

# POWER INVERTERS & INVERTER/CHARGERS FOR EMERGENCY VEHICLES



**VANNER MODELS:**  
**20-1050 CUL**  
**20-1050 CULW**  
**20-1000 TUL.2**

# AC POWER FOR EMERGENCY VEHICLES



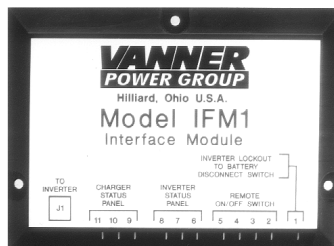
## Model 20-1050CUL/CULW AC Power Inverter System

### Key Features

- 1050 Watt Power Inverter
- Adjustable Battery Charger/Conditioner  
55 Amp-High Setting/15 Amp-Low Setting
- Automatic AC Transfer Switch
- UL Certified to Federal Specification KKK-A-1822D
- Underwriters Laboratories Listed (UL and C-UL Listed)
- Remote Monitor/Control System (Requires IFM1)
- Inverter Lockout Control Interlock (Requires IFM1)
- Ground Fault (GFCI) Protected AC Output

The Vanner 20-1050CUL/CULW AC Power System combines a powerful DC to AC power inverter with an automatic battery charger/conditioner and a 30 amp AC transfer switch. When connected to shore power (AC utility power) the vehicle's battery is charged, then automatically maintained in full charge condition. The shore power is automatically connected to the system's AC output receptacle to supply power to the AC loads. When shore power is disconnected (vehicle underway) the automatic transfer switch connects the AC output receptacle to the power inverter, which obtains power from the 12 volt battery.

The 20-1050CUL/CULW system contains a front panel LED indicator status panel and interface connector for the remote monitor/control units.



IFM1 Interface Module

A set of remote options allow flexibility in configuring the inverter system for specific needs. The optional IFM1 Interface Module, enables the two remote status panels, system on/off switch, and the Inverter Lockout Interlock to be connected to the 20-1050CUL/CULW system.

### 12 Volt Power Inverter

The power inverter is a highly reliable electronic power conversion unit that utilizes MOSFET power semiconductors and a microprocessor controller. It converts 12 volt DC battery power into 1050 watts of modified sine wave 120 volt AC power. This AC output power is precisely regulated at 120 Volts  $\pm 5\%$  and 60Hz  $\pm 0.1$ Hz.

### Battery Charger/Conditioner

When the system is connected to shore/utility power the battery charger/conditioner will automatically charge the battery, then keep it fully charged. The system's microprocessor controls the charging sequence, starting with the Bulk charge (55 amps on High setting, 15 amps on Low setting) mode. When the battery is fully charged, it switches to the ready/maintenance mode to keep the battery "topped up". The unit is designed to charge either lead acid flooded (wet) or gel type batteries.

### Automatic AC Transfer Switch

The 20-1050CUL system is provided with a 2.75 ft. AC power line cord. When connected to shore/utility power, the internal transfer switch routes the incoming 120 volt AC power to the AC output receptacle and to the input of the battery charger/conditioner. In this mode, loads connected to the AC output receptacle are supplied with shore/utility power and the battery charger/conditioner will automatically charge and maintain the battery. When the shore/utility power is disconnected, the 120 VAC output receptacle is switched from shore/utility power to the power inverter. If the inverter switch is On, the power inverter immediately (within 30 ms) supplies AC power to the AC output receptacle.

### Model 20-1050CULW

The difference between a hardwire unit (20-1050CULW) and a non-hardwire unit (20-1050CUL) is in the 120 VAC input wiring to the Automatic AC Transfer Switch. The actual function of the Transfer Relay system in the 20-1050CULW is identical to the 20-1050CUL; however, on the 20-1050CULW system, the AC input is hardwired through a wiring box located at the back



20-1050CULW — Front View



20-1050CULW — Rear View

side of the unit. The purpose of the wiring box is to allow the system installer to supply a 20-30 amp (instead of 15 amp) shore power input to the 20-1050CULW.

