5.8 Controller Parameter & Default Descriptions

113 Availability
This number is calculated by dividing Available Res (138) by Elapsed Res (137). It shows up as a percentage.

114 Efficiency
This number is calculated by dividing Calc'd KWH (112) by Wind KWH (110). It shows up as a percentage.

115 Capacity Ftr
This number is calculated by dividing Metered KWH (111) by 300 times Grid Hot (110). It shows up as a percentage.

116 Average WS
This is the average wind speed monitored since the monthly reset.

117 Highest KW
This is the highest KW observed since the monthly reset. It is captured as being the highest value seen which was the lowest of any consecutive 5 KW readings.

118 Hi Q Hour KW

119 Hi 1 Hour KW

120 Hi 1 Day KW

121 Hi Q Hour WS

122 Hi 1 Hour WS

123 Hi 1 Day WS
These six parameters are the maximum values observed since the monthly reset.

124 Cleared

125 At
These two parameters show the date and time of the last monthly reset. Ordinarily this occurs automatically at 12:00 midnight every 1st of the month.

126 Hi 7 Day KW

127 Hi 4 Week KW

128 Hi 7 Day WS

129 Hi 4 Week WS
These four parameters are the maximum values observed since the last reset. Cleared through PC in Call Turbine Mode.

130 Since
This is the reset date for parameters 126-129.

131 Pk Temp Gen

132 Amb Peak Gn
These two parameters show the peak Generator Temp observed since the monthly reset and the Ambient Temperature at that time.

133 Pk Temp G Box

134 Amb Peak GB
These two parameters show the peak Generator Temp observed since the monthly reset and the Ambient Temperature at that time.

135 System Reset
This is the date of the last System Reset.

136 Elapsed Res

137 Available Res
These two parameters show the elapsed hours and available hours since the monthly reset. These are parameters which allow you to fudge the Availability.

Control Parameters

200 Tie On RPM Default 1800 US, 1500 UK
This is the RPM relative to line frequency that the machine will connect to the line.

201 Cutout RPM Default 1800 US, 1500 UK
This is the RPM relative to line frequency that the machine will disconnect from the line.

5.8 Controller Parameter & Default Descriptions

202 Cutout WS Default 75

This is the wind speed at which the controller will decide that the machine should be shut down for a High Winds Warning. It must see at least two consecutive wind speeds in excess of this setting to activate this warning.

203 Pitch-Up WS Default 50

This is the wind speed which the controller must observe (or lower) before shutting the machine down for a High Winds Warning after it has been initiated due to winds in excess of Cutout WS (202). This is to allow the machine to shut down in a less violent condition.

204 Motoring KW Default 0

This is the KW (motoring) which must exist before the machine will shut down due to low winds. It is used by an internal algorithm in conjunction with motoring seconds. It should normally be 0.

205 1-2 KW Default 80

This is the KW (generating) which must exist (or higher) before the controller will increase the drive to the SCRs to SCRs High D/A (215). This should be a higher value than 2-1 KW (206). This parameter works in conjunction with 1-2 KWS (208). At this KW, the capacitor contactor is engaged and stays engaged until unit drops off line. For a full description read the operating manual.

206 2-1 KW Default 40

This is the KW (generating) which must exist (or lower) before the controller will decrease the drive to the SCRs to a range between SCRs Med D/A (214) and SCRs Low D/A (213). This should be a lower value than 1-2 KW (205). This parameter works in conjunction with 2-1 KWS (209). For a full description read the operating manual.

207 Motoring Sec Default 5

This is the number of seconds that the machine must motor continuously before the controller will remove its drive to the SCR firing board (i.e. take the machine off line).

208 1-2 KWS Default 0

This is the number of KW seconds above the setting in 1-2 KW (205) which must occur before the controller will increase the drive to the SCRs to SCRs High D/A (215).

209 2-1 KWS Default 80
This is the number of KW seconds below the setting in 2-1 KW (206) which must occur before the controller will decrease the drive to the SCRs to a range between SCRs Med D/A (214) and SCRs Low D/A (213).

210 Brake Speed Default 100
This is the speed below which the controller will set the brake when an error condition exists. This action would normally occur before the capacitor which holds off the brake is discharged.

211 Yaw Limits Default 15
This number sets the range of wind angle relative to the nacelle which is acceptable for power production. When the absolute value of Yaw Position (12) exceeds this number for 15 continuous seconds, the machine will yaw in a direction to bring itself back within the indicated window.

212 SCRs Low D/A Default 50
This parameter sets the lower limit of firing board drive levels which will be sent from the SPI board when the machine is running at low outputs. The intent is to lower the voltage for increased efficiency without allowing the firing board feedback loop to become unstable.

213 SCRs Med D/A Default 75
This parameter sets the upper limit of firing board drive levels which will be sent from the SPI board when the machine is running at low outputs.

214 SCRs High D/A Default 100
This parameter sets the firing board drive level which will be sent from the SPI board when the machine is running at high outputs.

