VANNER
POWER GROUP

A Series Dynamic Inverter

Installation/Operation/Service Manu

Please read through this manual carefully when proceeding through the installation of the inverter.

4282 Reynolds Drive • Hilliard, Ohio 43026
800-989-2718 • Office 614-771-2718 • Fax 614-771-4904

DYNAMIC INVERTERS

INSTALLATION/OPERATION/SERVICE MANUAL

VANNER WELDON
INCORPORATED

4282 Reynolds Drive, Hilliard, Ohio 43026
Tel: (614) 771-2718
Tel: 800-989-2718
Fax: (614) 771-4904

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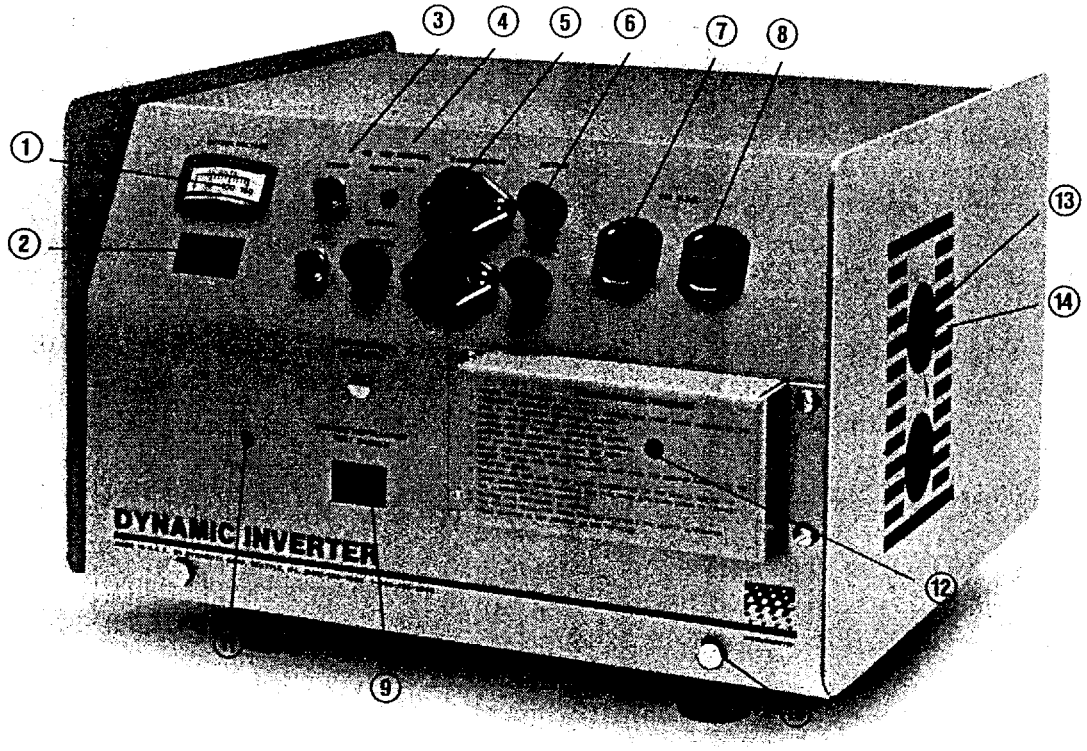
1.1 INVERTER CONTROL PANEL



1. OUTPUT AC VOLTAGE meter.

2. REMOTE CONTROL receptacle.

3. START/STOP switches.

4. AUTOMATIC/MANUAL switch (only with Load Demand option).

   When the toggle is in MANUAL, the inverter must be started and stopped with the START/STOP pushbutton switches on the control panel or the remote control.

   When the toggle is in AUTOMATIC, the inverter will start automatically when a load is applied and the engine is running. If the vehicle has an automatic throttle, it will be automatically activated when the inverter turns on as long as the vehicle is in "park" or "neutral" and the emergency brake is on. When the load is removed from the inverter, there is a 5-second delay after which the inverter turns off and the engine returns to idle.

5. INPUT (COMMUTATION) fuses.

1.1 *Inverter Control Panel continued*

6. OUTPUT RECEPTACLE fuses (one for each outlet). (The circuit breaker is located here on models with the 30-amp GFI circuit breaker option, /GFI30.)

7. 120-VAC convenience outlets (with the 120/240 V option, one of these outlets is 240V, 15A).
   (With the 20-amp GFI option, these outlets are GFI-protected; with the 30-amp GFI option, there is only one 120-VAC convenience outlet.)

8. LOW VOLTAGE INDICATOR (optional, MPA units only).

9. INVERTER TEST RECEPTACLE

   This test receptacle (used with the Model 4-2700 Dynamic Inverter Test Strip or Model 4-2600 Dynamic Inverter Test Module) facilitates checkout and troubleshooting of the inverter and charging system.

10. Hold-down bracket bolts.

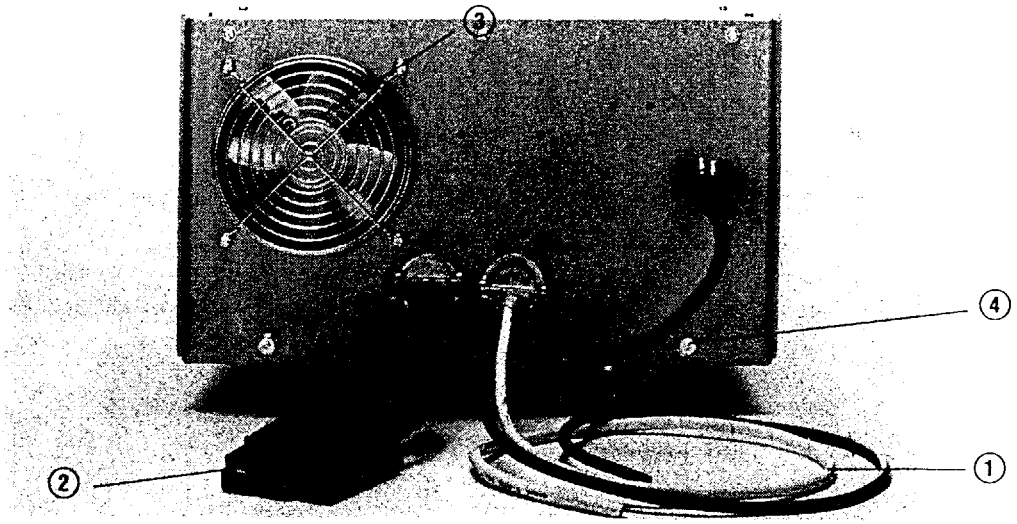
11. Inverter On Voltage Regulator adjustment.

12. Inverter Off Voltage Regulator adjustment.

13. Knockout plugs for component replacement.

14. Cooling air intake vents.

1.2 INVERTER BACK PANEL



1. AC output wiring. For connecting AC output to external receptacles. On 120 VAC units: two wires—one white, one black. On 240-VAC units, three wires—one white, one black, one red.

2. Power hookup pigtail, control hookup pigtail. A standard quick-disconnect 20-foot, six-wire harness provides for easy installation and checkout. A 30-foot harness is optional.

3. Exhaust fan outlet and fingerguard.

4. Hold-down bracket bolts.

1.3 OPERATING GUIDELINES

If you follow these four basic rules your inverter will provide continuous satisfactory performance at its rated capacity:

1. Use an alternator and inverter capable of delivering sufficient power for your requirements (see Appendix 4 for alternator/inverter selection guidelines).

2. Turn the alternator fast enough to generate the required power. The inverter does not generate power, so you must provide the input necessary for the desired AC output. (See Appendix 5 for output vs. RPM information).

3. Keep your inverter cool. Because solid-state components are affected by temperature, the inverter has an internal cooling fan that cools the components (if sufficient cooling air is provided to the intake louvers). See section 2.4.1.

4. Install the harness properly using good grounds, tight connections and keeping it away from heat-producing engine components such as the manifold and exhaust.

CAUTION

THE DYNAMOTE DYNAMIC INVERTER IS FOR INSTALLATION ON VEHICLES AND BOATS WITH 12-VOLT NEGATIVE GROUND ELECTRICAL SYSTEMS ONLY.

2.1 RECOMMENDED INSTALLATION TOOLS

1. 7" mechanic's screwdriver.

2. 7/16", 3/8" and 1/2" open-end wrenches.

3. Wire crimping tools for #16 AWG and #4 AWG wire (#2 AWG wire if 30-foot harness option is used) and lineman's pliers.

4. Wire stripper.

5. Electrical tape and putty.

6. Dynamote Model 4-2600 Installation Tester or Model 4-2700 Test Strip and VOM (such as a Fluke 8020A or Simpson 463).

2.2 INVERTER HARDWARE KIT

The chart below lists hardware included with all models of Dynamote Dynamic Inverters. Check and identify the various items as you unpack the shipping carton.

ITEM #	PART #	DESCRIPTION	INCLUDED WITH: Models A20, A30, MPA 30		Models A40, A60, MPA40, MPA60	
			STD.	/30	STD.	/30
1	2283-00014	Harness, power	1		1	
2	4283-00010	Harness, control	1		1	
3	2283-00016	Harness, power, 2 gauge				1
4	4283-00009	Harness, control		1		1
5	2283-00015	Harness, power, 4 gauge		1		
6	4200-06400	Fuses, ABU 40	2	2	4	4
7	4200-02150	Fuses, AGC 15	3	3	3	3
8	4282-00006	Holders, spare fuse	2	2		
9	4282-00006	Holders, spare fuse			4	4
10	3056-11451	Brackets, tiedown	4	4	4	4
11	4442-60920	Lugs, RB-257	2	2	2	2
12	4442-15200	Lugs, B-71	2	2	2	2
13	4442-14200	Lugs, B-87	4	4	4	4
14	4323-00417	Rubber cap	1	1	1	1
15	4722-37008	¼x20x⅜ bolt	1	1	1	1
16	4520-27000	¼x20 kept nut	1	1	1	1
17	4722-40008	#14x1" screws	4	4	4	4
18	4442-16600	Lugs, F-72	3	3	3	3
19	4760-14000	Ty Raps	5	5	5	5
20	4685-43051	Relay, high amp. bypass	*	*	*	*
21	4442-16700	Lugs, G-72				3
22	4882-90016	Wire, #16 white	1	1	1	1

*Optional

2.3 MOUNTING HOLE LOCATIONS

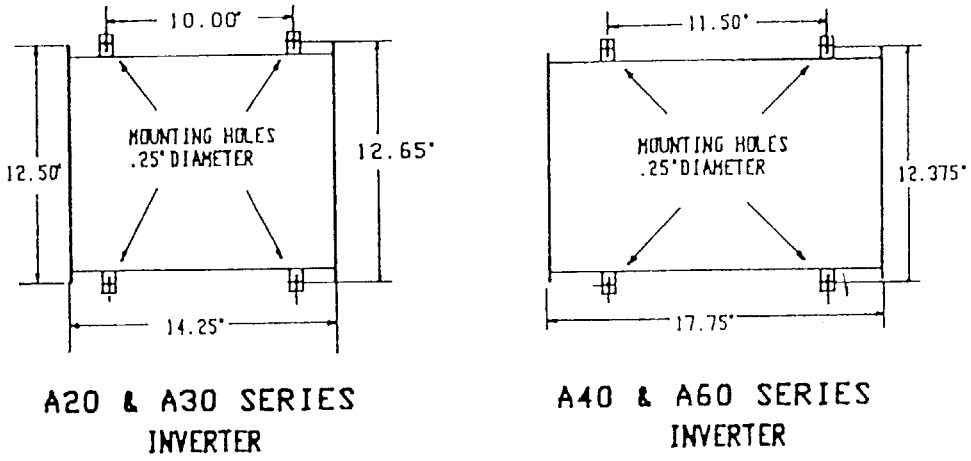


Figure 2-1. Mounting Hole Locations

2.4 EIGHT STEPS FOR PROPER INSTALLATION

There are eight steps that must be followed in sequence to ensure proper installation and operation of the entire vehicle electrical system:

1. Select the inverter's location (section 2.4.1).
2. Route the harness to the alternator (section 2.4.2).
3. Install the proper alternator (section 2.4.3).
4. Attach the harness to the alternator (section 2.4.4).
5. Install the automatic throttle, if used.
6. Wire the AC output (section 2.4.5).
7. Check out the inverter (section 2.4.6).
8. Complete, sign and mail your Inverter Registration Card (section 2.4.7).

As each step is completed, check it off in the space provided on the Inverter Registration card. DO NOT PROCEED TO ANOTHER STEP UNTIL ALL PREVIOUS STEPS HAVE BEEN SUCCESSFULLY COMPLETED.

2.4.1 Select Inverter Location

Place the inverter in a convenient location, protected from weather, such as the vehicle cab or outside service compartment. Do not secure it or tie it down at this time and do not connect the harness to the inverter. Be sure that:

- the harness will reach the alternator while providing proper length for bends and obstructions.

- the inverter is in as cool a place as possible and that there is adequate cooling air available. If in a closed cabinet, provide louvers or screened openings in the cabinet surfaces to supply cool intake air to the outside of the cabinet. A flange (Dynamote #4123-0000) is available for attaching a dryer hose to the inverter exhaust. Air flow requirements are 120 cfm for all models.