On both the 20-1050CUL and 20-1050CULW the battery charger in the “Low” setting uses approximately 3.5 amps of AC power to charge the batteries at the 15 amp rate. The battery charger, on the “High” setting uses 12 amps of AC power to supply 55 amps of DC charging. **NOTE: The battery capacity needs to be 220 amp-hours or more when charging at 55 amps DC.**

### Hardwiring the AC Input

There are situations where AC loads such as medical equipment or quartz lights (which usually operate from the inverter power during vehicle operation) need to operate from shore power while the charger is operating. In situations such as this, the system installer can use the model 20-1050CULW with a hardwire input to set up the system to supply 20 or 30 amp shore line power to the inverter unit.

When shore power is supplied to the 20-1050CULW, the inverter is protected in the following ways: 1) The shore power input passes through the unit's Transfer Relays and into two circuit breakers; 2) One breaker is 15 amps to protect the AC output receptacle. The other circuit breaker is 15 amps to protect the battery charger AC input circuit.

## Vanner Model 20-1000TUL.2 AC Power Inverter System

### Key Features

- 1,050 Watt Power Inverter
- Automatic AC Transfer Switch
- UL Certified to Federal Specification KKK-A-1822D
- Underwriters Laboratories Listed (UL and C-UL Listed)
- Optional Remote Monitor/Control System
- Ground Fault (GFCI) Protected AC Output



Vanner Model 20-1000TUL.2

The Vanner Model 20-1000TUL power inverter system has been the standard of the ambulance industry for many years. Redesigned in 1996, the 20-1000TUL.2 contains the same DC to AC inverter component as the 20-1050CUL/CULW and has an automatic heavy-duty AC transfer switch without the battery charger.

The 20-1000TUL.2 inverter works in conjunction with Vanner's 30-10 and 30-10GFI Battery Charger/Conditioners, has front panel status LED indicators, and remote monitor/control capabilities when used with the optional IFM1 Interface Module.



Certified to Federal Specification KKK-A-1822D

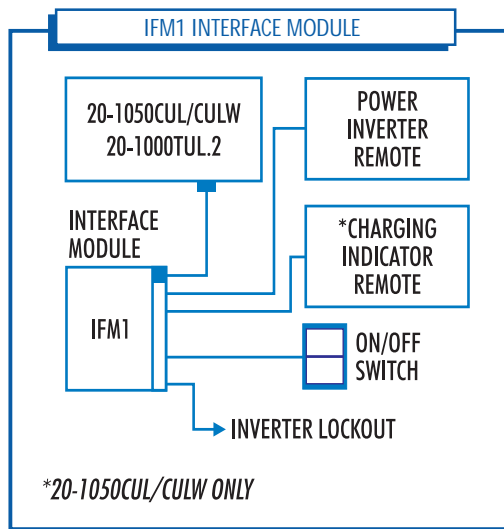


Vanner's model 20-1050CUL/CULW and model 20-1000TUL.2 AC Power Systems have been certified by Underwriter's Laboratories (UL) to meet the requirements of the Federal specification KKK-A-1822D. These units are UL and C-UL Listed (UL Listed to Canadian National Standards) to meet Power Inverter Emergency/Land Vehicle requirements.



# INVERTER SYSTEM REMOTE ACCESSORIES

The 20-1050CUL/CULW and 20-1000TUL.2 AC Power Inverter Systems support a variety of options designed to maximize the vehicle's electrical power capabilities. System options include a remote shore power/charging status panel, a remote inverter status panel, a remote system on/off switch, and the IFM1 interface module.



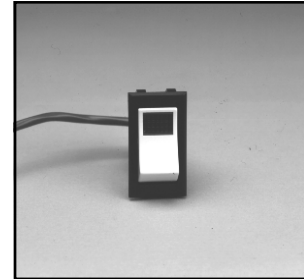
## Interface Module

This Interface Module (Model IFM1) enables various remote options to be connected to the 20-1050CUL/CULW, or 20-1000TUL.2 Power System. The IFM1 is supplied with a two foot (2') data cable to connect it to the inverter system. Electrical terminals on the IFM1 permit wiring to the two remote status panels, remote on/off rocker switch, and to the module disconnect switch for the inverter lockout control. The IFM1 can be mounted conveniently near the 20-1050CUL/CULW, or 20-1000TUL.2 unit.

