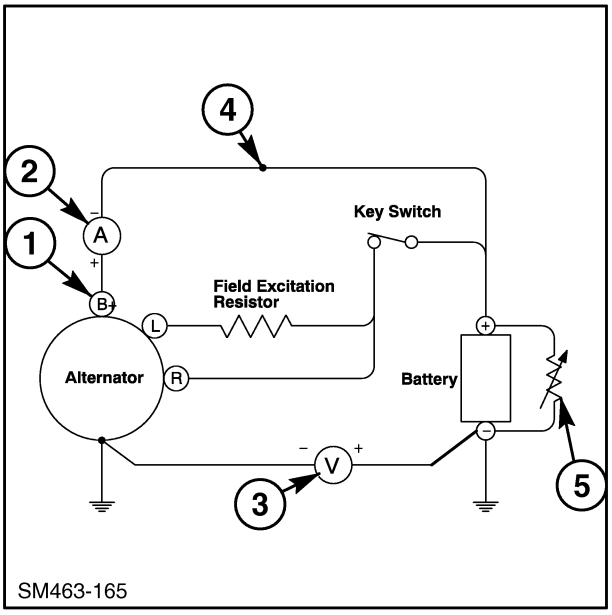
1. Ensure the key start switch is in the off position.
2. Test connections are the same as the previous test except that the voltmeter, 3, is now connected between the negative post of the battery and the alternator frame. Connect the voltmeter negative lead to the alternator frame.

NOTE: *Ensure the variable rate load tester, 5, is set to the minimum current draw position.*

3. Start the engine and increase the speed to 2000 RPM.
4. Slowly increase current draw until the ammeter, 2, reads 40 amps.
5. When the ammeter reads 40 amps, the voltmeter should not read more than 0.2 volts.

   If the reading is in excess of 0.2 volts, there is a high resistance fault in the ground side of the circuit.

   If the maximum output reading obtained is less than 40 amps and voltage drop is within specifications, the alternator is faulty. Conduct the alternator component tests outlined in this section.



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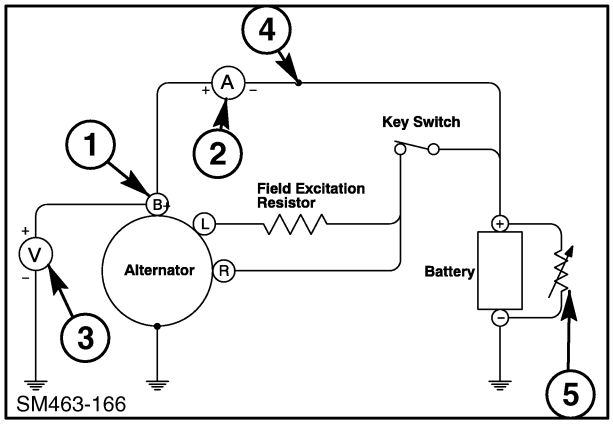
Alternator Maximum Output Performance Test

1. With the key start switch in the off position, disconnect the battery negative cable and the B+ cable from the alternator B+ terminal, 1.
2. Connect an ammeter, 2, of 60 amp minimum capacity between the B+ terminal of the alternator, 1, and the B+ cable, 4 (ammeter positive lead to alternator).
3. Connect a voltmeter, 3, between the alternator B+ terminal and ground.
4. Reconnect the battery negative cable. Connect a variable discharge rate (carbon pile) load tester, 5, across the battery terminals. Adjust the tester for minimum draw (maximum resistance) before connection.
5. Reconnect the battery, start the engine and increase the engine speed to 2000 RPM.
6. Slowly increase current draw until the ammeter reads 40 amps.
7. When the ammeter reads 40 amps, the voltmeter reading should be 13.4 volts minimum.

   If the voltage reading is less than 13.4 volts, a fault in the alternator is indicated. Conduct the alternator component tests outlined in this section.



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ALTERNATOR

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REMOVAL

1. Raise the boom and rest it on the boom lock pins, 1. Open the rear door, 2; raise the top engine shield, 3; and remove the right engine side shield, 4, to access the alternator.

2. For easier access, remove any attachment from the loader boom face plate, raise the boom and rest it on the boom lock pins.

⚠ CAUTION ⚠

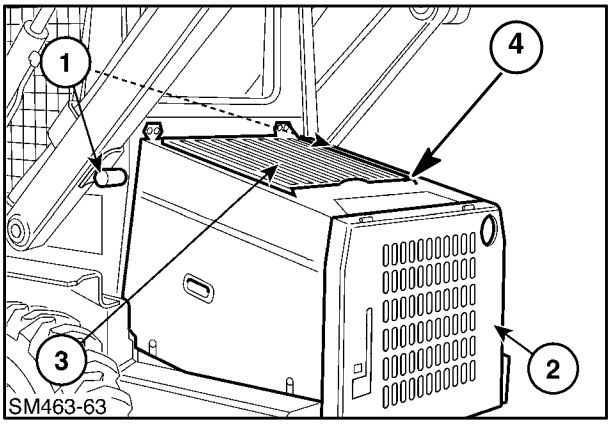
Never work under a raised boom unless it is properly supported by the boom lock pins.

Never work under a raised boom with an attachment. Always remove the attachment from the loader.

3. Disconnect the negative (–) battery cable to prevent possible damage to the alternator and electrical system.

4. Disconnect the wire connections from the alternator while noting their location, 1.

5. Remove the top strap retaining hardware, 2, and lower pivot, 3.



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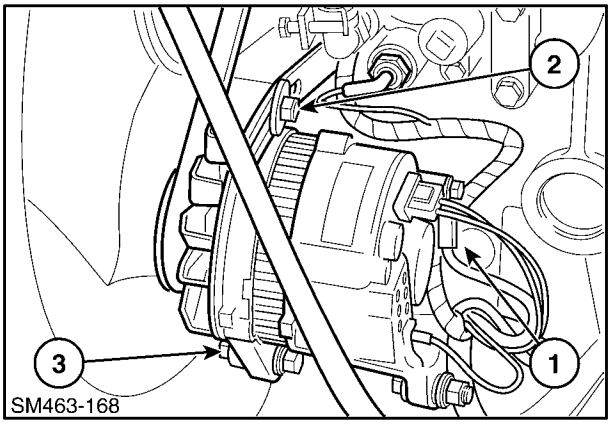

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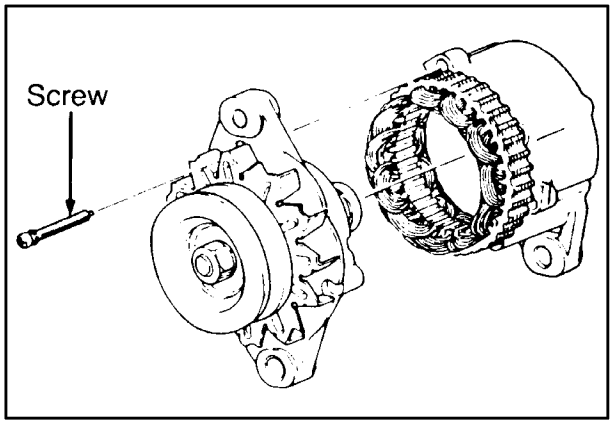
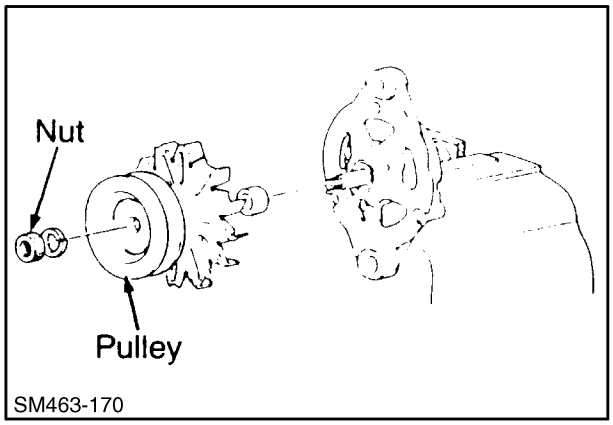
DISASSEMBLY

1. Mark both brackets and the stator with a scribe mark for reassembly.
2. Remove the four through bolts. Pry between the stator and front bracket with the blade of a screwdriver. Carefully separate the front bracket, pulley, and rotor assembly away from the stator and rear bracket assembly.



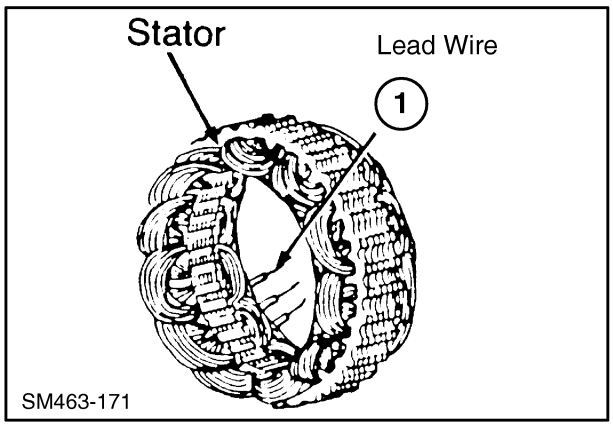
187

3. Place the rotor in a vise with soft jaws and remove the pulley nut, washer, pulley, spacer, and rear bracket from the rotor.



188

Unsolder three stator leads, 1, and remove the stator.



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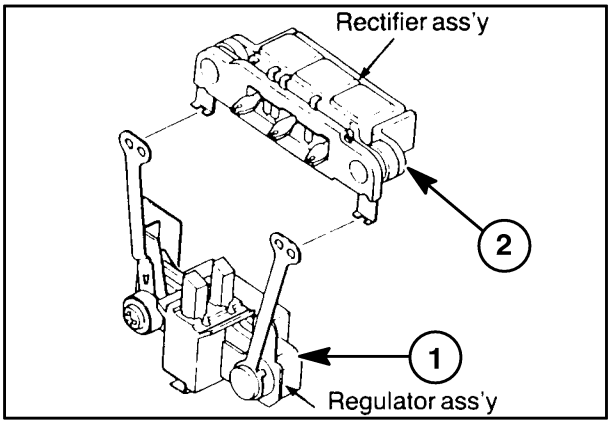
4. Remove the voltage regulator assembly, 1, and rectifier assembly, 2.



