DS74

Quad LocoNet Stationary/ Accessory decoder for turnout control.

Features:

- Quad LocoNet based Stationary decoder for operating four turnout control motors.
- Configurable to support four 12V Pulse-Solenoid, four Slow-motion turnout motors or eight layout Lights.
- Plug-in connectors for simple and easy installation and service.
- User configurable as 4 consecutive switch addresses in 2000+ switch range.
- Stabilized typical 12V output drive voltages.
- Easily configured with Option Switches and/or LocoNet based programming.
- Power input from 2mm DC jack, or DCC track voltages, 10V min to 22V max.
- Optional Capacitive Discharge configurable for balky pulse-solenoids.
- 8 DS74 easy to setup Routes, with 8 Switch Entries each.
- 8 input control lines; 4 for Switch/Output change and 4 DS/Sensor inputs.
- Additional advanced LocoNet Configuration modes using DT602 throttles.

Parts List

1 DS74 Stationary Decoder   1 10-pin pluggable input cable

1 Instruction Sheet

1.0 DS74 Quick Start - Solenoid Installation

The DS74 is simple to install and begin using on your LocoNet layout.

1. Figure 1 shows the recommended factory default connections to operate the DS74 on a LocoNet layout and controlling four e.g. Atlas or Bachmann 3-wire snap type 12V pulse-solenoid switch (SW) turnouts.
2. Connect a PS14 DC or similar power supply to your DS74 via the DC center-positive 2mm power jack. Power on the DC supply. The green ID LED should light and will briefly wink OFF every 2 secs as a product 'heartbeat' showing unit is powered and operational.
3. Plug in an active LocoNet to a DS74 RJ12 connector. The red OPS LED will light up showing connection. Any good LocoNet message seen will cause DS74 OPS LED to blink OFF briefly.
4. Press and hold down the ID button for about 3 seconds until the RTS and OPS LEDs blink alternately, then release the ID button.
5. From your system send a SW command to set the Base Board address as this switch#. The OPS and RTS LEDs will stop blinking showing the DS74 has set the unit's Base SW# to the switch number (SW#) you just sent.
6. Operate turnouts with a switch# and direction Thrown (T)/Closed(C) at the Base SW#, or the next 3 SW#'s in use for this DS74.

That's all that's required for installation of your DS74 on LocoNet!
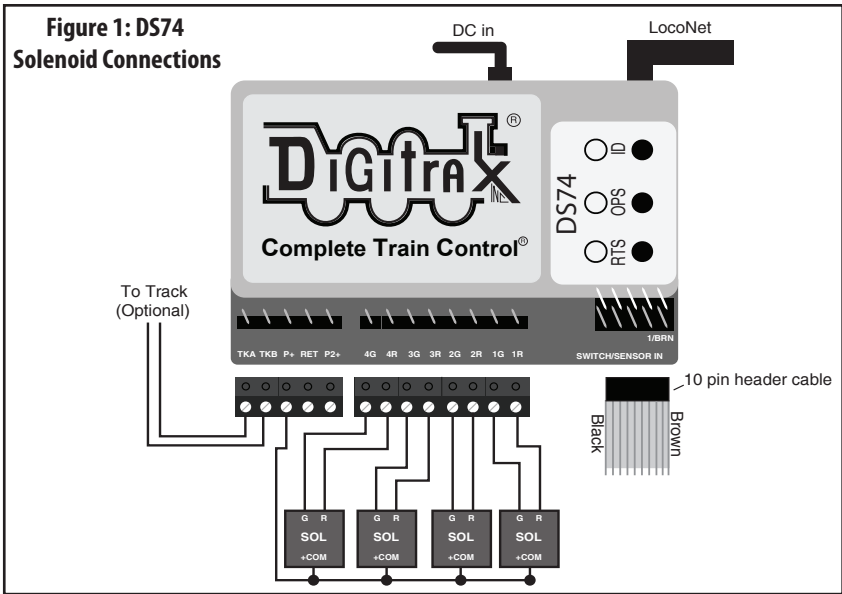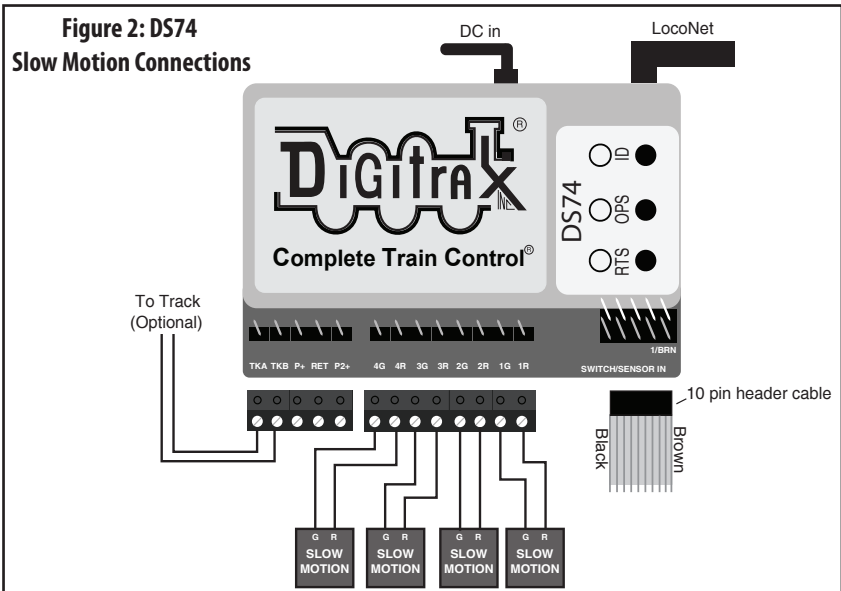
Figure 1: DS74 Solenoid Connections