In order to meet the Federal KKK-A-1822D ambulance specification requirements it is necessary to add an inverter lockout control. This control is provided by the IFM1 Interface Module. The Inverter Lockout Control terminal on the IFM1 is wired to the emergency vehicle's module disconnect switch load side. This control interlock ensures that when the Module Disconnect Switch is off, the 20-1050CUL/CULW or 20-1000TUL.2 cannot switch into the inverter mode, which could discharge the vehicle's battery. (See the 12 Volt Electrical System - Functional Diagram, on page 5.)

## Remote System On/Off Switch

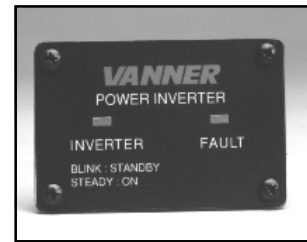
This switch allows the AC Power System to be remote controlled and normally would be installed near the Remote Power Inverter Panel. This On/Off switch controls the power inverter only. In the 20-1050CUL/CULW system the battery charger/conditioner will always be On if shore/utility power is present. The remote switch is provided with an eight foot (8') cable that connects to the IFM1 Interface Module.



Remote Switch Assembly—D06781

## Remote Power Inverter Panel

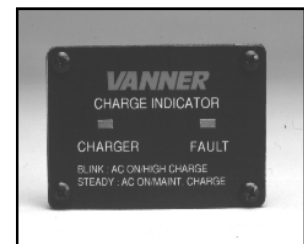
This remote panel contains a green INVERTER LED that shows when the inverter is in Standby (flashing) or On (steady). A red FAULT LED shows a problem such as Over Temperature, Output Overload or Low Battery. The panel has a sealed front overlay and can be mounted on a flat surface with four screws. A 12" wiring pigtail is provided to allow wiring to the IFM1 Interface Module.



Inverter Status Panel—D06638

## Remote Charger Indicator Panel

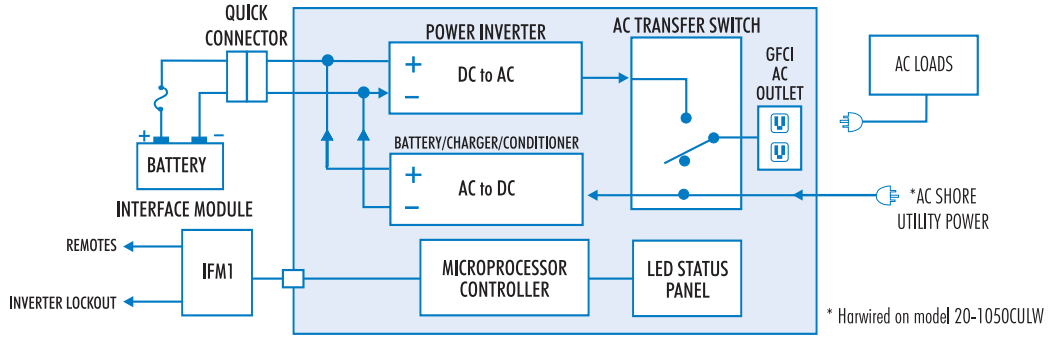
This remote panel contains a green CHARGING LED to show when AC shore/utility power is present, charging and maintaining the battery. A red FAULT LED shows the charger is Off due to a problem such as Over Temperature or Overload. The panel has a sealed front overlay and can be mounted on a flat surface with four screws. A 12" wiring pigtail is provided to permit wiring to the IFM1 Interface Module.