2.4.2 Route the Harness to the Alternator

CAUTION
BURNING OR CHAFING THROUGH HARNESS
INSULATION WILL DAMAGE THE INVERTER AND
THE VEHICLE ELECTRICAL SYSTEMS.
YOU SHOULD BE AWARE THAT THIS IS A COMMON
INSTALLATION PROBLEM.

Route the wiring harness to the alternator, using existing holes where possible. Use tie wraps and tape liberally to secure harness wires so they cannot contact hot engine exhaust or other heat-producing components. Grommets should be used to protect the wiring harness where it comes in contact with hard or sharp edges.

— NOTE —
Do not attach any wires to the inverter
at this time

2.4.3 Install the Proper Alternator

The correct alternator for your system must: 1) provide necessary power (see guidelines in Appendix 3) and 2) be properly wired to install with the inverter. **It is strongly recommended that alternators with external regulators be used. This will eliminate the need for alternator modification.** If the alternator you select has an internal regulator it must be modified before it can be installed with the inverter. Refer to section 2.4.4.3 for modification instructions.

2.4.3.1 *Alternator Pulley Alignment*

Correct pulley alignment is essential for maximum alternator and belt service life. The centerline of all pulleys related to the alternator drive must be within $\frac{1}{32}$" of true center as shown in Figure 2.2 below.

Best results are obtained if the belts wrap the alternator pulley 100 degrees or more (see Figure 2.3). Lesser wrap can induce belt slippage.

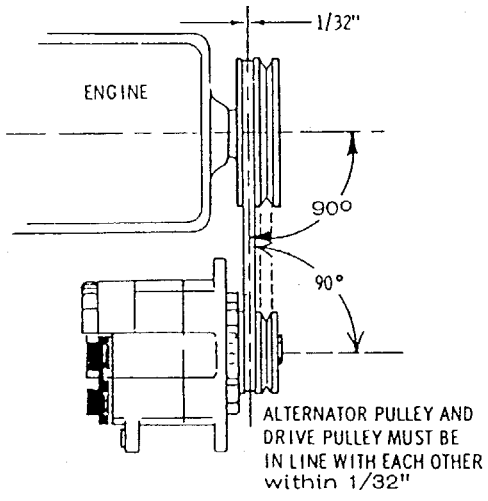


Figure 2-2. Alternator Pulley Alignment

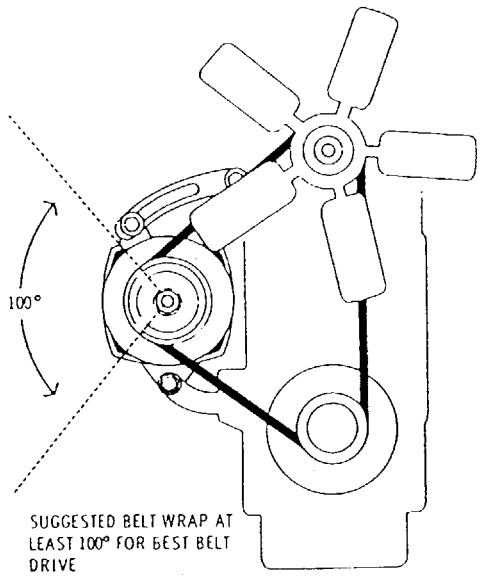


Figure 2-3. Alternator Belt Wrap

2.4.3.2 *Pulley Ratio*

The diameters of the crankshaft pulley and the alternator pulley will determine alternator RPM for a given engine speed. The largest possible crankshaft pulley and the smallest possible alternator pulley are most advantageous. The smallest alternator pulley diameter should be 2½" for standard single and double-groove pulleys, and 2.24" for poly-groove pulleys. Special small diameter double-groove, triple-groove and poly-groove pulleys are available from Dynamote.

To avoid reducing alternator bearing life, design the installation so that average continuous alternator RPM is not more than 8000 and maximum alternator RPM is not more than 10,000.

Using an impact wrench, tighten the pulley nut following the alternator manufacturer's recommendations for torque.

Tighten drive belts by applying leverage to the side of the front housing of the alternator being careful not to damage anything that you pry against. Set belt tension to the engine manufacturer's recommendations. If this information is not available, tighten belts to the point at which the alternator fan cannot be turned by hand (approximately 100 pounds of belt strand tension).

2.4.3.3 *Belt Capacity*

The greater the load on the inverter, the more force is required to turn the alternator. Consequently, more belt surface contact is required to prevent slipping. Normally, the belt width is determined by the crankshaft pulley width. The following chart shows—by belt width—the number of belts required (assuming a 100 degree minimum belt wrap).

Loads, Watts	Belt Width			Poly-Groove	
	3/8"	1/2"	5/8"	5-rib	6-rib
Up to 1800	1	1	1	1	1
1900-2400	2	1	1	1	1
2500-3600	2	2	1	1	1
3700-4800	2	2	1	1	1
Over 4800	2	2	2	1	1

2.4.4 Attach the Harness to the Alternator

Note 1. If your system utilizes a battery isolator, go to section 2.4.4.1 now.

Note 2. If your system utilizes an electric tachometer, go to section 2.4.4.2 now.

Note 3. If your alternator has an internal regulator, go to section 2.4.4.3 now.

Note 4. If an automatic throttle is used, go to your Automatic Throttle Instruction Manual and follow instructions for installation. NOTE: the BROWN wire from the inverter harness will attach to the BLACK wire from the automatic throttle harness.

Note 5. If alternator output is 141 amps or greater, use "Basic Installation Instructions" in section 2.4.4B, page 2-11.

Note 6. If none of the above conditions are present, or have been satisfied, use "Basic Installation Instructions" in section 2.4.4A, page 2-8.

2.4.4A Basic Installation Instructions for Inverters with Alternators 140 Amps or Less

Install the harness as follows (refer to Figure 2-4):

1. Disconnect the battery negative ground cable from the vehicle system battery.

2. Disconnect all wiring from the positive output (B+) terminal of the alternator. Tape and secure this connection to prevent an electrical short.

   If the vehicle has a shunt-type ammeter, one side of the shunt should be disconnected from the ammeter to prevent showing a constant discharge. The ammeter should be labeled "inoperative." In these cases, electrical system status can be indicated with a voltmeter connected to the same place as the ORANGE lead.

— NOTE —

1988 and later Fords have an electric choke powered by the alternator stator terminal or AC tap. The choke's wire may be included in the plug-in harness to the alternator; it should be separated from the connector and harness and attached to an ignition source (the same source the Dynamote ORANGE wire is attached to). The connector should be left unconnected from the alternator

3. Connect the BLACK wire from the Dynamote harness to to the battery positive terminal or—if more convenient—to the battery side of the starter solenoid.

4. Connect the RED wire from the Dynamote harness to the positive output (B+) terminal of the alternator.

5. Connect the GREEN wire from the Dynamote harness to the negative ground (B−) terminal of the alternator. Leave any previously attached wires connected.

— NOTE —

The B− terminal of the alternator and the negative battery terminal must be securely grounded to the engine block

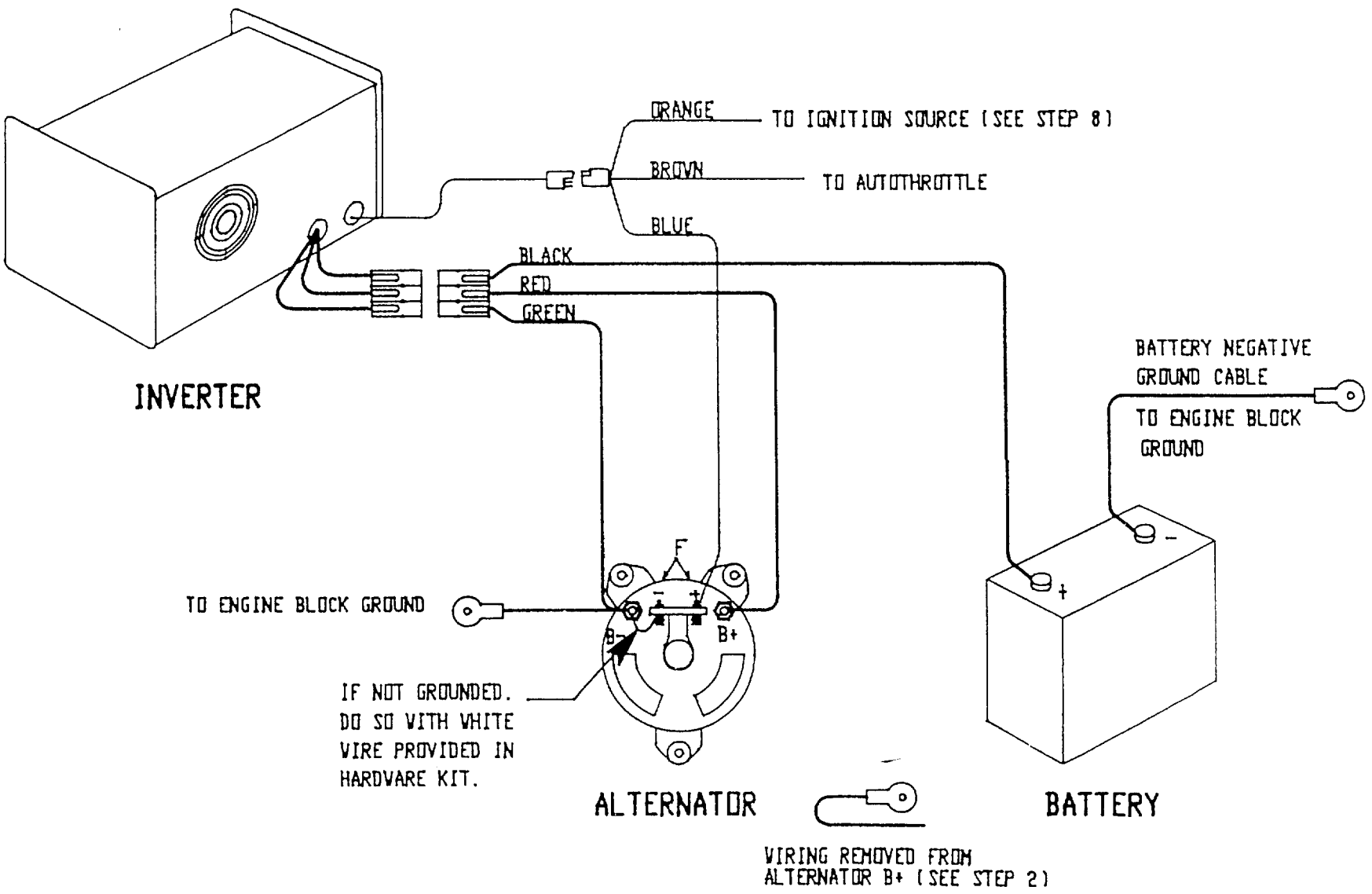


Figure 2-4. Dynamic Inverter Installation Wiring Diagram for Inverters with Alternators 140 Amps or Less

2.4.4A *Basic Installation Instructions (140 Amps or less) continued*

6. If there is a negative field terminal on the alternator, check to see that it has been grounded to the negative (B–) terminal of the alternator. If not, use a piece of the WHITE #16 AWG wire and the ring terminals provided in the hardware kit to accomplish this.

   If the alternator has an internal regulator, the modification instructions referenced in section 2.4.4.3 accomplish the grounding of the negative field lead.

7. Remove the wire from the alternator field terminal. Tape and secure the end of this wire to prevent electrical shorts. It will no longer be used because the field will be regulated from the inverter.

8. Connect the BLUE Dynamote harness wire to the field (+) terminal of the alternator from which the wire was removed in step 7. There should be no wire attached to the field terminal except the BLUE harness wire.

9. Attach the ORANGE wire from the Dynamote harness to a 12-V source which is hot only when the ignition is on. This can be the ignition switch feed on a terminal block, the radio feed wire or the accessory terminal of the ignition switch on the fuse block. It should not be the ignition terminal on the engine ignition coil. Use ring terminals provided in the hardware kit.

10. If an automatic throttle is used, attach the BROWN lead from the Dynamote control harness to the black lead from the automatic throttle harness.

11. If it is to be hardwired, wire the AC output according to section 2.4.5.

12. Connect the power and control harness to the inverter and connect the battery negative ground cable.

2.4.4B Basic Installation Instructions for Inverters with Alternators 141 Amps or Greater

Install the harness as follows (refer to Figure 2-5):

1. Disconnect the battery negative ground cable from the vehicle system battery.

2. Disconnect all wiring from the positive output (B+) terminal of the alternator. Tape and secure this connection to prevent an electrical short.

   If the vehicle has a shunt-type ammeter, one side of the shunt should be disconnected from the ammeter to prevent showing a constant discharge. The ammeter should be labeled "inoperative." In these cases, electrical system status can be indicated with a voltmeter connected to the same place as the ORANGE lead.

   — NOTE —

   1988 and newer Fords have an electric choke powered by the alternator stator terminal or the AC tap. The choke's wire may be included in the plug-in harness to the alternator and should be separated from the connector and harness and attached to an ignition source (the same source the Dynamote ORANGE wire is attached to). The connector should be left unconnected to the alternator.

3. Connect the BLACK wire from the Dynamote harness to the battery positive terminal or—if more convenient—to the battery side of the starter solenoid.

