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	Command listing for RS-232, Ethernet and Profibus for all Generators based on C3 Technology	Rev. date 30-Oct-06	Rev. A 04


**Products: Power Generators with C3 Technology
(made beginning of September 2002)**

**Subject: Command listing
Commands as used with RS-232, Ethernet and Profibus**


Attention: *This Technical Bulletin is outdated and will not be updated anymore. A current list of AE Bus Protocol commands can be found in the user manual (Table 4-16), which is delivered on CD-ROM with every generator.*

This list of commands is based on the AE Bus Protocol command structure and reflects the commands which are necessary to make use of a digital Interface such as the RS-232, Ethernet or Profibus.


Command	Description	Host Data Bytes	Response Data Bytes
1 RF off	Turns off RF output. Read back with command 162 .	0	1 (CSR only)
2 RF on	Turns on RF output; the unit must be in host control mode. Read back with command 162 .	0	1 (CSR only)
3 regulation select	Sets the regulation mode. Send one byte, indicating the desired mode: <ul style="list-style-type: none"> • 6 = Forward power regulation • 7 = Load power regulation • 8 = External power regulation (DC Bias) <p><i>Note:</i> You cannot change modes while the unit is on. Read back with command 154.</p>	1	1 (CSR only)
4 forward power limit	Specifies the maximum forward power that can be delivered. Send two bytes, least significant byte first, representing the maximum forward power in watts. This command is used to limit the forward power on external power regulation. Accepts a value of 5% of maximum power to maximum power Read back with command 169 .	2	1 (CSR only)

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Command	Description	Host Data Bytes	Response Data Bytes
8 set point	<p>Specifies the output set point level for the selected regulation mode (select regulation mode with command 3). Send two bytes, least significant byte first, representing the set point level in watts.</p> <p>Accepts a value of 0 to maximum power (or maximum external feedback value)</p> <p><i>Note:</i> The set point must be less than the maximum output power</p> <p>Read back with command 164.</p>	2	1 (CSR only)
9 maximum external feedback	<p>Specifies the external feedback value that corresponds to the maximum voltage on the User port. Send three bytes, least significant byte first. Bytes 1 and 2 specify the maximum external feedback value in the range of 100 to 16000 (100 V to 16000 V).</p> <p>Byte 3 not used (only for compatibility)</p> <p>Read back with command 171.</p>	3	1 (CSR only)
11 select active target	<p>Specifies which target is active. Send one byte.</p> <p>Accepts a value of 0 to 4.</p> <p><i>Note:</i> If 0 is selected the no target life timer will count.</p> <p>Read back with command 156.</p>	1	1 (CSR only)
12 set target life	<p>Sets the target life, in kilowatt hours, of the specified target . Send five bytes, least significant byte first.</p> <p>Byte 1 selects the target number (1 to 4). Bytes 2 through 5 specify the target life in kWh.</p> <p><i>Note:</i> A decimal is implied (for example, 100 = 1 kWh).</p> <p>Read back with command 157.</p>	5	1 (CSR only)
12 set target life (only Profibus)	<p>Sets the target life, in kilowatt hours, of the target which is active (see command 11). Send three bytes, least significant byte first.</p> <p><i>Note:</i> A decimal is implied (for example, 100 = 1 kWh).</p> <p>Read back with command 157.</p>	3	1 (CSR only)
13 tuner control mode	<p>Sets the tuner control mode. Send one byte:</p> <ul style="list-style-type: none"> • 0 = Manual mode • 1 = Automatic mode <p><i>Note:</i> A match network must be connected to the generator.</p>	1	1 (CSR only)

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Command	Description	Host Data Bytes	Response Data Bytes
14 active control mode	Sets the generator's active control mode. Send 1 byte: <ul style="list-style-type: none"> • 2 = Host control • 4 = User port (analog) control • 6 = Local control (front panel) <i>Note:</i> If you try to change the control mode while the unit is on, the unit automatically switches off. Read back with command 155 .	1	1 (CSR only)
17 frequency tuning parameters	Sets the parameters for frequency tuning. Send three bytes, least significant byte first. Byte1, 2 specify the maximum frequency in kHz (the value is ignored in control mode 0). Byte 3 selects the control mode for FST. <ul style="list-style-type: none"> • 0 = no FST. Frequency as defined with command 18 • 1 = integral, phase positive • 2 = integral, phase negative • 3 = proportional, phase positive • 4 = proportional, phase negative If FST is active (mode 1-4) the frequency set by the command 18 is used as minimum frequency limit. Take care that this frequency is less than the maximum frequency before command 17 is used. The accepted values depending on the type of generator <i>Note:</i> This command is not available on generators with fixed frequency. Read back with 187 .	3	1 (CSR only)
18 RF frequency	Sets the RF frequency. Send 4 byte representing the RF frequency Hertz. The accepted value depends on the type of generator. <i>Note:</i> This command is only available on generators with variable frequency. Read back with command 178 .	4	1 (CSR only)