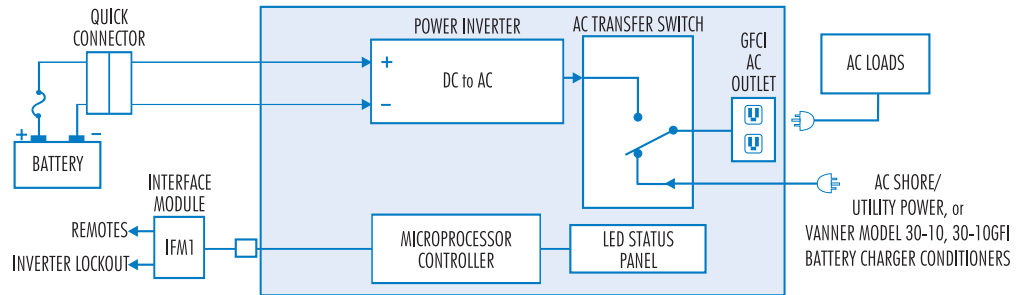
Charger Indicator Panel—D06639

# INVERTER SYSTEM WIRING DIAGRAMS

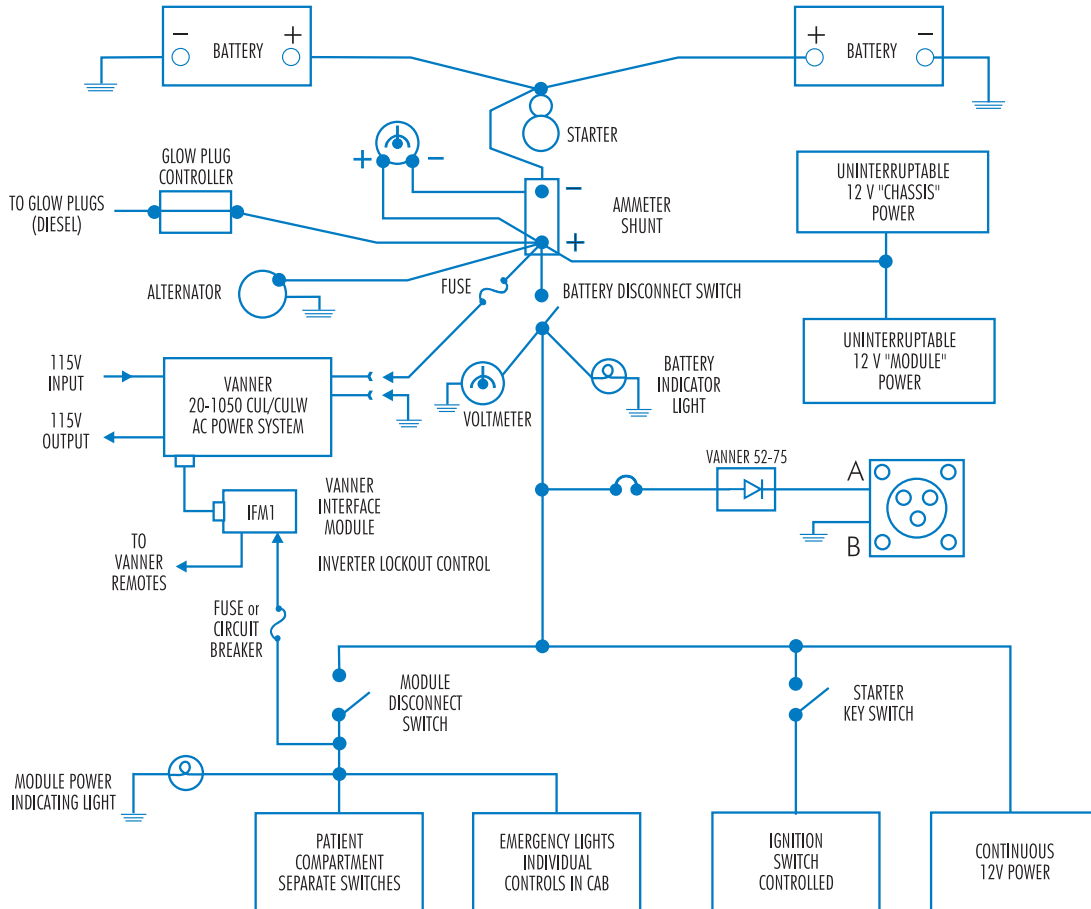
## VANNER 20-1050 AC POWER SYSTEM



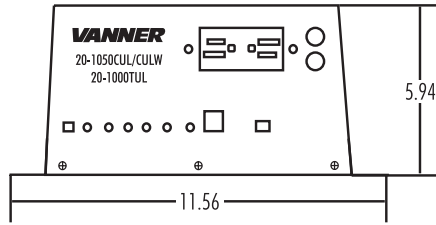
## VANNER 20-1000TUL.2 AC POWER SYSTEM



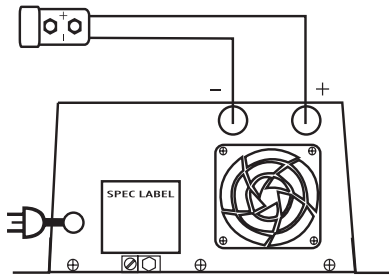
## 12 VOLT ELECTRICAL SYSTEM-FUNCTIONAL DIAGRAM FEDERAL SPECIFICATION KKK-A-1822D