4. Install a K3 High Amperage Bypass Relay (Dynamote Model 4-7211) as follows:

   a. Securely mount the K3 relay as close to the alternator as is practical with small #10 terminals up.

   b. Connect a length of #4 AWG wire from one of the bottom terminals on K3 to the positive output terminal of the alternator.

   c. Connect a length of #4 AWG wire from the other bottom terminal to the battery positive terminal or to the battery side of the starter solenoid (the same location selected in step 3 above).

   d. Connect the BROWN wire from the Dynamote harness to one of the #10 terminals on K3. This may have to be done by attaching the BROWN wire first and then attaching the black wire from the automatic throttle to the same terminal.

   e. Connect a green #16 AWG wire to the other #10 terminal and ground the other end of this wire under the rear mounting screw.

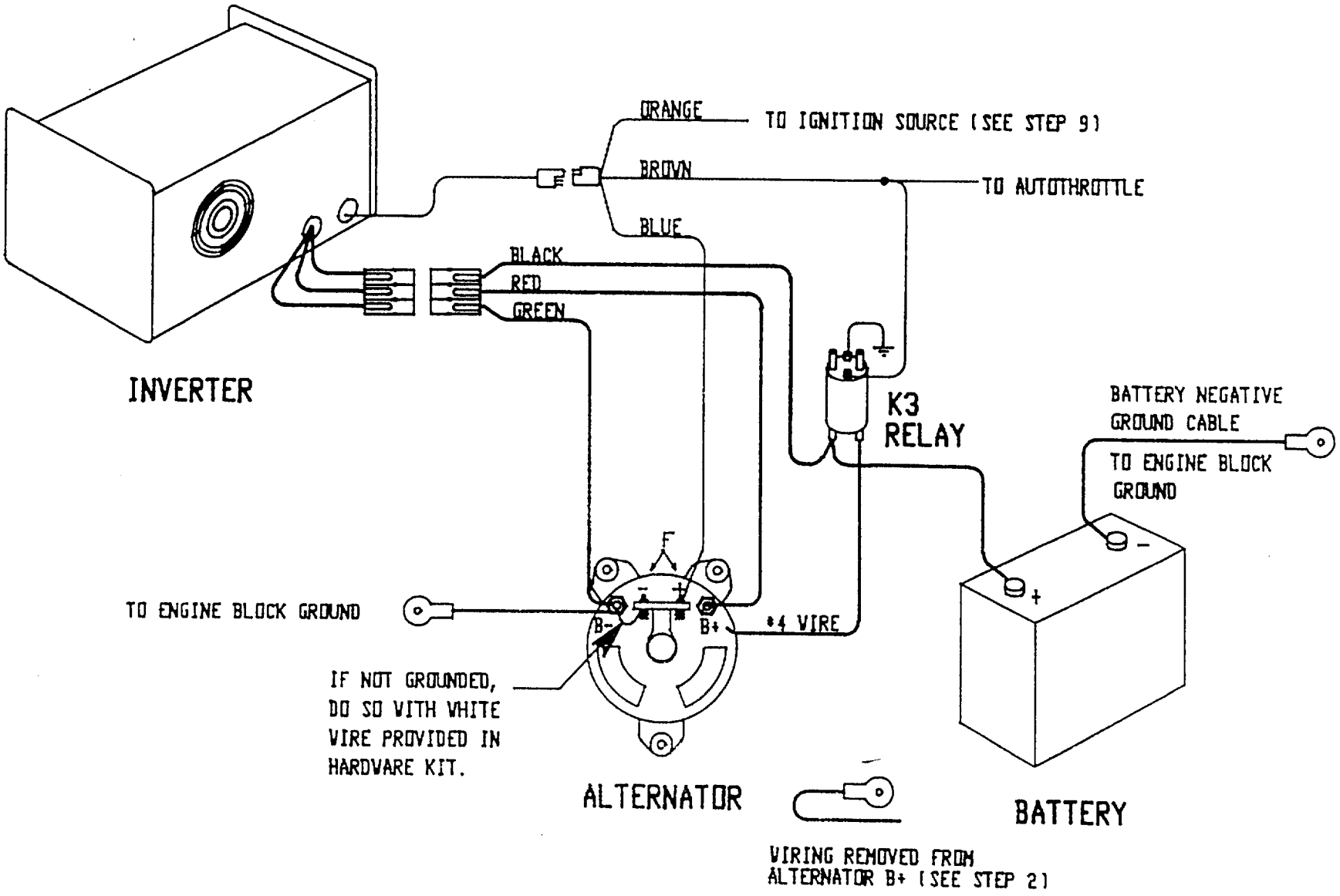


Figure 2-5. Dynamic Inverter Installation Wiring Diagram with K3 Relay

2.4.4B *Basic Installation Instructions (141 Amps or greater) continued*

5. Connect the RED wire from the Dynamote harness to the positive output (B+) terminal of the alternator.

6. Connect the GREEN wire from the Dynamote harness to to the negative ground (B−) terminal of the alternator. Leave any previously attached wires connected.

— NOTE —
The B− terminal of the alternator
and the negative battery terminal
must be securely grounded
to the engine block.

7. If there is a negative field terminal on the alternator, check to see that it has been grounded to the negative (B−) terminal of the alternator. If not, use a piece of the WHITE #16 AWG wire and the ring terminals provided in the hardware kit to accomplish this.

8. Remove the wire from the alternator field terminal. Tape the end of this wire to prevent electrical shorts, and secure the wire. It will no longer be used because the field will be regulated from the inverter.

9. Connect the BLUE Dynamote harness wire to the field (+) terminal of the alternator from which the wire was removed in step 9. There should be no wire attached to the field terminal except the BLUE harness wire.

10. Attach the ORANGE wire from the Dynamote harness to a 12-V source which is hot only when the ignition is on. This can be the ignition switch feed on a terminal block, the radio feed wire or the accessory terminal of the ignition switch on the fuse block. It should not be the ignition terminal on the engine ignition coil. Use ring terminals provided in the hardware kit to accomplish this.

11. If an automatic throttle is used, attach the BROWN lead from the Dynamote control harness to the black lead from the automatic throttle harness.

12. If it is to be hardwired, wire the AC output according to section 2.4.5.

13. Connect the power and control harness to the inverter and connect the battery negative ground cable.

    Note 1. If the BLACK (B+) lead is connected to a battery selector switch, the switch should be in the BOTH position.

    Note 2. If there is a battery isolator in the system and the instruction in section 2.4.4.1 has been followed, then for step 1A and 1B in the Harness Installation Checkout Chart on page 2-21, attach either the B1 or B2 wire on the battery isolator to the A terminal on the battery isolator. After steps 1A and 1B, return the battery isolator wiring to normal for the remaining checkout steps.

14. Proceed to section 2.4.6 (Checkout of Harness Installation and Alternator Output).

2.4.4.1 *Inverter Modification When a Battery Isolator is Used in the System*

1. Open the inverter by removing the front, back and top panel fasteners. Carefully lay the front and back panels down and remove the top panel.

2. Remove the small BLACK #16 AWG wire between terminal strip pin #6 in the front of the inverter and the B+ terminal in the back of the inverter (see Figure 4-1 in section 4); in A40/60 inverters, this wire is attached to pin #6 and the heat sink located on the front left side of the inverter (see Figure 4-2 in section 4).

3. Attach a #16 AWG or larger wire from terminal strip pin #6 directly to the battery positive or to one of the battery terminals on the battery isolator. Terminals are available in the hardware kit for this purpose.

4. Close the inverter cabinet and return to Note 2 in section 2.4.4.

2.4.4.2 *Installation of Electronic Tachometer Relay*

CAUTION

FAILURE TO FOLLOW THIS PROCEDURE MAY RESULT IN TACHOMETER BURNOUT.

If an electronic tachometer (which is driven from an alternator AC tap or an alternator tachometer tap) is used in the system, Dynamote Relay #4-1160 must be used when the inverter is installed. The relay ensures proper reading of the tachometer(s), both when the inverter is off and when it is on. The relay has two identical sets of contacts, so it can be used with one or two tachometers. For accurate adjustment, an adjustable trim pot is provided on each set of contacts.

2.4.4.2 *Installation of Electronic Tachometer Relay continued*

At a convenient location near where the relay is to be mounted:

1. Cut the wire leading from the tachometer to the alternator AC tap near the relay.

2. Attach the two parts of this wire according to Figure 2-6 below.

3. If two tachometers are used, attach one tachometer to each side of the relay board, as shown in Figure 2-6.

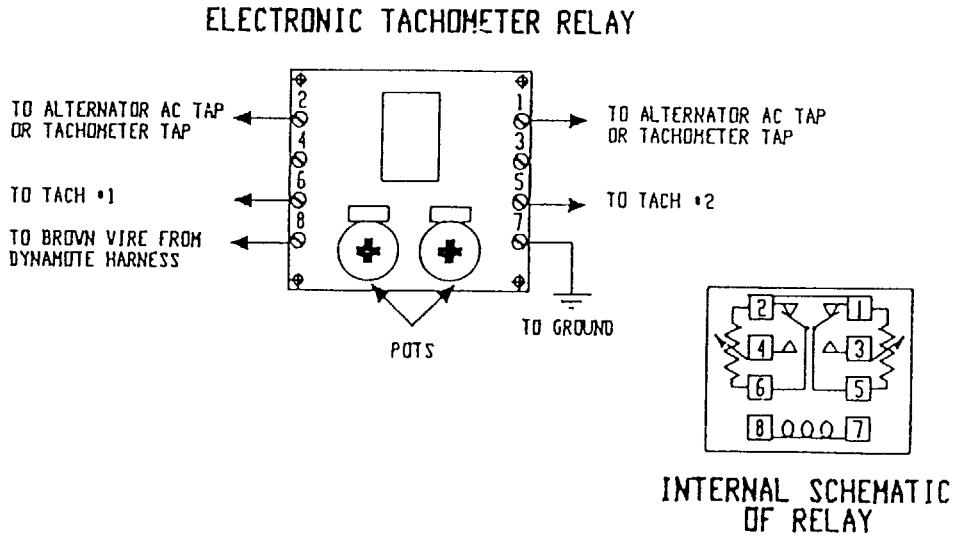


Figure 2-6. Installation of Electronic Tachometer Relay

Electronic tachometer relay calibration procedure:

1. With the inverter OFF, increase engine speed to approximately 1000 to 1400 RPM. Note the tachometer reading.

2.4.4.2 *Installation of Electronic Tachometer Relay continued*

2. Turn the inverter ON and adjust the trim pot on the tachometer relay circuit board so that the tachometer reads the same with the inverter ON as it reads with the inverter OFF.

3. Repeat steps 1 and 2 for the second tachometer.

4. Return to Note 3 in section 2.4.4A or 2.4.4B.

2.4.4.3 *Modification Instructions for Leece Neville Alternators with Internal Regulators*

These instructions—for use with Dynamote Model 4-3001 and 4-3002 Adapter Kits—simplify the alternator modification procedure prior to installation of the inverter. They are only for use with internally-regulated alternators that have a JA or JB suffix to the model number. Externally-regulated alternators, which have an AA or AB suffix to the model number, do not require modification.

Refer to the chart below to select the correct adapter kit number for each alternator and regulator:

Alternator Model No.	Regulator Model No.	Dynamote Part No.	Adapter Kit No.
2000J Series	79000	2002-03001	4-3001
3000J Series	97300	2002-03002	4-3002
4000J Series	77973	2002-03002	4-3002
7000J Series	77973	2002-03002	4-3002

To install the adapter kit:

1. Remove the regulator from the porcelain brush housing by removing the screws on top of the regulator.

2. Remove the diode trio and diode trio wire from the three AC tap terminals and the diode trio terminal on the regulator. Discard the diode trio.

3. Remove all external and internal wires from connections on the regulator, including wire connected to the vehicle wiring harness.

4. Compress the field brushes back into the porcelain brush housing and retain the springs by pushing a pin through the retaining hole in the back of the housing. This can be done with a $\frac{1}{16}$" drill rod or a paper clip.

5. Tape and secure all wires in the porcelain brush housings to prevent them from shorting to each other or the alternator body.

2.4.4.3 *Modification Instructions for Leece Neville Alternators with Internal Regulators continued*

6. Install the adapter plate in place in the porcelain brush housing and put the retaining screws in place fingertight.

7. Remove the retainer (clip or drill rod) to allow brushes to make contact with the adapter plate and tighten the adapter plate screws.

   You now have two exposed field terminals for making all necessary connections to the alternator and inverter.

8. Ground one of these terminals to the B– output terminal of the alternator.

9. Route the BLUE wire from the Dynamote control harness to the other field terminal.

10. Return to Note 4 in section 2.4.4.

2.4.5 Hardwiring the AC Output

— NOTE —

The AC output hardwiring is not the same for all dynamic inverters. Be sure to follow the appropriate instructions below for your specific inverter.

