



Owner's Manual

TA60-100

Dynamic Inverter



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1-800-AC POWER

TA60-100 AC DYNAMIC INVERTER—OWNER'S MANUAL

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Table of Contents

Section 1:	General	
	Section 1A	Introduction 1
	Section 1B	Specifications 1
	Section 1C	Inverter Standard Features 2
	Section 1D	Options 2
	Section 1E	Inverter Front Control Panel 2
	Section 1F	Inverter Rear Panel 4
Section 2:	Operation	
	Section 2A	Principle of Operation 5
	Section 2B	Operating Guidelines 6
Section 3:	Installation	
	Section 3A	Selection of Inverter Location 6
	Section 3B	Installation of Proper Alternator 7
	Section 3C	Preliminary Wiring Notes 8
	Section 3D	Basic Inverter and Harness Installation 9
	Section 3E	120 Volt AC Output Wiring 10
	Section 3F	Checkout of Harness Installation 11
	Section 3G	Inverter Voltage Regulator Adjustment Procedure 13
	Section 3H	Confirm Inverter Start-up 14
	Section 3I	Engine/Alternator RPM Adjustment 14
	Section 3J	Installation Complete 14
Section 4:	Service and Troubleshooting	
	Section 4A	General 15
	Section 4B	Troubleshooting 15
	Section 4C	Alternator Checkout Procedure 16
	Section 4D	Inverter Removal Procedure 17
	Section 4E	Bypass Voltage Regulator Adjustment Procedure 18
Section 5:	Supplemental Instructions	
	Section 5A	Inverter Installation Instructions with a Battery Isolator 20
	Section 5B	Inverter Installation Instructions with a 2-Speed Autothrottle 21
	Section 5C	Installation of Electronic Tachometer Relay 22
Section 6:	Warranty 23

List of Figures and Tables

Section 1:	General	
	Figure 1	Inverter Front View Illustration 3
	Figure 2	Inverter Rear View Illustration..... 4
Section 3:	Installation	
	Figure 3	Inverter Dimensions 7
	Table 1	Alternator RPM vs Output Wattage 8
	Figure 4	Installation Wiring Diagram 10
	Table 2	Harness Installation and Checkout Chart 12
Section 4:	Service and Troubleshooting	
	Figure 5	Front and Top View Illustration 17
	Figure 6	Top View Illustration 18
	Figure 7	System Wire Diagram With Inverter Removed (Bypassed) and Bypass Voltage Regulator Installed 19
	Figure 8	Installation with Battery Isolator 20
	Figure 9	Installation with a 2-Speed Autothrottle 21
	Figure 10	Installation of Electronic Tachometer Relay 22

Icon Legend

**Note**

*Important
Information*

**Warning**

*Failure to observe Warning could
cause damage to equipment or
harm personnel*

Section 1: General

1A) Introduction

The TA60-100 Dynamic Inverter is an instrument of the highest quality and designed with the latest “state-of-the-art” engineering for long-term reliable performance. It is backed by a nationwide network of service distributors.

The TA Series Inverter with Trusine® technology is a high performance dynamic inverter that converts the three phase AC output of a 12V alternator to 120 VAC, 60 Hz with a capacity of 6000 watts. Extensive performance testing has shown that the Dynamic Inverter performs best with the Leece-Neville 4000 series alternators.

Trusine® technology incorporates high frequency switching techniques to achieve a constant peak of pure sine wave output, the same as utility power. The waveform is not distorted under load so that even the most waveform sensitive instruments can be operated. When operating inductive loads, like a motor, Trusine® technology actually recycles the reactive energy from the motor so that it maintains its high efficiency. The TA Series has no limitations on the power factor of loads, either leading or lagging.

1B) Specifications

Model Number	TA60-100
Rated Output:	6000 Watts maximum combined AC plus DC
Surge Capacity, Amps	80 Amps AC
DC Charging Capacity	100 Amps maximum at 14 VDC
Output Voltage	120 VAC \pm 5%
Frequency	60 Hz \pm 0.1%
Output Waveform	Pure sine wave, <3% THD
Control Technology	High frequency pulse width modulation
Operating Temperature	-40 to + 105° F, -40 to + 40°C
Cooling Air	120 cfm, fan cooled
Chassis	Heavy-duty aluminum
Dimensions	19.625" W x 10" H x 13.5" D
Weight	80lbs
Recommended Leece-Neville Alternator	LN4625AB, LN4654AB, LN4725AB, LN4754AB, LN4805AB, LN4905AB

1C) Inverter Standard Features

1. Pure Sine Wave Output—Maintains constant-peak, constant-width pure sine wave output with less than 3% total harmonic distortion and no limitation on operation of loads.
2. Over-Current Protection—The TA Series AC output is protected by circuit breakers on the front panel and by an 80 Amp current limiting internal circuit.
3. Precise Voltage Regulation—TA Series regulates the 120 VAC output within $\pm 5\%$ under all load conditions.
4. Load Demand—Automatically starts and stops the inverter upon demand of AC load.
5. High Temperature Protection—Automatically turns the inverter off when the inverter internal temperature reaches an unacceptable high level. The multifunction indicator lamp will flash RED. The inverter must be cooled before it can be reset and started again.
6. Remote Control Receptacle—Provides capability to install optional remote control START-STOP switches.
7. Durable Enclosure—Protects inverter with a rugged aluminum enclosure and polyurethane enamel coating to stand up to extreme road conditions.
8. Quick Disconnect Connectors—All input cables and wires are supplied with quick disconnect connectors.
9. GFCI Receptacle—20 Amp Ground Fault Circuit Interrupter (GFCI) protected 120 VAC duplex receptacle is mounted on the front panel.
10. Battery Isolator Sense Circuit

1D) Options

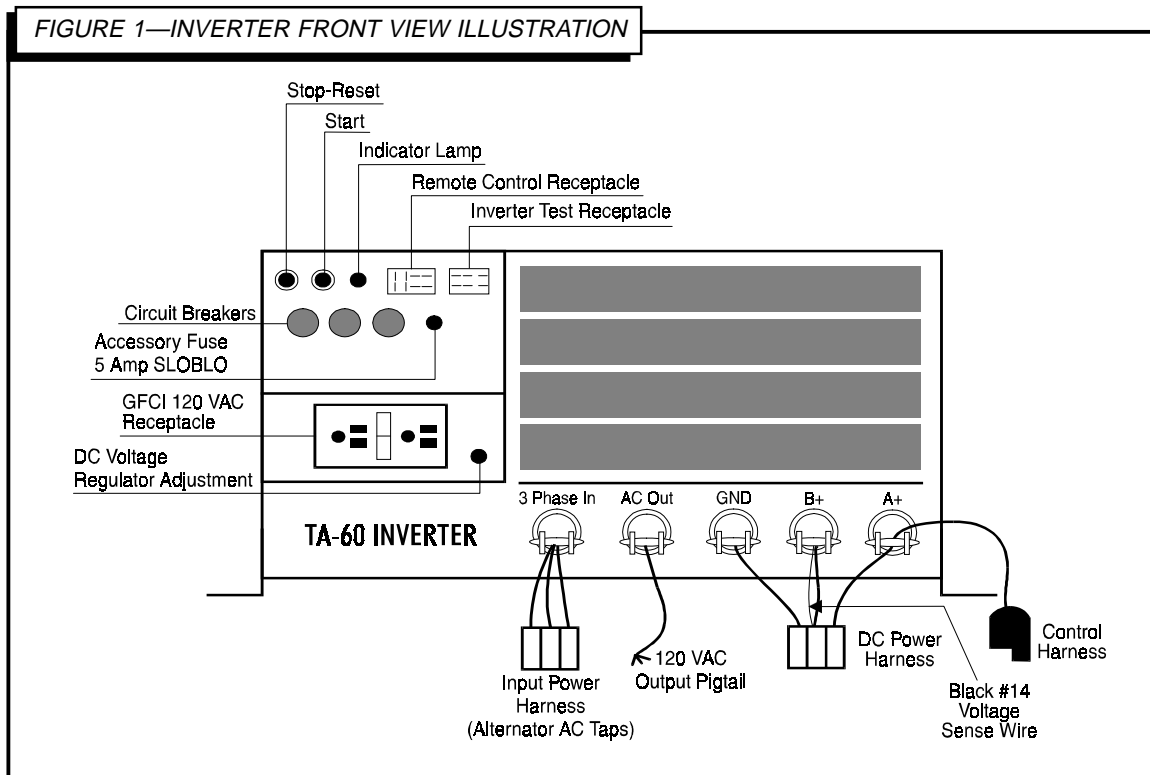
1. Remote Control Rocker Switch P/N D05033
2. Two Speed Auto Throttle Circuit

