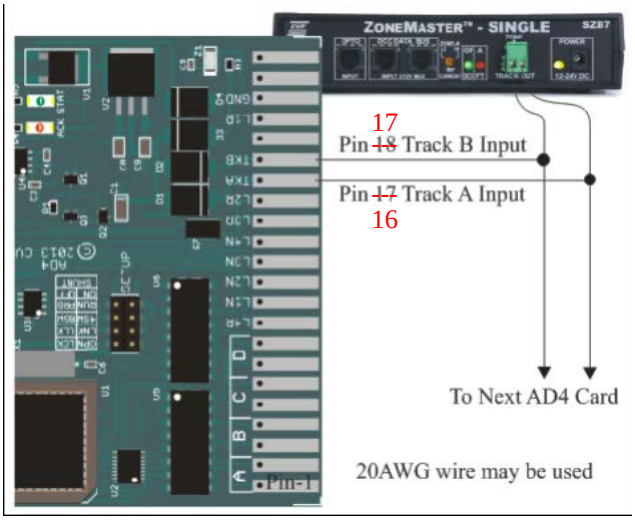
New AD4 Supplemental Instructions And Reference Tables

Rev 1 March 8, 2013

Corrections for AD4 Quick Reference 020513

- Section Title: AD4 Hookup To Booster: The text referencing the pin numbers is incorrect. The pin numbers should be 16 and 17, not 17 and 18. The physical placement of the wires on the pins is correct.



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AD4 Card Numbers and Output Addresses
See Page 9 For Cross Reference Table

The accessory decoder number and address range are distinct and separate from locomotive addresses. There are a total of 511 unique decoder numbers (we call them card numbers) in the current NMRA-DCC accessory decoder specification, all of which are supported by the AD4. Each decoder card number has 4 pairs of outputs labeled A-D. Since each decoder number has 4 output addresses, the total number of unique output addresses is 2044 (511x4). The output address is the actual address used to activate a specific turnout or accessory. You may unlink the AD4's paired outputs to provide 8 individually controlled outputs per card. For easier remembering, think of the decoder number as a number assigned to a specific AD4 circuit board. Then, each of the 4 outputs will have the 4 address numbers associated with that number. When power is applied for the first time, the decoder is initialized at number 1. The table shows the first 5 decoder numbers, and the sequence continues up to decoder number 511.

Decoder #	A Output Address	B Output Address	C Output Address	D Output Address
1 (default)	1	2	3	4
2	5	6	7	8
3	9	10	11	12
4	13	14	15	16
5	17	18	19	20 etc

See the Card-to-Address cross reference a complete listing showing the decoder card number, how it is split between CV513 and CV521 and the corresponding output addresses – for all 2044 addresses. **This is very important to know. Decoder card numbers above 63 will be in an unusual format.** Use the chart to translate decoder numbers to output addresses.

Accessory Addresses Are Unique

Accessory decoders have card numbers and output addresses. These are separate from the locomotive decoder addresses. You may have a locomotive on address one and an accessory decoder output address one at the same time.

Use A Dedicated Booster

We strongly recommend the use of a dedicated booster for all AD4s. If powered from the track which experiences a large number of derailments and short circuits, the AD4 may behave erratically. One booster can power about 100 AD4 units.

Doubling The Number Of Independent Outputs By "Unlinking"

For applications that require loads to be turned on or off by the AD4 decoder, the decoder can be easily converted from the usual 4 pairs of outputs to 8 individually controlled outputs. This is done with the setup shunt labeled LNK/ULK.

When the shunt removed for the unlink option, each output operates independently of all other outputs for pulse and continuous-on mode. The table shows how the AD4 outputs react to commands originating from the Command Station, throttle or the AD4 local inputs.

For the example below, only output A is shown. However all outputs will behave the same. The decoder outputs are **unlinked** and the **"On-time" CV value is 0, which is continuous on**. In the table, LC1n refers to the pushbutton connected to the "normal" local input for the A output. LC1r refers to the pushbutton connected to the "reverse" local input for the A output. When the source is from Command Station (or throttle) the command source assumes the appropriate decoder address has been previously entered. CSn means the normal key was pressed and CSr means the reverse key was pressed. The throttles N-ON and R-OFF keys will work the same as the Command Station. Check your system's documentation for the proper terminology and keystrokes needed to perform the same functions.

Note: When using unlinked outputs, the AD4 local inputs should also be changed from 4SW to 8SW by removing jumper 2. Also set CV 514 to a value of 255 to complete the change.

Command Source				"On-Time" CV Set To 0		
LC1n	**LC1r**	**CSn**	**CSr**	**Output 01**	**Output 02**	**Comment**
Push	-	-	-	On	Off	Output stays on until LC1n is pushed again
-	Push	-	-	On	On	Outputs are independently controlled
Push	-	-	-	Off	On	"
-	Push	-	-	Off	Off	"
-	-	Push	-	On	Off	Note this is the same as above
-	-	-	Push	On	On	"
-	-	Push	-	Off	Off	"
-	-	-	Push	Off	Off	"

As the table above shows, each output only changes when the corresponding local input or appropriate command is activated. The outputs can be controlled by the local inputs, the Command Station, throttles or all 3 independently. Both outputs can also be turned on at the same time.

When the decoder is powered on, it restores the outputs to their prior condition at the time power was removed. This does not occur with pulse mode since the default is OFF.

If the "on-time" CV is changed to a pulse, the outputs will turn on and stay on for the time set by the CV and then turn off. For the example below, the table above is repeated except the on-time is set for a pulse.

Command Source				"On-Time" CV Set To 2 (pulse of 0.2 seconds)		
LC1n	**LC1r**	**CSn**	**CSr**	**Output 01**	**Output 02**	**Comment**
Push	-	-	-	Pulse	Off	Output stays for on-time set in CV
-	Push	-	-	Off	Pulse	Outputs are independently controlled
Push	-	-	-	Pulse	Off	"
-	Push	-	-	Off	Pulse	
-	-	Push	-	Pulse	Off	Note this is the same as above
-	-	-	Push	Off	Pulse	"
-	-	Push	-	Pulse	Pulse	"
-	-	-	Push	Off	Pulse	"

No Flash When Unlinked

Do not use flash mode when outputs are unlinked. Although it won't damage the decoder, the flash mode can not be properly controlled and erratic results may occur. Use either pulse mode or continuous-on mode.

