

DE LAVAL STANDBY ALTERNATOR SERIES UR

Installation-Operation-Maintenance-Parts List

Printed in the U.S.A.

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Warranty

Sellers represent that De Laval's warranty is as follows:

This warranty is conditioned on the accuracy of the information furnished by the buyer, and installation (when applicable), operation, and performance of maintenance pursuant to equipment manufacturer's instructions.

De Laval warrants to the original user that equipment of its manufacture is free from defects in material and workmanship for a period of one year from the date of installation. Equipment parts or accessories manufactured by others carry the warranty and remedy provided by that manufacturer only.

The equipment will fulfill the mechanical function it is designed to perform, but due to the wide variation in farm animals, management practices on farms, and any other conditions beyond the equipment manufacturer's control, no specific level of performance is guaranteed.

Excluded from the foregoing warranty are damages caused by late delivery, ordinary wear and tear, erosion or corrosion, or by misuse, abuse, or improper handling or operation of the equipment by the purchaser or any third party.

Any warranty or claims which differ from the foregoing are unauthorized by De Laval, and become the warranty solely of the party making them.

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ENGINE EXHAUST GAS (CARBON MONOXIDE) IS DEADLY!

Carbon monoxide is an odorless, colorless gas formed by incomplete combustion of hydrocarbon fuels. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal. Some of the symptoms or signs of carbon monoxide inhalation are:

 Dizziness 	
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- Intense Headache
 Weakness and Sleepiness
- Muscular Twitching

Vomiting

• Throbbing in Temples

If you experience any of the above symptoms, get out into fresh air immediately.

The best protection against carbon monoxide inhalation is a regular inspection of the complete exhaust system. If you notice a change in the sound or appearance of exhaust system, shut the unit down immediately and have it inspected and repaired at once by a competent mechanic.

SAFETY PRECAUTIONS

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

This symbol is used throughout this manual to warn of possible serious personal injury.

CAUTION CAUTION Equipment damage

Study the following safety precautions carefully and insist that they be followed by those working with you and for you.

GUARD AGAINST ELECTRIC SHOCK

- Use extreme caution when working on electrical components. High voltage currents cause injury or death.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician.
- When working around electrical equipment, move cautiously to avoid shocks.
- Do not lunge after falling tools.
- Stop all power, and ground all high voltage points before touching wires.
- Make certain that power cannot be accidentally restored.
- Be sure power is off if you must work on underground electrical equipment.
- Do not examine live equipment when mentally or physically fatigued.
- Do not touch live electrical equipment while standing on metal floors, damp concrete or other well grounded surfaces.
- Do not handle live electrical equipment while wearing damp clothing (particularly wet shoes) or while skin surfaces are damp.
- Be extra cautious when working with alternator during a rain.

- Do not take unnecessary risks.
- Do not work along.

EXHAUST GASES ARE TOXIC

- Provide an adequate exhaust system to properly expel discharged gases. Check exhaust system regularly for leaks.
- Be sure the unit is well ventilated.

PROTECT AGAINST MOVING PARTS

- Avoid moving parts of the unit. Loose jackets, shirts or sleeves should not be permitted because of the danger of becoming caught in moving parts.
- Clothing worn by the operator should be fairly tight and belted. Loose jackets, shirts, or sleeves should not be permitted because of the danger of getting into moving parts.
- Do not allow anyone to operate the alternator without proper instructions.
- Make sure all nuts and bolts are secure. Keep power shields and guards in position.
- If adjustments *must* be made while the unit is running, use extreme caution around moving parts, etc.
- Before lubricating alternator always:
 - 1. Disengage all power
 - 2. Shut off engine, and then
 - 3. Wait until rotor stops.

FIRE EXTINGUISHERS

- It is a good practice to have a fire extinguisher nearby. Be sure that the extinguisher is properly maintained and be familiar with its proper use.
- Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.

KEEP THE UNIT AND SURROUNDING AREA CLEAN

- Remove oil, grease, ice, snow or materials that create slippery conditions around unit.
- Remove oily rags and other materials that create potential fire hazards.

GENERAL INFORMATION

INTRODUCTION

This manual contains information for the proper installation, operation and maintenance of your alternator. We suggest you keep this book handy so it can be referred to when necessary.

If you wish to contact your dealer regarding this equipment, be sure to supply the complete model number and the full serial number. This information is necessary to identify your equipment among the many units manufactured.

DESCRIPTION

PTO models 40.0 UR and 55.0 UR are revolving field, two bearing, brushless alternators. AC output voltage is generated in the stator and controlled by an exciterregulator system. The exciter-regulator produces DC for field excitation and regulates the AC output.

The rotor consists of four interconnected coils spaced symmetrically on a steel shaft which transmits excitation voltage to the field coils. The shaft is supported at both ends by ball bearings. A centrifugal blower on the drive end of the alternator draws air through the alternator for cooling.

The complete alternator includes an exciter-regulator system, mounting feet, lifting eye, mounted gear box with splined shaft, and control box.

Exciter-Regulator System

The exciter and voltage regulator work together to control the AC output voltage over a wide range of load conditions. This system is factory-set to provide the proper voltage.

Control Box

The control box includes a voltmeter, a fused, 120volt, duplex receptacle, an exciter circuit breaker (alternator protection), and convenient load connection terminals.

