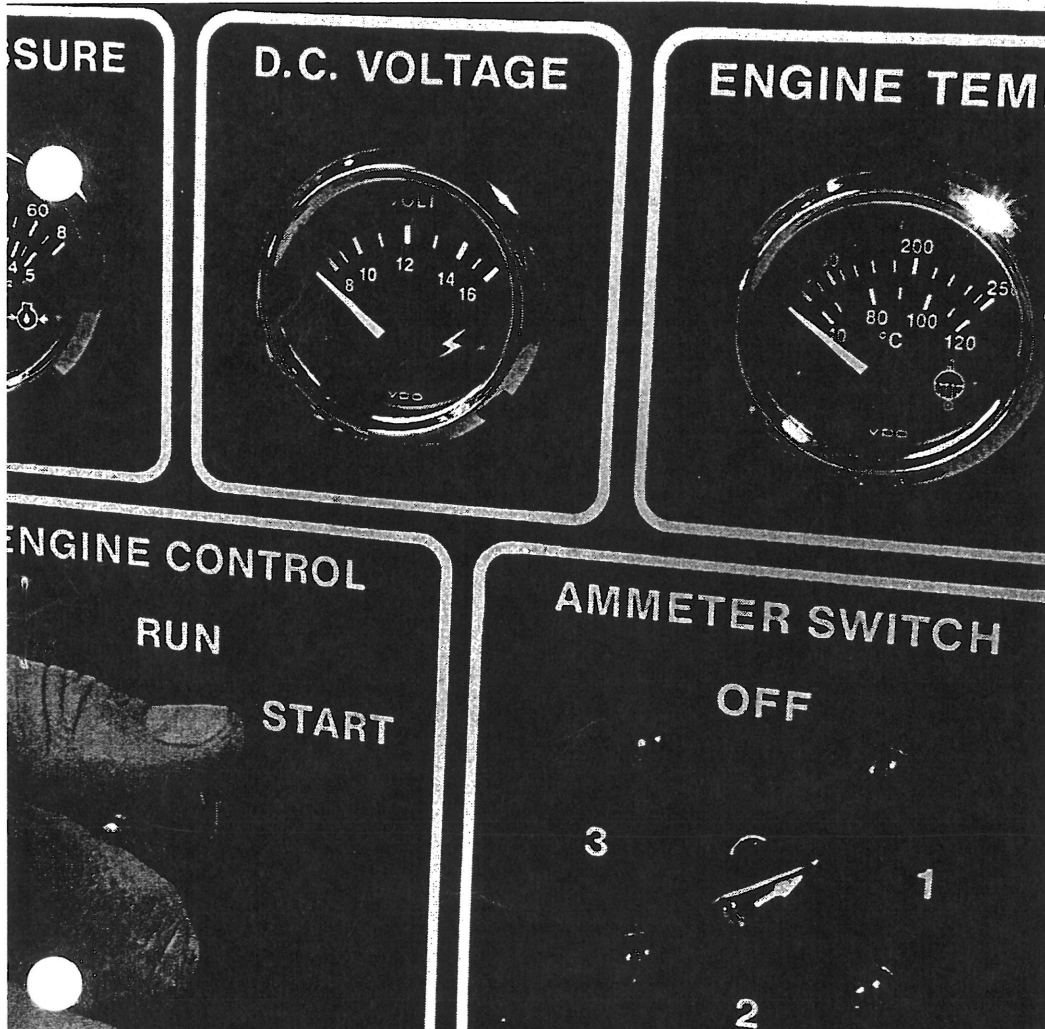


# OPERATOR'S MANUAL

0202



0909



## OPERATOR'S MANUAL O202

*Read this operator's manual thoroughly before starting to operate your equipment. This manual contains information you will need to run and service your new unit.*

### TABLE OF CONTENTS

<b>Introduction</b> .....	2	<b>Servicing (cont.)</b>	
<b>Unit Identification</b>		Fuels - General .....	12
Models Included .....	2	Fuel Filters .....	13
Model Numbers .....	2	Bleeding the Fuel System .....	13
Serial Numbers .....	2	Injector Service .....	13-15
<b>Warranty</b> .....	3	Injection Pump .....	15
<b>Safety Rules</b> .....	3	Cooling System - General .....	15
<b>Component Locations</b>		Cooling System Flushing .....	15-16
M753 and M753G Marine Generator .....	4	Heat Exchanger (Marine) .....	16
M843N Marine Generator .....	5	Clean Radiator .....	16
NL753, NL753G & NL843N Industrial Generators .....	6	Raw Water Pump .....	16
<b>Panels</b>		Generator Ends .....	16
Northern Lights Generator Sets .....	7	Electrical System - General .....	16
<b>Servicing Schedule Chart</b> .....	8	Glow Plugs .....	16
<b>Operating Procedures</b>		Booster Batteries .....	17
Break-in Period .....	9	Battery Care .....	17
Before Starting .....	9	Winterizing - Out-of-Service .....	17
Starting .....	9	<b>Troubleshooting</b>	
Operating .....	9	Electrical .....	18
Stopping .....	9	Troubleshooting - Engine .....	18-19
Shutdowns and Alarms .....	10	<b>Data Sheets</b>	
Spare Parts .....	10	753 and 753G .....	20
<b>Servicing</b>		843N .....	21
Lubrication - General .....	11	<b>Wiring Diagrams</b>	
Oil Changes .....	11	DC Electrical .....	22
Changing Oil Filter .....	11	SAW (1 Phase) .....	23
Air Filter .....	11	PXG (1 Phase) .....	23
V-Belts .....	11	PXG (3 Phase) .....	24
Retightening Cylinder Head Bolts .....	12	BCI Generator & Voltage Regulator .....	25
Valve Clearances .....	12	BCI .....	26
		BCI Series 5 .....	27

#### *Proprietary Information*

This publication is the property of Alaska Diesel Electric, Inc. It may not be reproduced in whole or part without the written permission of Alaska Diesel Electric, Inc.

© Alaska Diesel Electric, Inc. 1994 All rights reserved. Litho USA

## INTRODUCTION

Servicing of marine engines and generator sets presents unique problems. In many cases boats cannot be moved to a repair facility. Marine engines cannot be compared to the servicing of automobiles, trucks or even farm equipment. Failures often occur in remote areas far from competent assistance. Marine engines are taxed far more severely than auto or truck engines; therefore, maintenance schedules must be adhered to more strictly.

Failures begin with minor problems that are overlooked and become amplified when not corrected during routine maintenance.

As operator, it is your obligation to learn about your equipment and its proper maintenance. This is not a comprehensive technical service manual. Nor will it make the reader into an expert mechanic. Its aim is to aid you in maintaining your unit properly.

## UNIT IDENTIFICATION

### MODELS INCLUDED

This manual covers operating instructions for:

M753, M753G and M843N marine generator sets, and  
NL753, NL 753G and NL843N industrial generator sets.

### MODEL NUMBERS

Model numbers give unit's application, block model, aspiration and RPM:

M - NL	753, 843	G-N												
<p>M - Northern Lights marine generator set NL - Northern Lights industrial generator set</p>	<p>Model number of engine block</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 0 10px;">Bore</td> <td style="padding: 0 10px;">Cylinders</td> </tr> <tr> <td style="padding: 0 10px;">75</td> <td style="padding: 0 10px;">3</td> </tr> <tr> <td style="padding: 0 10px;">84</td> <td style="padding: 0 10px;">3</td> </tr> </table>	Bore	Cylinders	75	3	84	3	<p>Additional letter designates series within model number</p>						
Bore	Cylinders													
75	3													
84	3													
<table style="width: 100%;"> <tr> <td style="border: 1px solid black; padding: 5px; width: 150px;"><b>M 753</b></td> <td>Northern Lights marine diesel generator set with a 753 engine and a SAW generator end.</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;"><b>M 753G</b></td> <td>Northern Lights marine diesel generator set with a 753 engine, PXG generator end and an AVR.</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;"><b>NL 753</b></td> <td>Northern Lights industrial generator set with a 753 engine, SAW generator end and a radiator.</td> </tr> </table>	<b>M 753</b>	Northern Lights marine diesel generator set with a 753 engine and a SAW generator end.	<b>M 753G</b>	Northern Lights marine diesel generator set with a 753 engine, PXG generator end and an AVR.	<b>NL 753</b>	Northern Lights industrial generator set with a 753 engine, SAW generator end and a radiator.	<table style="width: 100%;"> <tr> <td style="border: 1px solid black; padding: 5px; width: 150px;"><b>NL753G</b></td> <td>Northern Lights industrial diesel generator set with a 753 engine, a BCI generator end with an AVR, and a radiator.</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;"><b>M 843N</b></td> <td>Northern Lights marine diesel generator set with a 753 engine and a PXG generator end with an AVR.</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;"><b>NL 843N</b></td> <td>Northern Lights industrial diesel generator set with an N-series 843 engine, a BCI generator end with an AVR, and a radiator.</td> </tr> </table>	<b>NL753G</b>	Northern Lights industrial diesel generator set with a 753 engine, a BCI generator end with an AVR, and a radiator.	<b>M 843N</b>	Northern Lights marine diesel generator set with a 753 engine and a PXG generator end with an AVR.	<b>NL 843N</b>	Northern Lights industrial diesel generator set with an N-series 843 engine, a BCI generator end with an AVR, and a radiator.	
<b>M 753</b>	Northern Lights marine diesel generator set with a 753 engine and a SAW generator end.													
<b>M 753G</b>	Northern Lights marine diesel generator set with a 753 engine, PXG generator end and an AVR.													
<b>NL 753</b>	Northern Lights industrial generator set with a 753 engine, SAW generator end and a radiator.													
<b>NL753G</b>	Northern Lights industrial diesel generator set with a 753 engine, a BCI generator end with an AVR, and a radiator.													
<b>M 843N</b>	Northern Lights marine diesel generator set with a 753 engine and a PXG generator end with an AVR.													
<b>NL 843N</b>	Northern Lights industrial diesel generator set with an N-series 843 engine, a BCI generator end with an AVR, and a radiator.													

### SERIAL NUMBERS

Your set has three serial numbers: an engine number stamped on the block, a generator plate and a generator set plate. Use the serial number on the generator set plate when ordering parts or in correspondence. The generator set plate is found on the service side of the generator and resembles the drawing below.

NORTHERN LIGHTS

DIESEL ELECTRIC & POWER SYSTEMS

SERIAL NO.

MODEL NO.

ALASKA DIESEL ELECTRIC  
4420 - 14th AVE. N.W., SEATTLE, WA

---

## WARRANTY

---

A warranty registration certificate is supplied with your set. It entitles the original purchaser of our equipment to a warranty covering material or assembly faults. The extent of coverage is described in the Limited Warranty Statement. We recommend that you study the statement carefully.

**NOTE: If the warranty is to apply, the servicing instructions outlined in this manual must be followed. If further information is needed, please contact an authorized dealer or the factory.**

---

## SAFETY RULES

---

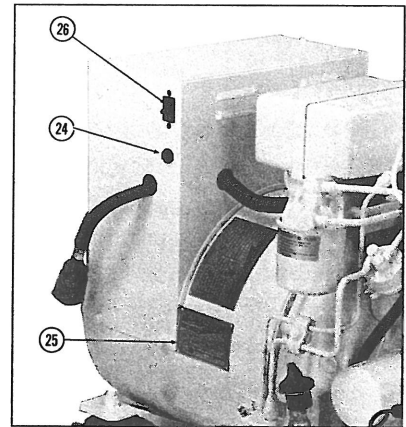
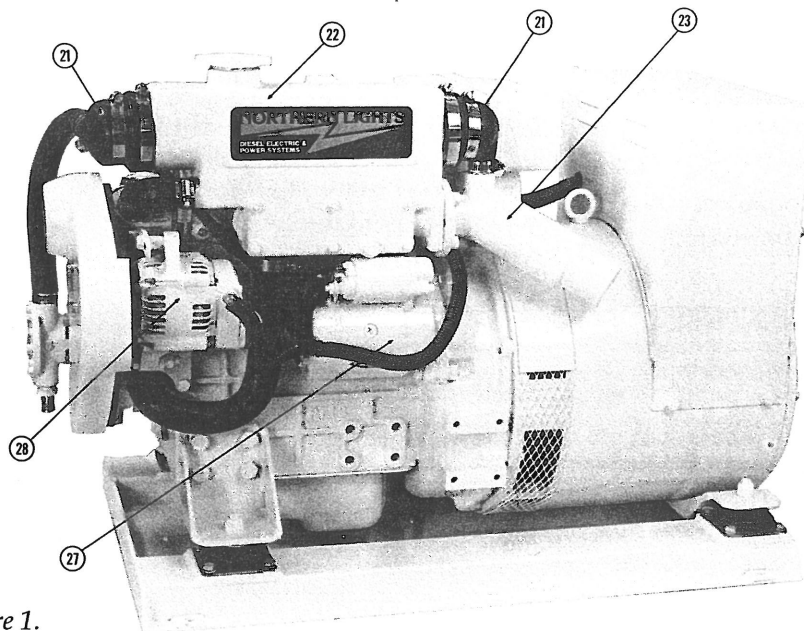
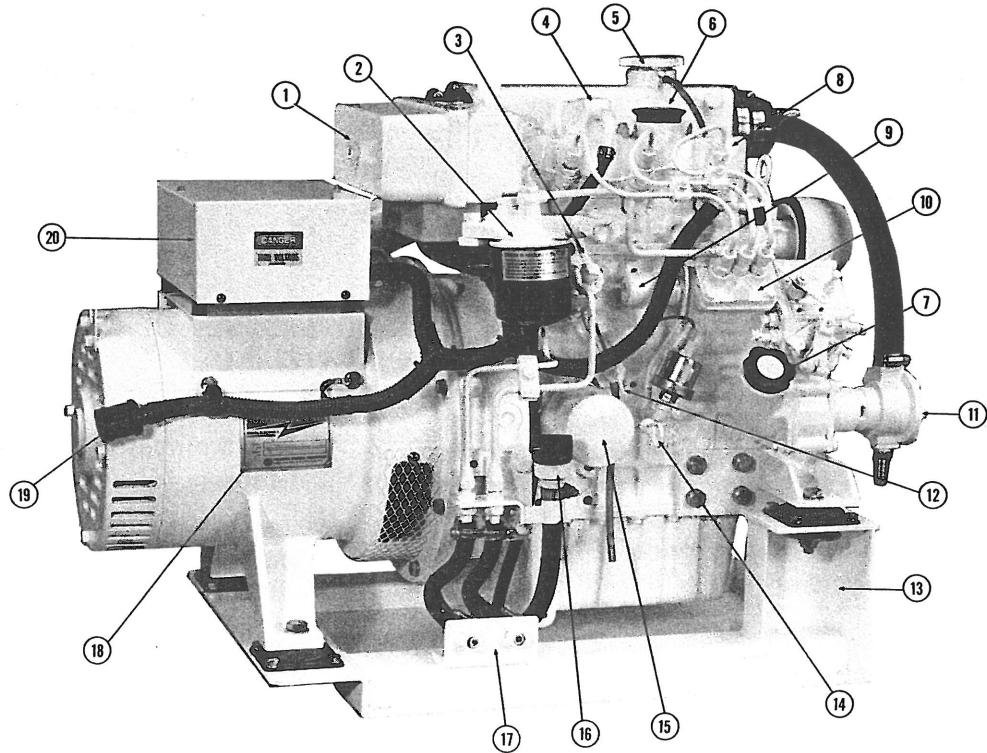
**!** **CAUTION:** *Accident reports show that careless use of engines causes of high percentage of accidents. You can avoid accidents by observing these safety rules. Study these rules carefully and enforce them on the job.*

