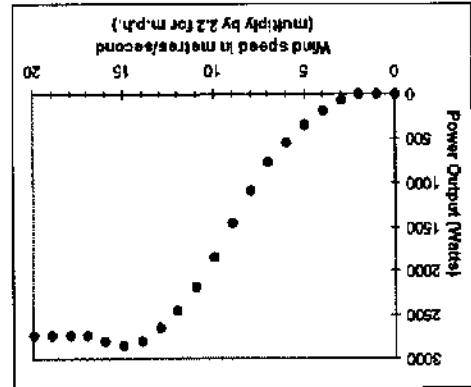
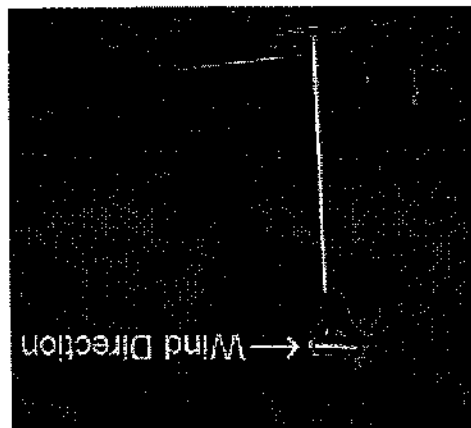


WT2500 MANUAL
SYSTEM
SPECIFICATION





Rotor Speed Control
 Above 12m/s (25mph) the blade pitch is automatically adjusted to maintain 300 rpm and full output up to 67m/s (150mph).
High Build Quality
 All components are hot-dipped galvanised steel, stainless steel or plastic. All bearings are triple sealed.
Low Speed Equals Durability
 Low rotor speed (half the speed of comparable machines) ensures extended durability of blades and bearings. It also means that Proven WTs are the quietest in the world!

Proven WT2500 2.5kW Wind Turbine
Proven TM650 6.5m Un-Guyed Mast

Performance
 Cut-In Wind Speed 2.5 metres/second (5.6 mph)
 Cut-Out Wind Speed >70 metres/second (>155mph)
 Rated Wind Speed 12 metres/second (26 mph)

Rotor
 Type Down-wind, Self-Regulating
 Number of Blades 3, Flexible
 Blade Material Polypropylene
 Rotor Diameter 3.5 metres (11' 1")

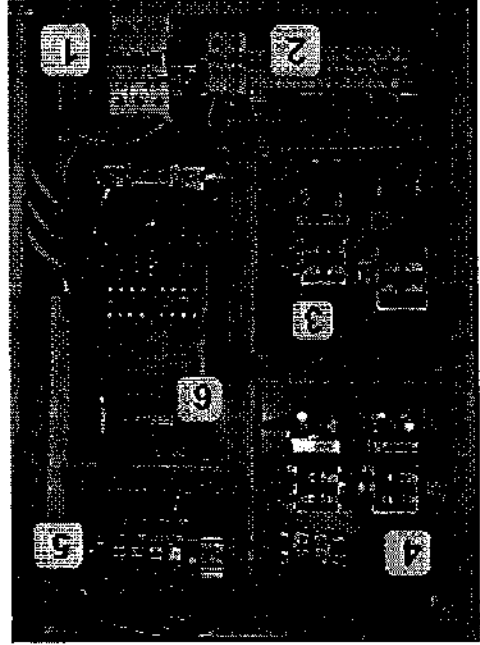
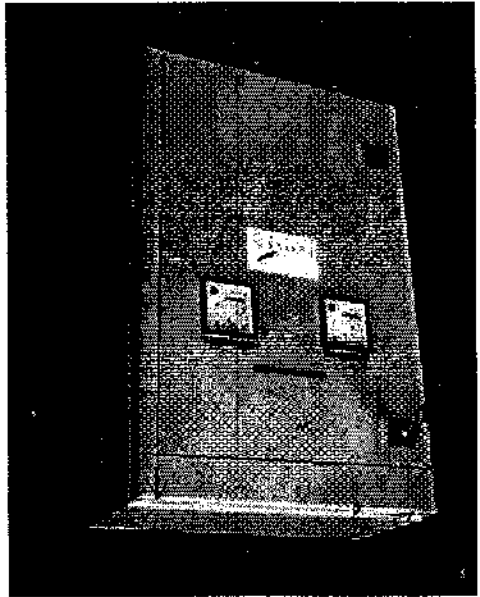
Generator
 Type Brushless, Direct Drive
 Permanent Magnet
 (No Gear-Box, Zero Maintenance)
 Output 24/48/120V 3-phase AC (20Hz)
 Rated RPM 300 nom.
 Rated Power 2500 Watts
 Annual Output 3000-8000 kWh depending on site

Mast
 Type Tapered, Hinged, Self-Supporting
 Hub Height 6.5m (21' 4")
 Foundation 1 m³ concrete (no guy wires)
 Base Ø 300 mm (11.8")
 Top Ø 150 mm (5.9")

Noise
 (all readings taken with an ATP SL-25 Portable Meter)
 45dB At 5m/s
 60dB At 20m/s
 70-80dB Car 15m away at approx 40 mph.

