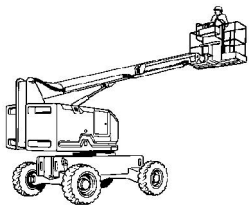
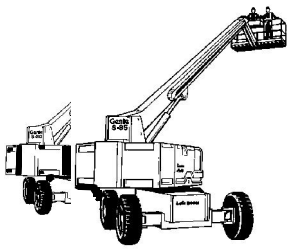
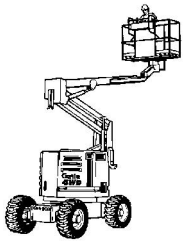
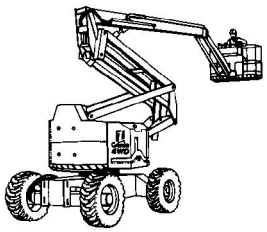
Genie Industries

Technical Publications

Genie® Supplement

Service Manual

For the following products:	
 S-40	 S-80 & 85
 Z-45/22	 Z-60/34

First Edition, Third Printing
Part No. 35023

Genie® Supplement

Genie Industries has endeavored to deliver the highest degree of accuracy possible. However, continuous improvement of our products is a Genie policy. Therefore product specifications are subject to change without notice.

Readers are encouraged to notify Genie of errors and send in suggestions for improvement. All communications will be carefully considered for future printings of this and other manuals. Please write or fax to the Technical Publications team:

Genie Industries
PO Box 69
Redmond, WA 98073-6900, USA
Fax Number: (206) 556-8528.

If you have any questions, call Genie Industries.

Genie North America

Telephone (206) 881-1800
Toll Free in U.S.A. 800 536-1800
Toll Free in Canada 800 426-8089
Fax (206) 883-3475

Genie Europe

Telephone (44) 01636-605030
Fax (44) 01636-611090

Genie® Industries

Copyright © 1995 by Genie Industries

First Edition: First Printing, February 1995
Second Printing, March 1995
Third Printing, June 1995

Genie® is a registered trademark
of Genie Industries. Registered 2009987

Patents pending

Printed on recycled paper

Printed in U.S.A.

How To Use This Supplement

This supplement is an addition to the service manuals listed below. The serial numbers listed below mark the first affected machine . Only the following changes are documented in this supplement:

Replacement of the Ford LSG-423 engine with the Ford LRG-423 engine

If you have any questions about what this supplements covers or how it fits in to your existing documentation, please call the Genie Industries Service Department.

Service Manual

There are four sections to the service manual supplement.

The Specifications section contains only the specifications for Ford LRG-423 Engine.

The maintenance section contains only those maintenance procedures that are different for the Ford LRG engine. Please note the procedure number for your machine, indentified at the beginning of each procedure in this supplement.

The schematic section contains complete, updated electrical schematics for the Gasoline/LPG machines. The schematics are arranged by product.

The repair section contains the complete Ford LRG engine section. Please note the section number for your machine.

Service Manuals:

Product	Part Number
S-40	32222
S-80 & S-85	34032
Z-45/22	32960
Z-60/34	30105

Serial Number Breaks:

Product	Machines after
S-40	271
S-80 & S-85	132
Z-45/22	2134
Z-60/34	481

Table of Contents

Section One	**Specifications**	
Ford LRG-423 Engine		1
Section Two	**Scheduled Maintenance Procedures**	
B-1	Check the Engine Belt(s)	2
B-2	Check and Adjust the Engine Idle Mixture - Gasoline/LPG Models	2
B-3	Check and Adjust the Engine RPM	2
C-1	Replace the Gasoline Fuel Filter - Gasoline/LPG Models	4
C-2	Replace the PCV Valve - Gasoline/LPG Models	5
C-3	Replace the Spark Plugs - Gasoline/LPG Models	6
C-4	Check and Adjust the Air/LPG Mixture - Gasoline/LPG Models	6
C-5	Check and Adjust the Ignition Timing - Gasoline/LPG Models	8
D-1	Change or Recondition the Engine Coolant - Gasoline/LPG Models	8
D-2	Change the Fuel Lines	9
D-3	Check the Engine Valve Clearance - Gasoline/LPG Models	10
D-4	Check the Engine Cylinder Compression - Gasoline/LPG Models	10
D-5	Clean the PCV Hoses and Fittings - Gasoline/LPG Models	11
D-6	Replace the Timing Belt - Gasoline/LPG Models	12
Section Three	**S-40 Electrical Schematics**	
	Electrical Schematic - Gasoline/LPG Models	13
	Ground Control Box Legend - Gasoline/LPG Models	15
	Relay Panel Legend - Gasoline/LPG Models	16
	Platform Control Box Legend - Gasoline/LPG Models	17
	S-80/85 Electrical Schematics	
	Electrical Schematic - Gasoline/LPG Models	18
	Ground Control Box Legend - Gasoline/LPG Models	20
	Relay Panel Legend - Gasoline/LPG Models	21
	Platform Control Box Legend - Gasoline/LPG Models	22
	Z-45/22 Electrical Schematics	
	Electrical Schematic - Gasoline/LPG Models	23
	Ground Control Box Legend - Gasoline/LPG Models	25
	Relay Panel Legend - Gasoline/LPG Models	26
	Platform Control Box Legend - Gasoline/LPG Models	27

Section Three, continued

Z-60/34 Electrical Schematics

Electrical Schematic - Gasoline/LPG Models 28
Ground Control Box Legend - Gasoline/LPG Models 30
Relay Panel Legend - Gasoline/LPG Models 31
Platform Control Box Legend - Gasoline/LPG Models 32

Section Four **Repair Procedures**

7-1 Governor Actuator 33
7-2 Choke Adjustments 34
7-3 Timing Adjustment 35
7-4 Carburetor Adjustment 35
7-5 RPM Adjustment 35
7-6 Flex Plate 35
7-7 Water Temperature and Oil Pressure Gauges 36
7-8 Vacuum Switch 36

Specifications

Ford Engine LRG-423

Displacement	140 cu in 2.3 liters
Number of cylinders	4
Bore & stroke	3.781 x 3.126 inches 96.04 x 79.4 mm
Horsepower	63 @ 4000 rpm
Firing order	1 - 3 - 4 - 2
S-40 RPM Specifications	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1600 rpm
High idle	2500 rpm
S-80/85 RPM Specifications	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1600 rpm
High idle	2500 rpm
Z-45/22 RPM Specifications	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1400 rpm
High idle	2150 rpm
Z-60/34 RPM Specifications	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1600 rpm
High idle	2500 rpm
Governor	electronic
Compression ratio	9.4:1
Compression pressure (approx.) Pressure (psi) of lowest cylinder must be at least 75% of highest cylinder	
Valve clearances - collapsed tappet	0.035 to 0.055 inches 0.889 to 1.397 mm
Lubrication system	
Oil pressure (operating temp. @ 2000 rpm)	40 to 60 psi 2.75 to 4.1 bar
Oil capacity (including filter)	5 quarts 4.7 liters

Oil viscosity requirements	
Temperature below 60°F / 15.5°C	5W-30
-10°F to 90°F / -23°C to 32°C	10W-30
Temperature above -10°F / -23°C	10W-40 to 10W-50
Temperature above 20°F / -6.6°C	20W-40 or 20W-50
Use oils meeting API classification SG (labeled SG/CC or SG/CD) as they offer improved wear protection. Units ship with 10W-40 SG/CC.	
Starter motor	
Normal engine cranking speed	200 to 250 rpm
Current draw, normal load	170A
Current draw, maximum load	200A
Current draw, minimum	140A
Maximum circuit voltage drop while starting (normal temperature)	0.5V DC
Brush length, new	0.66 in 16.8 mm
Brush length wear limit	0.25 in 6.35 mm
Brush spring tension	64 ounces 18 Newtons
Bolt torque through brush	45 to 84 inch-pounds 5.08 to 9.5 Nm
Brush mounting bolt torque	15 to 20 foot-pounds 20 to 27 Nm
Maximum commutator run-out	0.005 inches 0.127 mm
Battery	
Type	12V, Group 31
Quantity	1
Cold cranking ampere	1000A
Reserve capacity @ 25A rate	200 minutes
Fuel pump	
Electronic solenoid	7 psi 0.48 bar

Scheduled Maintenance Procedures

B-1
Check the Engine Belt(s)

NOTICE Genie S-40 models: This procedure replaces B-1.

Genie S-80/85 models: This procedure replaces B-1.

Genie Z-45/22 models: This procedure replaces B-1.

Genie Z-60/34 models: This procedure replaces B-1.

Maintaining the engine belt(s) is essential to good engine performance and service life. The machine will not operate properly with a loose or defective belt and continued use may cause component damage.

⚠WARNING Do not inspect while the engine is running. Remove the key to secure from operation.

⚠CAUTION Beware of hot engine components. Contact with hot engine components may cause severe burns.

1 Inspect the engine belt for:

- cracking
- glazing
- separation
- breaks

NOTICE Ford LRG-423 engines are equipped with a serpentine belt and incorporate a self adjusting pulley tensioner. No adjustment is required.

B-2
Check and Adjust the Engine Idle Mixture - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces B-11.

Genie S-80/85 models: This procedure replaces B-11.

Genie Z-45/22 models: This procedure replaces B-11.

Genie Z-60/34 models: This procedure replaces B-11.

Complete information to perform this procedure is available in the *Ford LRG-423 2.3 Liter Industrial Engine Service Manual* (Ford number: PPD-194-287). Genie part number 33907.

B-3
Check and Adjust the Engine RPM

NOTICE Genie S-40 models: This procedure replaces B-12.

Genie S-80/85 models: This procedure replaces B-12.

Genie Z-45/22 models: This procedure replaces B-12.

Genie Z-60/34 models: This procedure replaces B-12.

Maintaining the engine rpm at the proper setting for both low and high idle is essential to good engine performance and service life. The machine will not operate properly if the rpm is incorrect and continued use may cause component damage.

NOTICE Perform this procedure in gasoline mode with the engine at normal operating temperature.

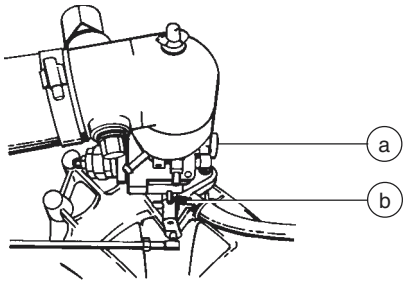
1 Disconnect the blue/black wire from the governor actuator.

2 Connect an rpm gauge to the engine, then start the engine from the ground controls.

⊙ Result: Refer to the RPM Specification chart for the correct rpm setting.

Skip to step 4 if the low idle rpm is correct.

3 Turn the idle adjustment screw on the carburetor clockwise to increase rpm or counterclockwise to decrease rpm.



Gasoline/LPG low idle adjustment
a carburetor
b adjustment screw

4 Turn the engine off and reconnect the blue/black wire to the governor actuator.

5 Start the engine from the ground controls.

⊙ Result: Refer to the RPM Specification chart for the correct rpm setting.

6 Move the engine idle control switch to high idle (rabbit symbol) from the ground controls.

⊙ Result: Refer to the RPM Specification chart for the correct rpm setting.

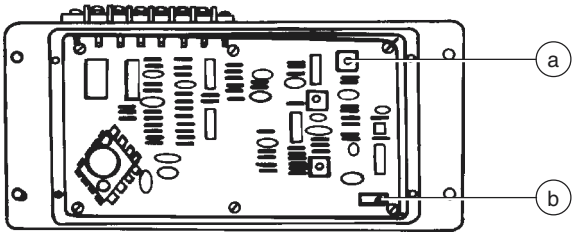
7 Turn the engine off.

If low and high idle rpm's are correct, disregard adjustment steps 8 and 9.

8 Remove the mounting fasteners from the electronic governor located on the engine side bulkhead, then remove the back panel from the governor.

9 Restart the engine, turn the low or high speed set screw clockwise to increase the rpm or counterclockwise to decrease the rpm.

NOTICE Do not adjust any trimpot other than specified in this procedure.



Gasoline/LPG idle adjustment
a low idle adjustment
b high idle adjustment

10 Apply a drop of silicone to the top of the trimpot screw. Apply a bead of silicone to the surface of the back panel prior to re-assembly.

11 Re-assemble the governor and recheck low and high idle.

S-40 RPM Specifications	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1600 rpm
High idle	2500 rpm
S-80/85 RPM Specifications	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1600 rpm
High idle	2500 rpm
Z-45/22 RPM Specifications	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1400 rpm
High idle	2150 rpm
Z-60/34 RPM Specifications	
Low idle - carburetor	900 rpm
Low idle - electronic governor	1600 rpm
High idle	2500 rpm

SCHEDULED MAINTENANCE PROCEDURES

C-1
Replace the Gasoline Fuel Filter - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces C-9.

Genie S-80/85 models: This procedure replaces C-10.

Genie Z-45/22 models: This procedure replaces C-9.

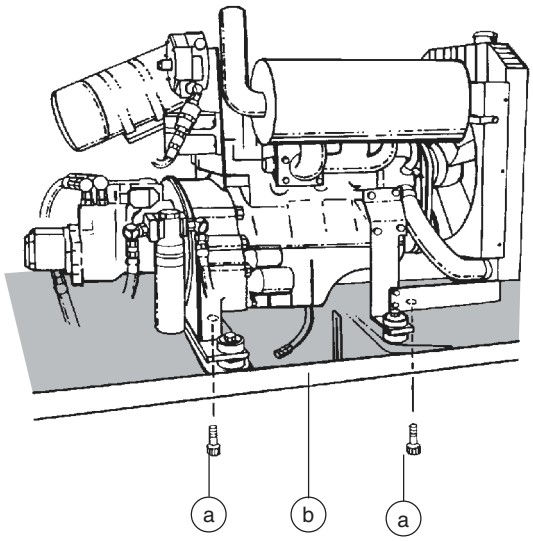
Genie Z-60/34 models: This procedure replaces C-9.

Replacing the gasoline fuel filter is essential to good engine performance and service life. A dirty or clogged filter may cause the engine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more often.

⚠ DANGER Engine fuels are combustible. Replace the fuel filter in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

NOTICE Perform this procedure with the engine off.

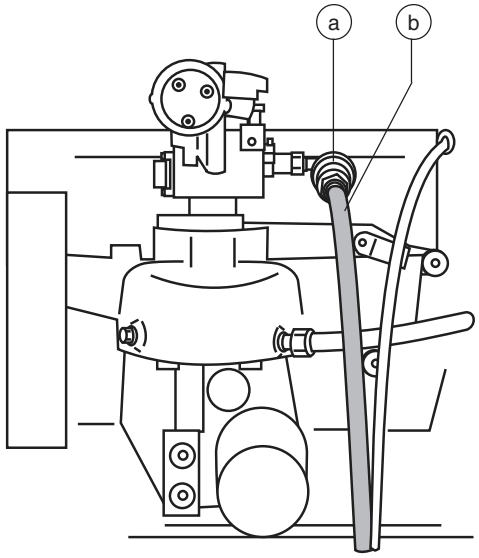
1 Remove the 2 bolts from under the engine pivot plate. Swing the engine pivot plate away from the machine to access the fuel filter, located near the carburetor.



a pivot plate retaining bolts
b engine pivot plate

2 Disconnect the fuel hose from the filter, then remove the fitting from the filter.

3 Remove the filter from the carburetor.



a fuel filter
b hose from the fuel pump to the fuel filter

4 Install the fitting into the new fuel filter, then install the fiter into the carburetor.

5 Connect the fuel hose to the filter.

6 Clean up any fuel that may have spilled during the installation procedure.

7 Start the machine from the ground controls, then inspect the fuel filter and hose for leaks.

⚠DANGER If a fuel leak is discovered, keep any additional personnel from entering the area and do not operate the machine. Repair the leak immediately.