- Never leave engine without proper security.
- Turn the coolant tank cap slowly to relieve pressure before removing. Add coolant only when the engine is stopped and cool.
- Mount a fire extinguisher near engine.
- Always disconnect the battery ground strap before making adjustments.
- Operate engines in properly ventilated areas.
- Keep trash and other objects away from engine.
- Escaping fluids under pressure can penetrate your skin. Use a piece of cardboard or wood, not your hands, to search for leaks.
- Avoid wearing loose clothing without a belt when working around engines.
- Do not oil or grease engine while it is running.
- Use caution in handling fuel. Never re-fuel a hot or running engine. Do not smoke while filling fuel tank or servicing fuel system.
- Keep your hands, feet, hair and clothing away from power-driven parts.
- Check for any loose electrical connections or faulty wiring.
- Engines should be operated only by knowledgeable, qualified personnel.
- Look completely around engine to make sure that everything is clear before starting.
- Do not operate an engine that isn't in proper working order. If an unsafe operating condition is noted, tag the set and control panel so others will also know about the problem.
- Provide first aid kits.

**!** **CAUTION:** *This symbol is used throughout this book to alert you to possible danger areas. Please take special notice of these sections.*

## M753 and M753G MARINE GENERATOR COMPONENT LOCATIONS

Service side of M753  
with SAW self regulated  
generator end.



Service side of M753G  
with PXG generator end.

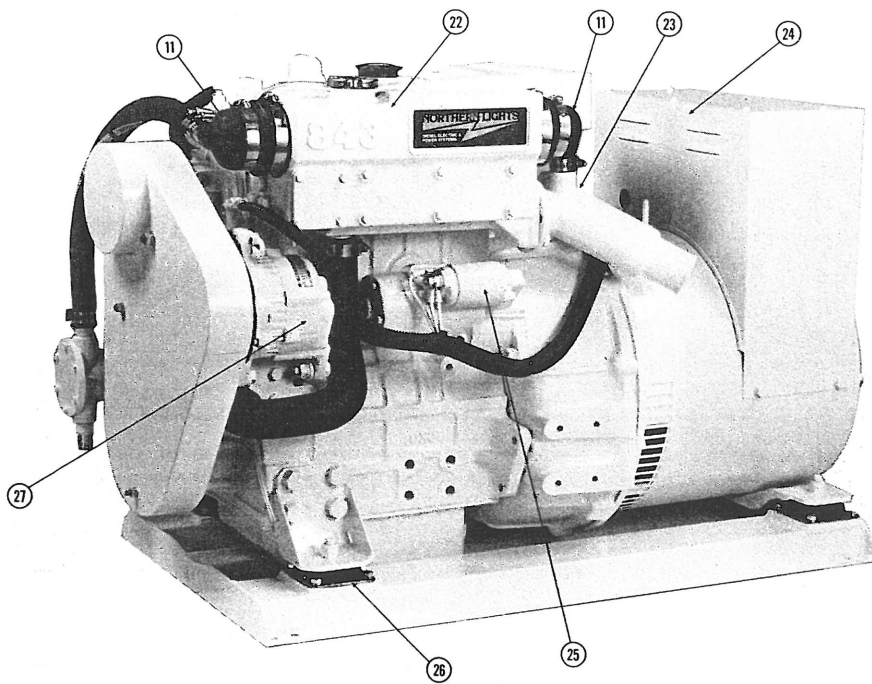
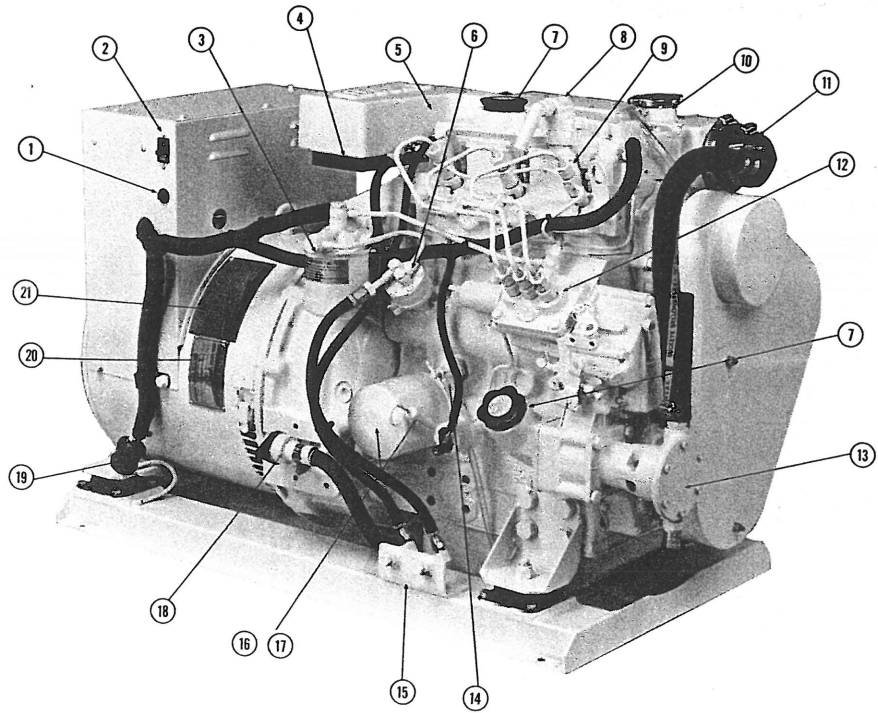
◀ Non-service side of M753G  
with PXG generator end and  
automatic voltage regulator.

Figure 1.

- |                          |                       |                            |                        |
|--------------------------|-----------------------|----------------------------|------------------------|
| 1. Air Filter            | 8. Fuel Injector      | 15. Lube Oil Filter        | 22. Expansion Tank     |
| 2. Secondary Fuel Filter | 9. Stop Solenoid      | 16. Lube Oil Drain         | 23. Wet Exhaust Elbow  |
| 3. Fuel Lift Pump        | 10. Injection Pump    | 17. Fuel Inlet and Return  | 24. DC Circuit Breaker |
| 4. Crankcase Vent        | 11. Seawater Pump     | 18. Generator Set Plate    | 25. Generator Plate    |
| 5. Coolant Fill          | 12. Block Drain       | 19. Control Panel Plug-In  | 26. Starter            |
| 6. Lube Oil Fill Top     | 13. Base Frame        | 20. Generator Control Box  | 27. Drain              |
| 7. Lube Oil Fill Side    | 14. Lube Oil Dipstick | 21. Heat Exchanger End Cap | 28. DC Alternator      |

## M843N MARINE GENERATOR COMPONENT LOCATIONS

Service side of M843N  
with PXG generator end.



Non-service side of M843N  
with PXG generator end.

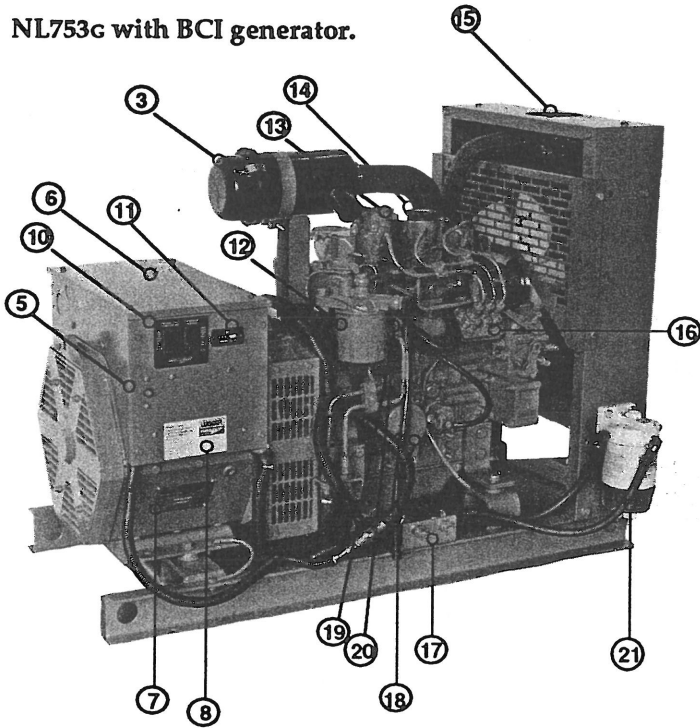
Figure 2.

- |                               |                            |                           |                       |
|-------------------------------|----------------------------|---------------------------|-----------------------|
| 1. DC Circuit Breaker         | 8. Crankcase Vent          | 15. Fuel Inlet & Return   | 22. Expansion Tank    |
| 2. AC Circuit Breaker for AVR | 9. Fuel Injector           | 16. Oil Filter            | 23. Wet Exhaust Elbow |
| 3. Fuel Filter                | 10. Coolant Fill           | 17. Oil Dipstick          | 24. Junction Box      |
| 4. Air Filter                 | 11. Heat Exchanger End Cap | 18. Oil Drain             | 25. Starter           |
| 5. Intake Manifold            | 12. Injection Pump         | 19. Control Panel Plug-In | 26. Vibration Mount   |
| 6. Fuel Lift Pump             | 13. Seawater Pump          | 20. Generator Set Plate   | 27. DC Alternator     |
| 7. Oil Fill (2)               | 14. Freshwater Block Drain | 21. Generator End Plate   |                       |

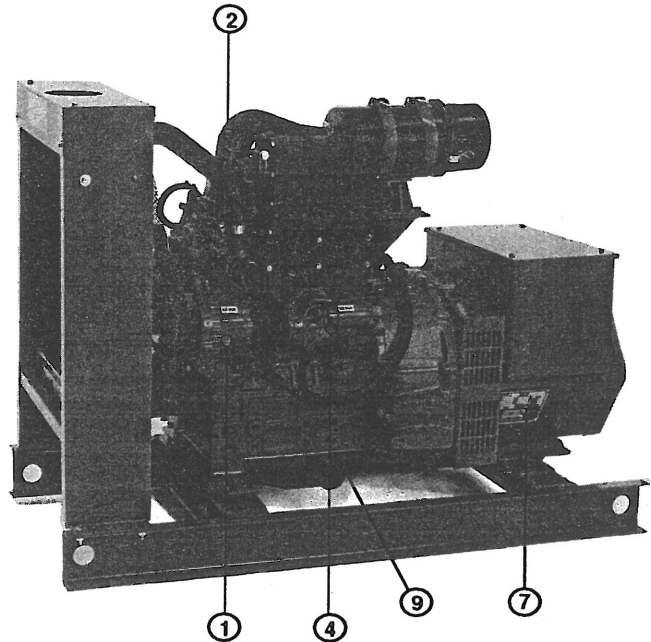
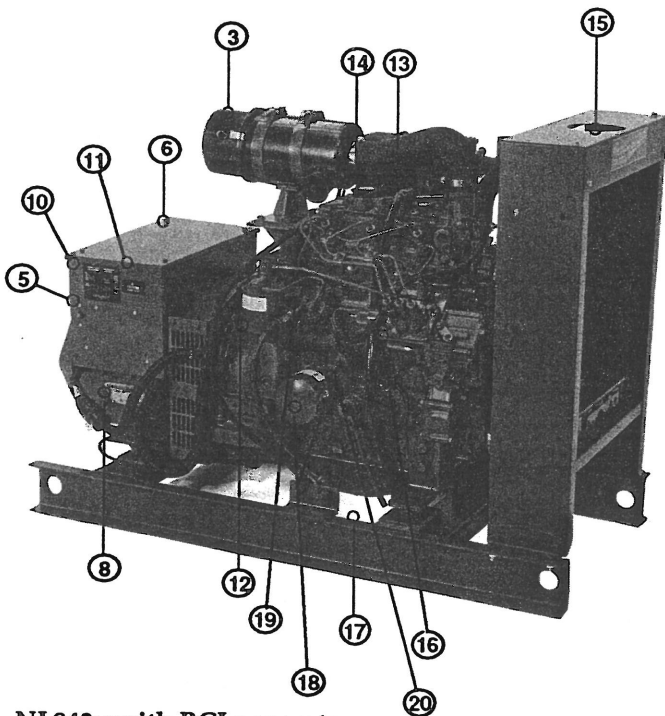
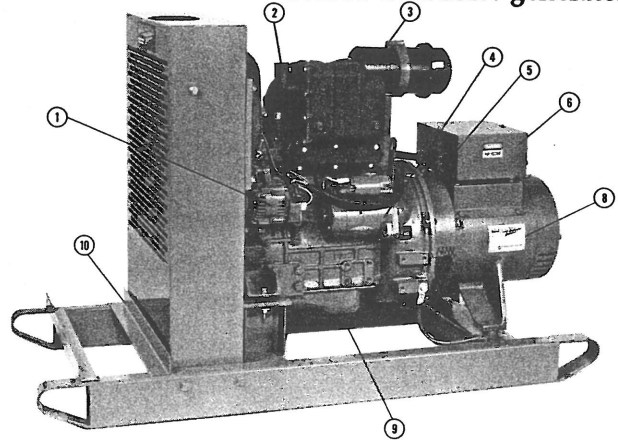


# NL753, NL753G & NL843N INDUSTRIAL GENERATOR SET COMPONENT LOCATIONS

NL753c with BCI generator.