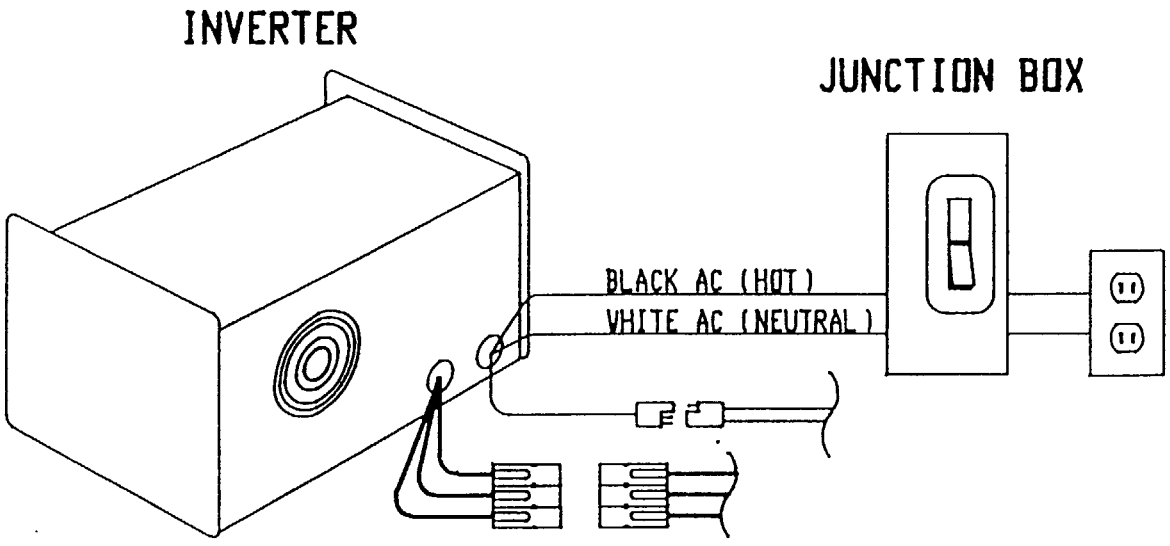


Figure 2-7. Hardwiring the AC Output

2.4.5.1 *Model A60-120C Inverter*

In this unit, both AC 1 and AC 2 wires are hot relative to chassis ground. Therefore, neither can be grounded. If they are, the inverter will not operate.

The AC receptacles on the inverter front panel may be used up to the fused limit of 15 amps per AC receptacle on all models.

To permanently wire the 120 VAC output:

1. Connect one of the BLACK AC leads from the rear of the inverter to the load neutral wire(s) inside the junction box. Make sure the neutral terminal is not grounded.

2. Connect the second BLACK AC wire from the rear of the inverter to the circuit breaker terminal inside the junction box.

3. Return to step 12 in section 2.4.4A or step 13 in section 2.4.4B.

2.4.5.2 *All models except A60-120C*

In these units, AC output is a standard two-wire output, with a hot and neutral lead. Only the "hot" lead (AC 1) cannot be grounded.

The AC receptacles on the inverter front panel can be used up to their fused capacity of 15 amps per receptacle for all models.

To permanently wire the 120 VAC output:

1. Connect the WHITE AC lead from the rear of the inverter to an external junction box neutral terminal.

2. Connect the BLACK AC lead from the rear of the inverter to the circuit breaker terminal inside the the junction box.

3. Return to step 12 in section 2.4.4A or step 13 in section 2.4.4B.

2.4.5.3 *Models with 120/240V Output Option*

In these units, AC output is standard three-wire output with two hot leads and one neutral lead. The two hot leads cannot be connected together. If they are, the inverter will not operate. 120 VAC is available between the two hot leads and ground. 240 VAC is available between the two hot leads.

To permanently wire the 120/240 output:

1. Connect the WHITE AC lead from the rear of the inverter to an external junction box neutral terminal.

2. Connect the BLACK AC lead from the rear of the inverter to one of the circuit breaker terminals inside the junction box.

3. Connect the RED AC lead from the rear of the inverter to the other circuit breaker terminal inside the junction box.

4. Return to step 12 in section 2.4.4A or step 13 in section 2.4.4B.

2.4.6 Checkout of Harness Installation and Alternator Output

— NOTE —

Before starting this procedure, place the AUTOMATIC-MANUAL switch (if present) in the MANUAL position.

This is one of the most important steps in the installation process. Its purpose is to ensure that the harness is properly connected to the alternator and that the alternator and inverter function properly. The entire checkout procedure is summarized on the "Harness Installation Checkout Chart," page 2-21. THE RESULTS OF THIS CHECKOUT PROCEDURE MUST BE RECORDED ON THE INVERTER REGISTRATION CARD BEFORE IT IS RETURNED TO DYNAMOTE.

There are two methods of performing this procedure:

1. Using a Model 4-2600 Dynamic Inverter Test Module. If this module is used, place the sequence switch in the IGNITION OFF position before connecting the module to the inverter. The vehicle ignition should also be off.

2. Using a Model 4-2700 Dynamic Inverter Test Strip and a VOM.

Using either device, follow these instructions:

1. Insert the six-pin plug into the INVERTER TEST RECEPTACLE on the front panel of the inverter.

2. Follow the Harness Installation Checkout Chart on page 2-21.

Note 1. If the BLACK (B+) lead is connected to a battery selector switch, the switch should be in the BOTH position.

Note 2. If there is a battery isolator in the system and the instruction in section 2.4.4.1 has been followed, then for step 1A and 1B in the Harness Installation Checkout Chart on page 2-21, jumper either the B1 or B2 wire on the battery isolator to the A terminal on the battery isolator. After steps 1A and 1B, return the battery isolator wiring to normal for the remaining checkout steps.

HARNESS INSTALLATION CHECKOUT CHART *

Switch Position for Test Module 4-2600	Color of Wires Being Read For Test Strip 4-2700		Vehicle Ignition Switch	Inverter Start Switch Pushed	Engine R.P.M.	Proper Voltmeter Reading	Actual Reading	See Note
1	RED (A+) to GREEN	A	OFF	NO	-0-	11-13VDC		#1
		B	OFF	YES	-0-	0-2VDC		#2
2	ORANGE (Ignition) to GREEN	A	OFF	NO	-0-	0-VDC		#3
		B	ON	NO	-0-	11-13VDC		#4
3	BLACK (B+) to GREEN	A	ON	NO (Inverter Off)	1500	14.0-14.2VDC		#5
		B	ON	YES (Inverter On) (See Note 7)	1500 (See Note 6)	14.0-14.2VDC		#5
		Prior to the next step, apply the actual or approximate planned load to the inverter						
		C	ON	YES (Inverter On)	Per Autothrottle Adjustment	14-14.2VDC		#8

NOTE 1 If voltage is low (6-11 VDC), recharge or replace vehicle battery as needed.
If reading is negative, check the polarity of your voltmeter leads or check the connections of the GREEN and RED inverter harness wires to be sure they are attached correctly.
If the voltage reading is 0, check 1) to make sure the alternator's negative (-) output terminal is grounded to the engine or 2) if a battery isolator has been installed on the vehicle, go to Section 2.4.4.1 for inverter modification instructions when using a battery isolator

NOTE 2 If relays chatter on and off, RED and BLACK inverter harness wires have been switched and connected incorrectly.
If the voltage reading is 11-13 VDC, check for 1) wires incorrectly connected to alternator positive output terminal (i.e. vehicle's original alternator output wire) or 2) a malfunctioning K-3 relay (if so equipped see Section 3.4.4).
If nothing happens when START button is pushed, go to the Troubleshooting Chart.

NOTE 3 If voltage is present, the connection point used for the ORANGE wire is incorrect. Connect the ORANGE wire to a terminal or wire that is at 0 VDC when the ignintion is OFF and 11-13 VDC when the ignition is ON.

NOTE 4 If voltage is low, the Inverter Off Voltage Regulator will not turn on. Be sure the ORANGE wire is attached to a good ignition-switched 12 VDC source. Make sure the ORANGE wire is not connected to the wire from the vehicle's original voltage regulator.

NOTE 5 If the voltage is low or high, adjust the appropriate voltage regulator according to Section 3.4.11.

NOTE 6 Increase engine speed to 1500 RPM by adjusting the manual or automatic throttle control. If Dynamote Autothrottle is used, refer to Autothrottle Manual Instructions steps 7 and 8 and adjust RPM to 1500 with inverter ON.

NOTE 7 If the inverter doesn't start and stay on, go to the Troubleshooting Chart.

NOTE 8 If the voltage is lower than 14.0 VDC, increase engine speed by adjusting manual or automatic throttle control until voltage reading is 14.0 VDC.
If the voltage is 14.1 VDC or above, reduce engine speed by adjusting manual or automatic throttle control until voltage begins to drop.

* PLACE INVERTER IN "MANUAL" TO PERFORM THESE PROCEDURES

2.4.7 Inverter Registration Card

— NOTE —

It is extremely important that you completely fill out this card and return it to Dynamote so that we can communicate with you as product updates occur.

Proper installation of the inverter is not complete until the warranty is properly initiated as follows:

1. Fill in the end user's name, address and vehicle data.

2. Enter all checkout data from the harness and alternator checkout procedures in section 2.4.6.

3. Sign your name and the company name and address, certifying that installation was properly completed, and enter the date of installation.

4. Fill in and sign the Inverter Registration card found in the front of this manual.

5. Mail this postage-paid card to Dynamote Corporation.

3. SERVICE AND TROUBLESHOOTING

3.1 GENERAL INFORMATION—PLEASE READ CAREFULLY

The only reason to be in this part of this manual is because your inverter and/or vehicle charging system is not working properly. If this is a new installation and has not yet been in service, be sure to go through the checkout procedures in section 2.4.6 before proceeding further. If you have completed the checkout procedures and the inverter still doesn't work, continue with this section.

If your inverter has been in service and working properly prior to this failure, and if the installation has not been tampered with, such as for servicing the vehicle in some way, then the likely cause of failure is in the inverter and can be found through the troubleshooting procedure.

You can troubleshoot the inverter three ways:

1. The easiest method is to troubleshoot the inverter while still installed in the vehicle or boat, because the electrical system provides a power source to check out all inverter functions.

2. You can use a test bench which includes an alternator and battery and simulates a vehicle or boat electrical system.

3. You can perform a minimum of troubleshooting tests by connecting the inverter harness to a 12-V battery as follows:

GREEN	to battery negative (–)
BLACK	to battery positive (+)
ORANGE	to battery positive (+)

   other wires not connected.

3.2 TROUBLESHOOTING

Only the simplest of tools and instruments are required for 90% of the problems you may encounter with your inverter:

- a Volt/Ohm Meter
- socket wrenches
- a screw driver
- a 10" extension on the socket wrench will be helpful if the cathode leads to the SCRs must be removed.

3.2 *Troubleshooting continued*

The remaining 10% of possible problems are often intermittent or less obvious and require more sophisticated instruments and technical expertise to solve. This kind of capability can be found at the Dynamote factory and major warranty and repair centers around the country. IF THE PROBLEM CANNOT BE SOLVED USING THIS TROUBLESHOOTING SECTION WITHIN APPROXIMATELY ONE HOUR, THEN HELP SHOULD BE SOUGHT FROM A DYNAMOTE SERVICE AND REPAIR CENTER OR FROM THE DYNAMOTE DIAGNOSTIC CENTER, 1-800-426-2838.

The component layout diagrams (Figures 3-2 and 3-3) will be useful in locating parts and terminal points. When ordering replacement parts, please refer to the Dynamote part numbers given in section 4.

If the symptom of failure is known, proceed directly to that symptom in the Troubleshooting Chart. If the symptom is not known, begin the troubleshooting process by going to symptom #1 in the Troubleshooting Chart, pushing the START button and progressing through the chart's steps until the applicable symptom is found.

If the inverter is connected only to a battery and not an alternator, the test at symptom #1 can be performed as well as the checkout procedures for the voltage regulators, oscillator board, diodes, SCRs and relays K1, K2 and K3.

3.3 TROUBLESHOOTING CHART

The Troubleshooting Chart and checkout procedures require the Dynamote Model 4-2700 Test Strip plugged into the INVERTER TEST RECEPTACLE on the front panel and a Volt/Ohm Meter.

If the inverter has the Load Demand option, place the AUTOMATIC/MANUAL switch in the MANUAL position for symptoms 1 through 11 and in the AUTOMATIC position for symptoms 12 and 13. Continue with the procedures below (the engine must be running while performing steps 3 through 13).

3.4 INVERTER REMOVAL PROCEDURE

— NOTE —

Do not remove the inverter until after the troubleshooting procedure has been completed and it is determined that the inverter must be removed for service. Then follow this procedure.

1. Remove the four screws holding the small box attached to the inverter front panel. Disconnect the wiring harness from the Inverter Off Voltage Regulator printed circuit board in the box.

3.4 *Inverter Removal Procedure continued*

2. Disconnect the small Dynamote control harness and the large power harness at the back of the inverter as well as any AC output wiring. Remove the inverter.

3. Locate the adapter harness attached to the vehicle side of the small Dynamote control harness and connect it to the Inverter Off Voltage Regulator in the small box.

4. Mount the box and ground the GREEN wire from the adapter harness to the mounting screw.

— Note —
The Inverter Off Voltage Regulator inside the box regulates the vehicle alternator when the inverter is not installed or not running.

5. Separate the red and black plastic connectors on the vehicle side of the large Dynamote power harness by sliding the red forward and the black backward. Plug them into each other to connect the alternator to the battery.