8 Swing the engine pivot plate back to its original position and replace the two retaining bolts.

C-2
Replace the PCV Valve - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces C-10.

Genie S-80/85 models: This procedure replaces C-11.

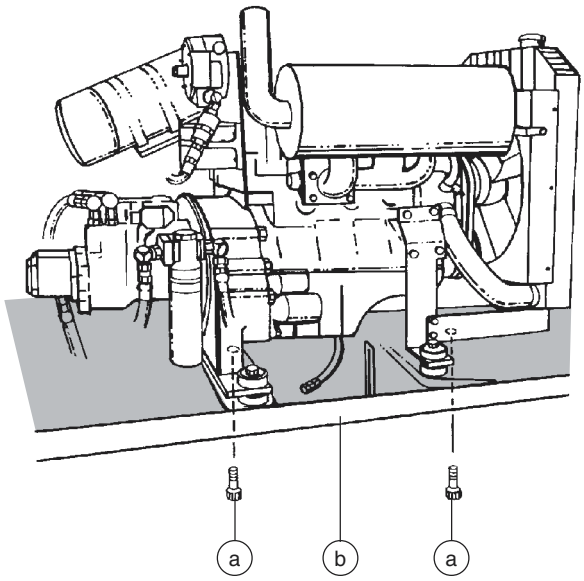
Genie Z-45/22 models: This procedure replaces C-10.

Genie Z-60/34 models: This procedure replaces C-10.

Yearly replacement of the PCV valve is essential to good engine performance. A malfunctioning valve can impair crankcase ventilation and may cause engine damage.

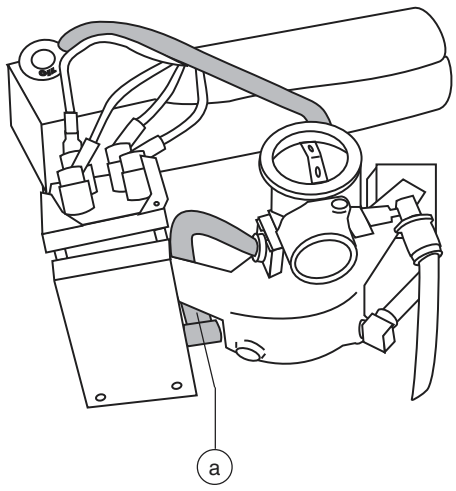
NOTICE Perform this procedure with the engine off.

1 Remove the 2 bolts from under the engine pivot plate. Swing the engine pivot plate away from the machine to access the PCV valve.



a pivot plate retaining bolts
b engine pivot plate

2 Remove the hose from the PCV valve, then remove the valve.



a PCV valve

3 Install the new PCV valve. Connect the hoses.

4 Swing the engine pivot plate back to its original position and replace the two retaining bolts.

SCHEDULED MAINTENANCE PROCEDURES

C-3
Replace the Spark Plugs - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces C-12.

Genie S-80/85 models: This procedure replaces C-13.

Genie Z-45/22 models: This procedure replaces C-12.

Genie Z-60/34 models: This procedure replaces C-12.

Periodic replacement of the spark plugs is essential to good engine performance and service life. Worn, loose or corroded spark plugs will cause the engine to perform poorly and may result in component damage.

NOTICE Perform this procedure with the engine off.

1 Label, then disconnect the plug wires from the spark plugs by grasping the molded boot. Do not pull on the plug wire.

2 Blow out any debris around spark plugs.

3 Remove all the spark plugs from the engine.

4 Adjust the gap on each new spark plug.

5 Install the new spark plugs, then connect the wires. Be sure that each spark plug wire is attached to the correct spark plug.

Spark plug specifications	
Spark plug type	Motorcraft AWSF-52C
Spark plug gap	0.042 to 0.046 inches 1.07 to 1.18 mm
Spark plug torque	5 to 10 foot-pounds 7 to 14 Nm

C-4
Check and Adjust the Air/LPG Mixture - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces C-13.

Genie S-80/85 models: This procedure replaces C-14.

Genie Z-45/22 models: This procedure replaces C-13.

Genie Z-60/34 models: This procedure replaces C-13.

Maintaining the proper air-to-fuel mixture during LPG operation is essential to good engine performance.

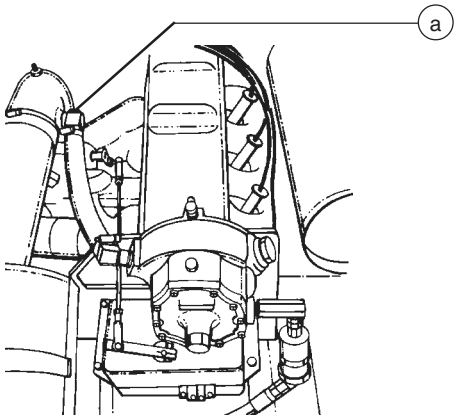
⚠DANGER Engine fuels are combustible. Perform this procedure in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

NOTICE The engine rpm needs to be preset for gasoline fuel operation before adjusting the LPG idle mixture. Refer to B-3, *Check and Adjust the Engine RPM.*

NOTICE The engine should be warmed to normal operating temperature before performing this procedure.

1 Move the fuel select switch to LPG fuel and start the engine from the ground controls.

2 Loosen the high idle mixture adjustment lock nut.



a high idle mixture adjustment screw

3 Load the system by pressing the boom retract switch, then move the engine idle control switch to high idle (rabbit symbol).

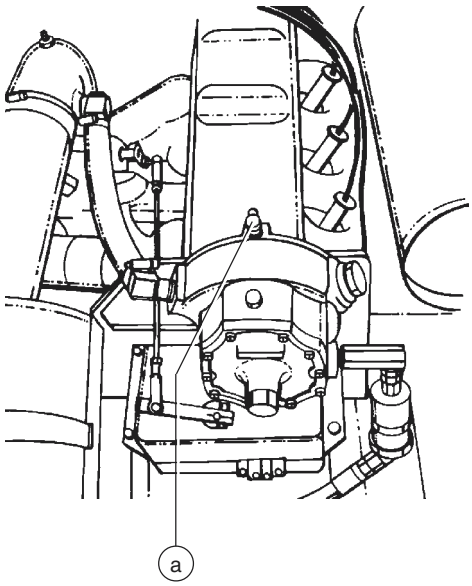
4 Adjust the high idle adjustment screw to obtain an air-to-fuel mixture ratio of 13.0:1 to 13.2:1, using an exhaust gas analyzer.

NOTICE Preliminary setting is 1/4 inch of threads showing. Measure from top of lock nut to top of adjustment screw.

NOTICE If an exhaust gas analyzer is not available, adjust to obtain peak or optimum rpm.

5 Hold the adjustment screw and tighten the lock nut.

6 Move the engine idle control switch to low idle (turtle symbol) and adjust the low idle screw to obtain an air-to-fuel mixture ratio of 13.0:1 to 13.2:1.



a low idle mixture adjustment screw

NOTICE Preliminary setting: turn low idle adjustment screw clockwise all the way in. Turn low idle adjustment screw counterclockwise 2 3/4 turns.

SCHEDULED MAINTENANCE PROCEDURES

C-5
Check and Adjust the Ignition Timing - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces C-14.

Genie S-80/85 models: This procedure replaces C-15.

Genie Z-45/22 models: This procedure replaces C-14.

Genie Z-60/34 models: This procedure replaces C-14.

Complete information to perform this procedure is available in the *Ford LRG-423 2.3 Liter Industrial Engine Service Manual* (Ford number: PPD-194-287). Genie part number 33907.

D-1
Change or Recondition the Engine Coolant - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces D-2.

Genie S-80/85 models: This procedure replaces D-2.

Genie Z-45/22 models: This procedure replaces D-2.

Genie Z-60/34 models: This procedure replaces D-2.

Replacing or reconditioning the engine coolant is essential to good engine performance and service life. Old or dirty coolant may cause the engine to perform poorly and continued use may cause engine damage. Extremely dirty conditions may require coolant to be changed more frequently.

⚠CAUTION Beware of hot engine parts and coolant. Contact with hot engine parts and/or coolant will cause severe burns.

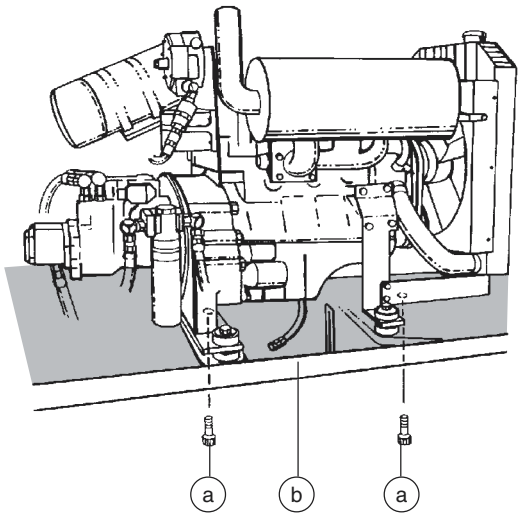
NOTICE Perform this procedure with the engine off and cooled.

1 Put on protective clothing and eye wear.

2 Disconnect the coolant return hose at the radiator and drain the coolant return tank.

3 Remove the radiator cap from the radiator.

4 Remove the 2 bolts from under the engine pivot plate. Swing the engine pivot plate away from the machine to access the radiator drain valve.



a pivot plate retaining bolts
b engine pivot plate

5 Open the drain valve on the radiator and allow all the coolant to drain into a suitable container.

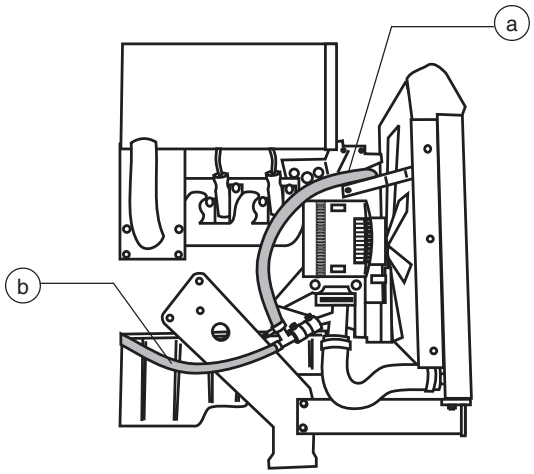
6 After all the coolant has drained, close the drain valve. Connect the coolant return hose to the radiator.

7 Open the drain valve on the engine block and allow the coolant to drain into a container. After the fluid is drained, close the drain valve.

8 Replace all coolant hoses and clamps.

9 Pour the proper coolant mixture (anti-freeze and water) for your climate into the radiator until it is full.

10 Disconnect the upper hose at the top and hold it until coolant starts to pour out of the open hose. Then immediately reconnect the hose.



a upper hose
b lower hose

11 Fill the radiator and then fill the coolant recovery tank to the NORMAL range.

12 Clean up any coolant spilled during this procedure.

13 Start the engine from the ground controls, run it for 30 seconds, and then turn it off.

14 Inspect for leaks and then check the fluid level in the coolant recovery tank. Add water if needed.

15 Start the engine from the ground controls and run it until reaching normal operating temperature.

16 Allow engine to cool and check the fluid level in the coolant recovery tank. Add water if needed.

Ford Engine Coolant capacity	11.5 quarts 10.9 liters

D-2
Change the Fuel Lines

NOTICE Genie S-40 models: This procedure replaces D-3.

Genie S-80/85 models: This procedure replaces D-3.

Genie Z-45/22 models: This procedure replaces D-3.

Genie Z-60/34 models: This procedure replaces D-3.

Maintaining the fuel lines in good condition is essential to safe operation and good engine performance. Failure to detect a worn, cracked or leaking fuel line may cause an unsafe operating condition.

⚠ DANGER Engine fuels are combustible. Replace the fuel lines in an open, well-ventilated area away from heaters, sparks, flames and lighted tobacco. Always have an approved fire extinguisher within easy reach.

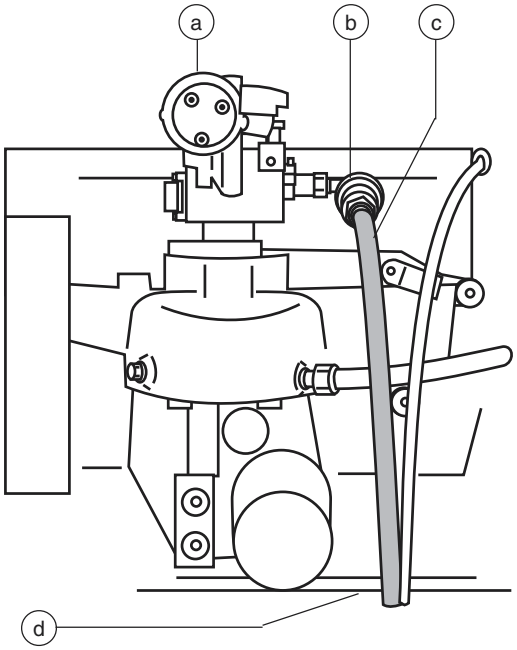
NOTICE Perform this procedure with the engine off.

1 Close the manual fuel shutoff valve, located next to the fuel tank.

SCHEDULED MAINTENANCE PROCEDURES

2 Remove and replace the fuel line hoses and clamps according to the following illustrations:

⚠ DANGER Fuel may be expelled under pressure. Wrap a cloth around fuel hoses to absorb leaking fuel before disconnecting them.



a carburetor
b fuel filter
c hose from the fuel filter to the fuel pump
d hose from the fuel pump to the fuel tank (not shown)

3 Clean up any fuel that may have spilled during this procedure.

4 Start the engine from the ground controls, then inspect the fuel filter and hoses for leaks.

⚠ DANGER If a fuel leak is discovered, keep any additional personnel from entering the area and do not operate the machine. Repair the leak immediately.

D-3
Check the Engine Valve Clearance - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces D-4.

Genie S-80/85 models: This procedure replaces D-4.

Genie Z-45/22 models: This procedure replaces D-4.

Genie Z-60/34 models: This procedure replaces D-4.

Complete information to perform this procedure is available in the *Ford LRG-423 2.3 Liter Industrial Engine Service Manual* (Ford number: PPD-194-287). Genie part number 33907.

D-4
Check the Engine Cylinder Compression - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces D-5.

Genie S-80/85 models: This procedure replaces D-5.

Genie Z-45/22 models: This procedure replaces D-5.

Genie Z-60/34 models: This procedure replaces D-5.

Complete information to perform this procedure is available in the *Ford LRG-423 2.3 Liter Industrial Engine Service Manual* (Ford number: PPD-194-287). Genie part number 33907.

D-5
Clean the PCV Hoses and Fittings - Gasoline/LPG Models

NOTICE Genie S-40 models: This procedure replaces D-6.

Genie S-80/85 models: This procedure replaces D-6.

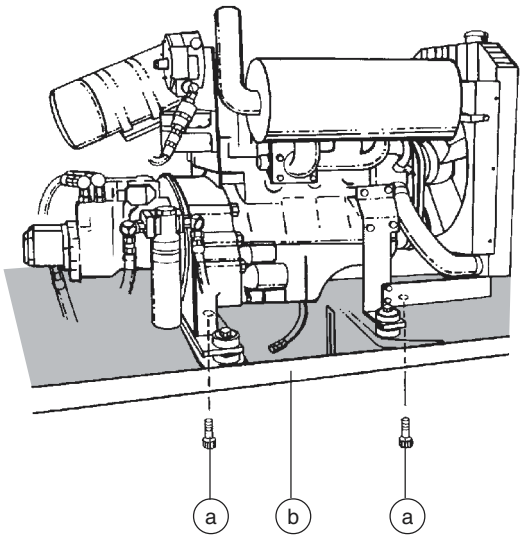
Genie Z-45/22 models: This procedure replaces D-6.