1E) Inverter Front Control Panel

1. START-STOP Switches—These are momentary push button switches which start and stop/reset the inverter.
 - A. STOP/RESET: When pushed and released, the inverter is completely off. This position is also used to reset the unit when required.
 - B. START: When pushed and released the inverter monitors the 120 VAC line to determine if a load is present. If it detects a load of greater than 5 watts, the inverter turns on fully. When the load is removed, the inverter returns to standby.
2. Multifunction Status Lamp—Indicates inverter status as follows:
 - A. START "ON" Indication: When START button is pushed and released the lamp illuminates GREEN indicating STANDBY mode and the inverter monitors the 120 VAC line to determine if a load is present. If a load of greater than 5 watts is detected, the inverter turns ON fully and the lamp remains GREEN. When the load is

removed, the inverter returns to STANDBY (after a 5 second delay) and the lamp remains GREEN.

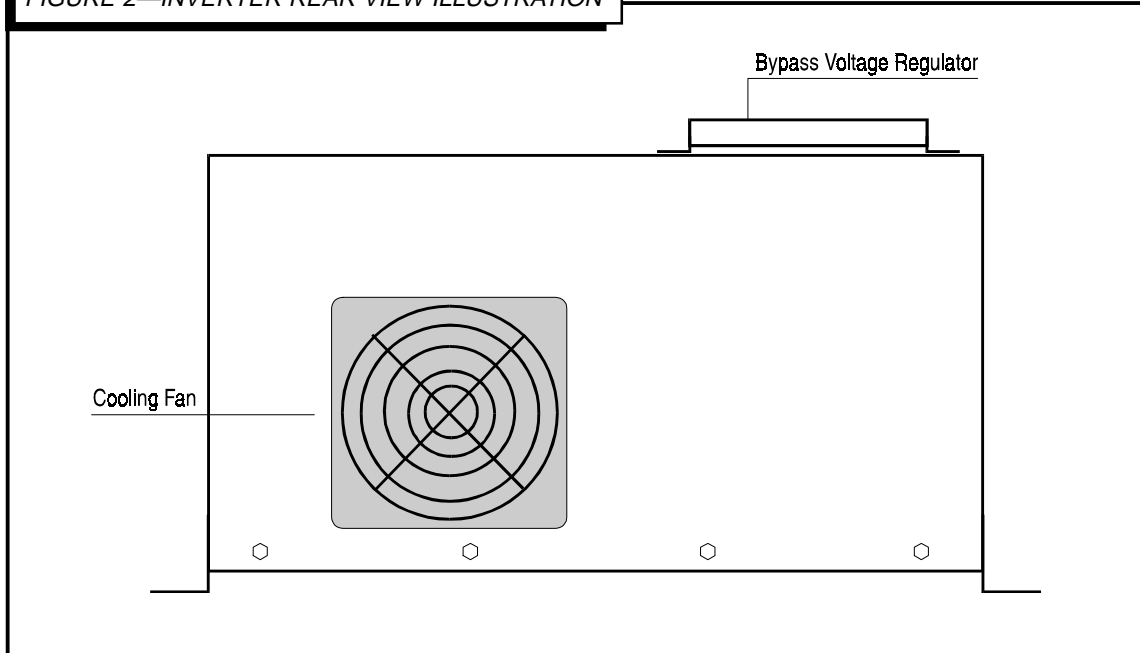
- B. **LOW VOLTAGE INPUT** Indication: When the alternator input voltage remains below an acceptable level, the lamp illuminates ORANGE. This is an indication the alternator is not spinning fast enough to support the AC load applied. The alternator speed must be increased to support the AC load. If this low voltage situation is allowed to continue or the voltage level is extremely low, the lamp momentarily flashes RED and AC output will be interrupted. The inverter will reset automatically if the alternator speed is increased or the AC load is reduced.



- C. **OVER TEMPERATURE** Indication: When the internal temperature of the inverter reaches an unacceptable level, the inverter shuts off, the lamp flashes RED for 5 seconds and then illuminates RED continuously. The inverter must be allowed to cool before it can be reset and started again.

3. **GFCI Receptacle**—A duplex Ground Fault Circuit Interrupter, GFCI protected receptacle is mounted on the front panel.
4. **Circuit Breakers**—Three push button circuit breakers (1-20A, 2-30A) are mounted on the front panel. The 20 Amp circuit breaker protects the front panel AC GFCI receptacle and the 30 Amp breakers protect the 8/3 AC Output Cable.
5. **Remote Control Receptacle**—Used with the optional Model D05033 Remote Control.

6. Inverter Test Receptacle—Can be used with the optional D05022 Test Strip for installation checkout procedure and service troubleshooting.
7. AC Output—8/3 AC Output Cable 36" long for connecting AC output to external, customer supplied, 120 VAC junction box/breaker panel.
8. 3 Phase Input from Alternator—3-cable alternator AC power (AC Tap) hookup with quick disconnects.
9. DC Power—3 cable (GRND, B+ with #14 battery sense wire, A+) power hookup with quick disconnects.
10. Control Harness—3-wire control harness with plug.
11. Access Panel—Removable panel.
12. Accessory Circuit (Brown wire) Fuse, 5 Amp SloBlo.

FIGURE 2—INVERTER REAR VIEW ILLUSTRATION

1F) Inverter Rear Panel

1. Cooling fan inlet and finger guard.
2. Bypass 14 VDC Voltage Regulator—To be used if inverter is removed from vehicle.

Section 2: Operation

2A) Principal of Operation

The Dynamic Inverter *System* consists of three major components;

1. An externally regulated alternator which can produce voltage higher than standard vehicle voltage at a reasonably low alternator RPM (5000RPM neighborhood).
2. A throttle control mechanism to provide sufficiently high engine RPM while the AC load is being powered.
3. The dynamic inverter.

The Inverter

The inverter is responsible for providing all 12 volt DC power for the vehicle as well as 120 volt AC. Whenever the vehicle is running, whether the inverter is OFF or ON, the voltage regulator in the inverter regulates the alternator voltage and the inverter receives all of the output voltage from the alternator.

The inverter has three states of operation:

1. **OFF**—The 120 volt AC part of the inverter is OFF.
2. **ON in Load Demand (Standby Mode)**—The inverter is ready to produce 120 volt AC and waits for an AC load to be applied.
3. **ON Under Load**—The inverter produces 120 volt AC and provides a 12 volt signal to tell the automatic throttle to rev up the engine.

When the inverter is **OFF** or **ON in Load Demand (Standby Mode)**, it is not producing 120 volt AC and the inverter accepts only 14.2 volt DC voltage from the alternator. The 14.2 volt DC goes to the inverter and then to the vehicle battery.

When the inverter is **ON Under Load**, the TA Series inverter accepts only three phase AC voltage from the alternator which now raises to approximately 42 volts. The inverter produces 120 volt AC for the 120 volt loads and also produces 14.2 volt DC for the vehicle battery.

The inverter is rated at 6000 total watts output, combining AC plus DC. It is rated for up to 50 amps AC and up to 100 amps DC.

The Alternator

Alternators which have been found to work successfully with the TA Series Inverter are listed in Table 1. It is critical that the proper alternator be used to insure system performance.

The alternator is externally regulated and has three AC output terminals along with the positive and negative DC terminals. The alternator output is connected only to the inverter. When the inverter is **OFF**, or **ON in Load Demand**, the alternator produces only 14.2 VDC. When the inverter is **ON Under Load** the alternator produces only 42 volts three phase AC.