NL753 with SAW generator.



NL843N with BCI generator.

NL843N with BCI generator.

Figure 3.

- |                       |                             |                           |                                    |
|-----------------------|-----------------------------|---------------------------|------------------------------------|
| 1. DC Alternator      | 6. Generator Control Box    | 11. Engine Hour Meter     | 16. Injection Pump                 |
| 2. Exhaust Outlet     | 7. Generator Plate          | 12. Secondary Fuel Filter | 17. Fuel Inlet and Return          |
| 3. Air Filter         | 8. Generator Set Plate      | 13. Crankcase Vent        | 18. Oil Filter & Dipstick          |
| 4. Starter            | 9. Lube Oil Drain           | 14. Lube Oil Fill         | 19. Fuel Lift Pump                 |
| 5. DC Circuit Breaker | 10. Series 1B Control Panel | 15. Coolant Fill          | 20. Block Drain                    |
|                       |                             |                           | 21. Primary Fuel Filter (Optional) |

## CONTROL PANELS

### Northern Lights Generator Sets

#### SERIES 1-B GENERATOR CONTROL PANEL

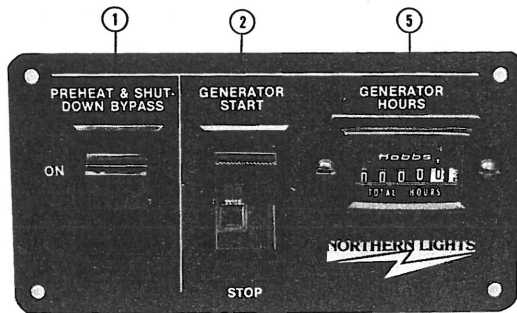


Figure 4A.

#### SERIES 3 GENERATOR CONTROL PANEL

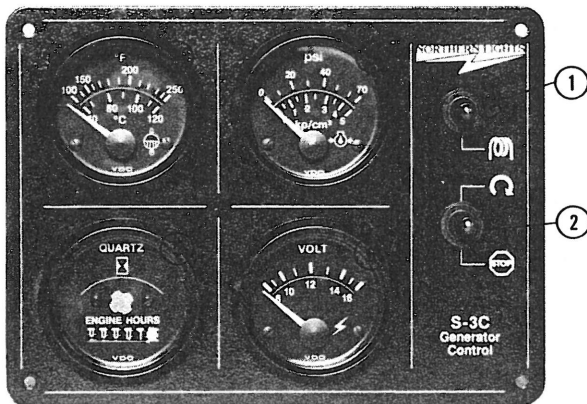


Figure 4B.

#### SERIES 4 GENERATOR CONTROL PANEL

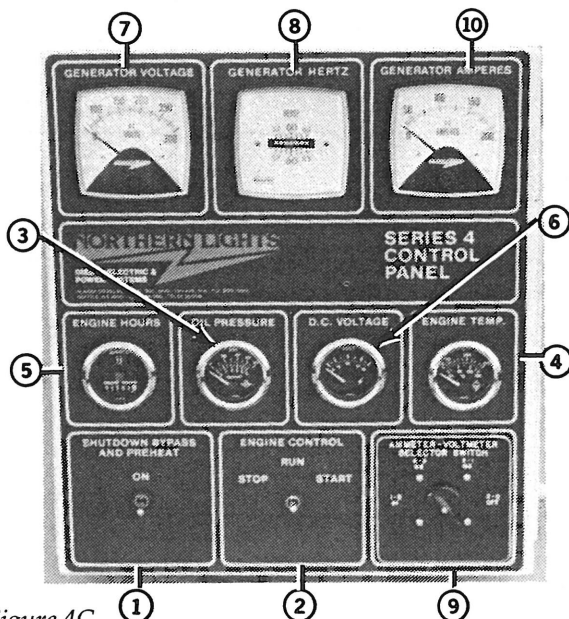


Figure 4C.

1. **SHUTDOWN BYPASS-PREHEAT SWITCH:**  
There are two functions built into this switch: preheating the engine and bypassing the engine safety shutdown circuit enabling a quicker start. Hold the switch in ON position for approximately 10-20 seconds before starting a cold engine. Holding the switch ON for too long can burn out the glow plugs. Note: Three position Engine Control Switches must be in the RUN position during preheating. Preheat switch must be held in ON position during starting.
2. **ENGINE CONTROL SWITCH**  
To start engine, hold the switch in START position until engine is running. *Note: Excessive cranking of marine sets equipped with water lift muffler systems can cause engine damage. See page 9* After the engine starts release switch and it will return to RUN position. To stop engine hold switch in STOP position. Note: The rocker switch is used on Series 1 panels only and has a light that glows when the set is running.
3. **OIL PRESSURE GAUGE:**  
The oil pressure gauge shows the oil pressure in the engine lubricating system.
4. **WATER TEMPERATURE GAUGE:**  
Registers temperature of cooling water.
5. **HOUR METER:**  
Keeps track of engine running time.
6. **D.C. VOLTMETER OR AMMETER:**  
When the engine is stopped, the voltmeter indicates the condition of the battery. When the engine is running, the voltmeter indicates the voltage output of the alternator.

#### **For Series 4 Control Panels Only:**

7. **A.C. VOLTMETER:**  
Shows the generator output voltage.
8. **FREQUENCY METER (Hertz):**  
The frequency meter indicates engine speed: 1200 or 1800 RPM (60 Hz), or 1500 RPM (50 Hz).
9. **AMMETER SELECTOR SWITCH:**  
Used to check each phase for load condition. *Note: Always leave this switch in the "ON" position while the unit is running.*
10. **A.C. AMMETER**  
Shows the generator load on each phase. The phase is selected with the Ammeter Selector Switch, #9.



## SERVICING SCHEDULE CHART

The Servicing Schedule Chart below shows the service schedule required for proper maintenance of your generator set. More detailed coverage of each Service Point (SP) is listed on the page noted in the 'page' column.

**DAILY:**

- SP1 Check oil level in engine
- SP7 Check primary fuel filter
- SP13 Check cooling water level  
Check sea strainer (marine)

**AFTER FIRST 50 HOURS:**

- SP2/3 Change engine oil and filter
- SP5 Check V-belt tension
- SP6 Adjust valves
- SP18 Check electrolyte in batteries  
Re-tighten head bolts (see pg. 12)

**EVERY 50 HOURS:**

- SP5 Check V-belt tension
- SP18 Check electrolyte in batteries

**EVERY 100 HOURS:**

- SP2/3 Change engine oil and filter
- SP4 Check air cleaner
- SP16 Check and clean radiator (industrial only)

**EVERY 200 HOURS:**

- SP8 Change primary fuel filter element
- SP9 Change secondary fuel filter

**EVERY 600 HOURS:**

- SP6 Check valve clearances
- SP11 Check injectors
- SP14 Check and flush cooling system
- SP17 Change impeller (marine)
- SP19 Check state of charge of batteries

**EVERY 2400 HOURS:**

- SP12 Check fuel injection pump
- SP15 Check and clean heat exchanger (marine only)

SERVICE POINT	PAGE	OPERATION	DAILY	50 Hours	100 Hours	200 Hours	600 Hours	2400 Hours
SP1	9	<b>ENGINE:</b> Check oil level	●					
SP2	11	Change engine oil 1)		5)	●			
SP3	11	Change lube oil filters 1)		5)	●			
SP4	11	Check air cleaner 1) 4)			●			
SP5	11	Check V-Belt tension 1)		●				
SP6	12	Check valve clearances 1)		5)			●	
SP7	13	<b>FUEL SYSTEM:</b> Check primary filter (Racor) 2)	●					
SP8	13	Change primary filter element (Racor) 2) 3)				●		
SP9	13	Change secondary fuel filter 1) 3)				●		
SP10	13	Bleed the fuel system 3)						
SP11	13	Check injectors 1)					●	
SP12	15	Check fuel injection pump						●
SP13	9-15	<b>COOLING SYSTEM</b> Check cooling water level	●					
SP14	15	Check and flush cooling system					●	
SP15	16	Check and clean heat exchanger (marine)						●
SP16	16	Check and clean radiator finds (industrial)			●			
SP17	16	Change impeller in seawater pump (marine) 1) 3)					●	
SP18	17	<b>ELECTRICAL SYSTEM:</b> Check electrolyte level in batteries 1) 4)		●				
SP19	17	Check condition of batteries with hydrometer 1)					●	
SP20	17	<b>OUT OF SERVICE:</b> Winterizing or out-of-service 3)						

1) Perform all maintenance once a year even if hour level has not been reached.  
 2) Consult manufacturer's maintenance schedule, note on chart.  
 3) Whenever necessary.

4) More often if necessary.  
 5) After first 50 hours.  
 6) Adjust at first 100 hours.

---

## OPERATING PROCEDURES

---

### **BREAK-IN PERIOD**

---


1. The first 100 hours on a new or reconditioned engine are critical to its life and performance.
2. Constantly check the engine temperature and oil pressure gauges.
3. Oil consumption is greater during break-in as piston rings and cylinder liners take time to seat.
4. Break-In Oil Changes: Change engine oil and filter at 50 hours. Change oil and filter again at 100 hours. (Consult Lubricants Section for oil recommendation.)
5. Re-tighten head bolts at 50 hours. (See page 12.)

### **Operating Instructions**

Generator Sets: Maintain at least a 75% load on your set for the first 100 hours. If this is not possible, maintain no less than a 50% load to ensure proper seating of the piston rings. Vary the load to help seat rings.

### **BEFORE STARTING**

---

1. **SP13.** Check the water level by removing the pressure cap from the expansion tank or radiator. In order to give the cooling water an opportunity to expand, the level should be about 1 in. (2.5 cm) below the filler cap sealing surface when the engine is cold.  
 **CAUTION:** Use protective clothing and open the filler cap carefully when the engine is warm to prevent burns.
2. **SP1.** Check the oil level in the crankcase with the dipstick. The oil level must be in the waffled area on stick. Never allow the level to go below this area. Always add the same viscosity of oil as is already in the crankcase.
3. Check the fuel tank level and open any fuel valves.
4. Marine sets: close the seacock, check and clean the sea strainer and re-open the seacock.
5. Marine sets: place the battery switch in the ON position.
6. **NOTE:** The battery switch must always be kept ON while the engine is running. If the switch is turned OFF while the engine is running, the battery charging regulator could be ruined.

### **STARTING**

---

1. Hold Shutdown Bypass-Preheat Switch in ON position for 10 to 20 seconds before starting a cold engine. Holding switch on too long can burn out the glow plugs. This step is not necessary if the engine is already warm.
2. While holding the Shutdown Bypass-Preheat Switch in ON position, push Engine Control Switch to START position.
3. As soon as the engine starts, release both switches. Do not crank starter for more than 20 seconds. If engine fails to start the first time, be sure starter has stopped before re-engaging.

**NOTE:** Excessive cranking of starter on marine sets equipped with water lift muffler can cause engine damage. If engine does not start after three, 20 second cranks, remove impeller from the seawater pump. This will prevent the muffler from filling with water and backfilling the exhaust line and engine. Once engine starts, shut it off immediately and re-install the impeller. Restart and check the exhaust overboard outlet for gushes of water.

### **OPERATING**

---

1. Units with Series 3 and 4 Control Panels: check gauges often. Oil pressure must be above 15 PSI. The D.C. voltmeter should read between 11 and 15 volts at 80°F (25°C) ambient temperature. Water temperature gauge must be below 200°F (94°C.) Check AC voltage and frequency meters (Series 4 Panel.) If gauges deviate from normal levels, shut down the set and investigate.
2. Let the unit run unloaded for a three to five minute warm-up period.
3. Add electrical load.


### **STOPPING**

---

1. Remove electrical load from generator set.
2. Run engine for a 3 to 5 minute cool down period.
3. Move engine control switch to the STOP position momentarily.
4. Marine sets: shut off seacock, fuel valve and battery switch.

## OPERATING PROCEDURES (cont.)

### SHUTDOWNS AND ALARMS

1. Your unit is fitted with a system to protect it from high water temperature or low oil pressure.
  - a. Generator sets have shutdown systems to stop the engine. They have no warning horns.
  - b. Other alarms and shutdowns are available as optional equipment.
  - c. **NOTE:** *Do not rely on your warning or shutdown system to the exclusion of careful gauge monitoring. Watching your gauges can prevent damage to the unit and dangerous power losses.*
2. Do the following when your warning or shutdown system is activated:
  - a. Check the temperature gauge. If above 205°F (97°C), shut off the engine immediately.
  - b. Use the Trouble Shooting Guide on page 21 to isolate the cause of the overheat.
  - c.  **CAUTION:** *Do not remove the water fill cap of an overheated engine. Escaping high temperature steam can cause severe burns. Allow the engine to cool and then remove the cap slowly using protective clothing.*
  - d. Make repairs and restart after the temperature gauge registers below 200°F (94°C.)
  - e. Watch the temperature gauge regularly and turn off the unit if the temperature rises above 205°F (97°C.) Repeat troubleshooting.
3. If the shutdown is activated and the temperature gauge shows temperature within normal temperature range:
  - a. Check the engine crankcase oil level.
  - b. If the oil level is low, fill with recommended lubricating oil and restart. Watch the oil pressure gauge carefully and shut off the engine if it does not show a normal reading (20-60 PSI) after a few seconds of operation.
  - c. If the oil level is normal, DO NOT restart the engine. Call your dealer for assistance.

### SPARE PARTS

1. ADE recommends that you keep the following spare parts on hand for field service. The parts are available from your local Northern Lights dealer. Some marine models already have "On-Board-Kits," a handy box that contains the most common parts you will need.
2. All owners should have the following:
  - a. Primary and secondary fuel filter elements
  - b. Oil filters
  - c. Air filter (industrial only)
  - d. Alternator belt
  - e. Thermostat and gaskets
  - f. Seawater pump impeller & gaskets (Marine only)
  - g. Glow plug
  - h. Injector and washer
3. If your set is operating a long distance from a servicing dealer, add the following:
  - a. Complete set of injectors
  - b. Copper washers for injector change
  - c. Complete set of glow plugs
  - d. Fuel lift pump

## SERVICING

### LUBRICATION - GENERAL

1. Use only clean, high quality lubricants stored in clean containers in a protected area.
2. These lubricants are acceptable:
  - a. API Service CC/CD/CE single viscosity oils.
  - b. API Service CC/CD/SF multi-viscosity oils.
3. Use the proper weight oil for your average operation temperature.

