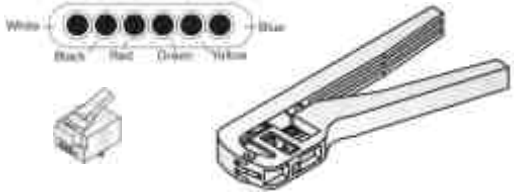
Tools, Supplies and Handy Resources

Modular Cable Wiring Supplies From Mouser Electronics

6C Modular Flat Cable	602-1606
Crimping Tool	382-8100
6x6 Modular Plug	154-7623-6



Lamps, Leds, Relays And Bulb Sources

Digikey and Mouser are two of the best companies for electronic parts and supplies. We endorse both of them. Most of the items you might need are available from both companies. So you might consider ordering from the company that is physically closest to you. Digikey is headquartered in Minnesota and Mouser is in Texas.

Digikey:	www.digikey.com
Mouser Electronics:	www.mouser.com

Low Voltage Landscape Lighting Accessories

Safe, low voltage lighting systems, used for gardens, ponds and landscapes, offers a wealth of items suitable for use with your Activator and connecting it to your accessories. Items such as wire, connectors, low voltage lighting fixtures and other accessories make the installation job much easier.

While there is a relatively small selection of items from the local big-box retailers like Home Depot and Lowes, a much better selection is available from the online retailers. There are many companies so be sure and carefully check their references and return policies. We do not endorse any of these companies but offer them as examples of what's available.

www.elights.com www.illuminatorwholesaler.com www.arcadianlighting.com

Warranty Information

This warranty covers substantial defects in materials and workmanship of the Activator.

What This Warranty Does Not Cover: This warranty does not cover any problems which result from improper installation, modifications, improper use of output power, improper operation, excessive voltages, excessive current draw, abuse, accidents, or acts of God such as excessive heat, floods, damage caused by exposure to moisture and rain, lightning or hurricanes.

How Long The Warranty Lasts: The coverage of this warranty lasts for 90 days. After this period, standard repair rates apply.

30 Day Money Back Guarantee: The Activator comes with a 30 day money back guarantee provided it has not been installed, modified, damaged or in any way changed from its original condition. Should you decide you do not want the Activator, it may be returned, at your expense, for a full refund (less shipping). You must include all the original packing and documentation.

Repair: Do not send items to us for repair without first obtaining authorization. In many cases, problems are easily solved via phone or email without the need or expense to return items to us. If we request you return an item, be sure to mark the "Return Material Authorization" (RMA) code number on the outside of the box. The RMA is issued when you call. You are responsible for all shipping charges. UPS Street Address: CVP Products 563 Sterling Drive, Richardson, TX 75081

P.O. Box 835772 Richardson, TX 75083-5772 www.cvpusa.com

— CVP PRODUCTS —

AIRWIRE® 900

The Activator™ Hookup and Operation

THROTTLE SOFTWARE MAY NEED UPDATING

For best operation, be sure to obtain the latest software update for your handheld throttle.

Check your T9000 throttle software revision number. It must show revision 1.3 or higher. If not, it will need to be returned to CVP Products for a free software upgrade. You pay the shipping charges to return the throttle to CVP. CVP will pay for the return shipping.

For the RF1300 throttle, check that the label on top of the chip says GTX-8A. If not, or if you are not sure, call us for a free chip to upgrade to the latest software. Instructions and the new chip will be sent at no charge.

WARNING

The Activator is not a toy and is not designed to be operated by children. Read and follow all directions and installation instructions. Do not allow the Activator to become wet. Connect the Activator only to a properly wired and protected Linker. CVP Products shall not be responsible for any claim or loss of any nature arising directly or consequentially from the use, application or modification of equipment described.

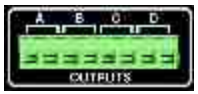
P.O. Box 835772 Richardson, TX 75083-5772 www.cvpusa.com

Quick Start Guide

Step 1: Select the Activator group number using the rotary switches. We suggest starting at the first group number which is 01. This makes the four output addresses, A, B, C and D, become 1, 2, 3 and 4 respectively.

Step 2: The small slide switches, labeled SETUP, select the mode to match the type of load you will connect to the Activator. For snap-action switch machines, this means the mode is PULSE. For this mode, all switches are down. Use a pencil to slide the white actuator up or down as needed.

Step 3: Connect the Activator to the Linker. The terminal strip connections labeled LINKER INPUT are used. Polarity doesn't matter.



Step 4: Connect the loads to the outputs. For this example, LGB snap switch machines are used. The right terminal of an output pair connects to the LGB switch machine's orange dot terminal. The left terminal of an output pair connects to the LGB switch machine's white dot labeled terminal. This is the standard convention but reversing it will not hurt anything.

Step 5: Turn on the Linker power supply and turn on an AirWire throttle. The Activator's GP light will turn on. If not, check your wiring and verify the Linker's power supply is turned on.

Step 6: To test that everything is OK, an activation command must be sent from a throttle. Whenever a correctly addressed activation command is received, the ST indicator will flash on and off. If you send a command to an address that is not associated with this specific Activator, the ST indicator will not flash.