Weight
 WT2500 200 kg (440 lb.)
 TM650 190 kg (418 lb.)

Sample of UK Commercial Customers
 British Telecom
 Scottish Youth Hostel Association
 British Rail
 Irish Lighthouse Authority
 Welsh Water
 UK Lighthouse Authority



**Proven ECM2501/ECM2502
24V/48V Wind Turbine Controller**

Functions

Voltmeter, Ammeter, Rectification of 3-phase input from WT2500, Isolator, Low Battery Voltage Warning, Multi-Mode Charging Control plus Solar PV connections.

Mode 1: Full Charging

To 120A/60A at nominal 24V/48V

Mode 2: Excess Energy Diver (Battery Full)

2 DC (ECM2501 only) & 3 AC Diver Load Relays are switched in sequentially to prevent battery overvoltage (Up to 5 AC Diver switches on request).

Each switch has pre-set 'ON' at 'OFF' at Voltages.

Mode 3: Reduced 'Trickle' Charging (Dump Load Fail)

Charging reduced to 20A max by series resistor on input

Mode 4: Auto-disconnect (Second Fail Safe)

WT runs off-load

Enclosure

IP66 Box, height 600mm, width 400mm, depth 200mm. Heat sink for rectifier on RHS adds 50mm to overall width. All connections via glands in base.

LED Indicator Display

1. (Green)	Volts High, WT Disconnected
2. (Green)	Volts High, Trickle Charging
3. (Red)	Volts High, DC Dump 1 On (ECM2501)
4. (Yellow)	Warning, Volts Low
5. (Red)	Volts High, DC Dump 2 On (ECM2501)
6. (Red)	Volts High, AC Dump 1 On
7. (Red)	Volts High, AC Dump 2 On
8. (Red)	Volts High, AC Dump 3 On

Layout

1. Miniature Circuit Breaker (MCB) WT Isolator
2. Terminal Strip
3. Full & Trickle Charge DC Contactors
4. DC Dump Contactors (ECM2501 only)
5. AC Dump Relays
6. Control Circuit (includes LED Indicator Display)

System 1 - Proven 24V/48V Battery Charge with 24V/48V Heat Dump

(suitable for DC supply systems or where inverter rating is less than WT)

System 1 / 024/048
 (note amps and volts
 below apply to 24V
 system)

Proven WT2500
 2.5kW wind turbine
 (available with
 6.5m, 9m or 11m
 self supporting,
 tilt-up mast)

WT2500/024/048 2.5kW
 Wind Turbine Generator
 3-phase output at nominal
 30V max 90A (60A/ph)
 for 24V system and
 nominal 60V max 45A
 (30A/ph for 48V system)
 Nominal 20Hz
 Up to 80m nom 20Vac (on 24VDC system)
 cable or 160m non 40Vac (on 48VDC system)
 3-core cable