215 SCR Bump D/A Default 125
This parameter sets the firing board drive level which will be sent from the SPI board when the machine is being bumped using 1*.

Supervisory Parameters

300 Overspeed RPM Default 1900 US, 1600 UK
This is the maximum generator RPM which can be observed without causing an Overspeed Warning. This parameter is compared to absolute RPM.

5.8 Controller Parameter & Default Descriptions

301 Over Power — Default 300
This is then maximum power output which can occur in conjunction with KW-Seconds (302) without causing an Over Power Error.

302 KW-Seconds — Default 1000
This is the number of KW seconds above the setting in Over Power (301) which must occur before the controller will cause an Over Power Error.

303 Current Imbal — Default 100
This is the maximum difference in amps measured from any phase to another which will not cause a Current Imbalance Error. The Condition must last continuously for 5 seconds.

304 Set Voltage — Default 480 US, 420 UK

305 Delta V — Default 60
These two parameters provide for Over and Under Voltage Error detection. The Set Voltage is the nominal center voltage. The Delta V is the maximum amount of variation which may occur before initiating an error. The delta voltage reduces linearly to 30 between 100 and 300 KW. The voltage comparison is between Line Voltage (11) and Set Voltage (304). The condition must last at least 3 seconds.

306 Effcy Lim — Default 0
This is the maximum efficiency which must be maintained which will not cause an efficiency warning to occur. This parameter is compared to Efficiency (114).

307 Rate Limit — Default 50
This is the maximum yaw rate which can occur without causing an Excess Yaw Failure. This parameter is compared to Yaw Rate (14).

308 Gen Temp Max — Default 149
This is the maximum generator temperature which can exist which will not cause a Generator Over Temp Warning. This parameter is compared to Gen Temp (15).

309 GBx Temp Max — Default 93
This is the maximum gear box temperature which can exist which will not cause a Gear Box Over Temp Warning. This parameter is compared to GBx Temp (16).

5.8 Controller Parameter & Default Descriptions

Maintenance Numbers

400 Key Code
This number acts as a combination lock with Set Key (401) to allow limited access to important parameters.

401 Set Key
This number acts as a combination lock with Key Code (400) to allow limited access to important parameters.

402 Run Status
This number allows various special functions having to do with running the machine. The machine is in a permanent Manual Stop Mode whenever this number is not 0.

403 EPROM # CWT
This is the current EPROM version.

404 Rotate 1

405 Rotate 2

406 Rotate 3
These parameters allow the display to be updated continuously with other selected data. The number of the parameters to be monitored are set into each of these and then the display will rotated through them continuously.

407 Modem Setup
This parameter allows the controller to send messages to the modem to set it up. See Cabinet Calibration Procedure for more details.

408 Wrap Cal
This parameter is used in conjunction with the Wrap Calibration procedure. See Nacelle Calibration Procedure for more details.

409 Historical #
This shows the number (not date) of the current day in the historical data base. This parameter is used primarily for maintenance.

NV RAM PERSONALITY PARAMETERS (Red jumper must be on both pins to change parameters; should be on only 1 pin during storage and operation.)

5.8 Controller Parameter & Default Descriptions

500 Machine #
As it says, this is the Machine number. (0-65536)

501	Line Volt Adj	Default 1000	Affects Line Voltage (11)
502	Gen Volt Adj	Default 1000	Affects Gen Voltage (10)
503	A Cur Adj	Default 1000	Affects Phase A Current (6)
504	C Cur Adj	Default 1000	Affects Phase C Current (8)

These four parameters allow adjustment of the electrical parameters.

They start with a nominal value of 1000 which is the equivalent of 1.000.

To modify a parameter this number would be changed to a relative number.

Example:

If Line voltage (11) reads 490 but should read 480 according to the voltmeter then you would change Line Voltage Adj (501) to 1000 * 480 / 490 or 980.

505	A Cur Sign	Default 0	Affects Phase A Current (6)
506	C Cur Sign	Default 0	Affects Phase C Current (8)

These two parameters allow the signs of the instantaneous current inputs to be inverted. These numbers should only be 0 or 1. When they are 0, the current is read as it is. When they are 1, the sign is inverted.

507	Flag Dir	Default 0	Affects Yaw Position (12)
508	Wrap Dir	Default 0	Affects Yaw Heading (13)

These two parameters allow the signs of the Flag and Wrap potentiometer inputs to be inverted. These numbers should only be 0 or 1. When they are 0, the pots are read as is. When they are 1, the sign is inverted.

509 Yaw Dir Default 0
This allows the direction of yaw drive to be inverted, whether it is due to the need to unwrap or to bring the machine back into the wind. This number should only be 0 or 1. When it is 0, the drive is normal. When it is 1, the drive direction is inverted.

510 Gin Heading Default 0 Affects Yaw Heading (13)
This number is used for telling the machine where true North is. The actual heading in degrees from true North should be entered here.

