

Dual Power Breaker - Alphanumeric Commands – for use with Arduino Serial Monitor

N	NOP Clears Debug and Display ADC Flags	Returns	"OK"
S + CV41 – CV56	Return CV Status	Returns	"CVs - "
A	Return Address	Returns	"Address = " + Address
V	Read Version	Returns	Major.Minor (3.6)
G	Enable Debug Messages	Returns	"OK"
K	Enable ADC Display - then displays ADC outputs continuously (5 times/second) as "Dist 1 ADC = " xxx – "Dist 2 ADC = " xxx	Returns	"OK" (only seen briefly !)
Tnnnn	Set Address Replace 'nnnn' with 1 to 4 digits for new address Error message if outside range 1 to 2043	Returns	"Address = " + Address
C1nn	Set Trip Current District 1	Returns	"Dist 1 Trip Current =" x.xxA
C2nn	Set Trip Current District 2 Replace 'nn' with index value 1 to 20 (x0.25A)	Returns	"Dist 2 Trip Current =" x.xxA
D1nnn	Set Trip Delay District 1	Returns	"Dist 1 Trip Delay =" xxxmsec
D2nnn	Set Trip Delay District 2 Replace 'nnn' with delay value 5 to 255	Returns	"Dist 2 Trip Delay =" xxxmsec
R1nnn	Set Reconnect Delay District 1	Returns	"Dist 1 Reconnect Delay =" xx.xxsec
R2nnn	Set Reconnect Delay District 2 Replace 'nnn' with index value 1 to 240 (x0.25sec)	Returns	"Dist 2 Reconnect Delay =" xx.xxsec
M1A	Set Automatic Reconnect Dist 1	Returns	"Dist 1 Reconnect = Automatic"
M1M	Set Manual Reconnect Dist 1	Returns	"Dist 1 Reconnect = Manual"
M2A	Set Automatic Reconnect Dist 2	Returns	"Dist 2 Reconnect = Automatic"
M2M	Set Manual Reconnect Dist 2	Returns	"Dist 2 Reconnect = Manual"
F	Reset CVs to Factory Default	Returns	"CVs Reset"
B1	Break Power District 1	Returns	"Dist 1 Switched Off"
B2	Break Power District 2	Returns	"Dist 2 Switched Off"
BB	Break Power Both Districts If in AutoReverser Mode generates error message – no break of power	Returns	"Dists 1 & 2 Switched Off"
P1	Resume Power District 1	Returns	"Dist 1 Switched On"
P2	Resume Power District 2	Returns	"Dist 2 Switched On"
PB	Resume Power Both Districts If in AutoReverser Mode generates error message – no resumption of power	Returns	"Dists 1 & 2 Switched On"
UE	Enable AutoReverser Mode	Returns	"AutoReverser Mode Enabled"
UD	Disable AutoReverser Mode	Returns	"AutoReverser Mode Disabled - Both Districts Switched Off"

Either upper or lower case can be used for commands and parameters
All parameter and result values are decimal

Power Breaker Controller – Constants and Variables

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const byte dpb_vern = 0x38; // Software Version = 3.8
const byte adr_prog = 11; // Set Accessory Address (pin D11)
const byte en_pout1 = 3; // Power District 1 Enable (pin D3)
const byte en_pout2 = 4; // Power District 2 Enable (pin D4)
const byte man_rst1 = 5; // Manual Reset Pushbutton 1 (pin D5)
const byte alm_out1 = 6; // Alarm Out 1 (Sounder) (pin D6)
const byte alm_led1 = 7; // Alarm LEDs 1 - Red (pin D7)
const byte man_rst2 = 8; // Manual Reset Pushbutton 2 (pin D8)
const byte alm_out2 = 9; // Alarm Out 2 (Sounder) (pin D9)
const byte alm_led2 = 10; // Alarm LEDs 2 - Red (pin D10)
const byte sens_in1 = 15; // Current Sensor 1 Input (pin A1)
const byte sens_in2 = 17; // Current Sensor 2 Input (pin A3)

byte in_cmnd = 0; // Serial command in
byte ser_prm1 = 0; // Serial data in / out
byte ser_prm2 = 0; // Serial data in / out
String ser_prmstr = ""; // Serial data in - as string of digits
String sub_prmstr = ""; // Serial data in - without ending LF (0x0A) character

byte flash = 0;
byte prog_actv = 0;
byte prog_done = 0;
int set_adr = 0;

bool debug = false; // To allow all debug messages to be displayed by the Serial Monitor, set debug = true
bool mon_cur = false; // Set = true to display live values of current measured by Nano A-D converters