The Automatic Throttle

While the inverter is under load the automatic throttle increases engine RPM to a preset level to provide high alternator RPM. (Some systems have a manually controlled electronic throttle. The electronic throttle provided by Ford on the 1995 through 1997 Ford 7.3L diesel is controlled manually.) The auto throttle normally has two safety interlocks:

1. The auto throttle will not engage unless the parking brake is set (or transmission is in park or neutral on some vehicles).
2. The auto throttle will disengage momentarily if the vehicle foot brake pedal is pressed.

2B) Operating Guidelines

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

1. Use an alternator capable of delivering sufficient power for your requirements. Refer to Table 1.
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 Table 1 Output Power vs. RPM.
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).
4. Install the harness properly using good grounds, tight connections and keep it away from heat-producing engine components such as the manifold and exhaust.
5. Keep a copy of this manual with the inverter at all times.

Section 3: Installation

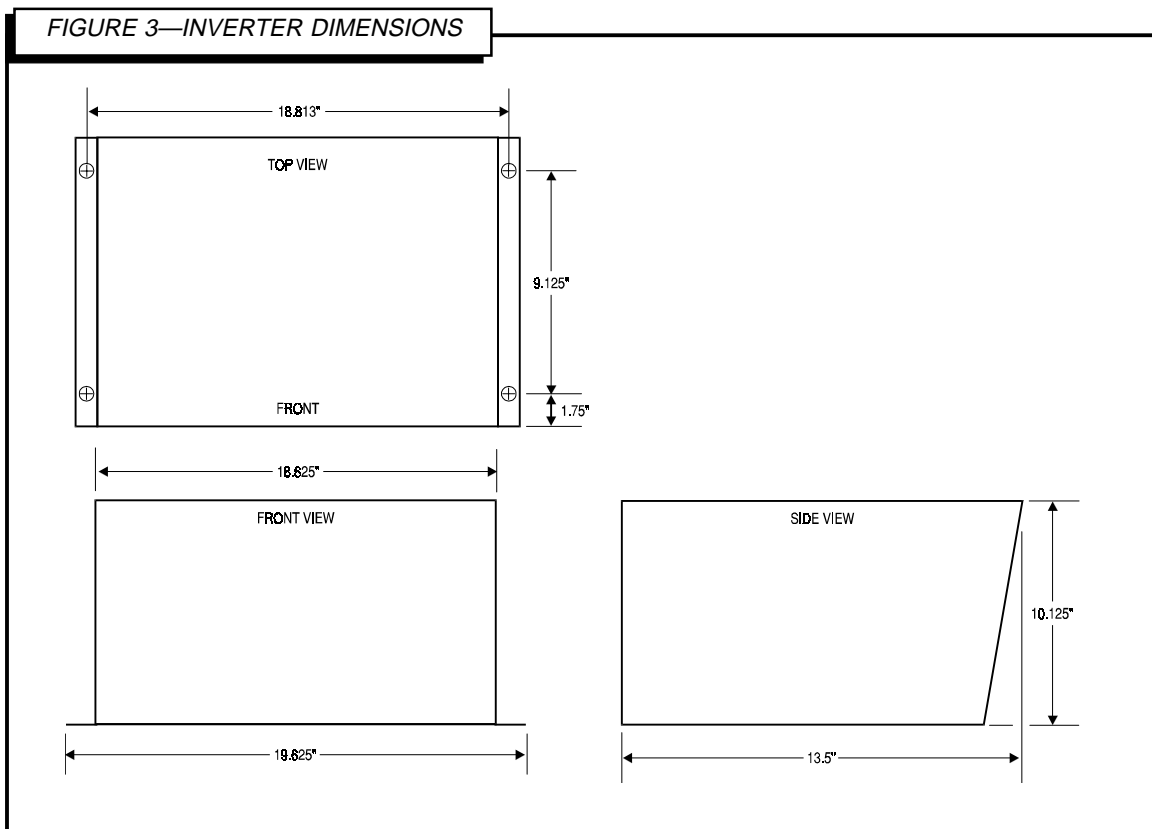
3A) Selection of Inverter Location

1. Select a location protected from the weather. Install the inverter in the vehicle cab or an outside service compartment. The area *must be dry*. Water is more harmful to the inverter than heat. We do not recommend installing the inverter in the bottom of a service compartment. NOTE: The inverter does produce audible transformer noise whenever the alternator is running—keep this in mind when selecting your inverter location.
2. The inverter location must be well-ventilated. Allow for a minimum of 2" of clearance around the entire inverter to provide adequate cooling air circulation. If mounted in a closed cabinet provide louvers or a screened opening in the cabinet to supply adequate cooling air circulation. Select a location where no other equipment or heat source can be stored directly on top of the inverter.

- Allow easy access to all inverter harness connections. Full access to all harness connections is required to permit future inverter removal, reinstallation, and troubleshooting.

Mounting Configuration

The inverter should be mounted horizontally utilizing the predrilled mounting flanges.



3B) Installation of Proper Alternator

- Select the Proper Alternator—The alternator for your system must provide the necessary power (see guidelines in Table 1) and be properly wired to the inverter. **It is required that one of the alternators from the table be used. If the alternator you select is not listed, there is no guarantee the inverter will work properly.**

The maximum rated alternator which may be used with the TA Series inverter is 200 amp. **DO NOT INSTALL A K3 RELAY** with the TA Series Dynamic Inverter System. (A K3 RELAY is a large current carrying relay and is acceptable for use only with an A Series Dynamic Inverter System.)

Table 1: Alternator RPM at given output wattage (W) for the TA60 Inverter

Alternator	1200W	2400W	3600W	4800W	6000W
4625/4654AB Leece-Neville, 105A	2600	2900	3300	4000	5200
4725/4754AB Leece-Neville, 130A	3350	3700	3950	4200	4750
4805AB, 4905AB Leece-Neville, 145A	2900	3150	3450	3950	4600
4860AB Leece-Neville, 200A	4000	4300	4650	5000	5700

2. Alternator Pulley Alignment—Correct pulley alignment is essential for maximum alternator and belt service life. The center line of all pulleys related to the alternator drive (normally the crankshaft pulley) must be within 1/32" of true center. Also for best results, the belt wrap about the alternator pulley should be 100 degrees or more. Lesser wrap can induce belt slippage.
3. Pulley Ratio—The diameter 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 2.25" for poly-groove pulleys to minimize belt slip.

Example: What engine RPM is required to spin the alternator at 5200 RPM when the alternator pulley is 2.25" diameter and the crankshaft pulley is 6.75" in diameter?

$$5200 \text{ Alternator RPM} \times \frac{2.25 \text{ Alt Pulley}}{6.75 \text{ Crank Pulley}} = 1733 \text{ Engine RPM}$$

To avoid reducing alternator bearing life, design the installation so the maximum continuous alternator RPM is not more than 8,500 RPM.



WARNING

Burning or Chafing through the cable insulation will damage the inverter and vehicle electrical systems. Be aware that this is a common installation problem.

3C) Preliminary Wiring Notes

TA Series Harness D05753, furnished separately, contains the necessary wiring (DC power, 3 Phase Input, and Control) for proper installation. Harness length is 20 feet.

Route the cables from the inverter location to the alternator and battery location using existing holes where possible. Use tie wraps and tape liberally to secure the cables so they cannot inadvertently contact the hot engine exhaust or other heat-producing components. Grommets should be used to protect cables where they come into contact with hard or sharp edges.

Note 1: If your system utilizes a battery isolator refer to Section 5A before proceeding.

Note 2: If your system utilizes a 2-speed autothrottle (/P option), refer to Section 5B before proceeding.

Note 3: If your system utilizes an electric tachometer, refer to Section 5C before proceeding.

Note 4: If an automatic throttle is used, go to your Automatic Throttle Instruction Manual and follow instructions for installation.

Note 5: If none of the above conditions are present, or have been satisfied, use the following "Basic Inverter Installation Instructions".



WARNING

Connect the Bypass Voltage Regulator ONLY when the inverter is disconnected from the vehicle. Damage will occur if Bypass Regulator and Inverter are connected at the same time.