Gear Box

The gear box is secured to the alternator's adapter and has two gears. A pinion gear is pressed onto the splined alternator rotor shaft. It meshes with a larger helical gear which is pressed onto the splined input shaft.



This alternator cannot be belt driven or damage will occur to the gear drive box.

OPTIONAL ACCESSORIES

The 1000 rpm PTO shaft has a 21-spline yoke assembly at both ends and extends from 40 to 56-5/8 inches (1015 to 1435 mm).



SPECIFICATIONS

	4(0 kW	55 kW		
	MODEL 3G	MODEL 5DG	MODEL 3G	MODEL 5DG	
Vatts Starting Watts	40,000 120,000 120/240	40,000 103,000 120/240∆*	55,000 163,000 120/240	55,000 140,000 120/240∆*	
Phase lertz (cycles per second)	1 60	3 60	1 60	3 60	
Running current (amperes)	166 1.0	120 0.8	229 1.0	166 0.8	
Tractor PTO speed (rpm) Tractor PTO speed (rpm) 21-Spline PTO Shaft	1800	1800	1000	1000	
Gearbox oil capacity	.2½ pts (1.18 lit)	2½ pts (1.18 lit)	2½ pts (1.18 lit)	2½ pts (1.18 lit)	
Recommended gear lubricant Ainimum tractor hp required	SAE 90 EP 73 (55 kW)	SAE 90 EP 73 (55 kW)	SAE 90 EP 100 (75 kW)	SAE 90 EP 100 (75 kW)	
	1 A A		•		

* - Reconnect to also deliver 120/208 volts, three phase.

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SUPPLEMENTARY INSTRUCTIONS AND PARTS CATALOG

Add this information to the Delaval Standby Alternator-Series UR Installation-Operation-Maintenance-Parts List SNF-4876 (971-0014)

This information applies to the Terrell gear boxes (190-0538) on all 45.0 kW and 65.0 kW PTO Alternators beginning with Spec E. The oil capacity of these gear boxes is 1.25 pints (0.66 litre) of SAE 90 EP gear lubricant. The Terrell 1000 rpm gear boxes are similar in appearance and other details to the Apex 1000 rpm gear boxes (190-0327) in use prior to Spec E.

NOTE: Spare parts are still available for Apex gear boxes on units built prior to Spec E.

The Terrell gear boxes can not be used to replace the Apex gear boxes on units built prior to Spec E, unless the shoulder on the rotor shaft is machined to fit the Terrell gear box.

NOTE: The above information does not apply to any of the 80.0 kW UR PTO Alternators.

SUPPLEMENTARY PARTS LIST

These parts are applicable to the 45.0KW and 65.0KW PTO alternators beginning spec E. Use these parts in place of or in addition to those listed in the main Installation - Operation - Maintenance - Parts List SNF-4876 (971-0014). Parts similar in appearance are not illustrated.

GENERATOR

REF.	PART (QTY.			PART			
<u>NO.</u>	NO.	USED		Ī	DESCRIPTI	ON		
1	ROTOR ASSEM	BLY, WOUN	ID (Includes	Parts	Marked '	' In	The Main	Parts
	, ,	· ·	List)		-			•
	201-2364	1	45KW				•	
	201-2366	1	65KW, 1	Phase	•			
	201-2365	. 1	.65KW, 3	Phase				
7	STATOR ASSE	MBLY, WOU	IND					
	220-1878	1	45KW, 1	Phase				
	220-1866	1	45KW, 3	Phase				•
	220-1880	1	65KW, 1	Phase				
	220-1867	• 1	65KW, 3	Phase				
12	STUD, ALTER	NATOR THR	OUGH					
	520-0721	4 .	45KW					
	520-0723	4	65KW, 1	Phase				
	520-0722	4	65KW, 3	Phase				

CONTROL

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
12	302-1036	1	Voltmeter
19	332-1956	1	Board Assembly, Printed Circuit (See Separate Group For Components)





GEAR DRIVE BOX (1000 rpm)

REF.	PART	QTY.	PART
NO.	NO.	USED	DESCRIPTION
-	190-0538	1	Gear Drive Box - Complete (terrell)
1	190-0548	2	Housing (Half)
2	190-0549	1	Gear (40 teeth)
3	190-0550	1	Gear (72 teeth)
4	190-0551	. 1	Shaft, Input - Splined
5	190-0552	1	Shaft, Output - Splined
6	190-0553	2	Cover
7	190-0554	1	Cover
8	190-0555	1	Flange, Generator
9	190-0556	4	Cup, Bearing
10	190-0557	4	Cone, Bearing
11	190-0558	. 2	Seal, Output Shaft
12	190-0559	1	Seal, Input Shaft
13	516-0024	2	Pin, Dowel (5/16 X 1")
14	190-0560	1	Gasket, Housing
15 ்	190-0561	As Req.	Shim (.005")
16	190-0562	As Req.	Shim (.007")
17	190-0563	As Req.	Shim (.020")
18	190-0564	2	Key, Square (3/8 Square X 1-7/8")
19	800-0051	8	Screw, Cap - Hex Head (3/8-16 X 1'4")
20	850-0050	. 26	Washer, Lock - Spring (3/8")
21	800-0059	10	Screw, Cap - Hex Head $(3/8-16 \times 3^{1}a'')$
22	862-0003	. 14	Nut, Hex (3/8-16)
23	800-0052	4	Screw, Cap - Hex Head (3/8-16 X 15")
24	190-0565	9	Plug. Pipe
25	190-0566	1	Plug, Plastic
27	190-0568	4	Stud (3/8 X 2")
28	505-0120	1	Elbow, Pipe - Street $(3/8 \times 90^{\circ})$
29	518-0275	· · 1	Vent, Gear Box