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Command	Description	Host Data Bytes	Response Data Bytes
18 RF frequency (Profibus only)	Sets the RF frequency. Send 3 byte representing the RF frequency in 100 Hertz steps. (for example, 10000 = 1 MHz). The accepted value depends on the type of generator. <i>Note:</i> This command is only available on generators with variable frequency. Read back with command 178 .	3	1 (CSR only)
19 number of recipe steps	Specifies the number of recipe steps. Send one data byte, representing the desired number of recipe steps Accepts a value of 0 through 2. <i>Note:</i> 0 = Recipe mode is disabled.	1	1 (CSR only)
21 recipe step/ ramp time	Specifies the ramp time for a given recipe step. Send 3 bytes, least significant byte first: Byte 1 selects the recipe step number 1 to 2 (set with command 19) Bytes 2, 3 set the ramp time value. Read back with command 191 .	3	1 (CSR only)
22 recipe step/ set point	Specifies the set point for a given recipe step. Send 3 data bytes, least significant byte first. Byte 1 selects the recipe step number 1 to 2 (set with command 19) Bytes 2, 3 specify the set point value. <i>Note:</i> The set point value must be within the operating range Read back with command 188 .	3	1 (CSR only)
23 recipe step/ run time	Sets the run time in seconds a specified recipe step Send 3 data bytes, least significant byte first. Byte 1 selects the recipe step number 1 to 2 (set with command 19) Bytes 2, 3 set the run time Read back with command 188 .	3	1 (CSR only)
24 save presets	Saves the current operation parameters to EEPROM as preset with the given number (0 to 9).	1	1 (CSR only)

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Command	Description	Host Data Bytes	Response Data Bytes
25 restore presets	Restores the current operation parameters to EEPROM as preset with the given number (0 to 9).	1	1 (CSR only)
27 set pulsing mode	Sets the desired pulsing mode. Send one byte. <ul style="list-style-type: none"> • 0 = Pulsing off • 1 = Internal pulsing • 2 = External pulsing • 3 = External pulsing inverted • 4 = Enable internal pulsing by external pulsing input Read back with command 177 .	1	1 (CSR only)
29 set partial remote control	Sets partial remote control, which enables partial front panel control. <ul style="list-style-type: none"> • Bit 0 set = RF ON/OFF buttons enabled • Bit 1 set = Rotating knob enabled • Bit 2 set = Matchbox buttons enabled It follows: <ul style="list-style-type: none"> • 0 = Buttons and Knob disabled • 1 = RF ON/OFF buttons enabled Rotating KNOB disabled Matchbox buttons disabled • 2 = RF ON/OFF buttons disabled Rotating KNOB enabled Matchbox buttons disabled • 3 = RF ON/OFF buttons enabled Rotating KNOB enabled Matchbox buttons disabled • 4 = RF ON/OFF buttons disabled Rotating KNOB disabled Matchbox buttons enabled • 5 = RF ON/OFF buttons enabled Rotating KNOB disabled Matchbox buttons enabled • 6 = RF ON/OFF buttons disabled Rotating KNOB enabled Matchbox buttons enabled • 7 = RF ON/OFF buttons enabled Rotating KNOB enabled Matchbox buttons enabled 	1	1 (CSR only)

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Command	Description	Host Data Bytes	Response Data Bytes
30 set User port voltage	User port (analog) voltage scaling from 0 – 2.5V to 0 – 10V in steps of 0.5V. A factor of 2 is implemented. (for example 20 = 10V, 5 = 2.5V). Read back with command 158 .	1	1 (CSR only)
31 set on/off ramping rise time	Sets on ramping rise time in tenths of a second. Send two bytes, least significant byte first. Read back with command 151 .	2	1 (CSR only)
32 set on/off ramping fall time	Sets off ramping fall times in tenths of a second. Send two bytes, least significant byte first. Read back with command 151 .	2	1 (CSR only)
33 set reflected power parameters	Sets reflected power parameters. Send three bytes, least significant byte first. Byte 1 sets the time until RF is turned off in seconds Bytes 2, 3 set the reflected power detection level in watts. <i>Note:</i> If the time is set to 0, the protection mode is turned off. Read back with command 152 .	3	1 (CSR only)
69 set serial port address and baud rate	Sets the serial port address and baud rate. Send 3 data bytes: Byte 1: addresses available. Byte 1 is only for compatibility Bytes 2, 3 set the baud rate (send least significant byte first). Valid baud rates are: 9600, 19200, 38400, 57600 For 115200 baud the selection value is 0 (115200 couldn't be represented in 2 byte) Read back with command 212 .	3	1 (CSR only)
69 set serial port address and baud rate (only Profibus	No function	-	-