Genie Z-60/34 models: This procedure replaces D-6.

Maintaining PCV hoses is essential to good engine performance. Improperly functioning PCV hoses will fail to ventilate the crankcase and continued use of neglected hoses could result in component damage.

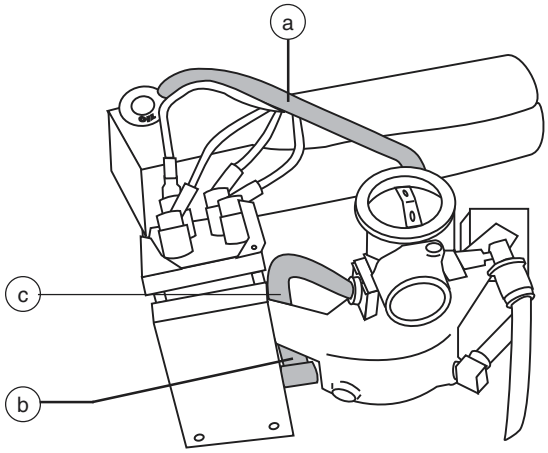
NOTICE Perform this procedure with the engine off.

1 Remove the 2 bolts from under the engine pivot plate. Swing the engine pivot plate away from the machine to access the PCV hoses.



a pivot plate retaining bolts
b engine pivot plate

2 Disconnect the hose from the PCV valve, then disconnect the hose from the engine.



a hose, carburetor to valve cover
b PCV valve
c hose, PCV valve to carburetor

3 Disconnect the hose from the carburetor, then disconnect the hose from the valve cover.

4 Clean the hoses with a mild cleaning solvent.

5 Dry both hoses and inspect them for cracks and damage. Replace the hoses if they are damaged.

SCHEDULED MAINTENANCE PROCEDURES

D-6
Replace the Timing Belt - Gasoline/LPG Models

NOTICE

Genie S-40 models: This procedure replaces D-9.

Genie S-80/85 models: This procedure replaces D-9.

Genie Z-45/22 models: This procedure replaces D-9.

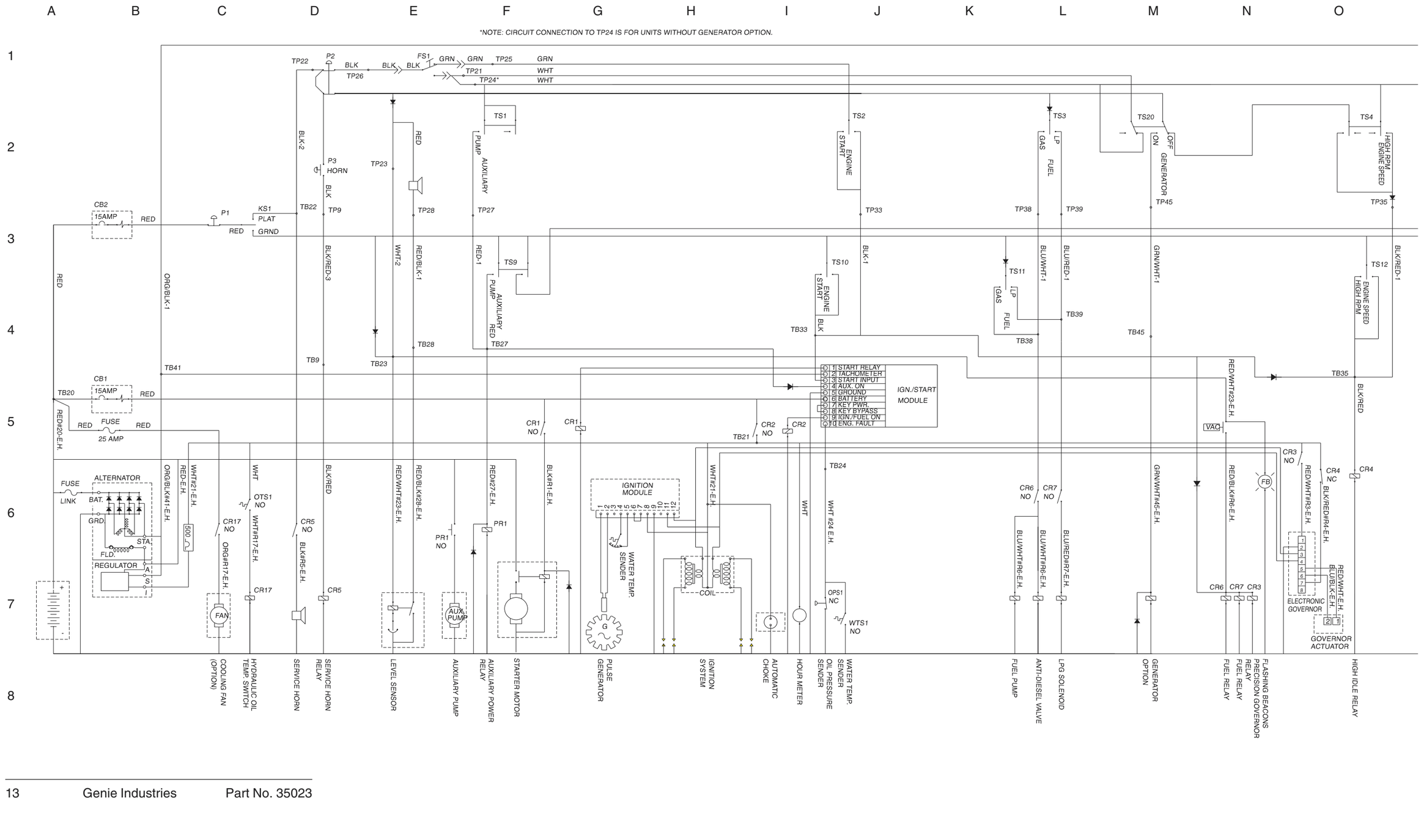
Genie Z-60/34 models: This procedure replaces D-9.

Complete information to perform this procedure is available in the *Ford LRG-423 2.3 Liter Industrial Engine Service Manual* (Ford number: PPD-194-287). Genie part number 33907.

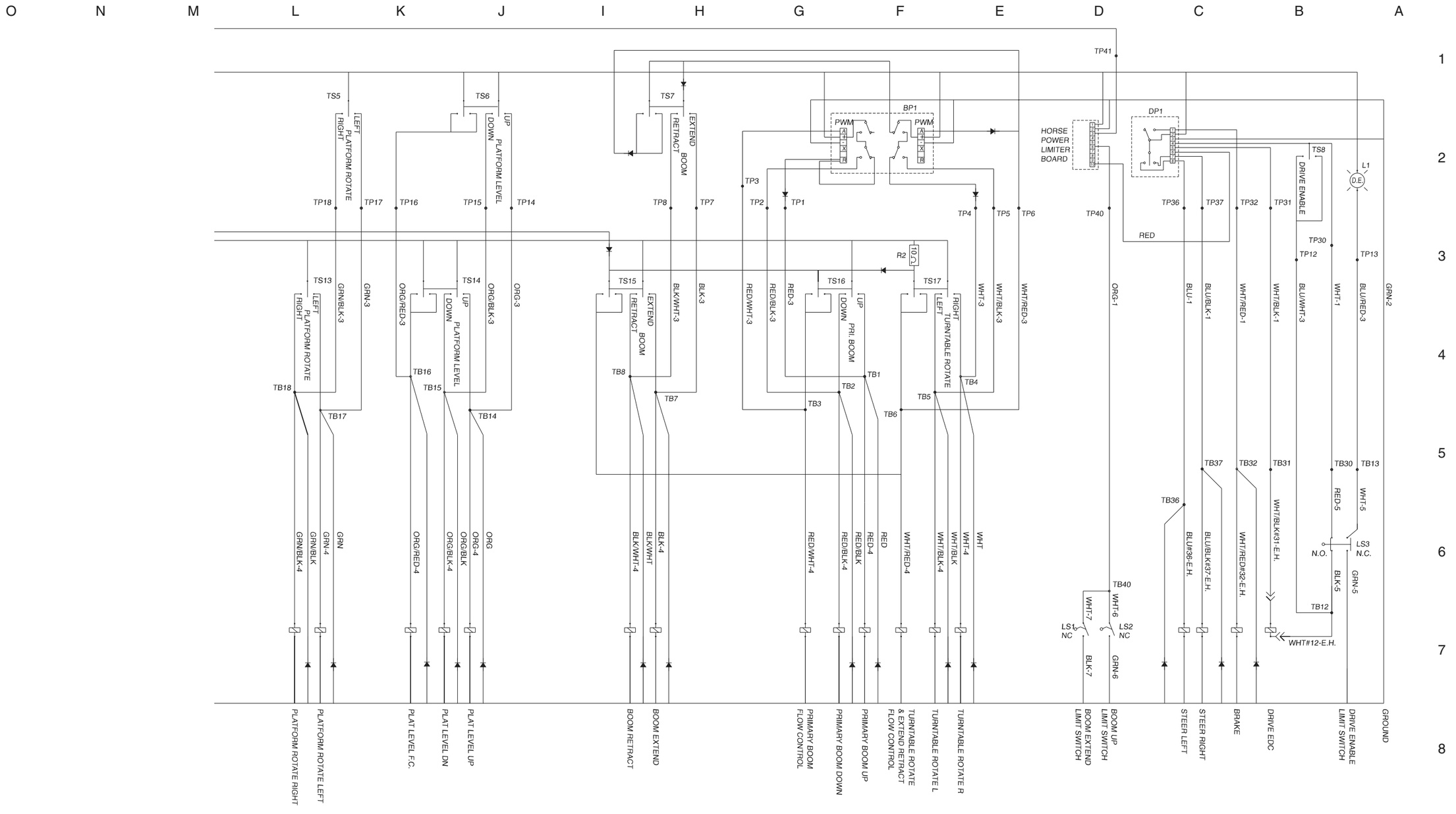




S-40 Electrical Schematic - Gasoline/LPG Models

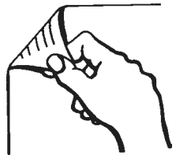


S-40 Electrical Schematic - Gasoline/LPG Models

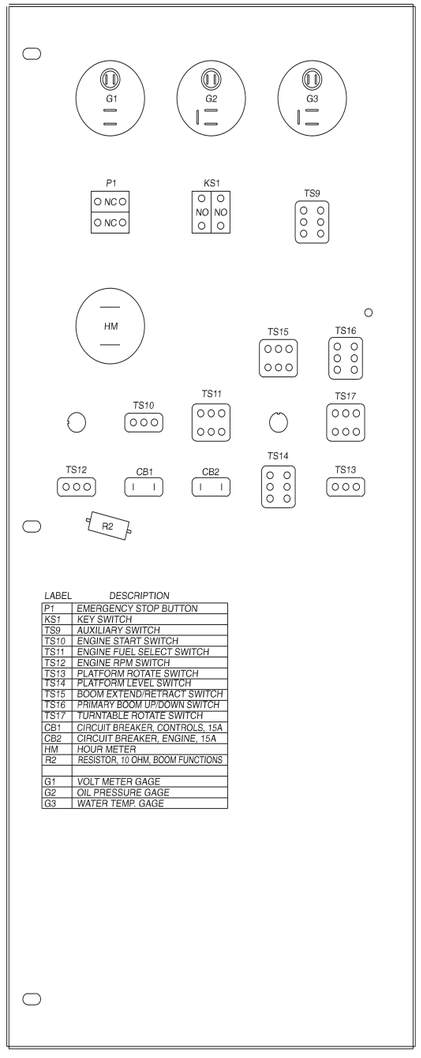


Service Manual Supplement

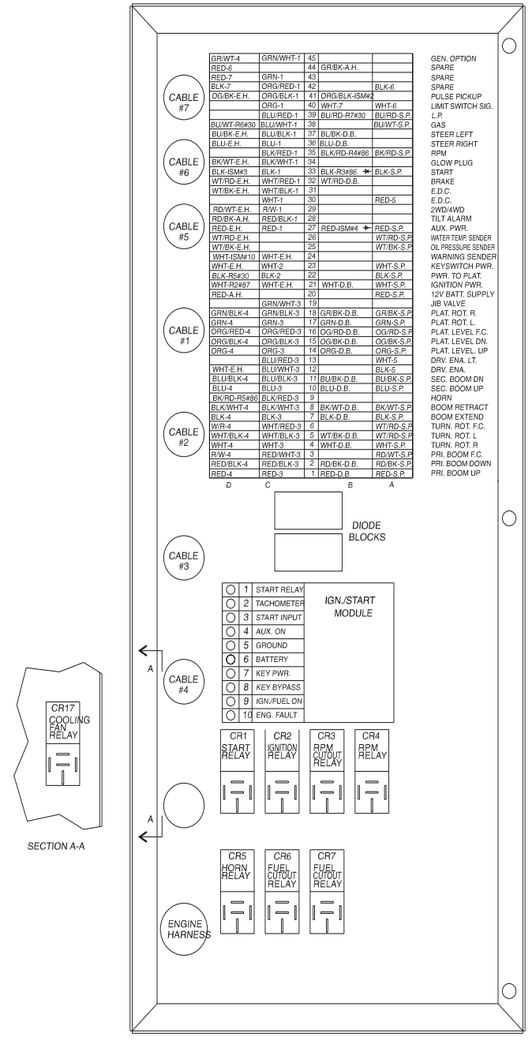
S-40 Electrical Schematic - Gasoline/LPG Models