Programming Track Programming Tips

Programming The Decoder Attach the AD4 track inputs, pin 16 and 17, to your programming track. Remove Setup jumper labeled #1 to disconnect the output drivers. Program the decoder then replace jumper #1 before using.

Changing the CV will not invoke its function. For example, the flashing output is off until turned on by the command station or throttle.

Changing the on-time CV takes effect on the next activation (if pulse) or next cycle if flashing if using maintrack programming.

Don't forget to remove the RUN/PRG shunt. Removing this shunt insures against inadvertent tripping of the Command Station current sensor when programming.

Don't forget to replace the RUN/PRG shunt. Without the shunt, none of the attached accessories will work.

The AD4's green STAT LED will flash on when the programming track is active.

Mainline or OPS Mode Programming

Maintrack, Mainline or OPS Mode programming allows fine tuning of a decoder's CVs after installation and without using the programming track. Some good examples include controlling a decoder card's local inputs, adjusting pulse durations and changing flash rates.

Mainline programming uses the decoder card number - not the output address. You must know the decoder card number in order to send it main track programming commands. As long as you know the decoder card number, you can send CV change commands directly to the decoder. No need to move the decoder to the programming track. If you only know the output address, use the card-to-address cross-reference to determine the card number.

You can change all CVs <u>including</u> the address. And you can also issue the restore command to restore factory defaults for a specific decoder number. We strongly advise against changing the decoder numbers while on the main track.

The red ACK LED will flash for main track programming. This serves as an indicator that the reprogramming packet has been received. You can also perform CV verify as long as the ACK LED is visible. During CV verify, the ACK LED will flash signifying the value has been verified.

Mainline or OPS Mode Broadcast Programming

Broadcast programming on the mainline allows all decoders to receive and act upon the same single command at the same time.

The special address of 511 is used for broadcast programming. By specifying decoder number 511 along with the desired CV number to be changed, **<u>all</u>** accessory decoders, connected to the booster, will have that CV's value changed.

This feature is most useful when you want to enable or disable the local inputs of all the accessory decoders at once. Local input control is by way of CV514. A value of 0 locks out all local inputs. A value of 85, unlocks all local inputs.

To issue a broadcast command, use the Main Track CV write command. For the above example, select decoder card number 511. Then specify CV514 and write the desired value. **<u>All</u>** decoders will immediately change their CV514 to the new value.

Card Numbers and Output Addresses

You must know the "card number" to use maintrack programming. You can not use an individual output address.

Attach a stick-on label to the decoder card showing the programmed decoder card number. This is handy when you have lots of cards on a large layout.

AD4 Application Guidelines

Recommended Wiring - Always place the decoder near the turnouts being controlled. We strongly recommend the use of either the edge connector or terminal strips for making all connections. Since the stall-motor type switch machines do not consume much power, it is permissible to use telephone wire or other small diameter wire for connections. Stranded wire should always be tinned before attaching to an edge connector or terminal strip. Carefully check that stray wires don't short to adjacent pins on the terminal strip.

Connection Options: We prefer the PCB edge connector. It is easy to wire and allows quick changes. If you never make mistakes, you can also solder wires directly to the edge connector fingers.

Use a dedicated booster. Drive your accessory decoders with their own dedicated booster. With a dedicated booster, you can always throw a turnout even if a derailment has shorted the mainline.

For Continuous-On outputs, the NORMAL key will turn on the "Normal" output and turn off the "REVERSE" output. The opposite occurs if you use the REVERSE key.

Card Racks: When installing a series of cards in a central location, make a card rack from a couple of wood or metal strips. About 1 inch of space between cards is sufficient.

Unused Local Inputs can be left unconnected. However, to insure against unintended activation, write a value of 0 into CV514 .

Accessory Decoder Troubleshooting Guide

If the accessory decoder doesn't function, here are some common symptoms and solutions.

Switch machine doesn't throw - An incorrect address has been selected. If the output is set for pulse, watch the green STAT LED when the sending a command to the decoder card. If the STAT LED does not flash when the command is issued, the decoder is not on the address you think it is. Reset or reprogram to the desired address. This feature isn't available if the output is set for constant on.

Maintrack programming doesn't work - your system may not support maintrack programming. Contact your system vendor for an upgrade.

Twin-coil doesn't lock - try increasing the input booster voltage, or increasing the length of the pulse

Track power is shorted out - if you are using track power for your decoder, a short circuit on the track will remove decoder power. Use a dedicated booster to drive accessory decoders.

Programming track acknowledge doesn't work - make sure your programming track supports the acknowledge function. Be sure to remove the RUN/PRG shunt before attempting to program.

Switch machine throws the wrong direction - reverse the two output wires from the AD4 output.

Local inputs don't work - CV514 (2) has the wrong value. Write a value of 85 to unlock all local inputs.

Using The ACK and STAT LEDs For Troubleshooting

Green STAT LED

The STAT LED is used to show that DCC packets are being properly received. If the LED is off, the decoder will not function properly. If the LED is blinking rapidly, it usually means a local input push button is stuck or there is a short circuit to ground on a local input.

If the addressed output's on-time CV is set for a pulse, the LED will flash when it receives an activate command.

If the addressed output's on-time CV is set for continuous, the LED will not flash when it receives an activate command.