PRINTED CIRCUIT BOARD ASSEMBLY (332-1956)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	332-1956	1	Board Assembly, Printed -	R11	352-0151	1	Resistor - Fixed 5 Watt, 15.000-Ohm
C1 14	355-0042	2	Capacitor - 47 Mfd, 250 Volt	B12	351-0909	1	Resistor - 1/2 Watt. 90.900-Ohm
C2 C7	355-0043	2	Capacitor - 22 Mfd, 250 Volt	B13	350-0411	1	Resistor - 1/2 Watt. 10.000-Ohm
C3	355-0047	1	Capacitor - 47 Mfd, 400 Volt	R14	350-0443	1	Resistor - 1/2 Watt, 220,000-Ohm
C4 C12	355-0044	2	Capacitor - 47 Mfd, 250 Volt	R15. R27	350-0435	2	Resistor - 1/2 Watt, 100,000-Ohm
C5 C8	355-0046	2	Capacitor - 1 Mfd, 100 Volt	B17	351-0521	1	Resistor, Metal Film -
C6	355-0056	1	Capacitor33 Mfd, 250 Volt				1/4 Watt, 12,100-Ohm
C11	355-0048	1	Capacitor - 1 Mfd, 400 Volt	R18	303-0210	1	Potentiometer - 5,000-Ohm, 1/2 Wat
C13	356-0039	1	Capacitor - Electrolytic	R20, 22			
0.0			100 Mfd, 10 Volt	29 & 30	351-0520	4	Resistor - 1/4 Watt, 28,000-Ohm
CB3				R21	351-0522	1	Resistor - Metal Film -
Thru 11	357-0014	9	Rectifier - Silicon				1/4 Watt, 5,110-Ohm
CR12	359-0036	1	Diode - Zener 5.6 Volt	R24	351-0523	1	Resistor - Metal Film -
CB13	359-0025	1	Diode - Zener 20 Volt				1/4 Watt, 8,870-Ohm
CR14	359-0026	1	Diode - Zener 18 Volt	R25, R31	350-1011	2	Resistor - 2 Watt, 10,000-Ohm
F1, F2, F3	321-0204	3	Fuse 1/4 Amp	R26	303-0211	1	Potentiometer - 1/2 Watt,
1C1	367-0005	1	Integrated Circuit				100,000-Ohm
Q2	362-0017	1	Transistor - Silicon NPN	R28	350-0568	1	Resistor - 1/2 Watt .47 Meg-Ohm
Q 3	361-0004	1	Transistor - Unijunction	TB1	332-1252	1	Terminal Block
R1	350-0355	1	Resistor - 1/2 Watt, 47-Ohm	CR15	359-0015	1	Diode - Zener - 24 Volt
R2, R3	350-0351	2.	Resistor - 1/2 Watt, 33-Ohm		321-0163	6	Clip - Fuse
R4	350-1075	1	Resistor - 2 Watt, 4.7 Meg-Ohm	K1	307-1063	1	Relay, Magnetic Reed
R5	353-0040	1	Resistor - Fixed 10 Watt,	R9	350-1014	1	Resistor - 2 Watt, 13,000-Ohm
			270-Ohm	R19	350-1007	1	Resistor - 2 Watt, 6,800-Ohm
R6	353-0039	`1	Resistor - Fixed 15 Watt, 5,000-Ohm				1
R 7	350-0398	1	Resistor - 1/2 Watt, 3,000-Ohm				
R8. R16	350-0447	2	Resistor - 1/2 Watt, 330,000-Ohm				
R10	351-0885	1	Resistor - 1/2 Watt, 51,100-Ohm				
• =				5			

INSTALLATION

LOCATION

Figure 1 shows dimensions of the alternator and bolthole centers for installation. Select a site for the alternator with the following points in mind.

Ventilation

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1.

The alternator creates considerable heat when operating under load. It is important that this heat be dissipated by proper ventilation. If the alternator is installed inside a small room or compartment, provide a vent for exhausting the air heated by the alternator. Locate the exhaust vent above the inlet vent. Heated air is discharged from the drive-shaft end of the alternator.

CAUTION Failure to ensure adequate ventilation results in alternator overheating and possible damage to alternator components.

Convenience to Driving Power

Locate the alternator for easy connection to the tractor. Align the power take-off to the alternator. Stay within the limits of the power take-off shaft.







UNIT RATING	DIM A	WEIGHT	MASS(Kg)	NOTES:
40.0 UR 5DG/170C (30 0.8 PF)	39.62 (1006)	820	372	ARE MILLIMETRES.
55.0 UR 506/170C (30 0.8 PF)	41.00 (1041)	886	402	· · · · ·
40.0 UR 3G/170C (10 LOPF)	40.25 (1022)	820	372	
55.0 UR 3G/17OC (10 1.0PF)	41.88 (1064)	886	402	

FIGURE 1. ALTERNATOR OUTLINE

Dusty or Damp Conditions

Avoid dusty or damp conditions as much as possible. Alternator should be mounted under cover or inside a building to protect it against the weather.