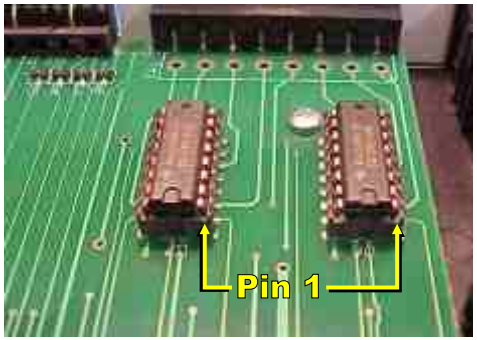
For the RF1300 throttle - push the * key twice. The mode LED starts flashing. Now enter the desired output address - for this example the Activator output address is 1 which is the A output. Push # 1 # to enter the Activator's output address. Now, to send an activation command, push either the 1 key or the 3 key. The 1 key, also called F1, sends the command to throw the turnout in the reverse direction. The 3 key, also called F3, sends the command to throw the turnout in the forward direction.

For the T9000 throttle - push SEL followed by the 5 key. Now enter the desired output address - for this example the Activator output address is 1 which is the A output. Push # 1 # to enter the Activator's output address. Now, to send an activation command, push either the 1 key or the 3 key. The 1 key, also called F1, sends the command to throw the turnout in the reverse direction. The 3 key, also called F3, sends the command to throw the turnout in the forward direction.

Table of Contents

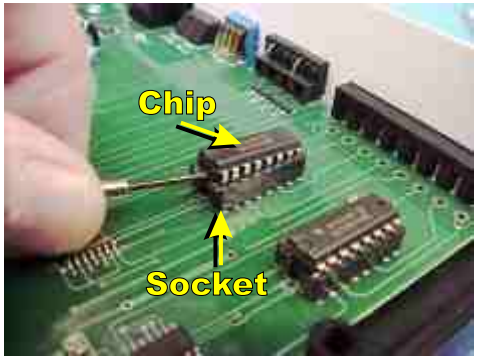
Replacing Driver Chips

Although rare, it is possible to damage U6 and U7, the output driver chips. U7 services the 4 right-most outputs and U6 services the 4 left-most outputs. Fortunately, these devices are in a socket and are easily replaced. However, try to determine what the cause of the failure before replacing the chip.



The most common cause of failure is a short circuit between the output driver and V+. Another possible cause of failure is accidentally selecting the continuous mode for switch machines instead of the pulse mode. Should either of these occur, the appropriate driver chip may have to be replaced.

Unscrew and completely remove the screws from bottom of enclosure using a Philips screwdriver. Turn the enclosure over. Remove the top.

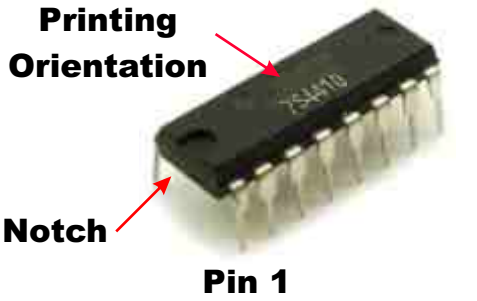


Locate and identify U6 and U7. They are new the output terminals. There might be two different chip part numbers: L293D or 754410. However, the two parts are interchangeable

Use a small screwdriver to pry the chip out of its socket. Be careful to place the screwdriver **between** the socket and the chip. Remove the bad chip and discard.

Don't Accidentally Pry Up The Socket.

Before inserting the new chip, it is very important that pin 1 be properly identified and that the new chip is oriented correctly. The chip has either a dimple or a notch on one end. The small circle in the middle of the package at the opposite end is not the notch. Also, when oriented, the printing on the top of the chip will face the left edge of the board.



Place the new chip in the socket and press on the top. Verify that all pins go into the socket and not over the side.

Before closing up the chassis, make one last inspection of the socket and the new chip. Verify that it is oriented properly. Verify that all pins are in the socket. Be especially careful to check for pins bent up underneath the chip.

Once you are satisfied that everything is in its proper place, replace the lid and the screws.

Extra chips may be purchased from CVP Products.

Proper Chip Orientation Mandatory

Output Addresses and Group Number (cont)