Air Temperature	Single Viscosity	Multi-Viscosity
Above 32°F (0°C)	SAE-30W	SAE 15-40W
-10 to 32°F (-23 to 0°C)	SAE-10W	SAE 10-30W
Below -10°F (-23°C)	SAE-5W	SAE 5-20W

Figure 5. Lube Oils

4. Some increase in oil consumption may be expected when SAE 5W and SAE5-20W oils are used. Check oil level frequently.
5. Never put additives or flushing oil in crankcase.

### SP2. OIL CHANGES

1. The set is delivered with special break-in oil. Change the engine oil and oil filter after 50 hours of operation. Use Service CC 30 weight oil during the first 100 hours.  
Change the oil and filter again at 100 hours using the oil recommended in the above diagram. After this, change oil and filter every 100 hours.
2. During intermittent cold weather operation, change oil every 100 hours or six weeks, whichever comes first.
3. Change oil at any seasonal change in temperature when a new viscosity of oil is required.
4. Change oil when engine is warm.
5. Dispose of waste oil in an approved manner.
6. Never use a flushing oil.
7. Loosen clamp on oil change tube. Remove cap. Drain oil. Replace cap and tube.
8. Refill engine with recommended oil.

9. Engine capacity with new oil filter is:
 

753	5.8 quarts (5.5 liters)
753G	3.7 quarts (3.5 liters)
843N	5.8 quarts (5.5 liters)

### SP3. CHANGING OIL FILTER

1. Change the lube oil filter every 100 hours.
2. Use a filter wrench to remove old filter. Dispose of filter in approved manner.
3. Make sure the gasket from the old filter is removed and discarded. Clean mount face.
4. Spread a thin film of engine oil on the rubber gasket on the new filter and screw it on nipple until gasket meets the sealing surface.
5. Using hands only, no wrench, tighten filter one-half turn farther. Overtightening can do damage to filter housing.
6. Fill engine with recommended oil. Start engine and check for leakage. Stop engine, wait 3 minutes, and check oil level. Add additional oil if necessary.
7. Oil filter part numbers are:
 

753 and 753G	140516190
843N	140516130

### SP4. AIR FILTER

1. Inspect air cleaner every 100 hours. In dusty conditions, check more often.
2. Marine: If dirty, wash element in soapy water. Rinse and dry thoroughly before reinstalling.
3. Industrial: Element cannot be cleaned. Replace it when necessary. Part number:
 

NL753 and NL753G	314531123
NL843N	314531127
4. **NOTE: Make absolutely sure no impurities enter the engine while changing the element. Do not run the engine with the air cleaner removed.**

### SP5. V-BELTS

1. Check the tension and wear on the V-belt after every 50 hours.
2. Use your thumb to press on the belt at the mid-point between the crankshaft and alternator pulleys. The tension is correct of the belt can be depressed about 3/16 in. (5mm.)

## SERVICING (cont.)

### RETIGHTENING CYLINDER HEAD BOLTS —

1. Re-tighten the head bolts after the first 50 hours.
2. Tighten bolts when the engine is cold.
3. Loosen the nuts and remove rocker arm cover.
4. Tighten head bolts with a torque wrench in order show in figures below. Tighten bolts evenly in 2 or 3 passes, ending at specified torque in final pass.
  - a. 753 and 753G: 33-36 ft/lbs (4.5-5 kg/m)
  - b. 843N: 60-64 ft/lbs (9-9.5 kg/m)

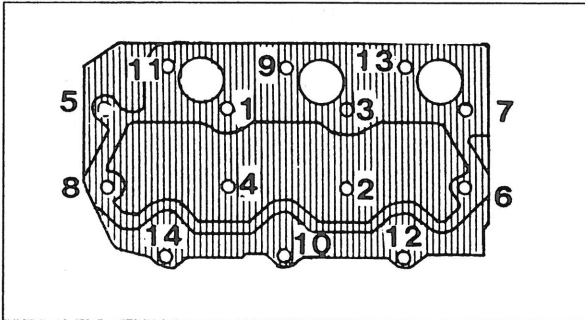


Figure 7. 753 Head Torque Sequence

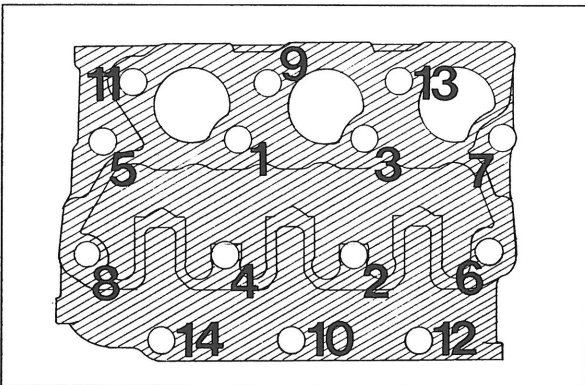


Figure 8. 843N Head Torque Sequence

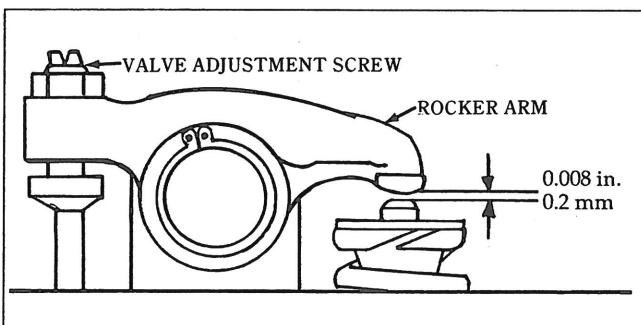


Figure 9. Valve Adjustment

### SP6. VALVE CLEARANCES —

1. Readjust valve clearance after first 50 hours of operation and every 600 hours thereafter.
2. Valve adjustments should be done after the cylinder head bolts have been retightened. Engine should be cold and NOT running.
3. Watch the valves while turning the engine over by hand. Turn until the inlet valve starts to open and the exhaust valve starts to close (the valves are rocking.) Then turn the crankshaft one more full turn and adjust the clearance on both valves for this cylinder.
4. Loosen the lock nut and adjust the clearance between the rocker arm and valve guide of both the intake and exhaust valves with the adjustment screw. Clearance on both intake and exhaust valves should be 0.008 in. (0.2 mm.)
5. Repeat steps 3 and 4 for each cylinder. Each set of valves must be adjusted individually.
6. Replace rocker arm cover. Tighten cover nuts to 5-8 ft/lb (0.8-2.3 kg/m.)

### FUELS - GENERAL —

1. Use only clean, high quality fuels of the following specifications, as defined by ASTM designation D975 for diesel fuels:
  - a. Use grade no. 2 diesel at ambient temperatures above freezing 32°F (0°C).
  - b. Use grade no. 1 at ambient temperatures below freezing and for all temperatures at an altitude of above 5,500 ft. (1500 meters.)
2. Use fuel having less than 1% sulphur (preferably less than 0.5%.)
3. The cetane number should be a minimum of 45.
4. DO NOT use these unsuitable grades of fuel:
  - a. Domestic heating oils, all types.
  - b. Class B engine.
  - c. Class D Domestic fuels.
  - d. Class E, F, G or H industrial or marine fuels.
  - e. ASTM-D975-60T No. 4-D and higher number fuels.
5. Storing fuel:
  - a. Keep dirt, scale, water and other foreign matter out of fuel.
  - b. Avoid storing fuel for long periods of time.
  - c. Fill the fuel tank at the end of each day's operation. This will reduce condensation.



## SERVICING (cont.)

### SP7-9. FUEL FILTERS

- Your generator set should have a primary fuel filter installed. We recommend the Racor brand of fuel filter - water separators.
  - Check the primary fuel filter daily as recommended by the filter manufacturer. Empty the collection bowl as necessary.
  - Change the element as often as necessary or every 200 hours.
  - If the bowl fills with water, change the primary and secondary element immediately.
- Change secondary fuel filter every 200 hours.
  - Remove the spin-on filter by turning it counter-clockwise with a filter wrench. Fill the new cartridge with fuel and install it after applying engine oil to gasket surface. Screw on until the gasket surface comes into contact with sealing surface of filter base. Then, tighten it two-thirds of a turn by hand. Do not overtighten.
- Fuel filter part numbers are:  
753, 753G 130336020  
843N 130336020

### SP10. BLEEDING THE FUEL SYSTEM

- CAUTION:** Escaping diesel fuel under pressure can penetrate skin, causing serious personal injury. Before disconnecting lines, be sure to relieve all pressure. Before applying pressure, be sure all connections are tight and lines, pipes and hoses aren't damaged. Fuel escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks. If injured by escaping fuel, see a doctor at once. Serious infection or reaction can develop if proper medical treatment isn't administered immediately.
- The fuel system is self-bleeding. However, any system may need manual bleeding when:
  - A new fuel filter is installed;
  - The engine has run out of fuel;
  - The fuel lines injection pump or any other fuel system component has been removed and installed.
- Loosen bleed bolt "A" on top of the filter. Pump hand primer "B" on fuel lift pump until pure fuel (no bubbles) escapes from bleed bolt "A." Tighten bleed screw "A."
- Loosen bleed screw or bolt "C." Pump hand primer "B" until pure fuel (no bubbles) escapes, then tighten bleed "C."

- If the engine does not start after the above bleeding process, loosen a fuel line at the injector while cranking the engine with the starter motor until pure fuel escapes. Then tighten the connection. Do each line one-at-a-time.

**Warning:** Excessive cranking can damage engine. See note on page 9.

- After engine has started, use a piece of cardboard to look for leaks.

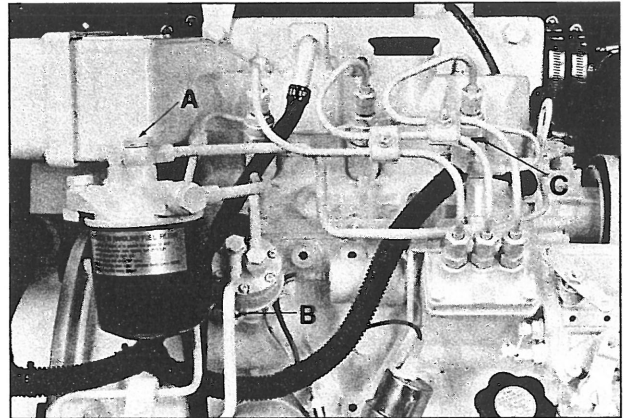


Figure 10. M-NL753 and 753G Fuel System

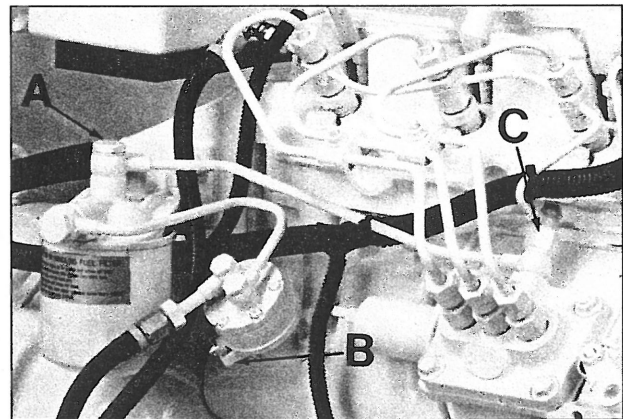
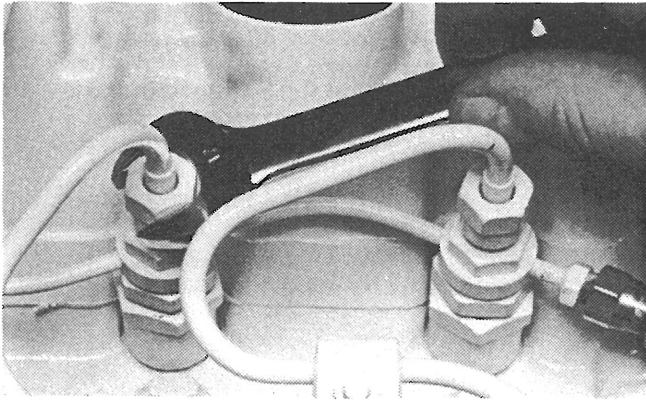


Figure 11. M-NL843N Fuel System

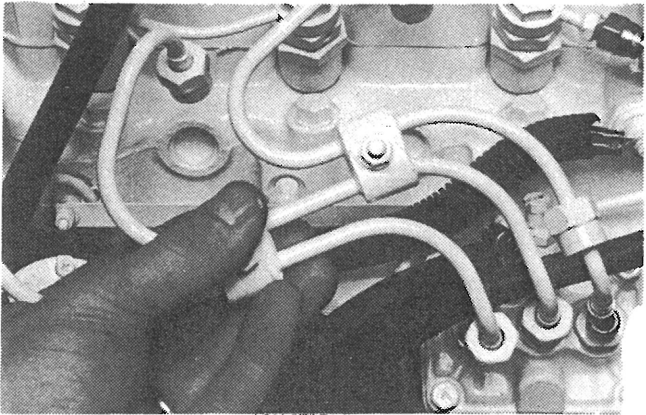
### SP11. INJECTOR SERVICE

- Injectors should be checked every 600 hours. Check should be made by Northern Lights dealer or local injection repair station.
- CAUTION:** Escaping diesel fuel under pressure can have sufficient force to penetrate the skin causing serious personal injury. If injured by escaping diesel fuel, see a doctor at once.
- Injector removal:
  - Clean loose dirt from around the injectors and the fuel lines.
  - Relieve high pressure in the fuel lines by loosening the delivery line flare nuts at each injector (Figure 12.)