Servicing Convenience

Allow at least 24 inches (610 mm) of space on all sides of the alternator.

Wiring Convenience

Install the alternator as close as possible to the load

transfer switch. Do not move the load transfer switch to the alternator (see *Installing Load Transfer Switch*). Do not locate the alternator in a location difficult to service or a location which provides poor ventilation just to save a few feet of wire.

MOUNTING

Figure 2 shows the recommended mounting base and bolt hole centers to use for the alternator. Be sure the mounting base is level and flat so the alternator mounting brackets do not bend when tightened down. Be sure the alternator is properly aligned with



FIGURE 3. TYPICAL SINGLE-PHASE ALTERNATOR INSTALLATION

the driving mechanism and that it will stay in alignment. After securing the alternator with lockwashers and nuts, the alternator PTO shaft should turn freely.

CAUTION Do not mount this alternator on a trailer. Torque from the tractor PTO will flip the alternator over unless secured to a strong substructure.

WIRING

Figure 3 shows a typical, single-phase installation of an alternator and a load transfer switch where the neutral is not switched. To gain access to the load connection bars of the alternator, open the two latches on the front of the control box. Then lift the cover off. Figure 4 shows the single-phase, three-wire connections; Figure 5 shows the three-phase, fourwire connections. Fasten the load wires to the connection bars with the capscrews and nuts. Knockouts are provided on each side of the control box.

For a safe installation, personnel connecting the alternator and any auxiliary equipment must be fully qualified and understand wiring diagrams, etc.

120/240-Volt, 1-Phase, 3-Wire Alternator

Terminal L0 is the grounded (neutral) terminal. For 120-volt current, connect the "hot" load wire to either the L1 or L2 terminal (Figure 4). Connect the neutral load wire to the L0 terminal. Two 120-volt circuits are thus available, with not more than 1/2 the alternator rated capacity available on each circuit. Balance the load as closely as possible. If using both 120- and 240volt current at the same time, use care not to overload either circuit.

120/240-Volt Delta, 3-Phase, 4-Wire Alternator

The 3-phase alternator is designed to supply 120-volt



FIGURE 4. 120/240-VOLT, SINGLE-PHASE CONNECTIONS



FIGURE 5. 120/240-VOLT, THREE-PHASE CONNECTIONS

and 240-volt, 1-phase current and 240-volt, 3-phase current.

For 3-phase operation, connect the three black load wires to the three terminals L1, L2, and L3—one wire to each terminal. For 3-phase operation, the L0 terminal is not used.

For 120/240-volt, 1-phase, 3-wire operation, terminals L1 and L2 are the "hot" terminals. The L0 terminal is the neutral, which can be grounded if required. For 120-volt service, connect the "hot" (black) load wire to either the L1 or L2 terminal. Two 120-volt circuits are available. A 240-volt, single-phase service can be obtained between any two three-phase terminals.

Any combination of 1-phase and 3-phase loading can be used at the same time as long as no terminal current exceeds the nameplate rating of the alternator. If no 3-phase output is used, usable 1-phase output is 2/3 of 3-phase kVA.

For reconnection to 120/208-voltage, refer to the wiring diagram.

Grounding the Alternator



Be sure to ground the alternator to eliminate electrical shock hazard.

Connect a #8 or larger wire between the alternator and:

- 1. the lightning ground rod at the pole (grounds neutral from power line at top of pole) as shown in Figure 3, or
- 2. a separate ground pipe or rod penetrating into moist earth as detailed by local codes.

Installing the Load Transfer Switch

Before using an alternator for standby power service, install a double-throw load transfer switch following

local electrical codes. The switch must have an ampere rating large enough to carry the total load when the main power source is used.

Install the load transfer switch close to the main line switch, and between the main line switch and the load. The load wires must connect to the center terminals of the switch (Figure 3). The alternator leads and main power leads must connect at opposite ends of the switch.

When properly installed, the load transfer switch in one position will connect the electrical load to the main power source. When the switch is thrown to the other position, the load is first disconnected from the main power source, then connected to the alternator. Using the load transfer switch ensures the alternator will not be connected to the main power source.

Power Return Signal

When using the alternator for emergency applications, install a pilot light or alarm signal to indicate when the power is restored and the alternator can be disconnected. Connect a signal light across the regular power line, just ahead of the load transfer switch as shown in Figure 6. Install an on-off switch and a fuse for the signal light. When a power failure occurs, snap the signal switch to the "ON" position before putting the alternator into operation. When the normal power returns, the signal will operate and the alternator can be disconnected.



FIGURE 6. LOAD TRANSFER SWITCH CONNECTIONS

COMBINATION SINGLE AND THREE PHASE LOAD TRANSFER CONNECTIONS

Two load transfer switches and additional wiring are required to connect one standby 3-phase alternator in locations where separate 1-phase and 3-phase power lines normally supply the power. A 3-pole, double throw switch alternately connects the 240 volt, 3phase line transformer power or the 240 volt, 3-phase alternator motor loads. A 2-pole, double throw switch alternately connects the 120/240 volt, 1-phase line transformer power or the 1-phase alternator power to the 120 volt and 240 volt loads. The alternator and load transfer switches should be located close to the power line transformer which carries the heavier load. Separate power lines must be installed to carry power from the alternator to the lighter loads, Figure 6A.



