REM 4/8/PSU ADW/ADP-SP16 Versatile Indicator / Controller with up to 16 Set Points

Supplement to be read in conjunction with ADW/ADP15 User Manual

User Manual
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Chapter 1 ADW/ADP-SP16 Multi Set Point Units

This supplement is to be read in conjunction with the ADP15 or ADW15 User Manual as appropriate.

Introduction

The DIN rail mounted remote relay units REM4 and REM8 have been developed to respond to the need for an increased number of set points over and above that provided by the standard ADW/ADP15.

This development allows for multi action operations such as batch and recipe control.

The software of the ADW/ADP15 has been written in such a way as to give the user complete freedom to programme the necessary number of set points for their requirements. A single ADW/ADP15 will control up to 16 set points, programmable from the front panel.

Each set point can be individually set with its own In Flight compensation (in the case of the ADW15) and hysteresis values.

Separate 'Output Latch' (OL) and 'Output Action' (OA) for up to 14 of the 16 set points is available, again settable from the front panel.

A special mnemonic (nOSP) number is set for the user to specify the number of set points to be used.

The operating procedures for these units are to be considered together with the standard ADW/ADP15 when preparing the system for operation.

A DIN rail mounted power supply unit is required where more than 4 set points are to be used.

Where the REM4 and REM8 units are used, a REM Driver board (REM DRV) is fitted into the ADW/ADP15, replacing the internal relays.

The REM4 Unit

The 4 relay unit can be powered directly from the ADW/ADP15 when being used alone (i.e. only 4 set points required) or from an external source when used in conjunction with other REM units.

Connection and Setting Up Detail:

PLEASE NOTE:

For 8 Set Points 2 x REM4's *cannot* be used.

Figure 1.1 REM4 Layout Diagram
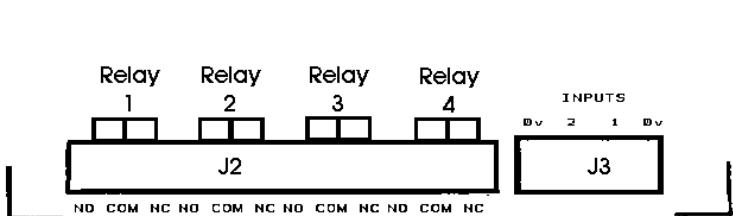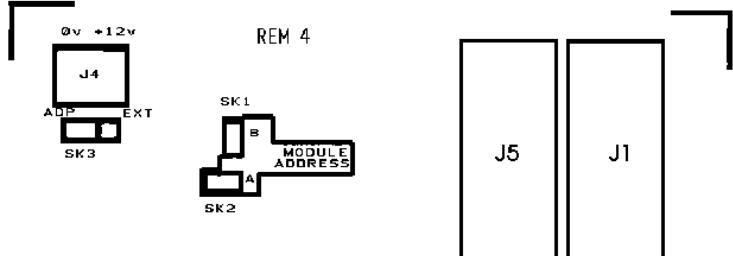
A number of links and connections are provided to set the unit to the users requirements as follows:

Connections

J1   A 9 way 'D' type connection. To provide the connection between the REM4 and the ADP/ADW15 (see connection lead details). The lead is provided.

J2   To provide the connections for the 4 relay outputs, common, normally open (NO) and normally closed (NC).

J3   To provide two auxiliary volt free, non isolated inputs where special requirements can be catered for (e.g. a Peak Hold or print function)

J4   To provide a power supply input from REM PSU external power supply when required (i.e. when the REM4 is connected to a further REM unit)

J5   A 9 way 'D' type connection. To provide a loop connection to a further REM unit when expanding the system.

Figure 1.2 Connection Lead Details
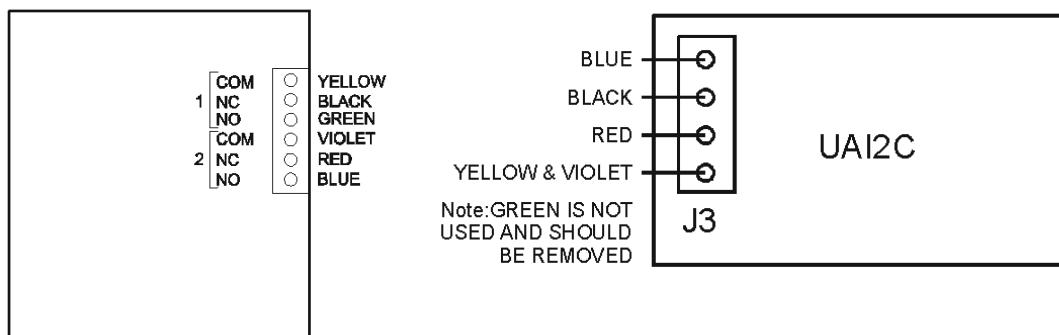
System Links