Figure 2: DS74 Slow Motion Connections

2.0 DS74 Quick Start - Slow-motion motors:

1. Figure 2 shows the DS74 wired for four 2-wire slow-motion motors. Using these Figure 2 connections, follow steps 2 to 5 of prior Solenoid section 1.0.
2. Press and hold the OPS button for about 3 seconds until the green ID and RTS LEDs blink alternately. Release the OPS button. The DS74 is now setup to configure Option Switch (OPSW) 1 to 40 by sending the required SW# as Closed or Thrown to setup an option.
3. Issue a **SW#1 Closed** command. This sets OPSW1 to Closed (C) From factory defaults this will configure for Slow Motion switch outputs.
4. Note: If the DS74 is not at factory defaults, also set Switch#2 =T, Switch#3=T and Switch#4=T. See Options section 4.0.
5. Press and hold OPS button for about 3 seconds to now exit OPSW setup.

2.1 DS74 Quick Start - Lamps:
12V lamps are connected between the R/G leads as the negative connection and P+/P2+ for positive. From defaults, set OPSW1=C and OPSW3=C to enable Lamp mode. The DS74 now responds to 8 SW#'s; with C = lamp ON and T = lamp OFF for 8 R/G output lines. LED lamps require current setting resistors *and* correct polarity connection.

3.0 Setup DS74 Ez-Routes:

The DS74 has 8 internal Routes with up to 8 switch# and T/C direction Entries each. These can be set up as Ez-Routes using the RTS button and switch commands from a LocoNet throttle or connected PC.

1. Press and hold the RTS button for about 3 seconds and the ID and OPSW LEDs will blink alternately to show one Route can be set up. Release the RTS button.
2. Select a switch address on your throttle between 1 and 8 and issue the command direction for Closed. This will now be the Route Number you are going to setup. Any previous Entries in this Route will now be replaced in following steps.
3. Select the desired TOP Switch address between 1 and 2000 and issue a C or T direction command. This SW# and direction is that which will trigger this Route to be executed when seen by this DS74
4. Now enter up to 7 more SW# and direction T or C for the other route Entries required. The route entry ID/OPS LED will stop blinking indicating route is full/completed.
5. If you issue a SW# and direction twice consecutively that will also end route entry.
6. If this DS74 does not have a LocoNet connection but operates from DCC Track power on the TRKA/B terminals, then it will ignore Route Entries that do not fall within the DS74's Base address and next 3 SW addresses.
7. Best practice is to set TOP SW#'s in each route in a unique "phantom" switch range e.g. 500 and above that do not control a physical switch. This will identify the issued switch is specifically a TOP or Route-start SW#.
8. Ez-Routes do not have the ability to read back , review and edit DS74 routes already set up. For more powerful color graphics for comprehensive DS74 Route review and editing consider using a DT602 as noted in section 6.0.