TYPICAL CIRCUIT AFTER INSTALLING PTO ALTERNATOR

FIGURE 6A. COMBINATION SINGLE AND THREE PHASE LOAD TRANSFER

OPERATION

GENERAL

Figure 7 shows some items on the alternator which will aid you in understanding operation and maintenance procedures. Note the location of the air inlet and outlet. Keep these areas unobstructed to ensure sufficient alternator cooling. Listed are some common power requirements of appliances and other equipment. For large motors, see the nameplate for power requirements.

CONNECTING TRACTOR TO ALTER-NATOR

When a power outage occurs, use the following procedure before engaging the tractor PTO.

- 1. Unlatch the control box cover and move the exciter circuit breaker to "OFF."
- 2. Back the tractor up so the PTO shaft will be straight as possible when connected (Figure 8).
- 3. Depress the spring-loaded pin on the PTO yoke and slide the yoke on to the alternator shaft. Make sure the pin is locked in the groove of the splined alternator shaft.
- 4. Connect the other end of PTO shaft and yoke to the tractor PTO splined shaft.
- 5. Turn on the power return signal switch (if one was installed).

POWER REQUIREMENTS

ltem		Approx. Wattage
Refrigerator		600-1000
Dishwasher		1000-1800
Water Heater		
Space Heater		1000-1500
Television		200-600
Electric Drill		250-750
Water Pump	·	450-1000
Range Top (per elemen	t)	3000-4000
Food Freezer		300-800
Brooders		500-1000
Stock Tank Heater		300-1400

MOTORS

	WATTS REQUIR		
MOTORS* (Capacitor Type)	START	RUN	
1/2 horsepower	2800	550	
3/4 horsepower	4300	775	
1 horsepower	5500	1000	
. 2 horsepower	7130	1960	
3 horsepower	10350	2970	
5 horsepower	16660	3500	
7-1/2 horsepower	23000	5250	

- Repulsion-induction motors require less starting wattage. Split phase motors require slightly more starting wattage.



FIGURE 7. UR TRACTOR-DRIVE ALTERNATOR





Be sure to ground the alternator to eliminate electrical shock hazard.

FIGURE 8. TRACTOR CONNECTION

STARTING ALTERNATOR AND CONNEC-TING LOAD

1. With the tractor running, engage the power takeoff and bring the PTO speed to 1000 rpm.



Make sure the PTO shaft shields are in place before engaging the PTO to prevent hazard of serious personal injury.

2. Move the exciter circuit breaker in the control box to "ON."

- 3. Check the voltmeter to make sure it reads approximately 120 volts.
- 4. Close the control box cover and secure with latches.
- 5. Connect the load to the alternator with the load transfer switch.

When large motor loads are added, connect one at a time if possible. Motors require four to five times more power starting than running at normal speeds. If several large motors are started at the same time, overload can develop during starting.

6. Check the voltage and tractor PTO rpm. In some cases, you will have to change speed when large changes in load are made.

OPERATION WITH LOAD

If the tractor engine has very little reserve power, use care when operating the alternator. For example, if a 100-horsepower (at the power take-off) engine is used to drive a 55,000-watt alternator, the engine throttle will be wide open at full alternator load. If most of the electrical load is suddenly removed, the governor cannot act quickly and smoothly enough to prevent a surge of speed and high voltage. Any electrical equipment left connected may be damaged by the resulting high voltage.

When disconnecting large portions of the load, disconnect one piece of equipment at a time. Then remove the rest of the load. Wait until the alternator speed has stabilized and then reconnect that part of the load which will be left on. The alternator speed will remain relatively stable, and the tractor engine speed will not change or surge enough to cause any damage if this procedure is followed.

SERVICE AND MAINTENANCE

PERIODIC SERVICE AND INSPECTION

Follow a regular schedule of inspection and servicing. Make a good visual check before, during, and after alternator operation; look for loose or broken leads and bad connections.

GEAR BOX LUBRICATION

Drain the gear box after the first 50 hours of operation and refill with fresh lubricant of the recommended grade. Use only SAE 90 EP gear lubricant. Repeat this procedure every year thereafter, or every 300 hours, whichever occurs first. Maintain the proper oil level between changes.



Overfilling gear box will cause foaming, which can lead to an oil leak.

Remove the filler plug on top of the case and the oil level plug from the face of the gear case. Fill the case until the oil just begins to flow from the oil level plug hole (see the *SPECIFICATIONS* section for oil capacities). Replace both plugs. See Figure 9.

POWER TAKE-OFF SHAFT

Grease the universal joints at least every 25 operating hours. Under adverse conditions, grease the joints as required, possibly every 4 to 8 hours. Never operate the alternator with the shield removed from the power take-off shaft.

Be extremely careful when working near a running unit. Avoid wearing loose clothing which could get caught in the revolving PTO.

ALTERNATOR BEARING

The alternator bearing is double-sealed and prelubricated. Inspect the bearing for rotation every 1000 hours while the alternator is running.

Replace the bearing every five years. Deterioration of the bearing grease, due to oxidation, makes this replacement necessary.