3D) Basic Inverter and Harness Installation

1. Disconnect the battery negative ground cable from the vehicle system battery.
2. Disconnect all wiring from the original alternator terminals. Tape and secure these connections 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.

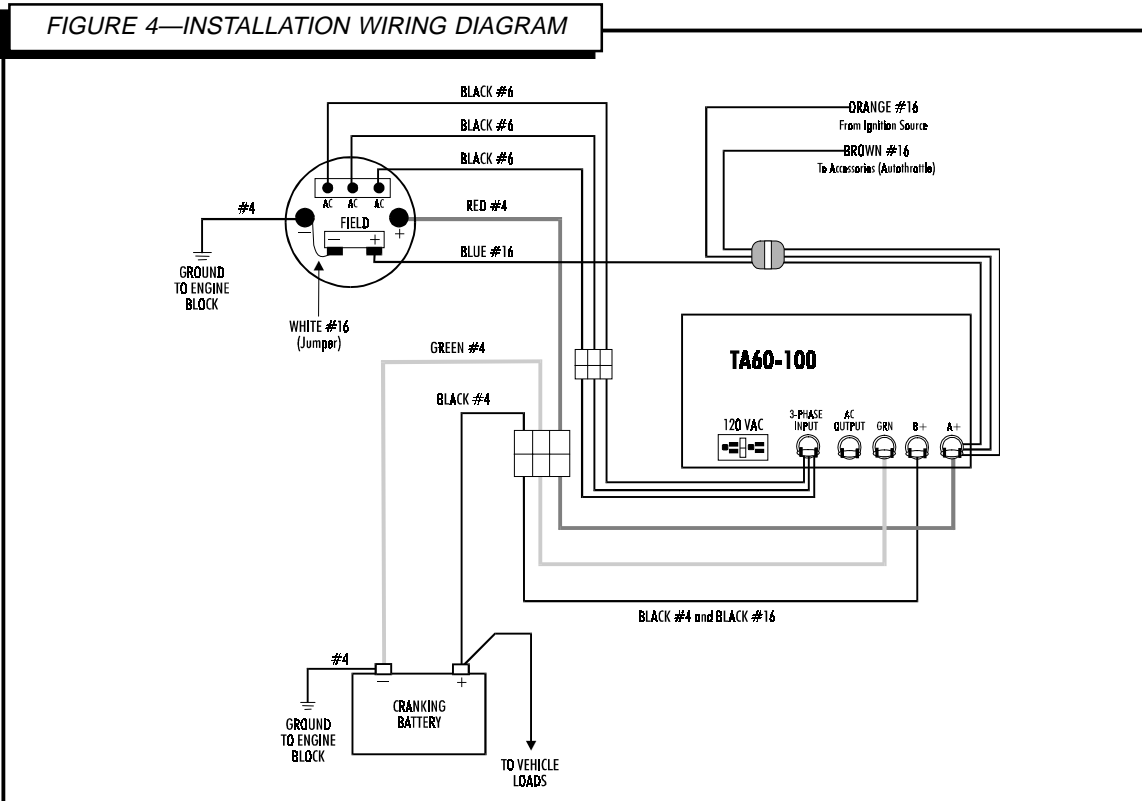
3. Remove original alternator and regulator. Install a new alternator of the type listed in Table 1 of this manual. Installation kits are available for these alternators.
4. Connect the Black #4 wire from the DC power harness to the battery positive (B+) terminal. Do not connect this wire to the starter or starter solenoid.
5. Connect the Red #4 wire from the DC power harness to the alternator positive output (A+) terminal by ITSELF. There should be no other wire attached to the alternator positive terminal.
6. Connect the Green #4 wire from the DC Power Harness to the alternator negative (A-) terminal or to the battery negative (B-) terminal. The alternator negative terminal also must be grounded to the engine block with a #4 cable or larger. Leave any previously attached ground wires connected.
7. Attach the three Black #6 wires from the 3 Phase Harness to the 3 Phase AC Output Taps on the back of the alternator. It does not matter in which order the wires are connected to the taps. Make sure the connections are secure to prevent them from shorting together or shorting to the alternator chassis.
8. Connect the field negative (F-) terminal on the alternator to the negative (A-) terminal on the alternator.
9. Connect the Blue #16 control harness wire to the field positive (F+) terminal of the alternator. There should be no other wire attached to the field terminal, only the Blue control harness wire.



NOTE

The alternator negative (A-) terminal and the battery negative (B-) terminal must be securely grounded to the engine block using #4 wire or larger.

10. Attach the Orange #16 wire from the control harness to a fused 10 amp 12 VDC source which is hot only when the ignition is in the run position. It should not be the ignition terminal on the engine ignition coil or original alternator wires. The Orange wire normally carries only 1 to 2 amps, however, when the inverter is bypassed, the Orange wire must carry all the current needed to power the alternator field. This is approximately 6 amps for the recommended alternators but may be higher for other alternators.
11. Attach the Brown #16 wire from the control harness to all accessories that must be activated whenever the inverter is turned on. The accessories that must be activated by the Brown #16 wire include the Electronic Tacho-meter Relay C05050 and the Automatic Throttle. If these accessories are used, see their respective manuals for installation details.
12. Connect the DC power, 3 Phase Input, and Control Harness to the inverter. Reconnect the battery ground cable.
13. Connect AC output wiring.



**WARNING**

If a harness cable or control wire is found to be disconnected during Checkout of the Harness Procedure, shut vehicle OFF before reconnecting to prevent damage to the inverter.

**WARNING**

A Dynamote 4-2600 Dynamic Test Module cannot be used with the TA Series Inverter. Damage to the inverter may result if a 4-2600 is used.

3E) 120 Volt AC Output Wiring

The AC output on all TA Series inverters is standard 120 VAC single phase. (120/240 VAC split phase is available as a special order. Contact factory for availability.) A 36" long 8/3 pigtail, extending from the front of the inverter, is provided for connection to an external, customer supplied, 120 VAC junction box or circuit breaker panel. (Black is hot, White is neutral, Green is ground).

When installing AC wiring, follow good electrical practices and standards. Since the full AC output of the inverter can be 50 amps, some type of circuit breaker panel must be used for distribution to outlet receptacles.

3F) Checkout of Harness Installation

This is one of the most important steps in the installation process. Its purpose is to insure that the harness is properly connected to the alternator and that the alternator and inverter function properly. The entire checkout procedure is summarized on Table 2 "Harness Installation and Checkout Chart."

1. Use a volt/ohm meter to perform the checkout procedure.
2. The wire colors listed in the checkout chart are those of the DC Harness (4 gauge wires) and the Control Harness (16 gauge wires) which are connected to the inverter through the front panel.
3. Volt/ohm meter connections should be made directly to the proper wire color at the front of the inverter. Volt/ohm meter connections can also be made using the wire colors of a Model D05022 Dynamic Inverter Test Strip which will plug into the 6 pin Inverter Test Receptacle on the front of the inverter.

If the Black (B+) lead is connected to a battery selector switch, the switch should be in the BOTH position. Do not change selector switch while engine is running.

If there is a battery isolator in the system, Steps 2A through 4C in the "Harness Installation Checkout Chart" can only be performed by first placing a jumper across either the B1 or B2 wire on the battery isolator to the A terminal on the battery isolator. After steps 2A through 4C, return the battery isolator wiring to normal for the remaining checkout steps.