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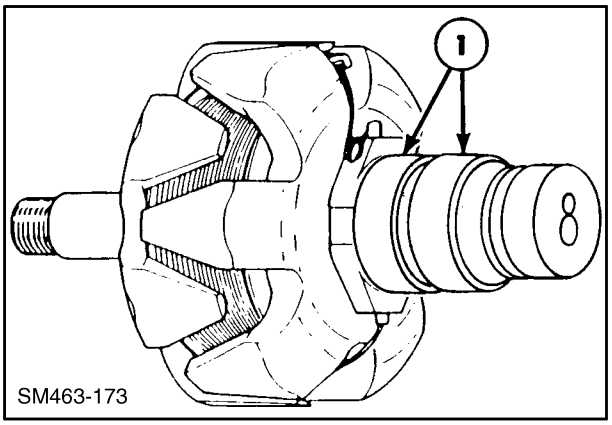
Alternator Component Tests

Rotor

1. Inspection of slip ring surface, 1.

   Polish discoloration or scratches on the slip ring surface with 400# - 600# grit sandpaper.

   Replace a badly roughened slip ring or a slip ring worn down beyond the service limit.



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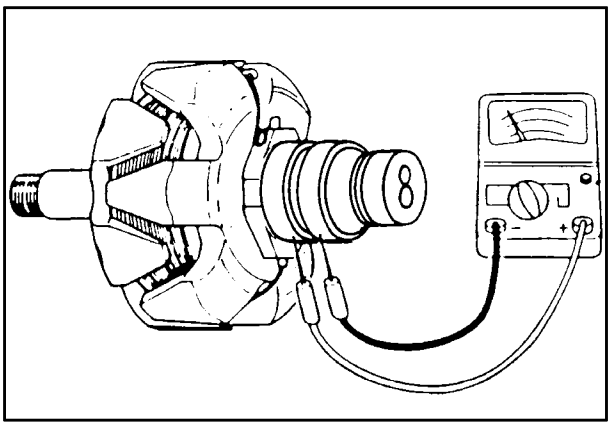
2. Check for continuity between both slip rings. If there is no continuity, the field coil is defective. Replace the rotor assembly.



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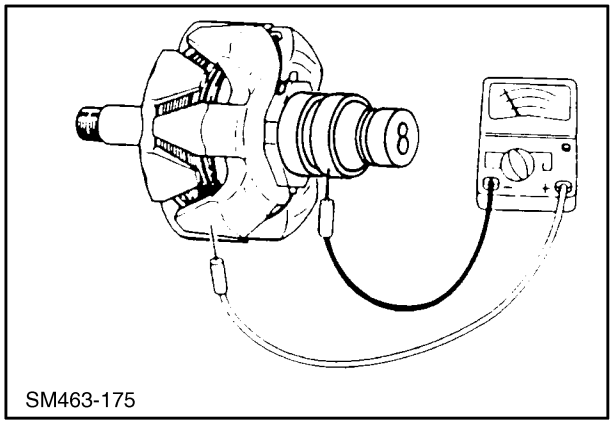
3. Check for continuity between the slip ring and shaft (or core). If there is continuity, it means the coil or slip ring is shorted. Replace the rotor assembly.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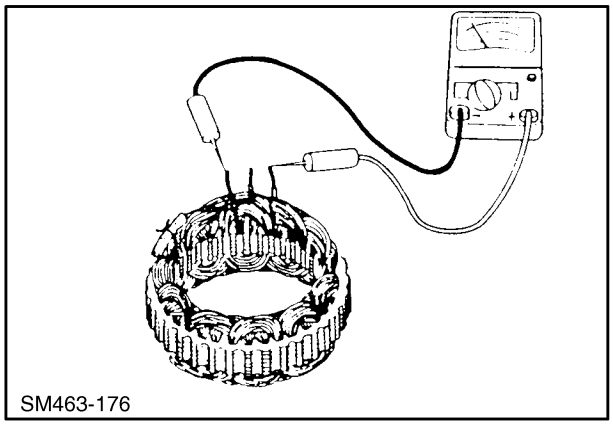
Stator

1. Check for continuity between the leads of the stator coil. If there is no continuity, the stator coil is defective. Replace the stator assembly.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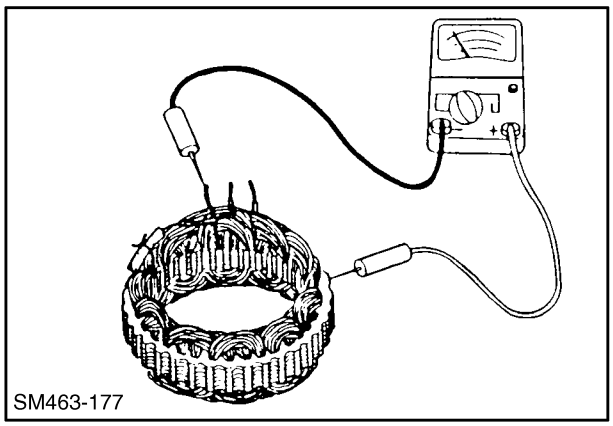
2. Check for continuity between any stator lead and stator core. If there is continuity, it means the coil is shorted. Replace the stator assembly.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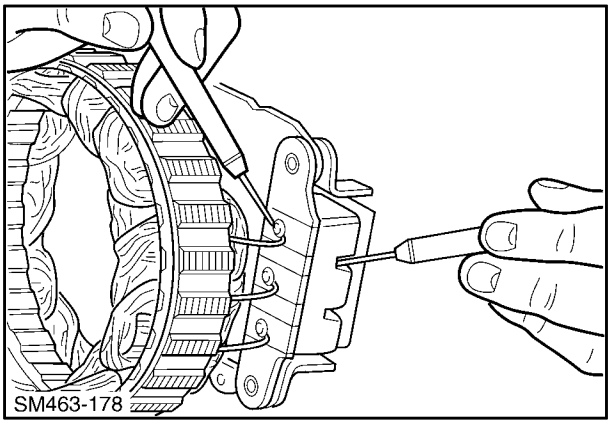
Rectifier Assembly

Positive Heat Sink

Check for continuity between the positive (+) heat sink and stator coil lead connection terminal with a circuit tester. If there is continuity in both directions, the diode is short-circuited. Replace the rectifier assembly.



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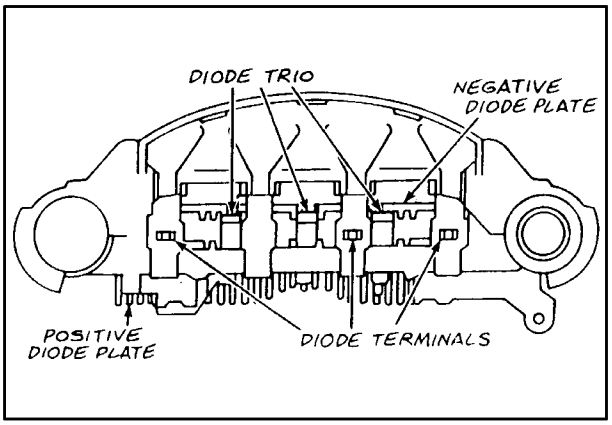
Negative Heat Sink

Check for continuity between the negative (–) heat sink and stator coil lead connection terminal. If there is continuity in both directions, the diode is short-circuited. Replace the rectifier assembly.



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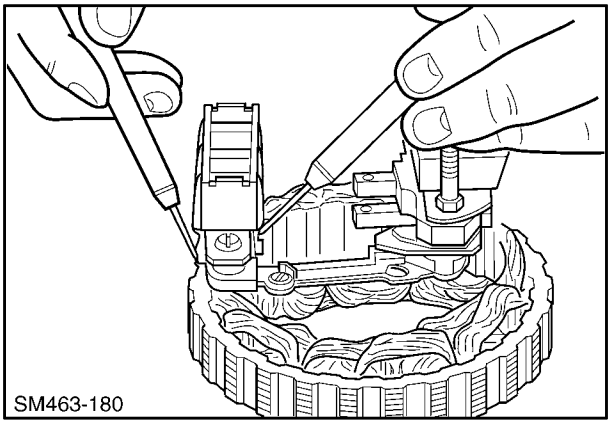
Diode Trio

Using a circuit tester, check the three small diodes for continuity in both directions. If there is either continuity or an open circuit in both directions, the diode is defective. Replace the rectifier assembly.



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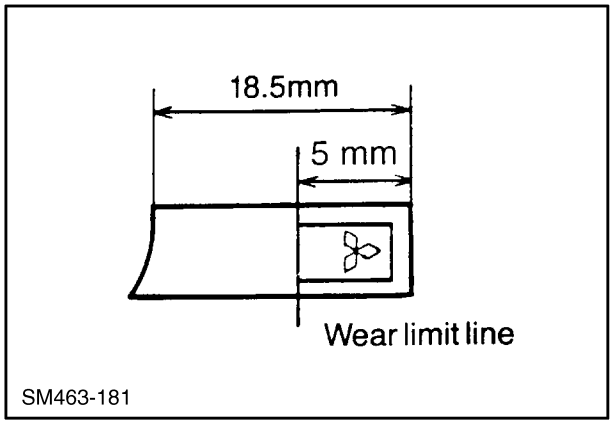
Brush and Brush Spring
Check the length of the brush. A brush worn down to the wear limit line should be replaced.

Check the brush spring pressure and make sure the brush moves smoothly in the brush holder.



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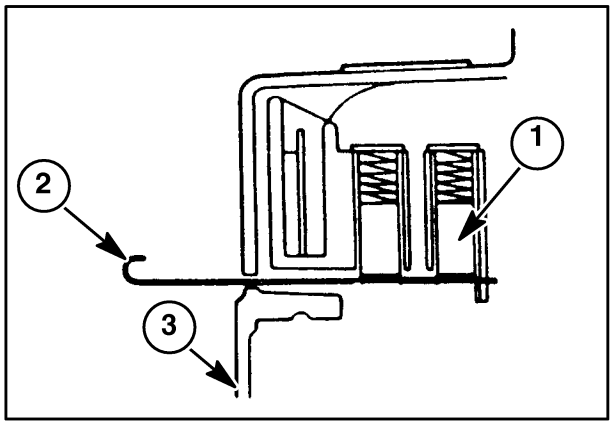
Reassembly
Reverse the disassembly, observing the following:

Installing Rotor

1. Push brushes, 1, into the brush holder and insert a wire, 2, to hold them in the raised position. Install the rotor and remove the wire.