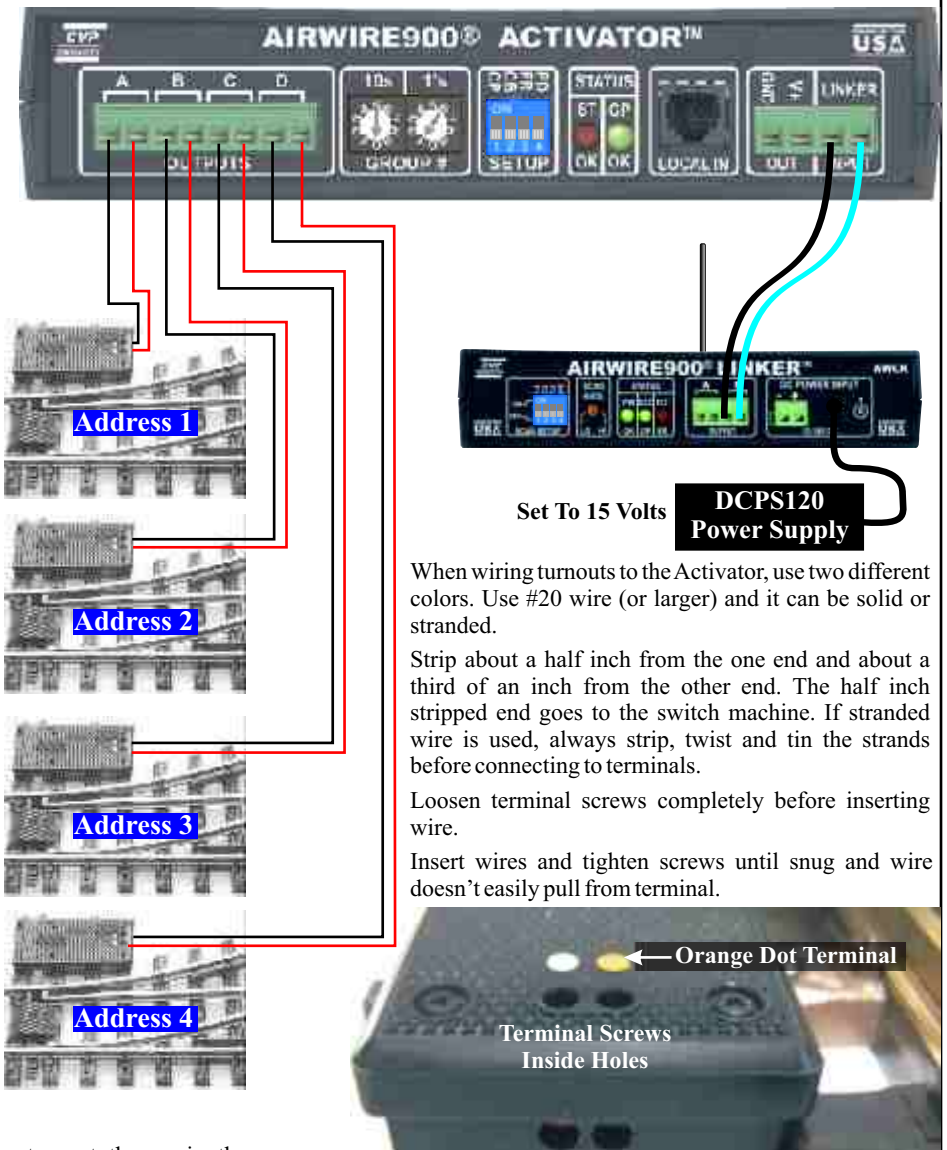
Group Number	Output Addresses			
	A	B	C	D
51	201	202	203	204
52	205	206	207	208
53	209	210	211	212
54	213	214	215	216
55	217	218	219	220
56	221	222	223	224
57	225	226	227	228
58	229	230	231	232
59	233	234	235	236
60	237	238	239	240
61	241	242	243	244
62	245	246	247	248
63	249	250	251	252
64	253	254	255	256
65	257	258	259	260
66	261	262	263	264
67	265	266	267	268
68	269	270	271	272
69	273	274	275	276
70	277	278	279	280
71	281	282	283	284
72	285	286	287	288
73	289	290	291	292
74	293	294	295	296
75	297	298	299	300

Group Number	Output Addresses			
	A	B	C	D
76	301	302	303	304
77	305	306	307	308
78	309	310	311	312
79	313	314	315	316
80	317	318	319	320
81	321	322	323	324
82	325	326	327	328
83	329	330	331	332
84	333	334	335	336
85	337	338	339	340
86	341	342	343	344
87	345	346	347	348
88	349	350	351	352
89	353	354	355	356
90	357	358	359	360
91	361	362	363	364
92	365	366	367	368
93	369	370	371	372
94	373	374	375	376
95	377	378	379	380
96	381	382	383	384
97	385	386	387	388
98	389	390	391	392
99	393	394	395	396

Group Number 00 Is Not Useable

Do not use Group # 00. It is not a valid number. Group numbers start at 01 and end at 99. No harm will occur but the Activator will not respond to 0 as an address. Also, the throttle will not accept 0 as a legal address.

Simplified Hookup Diagram For LGB Turnouts

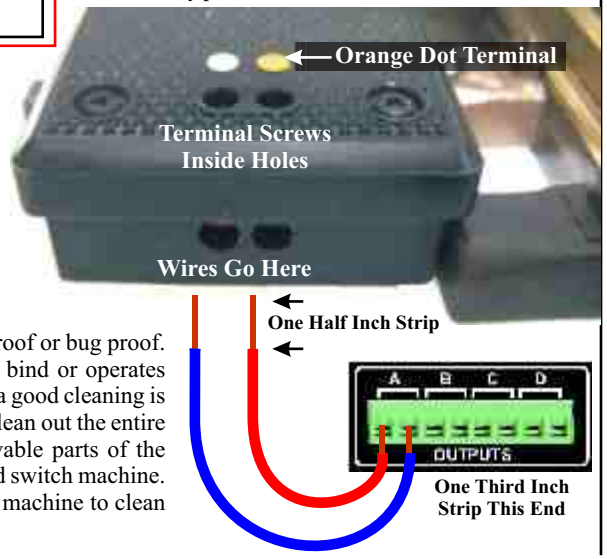


When wiring turnouts to the Activator, use two different colors. Use #20 wire (or larger) and it can be solid or stranded.

Strip about a half inch from the one end and about a third of an inch from the other end. The half inch stripped end goes to the switch machine. If stranded wire is used, always strip, twist and tin the strands before connecting to terminals.

Loosen terminal screws completely before inserting wire.

Insert wires and tighten screws until snug and wire doesn't easily pull from terminal.



If the turnout throws in the wrong direction, reverse the two wires at the switch machine.

LGB switch machines are not weatherproof or bug proof. If a working switch machine begins to bind or operates sluggishly or doesn't throw completely, a good cleaning is necessary. In the vicinity of the points, clean out the entire area. Clean debris from under the movable parts of the machine, including points, throw bar and switch machine. Also consider disassembling the switch machine to clean out bugs and other debris.