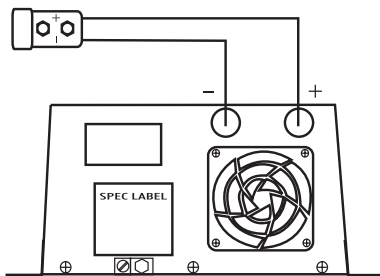
## Inverter Dimensions



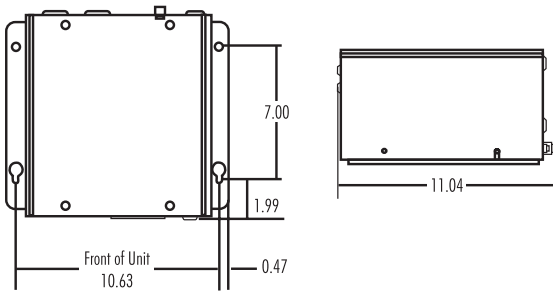
20-1050CUL/CULW/TUL.2 - Front of Unit



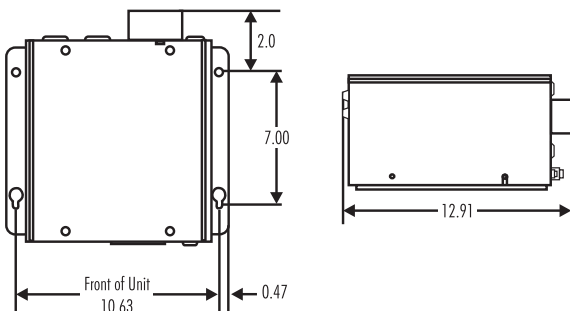
20-1050CUL/20-1000TUL.2 - Back of Unit



20-1050CULW - Back of Unit



20-1050CUL/20-1000TUL.2 • TOP VIEW/SIDE VIEW



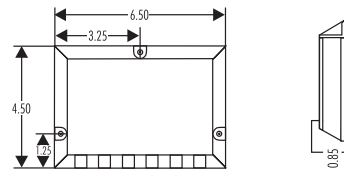
20-1050CULW • TOP VIEW/SIDE VIEW

## AMBULANCE INVERTER SPECIFICATIONS

Inverter Model:	20-1050CUL/CULW	20-1000TUL.2
Output at 120 VAC Continuous	1050 Watts	1050 Watts
Surge Capacity at 120 VAC (3 sec)	2100 Watts	2100 Watts
Input Voltage, VDC	12 VDC Nominal	12 VDC Nominal
(Deep Cycle Battery Recommended)	10.5 VDC min., 16.0 VDC max.	10.5 VDC min., 16.0 VDC max.
Output Voltage	120 Volts $\pm$ 5%	120 Volts $\pm$ 5%
DC Current Draw (Battery)		
OFF	0.017 A Typical	0.017 A Typical
Load Demand (Waiting)*	0.09 A Typical	0.09 A Typical
Full ON at No Load	0.7 A Typical	0.7 A Typical
Full ON with Load	Approx. Load Wattage $\div$ 10 or Load Amps x 12	Approx. Load Wattage $\div$ 10 or Load Amps x 12
Frequency	60Hz $\pm$ 0.1Hz	60Hz $\pm$ 0.1Hz
Output Waveform	Modified Sine Wave	Modified Sine Wave
Battery Charger		
Charging Capacity	55 A (High)* 15 A (Low)*	N/A
Input Current	12 A	N/A
Bulk Voltage	14.2 VDC (flooded), 14.1 VDC (gel)*	N/A
Float Voltage	13.2 VDC (flooded), 13.6 VDC (gel)*	N/A
Bypass Transfer		
Input Voltage	120 VAC $\pm$ 10%	
Output Current, GFCI Outlet	12 Amp	
Other Specifications		
Ambient Temperature	-20 to 110° F, -29 to 43.4°C	
Cooling Air	Thermostatically controlled fan cooling	
Chassis	White painted aluminum with noncorrosive hardware	
Dimensions	See dimensional diagrams	
Weight	22lbs	

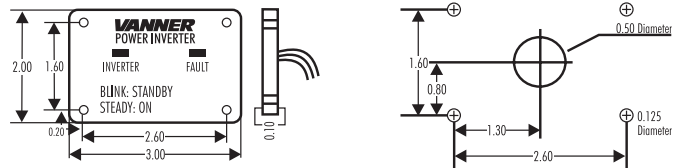
\* Setup switches are located on the front panel.

## IFM1 Interface Module Dimensions



IFM1 INTERFACE MODULE • TOP VIEW/SIDE VIEW

## Power Inverter Remote Dimensions



REMOTE INDICATOR PANEL

## IQ/Bravo Series Inverters & Inverter/Chargers

Designed to deliver regulated AC power for sensitive and demanding applications these inverters and inverter/chargers are highly reliable UL Listed units that are easy to install and simple to operate. The Bravo units are available in 1800 and 2600 watts with a battery charger option, and an optional remote panel.