NOTE: *The rear bearing and rear bracket, 3, fit is tight; heat the bearing box in the rear bracket to 50° - 60° C (122° - 140° F) before installing the rotor.*

NOTE: *Do not grease the rear bearings. Clean dirt and grease from the bearing bore in the rear bracket before assembly.*



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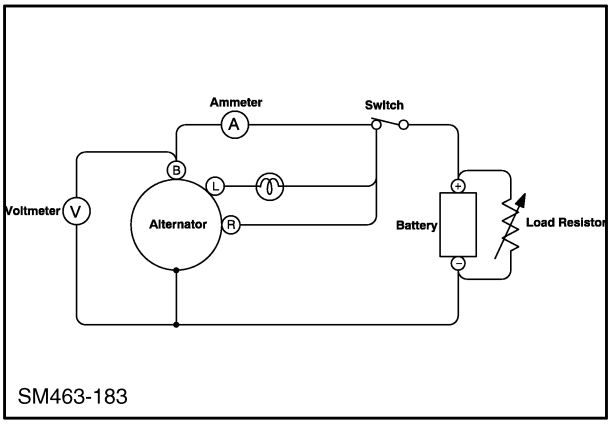
Bench Check

To check the alternator on a test bench, proceed as follows:

1. Connect the alternator as shown, except leave the load resistor disconnected.
2. Slowly increase the alternator speed and observe the voltage.
3. If the voltage is uncontrolled with speed, and increases above 15.5 V, check the regulator.
4. If voltage is below 15.5 V, connect the load resistor as shown.
5. Operate the alternator at 2500 RPM and adjust the load resistor as required to obtain maximum output.
6. Measure the output current. The output must be within the limits shown in the section on “Service Specifications.“ If the output is less than the specified value, disassemble and check the alternator.

IMPORTANT:

1. *Reversed battery connections will damage the alternator and/or wiring.*
2. *When connecting a booster battery, make certain to connect the negative battery terminals together and the positive battery terminals together.*
3. *When a fast charger is used to charge the battery, disconnect the equipment battery cables.*
4. *Grounding of the alternator output terminal will damage the alternator and/or circuit.*
5. *Do not connect a load of over 1A to the L terminal.*
6. *If the alternator is operated with terminals L and B short-circuited, it may damage the diode trio.*



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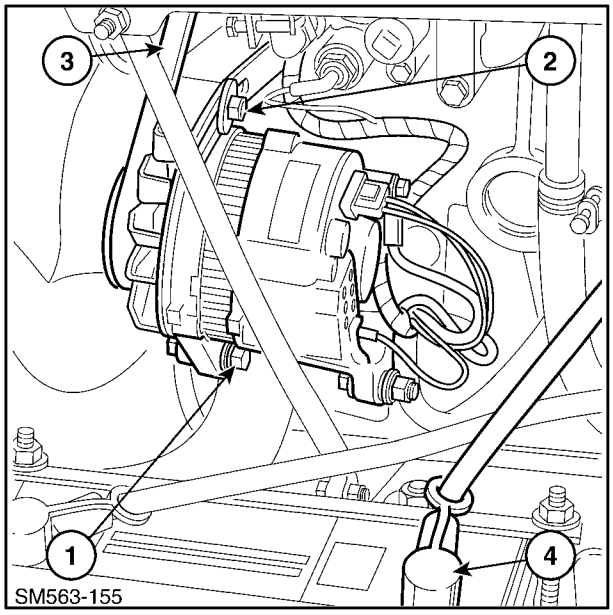
ALTERNATOR REINSTALLATION

1. Attach the alternator to the lower pivot, 1, and the upper support strap, 2.
2. Reattach the wires to the alternator terminals.
3. Pivot the alternator to tighten the belt to obtain proper belt tension. The belt is tightened properly when a force of 1 kg (2 lbs) is applied perpendicular to the belt at the center of the span, 3, with a 3 mm (1/8″) deflection.
4. Reconnect the negative (–) battery cable, 4.
5. Reinstall the engine side shield, close the top engine cover and rear door.



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STARTER

STARTER MOTOR TROUBLESHOOTING

Starter Motor Specifications

Rated voltage	12 volts
Output	2 kw
Motor type	Four-pole series wound motor
Engaging system	Magnetic shift
Rotation	Clockwise (viewed from pinion side)
Weight	Approximate 5 kg (11 lbs)

Starter Motor Service Specifications

ITEM	HOW RATED	STANDARD OR SERVICE LIMIT
No load test	Volts (V)	11.5 V
	Current (A)	130 A Max.
	Rotating speed (RPM)	4000 RPM Min.
Commutator	Outer dia. (mm-in)	35 mm (1.38″)
	Service limit (mm-in)	34 mm (1.34″)
Brush	Length (mm-in)	15 mm (0.59″)
	Service limit (mm-in)	9 mm (0.35″)
Brush spring	Tension (kg-lbs)	2.7 - 3.6 kg (5.9 - 7.8 lbs)
	Service limit (kg-lbs)	2.2 kg (4.7 lbs)

STARTER MOTOR TROUBLESHOOTING

Use the diagnostic charts as a guide when repairing the starting system. Before diagnosis, be certain the battery is fully charged and inspect the starter and battery cables for clean and tight connections.

IMPORTANT: *Do not operate the starter longer than 30 seconds at a time.*

Do not disconnect or short any lead wire while the starter is operating.

With key switch in “start” position:

Starter does not crank engine, solenoid switch clicks.

1. Disconnect the three cables from the solenoid.
2. Using an ohmmeter, touch one probe to the solenoid spade terminal and the other to the starter case. There should be continuity.

   If none, the hold-in winding is open-circuited. Replace the solenoid.

   If continuity, the fault is in the starter motor. Refer to repair procedures.

Starter does not crank engine, solenoid does not click.

1. Disconnect battery cable from starter.
2. Connect a jumper wire to the battery positive post. Ensure the negative cable is attached to battery and starter ground.
3. Briefly touch the jumper wire to the spade terminal on the solenoid.

   If the solenoid clicks, the probable cause is in the key switch, relay or wiring.

   If the solenoid does not click, replace it.

Starter cranks engine very slowly.

1. Check battery condition, should be a minimum of 12.5 volts.
2. Check starting system circuit.

   Voltage drop between battery positive post and starter terminal should not exceed 0.2 volts.

   Voltage drop between battery negative post and starter ground should not exceed 0.2 volts.

   If voltage drop exceeds 0.2 volts, clean connections or replace the cable.
3. If battery is charged and voltage is within specification, repair or replace starter.

Engine starts but pinion does not disengage.

1. Check voltage at spade terminal of solenoid. If 12 volts with key switch “off”, fault is in the key switch or start circuit.
2. If 0 volts with key switch “off” but starter turns, fault is in the solenoid or overrunning clutch assembly.

STARTER MOTOR

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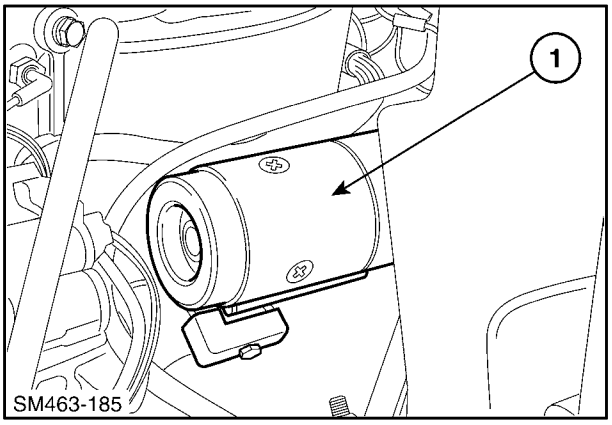
REMOVAL

1. The starter can be accessed through the right engine side shield with the boom up or down or from the operator's area with the seat raised.

2. To access the starter, 1, through the right engine side shield, open the rear door, raise the top engine side shield and remove the right engine side shield.

   If the boom is in the raised position, make sure the boom is resting on the boom lock pins.



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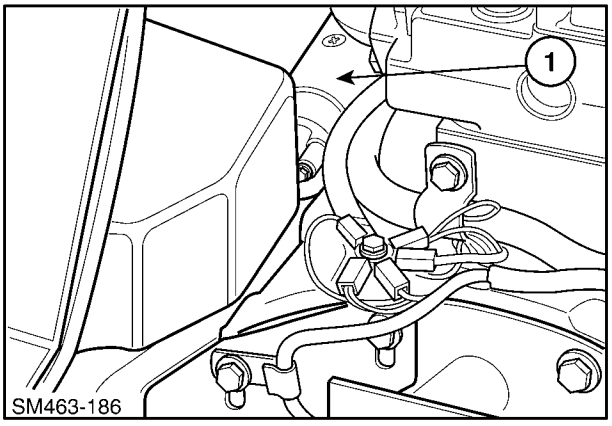
⚠ CAUTION ⚠

Never work under a raised boom unless it is properly supported by the boom lock pins.

3. To access the starter, 1, from the front, raise the seat and seat pan and securely latch in the raised position.

⚠ CAUTION ⚠

Never work under a raised seat unless it is properly latched in the raised position.



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4. Disconnect the negative (–) battery cable.