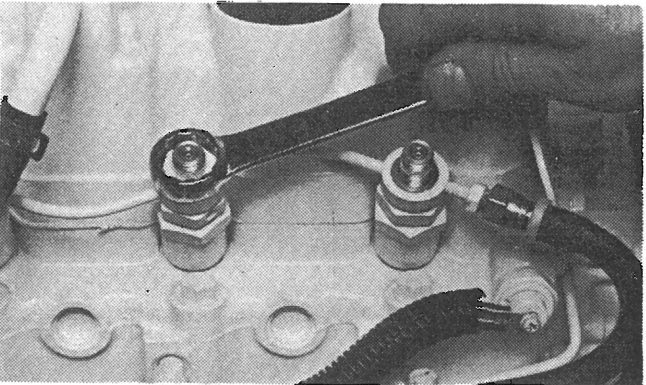
**SERVICING (cont.)**



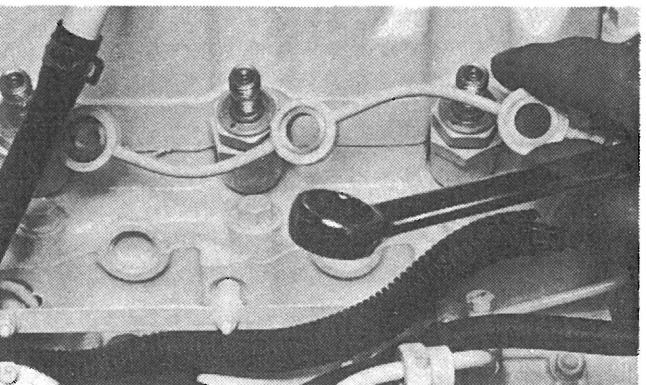
*Figure 12. Remove Delivery Line Flare Nuts*



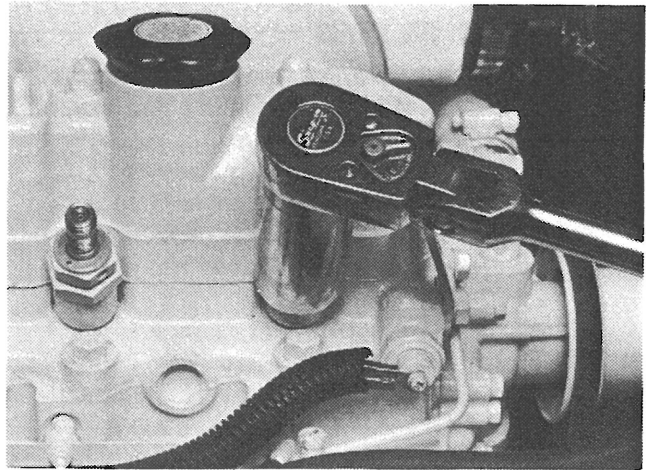
*Figure 13. Remove Delivery Lines*



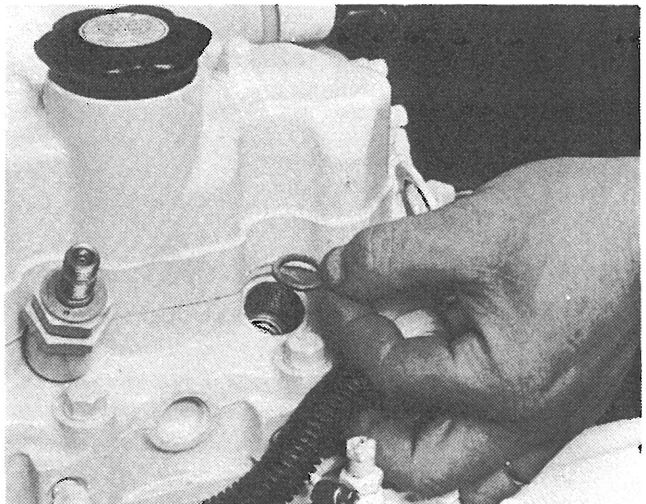
*Figure 14. Remove Return Line Nuts*



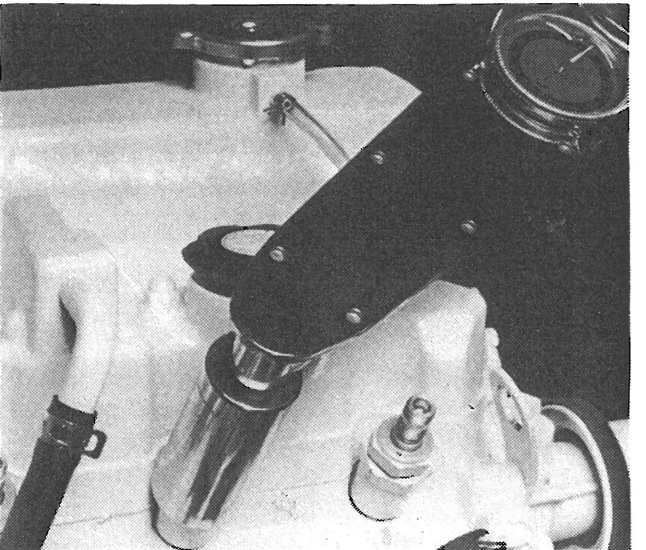
*Figure 15. Remove Return Line*



*Figure 16. Unscrew Injector*



*Figure 17. Remove and Replace Copper Sealing Washer*



*Figure 18. Reinstall Injector. Torque to Proper Tightness*



## SERVICING (cont.)

### SP11. INJECTOR SERVICE (cont.)


3. c. Remove delivery lines by disconnecting from injectors and injection pump (Figure 13.) Remove all lines as an assembly, do not remove the spacers. Cover the ends of the lines, the injector inlets and injection pump outlets to keep dirt out.
- d. Remove the return line retaining bolts (14.) Remove the return line (15.)
- e. Unscrew and remove the injectors (16.)  
**NOTE: Do not use pry bars to remove injectors from cylinder head.**
- f. After removing injectors, discard the copper sealing washers from the injector hole in the head (17.) Cover holes to prevent dirt and debris from entering cylinders.
4. Injector repair and cleaning: Take injectors to your Northern Lights dealer or local injection repair station for testing and service.
5. Injector installation:
  - a. Install a new copper sealing washer in each injector hole (Figure 17.)
  - b. Screw in injector and tighten to 43 or 50 ft/lbs (6 to 7 Kgm) (Figure 18.)**NOTE: Overtightening can damage injector.**
  - c. Install return line using new copper sealing above and below each connection. Tighten return line retaining bolts to 22-30 ft/lbs.
  - d. Install delivery lines. Leave loose at injectors for bleeding.
  - e. Pump hand level on fuel pump to fill lines. Tighten lines at injectors. Start engine and check for leaks using a piece of paper or cardboard. **DO NOT use hand to check for leaks.**

### SP12. INJECTION PUMP

1. Since operating conditions may vary considerably, it is difficult to give a definite interval. But, as a rule, the pump settings, maximum speed, idle speed and exhaust smoke should be checked after every 2400 hours of operation. Service of the fuel injection pump should only be done if checks indicate pump malfunction.
2. Black smoke can be an indication of pump malfunctions. Before servicing pump, check the other possible causes.
  - a. Check cleanliness of air filter.
  - b. Check valve clearances.
  - c. Clean and check injectors.

3. Any repair which involves disassembly of the injection pump must be carried out by specially-trained mechanics with the proper tools and test devices.
4. **NOTE: All warranties on the engine become null and void if the injection pump seals are broken by unauthorized persons.**

### COOLING SYSTEM - GENERAL

1. **NOTE: Marine sets—Be sure to close the seacock before working on the engine cooling system.**
2.  **CAUTION: The cooling water in the engine reaches extremely high temperatures. You must use extreme caution when working on hot engines to avoid burns. Allow the engine to cool before working on the cooling system. Open the filler cap carefully, using protective clothing when the engine is warm.**
3. **SP13.** Check the coolant level each day before starting the engine. check the water level by removing the pressure cap from the expansion tank or radiator. In order to give the cooling water an opportunity to expand, the level should be about 1 in. (2.5 cm) below the filler cap sealing surface when the engine is cold.
4. The pressure valve in the filler cap releases when the pressure is approximately 7 PSI (0.5 bar.) Use a cap pressure tester to check cap if you suspect it is faulty.

### SP14. COOLING SYSTEM FLUSHING

1. Flush the cooling system every 600 hours or every 12 months, whichever comes first.
2. **MARINE:**
  - a. Remove expansion tank cap and drain engine block.
  - b. Open block drain cock. Model 753 and 753c: remove plug in lower left side of heat exchanger tank. Model 843N: Remove hose from bottom of heat exchanger tank.
  - c. Pour clean water into expansion tank until water coming from drains is free of discoloration and sediment. Let water drain completely. Close drains and refill with recommended mixture.
3. **INDUSTRIAL:**  
Remove radiator cap and open drain cocks on radiator and engine block. Pour clean water into radiator until water coming from radiator is clear of discoloration. Close the radiator drain

---

## SERVICING (cont.)

---

### **SP14. COOLING SYS.FLUSHING (cont.)** —

and continue flushing until water from engine drain is clear. Open all drain cocks and drain completely. Close drain cock and refill with recommended coolant mixture. Clean fins on radiator.

#### **4. MARINE AND INDUSTRIAL:**

Use 50% water/50% ethylene glycol antifreeze mix. Antifreeze mixture is recommended as a good year-round coolant.

5. Check hoses and connections and repair any leakage.

### **SP15. HEAT EXCHANGER (Marine)** —

1. Clean the heat exchanger core once a year or after 2400 hours of operation.
2. Drain expansion tank and heat exchanger.
3. Remove heat exchanger end covers and remove core.
4. Clean the inside of exchanger core tubes using a metal rod. Flush, inspect and clean again if necessary.
5. Re-assemble. Fill the cooling system, start the engine and check for leaks.

### **SP16. CLEAN RADIATOR (Industrial)** —

1. Remove debris from radiator fins daily.
2. In very dusty applications, clean the radiator with compressed air or steam cleaner every 100 hours. Clean in the reverse direction of airflow.

### **SP17. RAW WATER PUMP (Marine)** —

1. Change the seawater pump impeller every 600 hours, or as needed.
2. Remove the pump end cover. Pry out the impeller with the help of two screwdrivers. Be sure you remove all pieces of failed impeller.
3. **NOTE: Place some kind of protection under the screwdrivers in order not to damage the housing.**
4. Clean the inside of the housing.
5. Press in the new impeller and place the sealing washers in the outer end of the impeller center if this has not already been done.
6. Replace the cover using a new gasket.
7. **NOTE: Make sure that there is always an extra impeller and cover gasket in reserve on board.**

### **GENERATOR ENDS** —

The maintenance and operation recommendations for the generator end are in a separate Owner's Manual. If you do not have one of these manuals, contact your local dealer.

### **ELECTRICAL SYSTEM - GENERAL** —

1. Never switch battery switch off or break the circuit between the alternator and batteries while the engine is running. Regulator damage can result.
2. Do NOT reverse the polarity of battery cables when installing the battery.
3. When welding on the unit, disconnect the regulator and battery. Isolate the leads.
4. Disconnect battery cables when servicing the DC alternator.
5. Never test with a screwdriver, etc., against any terminal to see if it emits sparks.
6. Do not polarize the alternator or regulator.
7. A DC circuit breaker protects your control panel and wiring harness. It is located in the side of the generator junction box.

### **GLOW PLUGS** —

1. Each cylinder is supplied with a glow plug which serves to heat the combustion chamber.
2. To check the glow plugs, loosen the current

carrying flat wire between the plus poles of the glow plugs (Figure 19.) Connect a DC test bulb between the plus pole of the battery and the plus pole of the glow plug.

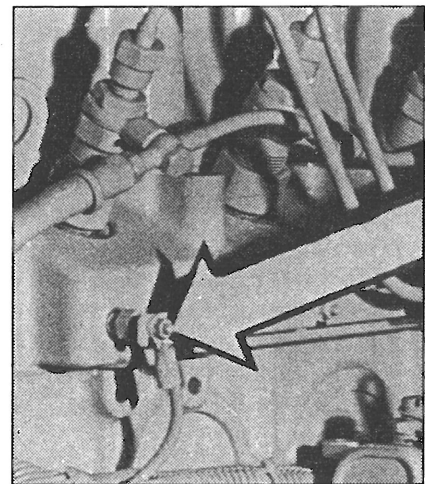


Figure 19. Glow Plugs

- If the bulb lights up, the glow plug is functioning properly.
3. Check all glow plugs and replace any faulty ones.

---

## SERVICING (cont.)

---

### BOOSTER BATTERIES

1. **CAUTION: Battery Gas Can Explode.** Keep all flames and sparks away from batteries.
2. Before changing or using booster batteries, check battery electrolyte level. Add distilled water if necessary.
3. Booster and main batteries must have the same voltage rating.
4. First, connect positive (+) terminal of booster battery to positive (+) terminal of main battery. Then, connect negative (-) terminal of booster battery to ground on the engine block. (See Figure 20.)
5. Remove booster battery after starting engine.
6. Sealed batteries: See manufacturer charging and booster instructions.

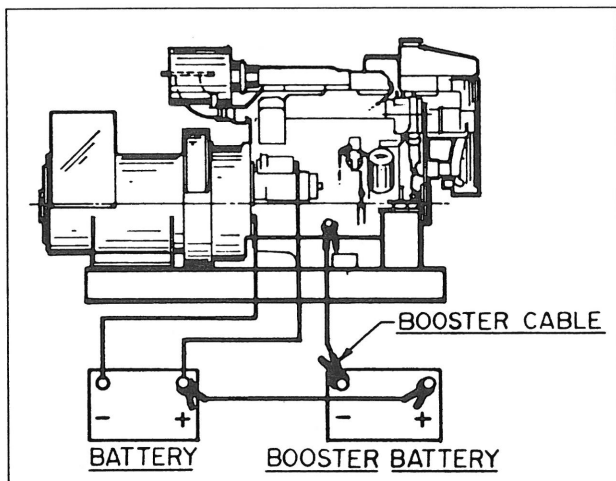


Figure 20. Battery Connections

### SP18-19. BATTERY CARE

1. Check electrolyte level every 50 hours or once per month. Add distilled water to manufacturer's recommended level.
2. Batteries, cables and cable terminals should be checked and cleaned every 100 hours. Clean corrosion with a water and baking soda solution. Flush with clean water. Tighten terminals and grease them to inhibit corrosion.
3. Check the battery condition with a hydrometer every 600 hours.