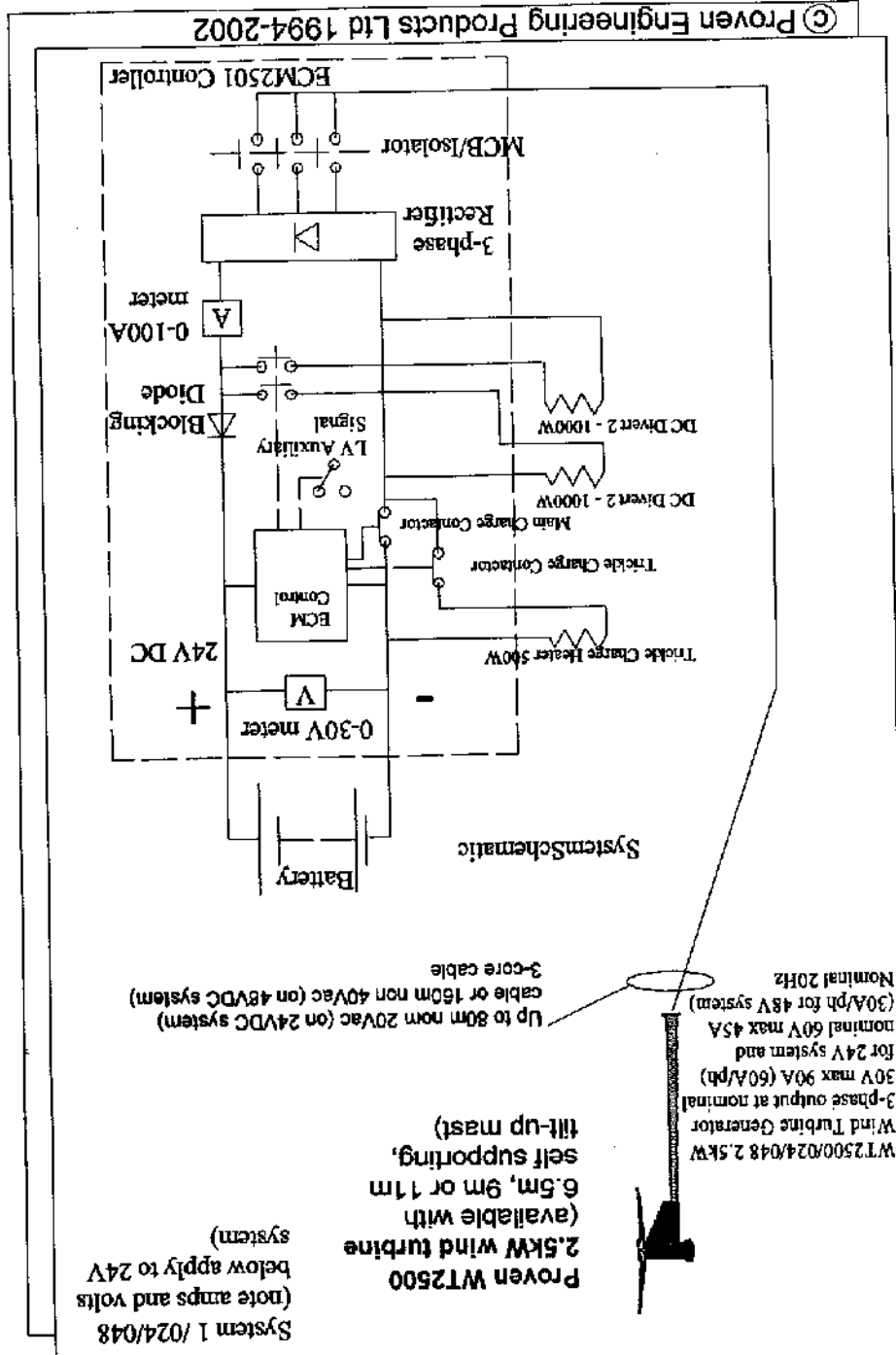
System 1 gives full power output to battery charging (at up to 90 Amperes on a 24V system) until the battery is full and the voltage rises to just about gassing level. If the battery voltage tries to rise further then a 1kW 24V heating load is switched in to use the excess power. If the voltage still rises then a second 1kW load is switched in. This should control the battery top voltage in most conditions. If there is a sustained high wind or a heating load is lost then if the battery voltage rises a little further the main charge contactor opens and the wind turbine output is fed through the trickle charge resistor/heater with the result of reducing input amps to 10-20% of normal values.

There is a further level of control to protect batteries: should battery voltage still continue to rise then the trickle charge contactor opens and no power input is allowed from the wind turbine. The wind turbine then spins free and will run up to its maximum speed when the Proven *Zebdeck Furl* mechanism will twist the blades to stall to control rotor speed.

Each stage of control is by means of a bistable switch which has a voltage gap between on and off levels to provide stability. This gap is adjustable and is preset for average battery conditions.

The blocking diode shown is optional. Use directly from the turbine. This will protect the battery from very mild cycling at very close to float voltage but get less heat output from the divert loads (turbine is not optimally loaded).

Short out the diode to run the divert loads from the battery. The battery will be cycled close to float voltage as divert loads come on and off but you get much more divert power.