// Array with output values from Nano ADCs corresponding to load currents of 0.25A up to 5.0A
int trip_slct[] = {60, 103, 147, 190, 233, 276, 320, 363, 406, 449, 492, 536, 579, 622, 665, 709, 752, 795, 838, 881};

int sen1trip; // Power District 1 - Set break current level - approx 1.5A as default
int sen2trip; // Power District 2 - Set break current level - approx 1.5A as default
int sen1read; // Power District 1 - Current value from Sensor 1 - Nano ADC Pin A1 (15)
int sen2read; // Power District 2 - Current value from Sensor 2 - Nano ADC Pin A3 (17)
unsigned long tmstart1; // Time when Over-Current detected in Power District 1
unsigned long timenow1; // Time read after Over-Current detected in Power District 1
unsigned long elapsed1; // Duration of Over-Current in Power District 1
unsigned long ovrtime1; // Duration (ms) of Over-Current before breaking in Power District 1
unsigned long trycnct1; // Multiples of 250ms before attempting reconnection in Power District 1
unsigned long tmstart2; // Time when Over-Current detected in Power District 2
unsigned long timenow2; // Time read after Over-Current detected in Power District 2
unsigned long elapsed2; // Duration of Over-Current in Power District 2
unsigned long ovrtime2; // Duration (ms) of Over-Current before breaking in Power District 1
unsigned long trycnct2; // Multiples of 250ms before attempting reconnection in Power District 1
unsigned long tmautosw; // Time when AutoReverser switches - ready to check for overcurrent in active District
unsigned long chkautsw; // Duration allowed for over-current detection
// .. after AutoReverser switches = 4 x ovrtime1 or 4 x ovrtime2
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unsigned long nxtadcop; // Next time to display ADC values in Serial Monitor if mon_cur = true (at 200msec intervals)
bool  enblout1 = false; // Output Enabled - Power District 1
bool  enblout2 = false; // Output Enabled - Power District 2
bool  ovrcurr1 = false; // Over-Current Detected - Power District 1
bool  ovrcurr2 = false; // Over-Current Detected - Power District 2
bool  pwbreak1 = false; // Power Breaker Active - Power District 1
bool  pwbreak2 = false; // Power Breaker Active - Power District 2
bool  autorct1 = true;   // Auto Reconnect Active - Power District 1
bool  autorct2 = true;   // Auto Reconnect Active - Power District 2
bool  killpwr1 = false;  // Break via soft command - Power District 1 (Can only resume via soft command or by Manual Reset)
bool  killpwr2 = false;  // Break via soft command - Power District 2
bool  autorvsr = false;  // AutoReverser Mode not enabled

int dpb_addr = 0;
int t;          // temp
int v;          // temp
int i;

byte busy_dcc = 0; // Set = 1 when any DCC command(s) being executed
byte arev_act = 0; // Set = 0 when AutoReverser not active, otherwise = 1 or 2 for active Power District

typedef struct
{
    int  cv_addr;
    byte cv_val;
} cv_pair;

byte cv_value;
int  SET_CV_Address = 31; // This Address is for setting CV'S like a Loco using Ops Mode - for this
                          // .. application it is made the same as the Power Breaker Address in CV 41 & CV42