5. Remove the wires from the starter solenoid and starter, noting their location.

6. Remove the starter retaining hardware and remove the starter from the engine bellhousing.

Starter Motor Description

1 Drive Gear

2 Housing

3 Field Coil

4 Armature

5 Brush Spring

6 Brush

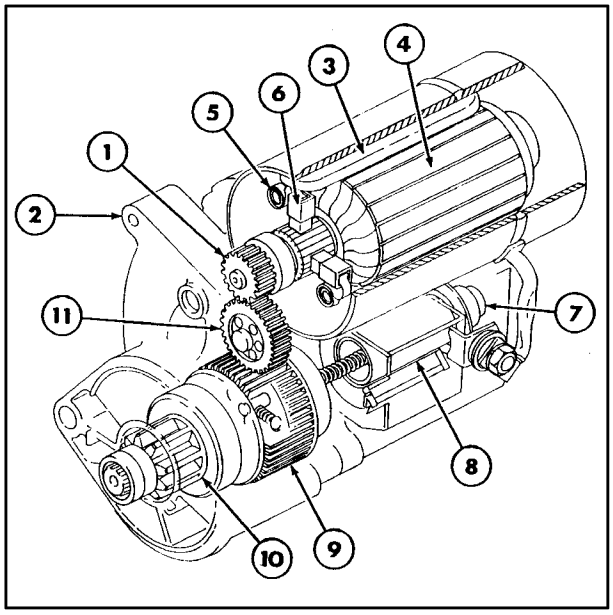
7 Plunger

8 Electric Solenoid

9 Overrunning Clutch

10 Pinion

11 Idler Gear



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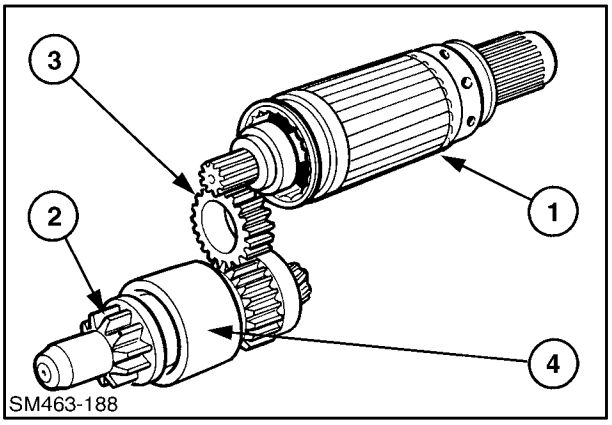
The starter assembly is a positive pinion shift, reduction type starter consisting of the motor, reduction gearset, overrunning clutch and electric solenoid.

The reduction type design allows use of a small, high speed, compact motor.

The sliding pinion and the electric solenoid are arranged on the same axis. The sliding pinion mechanism is totally enclosed, preventing dirt and water entry resulting in a more durable mechanism.

Starter Construction

The reduction type starter consists of the armature, housing, electric solenoid, drive pinion assembly and reduction gears. In a conventional type starter the armature and pinion rotate at the same speed on a common shaft. In a reduction type starter the pinion speed is reduced to about one-fourth armature speed by the reduction gear. Armature, 1, rotation is transmitted to the pinion, 2, via an idler gear, 3, and the overrunning clutch, 4.



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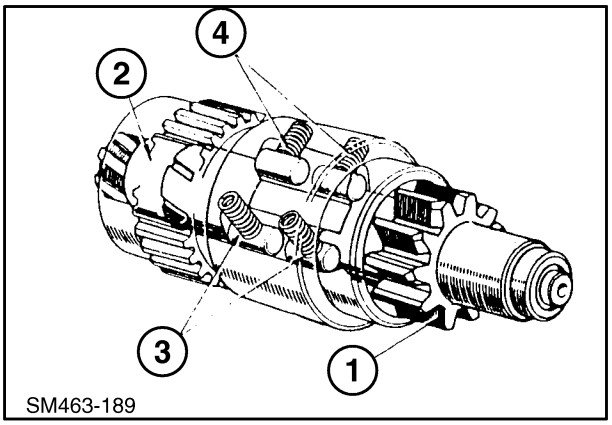
The overrunning clutch assembly consists of the pinion, 1, pinion shaft, 2, ball bearings and overrunning clutch which is a conventional design with clutch rollers, 3, and roller springs, 4. Due to the screw splines cut on the pinion shaft, the pinion gear advances while rotating to mesh with the flywheel ring gear.



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Starter Operation
Circuit diagram of reduction type starter.

1 Drive Pinion

2 Idler Gear

3 Field Coil

4 Armature

5 Brush

6 Commutator

7 Ball Bearing

8 Plunger

9 Main Contacts

10 Battery

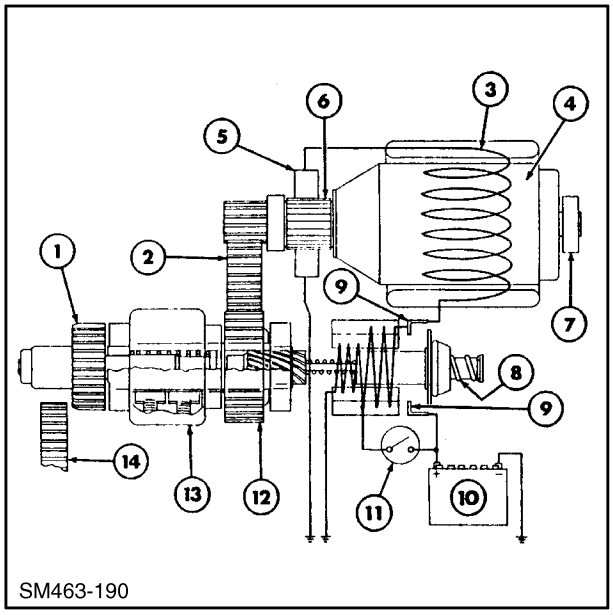
11 Starter Switch

12 Clutch Gear

13 Overrunning Clutch

14 Flywheel Ring Gear

The field windings are connected in series with the armature windings, through the brushes and commutator segments.



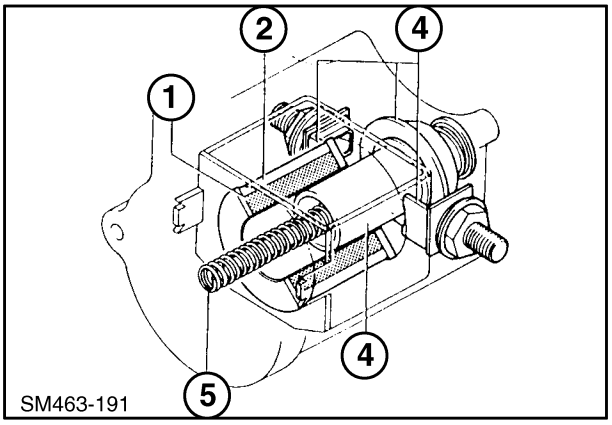
208

Electric Solenoid Operation

The electric solenoid consists of the pull-in coil, 1, hold-in coil, 2, main contacts, 3, plunger, 4 and return spring, 5. The mechanism is sealed against entry of dirt and moisture.

When the starting switch is closed, battery current flows through both the pull-in coil and the hold-in coil. This moves the plunger to the engaged position. When the plunger closes the main contacts in the engaged position, the pull-in coil circuit is opened, leaving the hold-in coil to retain the plunger in the engaged position. At the same time, current flows through the main contacts to the motor.

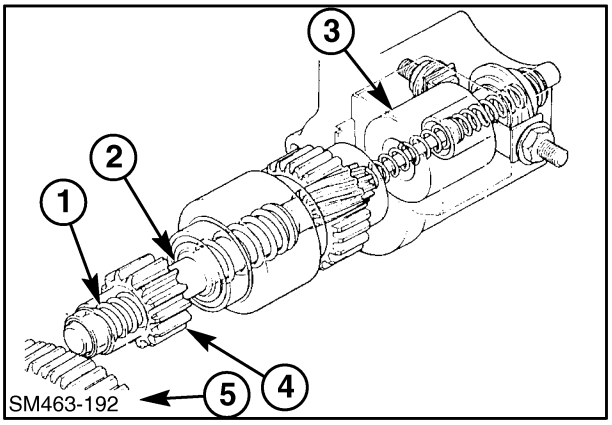
When the starting switch is released, the magnetic field in the hold-in circuit is reduced allowing the plunger spring to move the plunger out, opening the main contacts.



209

Drive Spring Operation

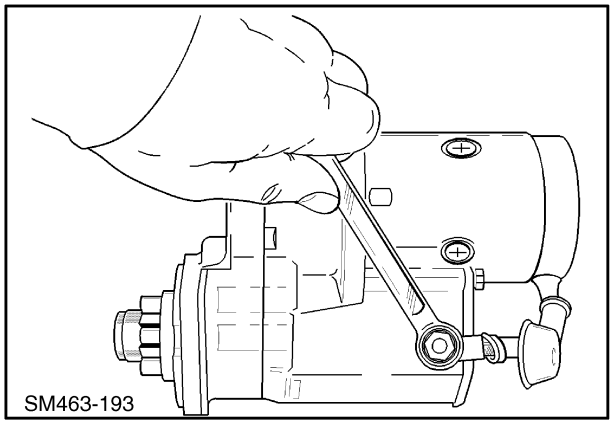
The drive spring, 1, is fitted on the pinion shaft, 2, in order to provide a smooth and positive pinion gear engagement. When the starting switch is closed, the plunger, 3, is pulled in moving the pinion, 4, toward the ring gear, 5. If the gear teeth do not mesh, the spring will be compressed, pressing on the pinion gear. With the first rotation of the pinion, the teeth will line up and the gears will mesh.



210

STARTER DISASSEMBLY

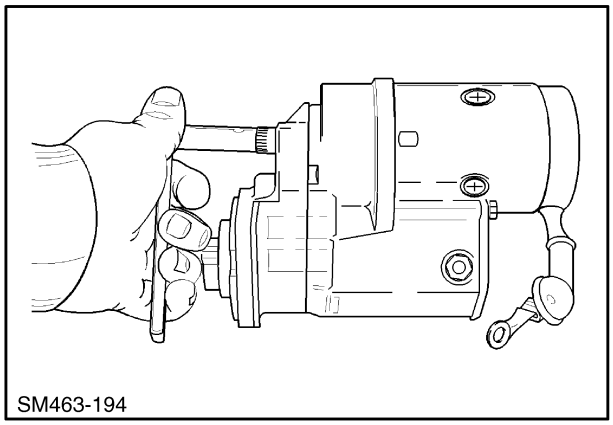
1. Disconnect the lead wire from the electric solenoid.