4.0 Other DS74 Options: OPSW changes

The DS74 configuration and behavior can be configured using 40 OPSW's. The Factory default OPSW settings will configure most common requirements.

1. Press and hold the OPS button for about 3 seconds until the green ID and RTS LEDs blink alternately. Release the OPS button. The DS74 is now setup to configure OPSW 1 to 40 by sending the required SW# as Closed or Thrown to setup an option.
2. Send a SW# in range 1-40 as Closed/Thrown matching the wanted settings from OPSW Table 1 choices below.
3. When finished press and hold OPS button for 3 seconds to exit OPSW setup mode. The DS74 will now restart with the new OPSW settings.
4. Factory default OPSW settings are shown in **BOLD**.
5. OPSW's not in this table are reserved and should be kept at Factory default T settings for predictable operation.
6. OPSW40 =C will reset to Factory defaults on OPSW mode exit

Table 1: DS74 Opsw setting table:

OPSW#		Action
1,2,3,4	**T,T,T,T**	Pulse Solenoid mode (4 out)
	C,T,T,T	Slow motion mode (4 out)
	C,T,C,T	Light mode (8 out)
6	**T**	C =Disable internal Routes
10	**T**	C= Ignore standard SW commands ("Bushby bit")
11	**T**	C= 8 input lines trigger Routes
14	**T**	C= DCC SW commands only. Ignore LocoNet SW#'s
15	**T**	C= Do not echo Route SW's to Loconet.
16	**T**	C= Use Capacitive Discharge in Pulse solenoid mode
40	**T**	C= Factory Reset

5.0 External hardware Input lines:

The DS74 has eight external hardware control lines on the "SWITCH/SENSOR IN" pluggable 10 pin PCB header and the 10-pin ribbon cable. The 6" Factory ribbon cable is color coded and the BROWN pin 1 side should be on the right side when plugged in, as shown in Figure 1. If you use external lines, connect these wires to your custom wiring by e.g. a screw terminal block. If using a non-color code ribbon cable, make sure the pin numbers are correct for Table 2 usage.

A +5V Reference voltage is provided on pin 10/ribbon cable BLACK wire, and a 0V reference on pin 9 or the WHITE wire. DO not draw more than 100mA from the BLACK wire. The SW/SENS wires pins 1/BROWN to 8/GRAY are rated for up to +18V maximum input voltage.

1. The lines SW1/BROWN, SW2/ORANGE,SW3/GREEN and SW4/VIOLET wires will toggle the state of the same number output when briefly connected to the +5V voltage on the BLACK wire or pin10. If the DS74 is connected to LocoNet this will occur as a SW# message to make the change and notify the system it has occurred. Use momentary press-ON buttons to control.

2. The lines SENS1/RED, SENS2/YELLOW, SENS3/BLUE and SENS4/GRAY will send a LocoNet Block Occupancy or DS message at the SW# of the output. This will be BLOCK OCCUPIED when the line is above +4V and a BLOCK UNOCCUPIED when between 0V/WHITE and +2V.

3. For example; if the SENS2/YELLOW line is connected to the BLACK +5V Reference wire, the the DS number reported will be SW# used for Output 2R/2G. If SW10 is the BASE address of the DS74, then Output2 is SW11 and the DS message will be Block 11 OCCUPIED.

4. A disconnected SENS line will report as UNOCCUPIED.

5. The BD4N does not plug directly into the 10 pin header, and will not operate. Connect the 5 wires used by the BD4N by name via a terminal strip. More conveniently, you may connect the BD4N through a DSXC4 connector with ribbon cables for true plug and play connectivity.