### SP20. WINTERIZING, OUT-OF-SERVICE

#### MARINE:

1. Drain fresh water and seawater cooling systems completely. Remember to shut off seacocks before opening drain cocks.
2. Drain water supply lines and wet exhaust line.
3. Loosen the seawater pump cover and drain pump.

#### INDUSTRIAL:

1. Drain and flush radiator and cooling system. Leave dry or refill with antifreeze-water mixture. If refilling, start the engine and run to circulate the antifreeze.
2. Fill fuel tank or add biocide as per manufacturer's instructions.
3. Seal air cleaner inlet, exhaust opening, crankcase breather pipe and fuel tank vent with plastic bags and tape.
4. Store the set in a dry, protected place. If unit must be stored outside, be sure it is well protected with a cover.

#### MARINE AND INDUSTRIAL:

1. Change the crankcase oil and filter.
2. Loosen the alternator belt.
3. Disconnect and clean battery. Remove to warm storage place if possible.
4. Clean outside of unit. Paint any scratched or chipped surfaces. Put corrosion preventative on all exposed metal surfaces.

## TROUBLESHOOTING

If you cannot correct problems with these procedures, see your **Northern Lights** dealer.

### **DC ELECTRICAL SYSTEM**

#### ✓ **Battery will not charge**

Loose or corroded connections:

- Clean and tighten battery connections.

Sulfated or worn out batteries:

- Check specific gravity of each battery.
- Check electrolyte level of each battery.

Loose or defective alternator belt:

- Adjust belt tension.
- Replace belt.

#### ✓ **Starter inoperative**

Check DC circuit breaker.

- If the breaker is tripped, reset it.

Loose or corroded connections:

- Clean and tighten loose battery and harness plug connection.

Low battery output:

- Check specific gravity of each battery.
- Check electrolyte level of each battery.

Defective electrical system ground wire:

- Repair or replace.

#### ✓ **Starter cranks slowly**

Low battery output:

- Batteries too small.
- Battery cables too small.

Check specific gravity of each battery.

- Replace battery if necessary.

Check electrolyte level of each battery.

- If low, fill cells with distilled water.

Crankcase oil too heavy.

- Fill with oil of appropriate viscosity.

Loose or corroded connections:

- Clean and tighten loose connections.

#### ✓ **Entire electrical system does not function**

Check DC circuit breaker.

- If breaker is tripped, reset it.

Faulty connection:

- Clean and tighten battery and harness plug connections.

Sulfated or worn out batteries:

- Check specific gravity and electrolyte level of each battery.

### **ENGINE**

#### ✓ **Engine hard to start or will not start**

Improper starting procedure.

- See starting section of this manual. Take special note of Bypass Switch operation.

No fuel.

- Check level of fuel in fuel tank.

Low battery output:

- Check electrolyte level and condition.

Excessive resistance in starting circuit:

- Clean and tighten all battery connections

Crankcase oil too heavy:

- Use oil of proper viscosity.

Improper type of fuel:

- Consult fuel supplier and use proper type of fuel for operating condition.

Water, dirt or air in fuel system:

- Drain, flush, fill and bleed system.

Clogged primary fuel filter element:

- Clean or replace filter element.

Clogged secondary fuel filter element:

- Replace filter element.

Dirty or faulty injection nozzles:

- Have your dealer check injection nozzles.

#### ✓ **Engine runs irregularly or stalls frequently**

Below normal engine temperature:

- Remove and check thermostat.

Clogged primary fuel filter element:

- Clean or replace filter element.

Clogged secondary fuel filter element:

- Replace secondary filter element.

Water or dirt in the fuel system.

- Drain, flush, fill and bleed system.

Dirty or faulty injection nozzles:

- Have your dealer check injection nozzles.

Air in fuel system:

- Inspect clamps and hoses on suction side of fuel pump for air leak.

Improper type of fuel:

- Consult fuel supplier and use proper type of fuel for operating condition.

#### ✓ **Lack of engine power**

Engine overloaded:

- Reduce load.

Intake air restriction:

- Service air cleaner.

Clogged primary fuel filter element:

- Clean or replace filter element.

Clogged secondary fuel filter element:

- Replace filter element.

Improper type of fuel:

- Consult fuel supplier and use proper type of fuel for operating conditions.

Overheated engine:

- See "Engine Overheats" in next category.

Below normal engine temperature:

- Remove and check thermostat.

## TROUBLESHOOTING (cont.)

If you cannot correct problems with these procedures, see your Northern Lights dealer.

### **ENGINE (cont.)**

Improper valve clearance:

- Reset valves. Best done by dealer.

Dirty or faulty injection nozzles:

- Replace injectors. Best done by dealer.

Injection pump out of time:

- See your local dealer.

#### ✓ **Engine overheats**

Engine overloaded:

- Reduce electrical load.

Low coolant level:

- Fill tank or radiator to proper level.
- Check hoses for loose connections and leaks.

Keel cooling tubes have been painted (marine.)

- Remove paint from tubes.

Cooling system needs flushing.

- Flush cooling system.

Defective thermostat:

- Remove and check thermostat.

Defective temperature gauge:

- Check water temperature with thermometer and replace gauge if necessary.

Water pump impeller worn/broken (marine.)

- Check impeller and replace if necessary.

#### ✓ **Engine knocks**

Insufficient oil:

- Call your dealer.

Injection pump out of time:

- Call your dealer.

Below normal engine temperature:

- Check your thermostats.
- Check water temperature to see if temperature gauge is working properly.

Engine overheating:

- See "Engine Overheating" section.

#### ✓ **High fuel consumption**

Improper type of fuel.

- Use correct fuel for temperature.

Clogged or dirty air cleaner:

- Service air cleaner.

Engine overloaded:

- Reduce electrical load.

Improper valve clearance:

- See your dealer.

Injection nozzles dirty:

- See your dealer.

Injection pump out of time:

- See your dealer.

Engine not at proper temperature.

- Check your thermostats.

- Check water temperature with thermometer and replace gauge if necessary.

#### ✓ **Below normal engine temperature**

Thermostats not working properly:

- Check thermostats.

Temperature gauge not working properly:

- Check water temperature with thermometer.

#### ✓ **Low oil pressure**

Low oil level.

- Fill crankcase to proper level.

Improper type of oil:

- Drain and fill crankcase with correct oil.

Partially plugged oil filter:

- Replace filter.

#### ✓ **High oil consumption**

Break-in period.

- Oil consumption decreases after break in.

Crankcase oil too light:

- Use proper viscosity oil.

Oil leaks:

- Check for leaks in lines around gaskets and drain plug.

Engine overheats:

- See "Engine Overheats".

#### ✓ **Engine emits black or gray exhaust smoke**

Clogged or dirty air cleaner:

- Service air cleaner.

Defective muffler (back pressure too high).

- Have dealer check back pressure.

Improper fuel.

- Use correct fuel for temperature.

Engine overloaded:

- Reduce electrical load.

Injection nozzles dirty:

- See your dealer.

Engine out of time:

- See your dealer.

#### ✓ **Engine emits white smoke**

Improper fuel.

- Use correct fuel for temperature.

Cold engine:

- Warm up engine to normal operating temperature.

Defective thermostat:

- Remove and check thermostat.

Engine out of time:

- See your dealer.

## NORTHERN LIGHTS 753 AND 753G DATA SHEET

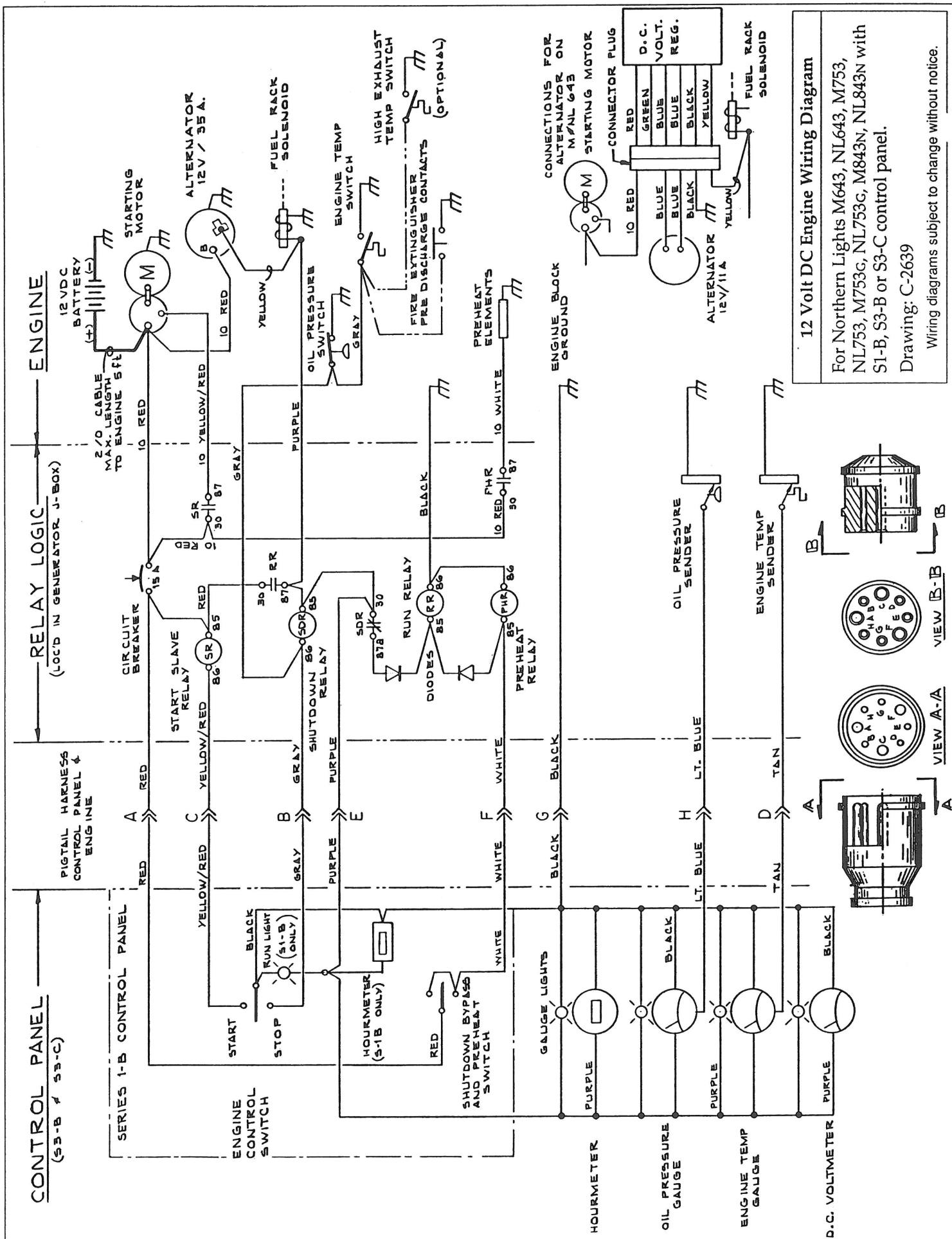
MODEL	ALL	M753 / M753a *		NL753 / NL753a *	
		8 / 1800 / 60	6 / 1500 / 50	8 / 1800 / 60	6 / 1500 / 50
<b>General Information</b>					
Cylinders	3				
Displacement	58.2 in <sup>3</sup> (.95L)				
Cycle	4				
Bore	2.95 in (75 mm)				
Stroke	2.83 in (72 mm)				
Rotation (Facing Flywheel)	counterclockwise				
Compression Ratio	23:1				
Crankcase Capacity	3.7 US qts. (3.5 L)				
Aspiration	Natural				
Flywheel Housing Size	SAE 5				
Flywheel Drive Size	6 in (152.4 mm)				
Dry Weight Complete Unit		497 lbs (225 kg) <b>545 lbs (247 kg)</b>	— <b>545 lbs (247 kg)</b>	475 lbs (215 kg) <b>497 lbs (226 kg)</b>	— <b>497 lbs (226 kg)</b>
Height		26.3 in (668 mm) <b>23.74 in (603 mm)</b>	— <b>23.74 in (603 mm)</b>	32 in (830mm) <b>30 in (757 mm)</b>	— <b>30 in (757mm)</b>
Width		18.3 in (465 mm) <b>18.5 in (475 mm)</b>	— <b>18.5 in (475 mm)</b>	23 in (590 mm) <b>19 in (474mm)</b>	— <b>19 in (474mm)</b>
Length		34.9 in (887 mm) <b>35.2 in (894 mm)</b>	— <b>35.2 in (894 mm)</b>	50 in (1270 mm) <b>39 in (978mm)</b>	— <b>39 in (978 mm)</b>
<b>Cooling System</b>					
Approx. Cooling System Capacity		1 US gal (3.7L)	1 US gal (3.7L)	1.25 US gal (4.7L)	1.25 US gal (4.7 L)
Minimum Through-Hull Diameter		.75 in (19 mm)	.75 in (19 mm)	—	—
Seawater Pump Inlet Hose I.D.		.75 in (19 mm)	.75 in (19 mm)	—	—
Minimum Seawater Discharge		.75 in (19 mm)	.75 in (19 mm)	—	—
Heat Rejection to Jacket Water		659 BTU/min	549 BTU/min	626 BTU/min	470 BTU/min
Freshwater Pump Capacity		7.9 USgal/min (30 L/min)	6.6 USgal/min (25 L/min)	7.9 USgal/min (30 L/min)	6.6 USgal/min (25 L/min)
Max. Seawater Pump Suction Head		39 in (1 m)	39 in (1 m)	—	—
Seawater Pump Capacity		9 US gal/min (34 L/min)	7.5 USgal/min (28 L/min)	—	—
Keel Cooler (Round) Tube Length		6 ft (1.8 m)	6 ft (1.8 m)	—	—
Keel Cooler Head Diameter		1 in NPT (25.4 mm)	1 in NPT (25.4 mm)	—	—
Keel Cooler Water Hose ID Discharge and Suction		1.25 in (30 mm)	1.25 in (30 mm)	—	—
<b>Electrical</b>					
Min. Battery Capacity @0°F (-17°C)	400 cca				
Battery Cable Size	#2 up to 10 ft				
Instrmnt. Harness Length (Standard)		20 ft (6.1 m)	20 ft (6.1 m)	—	—
Starting Voltage, Negative Ground	12				
<b>Air</b>					
Generator Cooling Air Flow		350 f <sup>3</sup> (10m <sup>3</sup> )/min <b>525 f<sup>3</sup> (15m<sup>3</sup>)/min</b>	290 f <sup>3</sup> (8.2m <sup>3</sup> )/min <b>437 f<sup>3</sup> (12.3m<sup>3</sup>)/min</b>	350 f <sup>3</sup> (10m <sup>3</sup> )/min <b>190 f<sup>3</sup> (5.4m<sup>3</sup>)/min</b>	290 f <sup>3</sup> (8.2m <sup>3</sup> )/min <b>170 f<sup>3</sup> (4.8m<sup>3</sup>)/min</b>
Air Consumption		27 f <sup>3</sup> (.76m <sup>3</sup> )/min 7.1 in <sup>2</sup> (46 cm <sup>2</sup> )	22.5 f <sup>3</sup> (.64m <sup>3</sup> )/min 5.9 in <sup>2</sup> (.38cm <sup>2</sup> )/min	27 f <sup>3</sup> (.76m <sup>3</sup> )/min —	22.5 f <sup>3</sup> (.64m <sup>3</sup> )/min —
Minimum Engine Room Vent	48 in (122 cm)H <sub>2</sub> O				
Maximum Exhaust Back Pressure					
Wet Exhaust Elbow OD		2 in (50 mm) OD	2 in (50 mm) OD	—	—
Dry Exhaust Elbow ID		1.5 NPT (38 mm)	1.5 NPT (38 mm)	—	—
<b>Max. Intrmnt. Eng. Oper. Angle</b>					
Front or Rear Down		15°	15°	0°	0°
<b>Fuel</b>					
Minimum Suction Line	.25 in (6.35mm)				
Minimum Return Line	.25 in (6.35mm)				
Max. Fuel Pump Head - Suction	39 in (1.0m)				
<b>Performance Data</b>					
Rated Flywheel HP		13.5	10	12	10
Specific Fuel Consumption at Maximum Load		0.458 lbs/hp/hr (279 g/kw/hr)	0.458 lbs/hp/hr (279 g/kw/hr)	0.458 lbs/hp/hr (279 g/kw/hr)	0.458 lbs/hp/hr (279 g/kw/hr)
Approximate Fuel Rate at Maximum Load		0.94 USgal/hr (3.5 L/hr)	0.70 USgal/hr (2.7 L/hr)	0.94 USgal/hr (3.5 L/hr)	0.70 USgal/hr (2.7 L/hr)
* Where data differs, 753g in bold.					