IQ Series Model Numbers: IQ2600 & IQC2600

- 2600 Watts, 65 Surge Power Amps
- 120 Volts  $\pm 5\%$
- 12 VDC Input Battery Voltage
- 120 Amp Battery Charger (IQC models only)
- Load Demand Switch
- Automatic Circuitry Protection
- Status Indicators - Inverter On, Battery Low, Over Temp, and Over Load
- Limited Compatibility with IFM1 Interface Module

Bravo Model Numbers: BR1800 & BRC1800

- 1800 Watts, 25 Surge Power Amps
- 120 Volts  $\pm 5\%$
- 12 VDC Input Battery Voltage
- 80 Amp Battery Charger (BRC models only)
- Load Demand Switch
- Automatic Circuitry Protection
- Status Indicators - Inverter On, Battery Low, Over Temp, and Over Load
- IFM1 Compatible

## Electronic Flashers

Vanner's heavy-duty Electronic Flashers are designed to meet the demanding needs of emergency response vehicles. These flashers are short-circuit proof, provide silent operation, and are hermetically sealed to protect against the elements and resist shock and vibration.



## Automatic Throttles

Vanner's Automatic Throttle Control System increases engine RPM, while in park or neutral, in order to provide higher output of the alternator under heavy electrical loading conditions. Automatic Throttles can be used on many types of vehicles, and are an excellent choice for applications using DC to AC inverters.

When equipped with the optional VoltGuard® Electronic Low/Battery Voltage Monitor, the automatic throttle activates when the vehicle's voltage drops below 12.6 VDC.



## Battery Chargers

The UL Listed ChargeMaster series of lead-acid battery chargers provide 10 Amps of regulated DC current for both stationary and mobile charging applications where extended life, high reliability, and freedom from maintenance are mandatory.

Built for heavy-duty applications, these chargers can be used with portable generators and produce regulated outputs even in areas having poorly regulated AC line power.