6. Reverse this procedure to reinstall the inverter.

3. SERVICE AND TROUBLESHOOTING

TROUBLESHOOTING CHART *

THIS TROUBLESHOOTING CHART AND CHECKOUT PROCEDURE REQUIRE THE 4-2700 TEST STRIP PLUGGED INTO THE INVERTER TEST RECEPTACLE AND A VOLT/OHM METER.

THE INVERTER SHOULD BE PROPERLY INSTALLED ON A VEHICLE OR TEST STAND.

*PLACE INVERTER IN "MANUAL" TO PERFORM THESE PROCEDURES

	SYMPTOM	PROBABLE CAUSE	SOLUTION
1.	START button pushed, no response (no audible click).	Blown control fuse, F5.	Check F5 on inverter front panel. If there is no control fuse, go on to next probable cause.
		If new installation, battery isolator in system.	See section 2.4.4.1
		Inoperative K2 relay.	Section 3.4.3
2.	START button pushed, relays will not remain energized but chatter on and off.	Inverter harness improperly installed with RED wire attached to battery and BLACK wire attached to alternator output.	Install RED and BLACK wires according to installation instructions.
	ENGINE MUST BE RUNNING AT APPROXIMATELY 1500 RPM FOR REMAINING TROUBLESHOOTING STEPS.		
3.	START button pushed, relays energize with an audible click, but inverter will not start. (Fan does not turn.)	Blown input fuses.	Section 3.4.5
		Inoperative K3 relay.	Section 3.4.4
		Inverter On Voltage Regulator inoperative or fuse is blown.	Section 3.4.6
		Shorted SCR.	Section 3.4.8
		Oscillator Circuit Board inoperative.	Section 3.4.7
		Diode D5 and D6 open.	Section 3.4.9
		Diode D3 and/or D4 shorted.	Section 3.4.9
4.	START button pushed, inverter turns on (fan turns) but stops when START button is released.	Diode D2 is open.	Replace diode D2.
5.	Low output voltage, AC and DC.	Loose alternator belts.	Tighten belts by adjusting alternator bracket.
		Alternator RPM too slow.	Run engine at faster speed and see if output voltage goes up. (Contact Dynamote for small diameter alternator pulleys.)
		K3 relay inoperative.	Section 3.4.4
		Inverter On Voltage Regulator out of adjustment.	Section 3.4.11
		Shorted or open diodes in the alternator.	Section 3.4.10
6.	Inverter will not turn off, high output voltage, AC and DC.	Inverter On Voltage Regulator inoperative or shorted.	Replace Inverter On Voltage Regulator, PCB 1.
7.	Inverter will not turn off, output voltage normal.	Inverter On Voltage Regulator inoperative.	Section 3.4.6
		K2 relay points 3 and 9 not disengaging.	Section 3.4.3
8.	Inverter turns on, but will not carry AC load.	Blocking diode D5 and/or D6 shorted.	Section 3.4.9
9.	High AC output voltage, low or normal DC output voltage.	Diodes D3 and/or D4 open.	Section 3.4.9
10.	High DC output voltage, low AC output voltage.	Faulty K3 relay.	Section 3.4.4
11.	Improper or no charging with inverter off, proper operation with inverter on.	Inverter Off Voltage Regulator faulty or out of adjustment.	Sections 3.4.6, 3.4.11
		Faulty K2 relay.	Section 3.4.3
		Faulty K3 relay.	Section 3.4.2

TROUBLESHOOTING CHART

IF YOUR INVERTER HAS THE LOAD DEMAND OPTION, PLACE THE "AUTOMATIC-MANUAL" SWITCH IN "AUTOMATIC" AND CONTINUE WITH THE PROCEDURES BELOW.			
12.	Load is applied, no response; inverter works properly in the manual mode.	ORANGE wire disconnected.	Reconnect wire to ignition-switched 12-V source.
		Load Demand PCB 4 defective.	Replace PCB 4.
13.	Load disconnected, unit does not stop after 15 sec.	All loads have not been disconnected from inverter output.	Remove or disconnect all external AC loads.
		Diodes D17 and D19 (D18 and D20 on A40/60 only) shorted.	Section 3.4.9
		Defective PCB 4.	Replace PCB 4.

3.4.1 Open Inverter

Tools required: 7/16" socket or open-end wrench and screwdriver or 1/4" nut driver.

1. Open the inverter by removing the front, top and back panel fasteners. Carefully lay the front and back panels down and remove the top panel.

3.4.2 K1 Relay Checkout Procedure

The engine and ignition should be off for this procedure.

1. Open the inverter according to section 3.4.1.

2. Locate the K1 relay in Figure 4-1 or 4-2 in section 4.

3. Read the voltage across the relay coil (the two small terminals on the top of the contactor). The reading should be:

   - without pressing the START button: 0 VDC
   - with START button depressed: 10 VDC or higher; if 0, recheck K2 relay in section 3.4.3.

4. If step 3 checks out OK, check the resistance across the two large terminals *at the top* of the relay with the Ohm meter. The reading should be:

   - without depressing the START button: 100 KOhms to infinity.
   - with the START button depressed: less than 5 Ohms. If otherwise, replace K1.

5. Repeat step 4, checking the resistance across the two large terminals *at the bottom* of the relay. The reading should be the same as in step 4.

3.4.3 K2 Relay Checkout Procedure

The engine should be off and the ignition on for this test.

1. Using the Model 4-2700 Test Strip, read voltage from blue to green. Without the START button depressed, the reading should be 10 VDC or higher. If not, replace K2.

2. With the START button depressed, the voltage from blue to green should be 10 VDC or higher. If not, replace PCB3.

3. With engine and ignition off, and without the START button depressed, the voltage from blue to green should be 0. If not, replace K2.

4. With the START button depressed, the voltage from blue to green should be 10 VDC or higher. If not, replace K2.

3.4.4 K3 Relay Checkout Procedure

The engine and ignition should be off for this test.

The K3 relay is the high amperage bypass relay and is a cylindrical silver solenoid contactor. It is installed near the alternator under the hood. It can be found by following the wiring from the positive terminal of the alternator. The small terminals on the relay are the coil terminals and the large terminals are the contacts.

1. Using the 4-2700 Test Strip, the voltage from brown to green should be 0. With the inverter START button depressed, there should be an audible click and voltage should be 10 VDC or higher.

   If these conditions are present, proceed to step 3.

2. If the voltage is 0 with the START button depressed, carefully check the wiring to the positive relay coil terminal (the one that is not grounded). This should come from the accessory terminal in the rear of the inverter (BROWN harness wire).

   If the wiring is correct, then go through the K2 relay checkout procedure in section 3.4.3 to be sure that there is voltage at the accessory terminal when the START button is depressed.

3. Check the voltage from the relay contact that is wired to the alternator positive terminal to ground. Without the START button depressed, the voltage should be 10 VDC or higher. With the START button depressed, the voltage should read 0-2. If otherwise, replace K3.

3.4.5 Input (Commutation) Fuse Checkout Procedure

Input (commutation) fuses are in the larger fuseholders on the front panel of the inverter. There are two input fuses on A30 inverters and four on A40 and A60 inverters.

1. Remove the input fuses. They must be checked with an Ohm Meter, as they are solid fuses and visual inspection will not determine if they are good.

2. Check the fuses with the Ohm Meter by placing a probe at each end. If there is no resistance, the fuse is good. If there is high resistance, the fuse is blown and must be replaced with the same value fuse.

3.4.6 Inverter On Voltage Regulator (PCB 1) and Inverter Off Voltage Regulator (PCB 3) Checkout Procedure

The engine should be OFF and the ignition switch ON for this test.

1. On the Model 4-2700 Test Strip, read the voltage from blue to green.

   Without depressing the START button, the voltage should be 10 VDC or higher. If not, replace the Inverter Off Voltage Regulator, PCB 3.

   With the START button depressed, the voltage should be 10 VDC or higher. If not, replace the Inverter On Voltage Regulator, PCB 1.

3.4.7 Oscillator Circuit Board Checkout Procedure

The engine and ignition should be off for this test.

1. Open the inverter according to section 3.4.1.

2. Locate the SCR gate leads. These are the small white leads to the SCRs which have a plastic connector in the lead. Separate by disconnecting the plastic connector.

3. With the START button depressed, read the voltage to GROUND from each gate lead connector on the part of the gate lead which is connected to the Oscillator Circuit Board. The voltage should be between 2 VDC and 7 VDC, and should be equal $\pm$.3 VDC for the two leads. If it is not, the board should be replaced.

3.4.8 SCR Checkout Procedure

Additional tools required: 7/16" socket wrench with extender, 3/4" socket wrench with extender (A40 and A60 inverters only).

The engine and inverter should be OFF for this test.

1. Prior to checking out the SCRs, be sure that the input (commutation) fuses are good (see section 3.4.5).

2. Open the inverter according to section 3.4.1.

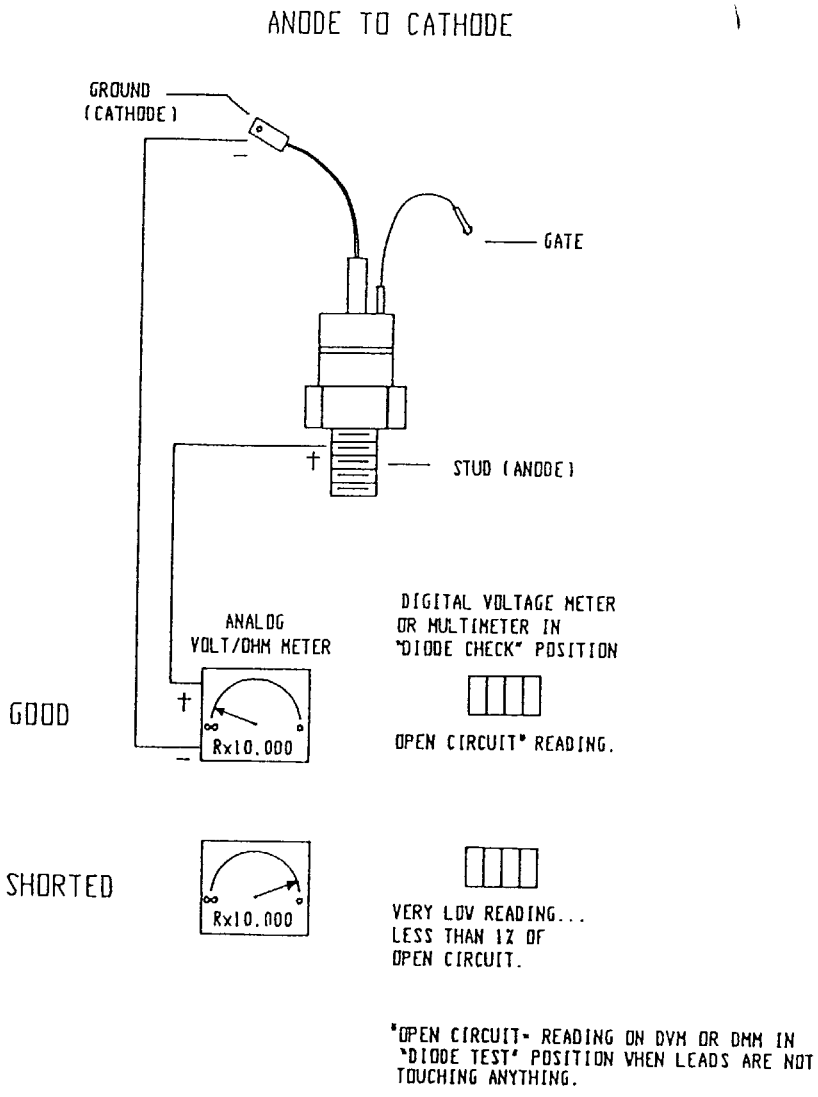


Figure 3-1. SCR Checkout Procedure

3. Remove SCR cathode (ground) leads from ground (these are RED #8 wires for A40 and A60 inverters and GREEN wires for A30 inverters) which are attached to the bottom of the inverter with a bolt and 7/16" nut. The SCR does not have to be removed from the heat sink for this test. The heat sink and anode are at the same potential.

4. Using an analog Volt/Ohm meter in the "resistance" setting (R x 10,000) or a Digital Voltmeter set in the "Diode Check" position, check the resistance across the SCR with the positive lead on the heat sink, and the negative lead on the cathode that was removed from the ground stud. If resistance reading is less than 1000 Ohms, the SCR is shorted and should be replaced. A resistance reading of 100,000 Ohms to infinity (∞) indicates that the SCR is OK.

5. To replace the SCR:

   a. Pop the plastic plugs out of the 1" holes in the slotted area behind the heat sink from the inside with a screwdriver.

   b. Disconnect the small connector in the SCR gate lead.

   c. Remove the SCR, using the 7/16" socket if it is an A30 inverter or the 3/4" socket for an A40 or A60 inverter, leaving as much of the white thermal compound on the heat sink as possible.

   d. Install the new SCR, making sure that there is thermal compound between the SCR case and the heat sink and that the nut is on very tight.

   e. Reconnect the cathode (ground) lead.

   f. Reconnect the gate lead.

3.4.9 Diode Checkout Procedure

For stud-mounted diodes with normal or standard polarity, the stud is the cathode and the tab or flag is the anode. The diode symbol points from the tab to the stud. Reverse polarity diodes are the opposite, have an R in their number (R3720 or IN1184R) and a diode symbol that points from the stud to the tab. Diodes conduct anode-to-cathode and block cathode-to-anode (see Figure 3-2).