Activator

Output Terminals

These terminals are where the loads are connected. Each output is configured as a pair.

The load might be a set of turnouts, lamps or other stationary accessories.

Each output automatically is assigned a unique address based on the Group Number rotary switch setting.

The 8 terminal plug can be easily unplugged.

Group # Rotary Switches

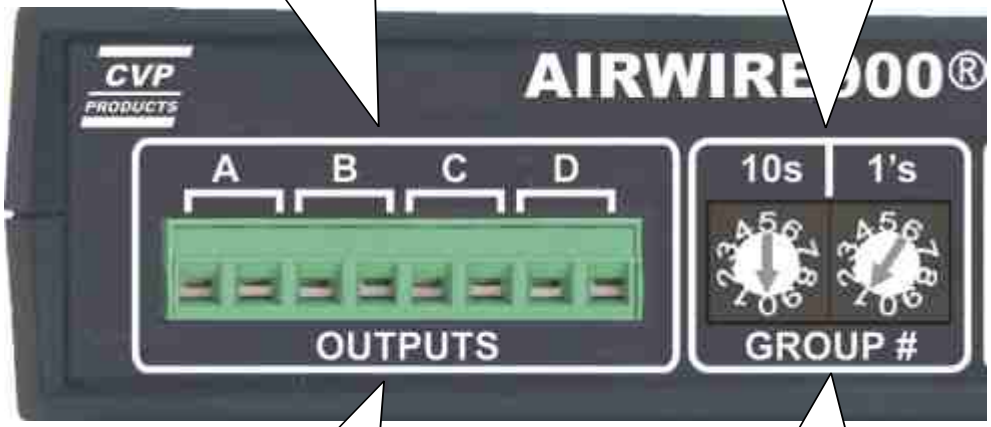
These two switches set the addresses of the 4 outputs.

The group number range is 01 through 99. Each group has 4 sets of addresses for the 4 outputs.

Output terminal address assignment is automatic upon setting of the Group Number.

Changes to a group number take effect immediately.

Group number 00 is not allowed.



Output Current

Maximum output current is ½ Amp.

Output Voltage

Output voltage is about 2.5 volts less than the Linker supply voltage.

Output Protection

Outputs have limited protection from short circuits overloads or overheating. The chip driving the outputs is in a socket should it ever need replacement. Changing the chip is very easy and users can open the case and quickly replace it.

Output Addresses

Group #	A	B	C	D
00	na	na	na	na
01	1	2	3	4
02	5	6	7	8
03	9	10	11	12
04	13	14	15	16
pattern continues up to group 99				
97	385	386	387	388
98	389	390	391	392
99	393	394	395	396

Output Addresses and Group Number

When a GROUP Number (#) is selected, the four output pairs, A, B, C, and D, are automatically assigned 4 different addresses. These addresses are always in sequential groups of four.

Group 00 is not used. The highest group number is 99.

A is always the lowest number in the sequence of 4 addresses.

D is always the highest number in the sequence of 4 addresses.

The Group Number and associated addresses are easy to figure out with some arithmetic or you may use the tables.

To determine the highest address in a group number sequence, multiply the group number by 4. The resulting number is the address of the D output. Then work backwards, subtracting one from the previous address. For example, group number 1 multiplied by 4, gives 4 as the highest address and is assigned to D. Then C = 3, B = 2 and A = 1.

Here's another example: Group number 50. Multiply 50 time 4 and that gives 200 which is the highest address in the sequence and is assigned to output D. Then C = 199, B = 198, and A = 197.

Group Number	Output Addresses			
	A	B	C	D
1	1	2	3	4
2	5	6	7	8
3	9	10	11	12
4	13	14	14	16
5	17	18	19	20
6	21	22	23	24
7	25	26	27	28
8	29	30	31	32
9	33	34	35	36
10	37	38	39	40
11	41	42	43	44
12	45	46	47	48
13	49	50	51	52
14	53	54	55	56
15	57	58	59	60
16	61	62	63	64
17	65	66	67	68
18	69	70	71	72
19	73	74	75	76
20	77	78	79	80
21	81	82	83	84
22	85	86	87	88
23	89	90	91	92
24	93	94	95	96
25	97	98	99	100

Group Number	Output Addresses			
	A	B	C	D
26	101	102	103	104
27	105	106	107	108
28	109	110	111	112
29	113	114	115	116
30	117	118	119	120
31	121	122	123	124
32	125	126	127	128
33	129	130	131	132
34	133	134	135	136
35	137	138	139	140
36	141	142	143	144
37	145	146	147	148
38	149	150	151	152
39	153	154	155	156
40	157	158	159	160
41	161	162	163	164
42	165	166	167	168
43	169	170	171	172
44	173	174	175	176
45	177	178	179	180
46	181	182	183	184
47	185	186	187	188
48	189	190	191	192
49	193	194	195	196
50	197	198	199	200

Distance Vs. Wire Gauge

Proper operation of switch machines and solenoids requires adequate wire size to deliver the required energy from the Activator to the device. If the wire is too small, the energy is dissipated in the wiring and a poor or weak throw will occur. In extreme cases, the switch machine or solenoid won't even move.

The Activator is designed to be relatively close to the devices connected to its turnouts. However, in some cases, the device may be at some distance from the Activator. Use the table below to determine the proper wire size when going further then 25 feet from the Activator. Of course, large wire size is OK for less than 25 feet.