Table 2: DS74 Input lines

Pin#	Wire Color	Function
1	BROWN	SW1 Toggle, +momentary
2	RED	SENS1 occupancy level
3	ORANGE	SW2 Toggle, +momentary
4	YELLOW	SENS2 occupancy level
5	GREEN	SW3 Toggle, +momentary
6	BLUE	SENS3 occupancy level
7	VIOLET	SW4 Toggle, +momentary
8	GRAY	SENS4 occupancy level
9	WHITE	0V reference
10	BLACK	+5V reference

6.0 Advanced DT602 based DS74 configuration

To perform these advanced features, the DT602 will need to be user updated to SubVersion 5.0 or higher, or a July 2021 or later IPL - see www.digitrax.com.

6.1 Detecting all DS74's and setting Base addresses: On an updated DT602 *plugged into* LocoNet, press the; Menu>3>4 keys to enter the Route Editor menu. If *any* DS74 is plugged into LocoNet, the DT602 will beep after about one second and show "DS7x" routes at the D soft key position.

1. Press the D soft key to now enter the "Selecting DS7x device " screen as shown below. This example DT602 screen shows four DS74 devices detected, their Base switch (SW) address, active switch address range# and unique device serial numbers (SN or SerNo).
2. The lowest DS74 Base address *detected and sorted* is SW0001, with 4 outputs with SN 9122. This is displayed in GREEN to indicate that it does NOT conflict with the second DS74 SN 3122 at Base address 5. This is true because the next free address is SW1+4 or SW0005, that second DS74 SN 3122 is set *at or above*. You can use the LH encoder knob to scroll up and down through the detected DS74 lines, with an underline showing the selected DS74.
3. The third DS74 shown at Base SW9 has 8# outputs shown, so it is configured by OPSW's to operate 8 on/off light outputs instead of 4 T/C turnout controls.
4. The 4th DS74 at Base Sw10 overlaps the third DS74, and so is displayed in RED text, because SW9+8 would require the 4th DS74 SN9945 to have a base address of at least Sw17 to avoid SW# overlaps.
5. Rotate the DT602 LH encoder knob to underline the fourth DS74 line entry.
6. Press the numbers 1 then 7 then press the A soft key "Chng Adr". The last DS74 will change to Base SW17 and now show GREEN because there are now no SW overlaps of any DS74's detected.
7. To identify the actual underlined fourth physical DS74 on the layout; press the F soft key "Ident" and just this DS74 will blink its ID/OPS/RTS leds for 3 seconds. Press "X" to exit any DT602 advanced mode.

CsRt		Ident
Selecting DS7x device		
Device:	Base+Out#	SerNo
DS74	Sw0001+04#	9122
DS74	Sw0005+04#	3122
DS74	Sw0009+08#	2500
DS74	Sw0010+04#	9945
DS7x device select: LH knob		
Chng adr		

8. This advanced DT602 capability allows you configure all DS74's in position on a LocoNet layout, quickly and conveniently, even if all devices are initially at factory-default Base SW1.
9. If you are using other types of Switch control decoders, you will have to note their active SW addresses and manually ensure the DS74's are configured to avoid these.

6.2 Reading and Editing a DS74's routes:

As for section 6.0, using a suitable DT602 plugged into LocoNet, press the; Menu>3>4 keys to enter Route Editor menu. If *any* DS74 is on LocoNet, the DT602 will beep after about one second and show "DS7x" routes at the D soft key position.

1. Press the D soft key to now enter the "Selecting DS7x device " screen ,
2. Rotate the LH encoder knob to underline the DS74 to edit routes on,
3. Now press DOWN the LH encoder knob to read in and display the Routes of the selected DS74, as shown in adjacent "EDIT DS7x Rt#" screen.
4. The LH encoder knob now selects a Route# and the RH encoder selects the *black outlined* Entry# to edit. Soft A key will toggle the entry from T to C direction choice. Numeric keys will change the SW# in the outlined Entry position. "Add" soft key allows inserting another entry at current position and "Delete" will remove the current entry. The "SW test" will send just the outlined switch# and direction to LocoNet.