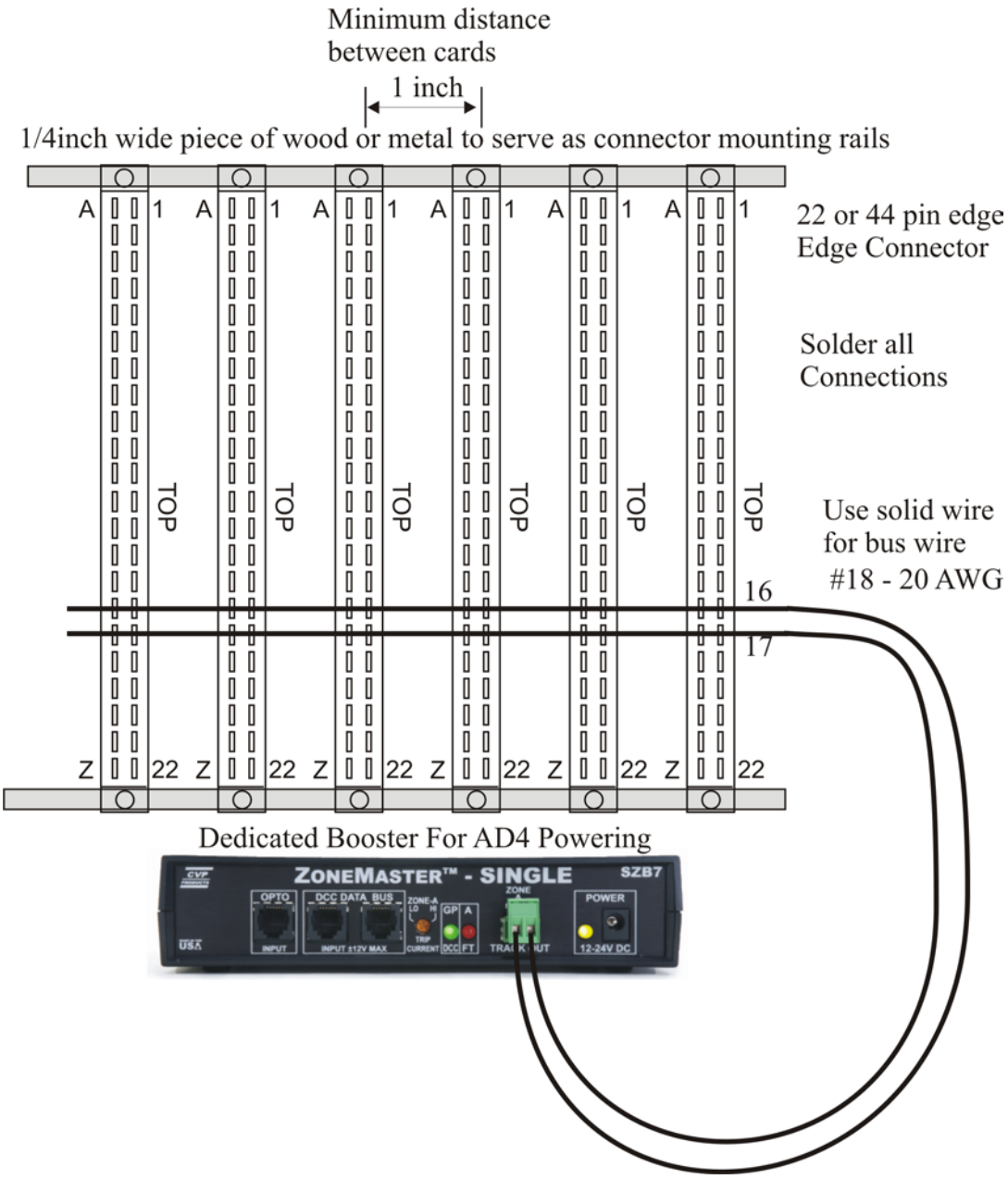
Red ACK LED

The ACK LED is used to show when a programming command is received and acted upon. It will flash briefly when a programming command is received on the programming track or during Ops Mode programming on the main track.

The ACK LED also flashes when the restore factory defaults command is activated.

The ACK LED is off during normal operation and activation.

AD4 Card Rack Construction



AD4 Pulse Rate Values Table (CV515-518)