Table 2: Harness Installation Checkout Chart

STEP	COLOR OF WIRES BEING READ	VEHICLE IGNITION SWITCH	INVERTER	ENGINE RPM	PROPER VOLTAGE READING	ACTUAL VOLTAGE READING	NOTES
1A	Orange (Ignition) To Green	OFF	OFF	-0-	0 VDC		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 ignition is OFF and 11-13 VDC when the ignition is in RUN only.
1B	Orange (Ignition) To Green	ON	OFF	-0-	11-13 VDC		If voltage is low the inverter may not turn ON. Be sure the ORANGE wire is attached to an ignition switched 12 VDC source rated at least 10 amps.
2A	Red (A+) to Green	OFF	OFF	-0-	11-14 VDC		If reading in steps 2A and 3A are not the same within 0.1 volt K1 relay is defective.
3A	Black (B+) to Green	OFF	OFF	-0-	11-14 VDC		If voltage is low, (6-11 VDC), charge or replace vehicle battery. If reading is negative, check DC harness connections and the polarity of the voltmeter leads. If voltage is 0 check the connections of the DC harness to be sure they are attached correctly. If voltage is 0 and a battery isolator has been installed on the vehicle, see Step 3 in Section 3F. See Section 5A for inverter installation instructions when using a battery isolator.
4A		OFF		-0-			Momentarily press Inverter Start button. Green light should flash for two seconds and go out. If light doesn't light, recheck the Orange and Black wires.
4B		ON		-0-			Momentarily press Inverter Start Button. The green light should stay on. If light doesn't light recheck the Orange #16 and the Black #4 wires. The light may turn orange or red if there is an AC load turned ON.
4C							Momentarily press Inverter Stop Button. The green light should go out. If the green light will not go out return the inverter for repair.
<p><i>You are now ready to check the Inverter Voltage Regulator's DC charging voltage setting and adjust if necessary.</i></p> <p>— Go to Section 3G —</p>							

3G) Inverter Voltage Regulator Adjustment Procedure

Before adjusting the voltage regulator read this entire section to prevent inverter or battery damage.

Preliminary

After the inverter is installed, but BEFORE the inverter is turned ON, the DC charging voltage should be checked to verify correct harness installation. DC charging voltage above 15.0 VDC can cause damage to the inverter when the inverter is ON.

Be sure the vehicle battery is fully charged before adjusting the Inverter Voltage Regulator. A low battery will cause the DC charging voltage to read temporarily low. Adjusting the voltage regulator at this time will result in a higher actual setting when the battery becomes fully charged.

The vehicle DC charging voltage is controlled at all times by the Inverter Voltage Regulator which is factory adjusted to 14.2 VDC. Adjustment may not be needed, but if necessary adjust the voltage regulator by using a small screwdriver through the ¼" diameter access hole in the front of the inverter to turn the small brass screw. Turn clockwise to increase voltage setting or counterclockwise to decrease.

Procedure

1. Attach multimeter leads to the Black #4 and the Green #4 wires at the front of the inverter. Read DC charging voltage using the multimeter's DC voltage scale. If a battery isolator is in the system (see Section 5A) attach the multimeter leads to the Black #14 voltage sensing wire.
2. Adjust the DC charging voltage to 14.2 VDC initially with the inverter OFF and the engine manually held at approximately 1500 RPM. Charging voltage should vary no more than 0.1 volt whether RPM is at 1500 or at idle or whether heavy DC loads, such as headlights and defroster, are all ON or all OFF. A charging voltage variation larger than 0.1 volt may be caused by a low battery, improper harness installation or extremely high DC load.
3. With the engine manually held at 1500 RPM measure DC charging current by clamping the clamp-on amp meter around the Black #4 wire. Turn all of the DC loads ON which are expected to operate when the inverter is ON. Verify that the DC charging current does not exceed 100 amps which is the maximum DC charging capacity of the inverter. (A diesel engine having electronic controlled glow plugs may draw more than 100 amps intermittently while the engine is cold). Do not turn ON the inverter with more than 100 amps of DC load.

If the DC charging current exceeds 100 amps verify that the vehicle battery is fully charged before continuing. If it is determined that the total DC load exceeds 100 amps then all of these loads cannot be ON while the inverter is ON. Provisions must be made to limit the DC charging current to 100 amps while the inverter is ON.

4. Turn ON the inverter. Final adjustment to 14.2 VDC should be made with the inverter ON and running a small AC load (100 to 1000 watts). The automatic throttle should be engaged at this time and the engine

RPM must be high enough (approximately 1500 RPM) so the inverter indicator light remains GREEN.

3H) Confirm Inverter Start-up

With the engine running, turn the inverter ON and apply a small load to confirm the inverter is functioning.

1. An audible click should be heard inside the inverter as the 200 amp relay is actuated.
2. The inverter's GREEN light should light and stay GREEN.
3. The inverter's fan should run.
4. The automatic throttle should engage.
5. The load should operate.

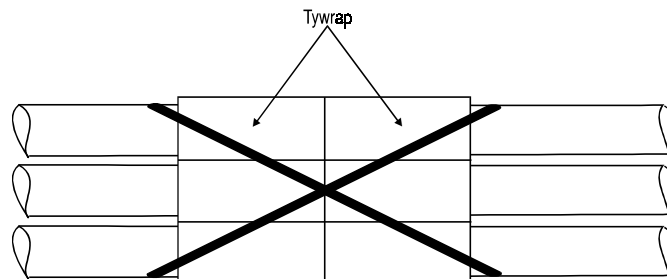
3I) Engine/Alternator RPM Adjustment

The alternator RPM determines how much power the inverter can produce. Set the RPM high enough to carry the required loads. Refer to Table 1 for comparison of alternator RPM and output power for various alternators.

1. Adjust the automatic throttle to approximately 1500 engine RPM and apply the AC and DC loads which are planned to be operated. Do not exceed 50 amps at 120 volts AC, 100 amps at 14.2 volts DC, and a maximum combined load of 6000 watts.
2. A GREEN indicator light means the inverter is able to produce the power required at that RPM. The RPM may be reduced as long as the indicator light remains GREEN.
3. An ORANGE indicator light means the alternator voltage is slightly too low. Increase RPM or reduce the load until the indicator light turns GREEN.
4. A red indicator light means the alternator voltage is severely too low. Increase RPM or reduce the load until the indicator light turns GREEN.

3J) Installation Complete

The inverter installation is now complete. Tywrap all of the input harness plastic connectors together so they cannot be disconnected accidentally.



Section 4: Service and Troubleshooting



WARNING
DO NOT
OPEN THE
INVERTER.
Potentially
fatal electric
shock and/ or
serious inverter
damage may
result even
after the
inverter is
removed from
the vehicle. It
is recom-
mended that
only a Vanner
Qualified
Technician
perform
service inside
the inverter.

4A) General

The following are the most common questions heard by Vanner service professionals. If your situation does not apply to the following categories, please contact your local Vanner Service Center.

Vanner Inc. Customer Service: 1-800-AC POWER

Before calling, determine and record the following information:

1. Inverter model number and serial number.
2. Alternator model number and pulley diameter.
3. Vehicle year, make, model, engine, and pulley diameter.
4. Autothrottle model and engine RPM setting.
5. AC load watts and description of load.
6. DC charging current and voltage measured at the inverter 4 gauge Black wire.

4B) Troubleshooting

Troubleshoot the inverter system while the inverter is still in the vehicle. Do not attempt to run the dynamic inverter from a DC power supply or battery charger.

Equipment Required: Volt/ohm Meter (Fluke 87 recommended), Clamp-on Amp Meter (Extech 382080 or equal), and a small flat blade screwdriver.

SYMPTOM: Inverter GREEN Indicator Light won't come on.

SOLUTION: Verify Orange wire in the control harness is properly connected. (You should have power only when the key is in the run position).

SYMPTOM: Inverter won't support the desired load.

- SOLUTION:**
- A. Verify the automatic throttle is working.
 - B. Increase engine/alternator RPM so indicator light remains GREEN. See Table 1.
 - C. Verify total inverter load (AC load plus DC load) is less than approximately 6000 total watts. (AC volts x AC amps = watts. DC volts x DC amps = watts.)
 - D. Verify alternator AC tap leads (3 Blue connectors at the front of the inverter) are connected.
 - E. Verify alternator is working properly. See Section 4C Alternator Checkout Procedure.