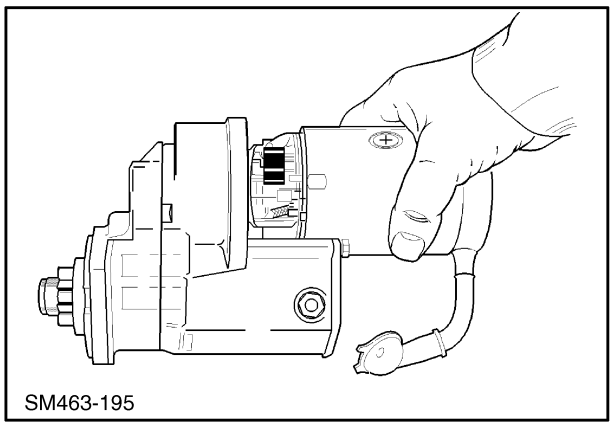
211

2. Scribe a line between the drive housing and motor to aid in proper reassembly. Remove the bolts securing the motor to the drive housing. The motor is now free to be separated from the drive housing.

NOTE: *New starter assembly #SBA185086530 has a different housing with two drawbolts. The testing and overhaul procedures are identical to the prior model (#SBA185086520).*

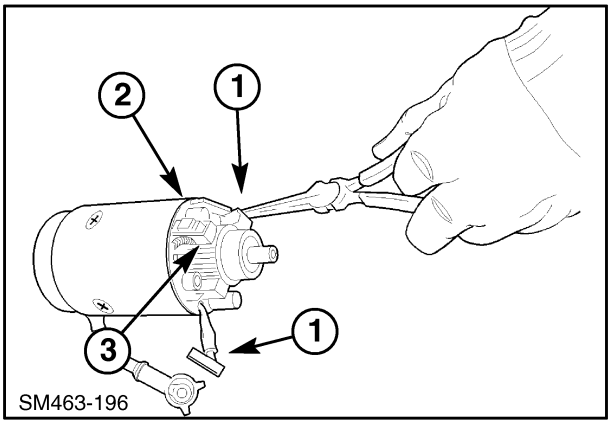


212



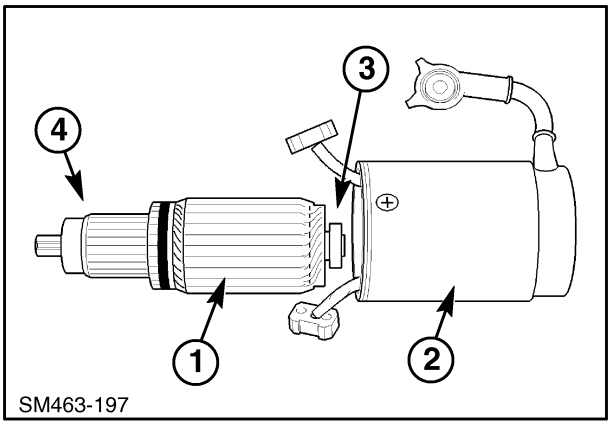
213

3. Extract the insulated brushes, 1, from the brush holders. Hold the springs away and remove the brushes. Slide the brush plate, 2, from the commutator, 3.



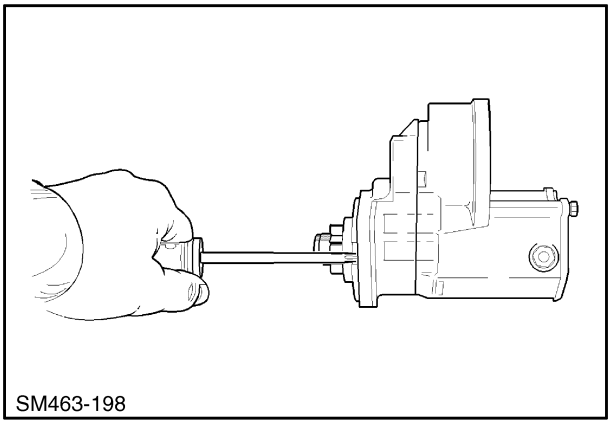
214

4. Remove the armature, 1, from the motor housing, 2. The rear bearing, 3, is a light press fit in the rear housing. It may be necessary to pull the armature from the housing, griping behind the front bearing, 4.



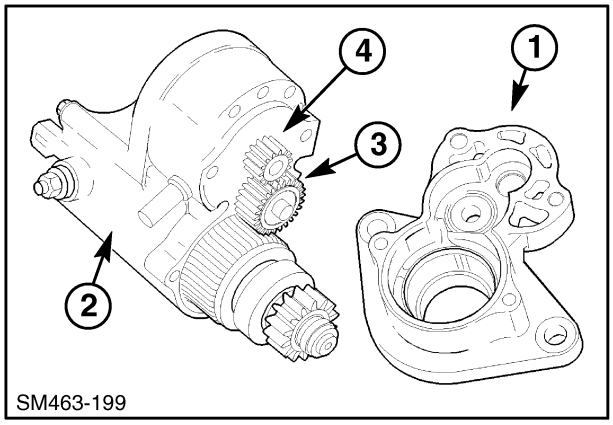
215

5. Remove the screws securing the drive end frame to the solenoid.



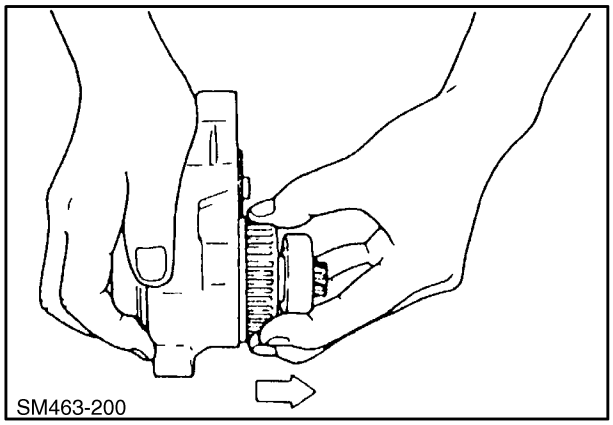
216

6. Remove the drive end frame, 1, from the solenoid, 2. The idler gear with bearings, 3, and the pinion gear, 4, will be free to fall out. Work over a clean bench, using care to avoid losing these pieces.



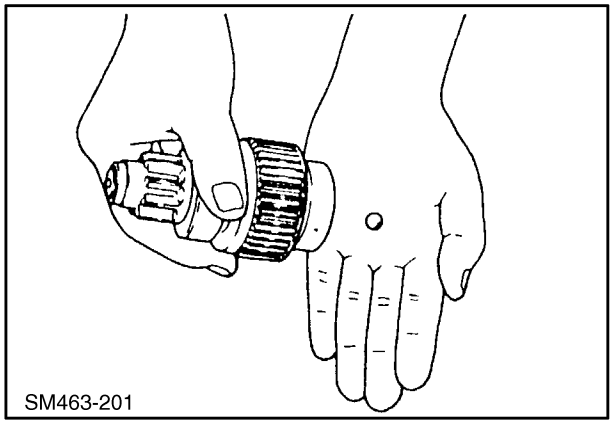
217

7. Remove the overrunning clutch from the drive end frame.



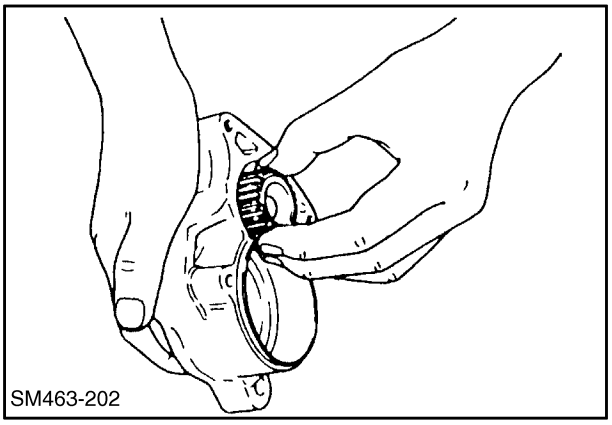
218

8. Remove the steel ball from the center of the overrunning clutch.



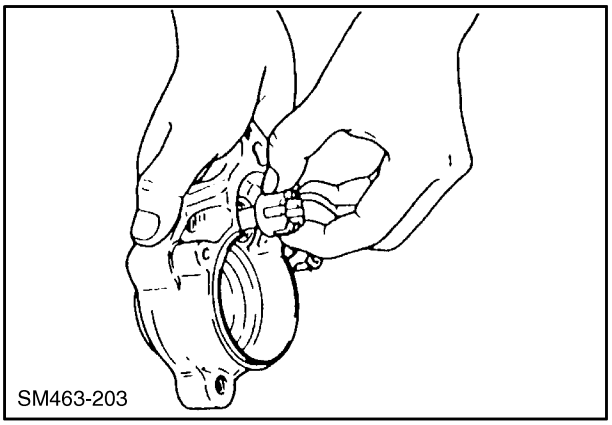
219

9. Remove the idler gear and small pinion from the drive end frame if they were not dislodged when the housing was separated.



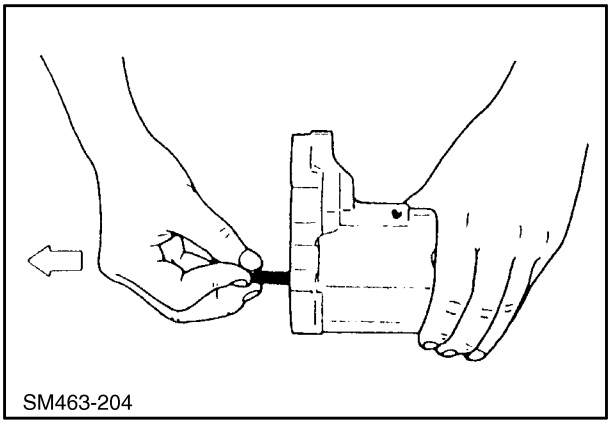
220

10. Remove the idler gear bearing rollers and retainer.



221

11. Remove the return spring from the electric solenoid.



222

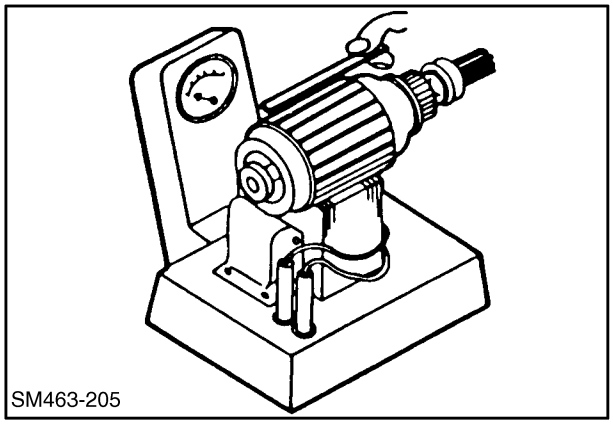
INSPECTION AND REPAIR

Inspect the following components, using conventional test methods, and repair or replace as necessary.