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Command	Description	Host Data Bytes	Response Data Bytes
and Ethernet)			
93 set pulsing frequency	<p>Sets the RF pulsing frequency. Send 3 bytes, least significant byte first, representing the pulsing frequency in Hz.</p> <p>Accepts a value of 1 to 100000 (1 Hz to 100000 Hz). But the value should not exceed the specified maximum pulse frequency of the specific generator.</p> <p>Read back with command 193.</p>	3	1 (CSR only)
96 set pulsing duty cycle	<p>Sets the RF pulsing duty ON time in increments of 1%. This value can range from 1% to 99%. Minimum ON time is 16 μs.</p> <p>Read back with command 196.</p>	2	1 (CSR only)
111 initialize capacitors	Moves capacitors of a connected match network to minimum position.	0	1 (CSR only)
112 move shunt capacitor position	<p>Moves the shunt capacitor of a connected match network to the specified position. Send two bytes to move the shunt motor to its new position.</p> <p>Accepts a value of 0 through 1000.</p> <p>Read back with command 175</p>	2	1 (CSR only)
119 Profibus reset/ explicit fault clear	<p>Clears profibus fault and error code register. Send one byte.</p> <p><i>Note:</i> Only if Profibus module is installed</p>	0	1 (CSR only)
122 move series capacitor position	<p>Moves the series capacitor motor of a connected match network to a specified position. Send two bytes to move the series motor to its new position.</p> <p>Accepts a value of 0 through 1000.</p> <p>Read back with command 175.</p>	2	1 CSR only)
128 supply type	Requests the generator type; returns 5 ASCII characters. (for example 'CESAR')	0	5 data bytes 5 ASCII characters
129 supply size	Requests the output capacity of the generator; returning packet contains 5	0	5 data bytes 5 ASCII

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Command	Description	Host Data Bytes	Response Data Bytes
	ASCII characters. (for example ' 1350')		characters
130 report software version	Requests the marking of the firmware software. The returning packet contains 5 ASCII characters. This command is used in conjunction With command 198 to obtain the version/ revision number of the firmware software. (for example 'C3STD)	0	5 data bytes 5 ASCII characters
131 report motor movement	Reports the motor movement. The control board returns 1 byte: • 0 = Match network's motors stopped • 1 = Match network's motors running	0	1
151 report ramping rise and fall times	Report on and off ramping rise and fall times. The controller board returns four bytes, least significant byte first: Bytes 1, 2 represent rise time. Bytes 3, 4 represent fall time. Set with command 31 and 32 .	0	4
152 report reflected power parameters	Reports reflected power parameters. The controller board returns three bytes, least significant byte first: Byte 1 reports the time until RF is turned off in seconds Bytes 2, 3 report reflected power detection level in watts. <i>Note:</i> If the time is set to 0, the protection mode is turned off. Set with command 33 .	0	3
154 report regulation mode	Requests regulation mode. The controller board returns one byte representing the mode: • 6 = Forward power regulation • 7 = Load power regulation • 8 = External power regulation (DC Bias) Set with command 3 .	0	1
155 read control method	Requests the control mode. The controller board returns one byte representing the control mode: • 2 = Host • 4 = User Port • 6 = Local Set with command 14 .	0	1
156		0	1

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Command	Description	Host Data Bytes	Response Data Bytes
read active target	Requests the number of the active target. Set with command 11 .		
157 read target life	Requests the amount of life remaining in the target you specify. Send one byte, representing the desired target number (1-4). The controller board returns the target life in kilowatt hours. <i>Note:</i> A decimal is implied (for example, 100 = 1 kWh) Set with command 12 .	1	4
158 report User port voltage	Reports User port (analog) voltage. Set with command 30 .	0	1
162 read process status	Requests process status. The controller board returns the packet arranged as follows. 1st status byte: <ul style="list-style-type: none"> • 0 = Reserved • 1 = Unassigned • 2 = Recipe run is active • 3 = Reserved • 4 = Reserved • 5 = Output power ~0 = Off ~1 = On • 6 = RF on requested ~0 = Off ~1 = On • 7 = Set point status ~0 = Within tolerance ~1 = Out of tolerance 2nd status byte: <ul style="list-style-type: none"> • 0 = End of target life • 1 = Reserved • 2 = Reserved • 3 = Overtemperature • 4 = Reserved • 5 = Reserved • 6 = Unassigned • 7 = Interlock open 3rd status byte—fault flags <ul style="list-style-type: none"> • 0 = Reserved • 1 = Reserved • 2 = Reserved 	0	4 data bytes 4 - 8-bit values