SK1   Link B - to select the unit address, normally fitted

SK2   Link A - As for above but not fitted when the REM4 is an additional secondary unit to a REM8 i.e. (Links A & B fitted for a single REM4) (Link A removed on additional REM unit)

SK3   To select power from the ADW/ADP15 or from an external REM PSU.
       Link in position 'INT', power is supplied from the ADW/ADP15.
       Link in position 'EXT', power is supplied by the REM PSU.

Chapter 2

The 8 relay unit must be powered from the REM power supply unit REM/PSU.
Connection and Setting Up Detail:

Figure 2.1 REM8 Layout Diagram

REM 8
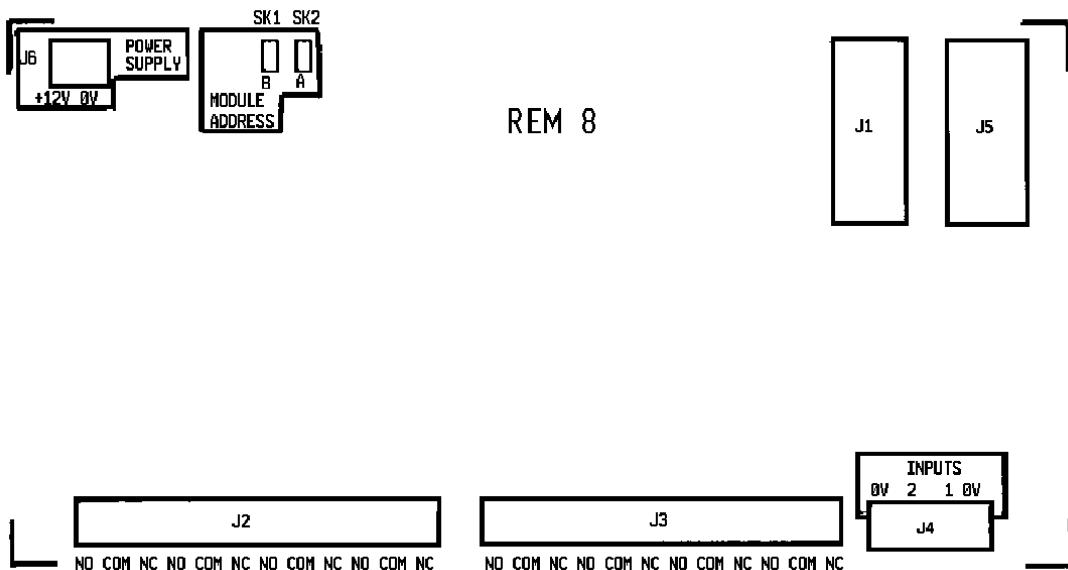
J1   To provide a loop connection for a further REM unit when expanding the system.

J2 & J3   To provide the connections for the relay outputs common, normally open(NO) and
          normally closed (NC).

J4   To provide two auxiliary, volt free, non isolated inputs where special requirements
          can be catered for (e.g. A Peak Hold or print function)

J5   To provide connection between the REM8 and the ADP/ADW15 (see connection lead
          details). The lead is provided.

J6   To provide a power supply input from the REM PSU external power supply unit.
          System Links

SK1   Link B - to select the unit address, normally fitted

SK2   Link A - As above but not fitted when the REM8 is an additional unit.

Programming the Mnemonics for REM4 and REM8 operation:-
To be read in conjunction with the ADW/ADP15 user manual

Set Points (SP)

Where REM units are used with an ADW/ADP15, a software provision is made to programme up to 16 Set Points (and In Flight compensation values in the case of the ADW15).
The display value will follow the 'SP' mnemonic unless the key is pressed within 2 seconds, when it will pass on to the next 'SP' number or In Flight mnemonic on the ADW15. (This gives the option to move quickly through the mnemonics without displaying the values of each).