S-40 Ground Control Box Legend - Gasoline/LPG Models

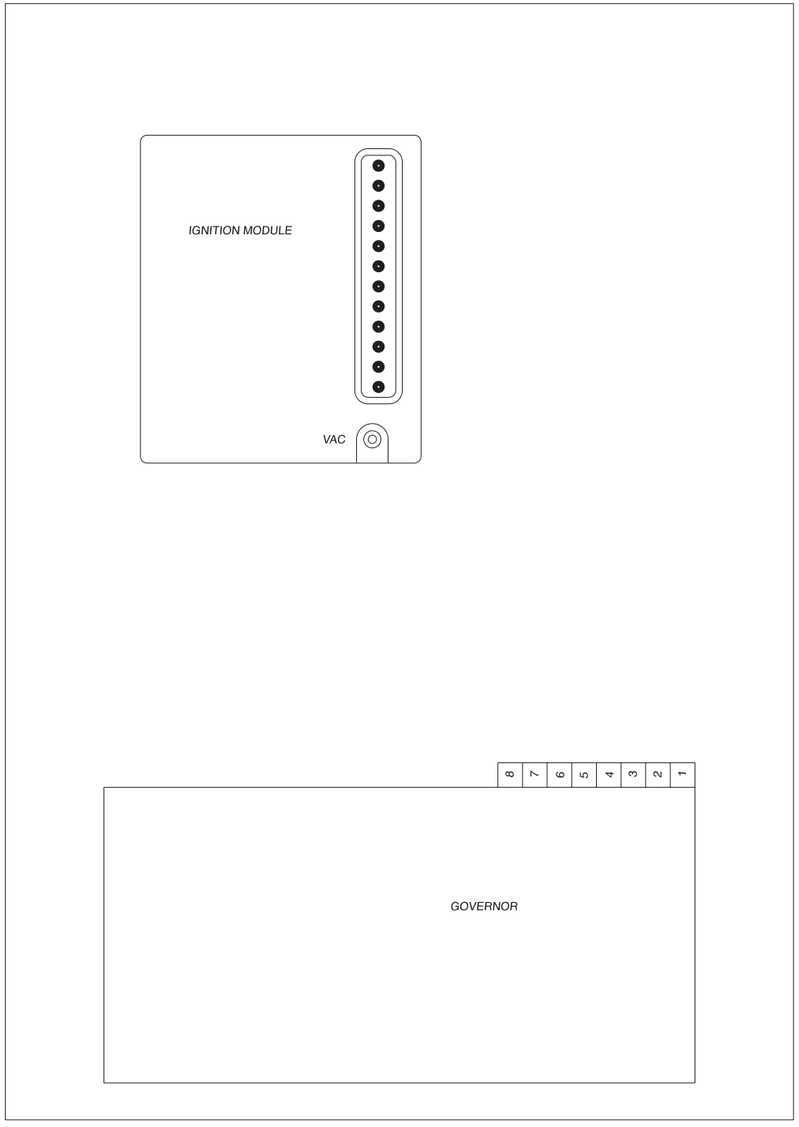


LABEL	DESCRIPTION
P1	EMERGENCY STOP BUTTON
KS1	KEY SWITCH
TS9	AUXILIARY SWITCH
TS10	ENGINE START SWITCH
TS11	ENGINE FUEL SELECT SWITCH
TS12	ENGINE RPM SWITCH
TS13	PLATFORM ROTATE SWITCH
TS14	PLATFORM LEVEL SWITCH
TS15	BOOM EXTEND/RETRACT SWITCH
TS16	PRIMARY BOOM UP/DOWN SWITCH
TS17	TURNTABLE ROTATE SWITCH
CB1	CIRCUIT BREAKER, CONTROLS, 15A
CB2	CIRCUIT BREAKER, ENGINE, 15A
HM	HOUR METER
R2	RESISTOR, 10 OHM, BOOM FUNCTIONS
G1	VOLT METER GAGE
G2	OIL PRESSURE GAGE
G3	WATER TEMP. GAGE



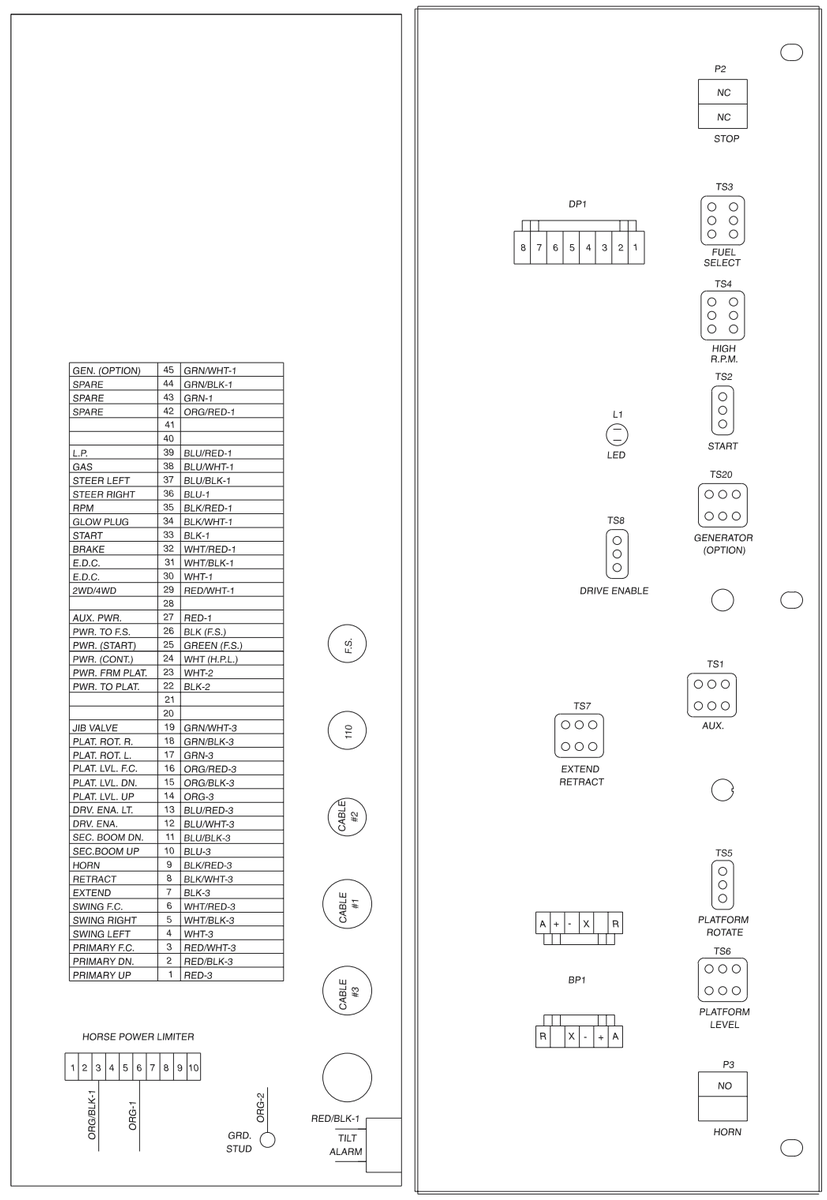
SECTION A-A

S-40 Relay Panel Legend - Gasoline/LPG Models

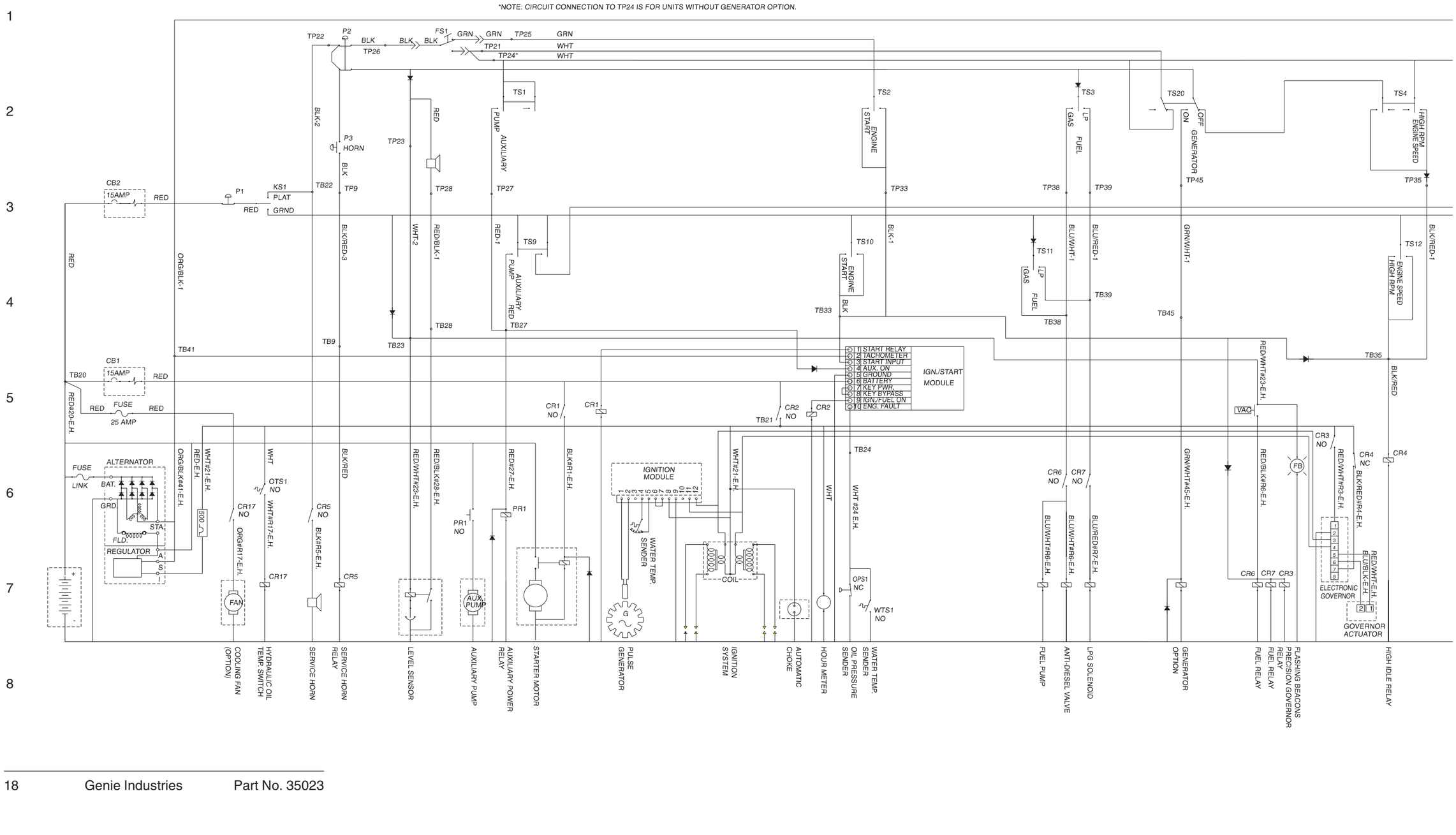


S-40 Platform Control Box Legend - Gasoline/LPG Models

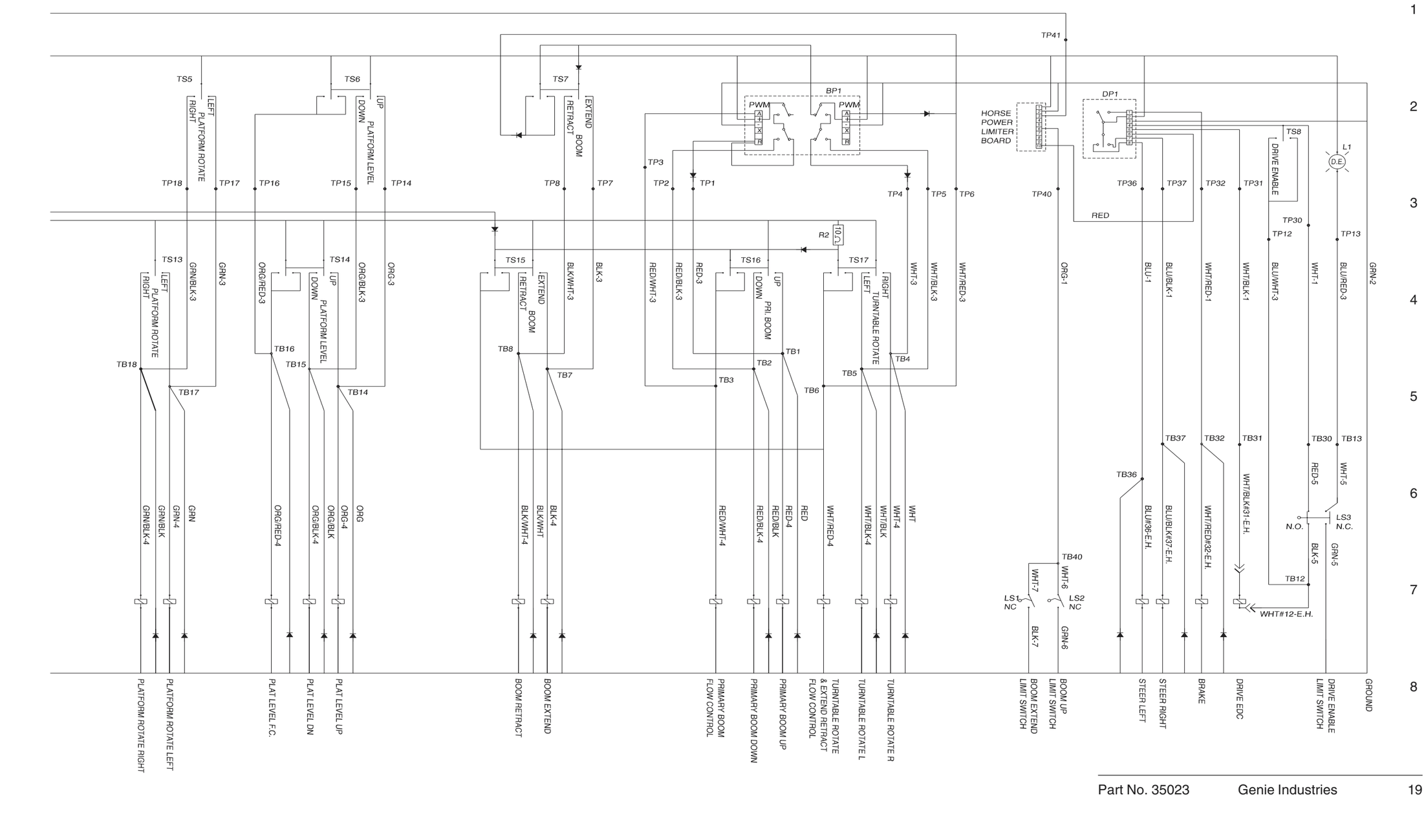
GEN. (OPTION)	45	GRN/WHT-1
SPARE	44	GRN/BLK-1
SPARE	43	GRN-1
SPARE	42	ORG/RED-1
	41	
	40	
L.P.	39	BLU/RED-1
GAS	38	BLU/WHT-1
STEER LEFT	37	BLU/BLK-1
STEER RIGHT	36	BLU-1
RPM	35	BLK/RED-1
GLOW PLUG	34	BLK/WHT-1
START	33	BLK-1
BRAKE	32	WHT/RED-1
E.D.C.	31	WHT/BLK-1
E.D.C.	30	WHT-1
2WD/4WD	29	RED/WHT-1
	28	
AUX. PWR.	27	RED-1
PWR. TO F.S.	26	BLK (F.S.)
PWR. (START)	25	GREEN (F.S.)
PWR. (CONT.)	24	WHT (H.P.L.)
PWR. FRM PLAT.	23	WHT-2
PWR. TO PLAT.	22	BLK-2
	21	
	20	
JIB VALVE	19	GRN/WHT-3
PLAT. ROT. R.	18	GRN/BLK-3
PLAT. ROT. L.	17	GRN-3
PLAT. LVL. F.C.	16	ORG/RED-3
PLAT. LVL. DN.	15	ORG/BLK-3
PLAT. LVL. UP	14	ORG-3
DRV. ENA. LT.	13	BLU/RED-3
DRV. ENA.	12	BLU/WHT-3
SEC. BOOM DN.	11	BLU/BLK-3
SEC.BOOM UP	10	BLU-3
HORN	9	BLK/RED-3
RETRACT	8	BLK/WHT-3
EXTEND	7	BLK-3
SWING F.C.	6	WHT/RED-3
SWING RIGHT	5	WHT/BLK-3
SWING LEFT	4	WHT-3
PRIMARY F.C.	3	RED/WHT-3
PRIMARY DN.	2	RED/BLK-3
PRIMARY UP	1	RED-3