Type Output	Rate	CV Value
Constant	Constant	0
Pulse (sec)	0.1	1
Pulse (sec)	0.2	2
Pulse (sec)	0.3	3
Pulse (sec)	0.4	4
Pulse (sec)	0.5	5
Pulse (sec)	0.6	6
Pulse (sec)	0.7	7
Pulse (sec)	0.8	8
Pulse (sec)	0.9	9
Pulse (sec)	1	10
Pulse (sec)	1.1	11
Pulse (sec)	1.2	12
Pulse (sec)	1.3	13
Pulse (sec)	1.4	14
Pulse (sec)	1.5	15
Pulse (sec)	1.6	16
Pulse (sec)	1.7	17
Pulse (sec)	1.8	18
Pulse (sec)	1.9	19
Pulse (sec)	2	20
Pulse (sec)	2.1	21
Pulse (sec)	2.2	22
Pulse (sec)	2.3	23
Pulse (sec)	2.4	24
Pulse (sec)	2.5	25
Pulse (sec)	2.6	26
Pulse (sec)	2.7	27
Pulse (sec)	2.8	28
Pulse (sec)	2.9	29
Pulse (sec)	3	30
Pulse (sec)	3.1	31
Pulse (sec)	3.2	32
Pulse (sec)	3.3	33
Pulse (sec)	3.4	34
Pulse (sec)	3.5	35
Pulse (sec)	3.6	36
Pulse (sec)	3.7	37
Pulse (sec)	3.8	38
Pulse (sec)	3.9	39
Pulse (sec)	4	40
Pulse (sec)	4.1	41
Pulse (sec)	4.2	42
Pulse (sec)	4.3	43
Pulse (sec)	4.4	44
Pulse (sec)	4.5	45
Pulse (sec)	4.6	46
Pulse (sec)	4.7	47
Pulse (sec)	4.8	48
Pulse (sec)	4.9	49
Pulse (sec)	5	50
Pulse (sec)	5.1	51
Pulse (sec)	5.2	52
Pulse (sec)	5.3	53
Pulse (sec)	5.4	54
Pulse (sec)	5.5	55
Pulse (sec)	5.6	56
Pulse (sec)	5.7	57
Pulse (sec)	5.8	58
Pulse (sec)	5.9	59
Pulse (sec)	6	60
Pulse (sec)	6.1	61
Pulse (sec)	6.2	62
Pulse (sec)	6.3	63
Pulse (sec)	6.4	64
Pulse (sec)	6.5	65
Pulse (sec)	6.6	66
Pulse (sec)	6.7	67
Pulse (sec)	6.8	68
Pulse (sec)	6.9	69
Pulse (sec)	7	70
Pulse (sec)	7.1	71
Pulse (sec)	7.2	72
Pulse (sec)	7.3	73
Pulse (sec)	7.4	74
Pulse (sec)	7.5	75
Pulse (sec)	7.6	76
Pulse (sec)	7.7	77
Pulse (sec)	7.8	78
Pulse (sec)	7.9	79
Pulse (sec)	8	80
Pulse (sec)	8.1	81
Pulse (sec)	8.2	82
Pulse (sec)	8.3	83
Pulse (sec)	8.4	84
Pulse (sec)	8.5	85
Pulse (sec)	8.6	86
Pulse (sec)	8.7	87
Pulse (sec)	8.8	88
Pulse (sec)	8.9	89
Pulse (sec)	9	90
Pulse (sec)	9.1	91
Pulse (sec)	9.2	92
Pulse (sec)	9.3	93
Pulse (sec)	9.4	94
Pulse (sec)	9.5	95
Pulse (sec)	9.6	96
Pulse (sec)	9.7	97
Pulse (sec)	9.8	98
Pulse (sec)	9.9	99
Pulse (sec)	10	100
Pulse (sec)	10.1	101
Pulse (sec)	10.2	102
Pulse (sec)	10.3	103
Pulse (sec)	10.4	104
Pulse (sec)	10.5	105
Pulse (sec)	10.6	106
Pulse (sec)	10.7	107
Pulse (sec)	10.8	108
Pulse (sec)	10.9	109
Pulse (sec)	11	110
Pulse (sec)	11.1	111
Pulse (sec)	11.2	112
Pulse (sec)	11.3	113
Pulse (sec)	11.4	114
Pulse (sec)	11.5	115
Pulse (sec)	11.6	116
Pulse (sec)	11.7	117
Pulse (sec)	11.8	118
Pulse (sec)	11.9	119
Pulse (sec)	12	120
Pulse (sec)	12.1	121
Pulse (sec)	12.2	122
Pulse (sec)	12.3	123
Pulse (sec)	12.4	124
Pulse (sec)	12.5	125
Pulse (sec)	12.6	126
Pulse (sec)	12.7	127

see next page for flash table

Always-On, or “continuous” is a CV value of 0.

Use this value when driving Tortoise or other motor drivern slow-motion type switch machines.

AD4 CV515-518 Flash Rate Values Table

Type Output	Rate	CV Value
Flash Rate (s)	25.6	128
Flash Rate (s)	0.1	129
Flash Rate (s)	0.2	130
Flash Rate (s)	0.3	131
Flash Rate (s)	0.4	132
Flash Rate (s)	0.5	133
Flash Rate (s)	0.6	134
Flash Rate (s)	0.7	135
Flash Rate (s)	0.8	136
Flash Rate (s)	0.9	137
Flash Rate (s)	1	138
Flash Rate (s)	1.1	139
Flash Rate (s)	1.2	140
Flash Rate (s)	1.3	141
Flash Rate (s)	1.4	142
Flash Rate (s)	1.5	143
Flash Rate (s)	1.6	144
Flash Rate (s)	1.7	145
Flash Rate (s)	1.8	146
Flash Rate (s)	1.9	147
Flash Rate (s)	2	148
Flash Rate (s)	2.1	149
Flash Rate (s)	2.2	150
Flash Rate (s)	2.3	151
Flash Rate (s)	2.4	152
Flash Rate (s)	2.5	153
Flash Rate (s)	2.6	154
Flash Rate (s)	2.7	155
Flash Rate (s)	2.8	156
Flash Rate (s)	2.9	157
Flash Rate (s)	3	158
Flash Rate (s)	3.1	159
Flash Rate (s)	3.2	160
Flash Rate (s)	3.3	161
Flash Rate (s)	3.4	162
Flash Rate (s)	3.5	163
Flash Rate (s)	3.6	164
Flash Rate (s)	3.7	165
Flash Rate (s)	3.8	166
Flash Rate (s)	3.9	167
Flash Rate (s)	4	168
Flash Rate (s)	4.1	169
Flash Rate (s)	4.2	170
Flash Rate (s)	4.3	171
Flash Rate (s)	4.4	172
Flash Rate (s)	4.5	173
Flash Rate (s)	4.6	174
Flash Rate (s)	4.7	175
Flash Rate (s)	4.8	176
Flash Rate (s)	4.9	177
Flash Rate (s)	5	178
Flash Rate (s)	5.1	179
Flash Rate (s)	5.2	180
Flash Rate (s)	5.3	181
Flash Rate (s)	5.4	182
Flash Rate (s)	5.5	183
Flash Rate (s)	5.6	184
Flash Rate (s)	5.7	185
Flash Rate (s)	5.8	186
Flash Rate (s)	5.9	187
Flash Rate (s)	6	188
Flash Rate (s)	6.1	189
Flash Rate (s)	6.2	190
Flash Rate (s)	6.3	191
Flash Rate (s)	6.4	192
Flash Rate (s)	6.5	193
Flash Rate (s)	6.6	194
Flash Rate (s)	6.7	195
Flash Rate (s)	6.8	196
Flash Rate (s)	6.9	197
Flash Rate (s)	7	198
Flash Rate (s)	7.1	199
Flash Rate (s)	7.2	200
Flash Rate (s)	7.3	201
Flash Rate (s)	7.4	202
Flash Rate (s)	7.5	203
Flash Rate (s)	7.6	204
Flash Rate (s)	7.7	205
Flash Rate (s)	7.8	206
Flash Rate (s)	7.9	207
Flash Rate (s)	8	208
Flash Rate (s)	8.1	209
Flash Rate (s)	8.2	210
Flash Rate (s)	8.3	211
Flash Rate (s)	8.4	212
Flash Rate (s)	8.5	213
Flash Rate (s)	8.6	214
Flash Rate (s)	8.7	215
Flash Rate (s)	8.8	216
Flash Rate (s)	8.9	217
Flash Rate (s)	9	218
Flash Rate (s)	9.1	219
Flash Rate (s)	9.2	220
Flash Rate (s)	9.3	221
Flash Rate (s)	9.4	222
Flash Rate (s)	9.5	223
Flash Rate (s)	9.6	224
Flash Rate (s)	9.7	225
Flash Rate (s)	9.8	226
Flash Rate (s)	9.9	227
Flash Rate (s)	10	228
Flash Rate (s)	10.1	229
Flash Rate (s)	10.2	230
Flash Rate (s)	10.3	231
Flash Rate (s)	10.4	232
Flash Rate (s)	10.5	233
Flash Rate (s)	10.6	234
Flash Rate (s)	10.7	235
Flash Rate (s)	10.8	236
Flash Rate (s)	10.9	237
Flash Rate (s)	11	238
Flash Rate (s)	11.1	239
Flash Rate (s)	11.2	240
Flash Rate (s)	11.3	241
Flash Rate (s)	11.4	242
Flash Rate (s)	11.5	243
Flash Rate (s)	11.6	244
Flash Rate (s)	11.7	245
Flash Rate (s)	11.8	246
Flash Rate (s)	11.9	247
Flash Rate (s)	12	248
Flash Rate (s)	12.1	249
Flash Rate (s)	12.2	250
Flash Rate (s)	12.3	251
Flash Rate (s)	12.4	252
Flash Rate (s)	12.5	253
Flash Rate (s)	12.6	254
Flash Rate (s)	12.7	255