Hysteresis (HY)

The individual set point hysteresis values (HY) are set in a similar manner to the set points.

Output Latch (OL)

The first 14 of the 16 set points are available to be latched by adding the 'Bit values' for chosen set points as shown in the following table:

Table 2.1 Numbers required for Output Latch

SP1	1	SP8	128
SP2	2	SP9	256
SP3	4	SP10	512
SP4	8	SP11	1024
SP5	16	SP12	2048
SP6	32	SP13	4096
SP7	64	SP14	8192

Output Action (OA)

The first 14 of the 16 set points are available to be selected for 'relay inversion' and may be actioned by adding the 'Bit values' for the chosen set points as shown in the table. Setting 0A negative inverts the analogue output.

Table 2.2 Numbers required for Output Action Setting

SP1	1	SP8	128
SP2	2	SP9	256
SP3	4	SP10	512
SP4	8	SP11	1024
SP5	16	SP12	2048
SP6	32	SP13	4096
SP7	64	SP14	8192

Number of Set Points (nOSP)

By placing a number between 1 and 16 in the display at this mnemonic, the appropriate number of set points will be addressed by the ADW/ADP15.

On the ADP15/SP16 PID is available on Analogue Output only.

An 'ON' 'OFF' timer is available and is common to all set points.

Chapter 3

REM PSU -Power Supply

Technical Details

Input   110/240V AC link selectable
Output   - 12VDC (10VA) Unregulated

Figure 3.1 - PSU Layout
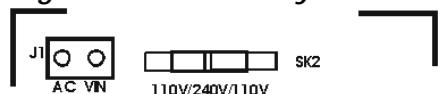
Relay contact rating   - 5A/240V AC

DIN rail or Top Hat mounting
ADW/ADP15 to REM unit, cable length must not exceed 2 metres
REM to REM cable length must not exceed 0.5 metres

Cable Connection Detail

Wire Colour		ADW/ADP15 Connection	DIN SKT
Yellow		COM	5
Black	1	NC	2
Green		NO	9
Purple		COM	5
Red	2	NC	8
Blue		NO	3

Figure 3.2 Dimensions
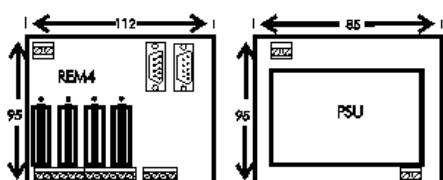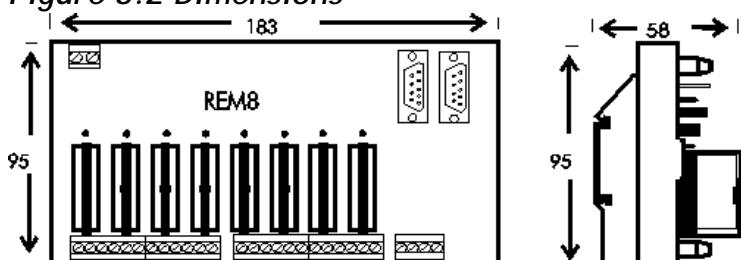
Chapter 4 Section to be used for ADW-SP16

Fast MANTRABUS Format   CP = 128

The command format is the same as used by the ADW/ADP15
Command No.