S-80/85 Electrical Schematic - Gasoline/LPG Models

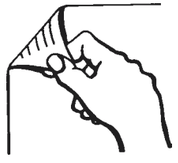


S-80/85 Electrical Schematic - Gasoline/LPG Models

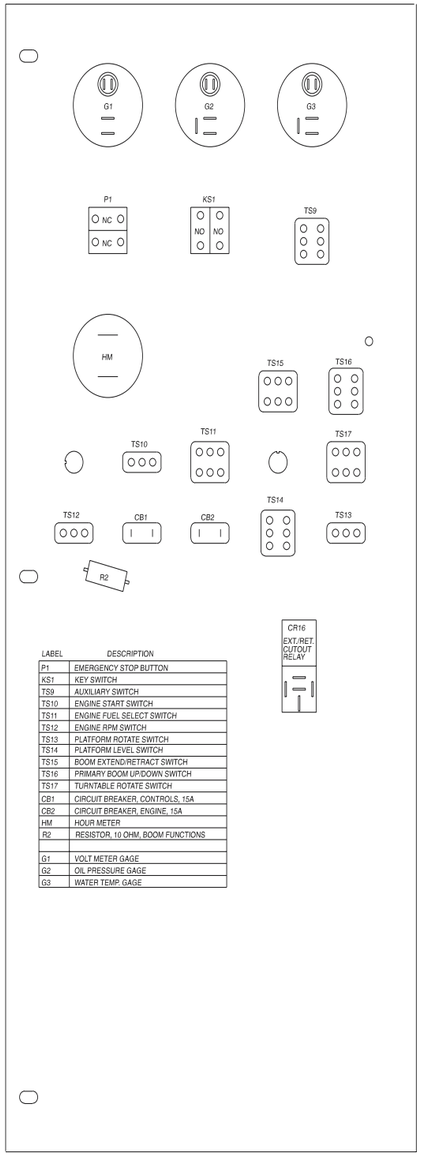


Service Manual Supplement

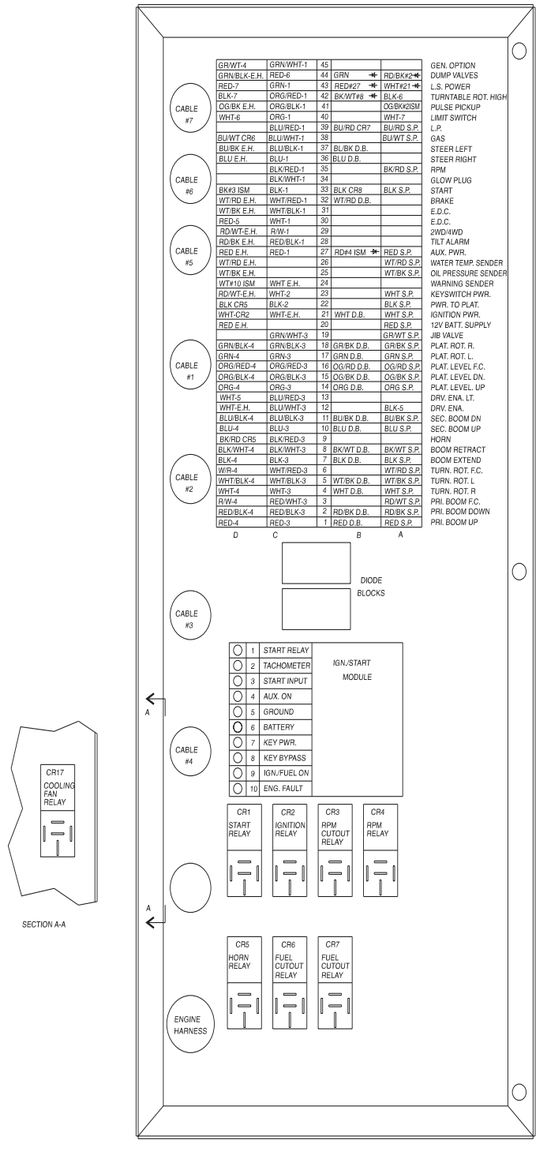
S-80/85 Electrical Schematic - Gasoline/LPG Models



S-80/85 Ground Control Box Legend - Gasoline/LPG Models

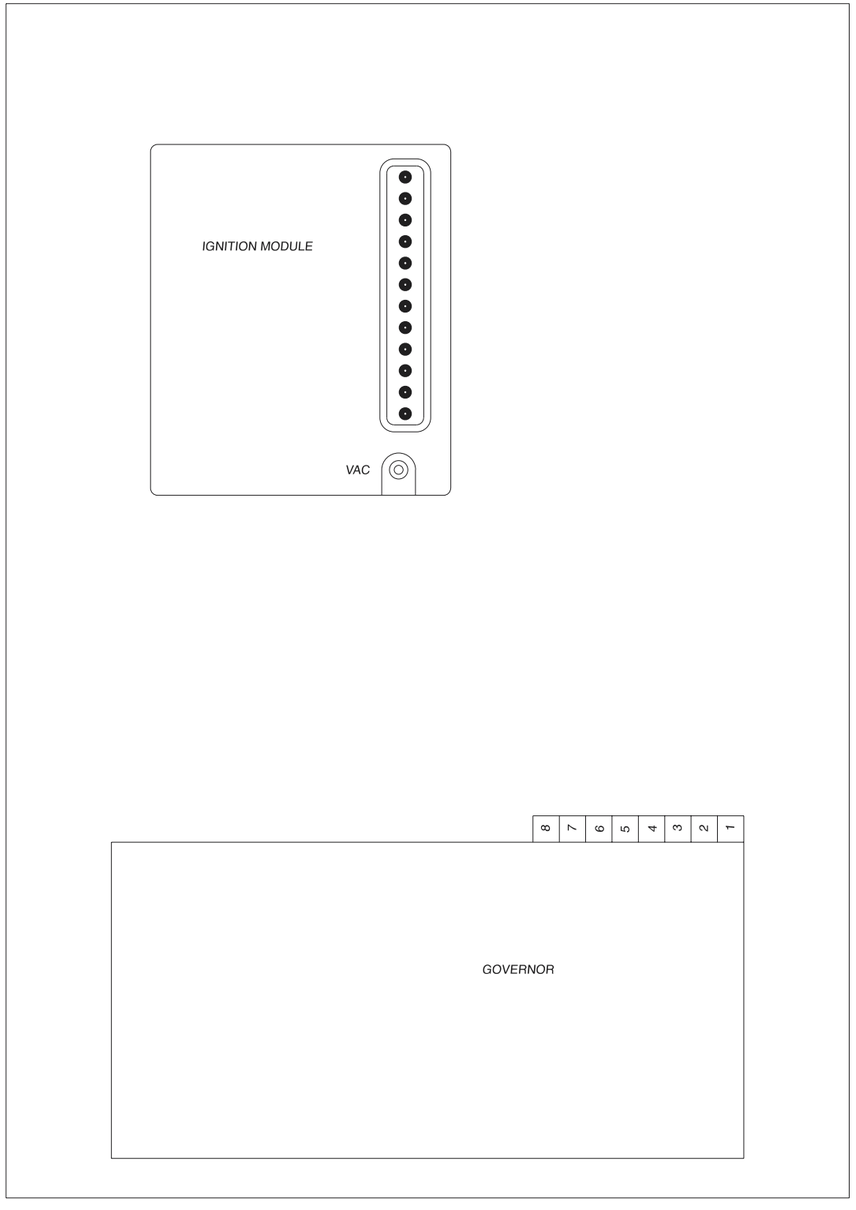


LABEL	DESCRIPTION
P1	EMERGENCY STOP BUTTON
KS1	KEY SWITCH
TS9	AUXILIARY SWITCH
TS10	ENGINE START SWITCH
TS11	ENGINE FUEL SELECT SWITCH
TS12	ENGINE RPM SWITCH
TS13	PLATFORM ROTATE SWITCH
TS14	PLATFORM LEVEL SWITCH
TS15	BOOM EXTEND/RETRACT SWITCH
TS16	PRIMARY BOOM UP/DOWN SWITCH
TS17	TURNTABLE ROTATE SWITCH
CB1	CIRCUIT BREAKER, CONTROLS, 15A
CB2	CIRCUIT BREAKER, ENGINE, 15A
HM	HOUR METER
R2	RESISTOR, 10 OHM, BOOM FUNCTIONS
G1	VOLT METER GAGE
G2	OIL PRESSURE GAGE
G3	WATER TEMP. GAGE



SECTION A-A

S-80/85 Relay Panel Legend - Gasoline/LPG Models



S-80/85 Platform Control Box Legend - Gasoline/LPG Models

GEN. (OPTION)	45	GRN/WHT-1
SPARE	44	GRN/BLK-1
SPARE	43	GRN-1
SPARE	42	ORG/RED-1
	41	
	40	
L.P.	39	BLU/RED-1
GAS	38	BLU/WHT-1
STEER LEFT	37	BLU/BLK-1
STEER RIGHT	36	BLU-1
RPM	35	BLK/RED-1
GLOW PLUG	34	BLK/WHT-1
START	33	BLK-1
BRAKE	32	WHT/RED-1
E.D.C.	31	WHT/BLK-1
E.D.C.	30	WHT-1
2WD/4WD	29	RED/WHT-1
	28	
AUX. PWR.	27	RED-1
PWR. TO F.S.	26	BLK (F.S.)
PWR. (START)	25	GREEN (F.S.)
PWR. (CONT.)	24	WHT (H.P.L.)
PWR. FRM PLAT.	23	WHT-2
PWR. TO PLAT.	22	BLK-2
	21	
	20	
JIB VALVE	19	GRN/WHT-3
PLAT. ROT. R.	18	GRN/BLK-3
PLAT. ROT. L.	17	GRN-3
PLAT. LVL. F.C.	16	ORG/RED-3
PLAT. LVL. DN.	15	ORG/BLK-3
PLAT. LVL. UP	14	ORG-3
DRV. ENA. LT.	13	BLU/RED-3
DRV. ENA.	12	BLU/WHT-3
SEC. BOOM DN.	11	BLU/BLK-3
SEC.BOOM UP	10	BLU-3
HORN	9	BLK/RED-3
RETRACT	8	BLK/WHT-3
EXTEND	7	BLK-3
SWING F.C.	6	WHT/RED-3
SWING RIGHT	5	WHT/BLK-3
SWING LEFT	4	WHT-3
PRIMARY F.C.	3	RED/WHT-3
PRIMARY DN.	2	RED/BLK-3
PRIMARY UP	1	RED-3

HORSE POWER LIMITER

1 2 3 4 5 6 7 8 9 10

ORG/BLK-1

ORG-1

ORG-2

GRD. STUD

F.S.

110

CABLE #2

CABLE #1

CABLE #3

RED/BLK-1

TILT ALARM

P2

NC

NC

STOP

DP1

8 7 6 5 4 3 2 1

TS3

FUEL SELECT

TS4

HIGH R.P.M.

TS2

START

L1

LED

TS20

GENERATOR (OPTION)

TS8

DRIVE ENABLE

TS1

AUX.