5.8 Controller Parameter & Default Descriptions

511 W/S Shadow Default 0

This number tells the machine where the wind speed shadow is. This should be the heading from true North that the wind will blow from when the tower shields the anemometer.

512 Wrap Factor Default 100 Affects Yaw Heading (13)

513 Wrap Offset Default 0 Affects Yaw Heading (13)

These numbers are automatically updated when the Wrap Calibration is done. See Yaw Heading (13) description for more details.

514 Altitude, Ft Default 0

This is the nominal altitude in feet of the wind turbine.

515 Start date Default present date

This is actual installation date of the turbine.

5.9 Tower Installation Summary

1 Install tower base, side anchors.

2 Pull tower & gin pole together (make sure lower tower base pivot is secured hard against pin with chain).

3 Install cabinets & wire power to cabinet & winch plug.

4 Measure tower h, Δh, & side distances to anchors.

5 Make up guy cables.

6 Install cables, flatten 1/2" bolts on cable pins and tighten turnbuckles to given length.

7 Install wiring harness & attach cable supports - prepare yaw tube for nacelle.

8 Raise gin pole & attach fore cable to tower (use 1/4" cable to steady gin pole).

9 Adjust tower base so both fangs of gin pole are supported evenly (no gaps).

10 Lift tower at fore cable fang and adjust tower base pivot (slotted holes) so lift is thru tower centerline & pivot saddle is snug against base pivot pin.

11 Raise gin pole & attach fore cable to tower (use 1/4" cable to steady gin pole).

12 Raise tower - adjust guy cable tension if necessary - install flex conduit in tower & cabinet - include excess wrap wires.

13 Lower tower - install flex conduit tower guide & pull plug.

14 Install blades.

15 Set blade pitch.

16 Wire up nacelle & cabinet.

17 Adjust flag pot, check that brake operates correctly - both instant & delay, check vibration switch, check that yaw motor operates both directions, check that both blade switches operate, and check that both blade solenoids work, check temp sensors, oil level & voltage across heater coil terminals in nacelle.

18 With blades hard against ground, complete wind turbine cabinet calibration.

19 Raise unit until blades are slightly off ground and bump unit to check rotation - swap

5.9 Tower Installation Summary

19 Raise unit until blades are slightly off ground and bump unit to check rotation - swap leads if required.

20 Raise unit all the way up and complete calibration of nacelle sensors & controls.

21 Before starting unit make sure installation check list is complete and checked off.

5.10 Installation Check List

DATE _____
UNIT #_____

TECHNICIAN INITIAL		
_____	1.	Caulking around anchor bolts.
_____	2.	Anchor bolts torqued to 350 ft-lbs.
_____	3.	Threads on guy cable turnbuckles flattened - 2 places 180° apart on each clevis or eye (perform after cables are attached).
_____	4.	Threads on anchor plate 2" dia. bolt are flattened over next to nut (3 turnbuckles & bottom bolt of triangle plates).
_____	5.	All 1/2" bolts securing 2" pins are tightened and flattened 2 places 180° apart (tower flanges, gin pole, triangle plates, 3 turnbuckles).
_____	6.	Tower base adjusted to gin pole flange.
_____	7.	Tower base pivot (slotted holes) is adjusted & bolts tightened.
_____	8.	Hub centered with shaft - tapered holes to shaft - same on both sides.
_____	9.	Blade bolts, L.E. arm bolts and weight bolts are torqued.
_____	10.	Grease all grease zerts including tower base & pulley blocks.
_____	11.	¼" cable turnbuckle safety wire attached.
_____	12.	Flag & wrap pots adjusted, brake operates correctly - both instant & delay modes, vibration switch operates, yaw motor operates both directions, both blade switches operate, both blade solenoids work, temperature sensors look correct, oil level shows low when unit on ground.
_____	13.	Cabinet calibration complete (** see reverse & Appendix 5.6).
_____	14.	Nacelle calibration of sensors & control complete (** see reverse & Appendix 5.5).

_____ 15. Controller information entered - time, date, KW/hr, available hrs., grid hot hrs, over 200 KW hrs, cleared dates, machine number, altitude and start date.

_____ 16. Drain holes in lowest corner of control & capacitor cabinet.

_____ 17. Blades in track.

_____ 18. KW/hr meter disk does not speed up & slow down with one or two revolutions of blade rotor.

NV RAM PERSONALITY PARAMETERS

		Default #	Revised Value Date_____	Revised Value Date_____	
500	Machine Number	0	_____	_____	
501	Line Voltage Adjust	1000	_____	_____	*
502	Gen Voltage Adjust	1000	_____	_____	*
503	Phase A Current Adjust	1000	_____	_____	*
504	Phase C Current Adjust	1000	_____	_____	*
505	Phase A Current Sign	0	_____	_____	
506	Phase C Current Sign	0	_____	_____	
507	Flag Direction	0	_____	_____	
508	Wrap Direction	0	_____	_____	
509	Yaw Direction	0	_____	_____	