Table 4.1 ADW-SP16 Communications Protocol

| DEC	HEX	Description	
1	1	Request all variables	(as ADP15)
2	2	Request display data	(as ADP15)
3	3	Update Set Point 1	(SP1)
4	4	Update In Flight 1	(IF1)
5	5	Update Set Point 2	(SP2)
6	6	Update In Flight 2	(IF2)
7	7	Update Set Point 3	(SP3)
8	8	Update In Flight 3	(IF3)
9	9	Update Set Point 4	(SP4)
10	A	Update In Flight 4	(IF4)
11	B	Update Set Point 5	(SP5)
12	C	Update In Flight 5	(IF5)
13	D	Update Set Point 6	(SP6)
14	E	Update In Flight 6	(IF6)
15	F	Update Set Point 7	(SP7)
16	10	Update In Flight 7	(IF7)
17	11	Update Set Point 8	(SP8)
18	12	Update In Flight 8	(IF8)
19	13	Update Set Point 9	(SP9)
20	14	Update In Flight 9	(IF9)
21	15	Update Set Point 10	(SP10)
22	16	Update In Flight 10	(IF10)
23	17	Update Set Point 11	(SP11)
24	18	Update In Flight 11	(IF11)
25	19	Update Set Point 12	(SP12)
26	1A	Update In Flight 12	(IF12)
27	1B	Update Set Point 13	(SP13)
28	1C	Update In Flight 13	(IF13)
29	1D	Update Set Point 14	(SP14)
30	1E	Update In Flight 14	(IF14)
31	1F	Update Set Point 15	(SP15)
32	20	Update In Flight 15	(IF15)
33	21	Update Set Point 16	(SP16)
34	22	Update In Flight 16	(IF16)
35	23	Update Hysteresis 1	(HY1)
36	24	Update Hysteresis 2	(HY2)
37	25	Update Hysteresis 3	(HY3)
38	26	Update Hysteresis 4	(HY4)
39	27	Update Hysteresis 5	(HY5)
40	28	Update Hysteresis 6	(HY6)
41	29	Update Hysteresis 7	(HY7)
42	2A	Update Hysteresis 8	(HY8)
43	2B	Update Hysteresis 9	(HY9)
44	2C	Update Hysteresis 10	(HY10)
45	2D	Update Hysteresis 11	(HY11)
46	2E	Update Hysteresis 12	(HY12)
47	2F	Update Hysteresis 13	(HY13)
48	30	Update Hysteresis 14	(HY14)

DEC	HEX	Description	
49	31	Update Hysteresis 15	(HY15)
50	32	Update Hysteresis 16	(HY16)
51	33	Update Output Latch	(OL)
52	34	Update Output Action	(OA)
53	35	Update Number Of Set Points (NOSP)	
54	36	Prohibited - Returns a 'NAK'	
55	37	Prohibited - Returns a 'NAK'	
56	38	Prohibited - Returns a 'NAK'	
57	39	Prohibited - Returns a 'NAK'	
58	3A	Update Auto Tare	(AT)
59	3B	Update Display Averages (DA)	
60	3C	Update Output Low	(OPL)
61	3D	Update Output High	(OPH)
62	3E	Update Decimal Point	(DP)
63	3F	Can not be written to	(CP)
64	40	Can not be written to	(SDST)
65	41	Update Log Number	(LN)
66	42	Update Log Number	(RS)
67	43	E2ROM Enable/Disable (As ADW15)	
68	44	Output Relay Reset	
69	45	Auto Tare ADW	
70	46	Peak Hold Reset	

Table 4.2 Response to Command 1:

BYTE

1	Station Number
2,3	Display
4,5	Set Point 1
6,7	In Flight 1
8,9	Set Point 2
10,11	In Flight 2
12,13	Set Point 3
14,15	In Flight 3
16,17	Set Point 4
18,19	In Flight 4
20,21	Set Point 5
22,23	In Flight 5
24,25	Set Point 6
26,27	In Flight 6
28,29	Set Point 7
30,31	In Flight 7
32,33	Set Point 8
34,35	In Flight 8
36,37	Set Point 9
38,39	In Flight 9
40,41	Set Point 10
42,43	In Flight 10
44,45	Set Point 11
46,4	In Flight 11
48,49	Set Point 12
50,51	In Flight 12
52,53	Set Point 13
54,55	In Flight 13
56,57	Set Point 14
58, 59	In Flight 14

BYTE

60,61	Set Point 15
62,63	In Flight 15
64,65	Set Point 16
66,67	In Flight 16
68,69	Hysteresis 1
70,71	Hysteresis 2
72,73	Hysteresis 3
74,75	Hysteresis 4
76,77	Hysteresis 5
78,79	Hysteresis 6
80,81	Hysteresis 7
82,83	Hysteresis 8
84,85	Hysteresis 9
86,87	Hysteresis 10
88,89	Hysteresis 11
90,91	Hysteresis 12
92,93	Hysteresis 13
94,95	Hysteresis 14
96,97	Hysteresis 15
98,99	Hysteresis 16
100,10	Output Action
102,10	Output Action
104,10	Number of Set Points
106,10	A/D Counts for Low Calibration Point
108,10	A/D Counts for High Calibration Point
110,11	Display Low Calibration Value
112,11	Display High Calibration Value
114,11	Auto Tare
116,11	Display Averaging
118,11	Output Low
120,12	Output High
122,12	Decimal Point Position
124,12	Comms Protocol
126,12	Station Number
128,12	Relay Status
130,13	Resolution
132	E2ROM Enable/Disable Flag
133	NUL
134	Exor Checksum of the above Data