TS7

EXTEND RETRACT

TS5

PLATFORM ROTATE

A + - X R

BP1

R X - + A

TS6

PLATFORM LEVEL

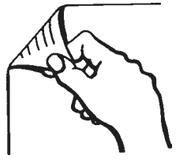
P3

NO

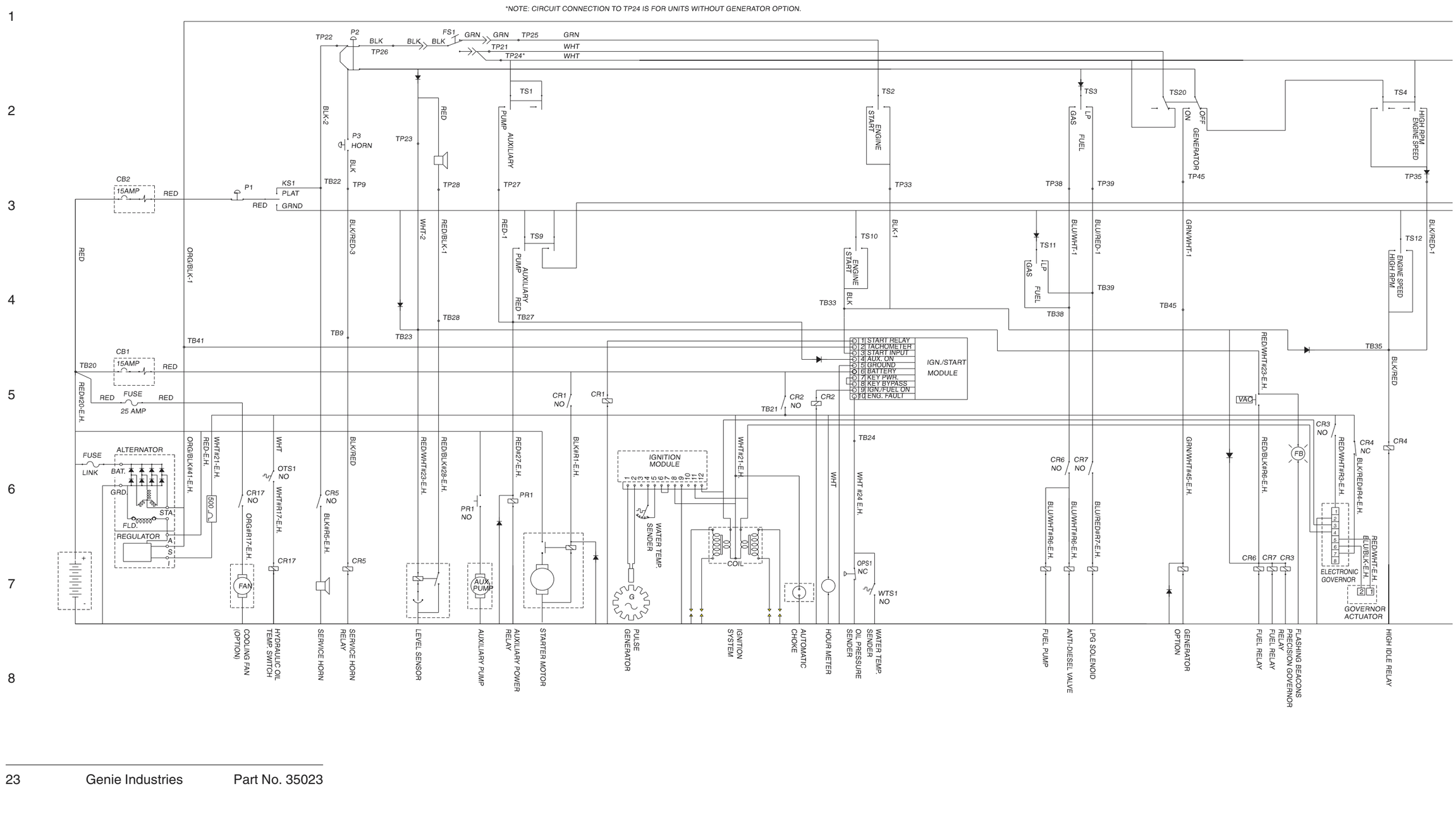
HORN

Service Manual Supplement

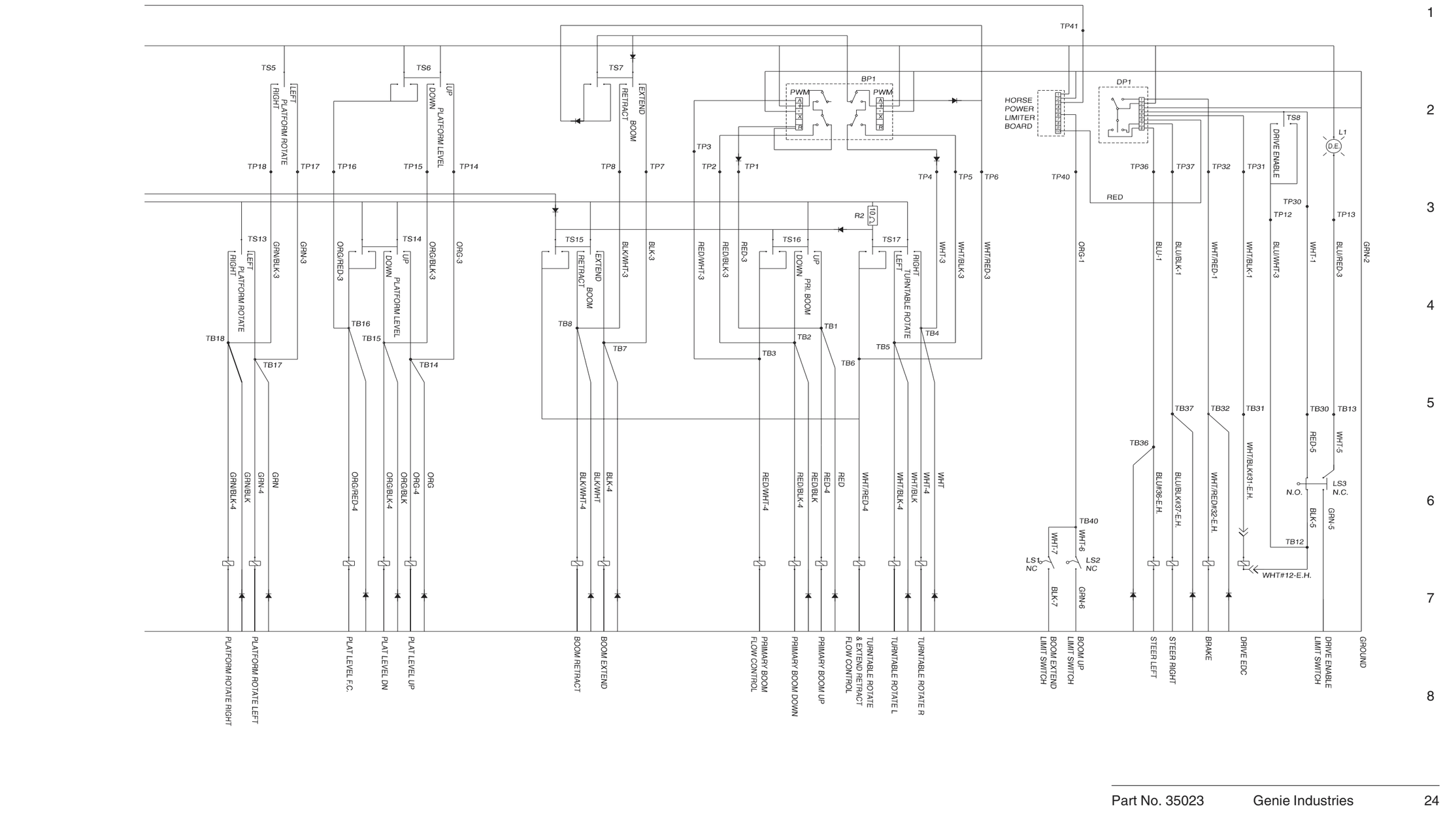
Z-45/22 Electrical Schematic - Gasoline/LPG Models



Z-45/22 Electrical Schematic - Gasoline/LPG Models

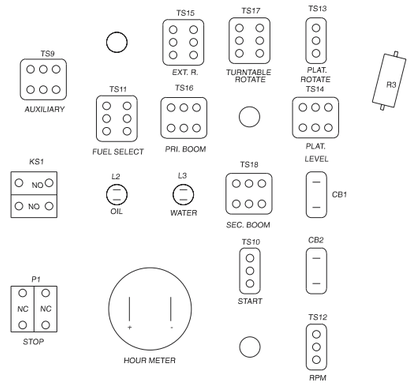


Z-45/22 Electrical Schematic - Gasoline/LPG Models



Z-45/22 Ground Control Box Legend - Gasoline/LPG Models

LABEL	DESCRIPTION
P1	EMERGENCY STOP BUTTON
KS1	KEY SWITCH
TS9	AUXILIARY SWITCH
TS10	ENGINE START SWITCH
TS11	FUEL SELECT SWITCH
TS12	ENGINE RPM SWITCH
TS13	PLATFORM ROTATE SWITCH
TS14	PLATFORM LEVEL SWITCH
TS15	BOOM EXTEND/RETRACT SWITCH
TS16	PRIMARY BOOM UP/DOWN SWITCH
TS17	TURNTABLE ROTATE SWITCH
TS18	SECONDARY BOOM UP/DOWN SWITCH
CB1	CIRCUIT BREAKER, CONTROLS, 15A
CB2	CIRCUIT BREAKER, ENGINE, 15A
HM	HOUR METER
R3	RESISTOR, 10 OHM, BOOM FUNCTIONS

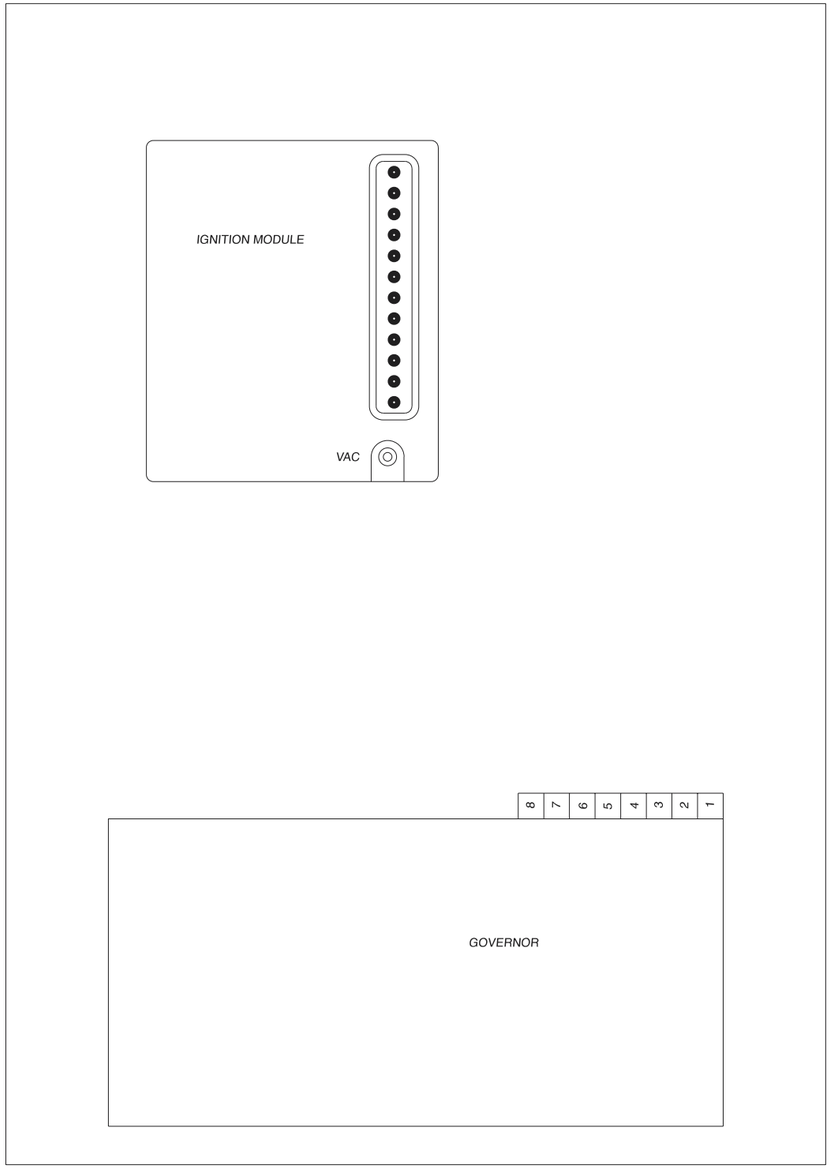


GEN. OPTION			45	GRN/WHT-1	GR/WT-4
SPARE		GR/BK-A.H.	44		
SPARE			43	GRN-1	
SPARE			42	ORG/RED-1	
PULSE PICKUP		ORG/BLK-ISM#2	41	ORG/BLK-1	OG/BK-E.H.
LIMIT SWITCH SIG.			40	ORG-1	WHT#40-E.H.
L.P.	BU/RD-S.P.	BU/RD-R7#30	39	BLU/RED-1	
GAS	BU/WT-S.P.	BU/WT-R6#30	38	BLU/WHT-1	
STEER LEFT		BL/BK-D.B.	37	BLU/BLK-1	BU/BK-E.H.
STEER RIGHT		BLU-D.B.	36	BLU-1	BLU-E.H.
RPM	BK/RD-S.P.	BLK/RED-R4#86	35	BLK/RED-1	
GLOW PLUG			34	BLK/WHT-1	BK/WT-E.H.
START	BLK-S.P.	BLK-ISM#3	33	BLK-1	BLK-R3#86
BRAKE		WT/RD-D.B.	32	WHT/RED-1	WT/RD-E.H.
E.D.C.			31	WHT/BLK-1	WT/BK-E.H.
E.D.C.			30	WHT-1	RED#30-E.H.
2WD/4WD		RD/WT-TR1#6	29	R/W-1	RD/WT-E.H.
TILT ALARM			28	RED/BLK-1	RD/BK-E.H.
AUX. PWR.	RED-S.P.	RED-ISM#4	27	RED-1	RED-E.H.
WATER TEMP. SENDER	WT/RD-S.P.		26		WT/RD-E.H.
OIL PRESSURE SENDER	WT/BK-S.P.		25		WT/BK-E.H.
WARNING SENDER	WHT-ISM#10		24		WHT-E.H.
KEYSWITCH PWR.	WHT-S.P.		23	WHT-2	RD/WT-E.H.
PWR. TO PLAT.	BLK-S.P.	BLK-R5#30	22	BLK-2	
IGNITION PWR.	WHT-S.P.	WHT-D.B.	21	WHT-E.H.	WHT-R2#87
12V BATT. SUPPLY	RED-S.P.		20		RED-A.H.
JIB VALVE			19	GRN/WHT-3	
PLAT. ROT. R.	GR/BK-S.P.	GR/BK-D.B.	18	GRN/BLK-3	GRN/BLK-4
PLAT. ROT. L.	GRN-S.P.	GRN-D.B.	17	GRN-3	GRN-4
PLAT. LEVEL F.C.	OG/RD-S.P.	OG/RD-D.B.	16	ORG/RED-3	ORG/RED-4
PLAT. LEVEL DN.	OG/BK-S.P.	OG/BK-D.B.	15	ORG/BLK-3	ORG/BLK-4
PLAT. LEVEL. UP	ORG-S.P.	ORG-D.B.	14	ORG-3	ORG-4
DRV. ENA. LT.			13	BLU/RED-3	WHT#13-E.H.
DRV. ENA.	WHT#12-E.H.		12	BLU/WHT-3	BLK#12-E.H.
SEC. BOOM DN	BU/BK-S.P.	BU/BK-D.B.	11	BLU/BLK-3	BLU/BLK-4
SEC. BOOM UP	BLU-S.P.	BLU-D.B.	10	BLU-3	BLU-4
HORN		BK/RD-R5#86	9	BLK/RED-3	
BOOM RETRACT	BK/WT-S.P.	BK/WT-D.B.	8	BLK/WHT-3	BLK/WHT-4
BOOM EXTEND	BLK-S.P.	BLK-D.B.	7	BLK-3	BLK-4
TURN. ROT. F.C.	WT/RD-S.P.		6	WHT/RED-3	W/R-4
TURN. ROT. L	WT/RD-S.P.	WT/BK-D.B.	5	WHT/BLK-3	WHT/BLK-4
TURN. ROT. R	WHT-S.P.	WHT-D.B.	4	WHT-3	WHT-4
PRI. BOOM F.C.	RD/WT-S.P.		3	RED/WHT-3	R/W-4
PRI. BOOM DOWN	RD/BK-S.P.	RD/BK-D.B.	2	RED/BLK-3	RED/BLK-4
PRI. BOOM UP	RED-S.P.	RED-D.B.	1	RED-3	RED-4
	A	B		C	D

1	START RELAY	IGN./START MODULE
2	TACHOMETER	
3	START INPUT	
4	AUX. ON	
5	GROUND	
6	BATTERY	
7	KEY PWR.	
8	KEY BYPASS	
9	IGN./FUEL ON	
10	ENG. FAULT	

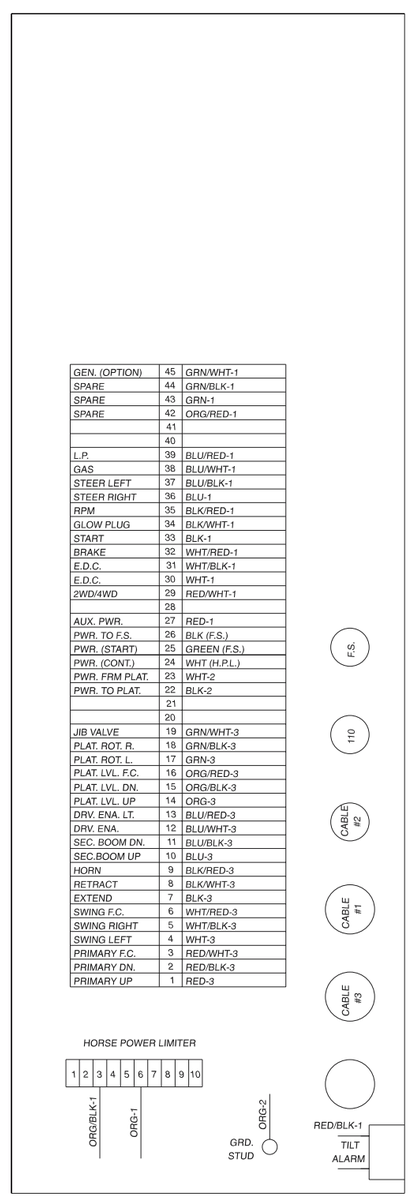
CABLE #1
CABLE #2
CABLE #3
CABLE #4
DIODE BLOCKS
CR1 START RELAY
CR2 IGNITION RELAY
CR3 RPM CUTOUT RELAY
CR4 RPM RELAY
CR5 HORN RELAY
CR6 FUEL CUTOUT RELAY
CR7 FUEL CUTOUT RELAY
CR9 OSCILLATE RELAY
CR10 OSCILLATE LOCKOUT RELAY
CR11 OSCILLATE LOCKOUT RELAY
TR1 TRACTION DELAY TIMER
WIRE HRNSS.
GRD.