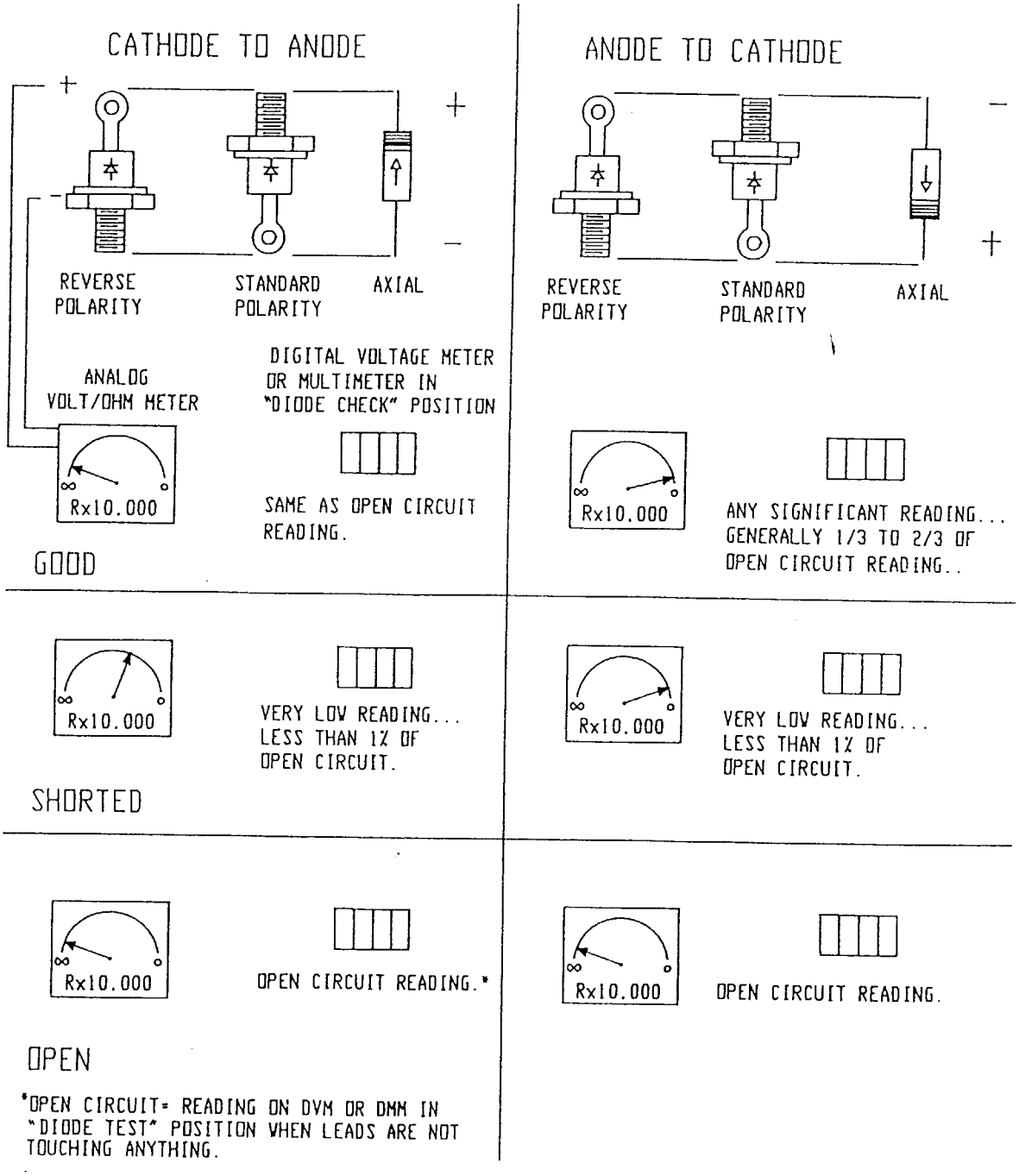


Figure 3-2. Diode Checkout Procedure

3.4.9 *Diode Checkout Procedure continued*

Following is the polarity of the diodes in the dynamic inverters:

Diodes	Polarity
D1	standard
D2	axial leads
D3,D4	reverse
D5,D6	standard
D7,D8,D9	standard
D10,D11,D12	standard
D13	axial leads
D14,D15	reverse
D17	standard
D18	reverse
D19	standard
D20	reverse

To perform diode checkout:

1. Open the inverter according to section 3.4.1
2. Diodes should be removed from the heat sink or chassis before testing.
3. Using an analog Volt/Ohm meter in the "resistance" setting (R× 10,000) or a Digital Voltmeter set to the "Diode Check" position, check out diodes according to Figure 3-2.

3.4.10 Alternator Diode Test Procedure

CAUTION

FOR THIS TEST, DISCONNECT THE AUTOMATIC THROTTLE AND DO NOT PUSH OR RELEASE THE INVERTER START BUTTON WHEN THE ENGINE IS ABOVE IDLE.

1. On the Model 4-2700 Test Strip, read voltage from red to green on a scale capable of reading 100 VDC.
2. Remove the INPUT (commutation) fuses from the inverter front panel.
3. Start the engine and run at an idle.
4. With the START button depressed, increase engine speed until voltage reaches 80 VDC to 100 VDC and then return to idle before releasing the START button.

3.4.10 *Alternator Diode Test Procedure continued*

5. If the voltage peaks out at 70 VDC or less, the alternator diodes are defective and should be replaced by an alternator repair shop.

3.4.11 Inverter On Voltage Regulator (PCB 1) and Inverter Off Voltage Regulator (PCB 3) Adjustment Procedure

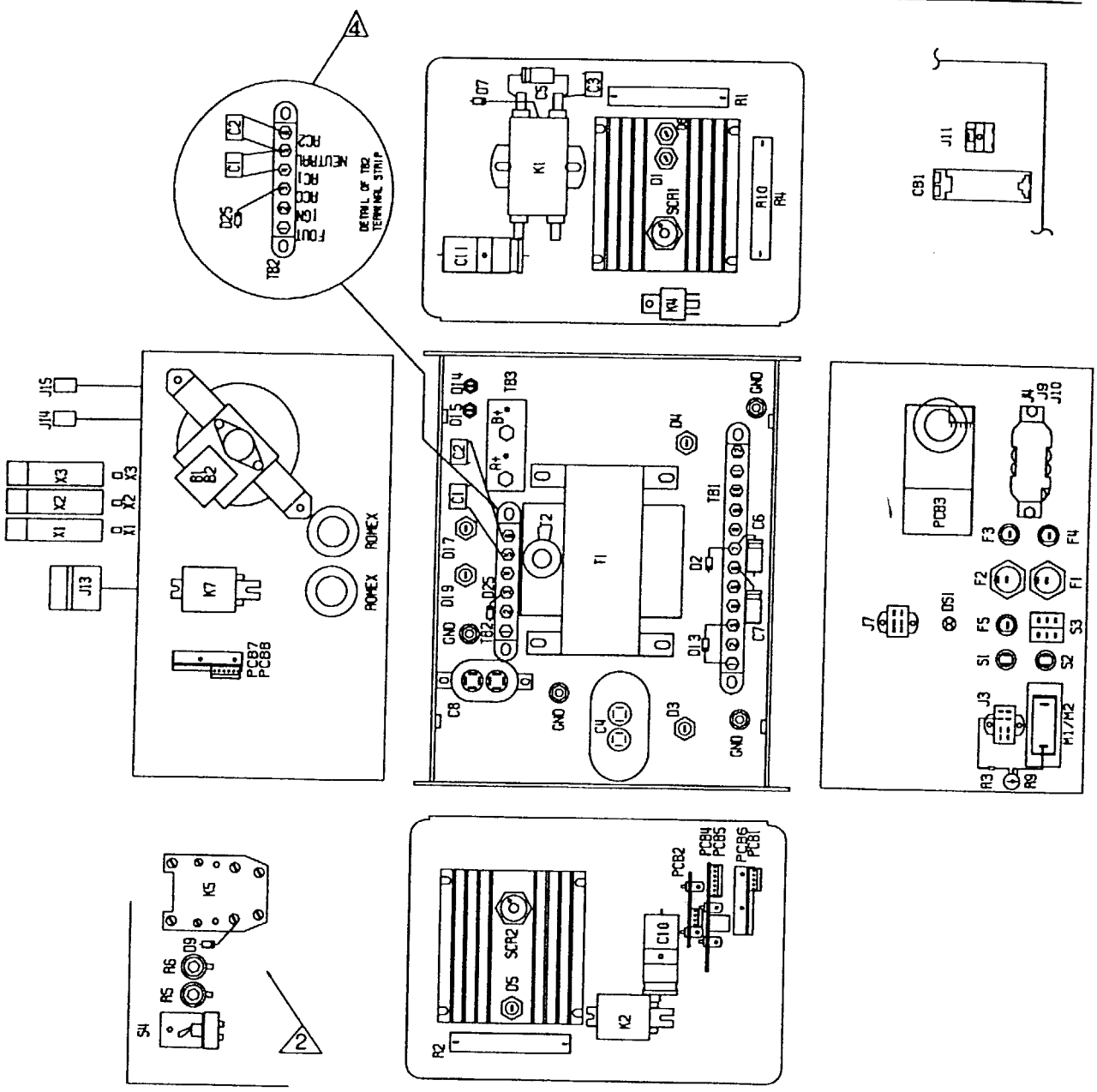
1. On the Model 4-2700 Test Strip, read the voltage from black to green on a scale capable of reading up to 15 VDC.

2. Start the engine and run at approximately 1500 RPM and turn on a moderate DC load such as the headlights.

3. With the inverter OFF, the Inverter Off Voltage Regulator is regulating the alternator. With the inverter ON, the Inverter On Voltage Regulator is regulating the alternator.

4. If the voltage in either case is other than 13.8 VDC to 14.2 VDC, the appropriate voltage regulator should be adjusted by turning the small brass screw on the voltage regulator circuit board with a very small screwdriver or knife blade (it could take two or three turns of the potentiometer screw to make this adjustment). If the voltage cannot be adjusted to approximately 14.2 VDC, the appropriate voltage regulator should be replaced.

   Access to the adjustment potentiometer screw for the Inverter On Voltage Regulator is through a small hole on the left-hand side of the front panel; access to the adjustment potentiometer screw for the Inverter Off Voltage Regulator is through a small hole in the box on the right side of the front panel.



NOTES:

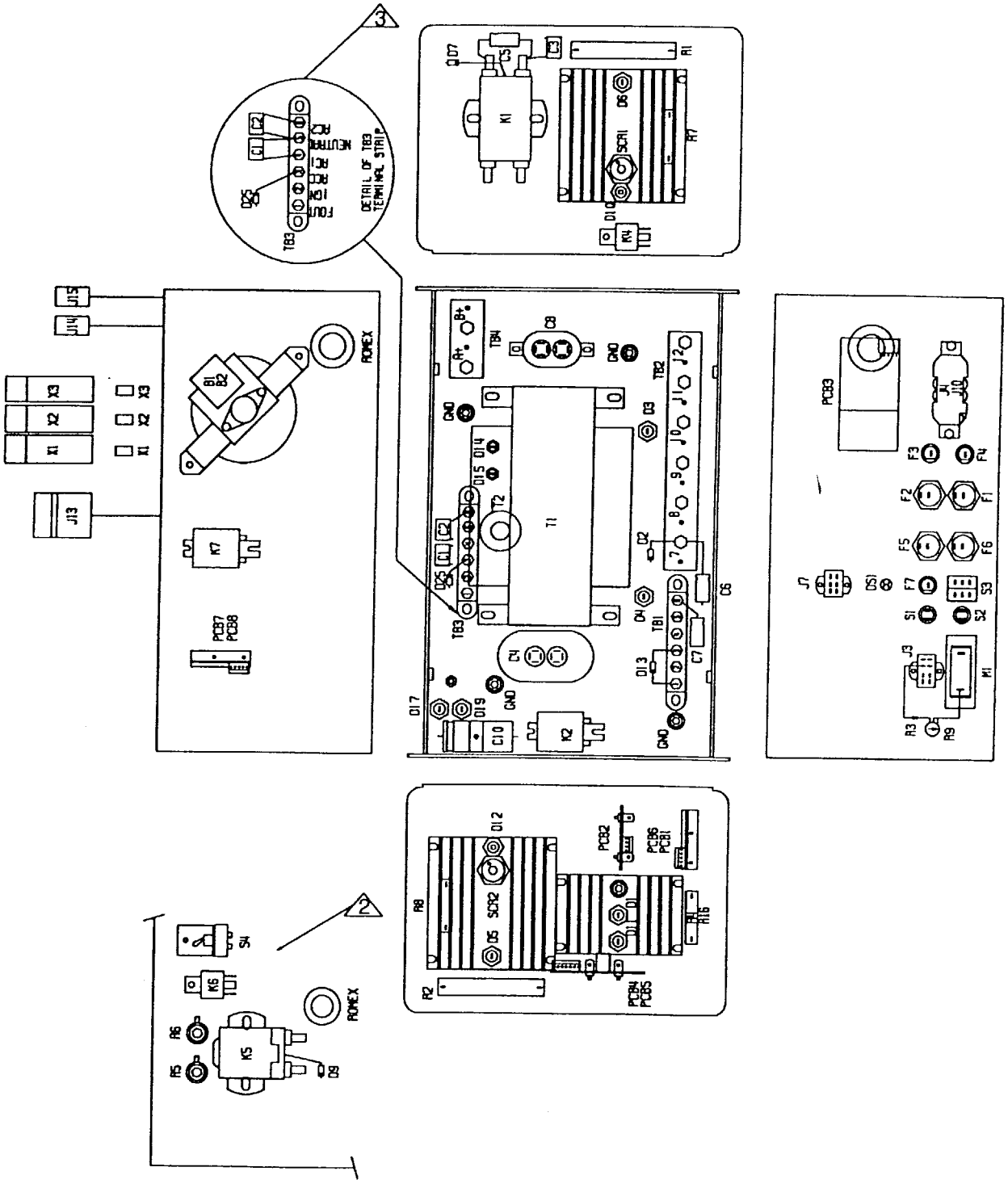
1 THIS DRAWING SHOWS PLACEMENT OF ALL COMPONENTS FOR ALL OPTIONS OF A20 AND A30 INVERTERS.