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			Output Addresses			
Decoder Card #	**LSB CV513**	**MSB CV521**	**A** Cv515	**B** Cv516	**C** Cv517	**D** Cv518
1	1	0	1	2	3	4
2	2	0	5	6	7	8
3	3	0	9	10	11	12
4	4	0	13	14	15	16
5	5	0	17	18	19	20
6	6	0	21	22	23	24
7	7	0	25	26	27	28
8	8	0	29	30	31	32
9	9	0	33	34	35	36
10	10	0	37	38	39	40
11	11	0	41	42	43	44
12	12	0	45	46	47	48
13	13	0	49	50	51	52
14	14	0	53	54	55	56
15	15	0	57	58	59	60
16	16	0	61	62	63	64
17	17	0	65	66	67	68
18	18	0	69	70	71	72
19	19	0	73	74	75	76
20	20	0	77	78	79	80
21	21	0	81	82	83	84
22	22	0	85	86	87	88
23	23	0	89	90	91	92
24	24	0	93	94	95	96
25	25	0	97	98	99	100
26	26	0	101	102	103	104
27	27	0	105	106	107	108
28	28	0	109	110	111	112
29	29	0	113	114	115	116
30	30	0	117	118	119	120
31	31	0	121	122	123	124
32	32	0	125	126	127	128
33	33	0	129	130	131	132
34	34	0	133	134	135	136
35	35	0	137	138	139	140
36	36	0	141	142	143	144
37	37	0	145	146	147	148
38	38	0	149	150	151	152
39	39	0	153	154	155	156
40	40	0	157	158	159	160
41	41	0	161	162	163	164
42	42	0	165	166	167	168
43	43	0	169	170	171	172
44	44	0	173	174	175	176
45	45	0	177	178	179	180
46	46	0	181	182	183	184
47	47	0	185	186	187	188
48	48	0	189	190	191	192
49	49	0	193	194	195	196

			Output Addresses			
Decoder Card #	**LSB CV513**	**MSB CV521**	**A** Cv515	**B** Cv516	**C** Cv517	**D** Cv518
50	50	0	197	198	199	200
51	51	0	201	202	203	204
52	52	0	205	206	207	208
53	53	0	209	210	211	212
54	54	0	213	214	215	216
55	55	0	217	218	219	220
56	56	0	221	222	223	224
57	57	0	225	226	227	228
58	58	0	229	230	231	232
59	59	0	233	234	235	236
60	60	0	237	238	239	240
61	61	0	241	242	243	244
62	62	0	245	246	247	248
63	63	0	249	250	251	252
64	1	0	253	254	255	256
65	1	1	257	258	259	260
66	2	1	261	262	263	264
67	3	1	265	266	267	268
68	4	1	269	270	271	272
69	5	1	273	274	275	276
70	6	1	277	278	279	280
71	7	1	281	282	283	284
72	8	1	285	286	287	288
73	9	1	289	290	291	292
74	10	1	293	294	295	296
75	11	1	297	298	299	300
76	12	1	301	302	303	304
77	13	1	305	306	307	308
78	14	1	309	310	311	312
79	15	1	313	314	315	316
80	16	1	317	318	319	320
81	17	1	321	322	323	324
82	18	1	325	326	327	328
83	19	1	329	330	331	332
84	20	1	333	334	335	336
85	21	1	337	338	339	340
86	22	1	341	342	343	344
87	23	1	345	346	347	348
88	24	1	349	350	351	352
89	25	1	353	354	355	356
90	26	1	357	358	359	360
91	27	1	361	362	363	364
92	28	1	365	366	367	368
93	29	1	369	370	371	372
94	30	1	373	374	375	376
95	31	1	377	378	379	380
96	32	1	381	382	383	384
97	33	1	385	386	387	388
98	34	1	389	390	391	392