Armature

Inspect the armature for internal short circuits with a growler.

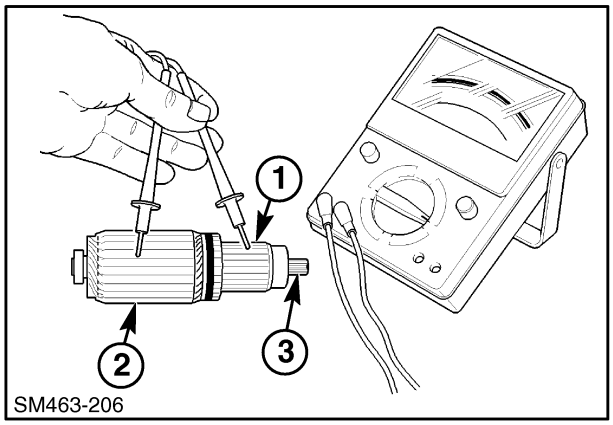
Replace the armature if a short circuit is indicated.



223

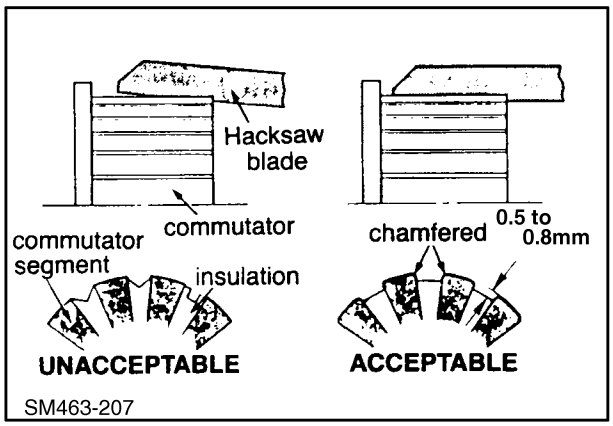
Inspect the armature for a short to ground using a continuity tester.

Replace the armature if there is any continuity between the commutator, 1, and armature shaft, 2, or core, 3.



224

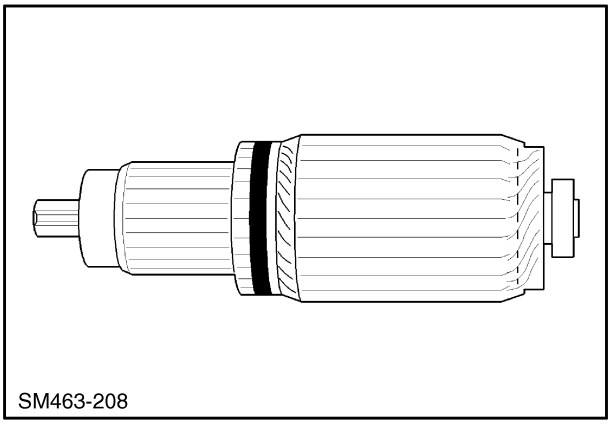
Check the armature for runout with a dial indicator and V-blocks. If the commutator is rough, or more than 0.05 mm (0.002″) out of round, turn it down or replace it. Undercut the separators between the segments if the depth is less than 0.2 mm (0.01″). The distance, 1, from the commutator segment and insulation should be between 0.5 mm and 0.8 mm (0.02″ and 0.03″).



225

Check the spline teeth for wear or damage, and replace the armature as necessary.

Check the bearings for signs of roughness or dryness. Lubricate or replace as necessary.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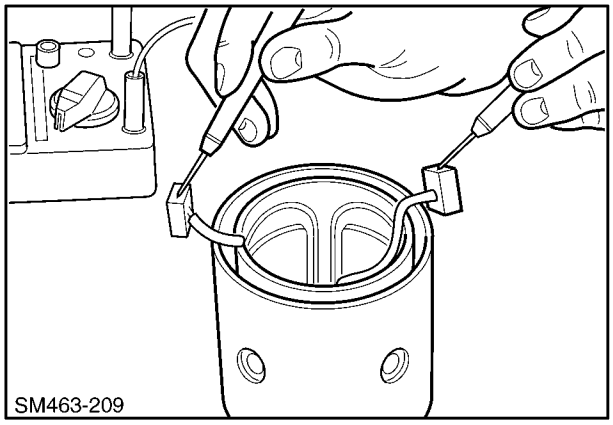
226

Field Coil

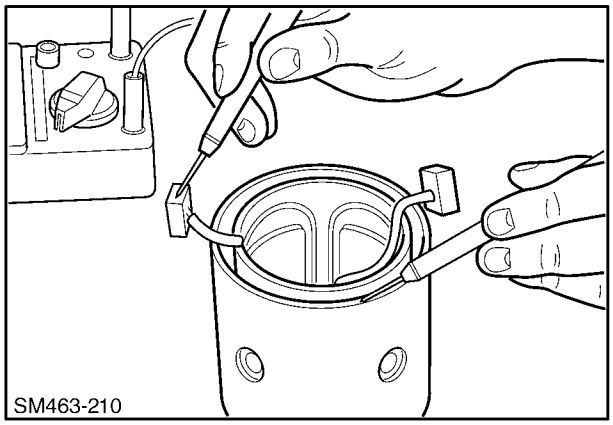
Inspect the field coil for an open circuit with a continuity tester. Replace the motor housing if there is no continuity between the two brushes.



227

Inspect the field coils for short to ground with a continuity tester. If any continuity is noted between the brush and motor housing, locate the fault in the insulation, and repair or replace the motor housing as appropriate.

Check field poles and coils for tightness. Replace the motor housing if loose or improperly seated coils are detected.



228

Brushes

Clean brushes and adjacent parts, removing carbon particles by wiping with a clean cloth.

Check each brush for wear. Replace brushes if they are worn to the service limit.

The positive brushes are welded to the field windings. If the positive brushes must be replaced, it will be necessary to replace the motor housing.

The negative brushes are welded to the brush plate. If the negative brushes must be replaced, it will be necessary to replace the brush holder assembly.

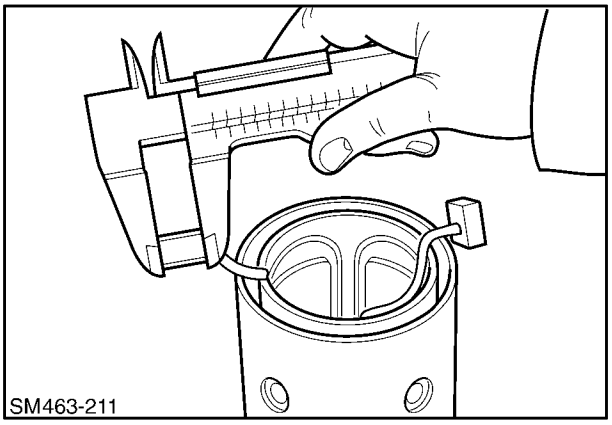
Standard Length	Service Limit
15 mm (0.59″)	9 mm (0.35″)

Move each brush in the holder to be sure that it is capable of sliding smoothly.

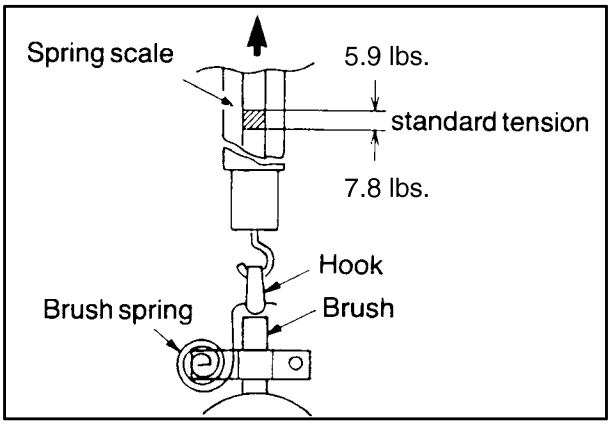
Check brush spring tension. Replace the brush holder assembly if the tension is not within specified limits.

Standard Tension	Service Limit
2.7 - 3.6 kg (5.9 - 7.8 lbs)	2.2 kg (4.7 lbs)

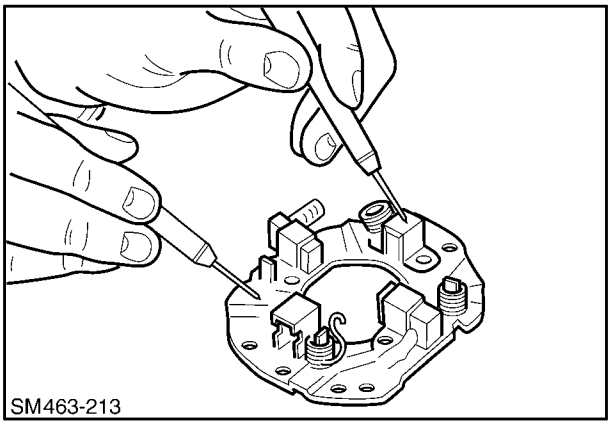
Check the brush holder assembly for short to ground. Touch one probe of a continuity tester to the plate and the other to each of the insulated holders. Replace the brush holder assembly if any continuity is noted.



229



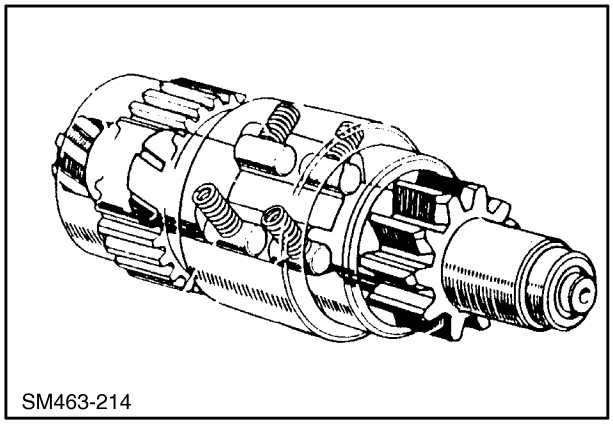
230



231

Overrunning Clutch

While holding the clutch housing, rotate the pinion. The pinion should rotate smoothly in one direction (not necessarily easily), but should not rotate in the opposite direction. If the clutch does not function properly, replace it.