- SYMPTOM: Indicator light continually blinks GREEN and won't go out.
- SOLUTION: Inverter is defective and should be returned for repair.
- SYMPTOM: Charging voltage won't adjust.
- SOLUTION: A. Verify vehicle batteries are fully charged.
B. Verify power harness and the control harness are properly connected.
- SYMPTOM: Vehicle batteries won't stay charged.
- SOLUTION: A. Verify Control Harness Orange wire has power only when the ignition is in the run position.
B. The normal 0.120 amp current draw while the vehicle is OFF, 0.090 amp inverter plus 0.030 amp vehicle, may run the battery down if the vehicle is not operated for more than one to two weeks.
Example: 0.120 amps x 24hr day x 7days = 20 amp hours of power will be drained from the battery per week. A typical 650 cold cranking amp starting battery, which can provide 50 amp hours of power, would run down in 2½ weeks.
- SYMPTOM: No DC charging with Inverter OFF or ON and the three AC tap leads are warm or hot when engine is running.
- SOLUTION: The problem is likely a shorted brick in the inverter. Disconnect the 3 AC tap leads and recheck inverter OFF DC Charging. Return inverter for repair.

4C) Alternator Checkout Procedure

The following tests will verify if the alternator is working properly and should uncover most alternator problems. Readings should be taken at the inverter, while the engine is running, using the 3 Phase Input Power and Control Harnesses at the front of the inverter.

The 3 Phase Input Power Harness is made up of the three Black #6 wires running from the alternator AC taps and connected through three light Blue connectors to the three Green #8 wires entering the inverter.

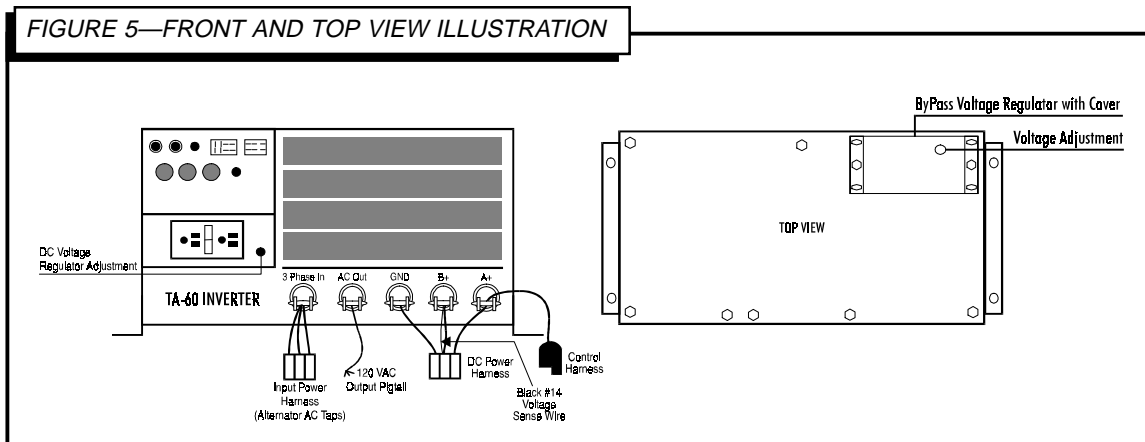
1. Verify the three AC taps are working and are balanced.
 - A. Take the following readings with the inverter OFF.
 - a. Using the multimeter DC scale, read the voltage between each AC tap and ground. (The three Green #8 wires and the single Green #4 wire).
 - Proper readings will be approximately ½ of DC charging voltage. (Black #4 to Green #4).
 - All three readings should be equal within 0.5 volt.

- B. Take the following readings with the inverter ON while running a 100 watt to 1000 watt load.
 - a. Using the multimeter AC scale, read the three voltages between the three AC taps, 1 to 2, 2 to 3, and 1 to 3.
 - Proper readings will be between 39 and 42 volts AC.
 - All three readings should be the same within 1.0 volt.
 - b. Using the clamp-on amp meter, read the AC current in each of the three AC tap wires.
 - The readings should be equal within 2 amps.
2. Check the Alternator Field Circuit (Blue #16 wire)
Measure DC voltage between the field wire and ground.
Correct readings are:

Inverter OFF _____ 4 to 14 VDC

Inverter ON under load _____ 4 to 22 VDC

The field voltage should decrease as RPM increases while running a constant load. The DC current through the Blue #16 wire should measure 1 to 6 DC Amps whenever the ignition is on.



WARNING

Connect the Bypass Regulator ONLY when the inverter is disconnected from the vehicle. Damage will occur if Bypass Regulator and inverter are connected at the same time.

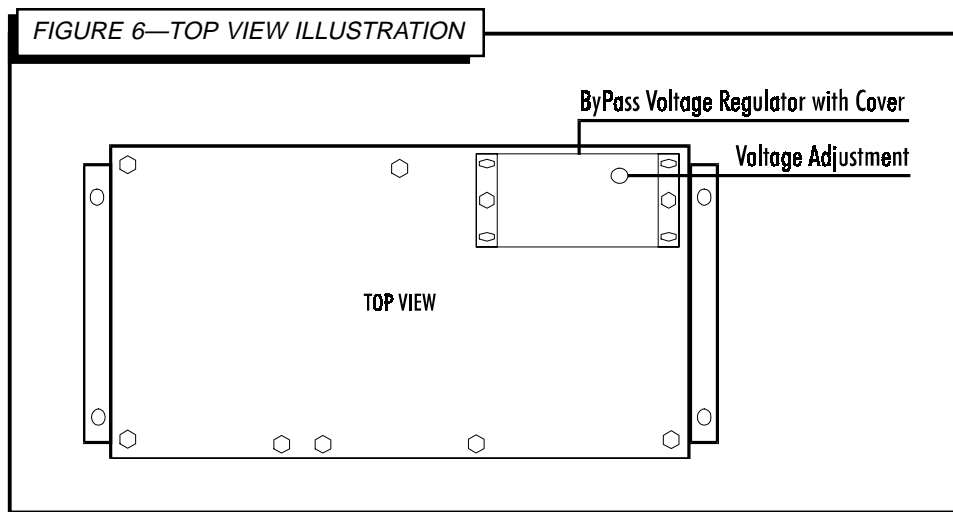
4D) Inverter Removal Procedure

A Bypass Voltage Regulator is provided so the vehicle can be used while the TA Series Inverter is removed from the vehicle (inverter bypassed). The Bypass Regulator will connect to the vehicle side of the three wire Control Harness through the unused five pin connector. Do Not Connect the Bypass Regulator while the inverter is still connected. Damage to both the inverter and the Bypass Regulator may result.

1. Find the Bypass Regulator box attached to the inverter top panel (see Figures 5 and 6).
2. Disconnect the inverter Control Harness, 3 Phase Input and the DC Power Harnesses at the front of the inverter as well as any AC output wiring. Remove the inverter.

Find the Bypass Voltage Regulator inside the box attached to the inverter.

3. Locate the 5 pin connector attached to the vehicle side of the Control Harness and connect it to the Bypass Voltage Regulator. (See Figure 7).
4. Mount the box and ground the Green #16 wire from the adapter harness to a mounting screw or bolt that was originally used to secure the inverter.
5. Separate the Red and Black plastic connectors on the vehicle side of the DC Power Harness by sliding the Red forward and the Black backward. Plug them into each other to connect the alternator to the battery.
6. Adjust DC charging voltage per Bypass Voltage Regulator adjustment procedure.
7. Reverse this procedure to reinstall the inverter.



4E) Bypass Voltage Regulator Adjustment Procedure

Be sure the vehicle battery is fully charged before adjusting the Bypass Voltage Regulator. A low battery will cause the DC charging voltage to read temporarily low. Adjusting the voltage regulator at this time will result in a higher actual setting when the battery becomes fully charged.

Adjust the Bypass Voltage Regulator by using a small screwdriver through the $\frac{1}{4}$ " diameter access hole in the cover to turn the small brass screw. Turn clockwise to increase voltage setting or counterclockwise to decrease.

1. Do Not Connect the Bypass Voltage Regulator until after the inverter is bypassed. This is when:
 - A. the Control Harness three prong plug is disconnected from the inverter,
 - B. the three AC tap leads are disconnected from the inverter,
 - C. the #4 Red, Black, and Green wires are disconnected from the inverter,
 - D. the #4 Red and Black connectors are plugged together.