AD4 Card Number and Output Addresses 99-190

Decoder Card #	LSB CV513	MSB CV521	Output Addresses A Cv515	B Cv516	C Cv517	D Cv518
99	35	1	393	394	395	396
100	36	1	397	398	399	400
101	37	1	401	402	403	404
102	38	1	405	406	407	408
103	39	1	409	410	411	412
104	40	1	413	414	415	416
105	41	1	417	418	419	420
106	42	1	421	422	423	424
107	43	1	425	426	427	428
108	44	1	429	430	431	432
109	45	1	433	434	435	436
110	46	1	437	438	439	440
111	47	1	441	442	443	444
112	48	1	445	446	447	448
113	49	1	449	450	451	452
114	50	1	453	454	455	456
115	51	1	457	458	459	460
116	52	1	461	462	463	464
117	53	1	465	466	467	468
118	54	1	469	470	471	472
119	55	1	473	474	475	476
120	56	1	477	478	479	480
121	57	1	481	482	483	484
122	58	1	485	486	487	488
123	59	1	489	490	491	492
124	60	1	493	494	495	496
125	61	1	497	498	499	500
126	62	1	501	502	503	504
127	63	1	505	506	507	508
128	0	2	509	510	511	512
129	1	2	513	514	515	516
130	2	2	517	518	519	520
131	3	2	521	522	523	524
132	4	2	525	526	527	528
133	5	2	529	530	531	532
134	6	2	533	534	535	536
135	7	2	537	538	539	540
136	8	2	541	542	543	544
137	9	2	545	546	547	548
138	10	2	549	550	551	552
139	11	2	553	554	555	556
140	12	2	557	558	559	560
141	13	2	561	562	563	564
142	14	2	565	566	567	568
143	15	2	569	570	571	572
144	16	2	573	574	575	576

Decoder Card #	LSB CV513	MSB CV521	Output Addresses A Cv515	B Cv516	C Cv517	D Cv518
145	17	2	577	578	579	580
146	18	2	581	582	583	584
147	19	2	585	586	587	588
148	20	2	589	590	591	592
149	21	2	593	594	595	596
150	22	2	597	598	599	600
151	23	2	601	602	603	604
152	24	2	605	606	607	608
153	25	2	609	610	611	612
154	26	2	613	614	615	616
155	27	2	617	618	619	620
156	28	2	621	622	623	624
157	29	2	625	626	627	628
158	30	2	629	630	631	632
159	31	2	633	634	635	636
160	32	2	637	638	639	640
161	33	2	641	642	643	644
162	34	2	645	646	647	648
163	35	2	649	650	651	652
164	36	2	653	654	655	656
165	37	2	657	658	659	660
166	38	2	661	662	663	664
167	39	2	665	666	667	668
168	40	2	669	670	671	672
169	41	2	673	674	675	676
170	42	2	677	678	679	680
171	43	2	681	682	683	684
172	44	2	685	686	687	688
173	45	2	689	690	691	692
174	46	2	693	694	695	696
175	47	2	697	698	699	700
176	48	2	701	702	703	704
177	49	2	705	706	707	708
178	50	2	709	710	711	712
179	51	2	713	714	715	716
180	52	2	717	718	719	720
181	53	2	721	722	723	724
182	54	2	725	726	727	728
183	55	2	729	730	731	732
184	56	2	733	734	735	736
185	57	2	737	738	739	740
186	58	2	741	742	743	744
187	59	2	745	746	747	748
188	60	2	749	750	751	752
189	61	2	753	754	755	756
190	62	2	757	758	759	760

AD4 Card Number and Output Addresses 191 to 282

Decoder Card #	LSB CV513	MSB CV521	Output Addresses A Cv515	B Cv516	C Cv517	D Cv518
191	63	2	761	762	763	764
192	0	3	765	766	767	768
193	1	3	769	770	771	772
194	2	3	773	774	775	776
195	3	3	777	778	779	780
196	4	3	781	782	783	784
197	5	3	785	786	787	788
198	6	3	789	790	791	792
199	7	3	793	794	795	796
200	8	3	797	798	799	800
201	9	3	801	802	803	804
202	10	3	805	806	807	808
203	11	3	809	810	811	812
204	12	3	813	814	815	816
205	13	3	817	818	819	820
206	14	3	821	822	823	824
207	15	3	825	826	827	828
208	16	3	829	830	831	832
209	17	3	833	834	835	836
210	18	3	837	838	839	840
211	19	3	841	842	843	844
212	20	3	845	846	847	848
213	21	3	849	850	851	852
214	22	3	853	854	855	856
215	23	3	857	858	859	860
216	24	3	861	862	863	864
217	25	3	865	866	867	868
218	26	3	869	870	871	872
219	27	3	873	874	875	876
220	28	3	877	878	879	880
221	29	3	881	882	883	884
222	30	3	885	886	887	888
223	31	3	889	890	891	892
224	32	3	893	894	895	896
225	33	3	897	898	899	900
226	34	3	901	902	903	904
227	35	3	905	906	907	908
228	36	3	909	910	911	912
229	37	3	913	914	915	916
230	38	3	917	918	919	920
231	39	3	921	922	923	924
232	40	3	925	926	927	928
233	41	3	929	930	931	932
234	42	3	933	934	935	936
235	43	3	937	938	939	940
236	44	3	941	942	943	944

Decoder Card #	LSB CV513	MSB CV521	Output Addresses A Cv515	B Cv516	C Cv517	D Cv518
237	45	3	945	946	947	948
238	46	3	949	950	951	952
239	47	3	953	954	955	956
240	48	3	957	958	959	960
241	49	3	961	962	963	964
242	50	3	965	966	967	968
243	51	3	969	970	971	972
244	52	3	973	974	975	976
245	53	3	977	978	979	980
246	54	3	981	982	983	984
247	55	3	985	986	987	988
248	56	3	989	990	991	992
249	57	3	993	994	995	996
250	58	3	997	998	999	1000
251	59	3	1001	1002	1003	1004
252	60	3	1005	1006	1007	1008
253	61	3	1009	1010	1011	1012
254	62	3	1013	1014	1015	1016
255	63	3	1017	1018	1019	1020
256	0	4	1021	1022	1023	1024
257	1	4	1025	1026	1027	1028
258	2	4	1029	1030	1031	1032
259	3	4	1033	1034	1035	1036
260	4	4	1037	1038	1039	1040
261	5	4	1041	1042	1043	1044
262	6	4	1045	1046	1047	1048
263	7	4	1049	1050	1051	1052
264	8	4	1053	1054	1055	1056
265	9	4	1057	1058	1059	1060
266	10	4	1061	1062	1063	1064
267	11	4	1065	1066	1067	1068
268	12	4	1069	1070	1071	1072
269	13	4	1073	1074	1075	1076
270	14	4	1077	1078	1079	1080
271	15	4	1081	1082	1083	1084
272	16	4	1085	1086	1087	1088
273	17	4	1089	1090	1091	1092
274	18	4	1093	1094	1095	1096
275	19	4	1097	1098	1099	1100
276	20	4	1101	1102	1103	1104
277	21	4	1105	1106	1107	1108
278	22	4	1109	1110	1111	1112
279	23	4	1113	1114	1115	1116
280	24	4	1117	1118	1119	1120
281	25	4	1121	1122	1123	1124
282	26	4	1125	1126	1127	1128