To read the table, find the distance of your wire run. This distance assumes an out and back run of wire. Next, pick the mode your Activator is using.

Continuous Mode: The 0.5 Amp column is for continuous on outputs and these are loaded down to the maximum of 0.5 Amps.

Pulse Mode: When in pulse mode, the Activator will momentarily output up to 2 amps. This power doesn't last long but it helps throw balky turnouts. However, to deliver this energy to the turnout, the wire must be the right size.

This table was created by allowing up to 0.25 volt drop for the given current for the specified distance. The entries with "not recommended" indicate the wire size is not realistic. You can certainly go that distance but there will be a greater voltage drop for a smaller wire size.

Distance (feet) From Activator To Load	For Continuous 0.5 Amp load	For Pulse Output @ 2 Amp Peak
	Wire Size Minimum	Wire Size Minimum
10	20	20
25	18	16
50	16	14
100	14	not recommended
150	12	not recommended
200	not recommended	not recommended

Wiring Tips - All Modes and Hookups

Wiring from the Activator to the Linker should be 14 AWG to 18 AWG depending on distance. See the chart on the inside pages for recommendations.

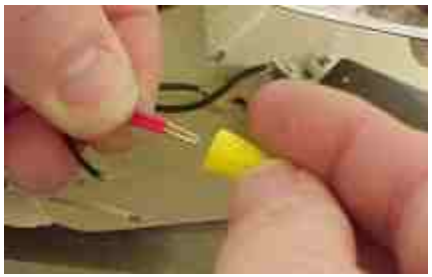
Wire size that connects the Activator to the load should be about 18AWG to 20 AWG and may be stranded or solid. If going a long distance the wire must be larger or there will be a voltage loss.

For stranded wire, strip the insulation back about 1/4 inch back, twist strands together and tin.

Test each turnout for excessive drag or mechanical binding. Correct any problems found now. If the machine throws in the wrong direction reverse the two wires at the switch machine.

Use safe wiring techniques. All splices and joints should be soldered. If not soldering, use appropriately sized wire nuts.

To remove the plug from the socket, gently rock the plug back and forth horizontally to release the locking tabs. Replacement plugs are available from CVP Products. The tabs can be cut off if needed.



Overview

Status Indicators

The bright LED indicators are used during setup and to confirm receipt of activation commands.

GP is both a power and a data indicator. If it is on, it means both power and data are being received from the Linker. If slowly blinking on and off, it means there is power but no throttle is turned on.

ST flashes any time an activation command is received addressed to any of its 4 outputs

Linker Input & References

The two wires from the Linker connect to the two right terminals only. Polarity does not matter.

V+ is a voltage source derived from the Linker's input signal. Lamps or relays can use this as a power source. It is about 2.5 volts less than the Linker power supply voltage.

GND is the Activator's internal ground reference. It is used when an external power supply is connected.

Setup Switches

Used to select how the Activator's outputs respond to a throttle's activation commands.

Pulse Mode: Used for momentary or pulsed outputs on switch machines.

Continuous Mode: Used for On/Off control of lamps or relays.

Combination Mode: Outputs A and D are alternate flashing when On and B and C outputs that are On/Off.

There are two flash rates and two pulse rates from which to select.

Local Inputs

If push buttons are to be used to control the Activator's outputs, they connect here. The push button toggles an output between On/Off or throws the turnout normal or reverse.

Local inputs are active any time power is applied. A throttle does not have to be turned on. In this case the GP indicator will be slowly flashing.

Local inputs can be used at the same time as throttle control or separately.

Easily obtained modular telephone plugs and cables are used.

Using The Setup Switches

Always Make Your Selection Before Using Activator

What's Connected To The Outputs?	Select Mode	Switch Settings	Affects Which Outputs	Recommended Linker Voltage
Snap Switch Machines Like LGB, Aristo, Air Solenoids *Note 1*	Pulse Normal		A,B,C,D	+15V *Note 4*
	Pulse Long			
Lamps, LEDs Relays LEDs *Note 2,5*	Continuous		A,B,C,D	+15V *Note 4*
Lamps, LEDs Relays LEDs *Note 3,5*	Combo Normal Flash		A and D are alternate flash while B and C are continuous on	+15V *Note 4*
	Combo Fast Flash			

Note1: LGB switch machines or other machines that take a **momentary pulse** of power to throw or activate must use this setup. Using any other setup might damage the switch machine or the Activator. The white rectangle is the movable switch. Use a small pencil or pen to move the switches.

The longer duration switch setting provides a longer throwing pulse. This may be needed for sluggish switch machines. Sluggishness might be due to drag or some other mechanical problem. However, for best operation, fix the cause of the drag and use the normal pulse duration.

F1 activates the Left Terminal of an output pair and F3 activates the Right terminal of an output pair.

Note 2: Continuous on operation means the output turns ON continuously when activated. Each output pair will have one output ON and the other output OFF when the throttle's F3 key is pressed. When the F1 key is pressed, the outputs reverse their state. See the application tips for additional details.

Note 3: Combo mode sets two outputs to flash alternately, like a grade crossing signal, and the other two outputs are set to continuous on. F3 turns on the alternating flash and F1 turns it off. For the continuous outputs, F3 turns them on and F1 turns them off.

Note 4: The Linker power supply voltage sets the voltage for the Activator outputs. For 12 to 14 volt devices connected to the outputs, the Linker's power supply needs to be 15 volts. For 24 volt devices, the Linker power supply needs to be 24 volts.