WARNING

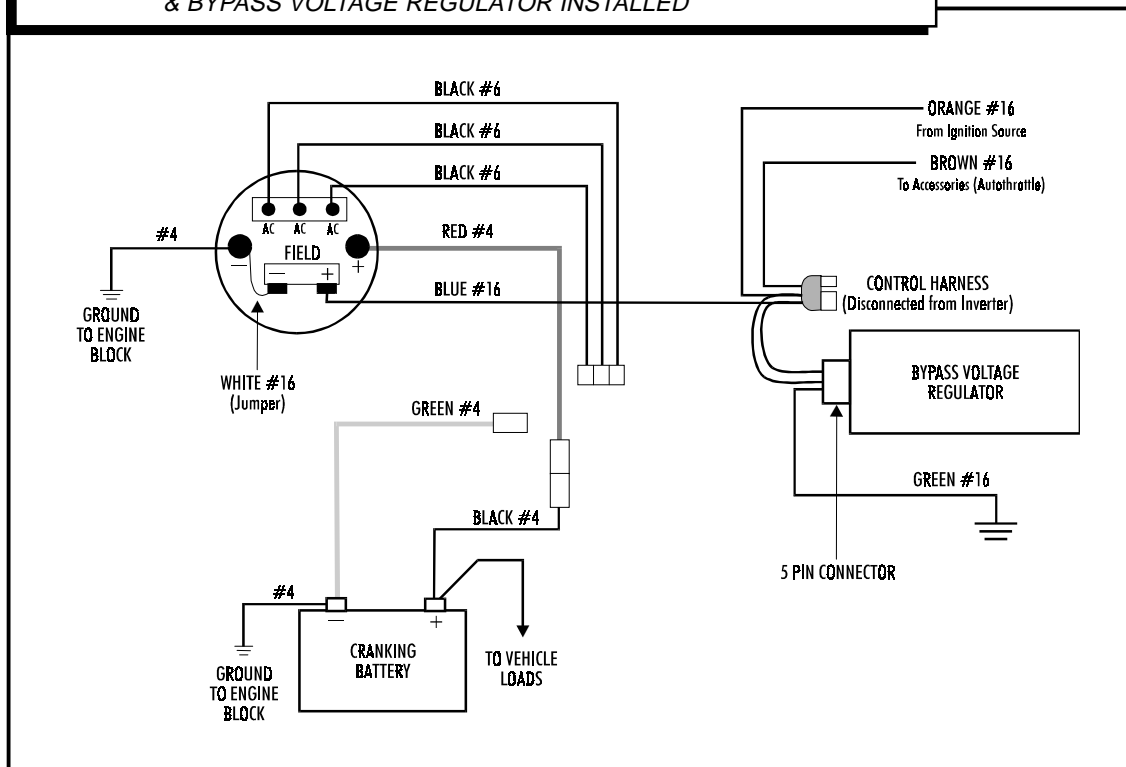
Connect the Bypass Regulator ONLY when the inverter is disconnected from the vehicle. Damage will occur if Bypass Regulator and inverter are connected at the same time.



NOTE
It is common for the charging voltage to oscillate when using the bypass regulator.

2. Connect the Bypass Voltage Regulator to the five pin connector on the vehicle side of the Control Harness and ground the #16 Green wire.
3. Attach the multimeter leads to the #4 Black wire and the #4 Green wire. Read the vehicle charging voltage using the meter's DC voltage scale. If a battery isolator is in the system attach leads to the vehicle battery.
4. Turn the headlights ON and hold the engine at approximately 1500 RPM.
5. Adjust voltage to 14.2 VDC.