AD4 Card Number and Output Addresses 283 to 380

Decoder Card #	LSB CV513	MSB CV521	Output Addresses A Cv515	B Cv516	C Cv517	D Cv518
283	27	4	1129	1130	1131	1132
284	28	4	1133	1134	1135	1136
285	29	4	1137	1138	1139	1140
286	30	4	1141	1142	1143	1144
287	31	4	1145	1146	1147	1148
288	32	4	1149	1150	1151	1152
289	33	4	1153	1154	1155	1156
290	34	4	1157	1158	1159	1160
291	35	4	1161	1162	1163	1164
292	36	4	1165	1166	1167	1168
293	37	4	1169	1170	1171	1172
294	38	4	1173	1174	1175	1176
295	39	4	1177	1178	1179	1180
296	40	4	1181	1182	1183	1184
297	41	4	1185	1186	1187	1188
298	42	4	1189	1190	1191	1192
299	43	4	1193	1194	1195	1196
300	44	4	1197	1198	1199	1200
301	45	4	1201	1202	1203	1204
302	46	4	1205	1206	1207	1208
303	47	4	1209	1210	1211	1212
304	48	4	1213	1214	1215	1216
305	49	4	1217	1218	1219	1220
306	50	4	1221	1222	1223	1224
307	51	4	1225	1226	1227	1228
308	52	4	1229	1230	1231	1232
309	53	4	1233	1234	1235	1236
310	54	4	1237	1238	1239	1240
311	55	4	1241	1242	1243	1244
312	56	4	1245	1246	1247	1248
313	57	4	1249	1250	1251	1252
314	58	4	1253	1254	1255	1256
315	59	4	1257	1258	1259	1260
316	60	4	1261	1262	1263	1264
317	61	4	1265	1266	1267	1268
318	62	4	1269	1270	1271	1272
319	63	4	1273	1274	1275	1276
320	0	5	1277	1278	1279	1280
321	1	5	1281	1282	1283	1284
322	2	5	1285	1286	1287	1288
323	3	5	1289	1290	1291	1292
324	4	5	1293	1294	1295	1296
325	5	5	1297	1298	1299	1300
326	6	5	1301	1302	1303	1304
327	7	5	1305	1306	1307	1308
328	8	5	1309	1310	1311	1312
329	9	5	1313	1314	1315	1316
330	10	5	1317	1318	1319	1320
331	11	5	1321	1322	1323	1324

Decoder Card #	LSB CV513	MSB CV521	Output Addresses A Cv515	B Cv516	C Cv517	D Cv518
332	12	5	1325	1326	1327	1328
333	13	5	1329	1330	1331	1332
334	14	5	1333	1334	1335	1336
335	15	5	1337	1338	1339	1340
336	16	5	1341	1342	1343	1344
337	17	5	1345	1346	1347	1348
338	18	5	1349	1350	1351	1352
339	19	5	1353	1354	1355	1356
340	20	5	1357	1358	1359	1360
341	21	5	1361	1362	1363	1364
342	22	5	1365	1366	1367	1368
343	23	5	1369	1370	1371	1372
344	24	5	1373	1374	1375	1376
345	25	5	1377	1378	1379	1380
346	26	5	1381	1382	1383	1384
347	27	5	1385	1386	1387	1388
348	28	5	1389	1390	1391	1392
349	29	5	1393	1394	1395	1396
350	30	5	1397	1398	1399	1400
351	31	5	1401	1402	1403	1404
352	32	5	1405	1406	1407	1408
353	33	5	1409	1410	1411	1412
354	34	5	1413	1414	1415	1416
355	35	5	1417	1418	1419	1420
356	36	5	1421	1422	1423	1424
357	37	5	1425	1426	1427	1428
358	38	5	1429	1430	1431	1432
359	39	5	1433	1434	1435	1436
360	40	5	1437	1438	1439	1440
361	41	5	1441	1442	1443	1444
362	42	5	1445	1446	1447	1448
363	43	5	1449	1450	1451	1452
364	44	5	1453	1454	1455	1456
365	45	5	1457	1458	1459	1460
366	46	5	1461	1462	1463	1464
367	47	5	1465	1466	1467	1468
368	48	5	1469	1470	1471	1472
369	49	5	1473	1474	1475	1476
370	50	5	1477	1478	1479	1480
371	51	5	1481	1482	1483	1484
372	52	5	1485	1486	1487	1488
373	53	5	1489	1490	1491	1492
374	54	5	1493	1494	1495	1496
375	55	5	1497	1498	1499	1500
376	56	5	1501	1502	1503	1504
377	57	5	1505	1506	1507	1508
378	58	5	1509	1510	1511	1512
379	59	5	1513	1514	1515	1516
380	60	5	1517	1518	1519	1520