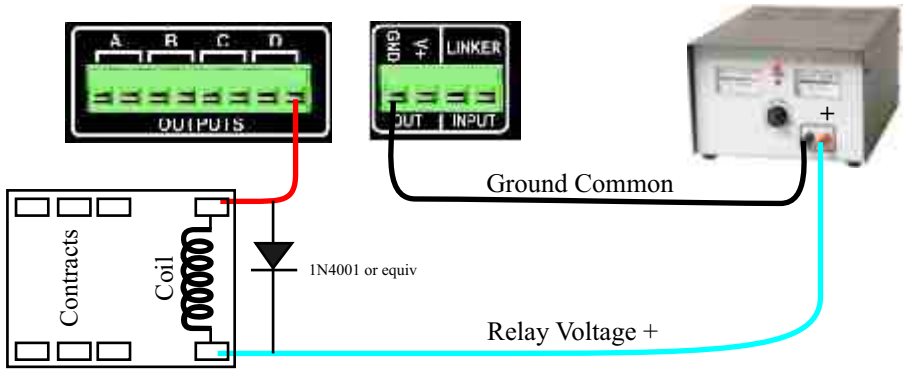
Note 5: Light Emitting Diodes (LED) must have a limit resistor whose value is determined by the Linker power supply voltage. The arithmetic to calculate the proper value is shown on page 8.

Using An External Power Supply

An external power supply is needed whenever the voltage requirements of the load exceed the capability of the Linker's power supply. Connect the external power supply to a GFI protected power outlet.

The power supply requires a ground common connection from the external power supply's ground (sometimes called minus) to the Activator's GND terminal. Use appropriate sized wire for the output loads.

The image shows an external supply used to provide power to a relay being controlled by the D output.



Remote Indication Using A 2nd Activator

Note: This feature is not usable if local inputs are used.

To add position indication of a remote turnout, simply use another Activator that is set to the same Group # as the remote Activator. Since both Activators receive the same command, their outputs will also be the same.

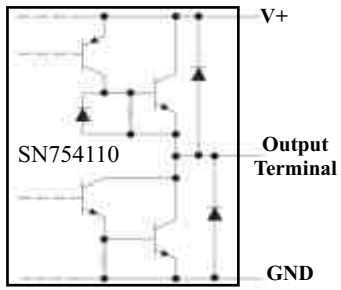
The second Activator can be set to for a different type of output mode. This is very handy when you wish to drive indicator lamps with the second output while the first Activator is set for pulse to throw snap switch machines.

The two Activators do not have to use the same Linker. The key is simply to use the same Group # for both Activators.

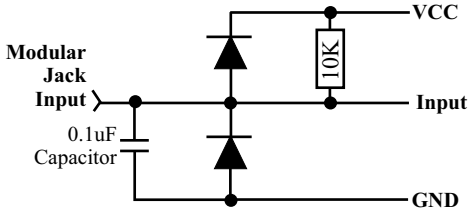
When power is first applied, both Activators will default to all outputs off. However, as each turnout is activated, the second activator synchronizes its indicators.

Equivalent Input And Output Circuits

Output Circuit (1 of 8)



Local Input (one of four)



Using Combo Mode

Combo mode splits the 4 outputs into two sets having different characteristics. Two of the outputs become alternate flashing, when turned on, and the other two outputs are set for continuous on.

Setup: The Combo mode is enabled when the SETUP switch #1 and #2 are on or the switch is up. Switch #3 sets the flash rate for the alternating outputs. When switch #3 is down the flash rate normal and when up the flash rate is faster. The flash rate may be changed at any time. The change takes effect immediately.

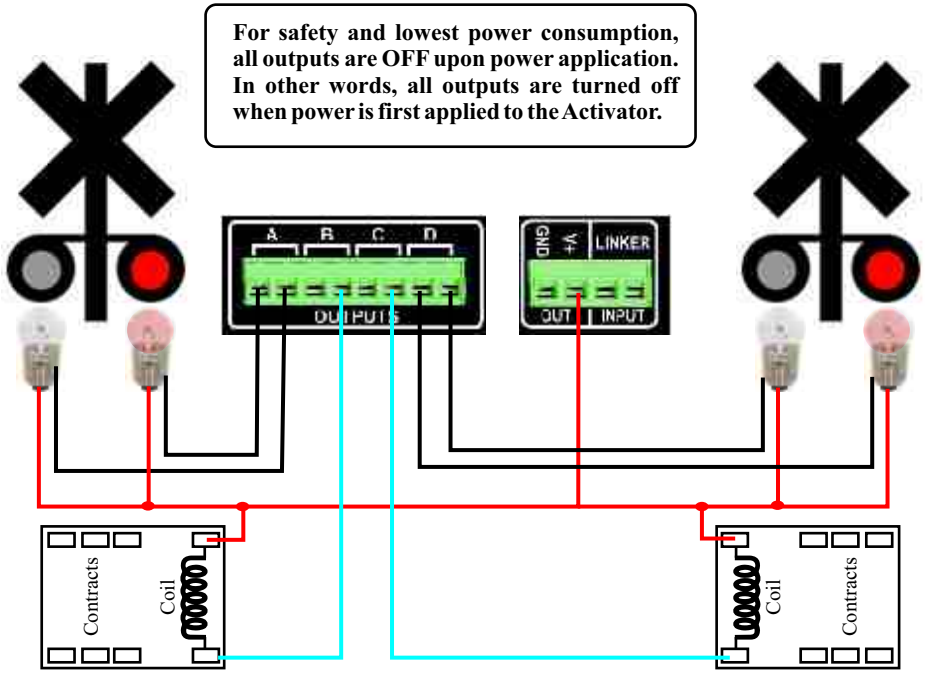
Output Definitions: The two sets of outputs are configured as follows: A and D are the flash outputs. B and C are the continuous outputs.