## NORTHERN LIGHTS 843N DATA SHEET

MODEL	ALL	M843N		NL843N	
<b>Rated RPM</b>		<b>1800</b>	<b>1500</b>	<b>1800</b>	<b>1500</b>
<b>Kilowatt Rating</b>		<b>12</b>	<b>10</b>	<b>12</b>	<b>10</b>
<b>Frequency (Hz)</b>		<b>60</b>	<b>50</b>	<b>60</b>	<b>50</b>
<b>General Information</b>					
Cylinders	3				
Displacement	90.8 in <sup>3</sup> (1.49 L)				
Cycle	4				
Bore	3.31 in (84 mm)				
Stroke	3.54 in (90 mm)				
Rotation (Facing Flywheel)	counterclockwise				
Compression Ratio	22:1				
Crankcase Capacity	5.8 US qts. (5.5 L)				
Aspiration	Natural				
Flywheel Housing Size	SAE 4				
Flywheel Drive Size	7.5 in				
Dry Weight Complete Unit with Heat Exchanger or Radiator		726 lbs (329 kg)	726 lbs (329 kg)	675 lbs (306 kg)	675 lbs (306 kg)
Height		25.1 in (637 mm)	25.1 in (637 mm)	33.0 in (835 mm)	33.0 in (835mm)
Width		20.1 in (510 mm)	20.1 in (510 mm)	21.0 in (540 mm)	21.0 in (540 mm)
Length		38.1 in (969 mm)	38.1 in (969 mm)	45.0 in (1143 mm)	45.0 in (1143 mm)
<b>Cooling System</b>					
Approx. Cooling System Capacity		1.1 US gal (4.1 L)	1.1 US gal (4.1 L)	—	—
Minimum Through-Hull Diameter		.75 in (19 mm)	.75 in (19 mm)	—	—
Seawater Pump Inlet Hose (Inside Dia.)		.75 in (19 mm)	.75 in (19 mm)	—	—
Minimum Seawater Discharge		.75 in (19 mm)	.75 in (19 mm)	—	—
Heat Rejection to Jacket Water		790 BTU/min	658 BTU/min	750 BTU/min	625 BTU/min
Freshwater Pump Capacity		13.3 USgal/min (50 L/min)	11.0 USgal/min (42 L/min)	13.3 USgal/min (50 L/min)	11.0 USgal/min (42 L/min)
Max. Seawater Pump Suction Head		39 in (1 m)	39 in (1 m)	—	—
Seawater Pump Capacity		9 US gal/min (34 L/min)	7.5 US gal/min (28 L/min)	—	—
Keel Cooler (Round) Tube Length		8 ft (2.6 m)	8 ft (2.6m)	—	—
Keel Cooler Head Diameter		1 in NPT (25.4 mm)	1 in NPT (25.4 mm)	—	—
Keel Cooler Water Hose ID Discharge and Suction		1.25 in (30 mm)	1.25 in (30 mm)	—	—
<b>Electrical</b>					
Minimum Battery Capacity @ 0°F (-17°C)	500 cca				
Battery Cable Size	#2AWG up to 10ft				
Instrmnt. Harness Length (Std)		20 ft (6.1m)	20 ft (6.1m)	—	—
Starting Voltage, Negative Ground	12 volt				
<b>Air</b>					
Generator Cooling Air Flow		378 ft <sup>3</sup> /min (10.8 m <sup>3</sup> /min)	357 ft <sup>3</sup> /min (10.2 m <sup>3</sup> /min)	190 ft <sup>3</sup> /min (5.4 m <sup>3</sup> /min)	170 ft <sup>3</sup> /min (4.8 m <sup>3</sup> /min)
Air Consumption		39.6 ft <sup>3</sup> /min (1.13 m <sup>3</sup> /min)	33 ft <sup>3</sup> /min (.93 m <sup>3</sup> /min)	39.6 ft <sup>3</sup> /min (1.13 m <sup>3</sup> /min)	33 ft <sup>3</sup> /min (.93 m <sup>3</sup> /min)
Minimum Engine Room Vent		11 in <sup>2</sup> (72cm <sup>2</sup> )	—	—	—
Maximum Exhaust Back Pressure	48 in (122 cm) H <sub>2</sub> O				
Wet Exhaust Elbow OD		2 in (52 mm) OD	2 in (52 mm) OD	—	—
Dry Exhaust Elbow		1.5 in NPT	1.5 in NPT	—	—
<b>Max. Intrmnt. Eng. Oper. Angle</b>					
Front Down		15°	15°	—	—
Rear Down		15°	15°	—	—
<b>Fuel</b>					
Minimum Suction Line	1/4 NPT				
Minimum Return Line	1/4 NPT				
Max. Fuel Pump Head - Suction	39 in (1m)				
<b>Performance Data</b>					
Rated Flywheel HP		19	15	18	15
Specific Fuel Consumption at Maximum Load		.464 lbs/hp/hr (282 g/kwh)	.464 lbs/hp/hr (282 g/kwh)	.464 lbs/hp/hr (282 g/kwh)	.464 lbs/hp/hr (282 g/kwh)
Approximate Fuel Rate at Maximum Load		1.2 US gal/hr (4.5 L/hr)	10 US gal/hr (3.8 L/hr)	1.2 US gal/hr (4.5 L/hr)	10 US gal/hr (3.8 L/hr)



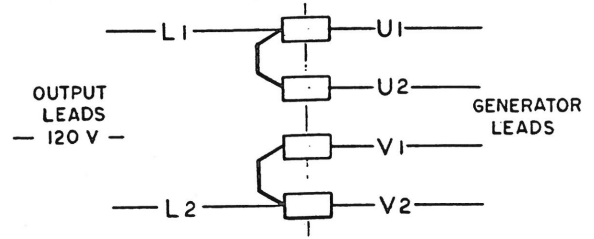
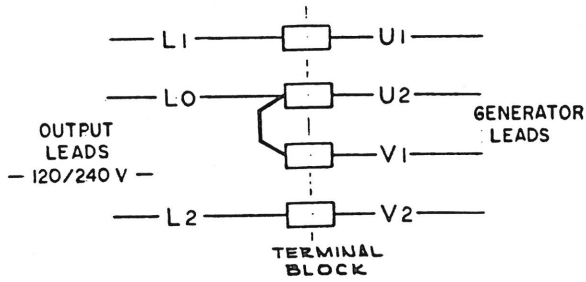


**12 Volt DC Engine Wiring Diagram**

For Northern Lights M643, NL643, M753, NL753, M753G, NL753G, M843N, NL843N with S1-B, S3-B or S3-C control panel.

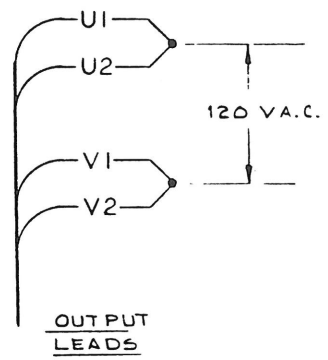
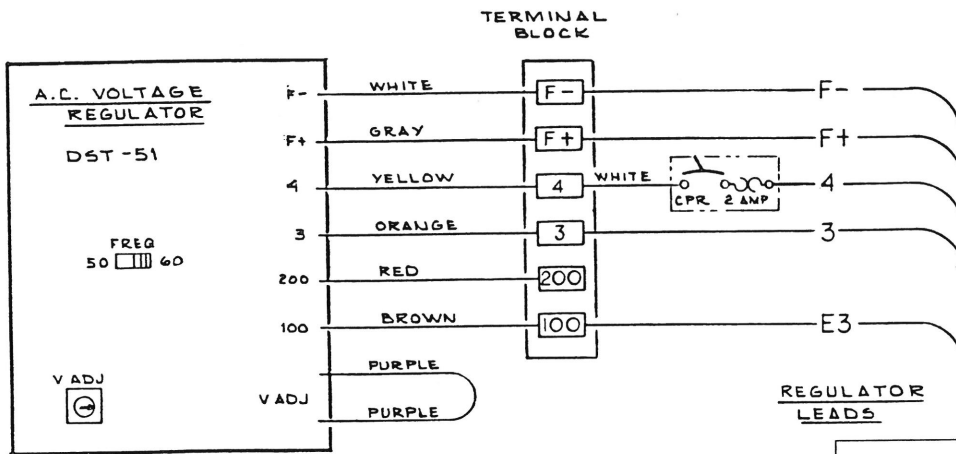
Drawing: C-2639

Wiring diagrams subject to change without notice.



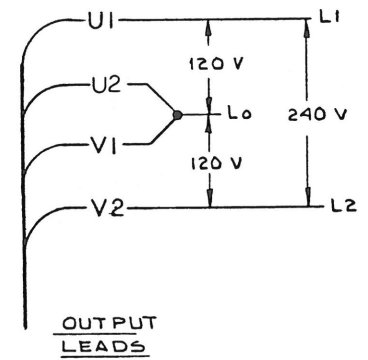
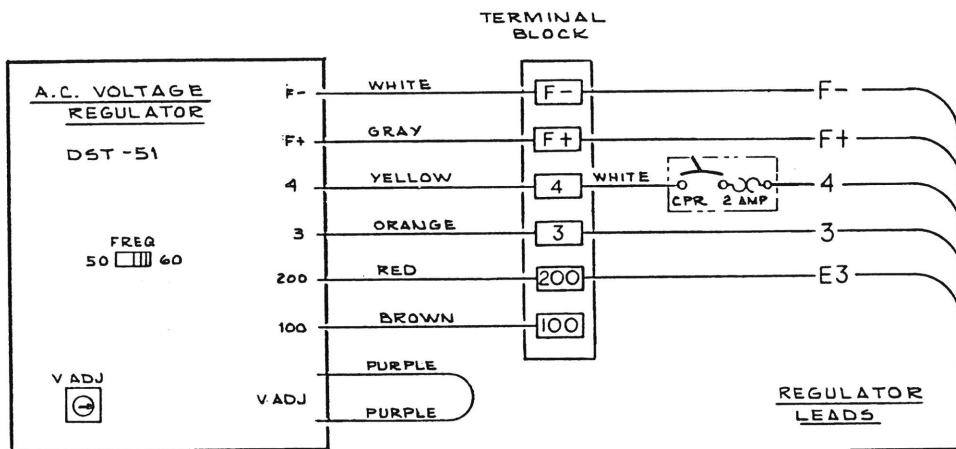
**SAW AC Wiring Diagram**  
**Single Phase - 120 Volt and 120/240 Volts**  
 For Northern Lights M753 and NL753 with  
 SAW self regulated generator end.  
 Drawing: A-5261

Wiring diagrams subject to change without notice.