AD4 Card Number and Output Addresses 381 to 468

			Output Addresses			
Decoder Card #	LSB CV513	MSB CV521	A Cv515	B Cv516	C Cv517	D Cv518
381	61	5	1521	1522	1523	1524
382	62	5	1525	1526	1527	1528
383	63	5	1529	1530	1531	1532
384	0	6	1533	1534	1535	1536
385	1	6	1537	1538	1539	1540
386	2	6	1541	1542	1543	1544
387	3	6	1545	1546	1547	1548
388	4	6	1549	1550	1551	1552
389	5	6	1553	1554	1555	1556
390	6	6	1557	1558	1559	1560
391	7	6	1561	1562	1563	1564
392	8	6	1565	1566	1567	1568
393	9	6	1569	1570	1571	1572
394	10	6	1573	1574	1575	1576
395	11	6	1577	1578	1579	1580
396	12	6	1581	1582	1583	1584
397	13	6	1585	1586	1587	1588
398	14	6	1589	1590	1591	1592
399	15	6	1593	1594	1595	1596
400	16	6	1597	1598	1599	1600
401	17	6	1601	1602	1603	1604
402	18	6	1605	1606	1607	1608
403	19	6	1609	1610	1611	1612
404	20	6	1613	1614	1615	1616
405	21	6	1617	1618	1619	1620
406	22	6	1621	1622	1623	1624
407	23	6	1625	1626	1627	1628
408	24	6	1629	1630	1631	1632
409	25	6	1633	1634	1635	1636
410	26	6	1637	1638	1639	1640
411	27	6	1641	1642	1643	1644
412	28	6	1645	1646	1647	1648
413	29	6	1649	1650	1651	1652
414	30	6	1653	1654	1655	1656
415	31	6	1657	1658	1659	1660
416	32	6	1661	1662	1663	1664
417	33	6	1665	1666	1667	1668
418	34	6	1669	1670	1671	1672
419	35	6	1673	1674	1675	1676
420	36	6	1677	1678	1679	1680
421	37	6	1681	1682	1683	1684
422	38	6	1685	1686	1687	1688
423	39	6	1689	1690	1691	1692
424	40	6	1693	1694	1695	1696

			Output Addresses			
Decoder Card #	LSB CV513	MSB CV521	A Cv515	B Cv516	C Cv517	D Cv518
425	41	6	1697	1698	1699	1700
426	42	6	1701	1702	1703	1704
427	43	6	1705	1706	1707	1708
428	44	6	1709	1710	1711	1712
429	45	6	1713	1714	1715	1716
430	46	6	1717	1718	1719	1720
431	47	6	1721	1722	1723	1724
432	48	6	1725	1726	1727	1728
433	49	6	1729	1730	1731	1732
434	50	6	1733	1734	1735	1736
435	51	6	1737	1738	1739	1740
436	52	6	1741	1742	1743	1744
437	53	6	1745	1746	1747	1748
438	54	6	1749	1750	1751	1752
439	55	6	1753	1754	1755	1756
440	56	6	1757	1758	1759	1760
441	57	6	1761	1762	1763	1764
442	58	6	1765	1766	1767	1768
443	59	6	1769	1770	1771	1772
444	60	6	1773	1774	1775	1776
445	61	6	1777	1778	1779	1780
446	62	6	1781	1782	1783	1784
447	63	6	1785	1786	1787	1788
448	0	7	1789	1790	1791	1792
449	1	7	1793	1794	1795	1796
450	2	7	1797	1798	1799	1800
451	3	7	1801	1802	1803	1804
452	4	7	1805	1806	1807	1808
453	5	7	1809	1810	1811	1812
454	6	7	1813	1814	1815	1816
455	7	7	1817	1818	1819	1820
456	8	7	1821	1822	1823	1824
457	9	7	1825	1826	1827	1828
458	10	7	1829	1830	1831	1832
459	11	7	1833	1834	1835	1836
460	12	7	1837	1838	1839	1840
461	13	7	1841	1842	1843	1844
462	14	7	1845	1846	1847	1848
463	15	7	1849	1850	1851	1852
464	16	7	1853	1854	1855	1856
465	17	7	1857	1858	1859	1860
466	18	7	1861	1862	1863	1864
467	19	7	1865	1866	1867	1868
468	20	7	1869	1870	1871	1872

AD4 Card Number and Output Addresses 469 to 511

Decoder Card #	LSB CV513	MSB CV521	Output Addresses A Cv515	B Cv516	C Cv517	D Cv518
469	21	7	1873	1874	1875	1876
470	22	7	1877	1878	1879	1880
471	23	7	1881	1882	1883	1884
472	24	7	1885	1886	1887	1888
473	25	7	1889	1890	1891	1892
474	26	7	1893	1894	1895	1896
475	27	7	1897	1898	1899	1900
476	28	7	1901	1902	1903	1904
477	29	7	1905	1906	1907	1908
478	30	7	1909	1910	1911	1912
479	31	7	1913	1914	1915	1916
480	32	7	1917	1918	1919	1920
481	33	7	1921	1922	1923	1924
482	34	7	1925	1926	1927	1928
483	35	7	1929	1930	1931	1932
484	36	7	1933	1934	1935	1936
485	37	7	1937	1938	1939	1940
486	38	7	1941	1942	1943	1944
487	39	7	1945	1946	1947	1948
488	40	7	1949	1950	1951	1952
489	41	7	1953	1954	1955	1956
490	42	7	1957	1958	1959	1960
491	43	7	1961	1962	1963	1964
492	44	7	1965	1966	1967	1968
493	45	7	1969	1970	1971	1972
494	46	7	1973	1974	1975	1976
495	47	7	1977	1978	1979	1980
496	48	7	1981	1982	1983	1984
497	49	7	1985	1986	1987	1988
498	50	7	1989	1990	1991	1992
499	51	7	1993	1994	1995	1996
500	52	7	1997	1998	1999	2000

Decoder Card #	LSB CV513	MSB CV521	Output Addresses A Cv515	B Cv516	C Cv517	D Cv518
501	53	7	2001	2002	2003	2004
502	54	7	2005	2006	2007	2008
503	55	7	2009	2010	2011	2012
504	56	7	2013	2014	2015	2016
505	57	7	2017	2018	2019	2020
506	58	7	2021	2022	2023	2024
507	59	7	2025	2026	2027	2028
508	60	7	2029	2030	2031	2032
509	61	7	2033	2034	2035	2036
510	62	7	2037	2038	2039	2040
511*	-	-	2041	2042	2043	2044