Connections A and D Outputs: The illustration shows the connection of a grade crossing flasher that uses standard incandescent lamps. See the section on controlling lamps and relays for additional information and requirements for voltage settings and current ratings.

Connections B and C outputs: These are used the same way as described in the section on lamps and relays. B and C are simply continuous on and off outputs in the combo mode. Relays are used in the picture below but they could be almost any type of on/off device. See the section on controlling lamps and relays for additional information and requirements for voltage settings and current ratings.

Activation Commands A and D: First set the throttle to the accessory mode. When connected as shown in the picture, and after selecting the correct output address, pushing the throttle's 3 key starts selected output alternately flashing. They alternately flash on and off and remain in this mode until turned off. Pushing the throttle's 1 key, turns off the bulb or LED. To flash the lamps at a faster rate, turn on switch #3 (FR).

Activation Commands B and C: First set the throttle to the accessory mode. When connected as shown in the picture, and after selecting the correct output address, pushing the throttle's 3 key turns on the relay. Pushing the throttle's 1 key, turns off the relay.

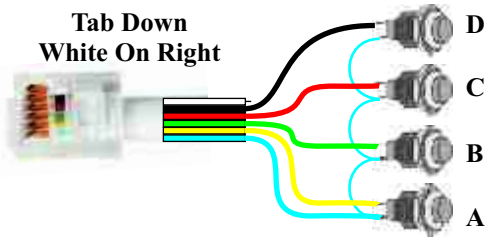


Using Local Inputs

When using local inputs, the push buttons "toggle" or change the state of the device connected to the Activator output. If it is a turnout, it cycles the turnout between normal and reverse each time the button is pushed. If the Activator is set for On/Off control, each time the button is pushed it cycles the load between On and Off.

Push buttons must be momentary and they must be normally open. This means the button connects the two wires together when pushed. Any type of push button can be used. Only low voltages are used and the wire size can be small.

Although there are no real limits to the amount of cable allowed, the local inputs are just that - local. That means the push buttons are located relatively close to the Activator.



Wiring of the local push buttons is easy. Each push button connects to the common ground and one of the local inputs. The picture shows the wiring for the a modular cable with its white wire oriented to the right side of the plug.

The Local Input jack is designed to fit standard 6 conductor modular telephone plugs and cables. These can be obtained from almost any large hardware store, or local electronics store. However, the cheapest source of plugs and cables is from the online catalog stores like Mouser Electronics. See the back cover for their website.

CVP Products offers custom cut lengths of modular cable with the plug already attached on one end. Call us for a quotation.

Local Input Pinout

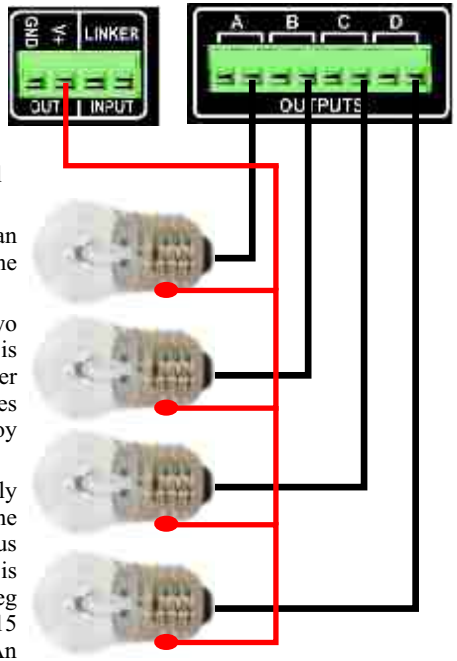
White Left	Pin #	Function	White Right
White	1	Ground Common	Blue
Black	2	Input for A	Yellow
Red	3	Input for B	Green
Green	4	Input for C	Red
Yellow	5	Input for D	Black
Blue	6	+5 volts	White

Using Incandescent Lamps, or LEDs

Lamps, relays, and LEDs are devices that require power to be applied continuously when they are on. Thus, this mode is called "Continuous." This means that once an "ON" command is received, the Activator output turns on and stays on until it receives the "OFF" command.

Setup: This mode is enabled when the SETUP switch #1 is turned on or is up. When in this mode, all outputs feature continuous on operation.

Connections: For most installations, the device will connect between the right terminal of an output and the Activator's V+ terminal. The V+ terminal is shared by all devices. The right terminal turns ON when it receives the ON activation command.



Voltage Ratings: The incandescent bulb voltage rating must be appropriate for the Linker's power supply setting.

The V+ source voltage is about 2.5 volts less than the Linker's power supply setting. For example, if the power supply is set for 15 volts, about 12.5 volts will be present at the V+ terminal - perfect for a 12V bulb.

Bulb/Relay Polarity: There is no polarity to an incandescent lamp. Use either pin to connect to the Activator.