2 MARINE POWER UNITS INCLUDE THESE ADDITIONAL COMPONENTS MOUNTED ON THE BACK PANEL.

3 IN UNITS WITH THE /GFI OPTION. COMPONENTS CB1 AND J11 REPLACE COMPONENTS J4, J9, OR J10 ON THE FRONT PANEL.

4 UNITS WITHOUT THE /240 OPTION USE A 5- PIN TERMINAL STRIP.

Figure 3-3. Model A20/A30 Component Layout



NOTES:

1 THIS DRAWING SHOWS PLACEMENT OF ALL COMPONENTS FOR ALL OPTIONS OF THE A40 AND A60 SERIES INVERTERS.

2 MARINE POWER UNITS USE THESE ADDITIONAL COMPONENTS ON THE BACK PANEL.

3 UNITS WITHOUT THE /240 OPTION USE A 5-PIN TERMINAL STRIP.

Figure 3-4. Model A40/A60 Component Layout

4. DYNAMIC INVERTERS PARTS LISTS/SCHEMATICS

Circuit Designation	Dynamote Part No.	Description	Model No: A20	A30	A40	A60
C1	4092-80651	Output Capacitor	X	X	X	X
C2	4092-80651	Output Capacitor	X	X		
C3	4092-80651	Transformer Input Capacitor	X	X	X	X
C4	4095-24712	Commutation Capacitor	X	X	X	X
C5	4093-05904	Contactor Suppression Cap.	X	X	X	X
C6, C7	4093-10147	Circuit Board Filter	X	X	X	X
C8	4095-74610	AC Output Capacitor			X	X
C8	4095-74606	AC Output Capacitor	X	X		
C9	4092-80651	Output Capacitor			X	X
C10	4093-05904	Boosted Field Capacitor	X	X	X	X
C11	4093-05904	DC Input Capacitor	X	X		
CB1	4082-10030	GFI 30 Circuit Breaker	#	#		
D1	4121-85045	Unit Isolation Diode	X	X		
D1	4121-43700	Unit Isolation Diode (not A60-70)			X	X
D2	4121-14005	K2 Relay Hold-in Diode	X	X	X	X
D3, D4	4121-23720	Battery Charger Diode	X	X	X	X
D5, D6	4121-43700	AC Blocking Diode			X	X
D5, D6	4121-11186	AC Blocking Diode	X	X		
D7	4121-14005	Relay Diode	X	X	X	X
D9	4121-14005	Relay Diode	0	0	0	0
D10, D12	4121-22030	Reverse Parallel Diode			X	X
D11	4121-43700	Battery Isolation Diode			X	X
D13	4121-00610	Isolation Diode	X	X	X	X
D14, D15	4121-20410	Rectification Diode	X	X	X	X
D17	4121-43700	DC Charging Diode	*	*	*	*
D19	4121-23720	DC Charging Diode	*	*	*	*
D25	4121-10751	Accessories Protection Diode	X	X	X	X
D26	4121-10751	Contactor Suppression Diode	X	X	X	X
R1, R2	4681-10025	Stabilizing Resistor	X	X	X	X
R3	4681-00310	Current Limit Resistor	X	X	X	X
R4	4681-08020	VR Stabilize Resistor	X	X	X	X
R5, R6	4681-09005	Field Current Limit Resistor	0	0	0	0
R7, R8	4681-07010	Current Limit Resistor			X	X
R9	4602-00103	Meter Adjustment Potentiometer	X	X	X	X
R10	4681-00540	DC Load Resistor	#	#	#	#
R11	4681-03147	Contactor Suppression Resistor	X	X	X	X
S1, S2	4721-08411	Start/Stop Switch	X	X	X	X
S3	4721-00255	Load Demand Switch	*	*	*	*
S4	4721-00256	Field Selection Switch	0	0	0	0
B1	4046-12337	Fan Motor, 120 VAC	X	X	X	X
B1	4047-04185	Fan Blade (only)	X	X	X	X
B2	4046-02339	Fan Motor, 220 VAC	#	#	#	#
F1, F2	4200-06400	Fuses, ABU40	X	X		
F1, F2, F5, F6	4200-06400	Fuses, ABU40			X	X
F3, F4	4200-02150	Fuses, AGC15	X	X	X	X
F5	4200-02150	Fuses, AGC15	X	X		
F7	4200-02150	Fuses, AGC15			X	X
F1, F2, F5, F6	4282-00011	Fuseholder, HPG	X	X	X	X
F3,F4	4282-00003	Fuseholder, HKP	X	X	X	X
F5	4282-00003	Fuseholder, HKP	X	X		
F7	4282-00003	Fuseholder, HKP			X	X

0 - MPA units only * - LD units only # - Optional

4. DYNAMIC INVERTERS PARTS LISTS/SCHEMATICS

Circuit Designation	Dynamote Part No.	Description	Model No: A20	A30	A40	A60
K1	4685-43051	Power Relay	X	X	X	X
K2	4685-01156	Control Relay	X	X	X	X
K4	4685-02030	VVR Relay	X	X	X	X
K5	4685-42592	LVCO Relay	0	0		
K5	4685-41051	LVCO Relay (Power)			0	0
K6	4685-02030	LVCO Relay (Control)			0	0
K7	4685-01156	Neutral Safety Relay	#	#	#	#
M1	4481-20123	Volmeter, 0-150 VAC	X	X	X	X
M2	4481-20023	Volmeter, 0-300 VAC	#	#	#	#
PCB1	2081-00005	Regulator	X	X	X	X
PCB2	2081-00930	Oscillator, 60 HZ	X	X	X	X
PCB2	2081-00932	Oscillator, 50 HZ	#	#	#	#
PCB3	2081-00005	Regulator (Vehicle)	X	X	X	X
PCB4	2081-B3693	Load Demand PCB	*	*	*	*
PCB5	2081-02407	Low Voltage Cutout	0	0	0	0
PCB6	2081-B3596	Regulator, 120V RMS	#	#	#	#
PCB7	2081-B3602	Control, Two-speed	#	#	#	#
PCB8	2081-B3725	Control, Three-speed	#	#	#	#
T1	2764-01400	Transformer, A20-50 (120 VAC)	X			
T1	2764-02007	Transformer, A30-70 (120 VAC only)		X		
T1	2764-01415	Transformer, A40-120 (120 VAC only)			X	
T1	2764-02022	Transformer, A60-120D (120 VAC only)				X
T1	2764-02020	Transformer, A60-70 (120 VAC only)				X
T2	4766-00125	Transformer, Current Sense	#	#	#	#
SCR1, SCR2	2720-40125	Main SCRs	X	X		
SCR1, SCR2	2720-70100	Main SCRs			X	X
J3	4080-03080	Control Head Receptacle	X	X	X	X
J4	4683-25320	Output Receptacle	X	X	X	X
J7	4080-03060	Test Module Receptacle	X	X	X	X
J9	4683-25462	Duplex Receptacle, 250V	X	X		
J10	4683-26599	Receptacle For GFI20	#	#	#	#
J11	4683-11369	Receptacle For GFI30	#	#		
J13	4080-86222	Receptacle, 30A 250VAC Twistlock			#	#
J13	4683-15020	Receptacle, 30A 120VAC Twistlock	#	#		
J14, J15	4080-00250	Connector, Innogaz Output	#	#	#	#
X1	4080-04014	Connector, 120A Black	X	X	X	X
X2	4080-04013	Connector, 120A Red	X	X	X	X
X3	4080-04015	Connector, 120A Green	X	X	X	X
X1, X2, X3	4442-90000	Lugs, 120A (for connectors above)	X	X	X	X
DS1	4440-00346	LVCO Indicator Lamp	0	0	0	0

.0 - MPA units only * - LD units only # - Optional

APPENDIX 2. PRINCIPLE OF OPERATION

Dynamote solid-state Dynamic Inverters provide 120 VAC, 60 Hz power and 14 VDC power for batteries from the DC output of a standard heavy-duty 12-VDC alternator. When installed according to the instructions in this manual, the inverter will safely operate all electric tools, lights, appliances and heavy motor loads, and keep the vehicle's cranking battery charged up to its rated capacity.

The relationship of the inverter to the vehicle electrical system is illustrated in Figures A-1 and A-2.

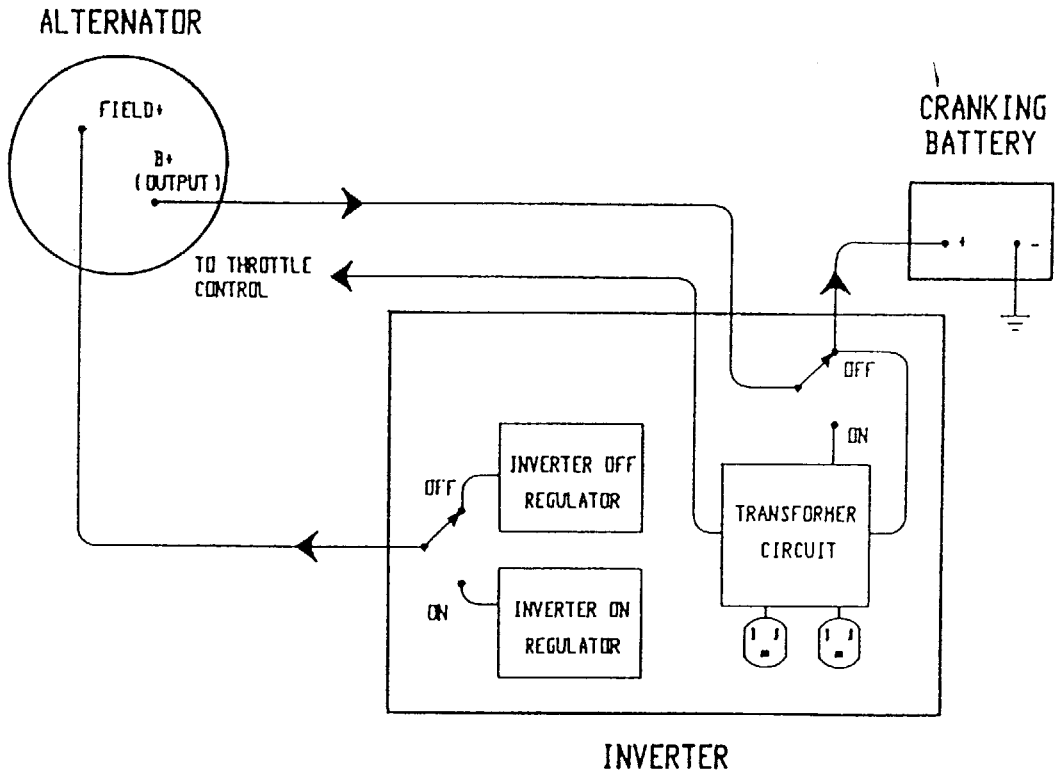


Figure A-1. Relationship of Inverter to Electrical System When Inverter is Off

When the inverter is off:

1. Relays bypass the Transformer Circuit and connect the alternator output directly to the battery.

2. The alternator output is regulated by the Inverter Off Voltage Regulator.

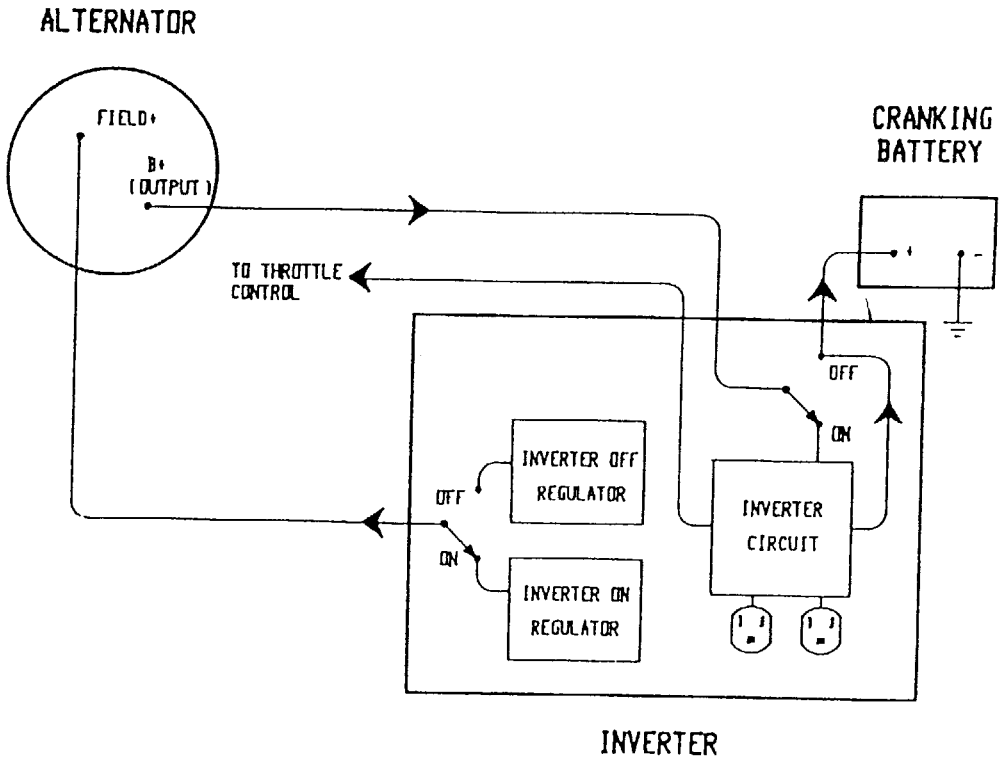


Figure A-2. Relationship of Inverter to Electrical System When the Inverter is On

When the inverter is on:

1. Alternator output is switched to the Transformer Circuit.
2. The alternator output is regulated by the Inverter On Voltage Regulator.
3. The automatic throttle (if used) automatically increases engine RPM to the required level.
4. The inverter produces 120 VAC power for operating AC loads and 14 VDC power for keeping the electrical system supported.