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System 2 - Proven 24V/48V Battery Charge with AC Heat Dump (suitable for domestic or commercial systems where inverter rating is more than WT)

Proven Wind Turbines
 Wardhead Park, Stewarton,
 KA3 5LH, Scotland, UK
 Tel: +44 (0) 01560 485 570
 Fax: +44 (0) 01560 485 580
 Email: info@provenenergy.com

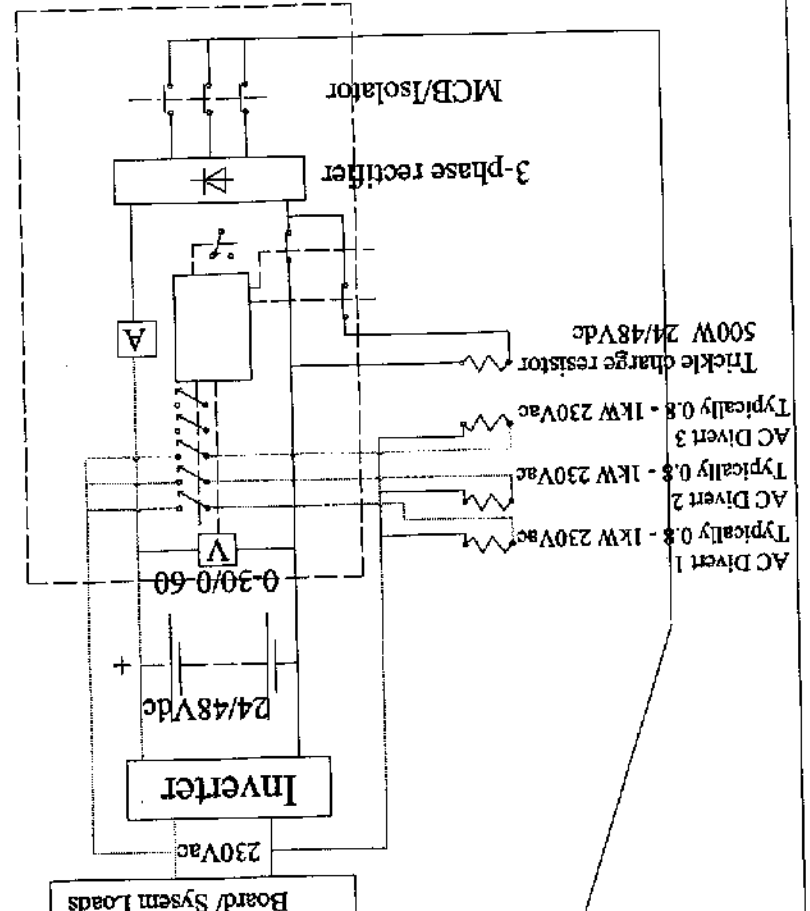
PROVEN
 PROVEN WIND TURBINES

System 2 /024/048

System 2 gives full power output to 24V system) until the battery is full and battery charging (at up to 90 Amps on a 24V system) rises to just about gassing level.
 If the battery voltage tries to rise further then a 1kW 230Vac heating load is switched in via the inverter to use the excess power.
 If the voltage still rises then a second 1kW load is switched in. A third 1kW load may be provided if one of the first ones will trip out on a thermostat setting (e.g. immersion element). 3 AC divert loads AC relays are provided within the BCM2502 as standard although 2 more can be fitted on request. A further relay provides clean contacts low battery warning signal.
 If there is a sustained high wind or a heating load is lost (e.g. by thermostat switch out) then if the battery voltage rises a little further the main charge contactor opens and the wind turbine output is fed through the trickle charge resistor/heater with the result of reducing input amps to 10-20% of normal values.
 There is a further level of control to protect batteries: should battery voltage STILL continue to rise then the trickle charge contactor opens and no power input is allowed from the wind turbine. The wind turbine then spins free and will run up to its maximum speed when the Proven *Zebedee Furl* mechanism will twist the blades to stall to control rotor speed.

Each stage of control is by means of a bistable switch which has a voltage gap between on and off levels to provide stability. This gap is adjustable and is preset for average battery conditions.

Proven WT2500
 2.5kW wind turbine
 (available with
 6.5m, 9m or 11m
 self supporting,
 tilt-up mast)
 Up to 80m nom 20Vac (on 24VDC system)
 cable or 160m non 40Vac (on 48VDC system)
 3-core cable
 Normal 20Hz
 (30A/ph for 48V system)
 nominal 60V max 45A
 for 24V system and
 30V max 90A (60A/ph)
 Wind Turbine Generator
 3-phase output at nominal
 WT2500/024/048 2.5kW
 2.5kW max 90A (60A/ph)
 30V max 90A (60A/ph)
 for 24V system and
 nominal 60V max 45A
 (30A/ph for 48V system)
 Normal 20Hz



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