EXCITER VOLTAGE REGULATOR

This system contains no moving parts. Occasionally blow out dust, etc. with clean, filtered air. Check thoroughly to assure that all components are mechanically secure and that all electrical connections are tight.



FIGURE 9. GEAR BOX LUBRICATION

OUTPUT VOLTAGE

A voltage adjusting potentiometer located on the printed circuit board inside the control box provides for a \pm 3% adjustment of the output voltage. This potentiometer is preset at the factory and should not require readjustment unless replacing printed circuit board (contact your dealer).

TROUBLESHOOTING

A few simple checks and a proper troubleshooting procedure can locate the probable source of trouble and cut down troubleshooting time.

- Check all modifications, repairs, and replacements performed since last satisfactory operation of set to be sure that connection of generator leads are correct. A loose wire connection, overlooked when installing a replacement part could cause problems. An incorrect connection, an opened circuit breaker, or a loose printed circuit board are all potential malfunction areas to be eliminated by a visual check.
- 2. Unless absolutely sure that panel instruments are accurate, use portable test meters for troubleshooting.
- 3. Visually inspect components on voltage regulator. Look for dirt, dust, moisture and cracks in the printed solder conductors. Burned resistors, arcing tracks are all identifiable. Do not mark on printed circuit boards with a pencil. Graphite lines are conductive and can cause short circuits between components.

FUSE REPLACEMENT

A fused, 120-volt duplex receptacle provides for convenient load connections up to 15 amperes. If exceeding this load, the fuse will blow and will require replacement. To change fuse, unlatch top panel of control box and lift open. Twist fuseholder as shown in Figure 10 and replace with Buss ABC 15 or equivalent.



FIGURE 10. FUSE REPLACEMENT

NATURE OF TROUBLE	POSSIBLE CAUSE	REMEDY
Alternator Overheats	1. Windings and parts covered with dirt and oil.	1. Disassemble alternator and clean.
	2. Air intake is restricted or incoming air too hot.	 Clean alternator air intake and outlet areas.
	3. Overloaded.	3. Remove part of load.
Noisy Alternator	1. Alternator loose on base.	1. Tighten mounting bolts.
	2. Defective bearing.	2. Replace. Check alignment.
No Voltage Output	 Voltage regulator trouble, or open, short or grounded circuit in alternator. 	1. Call your De Laval Dealer.
	 Alternator leads broken or loose. 	 Tighten connections and replace broken leads.
	 Load circuit breaker in tripped position. 	 Remove part of load and reset circuit breaker.
	4. Open circuit of field or stator winding.	4. Make proper connections.
	5. Short circuit of winding in the field or stator.	5. Call your De Laval Dealer.
Low Voltage Output of Alternator	1. External short circuit on line.	1. Test alternator with line wires disconnected.
	2. Incorrect PTO speed.	2. Readjust PTO speed to 1000 rpm.

PARTS CATALOG

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INSTRUCTIONS FOR ORDERING REPAIR PARTS

For parts or service, contact the dealer from whom you purchased this equipment or refer to your Nearest Authorized Parts & Service Center.

To avoid errors or delay in filling your parts order, please furnish all information requested.



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REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO	QTY. USED	PART DESCRIPTION
	201-1739	1	Rotor, Exciter (Complete)	11	526-0009	4	Washer, Flat (7/32" ID x
1	358-0016	3	Rectifier, Diode - Positive				1/2" OD x 1/16" THK)
2	358-0015	· 3	Rectifier, Diode - Negative	12	332-0050	2 .	Clamp, Loop
3	870-0053	6	Nut Hex (#10-32)	13	508-0187	4 .	Spacer, Stepped
4	850-0030	ĕ	Washer Lock - Spring (#10)	· . 14-	508-0156	. 4	Washer, Flat - Fiber
.5	508-0093	2	Grommet Bubber			•	(19/64" ID x 1-7/8" OD x 1/8" THK)
e e	813-0100	2	Screw Machine - Round Head	15	850-0030	4	Washer, Lock - Spring (#10)
0	010-0100	۲	(#10.22 g 1/2")	16	870-0053	. 4	Nut, Hex (#10-32)
7	526-0008	2	Washer, Flat (13/64" ID x	17	363-0054	1	Heat Sink, Rectifier - Positive
8	850-0030	. 2	Washer, Lock - Spring (#10)	18	363-0055	ِ 1 _َ	Heat Sink, Rectifier -
9	870-0053	2	Nut, Hex (#10-32)				Negative .
10	813-0110	4	Screw, Machine - Round Head (#10-32 x 2")	,			•