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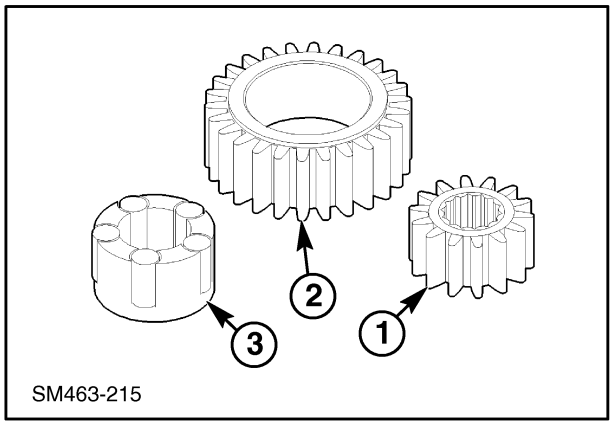
Reduction Gears

Inspect the pinion gear, 1, the idler gear, 2, and the overrunning clutch gear for wear or damage.

Inspect the idler gear bearing rollers and retainer, 3.

Replace any parts found worn or damaged.



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233

Electric Solenoid

The following tests should be performed with the motor removed from the starter assembly.

Each test should not last more than 3 - 5 seconds to avoid overheating the solenoid.

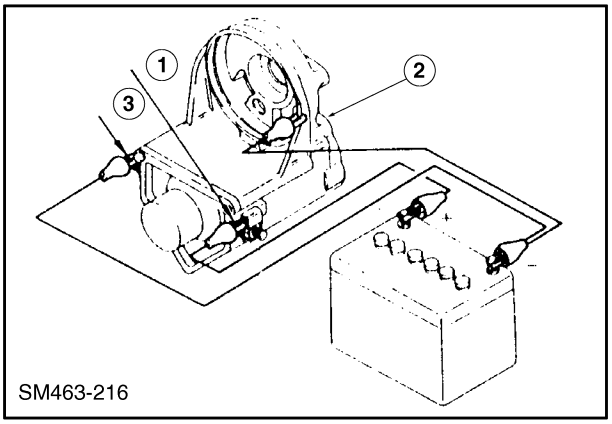
Tests should be performed with a fully charged 12 volt battery.

Pull-in Test

Connect a lead from the positive battery post to the spade terminal, 1, (starter switch wire) on the solenoid. Connect a lead from the battery negative post to the solenoid housing, 2.

Touch a second negative lead to the heavy solenoid terminal leading to the field coil, 3. This completes the circuit through both the pull-in and hold-in coil windings. The pinion should jump forward.

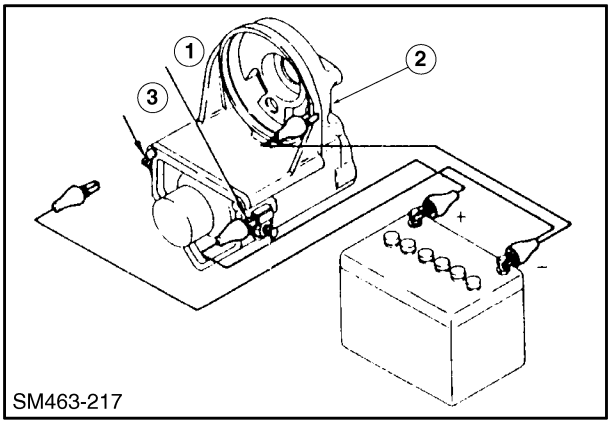
Remove the negative lead from the field coil terminal, 3. The pinion should stay extended, held by the hold-in coil.



234

Remove the positive lead from the spade terminal. The pinion should retract immediately.

If the solenoid fails to perform as described, replace it.



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REASSEMBLY

Reassemble the starter in the reverse order of disassembly. Observe the following cautions and procedures.

1. Lubricate the following components with a light coating of White Lithium Grease (Part Number RL 666).

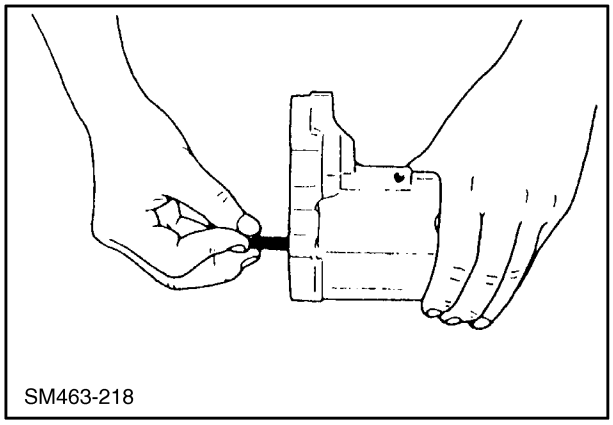
   Idler gear retainer and rollers.

   Overrunning clutch.

   Steel ball and return spring.

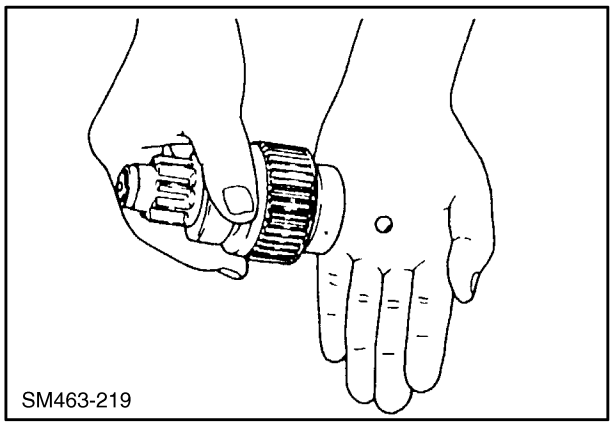
   Armature bearings.

   Reduction gears.



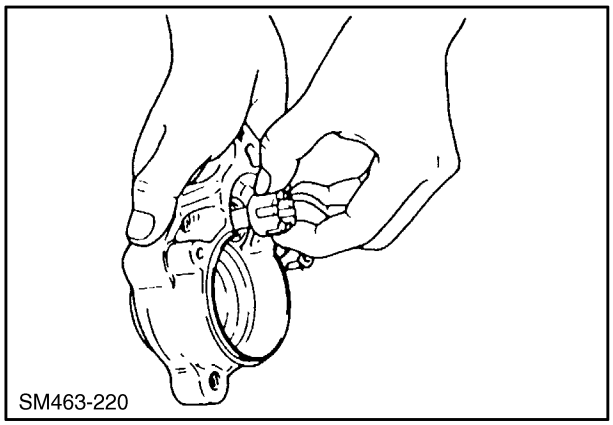
236

2. Install the return spring into the electric solenoid and the steel ball into the center of the overrunning clutch. The ball should be held in place by the coating of grease.



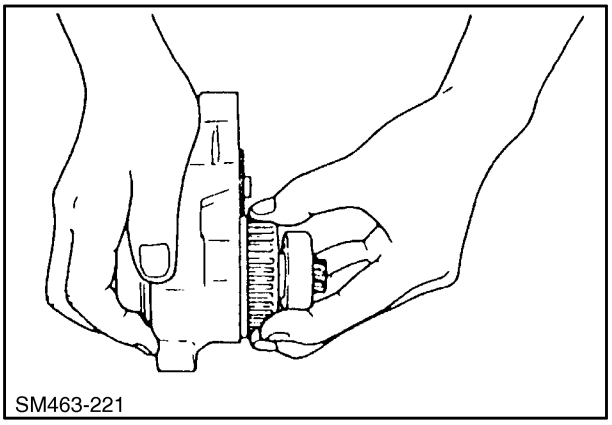
237

3. Install the idler gear bearing rollers and retainer.



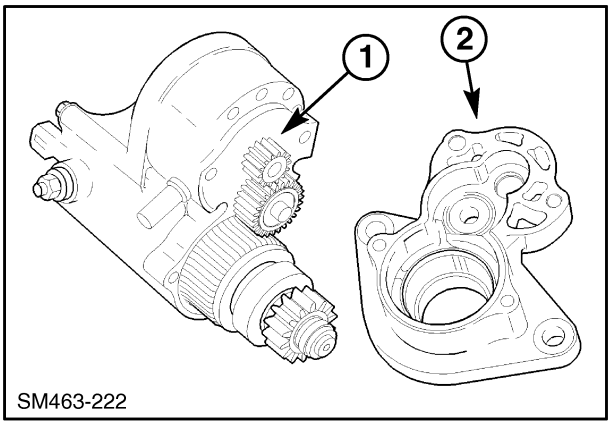
238

4. Install the overrunning clutch assembly part way into the housing. Mesh the idler gear with the driven gear, then fully install both pieces together.



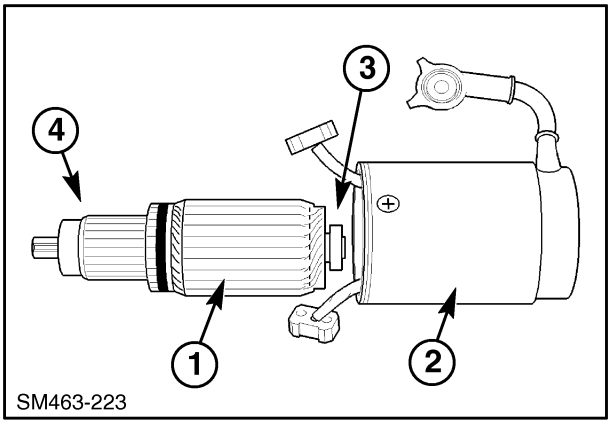
239

5. Position the pinion gear, 1,over the armature hole shaft then install the drive end frame, 2. Install the retaining screws and torque to 7 - 12 N·m (5 - 9 ft. lbs.).