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Command	Description	Host Data Bytes	Response Data Bytes
162 read process status	<ul style="list-style-type: none"> • 3 = Unassigned • 4 = Reserved • 5 = Out of set point • 6 = Reserved • 7 = Reserved 4th status byte—fault flags <ul style="list-style-type: none"> • 0 = Current limit • 1 = Reserved • 2 = PROFIBUS error • 3 = Unassigned • 4 = unassigned • 5 = Extended fault status • 6 = Reserved • 7 = CEX is locked ~0 = Unlocked ~1 = Locked		
163 report tuning control mode	Reports tuner control mode: <ul style="list-style-type: none"> • 0 = Manual mode • 1 = Automatic mode Set with command 13 .	0	1
164 read set point/ regulation mode	Requests output set point level (set with command 8) and whatever method of output regulation has been selected (set with command 3). The controller board returns 3 bytes: Bytes 1, 2 represent the set point value Byte 3 reports the method of output regulation.	0	3
165 read forward power	Requests a snapshot of forward power level at that instant. The controller board returns two bytes representing the forward power in watts (LSB first).	0	2
166 read reflected power	Requests a snapshot of reflected power level at that instant. The control board returns two bytes representing the reflected power in watts (LSB first).	0	2
167 read	Requests a snapshot of load power level at that instant. The response contains 2 data bytes. Both bytes	0	2

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Command	Description	Host Data Bytes	Response Data Bytes
delivered power	represent delivered power (LSB first).		
168 read external feedback (DC Bias)	Requests a snapshot of external feedback level at that instant. The controller board returns two bytes representing the external feedback (LSB first).	0	2
169 read forward power limit	Requests programmed limit for forward power. The controller returns the user forward power limit in watts. Set with command 4 .	0	2
175 report capacitor positions	Reports current shunt and series motor positions. The controller returns four bytes, least significant byte first. Bytes 1, 2 report the current shunt position (0 to 1000). Bytes 3, 4 report the current series position (0 to 1000). Set with command 112 and 122 or found by auto tune process	1	4
177 report pulsing mode	Reports pulsing mode. The controller returns one byte. <ul style="list-style-type: none"> • 0 = Pulsing off • 1 = Internal pulsing • 2 = External pulsing • 3 = External pulsing inverted • 4 = Enable internal pulsing by external pulsing input Set with command 27 .	0	1
178 report RF frequency	Reports RF frequency in Hertz. <i>Note:</i> This command is only available on generators with variable frequency. Set with command 18 .	0	4
187 report frequency tuning parameters	Reports frequency tuning parameters. Set with command 17 .	0	3
188 report recipe step set point/ run time	Reports the set point and run time for the selected recipe step. For the recipe step, the controller returns four bytes: Bytes 1, 2 represent the recipe step set point in watts Bytes 3, 4 represent the recipe step run time in tenths	1	4

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Command	Description	Host Data Bytes	Response Data Bytes
	of seconds. Set with command 22 and 23 .		
191 report recipe step ramp time	Reports the ramp time for the selected recipe step. For the recipe step, the controller returns two bytes: Bytes 1, 2 represent the recipe step ramp time in tenths of seconds. Set with command 21 .	1	4
193 read pulsing frequency	Requests the RF pulsing frequency. The controller returns four bytes, least significant byte first, representing the pulse frequency in Hertz. Set with command 93 .	0	4
196 read pulsing duty cycle	Requests the duty cycle in % ON time. The controller board returns two bytes, least significant byte first, representing the duty cycle in percent on time. Set with command 96 .	0	2
198 reports software revision level	Requests the revision level of the firmware software. Used in conjunction with command 130 to obtain the version/revision of the firmware software. (for example, 1.27)	0	4 data bytes 4 ASCII characters
205 read run time	Requests the amount of time that the generator was producing output. The controller board returns four bytes, least significant byte first, representing the amount of time in seconds that the unit was producing output.	0	4
212 report serial port address and baud	Returns the serial port address and baud rate. The controller returns three bytes: Byte 1: always address 1 Bytes 2, 3 = baud rate Set with command 69 .	0	3
212 report serial port address and baud rate (only Profibus and Ethernet)	No function	-	-
223 report error	Retrieves the error code.	0	1

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Command	Description	Host Data Bytes	Response Data Bytes
code register			
230 report sensor data	Returns sensor data Byte 1, 2 = Reserved Byte 3, 4 = Condensation	0	4
231 report unit serial number	The controller board returns four bytes for serial number (LSB first)	0	4

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