GENERATOR GROUP





GENERATOR GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	ROTORASS	SEMBLY; W	VOUND (Includes Parts Marked *)	. 25	800-0009	4	Screw, Cap - Hex Head -
	201-2364	1	40 kW 1 Phase				Exciter Stator Mounting
	201-2363	1	40 kW 3 Phase				(1/4-20 x 1-1/2" lg)
	201-2366	1	55 kW 1 Phase	· 26	800-0009	. 2	Screw, Cap - Hex Head -
	201-2365	1	55 kW 3 Phase				Screen Mounting
2	201-1739	1	*Rotor Assembly, Wound -				(1/4-20 x 1-1/2" lg)
			Exciter (See Separate Group	27	800 - 0050	8	Screw, Cap - Hex Head -
			for Components)				Stator to Adapter
3	232-2102	1	*Spacer, Bearing				(3/8-16 x 1″)
4	515-0145	1	*Key, Exciter Rotor Mounting	28	800-0090	2	Screw, Cap - Hex Head -
5	205-0098	1	Blower				Generator Adapter Spacer
6	510-0101	1	*Bearing, Ball				Mounting (1/2-13 x 1")
7.	STATOR AS	SEMBLY,	WOUND	29	800-0152	1 -	Screw, Cap - Hex Head -
	220-1878	1	40 kW, 1 Phase	· .			Bass to Stator Assembly
	220-1865	1	40 kW, 3 Phase				(3/4-10 x 1-1/4")
	220-1880	1	55 kW, 1 Phase	30	850-0060	2	Washer, Lock - Spring -
	220-1867	1	55 kW, 3 Phase				Generator Adapter Spacer
8	232-2664	1	Spacer, Generator Shaft				Mounting (1/2")
9	234-0429	2	Bracket, End Bell Cover	31	850-0050	. 8.	Washer, Lock - Spring - Stator
10	503-0611	4	Hose, Vibration Dampner			-	to Adapter Mounting (3/8")
11	403-0931	1	Eyebolt, Lifting	32	850-0050	4	Washer, Lock - Spring -
12	STUD, ALT	ERNATOR	THROUGH				Generator Through Stud (3/8")
	520-0721	4	40 kW, 1 Phase	33	850-0050	4	Washer, Lock - Spring -
	520-0720	4	40 kW, 3 Phase				Blower Mounting (3/8")
	520-0723	4	55 kW, 1 Phase	34	850-0040	4	Washer, Lock - Spring -
	520-0722	4	55 kW, 3 Phase				Exciter Stator Mounting (1/4")
13	. 220-2353	1	Stator Assembly, Wound	35	850-0040	2	Washer, Lock - Spring -
			Exciter				Screen Mounting (1/4")
14	211-0185	1	Bell, End	36	850-007 9	1	Washer, Lock - Spring - Base
15	234-0368	1	Screen, Alternator				to Stator Assembly (3/4")
16	403-0985	1	Base, Alternator Mounting	37	862-0011	4	Nut, Hex - Generator
17	800-0513	1	*Screw, Cap - Hex Head				Through Stud (3/8-16")
			Bearing Retainer Mounting	38	862-0016	2 ·	Nut, Hex - Generator
			(3/4-10 x 1-1/2")				Adapter Spacer Mounting
18	231-0204	1	Adapter, Alternator				(1/2-13)
19	234-0457	1	Grille, Alternator Air Inlet	39	862-0001	2	Nut, Hex - Screen Mounting
20	234-0361	1	Wrapper, Alternator End Bell	· .			(1/4-20)
21	509-0125	1	Seal, "O" Ring - Bearing	40	821-0010	3	Sorow Looking Llood Frid
22	526-0238	1	*Washer, Flat - Bearing	40	021-0010	3	Screw, Locking Head - End
			Retainer (13/16" ID x				Dell wrapper Mounting
			2" OD x 3/16" Thk)	4 1	232-2664	1	(1/4-20 X //0) Spacer Concreter Sheft
23	850-0079	1	Washer, Lock - Spring (3/4")		202-2004	I	Spacer, Generator Shaft
24	800-0049	. 4	Screw, Cap - Hex Head - Blower				
			Mounting (3/16-18 x 7/8")	٠.	- Parts includ	led in the W	ound Botor Assembly



CONTROL

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	301-3296	1	Saddle, Box Control
2	301-3298	1	Cover, Control Box
3	301-3722	1	Panel, Control Box Chassis
4	315-0343	1	Reactor, Commutator
5	406-0341	1	Holder, Control Box Cover
6	301-3300	1	Chassis, Control
7	320-0431	1	Breaker, Circuit (2 Amp)
8	321-0138	1	Fuse, Cartridge (15 Amp)
9	321-0104	1	Holder, Fuse
10	323-0184	1	Receptacle, Duplex
11	323-0806	1	Cover, Receptacle
12	302-0873	1	Voltmeter
13	351-0216	1	Resistor (1740-Ohm, 1/4 Watt)
14	315-0342	1	Transformer, Voltage
15	332-0607	1	Block, Terminal (12 Place)
16	332-1248	1	Strip, Marker (12 Place)
17	332-0513	1	Block, Terminal (4 Place)
18	301-0458	4	Spacer, Terminal Block
			Mounting
19	332-1268	1	Board Assembly, Printed
			Circuit (See Separate Group
			for Components)
20	821-0010	7	Screw, Locking Head - Control
			Box Support Mounting
			(1/4-20 x 1/2")
21	305-0524	1	Rectifier, Bridge (Scr)
22	860-0005	1	Nut, Hex - Control Cover
			Holder (6-32)
23	338-0748	1	Harness, Wiring - Control
24	815-0026	16	Screw, Machine - Truss Head
			Control Box (10-32 x 3/8")
25	850-0030	15	Washer, Lock - Spring
			Control Box (1/4")
- 26	850-0020	1	Washer, Lock - Spring - Control
			Cover Holder (#6)
27	526-0018	1	Washer, Flat - Control Box
			Support Mounting (13/32" ID >
	· · ·		3/4" OD x 1/16" Thk)