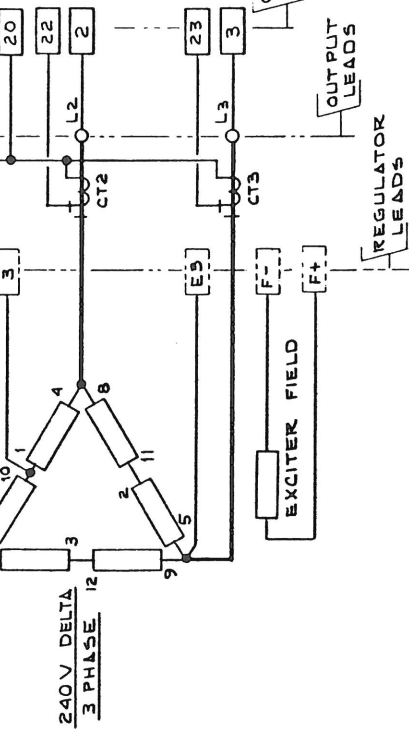
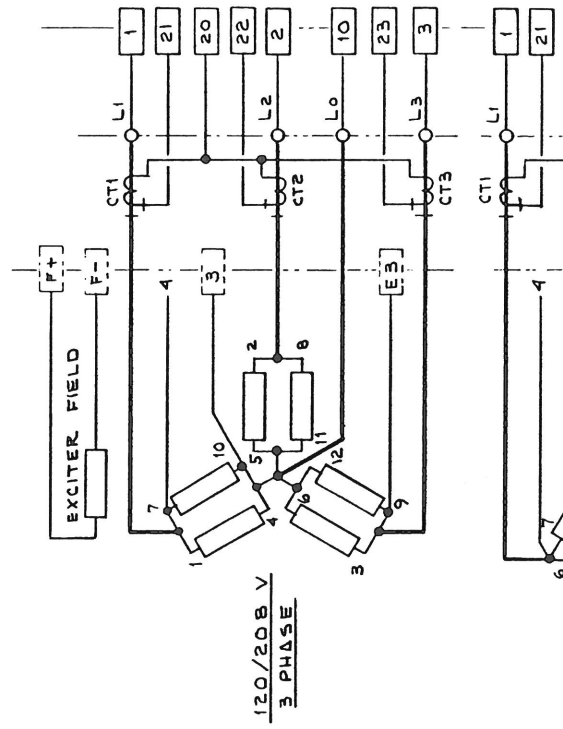
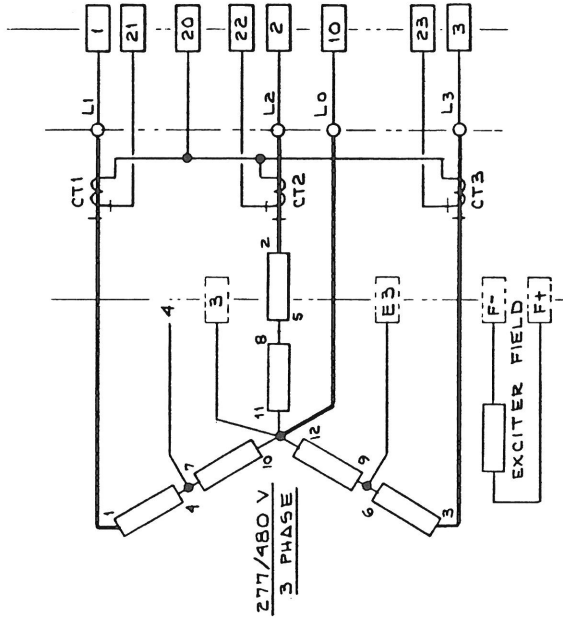
**PXG AC Wiring Diagram**  
**Single Phase - 120 Volts**  
 For Northern Lights M753G, NL753G, 843N &  
 NL843N with 4-wire PXG generator ends and  
 automatic voltage regulators. Drawing: B-4028

Wiring diagrams subject to change without notice.



**PXG AC Wiring Diagram**  
**Single Phase - 120/240 Volts**  
 For Northern Lights M753G, NL753G, 843N &  
 NL843N with 4-wire PXG generator ends and  
 automatic voltage regulators. Drawing: B-4080

Wiring diagrams subject to change without notice.

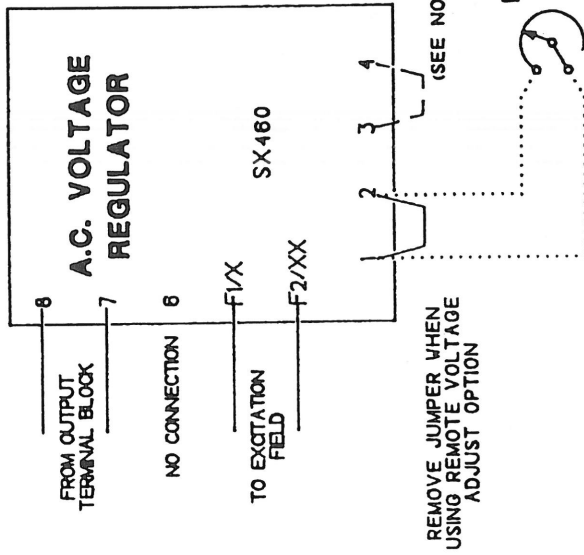


**PXG AC Wiring Diagram**  
**Three Phase - 120/208, 240 Delta, 277/480V**

For Northern Lights M753g, NL753g, M843n, NL843n with 12 wire PXG generator ends and automatic voltage regulators.

Drawing: B-4081  
 Wiring diagrams subject to change without notice.

NOTES: 1. JUMPER TERMINALS 3 & 4 ON REGULATOR WHEN CONFIGURED FOR 120V(110V) OUTPUT ONLY.

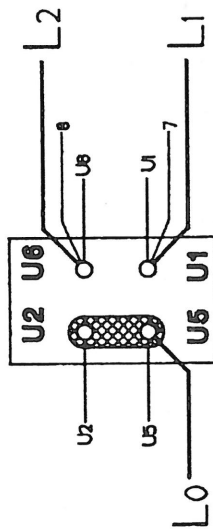


THIS DRAWING IS REFERENCED TO DRAWINGS DA7-A401 AND DA7-1460 "NEWAGE INTERNATIONAL Ltd."

BCI AC Wiring Generator & Voltage Regulator

For Northern Lights M753G, NL753G, M843N & NL843N. Drawing: B-4676

**OUTPUT TERMINAL BLOCK**

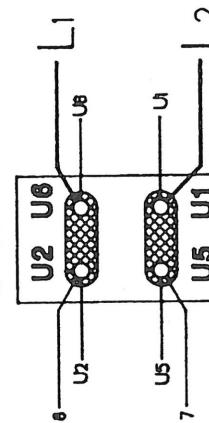


120/240V 1PH 60 Hz  
(110/220V 1PH 50 Hz)

INDICATES USE OF LINK BARS



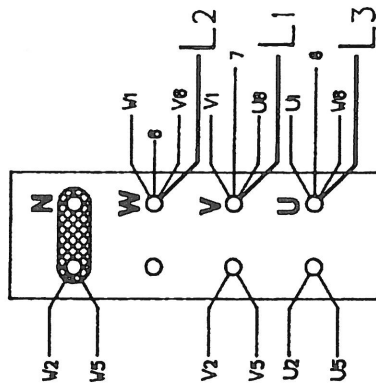
**OUTPUT TERMINAL BLOCK**



120V 1 PHASE 60 Hz  
(110V 1 PHASE 50 Hz)

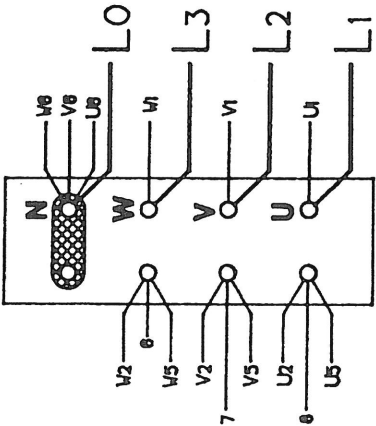
NOTE : 1. REGULATOR WIRE No.6 IS NOT REQUIRED.  
MAY BE ELIMINATED FOR CONVIENCE.

**OUTPUT TERMINAL BLOCK**



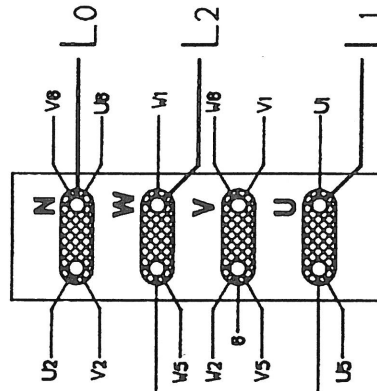
240V 3PH 60 Hz DELTA  
(220V 3PH 50 Hz DELTA)

**OUTPUT TERMINAL BLOCK**



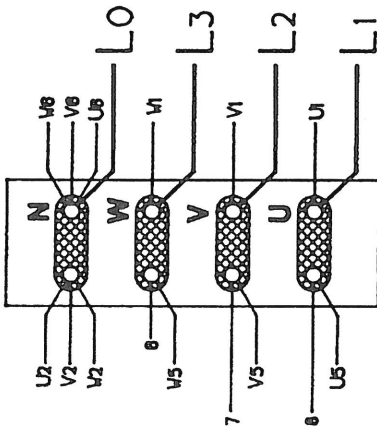
277/480V 3PH 60 Hz  
(220/380V 3PH 50 Hz)

**OUTPUT TERMINAL BLOCK**



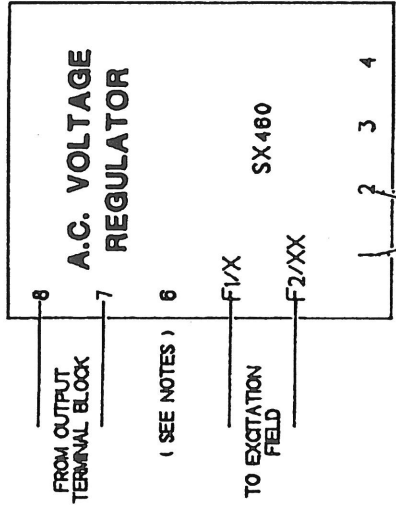
120/240V 1PH 60 Hz  
(110/220V 1PH 50 Hz)

**OUTPUT TERMINAL BLOCK**



120/208V 3PH 60 Hz  
(110/220V 3PH 50 Hz)

INDICATES USE OF LINK BARS



REMOVE JUMPER WHEN USING REMOTE VOLTAGE ADJUST OPTION



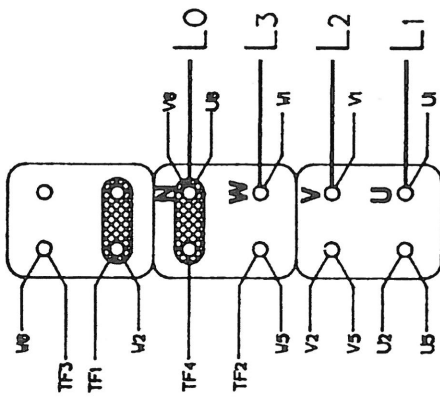
REMOTE VOLTAGE ADJUST (OPTIONAL)

THIS DRAWING IS REFERENCED TO DA7-A100 "NEVAGE INTERNATIONAL Ltd."

**BCI AC Wiring Diagram**

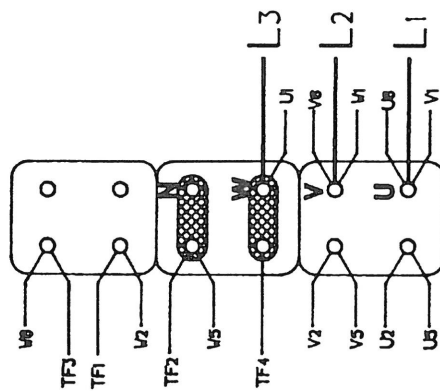
For Northern Lights M753G, NL753G, M843N & NL843n with BCI generator ends and automatic voltage regulators. Drawing: B-4569

**OUTPUT TERMINAL BLOCK**



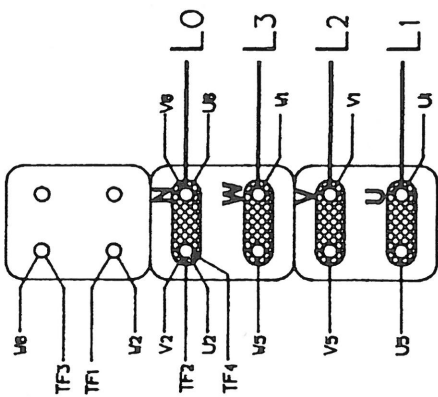
277/480V 3PH 60 Hz  
(220/380V 3PH 50 Hz)

**OUTPUT TERMINAL BLOCK**



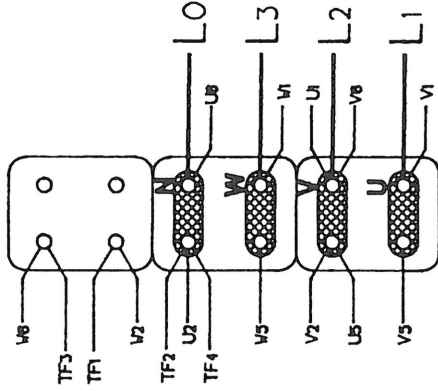
240V 3PH 60 Hz DELTA  
(220V 3PH 50 Hz DELTA)

**OUTPUT TERMINAL BLOCK**



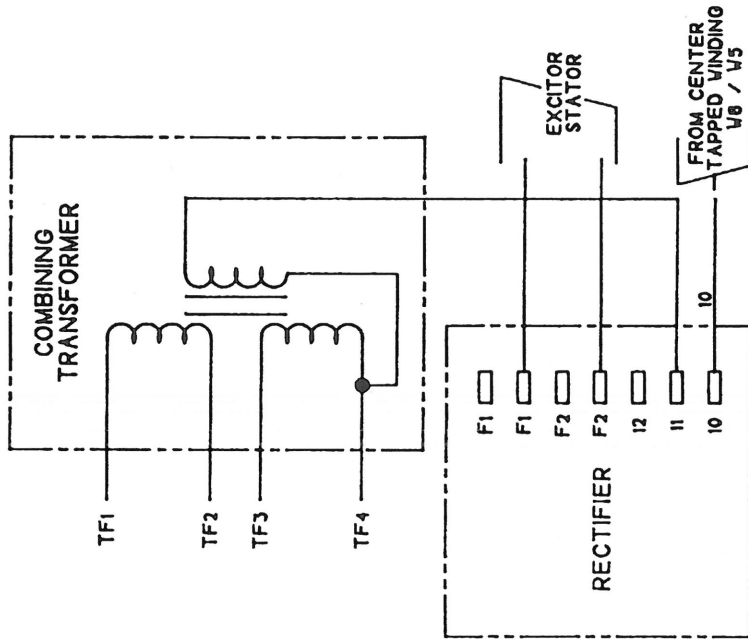
120/208V 3PH 60 Hz  
(110/220V 3PH 50 Hz)

**OUTPUT TERMINAL BLOCK**



120/240V 1PH 60 Hz  
(110/220V 1PH 50 Hz)

INDICATES USE OF LINK BARS



THIS DRAWING IS REFERENCED TO  
DA7-1500 "NEWAGE INTERNATIONAL Ltd."

BCI Series 5 AC Wiring Diagram

For Northern Lights M753G, NL753G, M843N &  
NL843N with self regulated BCI Series 5  
generator end. Drawing: B-4689

Notes