FIGURE 7—SYSTEM WIRE DIAGRAM WITH INVERTER REMOVED (BYPASSED) & BYPASS VOLTAGE REGULATOR INSTALLED

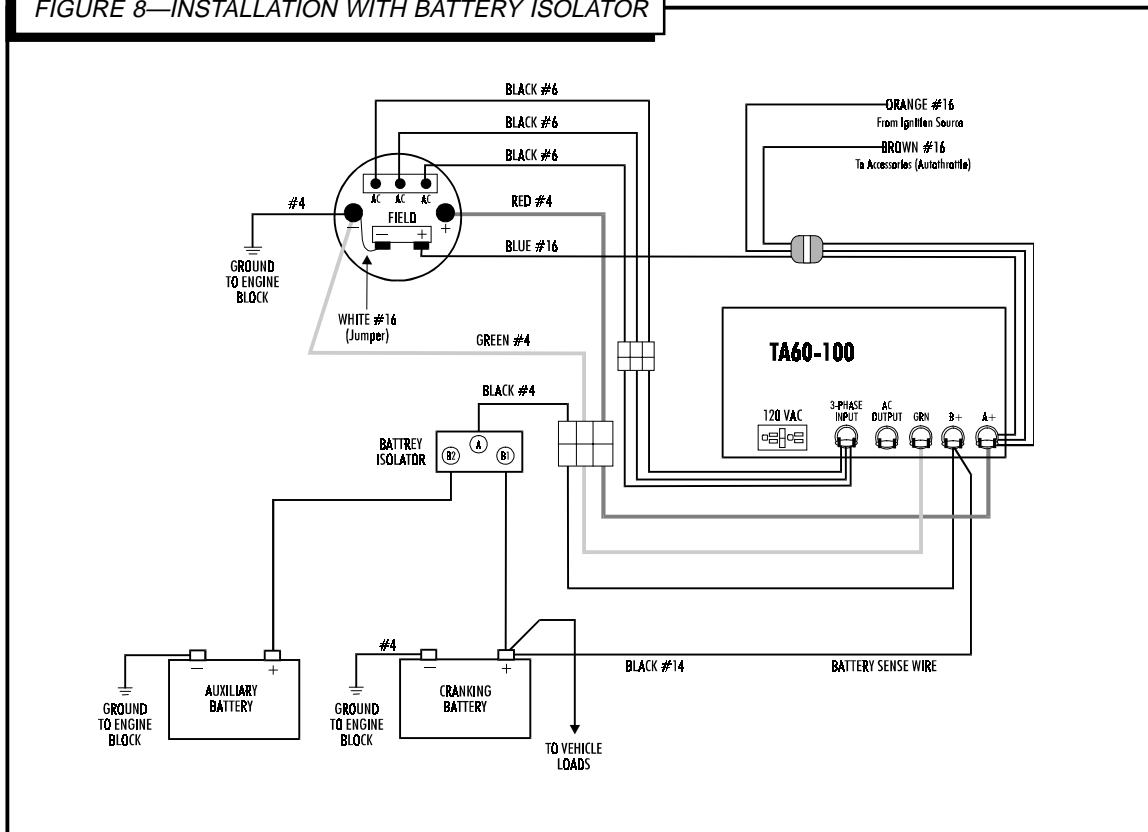


Section 5: Supplements

5A) Inverter Installation Instructions with a Battery Isolator

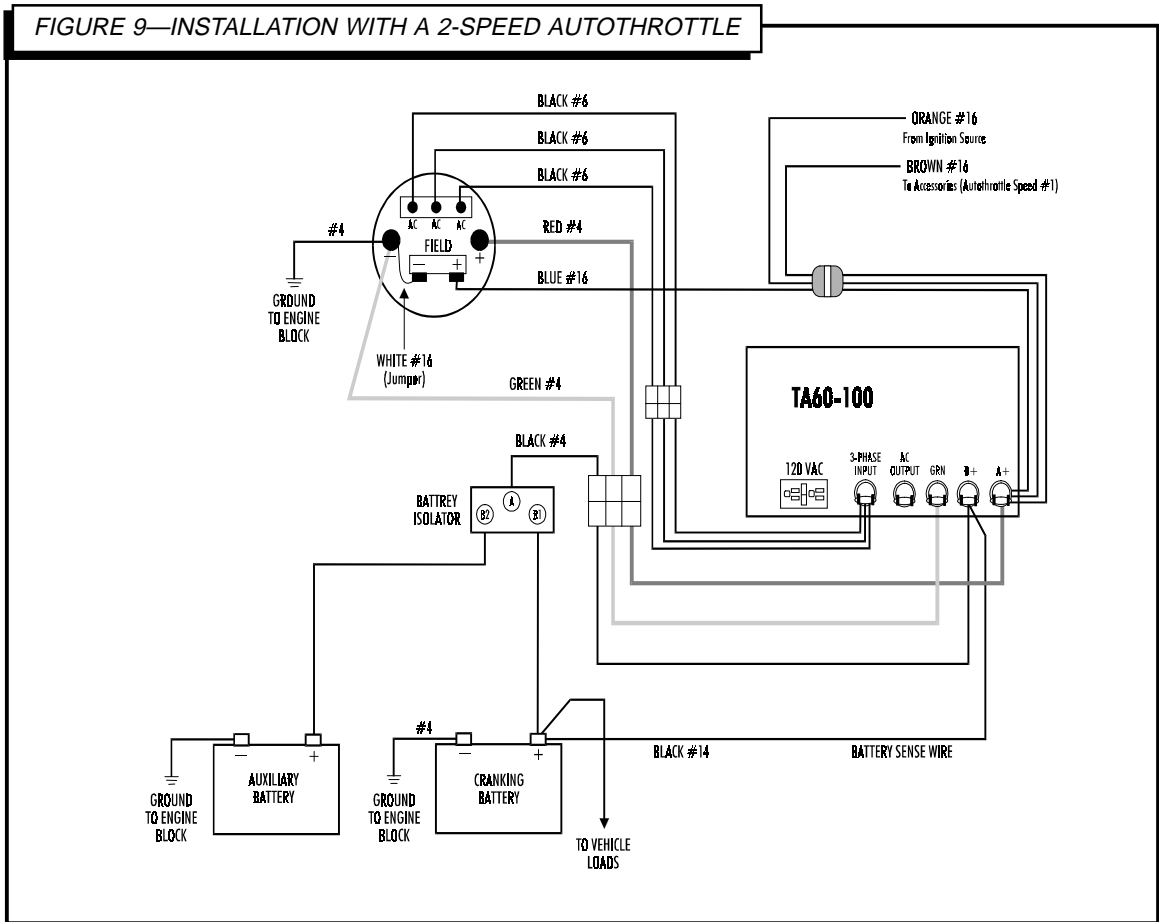
1. Complete Section 3D instruction steps 1 through 3 (Refer to Figure 8).
2. Connect the BLACK #4 wire from the DC power harness to the single input terminal (A) of the battery isolator.
3. Connect the battery isolator output terminal B1 and B2 to the two batteries as shown in Figure 8. (Use #4 wire or larger). Ground negative terminals of the batteries to the engine block.
4. *The Battery Sense Wire (Black #14) and the B+ Wire (Black #4) extend from the inverter tywrapped together and are connected in the black plastic quick disconnect housing. Disconnect (cut) the Battery Sense Wire (Black #14) from the black plastic housing. Attach the Battery Sense Wire to the cranking battery positive terminal.*
5. Return to Section 3D and complete steps 5 through 13.

FIGURE 8—INSTALLATION WITH BATTERY ISOLATOR



5B) Inverter Installation Instructions with a 2-Speed Autothrottle

1. Complete Section 3D instruction steps 1 through 10 (Refer to Figure 9).
2. Attach the Violet/White wire coming from the inverter A+ strain relief clamp to the 2-speed autothrottle actuator. The Violet/White wire is used to power (12 VDC) the #2 high speed setting whenever a high demand AC load is applied.
3. Return to Section 3D and complete steps 11 through 13.



**WARNING**

Failure to follow this procedure may result in tachometer burnout.

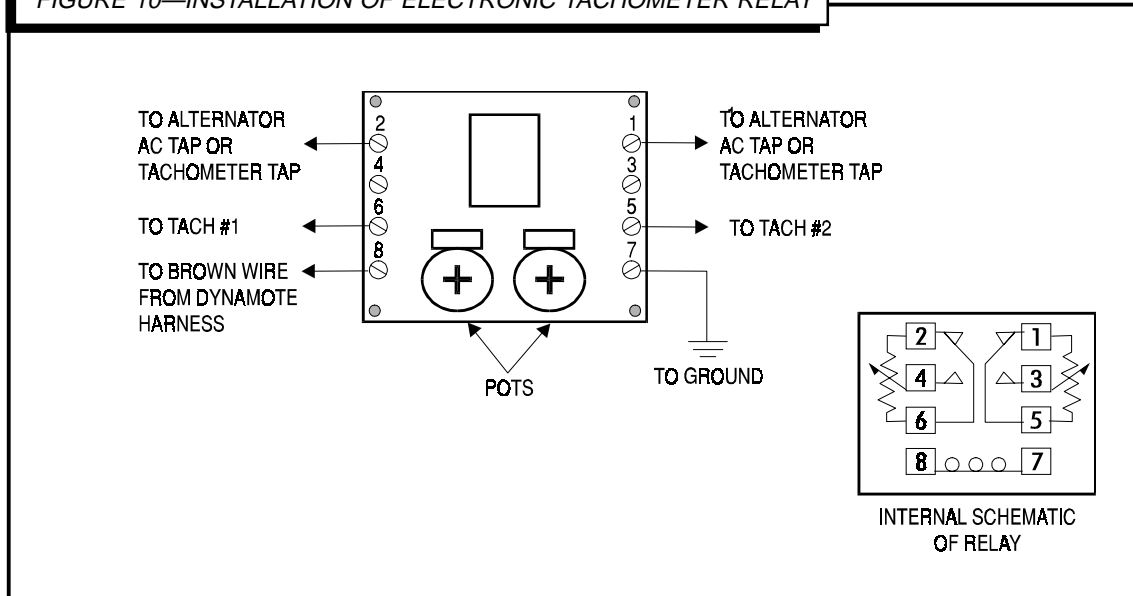
5C) Installation of Electronic Tachometer Relay

If an electronic tachometer (which is driven from an alternator AC tap or an alternator tachometer tap) is used in the system, an electronic tachometer relay (C05050) must be installed when the inverter is installed. The relay insures 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.

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 the Figure 10.
3. If two tachometers are used, attach one tachometer to each side of the relay board, as shown in Figure 10.

FIGURE 10—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. 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, if used.

Section 6: Warranty

Vanner Inc., referred to herein as Vanner, warrants that this product is free from defects in materials and workmanship for a period of two (2) years from date of installation or two and one half (2 ½) years from date of manufacture, whichever is less if and only if the following requirements are complied with:

1. The product is installed and checked out properly according to all guidelines, instructions, and checkout procedures set forth in the product Installation and Operating Manual.
2. The installer records all checkout data required and completes, signs, and returns the warranty registration card to Vanner within ten (10) days after installation.
3. The product was purchased after January 1, 2000.

Vanner does not warrant its products against any and all defects when: defect is a result of material or workmanship not provided by Vanner; normal wear and tear, or defects caused by misuse or use in contrary to instructions supplied, neglect, accident, reversed polarity, unauthorized repairs and/or replacements.

All warranties of merchantability and fitness for a particular purpose: written or oral, expressed or implied, shall extend only for a period of two (2) years from date of installation or two and one half (2 ½) years from date of manufacture, whichever is first. There are no other warranties that extend beyond those described on the face of this warranty. Some states do not allow limitation on how long an implied warranty lasts, so the above limitations may not apply to you.

Vanner does not undertake responsibility to any purchaser of its product for any undertaking, representation, or warranty made by any dealers or distributors selling its products beyond those herein expressed unless expressed in writing by an officer of Vanner.

Vanner does not assume responsibility for incidental or consequential damages, including, but not limited to, responsibility for loss of use of this product, removal or replacement labor, loss of time, inconvenience, expense for telephone calls, shipping expense, loss or damage to property, or loss of revenue. Some states do not allow the exclusion or limitation of incidental or consequential damages, so these limitations may not apply to you.

Vanner reserves the right to repair, replace, or allow credit for any material returned under this warranty. Any damage caused by the customer will be charged or deducted from the allowance.

All warranty work will be performed at Vanner's factory, or authorized repair facility utilizing a valid Warranty Authorization Number (WAN) prior to repair. Products shall be delivered to Vanner's facility, freight prepaid and fully insured. Products repaired under warranty, or replacement parts or products will be returned to North American location prepaid via same transportation means and level of service as received, unless directed otherwise. Prepaid freight policy does not apply to locations outside North America.

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Specifications Subject to Change
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