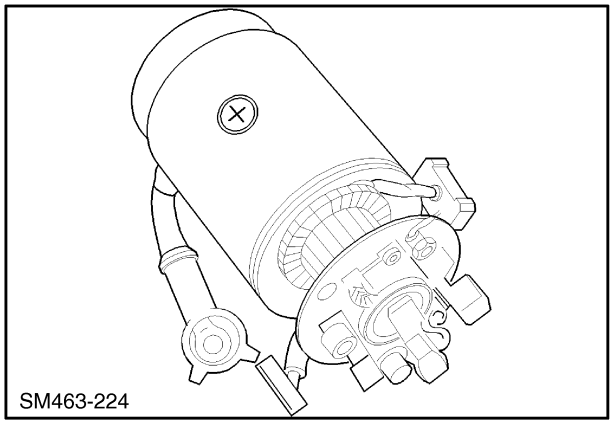
240

6. Install the armature into the motor housing. Gently tap the armature into place with a soft hammer to seat the rear bearing.



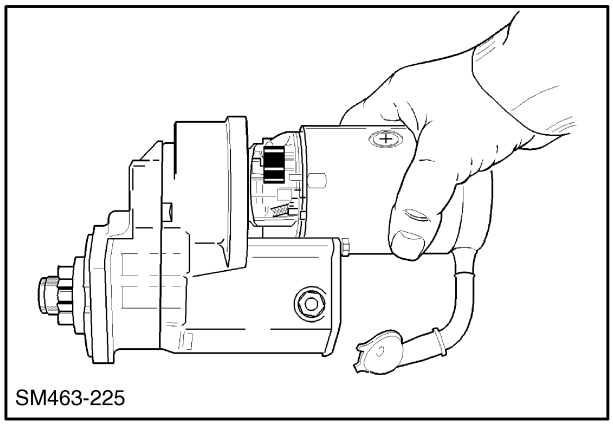
241

7. Install the brush plate onto the motor housing. Install the insulated brushes into the holder. Ensure the insulated brush leads are not grounded. Avoid getting oil or grease on the brushes or commutator.



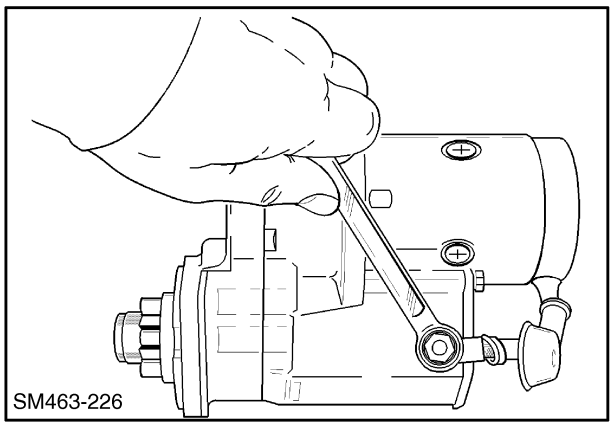
242

8. Install the motor into the drive housing observing the scribe marks. Install the retaining bolts and torque to 7 - 12 N·m (5 - 9 ft. lbs.).



243

9. Reconnect the lead wire from the electric solenoid.



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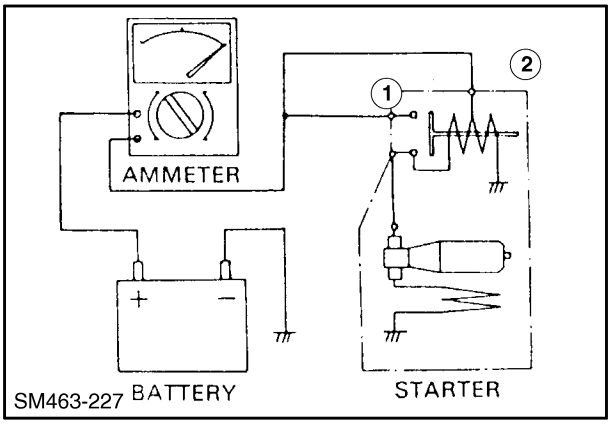
Performance Test

After reassembly, a no-load test should be conducted.

Clamp the starter securely in a vise. Connect a heavy wire (jumper cable) from a 12 volt battery positive terminal, through a suitable ammeter, to the battery cable post of the starter, 1. Connect a second cable from the battery negative post to the starter case or vise. Connect a jumper wire from the positive cable to the spade terminal on the solenoid, 2.

The pinion gear should jump forward and the starter turn smoothly. Current draw should not exceed 130 amps.



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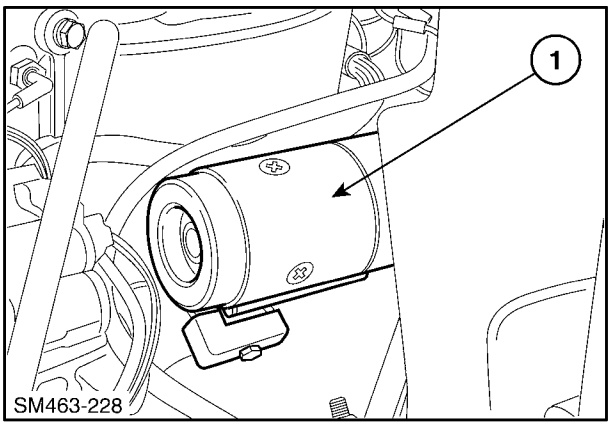
STARTER REINSTALLATION

1. Attach the starter to the bellhousing and tighten the hardware, 1. When installing the starter into the bellhousing, make sure it is properly seated before installing and tightening the hardware.
2. Reconnect the wires to the proper terminals, 2, on the starter solenoid and starter.
3. Reconnect the negative (–) battery cable.
4. Reinstall and close any shields removed.

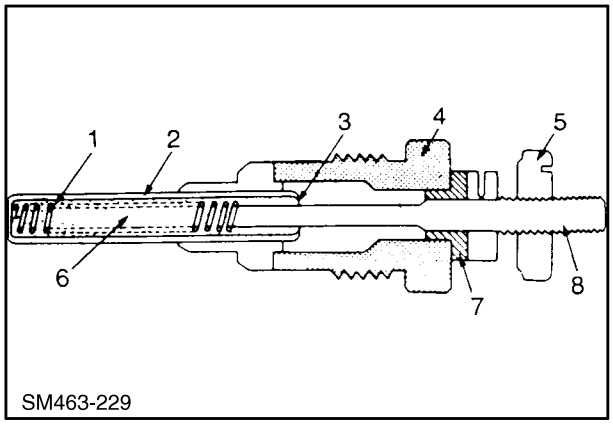


246

MISCELLANEOUS ENGINE COMPONENTS

GLOW PLUG

Sheathed type glow plugs are used to improve cold engine starting. The glow plugs draw 6.9 amps at 10.5 volts.



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1. Heat wire
2. Sheath
3. Insulation
4. Body
5. Nut
6. Magnesium oxide powder
7. Insulating bushing
8. Center electrode

Description and Operation

A coiled, thin resistance wire is placed in the sintered magnesium oxide powder enclosed by a stainless steal sheath. One end of the wire is welded to the sheath end and the other end to the center electrode. When the key switch is placed in the “pre-heat” position current flows to the center electrode and through the resistance wire heating the air in the combustion chamber.

GLOW PLUG TROUBLESHOOTING

Open Circuit

The glow plug system operates even if a glow plug is disconnected or if it open-circuits internally because the glow plugs are connected in parallel. An open circuit in one glow plug will result in a greatly extended heating cycle.

Remove the wiring connector and check the continuity of the glow plug terminal to body ground. The resistance should be 35 ohms. A higher reading indicates an open circuit in the glow plug and the plug must be replaced.

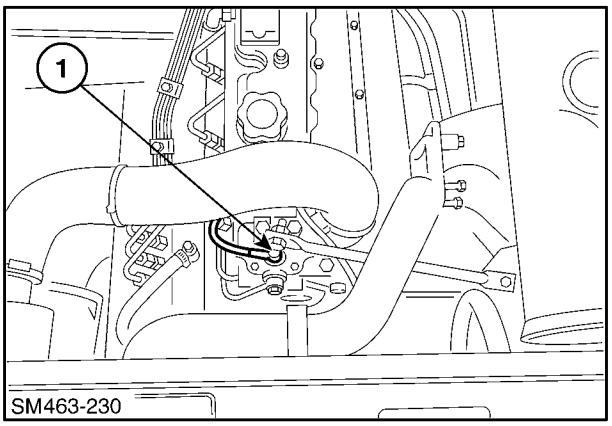
Short Circuit

Glow plugs seldom short-circuit internally. If, however, the glow plug should short, the external wiring will be damaged at start-up.

Remove the wiring connector and check the continuity of the glow plug terminal to body ground. The resistance should be 0.7 Ω ± 0.16 Ω. A reading of 0 Ω indicates a short circuit in the glow plug and the plug must be replaced.

OIL PRESSURE SWITCH

The oil pressure switch is a normally closed switch completing a circuit to ground signaling the EIC to generate a low engine oil pressure warning signal. The pressure switch operates in a range of 0.2 - 0.4 kg/cm^2 (2.8 - 5.7 PSI). At engine start up, when oil pressure rises sufficiently, the switch opens, turning out the low pressure signal.



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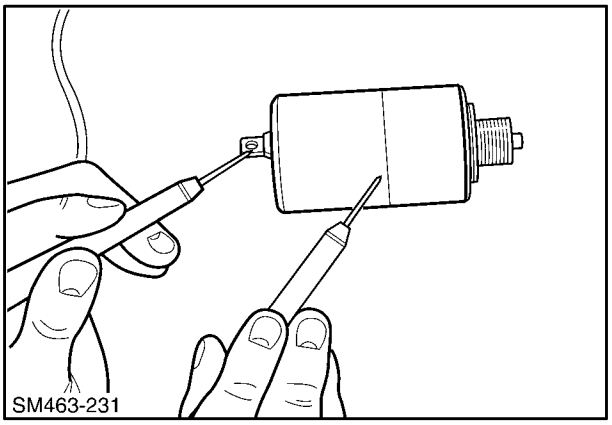
FUEL SHUT-OFF SOLENOID

The fuel shut off solenoid is a normally extended solenoid. In this state the plunger rests against the injection pump rack, holding it in the shut-off position. Applying current to the terminal causes the plunger to withdraw into the solenoid body allowing the fuel control rack to move to the operating position.

The solenoid may be bench tested by applying positive battery voltage to the terminal and grounding the solenoid body. The plunger should retract.



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