Table 4.3 Response to Command 2:
BYTE

1. Station Number
2. Display Reading MSB
3. Display Reading LSB
4. Exor Checksum of the above Data

Table 4.4 CP2 (ASCII Format):

Note: For operation see ADW15 manual

Labels	Description	
DISP	Request Display Reading	
SP1	Set Point 1	(SP1)
IF1	In Flight 1	(IF1)
SP2	Set Point 2	(SP2)
IF2	In Flight 2	(IF2)
SP3	Set Point 3	(SP3)
IF3	In Flight 3	(IF3)
SP4	Set Point 4	(SP4)
IF4	In Flight 4	(IF4)
SP5	Set Point 5	(SP5)
IF5	In Flight 5	(IF5)
SP6	Set Point 6	(SP6)
IF6	In Flight 6	(IF6)
SP7	Set Point 7	(SP7)
IF7	In Flight 7	(IF7)
SP8	Set Point 8	(SP8)
IF8	In Flight 8	(IF8)
SP9	Set Point 9	(SP9)
IF9	In Flight 9	(IF9)
SP10	Set Point 10	(SP10)
IF10	In Flight 10	(IF10)
SP11	Set Point 11	(SP11)
IF11	In Flight 11	(IF11)
SP12	Set Point 12	(SP12)
IF12	In Flight 12	(IF12)
SP13	Set Point 13	(SP13)
F13	In Flight 13	(IF13)
SP14	Set Point 14	(SP14)
IF14	In Flight 14	(IF14)
SP15	Set Point 15	(SP15)
IF15	In Flight 15	(IF15)
SP16	Set Point 16	(SP16)
IF16	In Flight 16	(IF16)
H1	Hysteresis 1	(HY1)
H2	Hysteresis 2	(HY2)
H3	Hysteresis 3	(HY3)
H4	Hysteresis 4	(HY4)
H5	Hysteresis 5	(HY5)
H6	Hysteresis 6	(HY6)
H7	Hysteresis 7	(HY7)
H8	Hysteresis 8	(HY8)
H9	Hysteresis 9	(HY9)
H10	Hysteresis 10	(HY10)
H11	Hysteresis 11	(HY11)

Lab	Description	
H12	Hysteresis 12	(HY12)
H13	Hysteresis 13	(HY13)
H14	Hysteresis 14	(HY14)
H15	Hysteresis 15	(HY15)
H16	Hysteresis 16	(HY16)
OL	Output Latch	(OL)
OA	Output Action	(OA)
SP	Number of Set Points	
ADCL	Do not use, will affect Auto Cal constants	
ADCH	Do not use, will affect Auto Cal constants	
CALL	Display Calibration Low Value (CALL) Use with care	
CALH	Display Calibration High Value (CALH) Use with care	
AT	Auto Tare	(AT)
DA	Display Averages (DA)	
OPL	Output Low	(OPL)
OPH	Output High	(OPH)

DP	DP	Decimal Point	(DP)
SDST	SDST	Can not be written to (SDST)	
DROM	DROM	Disable E2ROM (DROM = 256)	
ERRD	ERRD	Enable E2ROM and Read From It	
ERWR	ERWR	Enable E2ROM and Write to It	
PID	PID	No PID available on ADW version	
RLYS	RLYS	Output Relay Status (Returns 0)	
RES	RES	Output Relay Reset	
TARE	TARE	Auto Tare	
PKR	PKR	Peak Hold Reset	

Chapter 5 Section to be used for ADP-SP16

Table 5.1 ADP-SP16 Communications Protocol

Fast Format   CP = 128
The command format is the same as used by the ADP15
Command No.