## Battery Isolators

Vanner Battery Isolators are designed to allow dual battery systems to be charged from a battery charging source while preventing one battery from discharging the other. This protects the engine battery from being discharged by an auxiliary battery operation. Silicon Diode and the low voltage loss Schottky Diode Isolators are available in several current ratings.



## VANNER EMERGENCY VEHICLE POWER PRODUCTS

Model/Part Number	Description
20-1050CUL	Combination Power Inverter, Battery Charger/Conditioner and Automatic AC Transfer Switch System, with mating DC Connector
20-1050CULW	Combination Power Inverter, Battery Charger/Conditioner, Hardwired AC Input, Automatic AC Transfer Switch System, with mating DC Connector
20-1000TUL.2	Combination Power Inverter and Automatic AC Transfer Switch, with mating DC Connector
IFM1	Interface Module (with 2ft. data cable)
D06781	Remote System ON/OFF Switch Assembly (Rocker Switch with 8ft. Cable, used with IFM1 Interface Module)
D06638	Remote Power Inverter Indicator Panel, used with IFM1 Interface Module
D06639	Remote Charge Indicator Panel, used with IFM1 Interface Module
D06625	Remote Switch Adapter (For Older Model Rocker Switch Assemblies)
D06623	DC Cable Adapter (Blue to Gray Connector)
02635	Rocker Switch for model D06781 Remote ON/OFF Switch Assembly
03637	Fuse Holder (For Bussmann ANN-125)
03640	Fuse 125A for 1000 watt & 1050 watt inverters (Bussmann Ann-125)
04522	Fuse 200A for 1800 watt inverters (Bussmann ANN-200)
04523	Fuse 400A for 2600 watt inverters (Bussmann ANN-400)
02216	Gray DC Connector w/Contacts (supplied with 20-1050CUL, 20-1050CULW, and 20-1000TUL.2)
02218	DC Connector Strain Relief (supplied with 20-1050CUL, 20-1050CULW, and 20-1000TUL.2)
02217	Reducer Bushing to #2 AWG (need 2 per connector)
BR12-1800SH/IQ12-1800	Bravo 1800 Power Inverter, Hardwire (IQ1800*)
BR12-1800SG/IQ12-1800	Bravo 1800 Power Inverter, GFCI Protected Duplex Receptacle (IQ1800*) <i>* IQ12-1800 model will eventually replace Bravo 1800 units and will include both a Hardwire and GFCI Receptacle)</i>
BRC12-1800SH/IQC12-1800	Bravo 1800 (IQC1800) Combination Power Inverter, Battery Charger/Conditioner, Hardwire
IQ12-2600	IQ2600 Power Inverter, Hardwire
IQC12-2600	IQ2600 Combination Power Inverter, Battery Charger/Conditioner, Hardwire
D05039	Bravo Remote Panel (Switch and 3 LEDs) w/20' Cable, used with Bravo 1800
1250GCP	Warning Light Flasher, Alternating, Dual 50 Amp Outputs
1616GCP	Warning Light Flasher, Alternating, Dual 12 Amp Outputs
1840GCP	Warning Light Flasher, Duo-mode for KKK-B Vehicles, 30/30/30 Amp
1860GCP	Warning Light Flasher, Duo-mode for KKK-C & D Vehicles, 40/24/30 Amp
73-46	Heavy-duty Automatic Throttle System with solenoid/cable assembly, and control module assembly
73-48	Auto Throttle kit with ON/OFF toggle switch, #02264 isolation diode, fuse, and fuse holder
70-VG	Volt Guard low voltage auto throttle actuator
30-10	Battery Charger/Conditioner, 12 VDC, 10 Amp, w/AC Outlet
30-10GFI	Battery Charger/Conditioner 12 VDC, 10 Amp, w/GFCI AC Outlet
50-140	Silicon Battery Isolator, 2 Battery, 180 Amp Alternator
51-140	Schottky Battery Isolator, 2 Battery, 250 Amp Alternator
52-75	Schottky Medical Isolator, 75 Amp Surge

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