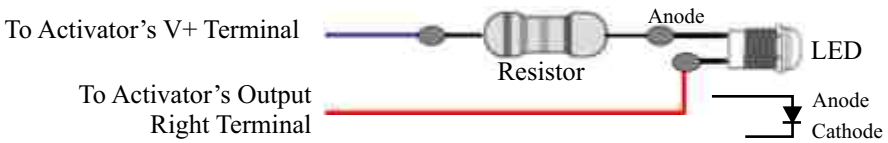
LEDs: A Light Emitting Diode, LED, has two requirements if used with the Activator. First - an LED is polarity sensitive. It must be connected to the proper terminals in order to light up. Second - an LED requires a limit resistor. Failure to use a limit resistor will destroy the LED.

LED Limit Resistor: The limit resistor value is easily determined with a bit of arithmetic. The value of the limit resistor in ohms is equal to Linker Voltage minus 2.5V divided by 0.02 or whatever the current rating is for your LED. The resistor goes in series with either leg of the LED. For example, with the Linker set to +15 volts, the limit resistor value is 625 ohms. An appropriate standard value is 620 ohms. The chosen value doesn't have to be exactly as calculated. Plus or minus 5% is close enough. Tip: higher resistor values mean a dimmer LED.

LED Polarity: In most cases, a simple, single color LED has two pins. One pin is usually longer than the other - this pin is called the anode pin. It must connect to the V+ terminal to work correctly. The other pin is called the cathode. The image below shows the long pin connected to the V+ terminal through a limit resistor. The electrical symbol for an LED is also shown and oriented the same as the LED in the holder.

Activation Commands: When connected as shown in the picture, and after putting the throttle into Accessory Mode and selecting the desired output address, pushing the throttle's 3 key turns on the bulb or LED. Pushing the throttle's 1 key, turns off the bulb or LED.

For safety and lowest power consumption, all outputs are OFF upon power application. In other words, all outputs are disabled when power is first applied to the Activator.



Using Relays

Relays are perfect devices for controlling other devices and equipment that the Activator can not control directly. A good example of this is low voltage garden landscape lighting. A simple relay connected to the activator allows you to control your outdoor lighting directly from your handheld throttle. Another example is where the relay controls a landscape and scenery water pump.

Relays require power to be applied continuously when they are on. Thus, this mode is called "Continuous." This means that once a "ON" command is received, the Activator output turns on and stays on until it receives the "OFF" command.

Setup: This mode is enabled when the SETUP switch #1 is turned on or is up. When in this mode, all outputs feature continuous on operation. There are many types of relays. Most low voltage DC operated relays can be used with the Activator provided the voltage requirement is met. See note below about output voltage.

Connections: For most installations, the relay will connect between the right terminal of an output and the Activator's V+ terminal. The V+ terminal is shared by all devices. The right terminal turns ON when it receives the ON activation command.

Voltage Ratings: The relay voltage rating must be appropriate for the Linker's power supply setting. The V+ source voltage is about 2.5 volts less than the Linker's power supply setting. For example, if the power supply is set for 15 volts, about 12.5 volts will be present at the V+ terminal. Thus a 12-14 volt automotive relay works great. If you want to use an external supply, the drawing on the lower left is how to connect it.

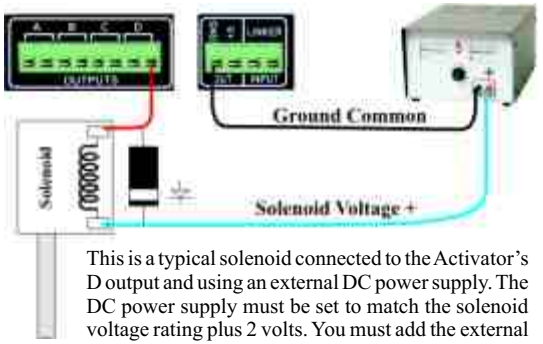
Relay Polarity: There is no polarity to a relay. Use either pin to connect to the Activator.

Relay Coil Current: The rating for the amount of current used to activate the relay coil must be ½ amp or less. Most high quality low voltage relays consume much less current than this.

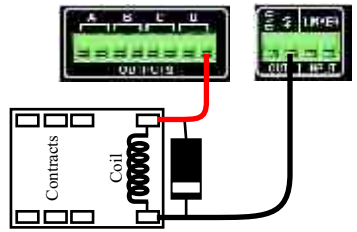
Relay Contact Ratings: Be sure to use a relay that can switch the desired amount of load current. Generally, the higher the current, the bigger the relay.

Activation Commands: When connected as shown in the picture, and after putting the throttle into Accessory Mode and selecting the desired output address, pushing the throttle's 3 key turns on the bulb or LED. Pushing the throttle's 1 key, turns off the bulb or LED.

For safety and lowest power consumption, all outputs are OFF upon power application. In other words, all outputs are disabled when power is first applied to the Activator.



This is a typical solenoid connected to the Activator's D output and using an external DC power supply. The DC power supply must be set to match the solenoid voltage rating plus 2 volts. You must add the external diode. Diode is a 1N4001 or equivalent.



This is a typical relay connected to the Activator's D output. Study your relay to determine both the coil terminals and the contact terminals. Diode is 1N4001 or equivalent.

Caution: For 12-14V DC Relays or Solenoids, Set Linker Power Supply to 15 Volts

There is about a 2.5 volt loss between the Linker DC power supply voltage input and what appears at the Activator outputs. For 12 volt relays, the DC power supply should be set to 15 volts. For 24 volt relays, only about 21 volts is available when the Linker has an input DC voltage of 24 volts. The 24 relays might not activate.

Warning - Do Not Use AC Relays

Only DC relays can be used with the Activator.