DEC	HEX	Description	
1	1	Request all variables (as ADP15)	
2	2	Request display data (as ADP15)	
3	3	Update Set Point 1	(SP1)
4	4	Update Set Point 2	(SP2)
5	5	Update Set Point 3	(SP3)
6	6	Update Set Point 4	(SP4)
7	7	Update Set Point 5	(SP5)
8	8	Update Set Point 6	(SP6)
9	9	Update Set Point 7	(SP7)
10	A	Update Set Point 8	(SP8)
11	B	Update Set Point 9	(SP9)
12	C	Update Set Point 10	(SP10)
13	D	Update Set Point 11	(SP11)
14	E	Update Set Point 12	(SP12)
15	F	Update Set Point 13	(SP13)
16	10	Update Set Point 14	(SP14)
17	11	Update Set Point 15	(SP15)
18	12	Update Set Point 16	(SP16)
19	13	Update Hysteresis 1	(HY1)
20	14	Update Hysteresis 2	(HY2)
21	15	Update Hysteresis 3	(HY3)
22	16	Update Hysteresis 4	(HY4)
23	17	Update Hysteresis 5	(HY5)
24	18	Update Hysteresis 6	(HY6)
25	19	Update Hysteresis 7	(HY7)
26	1A	Update Hysteresis 8	(HY8)
27	1B	Update Hysteresis 9	(HY9)
28	1C	Update Hysteresis 10	(HY10)
29	1D	Update Hysteresis 11	(HY11)
30	1E	Update Hysteresis 12	(HY12)
31	1F	Update Hysteresis 13	(HY13)
32	20	Update Hysteresis 14	(HY14)
33	21	Update Hysteresis 15	(HY15)
34	22	Update Hysteresis 16	(HY16)
35	23	Update Output Latch	(OL)
36	24	Update Output Action	(OA)
37	25	Update Number of Set Points	(NOSP)
38	26	Update Proportional Band	(PB)
39	27	Update Integral Time	(IT/ONT)
40	28	Update Derivative Time	(DT/OFFT)
41	29	Update Cycle Time	(CT/DA)
42	2A	Update Input Low	(IPL)
43	2B	Update Input High	(IPH)
44	2C	Update Output Low	(OPL)
45	2D	Update Output High	(OPH
46	2E	Update Input Select	(IP)

DEC	HEX	Description	
46	2E	Update Input Select	(IP)
47	2F	Update Decimal Point	(DPr)
48	30	Can Not be Written To	(CP)
49	31	Can Not be Written To	(SDST/LAB))
50	32	Update Log Number Printer (LN)	
51	33	Update Resolution	(RS)
52	34	E2ROM Enable/Disable (As ADP15)	
53	35	Output Relay Reset	
54	36	Count Reset	
55	37	Peak Hold Reset	

Table 5.2   Response to Command 1:

BYTE		
1	Station Number	
2,3	Display	
4,5	Set Point 1	(SP1)
6,7	Set Point 2	(SP2)
8,9	Set Point 3	(SP3)
10,11	Set Point 4	(SP4)
12,13	Set Point 5	(SP5)
14,15	Set Point 6	(SP6)
16,17	Set Point 7	(SP7)
18,19	Set Point 8	(SP8)
20,21	Set Point 9	(SP9)
22,23	Set Point 10	(SP10)
24,25	Set Point 11	(SP11)
26,27	Set Point 12	(SP12)
28,29	Set Point 13	(SP13)
30,31	Set Point 14	(SP14)
32,33	Set Point 15	(SP15)
34,35	Set Point 16	(SP16)
36,37	Hysteresis 1	(HY 1)
38,39	Hysteresis 2	(HY 2)
40,41	Hysteresis 3	(HY 3)
42,43	Hysteresis 4	(HY 4)
44,45	Hysteresis 5	(HY 5)
46,47	Hysteresis 6	(HY 6)
48,49	Hysteresis 7	(HY 7)
50,51	Hysteresis 8	(HY 8)
52,53	Hysteresis 9	(HY 9)
54,55	Hysteresis 10	(HY 10)
56,57	Hysteresis 11	(HY 11)
58,59	Hysteresis 12	(HY 12)
60,61	Hysteresis 13	(HY 13)
62,63	Hysteresis 14	(HY 14)
64,65	Hysteresis 15	(HY 15)
66,67	Hysteresis 16	(HY 16)
68,69	Output Action	(OL)
70,71	Output Action	(OA)
72,73	Number of Set Points (NOSP)	
74,75	Proportional Band (PB)	
76,77	Integral Time	(IT/ONT)
78,79	Derivative Time (DT/OFFT)	
80,81	Cycle Time	(CT/DA)
82,83	Input Low	(IPL)