CS Rt	SW test	Delete

EDIT DS7x Rt#   01   of 8
Entry# TOP of 8

`0100c`
`0224t`

DS74 Sw0005+04# 3122
DS7X Edit: LH knob selects

Thrown	Add	Save

5. <u>After edit of a Route is complete **be sure** to press the "Save" soft key to update this in DS74 Route to non-volatile memory.</u> Press "X" to exit.

6.3 Programming DS74 CVs on LocoNet:

As for section 6.0, with a suitable DT602; press Menu>2>1 keys to enter Operations Mode programming.

1. Press the F "SWITCH" soft key to enter the "Ops **Switch**" mode programming screen as shown adjacent. This example screen shows CV11 selected for a DS74 with BASE address of SW1.
2. Use the LH and RH encoder knobs to select the SW# that you wish to modify a CV on. DS74's CV11 to CV15 access the 40 OPSW bit settings.
3. For example; at CV11 press the "CV-DATA" soft key to change to CV data entry and press the number 5 then press "WRITE" key. This now configures the 8 OPSW bits in CV11 to 5, forcing this DS74 to change to Light mode with 8 on/off outputs. A value of 00 in CV11 will return to factory default Pulse-solenoid mode. A CV11 value of 01 sets Slow motion output mode.
4. Be careful changing the values in

LOCO

CV Program Menu A:
 Ops Switch ADR: 0001

CV Number: 0011

CV data: 0000

CVNUM	CVDATA	DONE

CV11,12,13,14 and CV15 since the 8 bit data number 0-255 in these CV's actually each control 8 individual OPSW bits.

5. The DT602 does not indicate to the DS74 when finished programming, so after you have *finished* CV changes, best practice is to POWER cycle the DS74. Alternately, you can WRITE CV7 to 00 to restart that DS74.

7.0 Set up Notes: The DS74 manages SW output voltages and current.

1. In pulse solenoid mode for problem solenoids, try OPSW16=C for higher current Capacitive Discharge pulse action.
2. In all output modes a 300mA /14V supply should suffice.
3. You can optionally operate DS74's on TKA/TKB terminals with DCC power only, but control may fail due to track power interruptions from e.g. derailments etc. Also, the total DS74 run and startup current will subtract from the Booster current available for mobile/locomotive decoders in that Power District.
4. For 2-wire pulse solenoids, e.g. a Kato N-crossover, just wire to R/G terminals in the polarity that operates as you need. Do not run more than one solenoid device per DS74 R/G output pair.
5. For Slow motion turnouts the total current per output R/G pair should be less than 70mA. Total 8 Light/Lamp loads should be less than 280mA peak.
6. Take care not to short any of the DS74; R/G output, P+ and RET leads, or connect to other voltages like Track power etc. This may cause damage not covered by Warranty.
7. If the DS74 flashes the "Ident" pattern of ID & RTS LEDs alternating with OPS LED for 3 seconds it has detected an overload and has shutdown control power. Identify the cause of the overload and fix this before resuming operation.
8. While a DS74 can operate with just DCC track power on TKA/TKB terminals, it will not have all features available.

8.0 Warranty & Repair

Digitrax gives a one year Warranty against material and manufacturing defects on the DS74.

Visit www.digitrax.com for instructions for returning items for repair. **Please return warranty items directly to Digitrax** - DO NOT return items to place of purchase.

Digitrax, Inc. reserves the right to make changes in design and specifications, and/or to make additions or improvements in its products without imposing any obligations upon itself to install these changes, additions or improvements on products previously manufactured. IPL capable products like the DS74 & DT602 may be user updated with the latest IPL files that are available for free on the product specific information pages of the www.digitrax.com web site. The newest features are documented on the product pages of the website.

Digitrax, Inc. is not responsible for unintentional errors or omissions in this document.

2443 Transmitter Road

Panama City, FL 32404

www.digitrax.com

Need Support?

helpdesk.digitrax.com

DS74

307-DS74-0000

Made in the USA

6 52667 08009 5