int  Accessory_Address = 1; // This Address is the default Accessory Address - not used for Power Breaker
byte CV_DECODER_MASTER_RESET = 120; // This is the CV Address for Full Reset - load a value of 120
                                   // .. to this location and then press the Nano Reset button
                                   // .. Return to default CV values can also be achieved by loading any value
                                   // .. other than 0xAD (173) to CV50 and then pressing the Nano Reset button
byte CV_To_Store_SET_CV_Address = 121; // The address used to change CVs using Ops Mode (set as 31 above) is
                                   // .. stored in this location, and in the following CV if greater than 256
byte CV_Accessory_Address = CV_ACCESSORY_DECODER_ADDRESS_LSB; // CV01 - the Board Address
byte accadrlo = lowByte(Accessory_Address);
byte accadrhi = highByte(Accessory_Address) & 0x07;
byte scvadrlo = lowByte(SET_CV_Address);
byte scvadrhi = highByte(SET_CV_Address) & 0x3F;

cv_pair FactoryDefaultCVs [] =
{
    // These two CVs define the Long Accessory Address
    //{CV_ACCESSORY_DECODER_ADDRESS_LSB, Accessory_Address&0xFF},
    //{CV_ACCESSORY_DECODER_ADDRESS_MSB, (Accessory_Address>>8)&0x07},
    {CV_ACCESSORY_DECODER_ADDRESS_LSB, accadrlo},

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{CV_ACCESSORY_DECODER_ADDRESS_MSB, accadrhi},

{CV_MULTIFUNCTION_EXTENDED_ADDRESS_MSB, 0},
{CV_MULTIFUNCTION_EXTENDED_ADDRESS_LSB, 0},
// Accessory Decoder Short Address
// {CV_29_CONFIG,CV29_ACCESSORY_DECODER|CV29_OUTPUT_ADDRESS_MODE|CV29_F0_LOCATION},
// Accessory Decoder Long Address
{CV_29_CONFIG, CV29_ACCESSORY_DECODER|CV29_OUTPUT_ADDRESS_MODE|CV29_EXT_ADDRESSING | CV29_F0_LOCATION},

{CV_DECODER_MASTER_RESET, 0},
{CV_To_Store_SET_CV_Address, scvadrlo}, // LSB Set CV Address
{CV_To_Store_SET_CV_Address+1,scvadrlo}, // MSB Set CV Address
{30, 0}, // Not Used
{31, 0}, // Not Used
{32, 0}, // Not Used
{33, 0}, // Not Used
{34, 0}, // Not Used
{35, 0}, // Not Used
{36, 0}, // Not Used
{37, 0}, // Not Used
{38, 0}, // Not Used
{39, 0}, // Not Used
{40, 0}, // Not Used
{41, 31}, // Power Breaker Address LSB (31)
{42, 0}, // Power Breaker Address MSB
{43, 6}, // Current Sensor 1 Limit - Index (+1) into trip_slct[] array - set at 1.5A
{44, 6}, // Current Sensor 2 Limit - Index (+1) into trip_slct[] array - set at 1.5A
{45, 25}, // Allowed duration of overcurrent before breaking Power District 1 (msec) - set at 25ms
{46, 25}, // Allowed duration of overcurrent before breaking Power District 2 (msec) - set at 25ms
{47, 12}, // Time before attempting reconnection after break Power District 1 (250msec steps) - set at 3sec
{48, 12}, // Time before attempting reconnection after break Power District 2 (250msec steps) - set at 3sec
{49, 0}, // Use as AutoReverser if = 0x5A
{50, 0}, // Reset to default CVs if CV50 not equal to 173 (0xAD = "All Default")
{51, 0}, // Not Used
{52, 10}, // Manual-Auto Reset 1 - 0x0A (10) = Auto (default) - any other value for Manual
{53, 10}, // Manual-Auto Reset 2 - 0x0A (10) = Auto (default) - any other value for Manual
{54, 0}, // Output current values to serial monitor if not zero
{55, 0}, // Set debug = true if not zero
{56, 0}, // Not Used
{57, 0}, // Not Used
{58, 0}, // Not Used
{59, 0}, // Not Used
{60, 0}, // Not Used
{109, 68}, // "D" - Extended Decoder Version
{110, 80}, // "P"
{111, 66}, // "B"
{112, dpb_vern}, // Software Version
};

```