BYTE

84,85	Input High	(IPH)
86,87	Output Low	(OPL)
88,89	Output High	(OPH)
90,91	Input Select	(IP)
92	PID Power Level	
93	Decimal Point Position (DPr)	
94,95	Comms Protocol	(CP)
96,97	Station Number	(SDST/LAB)
98,99	Relay status	(LN)
100,101	Resolution	(RS)
102	EPROM Enable/Disable Flag	
103	NULL	
104	Exor Checksum of the above Data	

Table 5.3 Response to Command 2:

BYTE

1	Station Number
2	Display Reading MSB
3	Display Reading MSB
4	Exor Checksum of the above Data

Table 5.4 ASCII Format CP=129

Note: For operation see ADP15 Manual

Labels	Description	
DISP	Request Display Reading	
SP1	Set Point 1	(SP1)
SP2	Set Point 2	(SP2)
SP3	Set Point 3	(SP3)
SP4	Set Point 4	(SP4)
SP5	Set Point 5	(SP5)
SP6	Set Point 6	(SP6)
SP7	Set Point 7	(SP7)
SP8	Set Point 8	(SP8)
SP9	Set Point 9	(SP9)
SP10	Set Point 10	(SP10)
SP11	Set Point 11	(SP11)
SP12	Set Point 12	(SP12)
SP13	Set Point 13	(SP13)
SP14	Set Point 14	(SP14)
SP15	Set Point 15	(SP15)
SP16	Set Point 16	(SP16)
H1	Hysteresis 1	(HY1)
H2	Hysteresis 2	(HY2)
H3	Hysteresis 3	(HY3)
H4	Hysteresis 4	(HY4)
H5	Hysteresis 5	(HY5)
H6	Hysteresis 6	(HY6)
H7	Hysteresis 7	(HY7)
H8	Hysteresis 8	(HY8)
H9	Hysteresis 9	(HY9)
H10	Hysteresis 10	(HY10)
H11	Hysteresis 11	(HY11)
H12	Hysteresis 12	(HY12)
H13	Hysteresis 13	(HY13)
H14	Hysteresis 14	(HY14)
H15	Hysteresis 15	(HY15)

H16	Hysteresis 16	(HY16)
OL	Output Latch	(OL)
OA	Output Action	(OA)
SP	Number of Set Points (NOSP)	
PB	Proportional Band (PB)	
IT	Integral Time	(ONT)
DT	Derivative Time	(OFFT)
CT	Cycle Time	(DA)
IPL	Display Calibration Low Value (CALL). Use with care	
IPH	Display Calibration High Value (CALH). Use with care	
OPL	Output Low	(OPL)
OPH	Output High	(OPH)
IP	Input Select	(IP)
DP	Decimal Point Position(DPr)	
CP	Can Not be Written To (CP)	
SDST	Can Not be Written To (SDST/LAB)	
LN	Log Number	
RS	Resolution PID Power Level	
DROM	Disable E2ROM	(DROM = 256)
ERRD	Enable E2ROM and Read From It	
ERWR	Enable E2ROM and Write to It	
PID	PID Power	
RLYS	Output Relay Status (Returns 0)	
RES	Output Relay Reset	
TARE	Auto Tare	
PKR	Peak Hold Reset	

W A R R A N T Y

All REM 4/8/PSU products from Mantracourt Electronics Ltd., ('Mantracourt') are warranted against defective material and workmanship for a period of (3) three years from the date of dispatch.

If the 'Mantracourt' product you purchase appears to have a defect in material or workmanship or fails during normal use within the period, please contact your Distributor, who will assist you in resolving the problem. If it is necessary to return the product to 'Mantracourt' please include a note stating name, company, address, phone number and a detailed description of the problem. Also, please indicate if it is a warranty repair.

The sender is responsible for shipping charges, freight insurance and proper packaging to prevent breakage in transit.

'Mantracourt' warranty does not apply to defects resulting from action of the buyer such as mishandling, improper interfacing, operation outside of design limits, improper repair or unauthorised modification.

No other warranties are expressed or implied. 'Mantracourt' specifically disclaims any implied warranties of merchantability or fitness for a specific purpose. The remedies outlined above are the buyer's only remedies. 'Mantracourt' will not be liable for direct, indirect, special, incidental or consequential damages whether based on the contract, tort or other legal theory.

Any corrective maintenance required after the warranty period should be performed by 'Mantracourt' approved personnel only.

In the interests of continued product development, Mantracourt Electronics Limited reserves the right to alter product specifications without prior notice.