Z-45/22 Relay Panel Legend - Gasoline/LPG Models

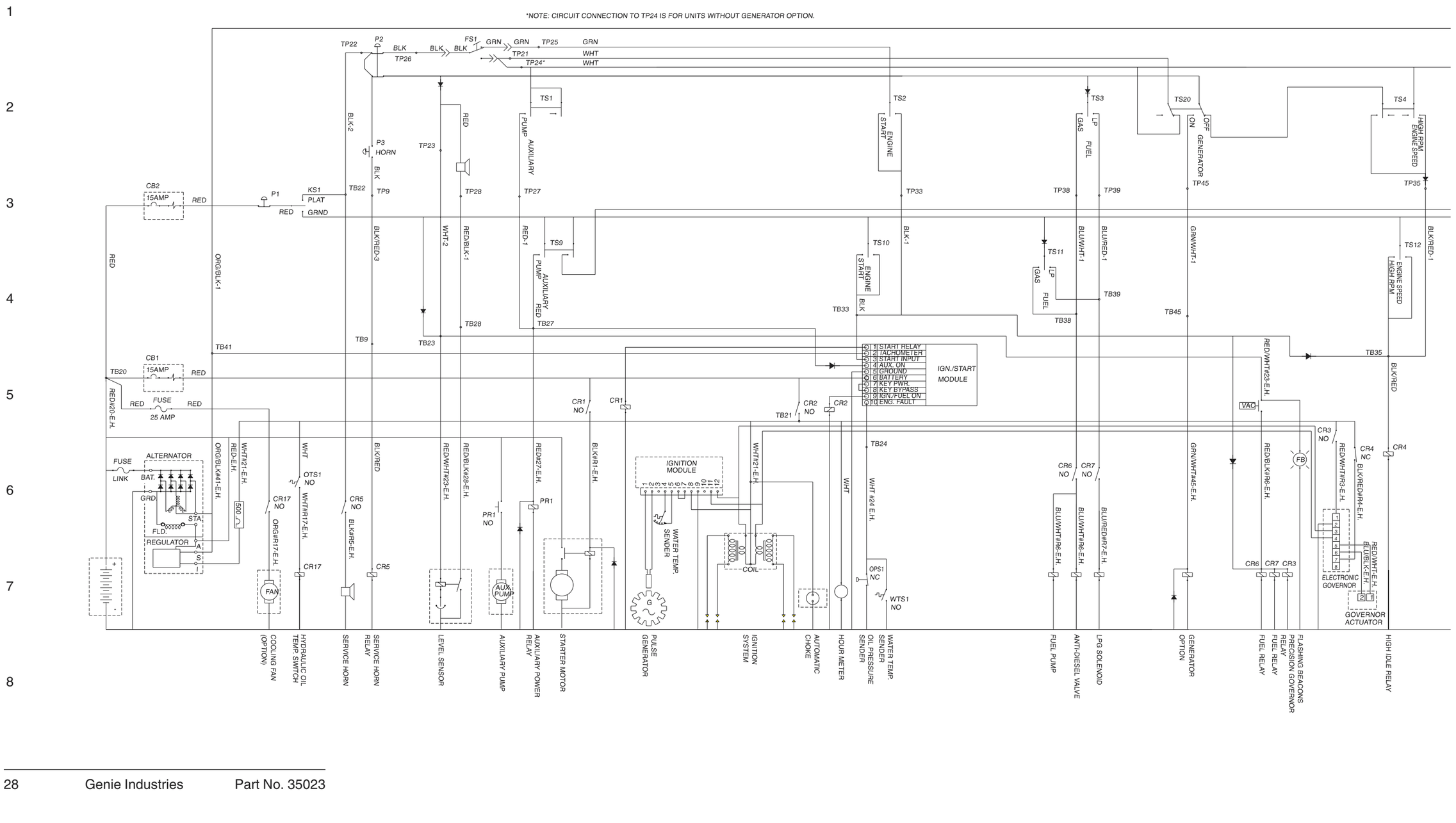


Z-45/22 Platform Control Box Legend - Gasoline/LPG Models

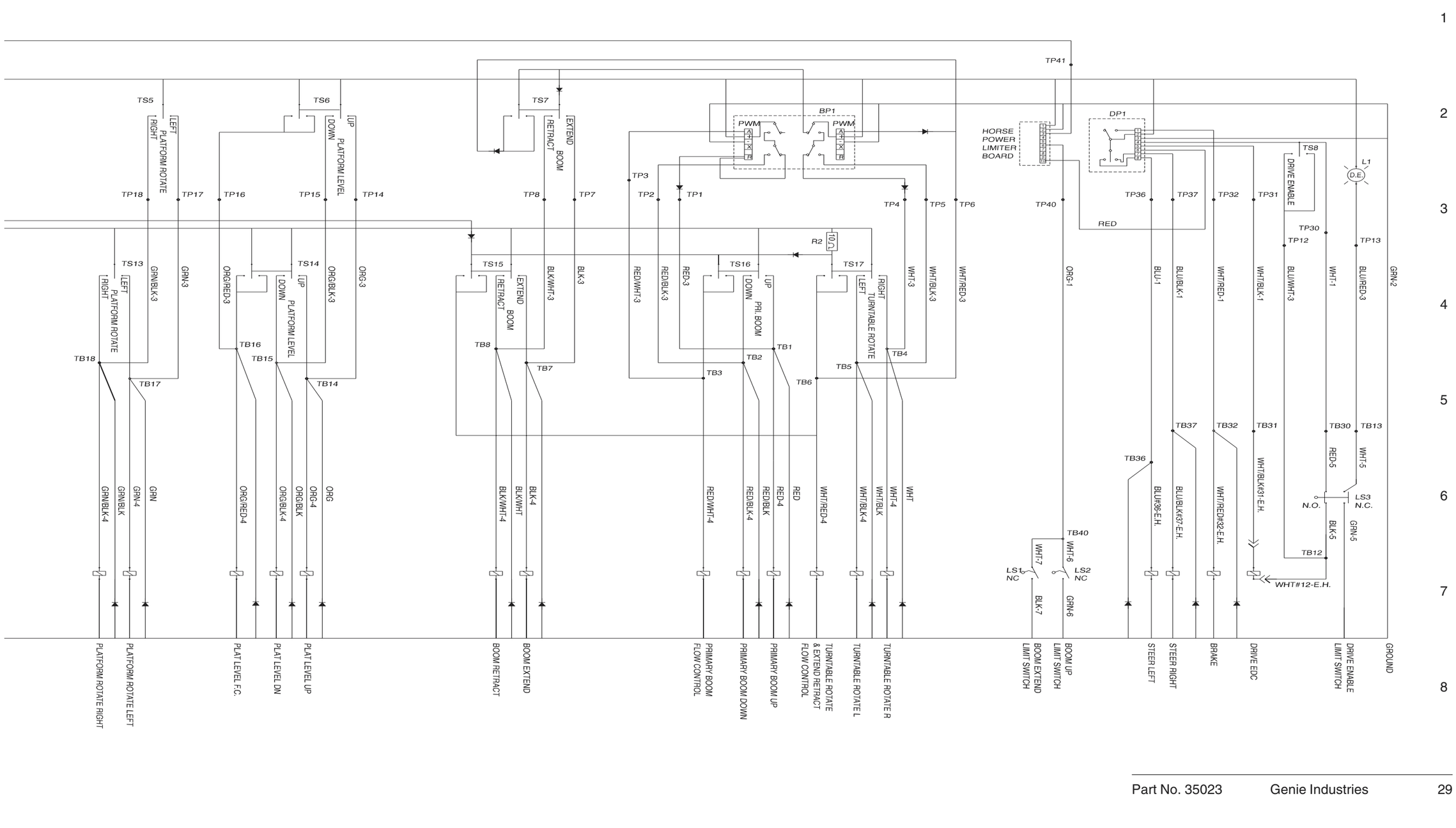
GEN. (OPTION)	45	GRN/WHT-1
SPARE	44	GRN/BLK-1
SPARE	43	GRN-1
SPARE	42	ORG/RED-1
	41	
	40	
L.P.	39	BLU/RED-1
GAS	38	BLU/WHT-1
STEER LEFT	37	BLU/BLK-1
STEER RIGHT	36	BLU-1
RPM	35	BLK/RED-1
GLOW PLUG	34	BLK/WHT-1
START	33	BLK-1
BRAKE	32	WHT/RED-1
E.D.C.	31	WHT/BLK-1
E.D.C.	30	WHT-1
2WD/4WD	29	RED/WHT-1
	28	
AUX. PWR.	27	RED-1
PWR. TO F.S.	26	BLK (F.S.)
PWR. (START)	25	GREEN (F.S.)
PWR. (CONT.)	24	WHT (H.P.L.)
PWR. FRM PLAT.	23	WHT-2
PWR. TO PLAT.	22	BLK-2
	21	
	20	
JIB VALVE	19	GRN/WHT-3
PLAT. ROT. R.	18	GRN/BLK-3
PLAT. ROT. L.	17	GRN-3
PLAT. LVL. F.C.	16	ORG/RED-3
PLAT. LVL. DN.	15	ORG/BLK-3
PLAT. LVL. UP	14	ORG-3
DRV. ENA. LT.	13	BLU/RED-3
DRV. ENA.	12	BLU/WHT-3
SEC. BOOM DN.	11	BLU/BLK-3
SEC.BOOM UP	10	BLU-3
HORN	9	BLK/RED-3
RETRACT	8	BLK/WHT-3
EXTEND	7	BLK-3
SWING F.C.	6	WHT/RED-3
SWING RIGHT	5	WHT/BLK-3
SWING LEFT	4	WHT-3
PRIMARY F.C.	3	RED/WHT-3
PRIMARY DN.	2	RED/BLK-3
PRIMARY UP	1	RED-3



Z-60/34 Electrical Schematic - Gasoline/LPG Models

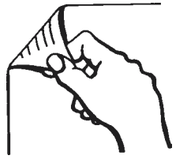


Z-60/34 Electrical Schematic - Gasoline/LPG Models

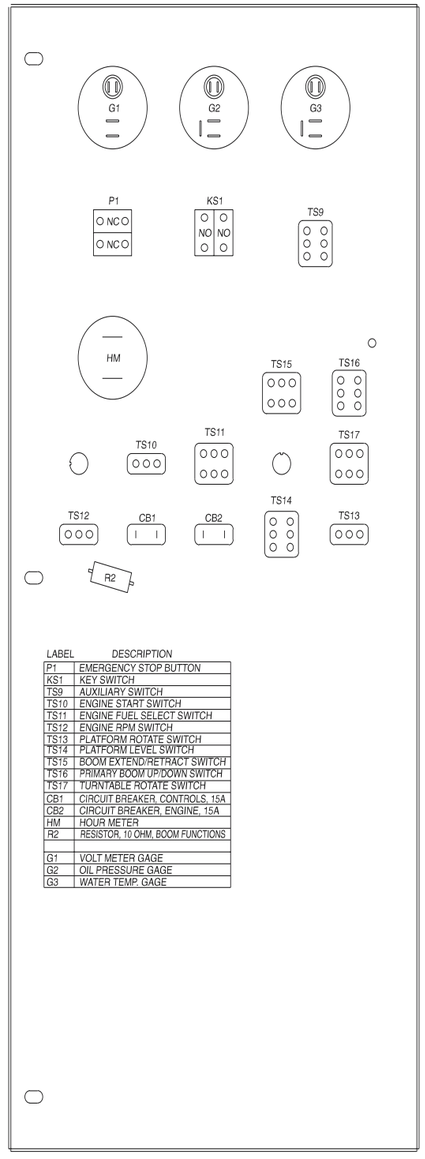


Service Manual Supplement

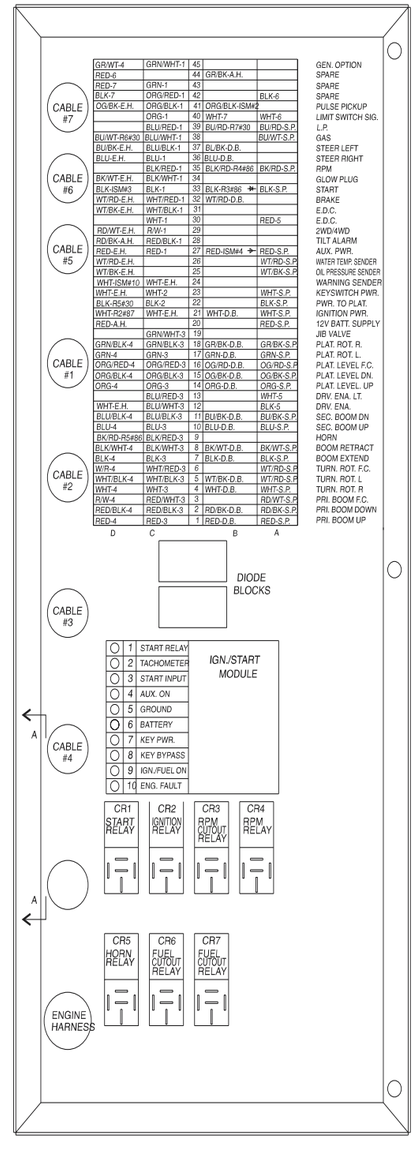
Z-60/34 Electrical Schematic - Gasoline/LPG Models

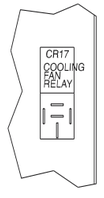


Z-60/34 Ground Control Box Legend - Gasoline/LPG Models



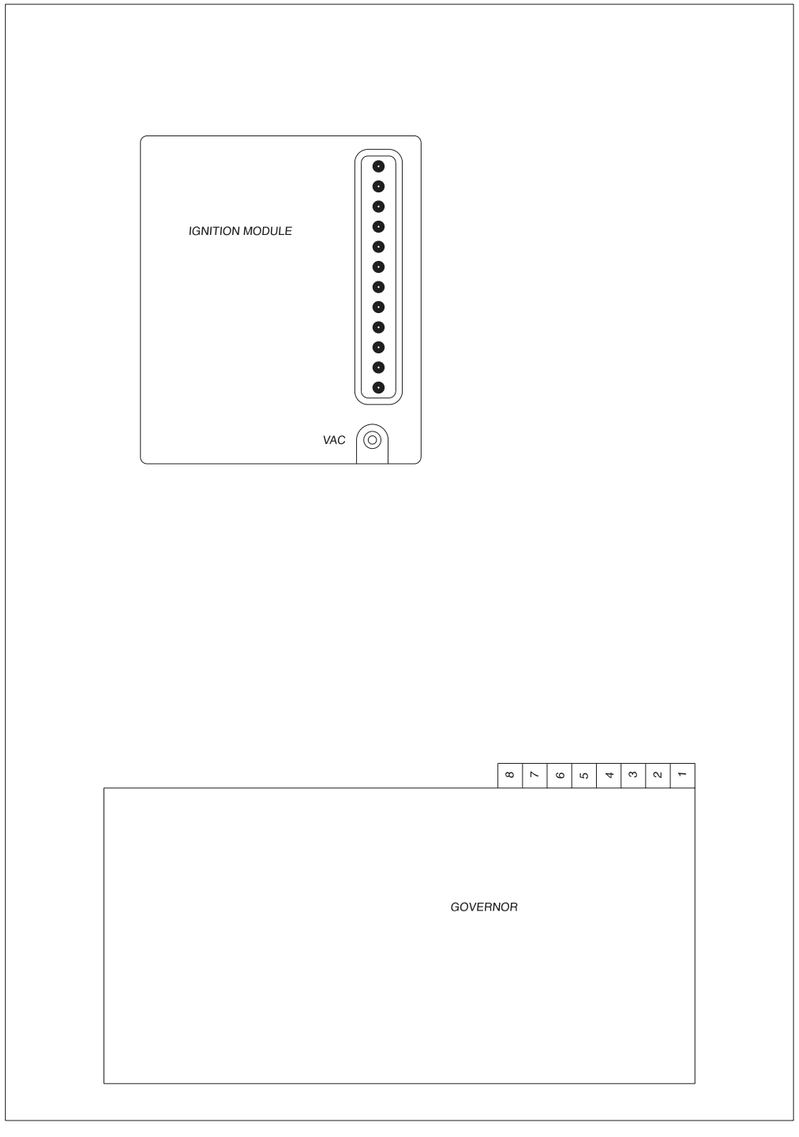
LABEL	DESCRIPTION
P1	EMERGENCY STOP BUTTON
KS1	KEY SWITCH
TS9	AUXILIARY SWITCH
TS10	ENGINE START SWITCH
TS11	ENGINE FUEL SELECT SWITCH
TS12	ENGINE RPM SWITCH
TS13	PLATFORM ROTATE SWITCH
TS14	PLATFORM LEVEL SWITCH
TS15	BOOM EXTEND/RETRACT SWITCH
TS16	PRIMARY BOOM UP/DOWN SWITCH
TS17	TURNTABLE ROTATE SWITCH
CB1	CIRCUIT BREAKER, CONTROLS, 15A
CB2	CIRCUIT BREAKER, ENGINE, 15A
HM	HOUR METER
R2	RESISTOR, 10 OHM, BOOM FUNCTIONS
G1	VOLT METER GAGE
G2	OIL PRESSURE GAGE
G3	WATER TEMP. GAGE