APPENDIX 3. DYNAMIC INVERTER SPECIFICATIONS

Model	Output Watts at 120 VAC	Output Amps at 120 VAC	Surge Cap., Amps	Max. DC Charging	Shipping Wt., Lbs.	Dimensions H"xW"xD"
A20-50	2400	20	40	50	70	9.75x14.25x15
A30-70	3600	30	60	70	70	9.75x14.25x15
A40-120	4800	40	60	120	105	9.75x17.75x15
A60-120D	6000	50	75	120	100	9.75x17.75x15
A60-70	7200	60	80	70	100	9.75x17.75x15
A60-120C	7200	60	80	120	100	9.75x17.75x15

Cooling Air: All Dynamic Inverter exhaust fans are rated at 120 CFM.

OPTIONS FOR DYNAMIC INVERTERS

Model*	Description
/240	120/240VAC output (NOT AVAILABLE FOR A60-120C)
/240/50Hz	240VAC 50Hz output for export
/LD	Load Demand Start/Stop (NOT AVAILABLE FOR MPA SERIES OR A60-120C)
/30	30-ft. harness (replaces standard 20' harness) for A30 30-ft. harness (replaces 20' harness) for A40 or A60
/R	30-amp twist-lock 120VAC receptacle, NEMA L5-30
/RP	30-amp twist-lock 120 VAC receptacle with mating plug, NEMA L5-30
/GFI20	20-amp GFI duplex receptacle; *replaces* standard duplex receptacle
/GFI30	30-amp GFI circuit breaker; *replaces* one of the front panel AC receptacles
/EA	Required for use with Aldyl Electrofusion Systems
/EI	Provides 55VAC output to power Innogaz Electrofusion System

*Add designator to inverter model number (e.g., A30-70/240).

APPENDIX 4. ALTERNATOR/INVERTER SELECTION PROCEDURE

1. Determine Maximum Load Requirement

The first step is to determine, in watts, the largest load or combination of simultaneous loads that will be operated by the inverter. If the rating for a device is in amps, multiply by 120 volts to get watts. Use the running load—not the starting load—for motors. Refer to "Typical Wattage Requirements" below for power requirements of loads or use nameplate data on the devices.

TYPICAL WATTAGE REQUIREMENTS

AC Load	Running Amps at 120 VAC
Air conditioners	8-15*
Automatic pilot	1-2
Blender	3-7
Broiler	10-15
Coffeemaker (12-cup), fry pan	8-12
Depthmeter	.5-1
Drills, ¼" to ½"	1-6
Electric blankets	.5-3
Fans	.5-3
Grinders	5-10
Heaters: water	8-40
space	8-15
Hot plate element	5-10
Impact wrench	3-6
Icemaker	2-4*
Irons: hand	4-12
soldering	1-5
Microwave ovens	10-13*
Radar	4-12
Radios	.5-3
Ranges (per element)	8-15
Refrigerator	2-5*
Sanders	.5-10
Saws: sabre	3-10
Saws: builder's	5-13
Sewing machine	2-4
Skillet	10-15
Televisions	1-5
Toasters	3-12
Vacuum cleaners	1-8

*Inductive loads require intermittent starting surge amperage up to four times running amperage.

AVERAGE MOTOR LOADS, STARTING AND RUNNING

MOTOR LOADS		APPROXIMATE AMPS REQUIRED TO START	
Motor HP Rating	**Approx Running Amps**	**Split Capacitor Type**	**Phase Type**
1/6	4.4	8	12
1/4	5.8	9	14
1/3	7.2	11	16
1/2	9.8	15	22
3/4	13.8	22	
1	16.0	28	
1 1/2	20.0	39	
2	24.0	51	
3	34.0	76	

For motors starting under load, increase motor starting requirement by 25%.

NOTE: Motor load, running amperage is taken from Table 430-148, NFPA Handbook of the National Electrical Code, Fourth Edition, 1987.

2. Add a Safety Factor

   A safety factor should be added to allow for errors in estimating loads and for future growth. If the loads are largely resistive, such as lights or heaters, a 25% safety factor will be sufficient. If the loads are largely induction motors, a 50% safety factor should be used to accommodate the large surges required for motor starting.

3. Select the Right Inverter

   To select the right inverter, add the maximum load from step 1 and get the safety factor from step 2 to determine required inverter capacity. Refer to "Dynamic Inverter Performance Data" below for the inverter and alternator combination that best fits the application. For example, assume your application calls for a Model A30-70; using a Leece Neville Model 4425AA 75-amp alternator, to get 3600 watts, your alternator must turn 3750 RPM. With a 3:1 crankshaft-to-alternator pulley ratio, the engine will be running at 1250 RPM.

APPENDIX 5. DYNAMIC INVERTER POWER OUTPUT VS. ALTERNATOR RPM

To convert alternator RPM to engine RPM, divide by the drive pulley-to-alternator pulley ratio.

ALTERNATOR	INVERTER	ALTERNATOR RPM at: 1200W	2400W	3600W	4800W	6000W	7200W
5M250/278,	A30/A60	2625	3450	4600	9600		
MOTOROLA, 90A	A20/A40	2450	3500	5175			
5M255/277/279,	A30/A60	3650	4025	4600	5450	7050	9300
MOTOROLA, 130A	A20/A40	2800	3525	4450	5500		
5M254,	A30/A60	4350	4825	5225	5900	6800	8150
MOTOROLA, 160A	A20/A40	3525	4050	4550	5600		
5LN4425/4452AA,	A30/A60	2125	2700	3750	9075		
LEECE NEVILLE, 75A	A20/A40	1750	2575	8000			
5LN4625/4654AA,	A30/A60	2925	3350	3925	5150	7600	
LEECE NEVILLE, 105A	A20/A40	2450	2975	4225			
5LN4725/4754AA,	A30/A60	3675	4125	4675	5475	6450	8600
LEECE NEVILLE, 130A	A20/A40	2950	3475	4250	5600		
5LN4805AA,	A30/A60	3625	4000	4350	4700	5400	7400
LEECE NEVILLE, 145A	A20/A40	2950	3350	3950	4650		
5LN7501AA,	A30/A60	3875	4550	5050	7475		
LEECE NEVILLE, 90A	A20/A40	2900	3750				
5LN7605AA,	A30/A60	3475	4100	5150	6725		
LEECE NEVILLE, 105A	A20/A40	2850	4150	5550	8550		
5LN7705AA,	A30/A60	3700	4175	4825	5850	7050	
LEECE NEVILLE, 130A	A20/A40	2950	3900	4850	6150		
5LN8050AA,	A30/A60	3500	3800	4150	4525	5025	5900
LEECE NEVILLE, 145A	A20/A40	2650	3025	3550	4700		
DELCO 1101322,	A30/A60	4600	5750	8100			
70A	A20/A40	3950	5650				
DELCO 1117147,	A30/A60	3550	3950	4525	5375	6400	8200
145A	A20/A40	2825	3350	4150	5450		
DELCO 01101306,	A30/A60	5025	5800	6975			
108A	A20/A40	3825	5050				
DELCO 10495435,	A30/A60	4950	6350	8200			
60A	A20/A40	4350	6000				

APPENDIX 5. DYNAMIC INVERTER POWER OUTPUT VS. ALTERNATOR RPM

ALTERNATOR	INVERTER	ALTERNATOR RPM at: 1200W	2400W	3600W	4800W	6000W	7200W
LESTEK 9135, 105A	A30/A60	7300	8800				
	A20/A40	5850	7600				
LESTEK 9230, 130A	A30/A60	5025	5850	6875			
	A20/A40	4150	5050	6825			
LESTEK 9265, 165A	A30/A60	5700	6300	7400			
	A20/A40	--	--	--			
MOTORCRAFT, 100A, E1VZ-10346-A	A30/A60	4150	4850	6575			
	A20/A40	3525	4650				
MOTORCRAFT, 70A, E7PF-10346-PA	A30/A60	3900	4900	7800			
	A20/A40	3250	5400				

APPENDIX 6.
OPTIMUM INVERTER/ALTERNATOR COMBINATIONS FOR VARIOUS POWER LEVELS

ALTERNATOR	1200W INV.	ALT. RPM
5LN4425/4452AA	A20/A40	1750
5LN4425/4452AA	A30/A60	2125
5M250/278	A20/A40	2450
5LN4625/4654AA	A20/A40	2450
5M250/278	A30/A60	2625
5LN8050AA	A20/A40	2650
5M255/277/279	A20/A40	2800
DELCO, 145A	A20/A40	2825
5LN7605AA	A20/A40	2850
5LN7501AA	A20/A40	2900
5LN4625/4654AA	A30/A60	2925
5LN4725/4754AA	A20/A40	2950
5LN4805AA	A20/A40	2950
5LN7705AA	A20/A40	2950
MOTORCRAFT, 70A	A20/A40	3250
5LN7605AA	A30/A60	3475
5LN8050AA	A30/A60	3500
MOTORCRAFT, 100A	A20/A40	3525

ALTERNATOR	2400W INV.	ALT. RPM
5LN4425/4452AA	A20/A40	2575
5LN4425/4452AA	A30/A60	2700
5LN4625/4654AA	A20/A40	2975
5LN8050AA	A20/A40	3025
DELCO, 145A	A20/A40	3350
5LN4805AA	A20/A40	3350
5LN4625/4654AA	A30/A60	3350
5M250/278	A30/A60	3450
5LN4725/4754AA	A20/A40	3475
5M250/278	A20/A40	3500
5M255/277/279	A20/A40	3525
5LN7501AA	A30/A60	3750
5LN8050AA	A30/A60	3800
5LN7705AA	A20/A40	3900
DELCO, 145A	A30/A60	3950
5LN4805AA	A30/A60	4000
5M255/277/279	A30/A60	4025
5M254	A20/A40	4050

ALTERNATOR	3600W INV.	ALT. RPM
5LN8050AA	A40	3550
5LN4425/4452AA	A30/A60	3750
5LN4625/4654AA	A30/A60	3925
5LN4805AA	A40	3950
DELCO, 145A	A40	4150
5LN8050AA	A30/A60	4150
5LN4625/4654AA	A40	4225
5LN4725/4754AA	A40	4250
5LN4805AA	A30/A60	4350
5M255/277/279	A40	4450
DELCO, 145A	A30/A60	4525
5M254	A40	4550
5M250/278	A30/A60	4600
5M255/277/279	A30/A60	4600
5LN4725/4754AA	A30/A60	4675

ALTERNATOR	4800W INV.	ALT. RPM
5LN8050AA	A60	4525
5LN4805AA	A40	4650
5LN4805AA	A60	4700
5LN8050AA	A40	4700
5LN4625/4654AA	A60	5150
DELCO, 145A	A60	5375
DELCO, 145A	A40	5450
5M255/277/279	A60	5450
5LN4725/4754AA	A60	5475
5M255/277/279	A40	5500
5LN4725/4754AA	A40	5600
5M254	A40	5600
5LN7705AA	A60	5850
5M254	A60	5900
5LN7705AA	A40	6150

ALTERNATOR	6000W INV.	ALT. RPM
5LN8050AA	A60	5025
5LN4805AA	A60	5400
DELCO, 145A	A60	6400
5LN4725/4754AA	A60	6450
5M254	A60	6800
5M255/277/279	A60	7050
5LN7705AA	A60	7050
5LN4625/4654AA	A60	7600

ALTERNATOR	7200W INV.	ALT. RPM
5LN8050AA	A60	5900
5LN4805AA	A60	7400
5M254	A60	8150
DELCO, 145A	A60	8200
5LN4725/4754AA	A60	8600
5M255/277/279	A60	9300