PRINTED CIRCUIT BOARD ASSEMBLY GROUP (AC)

332-1268 - Printed Circuit Board, Complete



REF.	RART	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	DESCRIPTION
TB1	332-1252	1	Terminal Block	R6	353-0039	1	Resistor, Fixed (5,000-Ohm, 15 Watt)
C1	355-0018	1	Capacitor (.47 Mfd., 100 Volt) Capacitor (.22 Mfd., 200 Volt)	R 7	350-0398	1	Resistor (3,000-Ohm, 1/2 Watt)
C3 C9	355-0017	· 2	Capacitor (.47 Mfd., 400 Volt)	R8, R16	350-0447	2	Resistor (330,000-Ohm, 1/2 Watt)
C4, C12	355-0006	2	Capacitor (.47 Mfd., 200 Volt)	R9, R10 R11 R12	350-0423	2	Resistor (33,000-0111, 1/2 watt) Resistor, Fixed (15,000-
C5, C8	355-0016	2	Capacitor (1 Mfd., 100 Volt)	M11 M12	002 0101	~	Ohm, 5 Watt)
C6 C10	355-0015	1	Capacitor (.047 Mfd., 200 Volt)	R13	350-1007	1	Resistor (6,800-Ohm, 2 Watt)
C11	355-0020	1	Capacitor (.1 Mfd., 400 Volt)	H14 ·	350-0443	2	Resistor (100.000-Ohm, 1/2 Watt)
C13 CB4 thru 11	356-0039 357-0014	1 8	Capacitor (100 Mfd., 10 Volt) Rectifier, Silicon	R17	351-0521	1	Resistor, Metal Film
CR12	359-0016	1	Diode, Zener (6.8 Volt)	R18	303-0168	1	Potentiometer
CR13 CR14	359-0025	1	Diode, Zener (18 Volt)	R20, R22	351-0520	2	Resistor, Metal Film (28 000-Ohm, 1/4 Watt)
CR15 K1	359-0015 307-1063	1 1	Diode, Zener (24 Volt)	R21	351-0522	1	Resistor, Metal Film (5 110-Obm 1/4 Watt)
Q1, Q2 Q3	362-0017 361-0004	2 1	Transistor, Silicon (NPN) Transistor, Unijunction	R24	351-0523	1	Resistor, Metal Film (8 870-Ohm 1/4 Watt)
R1, R23	350-0355	2	Resistor (47-Ohm, 1/2 Watt)	B25	350-1011	1	Resistor (10,000-Ohm, 2 Watt)
R2, R3	350-0351	2	Resistor (33-Ohm, 1/2 Watt) Resistor (4.7 Megohm, 2 Watt)	R26	303-0164	1	Potentiometer
114 185	353-0040	1	Resistor, Fixed (270-Ohm,	R28	350-0459	1	Resistor (1.0 Megohm, 1 Watt)
110		•	10 Watt)		517-0127	2	Cover, Potentiometer

GEAR DRIVE BOX (1000 rpm)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	190-0413	1	Gear Drive Box - Complete
1	190-0417	1 .	Flange, Mounting
2	800-0093	4	Screw, Cap - Hex Head (1/2-13 x 1-3/4" lg)
3	850-0060	4	Washer, Lock - Spring (1/2")
4	190-0418	1	Shim, Flange to Case
5	190-0419	1	Gasket, Case
6	10167*	2	Pin, Dowel
7	850-0045	4.	Washer, Lock - Spring (5/16")
8	800-0037	4	Screw, Cap - Hex Head (5/16-18 x 3" lg)
9	190-0420	1	Gear, Output
10	190-0426	2	Seal, Output Gear
11	190-0427	2	Bearing, Ball - Output Gear
12	190-0423	1	Shaft, Input (Splined)
13	190-0425	2	Seal, Input Shaft
14	190-0424	2	Bearing, Ball (Input Shaft)
15	190-0421	1	Gear, Input
16	800-0043	6	Screw, Cap - Hex Head (5/16-18 x 5" lg)
17	850-0045	6	Washer, Lock - Spring (5/16")
18	862-0015	6	Nut. Hex (5/16-18)

REF. NO.	PART	QTY. USED	PART DESCRIPTION
19	190-0422	1 ·	Case
20	190-0428	1	Ring, Retaining
21	190-0416	1.	Cap, Dust
22	10250*	1	Key (3/8" x 3/8" x 2" lg)
23	10166*	2	Plug, Drain and Fill
24	518-0275	1	Cap, Vent
25	190-0384	1	Guard, Power Take Off
26	870-0257	3	Nut, Hex - Guard Mounting (5/16-18)
27	850-0060	. 4	Washer, Lock - Spring - Gearbox Mounting (1/2")
28	526-0030	3	Washer, Flat - Guard Mounting (13/32" ID x 7/8" OD x 1/8" Thk)
29	800-0092	4	Screw, Cap - Hex Head - Gearbox Mounting (1/2-13 x 1-1/2" lg)

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 These Part Numbers are Apex Part Numbers -Order these parts from: Apex Industries, 114 East Main, Waterville, Minnesota

The De Laval Separator Company



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For parts and service, your De Laval Dealer is:

Farm Division, Poughkeepsie, New York

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