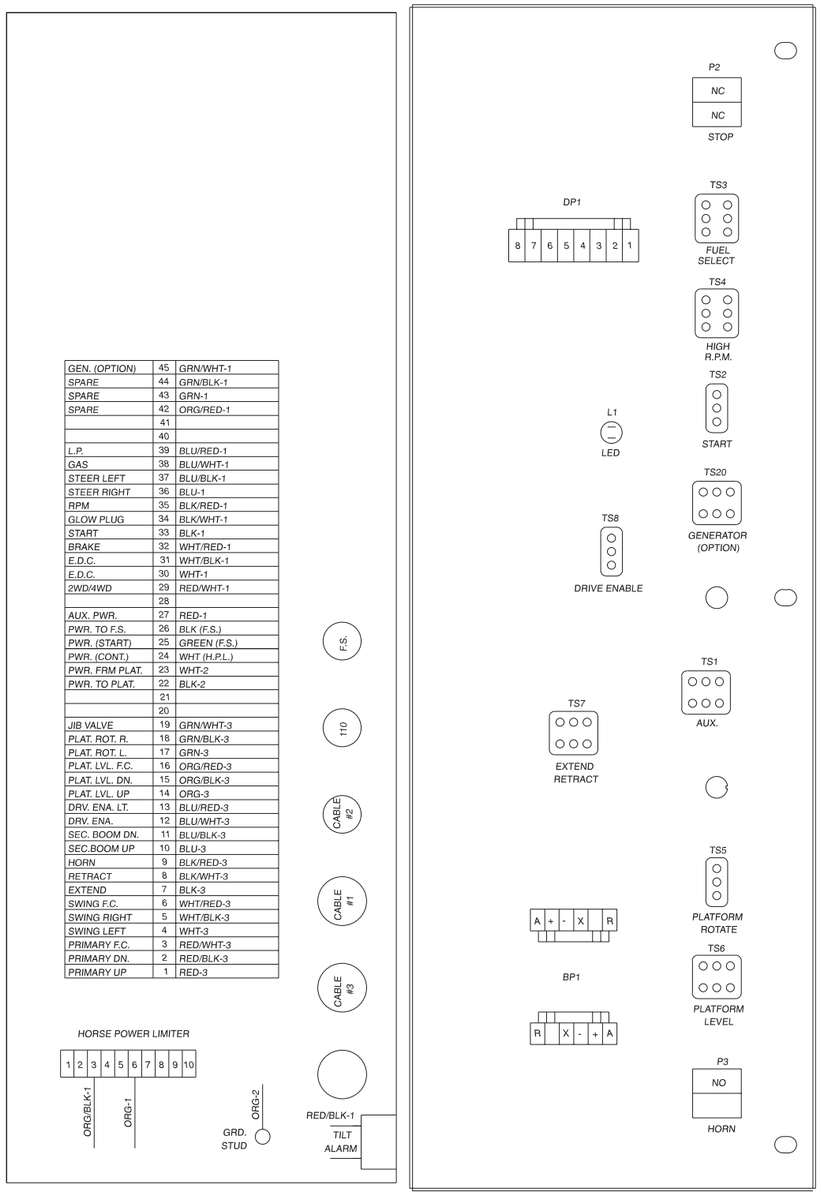
SECTION A-A

Z-60/34 Relay Panel Legend - Gasoline/LPG Models

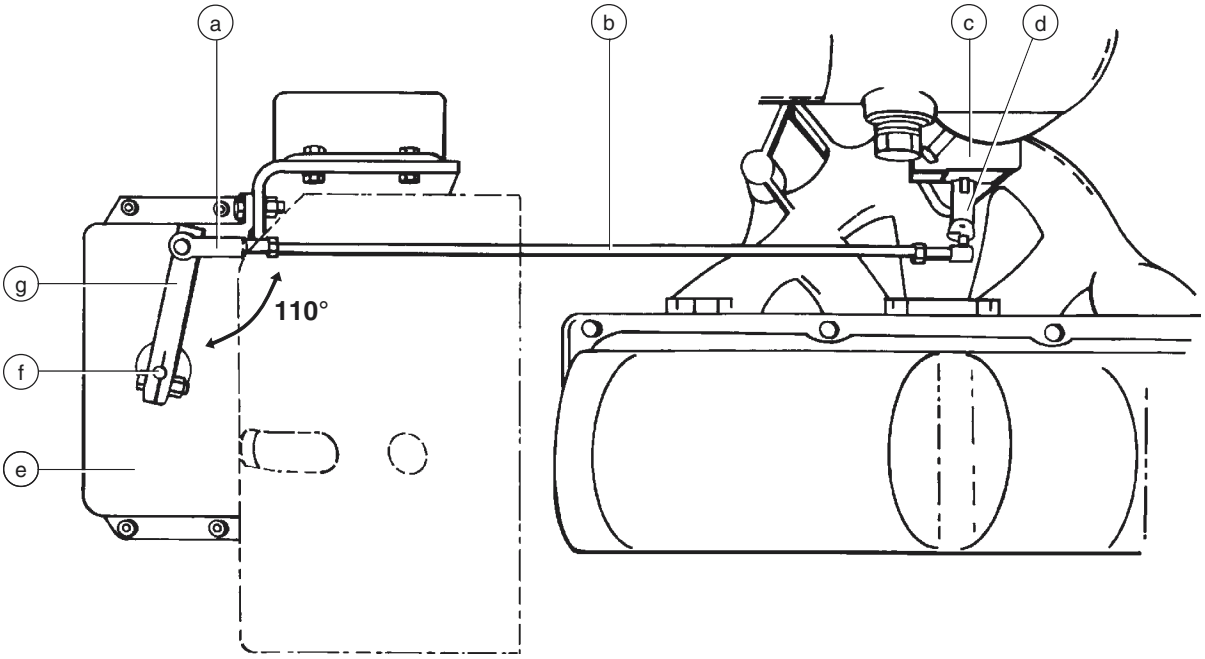


Z-60/34 Ground Control Box Legend - Gasoline/LPG Models

GEN. (OPTION)	45	GRN/WHT-1
SPARE	44	GRN/BLK-1
SPARE	43	GRN-1
SPARE	42	ORG/RED-1
	41	
	40	
L.P.	39	BLU/RED-1
GAS	38	BLU/WHT-1
STEER LEFT	37	BLU/BLK-1
STEER RIGHT	36	BLU-1
RPM	35	BLK/RED-1
GLOW PLUG	34	BLK/WHT-1
START	33	BLK-1
BRAKE	32	WHT/RED-1
E.D.C.	31	WHT/BLK-1
E.D.C.	30	WHT-1
2WD/4WD	29	RED/WHT-1
	28	
AUX. PWR.	27	RED-1
PWR. TO F.S.	26	BLK (F.S.)
PWR. (START)	25	GREEN (F.S.)
PWR. (CONT.)	24	WHT (H.P.L.)
PWR. FRM PLAT.	23	WHT-2
PWR. TO PLAT.	22	BLK-2
	21	
	20	
JIB VALVE	19	GRN/WHT-3
PLAT. ROT. R.	18	GRN/BLK-3
PLAT. ROT. L.	17	GRN-3
PLAT. LVL. F.C.	16	ORG/RED-3
PLAT. LVL. DN.	15	ORG/BLK-3
PLAT. LVL. UP	14	ORG-3
DRV. ENA. LT.	13	BLU/RED-3
DRV. ENA.	12	BLU/WHT-3
SEC. BOOM DN.	11	BLU/BLK-3
SEC.BOOM UP	10	BLU-3
HORN	9	BLK/RED-3
RETRACT	8	BLK/WHT-3
EXTEND	7	BLK-3
SWING F.C.	6	WHT/RED-3
SWING RIGHT	5	WHT/BLK-3
SWING LEFT	4	WHT-3
PRIMARY F.C.	3	RED/WHT-3
PRIMARY DN.	2	RED/BLK-3
PRIMARY UP	1	RED-3



Ford LRG-423 Engine



Governor actuator and linkage
a clevis yoke
b linkage rod
c carburetor
d throttle plate shaft
e governor actuator
f actuator shaft
g actuator arm

NOTICE Genie S-40 models: This section replaces Section 6.

Genie S-80/85 models: This section replaces Section 7.

Genie Z-45/22 models: This section replaces Section 7.

Genie Z-60/34 models: This section replaces Section 8.

7-1
Governor Actuator

How to Set Up the Governor Actuator and Linkage

NOTICE Adjustment of the governor actuator is only necessary when the governor actuator or the linkage has been replaced.

1 Connect the linkage rod to the throttle plate shaft, then tighten the lock nut.

2 Fasten the lock nut and clevis yoke to the linkage rod. Do not tighten the lock nut against the clevis yoke.

3 Loosen the fastener on the actuator arm. Rotate the actuator arm until it is at a 110 degree angle to the linkage rod. Then tighten the actuator arm fastener.

4 Position the linkage rod so that the throttle is in the idle position. Then adjust the clevis yoke on the linkage rod to obtain the proper length. Install the yoke onto the actuator arm.

5 With the throttle in the idle position and the actuator arm at a 110 degree angle to the linkage, rotate the clevis yoke on the linkage rod two turns counterclockwise to pre-load the spring. Tighten the lock nut on the linkage rod.

6 Manually pull the actuator arm through a full cycle to be sure that the linkage moves freely. Be sure that the linkage activates the throttle shaft to approximately half throttle.

NOTICE The linkage must be free of friction and obstruction. Do not let it rub against the engine, brackets or hoses.

⚠CAUTION Component damage hazard. If the throttle linkage is improperly adjusted and allowed to reach full throttle, the engine will over-rev and cause component damage.

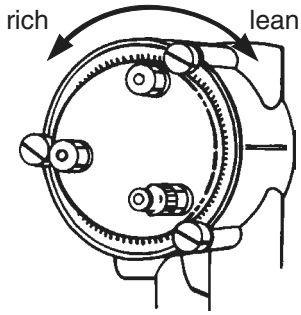
7-2
Choke Adjustments

This engine is equipped with an electrically heated automatic choke. The choke has a poppet valve to enhance cold starting ability on LPG fuel.

NOTICE Choke adjustments are affected by climate. Richer adjustment will be necessary in colder climates, leaner adjustment in warmer climates.

Automatic Choke with Poppet Valve

The choke functions in both gasoline and LPG mode. The choke butterfly may be adjusted to a fully closed (rich) position for colder climates and the poppet valve will provide a flow path during LPG fueled operation.



7-3
Timing Adjustment

Complete information to perform this procedure is available in the *Ford LRG-423 2.3 Liter Industrial Engine Service Manual* (Ford number: PPD-194-287). Genie part number 33907.

7-4
Carburetor Adjustment

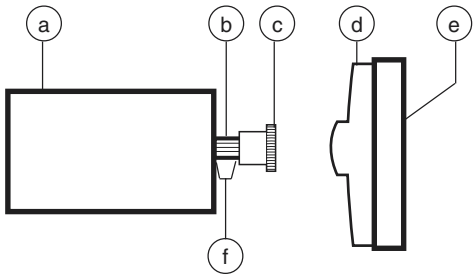
Complete information to perform this procedure is available in the *Ford LRG-423 2.3 Liter Industrial Engine Service Manual* (Ford number: PPD-194-287). Genie part number 33907.

7-5
RPM Adjustment

Refer to Maintenance Procedures, B-3, *Check and Adjust the Engine RPM*.

7-6
Flex Plate

The flex plate acts as a coupler between the engine and the pump. It is bolted to the engine flywheel and has a splined center to drive the pump.



a pump
b pump shaft
c coupler
d flex plate with raised spline
e flywheel
f 1/4 inch gap

Flex Plate Removal

1 Disconnect and remove the hose between the carburetor venturi and the air cleaner.

2 Disconnect the linkage from the governor, then remove the governor linkage from the carburetor. Do not alter the length of the linkage.

3 Disconnect the wiring plug at the electronic displacement controller (EDC), located on the drive pump.

4 Remove the mounting fasteners from the regulator mounting bracket, then pull the bracket up past the bell housing. Secure the bracket before continuing.

5 Support the drive pump with an appropriate lifting device. Then remove all of the pump mounting plate to engine bell housing bolts.

6 Carefully pull the pump away from the engine and secure it from moving.

7 Remove the flex plate mounting fasteners, then remove the flex plate from the fly wheel.

How to Install the Flex Plate

1 Install the flex plate onto the flywheel with the raised spline towards the pump. Torque the flex plate mounting bolts to 34 ft-lbs (46 Nm).

2 Install the coupler onto the pump shaft with the set screw towards the pump. Leave a 1/4 inch (6.35 mm) gap between the coupler and pump end plate.

3 Apply Loctite® removable thread sealant to the coupler set screw. Torque the set screw to 45 ft-lbs (61 Nm).

⚠CAUTION Component damage hazard. Do not force the drive pump during installation or the flex plate teeth may become damaged.

4 Install the pump and torque the pump mounting plate fasteners to 34 ft-lbs (46 Nm).

7-7
Water Temperature and Oil Pressure Gauges

The water temperature gauge is an electrical gauge. The sending unit has limit contacts that are factory set. The contacts will close at 230° F (109° C). When the contacts close, the engine will shut off to prevent damage and will not start until the temperature drops below the contact point. Temperature will be indicated when the key is on and the Emergency Stop Button is pulled out to the ON position.

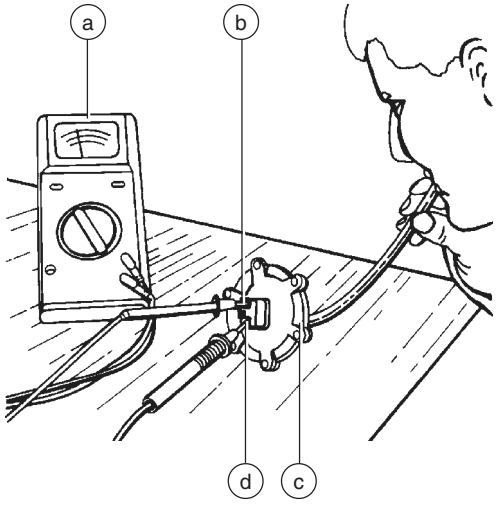
⚠CAUTION Component damage hazard. Do not crank the engine with the over-temperature light on.

The oil pressure gauge is an electrical gauge. The sending unit has limit contacts that are factory set. The contacts will close at 8 psi (0.55 bar). When the contacts close, the engine will shut off to prevent damage. Oil pressure will be indicated when the engine is running.

⚠CAUTION Component damage hazard. Do not crank the engine with the low oil pressure light on.

7-8
Vacuum Switch

How to Test the Vacuum Switch



a ohmmeter
b common terminal (SOL.)
c vacuum switch
d normally open terminal (ING.)

1 Connect the leads from an ohmmeter or continuity tester to the common and normally open terminals.

⊙ Result: There should be no continuity (infinite Ω).

2 Apply mild suction to the vacuum port.

⊙ Result: The switch should close and show full continuity (zero Ω).

⚠CAUTION Component damage hazard. Do not short the vacuum switch terminals to ground.



U.S.A.

18340 NE 76th Street

P.O. Box 69

Redmond, Washington

98073-0069



Europe

Brunel Drive

Newark

Nottinghamshire

NG24 2EG England