DTMF3 User manual

DC Custom Electronics
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1: Overview

Signal from radio

Negative voltage (0V)

Positive Power to radio (+7.2-8.6V)

Positive Voltage (12V)

Power IN 12V DC

Motor output for switch #1

Motor output for switch #2

Motor output for switch #3

Status light

Programming Button

Signal outputs for switch #3

Programming LEDs

Track detection input for switch #1

Top green signal for switch #1

Top red signal for switch #1

Bottom green signal for switch #1

Bottom red signal for switch #1

Signal outputs for switch #2

Track detection input for switch #2

Track detection input for switch #3

A= Switch is set in mainline direction
B= Switch is set in diverging direction
C= Error/Switch is being lined

2: Power requirements

	Min	Max	Nominal
Operating voltage	10Vdc	15Vdc	12Vdc
Over all Current draw	100mA	10A	---
Output current (motors)	---	8A	---
Output current (signals)	---	500mA	---
Input voltage tolerance	0v	24V	0V
Input ON voltage	0V	2V	< 2V
Input OFF voltage	2.5V	24V	> 2.5V
Output ON voltage	---	---	0V
Output OFF voltage	---	---	High Z

3:Setup

A: Programming Switch IDs

There are 2 user changeable parameters in the DTMF3. Switch ID and pulse time. Switch ID is the unique 3 digit ID used to determine what switch to throw. This can be anything from 000 to 999. Pulse time is the amount of time the switch motor will be powered in order to throw the switch. This can be anything in multiples of 10mS (0.01s) from 0.01 to 9.99 seconds. When you first receive your DTMF3 these should be preset to the following unless otherwise specified.
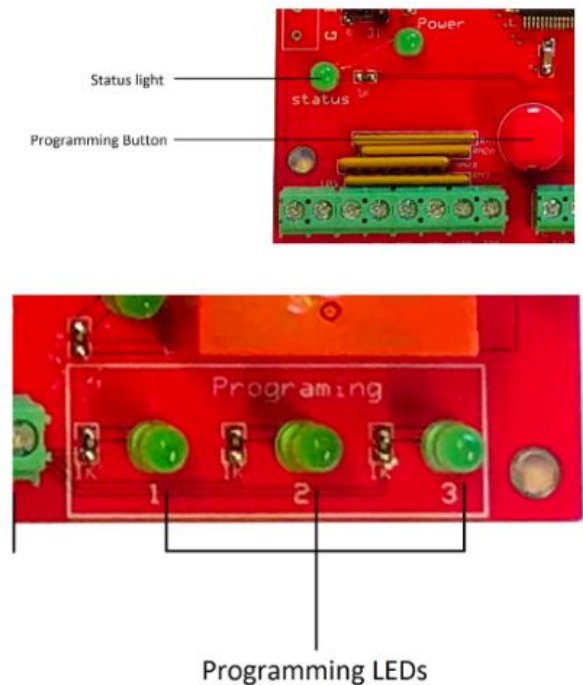
SW#1- ID=123 Pulse=1 second
SW#2- ID=456 Pulse=1 second
SW#3- ID=789 Pulse=1 second

With the power ON locate the programming button on the lower left of the circuit board. Now locate the 3 programing LEDs on the lower right of the circuit board. Press and hold the programming button until LED 1 iluminates, If you continue to hold it will cycle to LED 2 and then LED 3 .Let go when the desired LED is selected. This selects what switch (out of the 3 available) will be programmed.

Once the desired switch has been selected and the LED illuminates, release the button. Now press the programming button to enter ID mode. Once you do this regardless of what switch is selected LED 1 will begin to blink. When LED1 is blinking, key up on your radio and enter the number of the first digit desired. (if your desired ID is 286 enter 2). Now LED 2 will begin to blink. Enter the next digit (in our example: 8) Then LED 3 flashes, enter digit 3 (Our example: 6). Now all 3 LEDs should glow for 1 second indicating It is saving. After this the board will go back to regular mode. Repeat this for each switch remembering to hold the programming button until the desired led glows.

Programming LEDs

Example:
    After pressing the programming button LED1 blinks
    Our desired ID is 286 so we enter the number 2
    Now LED 2 blinks, so we enter the number 8
    Now LED 3 blinks, we enter the number 6
    2+8+6 = 286
    Your radio entry should look like this:
    Key up and hold -> 2 -> 8 -> 6 -> Key down the radio (release PTT)

Switch ID can be any number between 000 and 999

B: Programming Switch Timing

With the power on locate the programming button on the lower left of the circuit board. Now locate the 3 programing LEDs on the lower right of the circuit board. Press and hold the programming button until LED 1 iluminates, If you continue to hold it will cycle to LED 2 and then LED 3 .Let go when the desired LED is selected. This selects what switch (out of the 3 available) will be programmed.

Once the desired switch has been selected and you have let go of the programming button, press AND HOLD the programming button for 3 seconds until LED 1 begins to blink. Once LED 1 is blinking key up on your radio and enter the 1s place digit. Next LED 2 blinks, enter the tenths place digit, then the hundredths place digit when LED 3 blinks.

Now all 3 LEDs should glow for 1 second indicating It is saving. After this the board will go back to regular mode. Repeat this for each switch remembering to press and hold until the desired switch is selected.

NOTE: It is recommended to start with a small number and work your way up until the switch points close in the desired position. The DTMF3 DOES NOT have built in stops and will continue to apply power for up to 10 seconds regardless of switch state. It is recommended to use your own stop switches to restrict point movement.

Example:
        After pressing and holding the programming button LED1 blinks
        Our desired time is 2.75 seconds so we enter the number 2
        Now LED 2 blinks, so we enter the number 7
   Now LED 3 blinks, we enter the number 5
        2+7+5 = 2.75 seconds.

        NOTE: Entering 0.00 into the pulse programming will disable this switch.

C: Wiring Motors

The Outputs of the DTMF3 are momentary polarity reversing. This means when the system is idle and no switches are moving there will be no power to the switch machine. When the switch is thrown in the "A" position Polarity will read + - for the duration of the timing cycle. When the switch is thrown in the "B" position polarity will read - + for the duration of the timing cycle. There are NO built in stops at this time so it is recommended that the user wiring in limit switches to prevent switch machine damage.
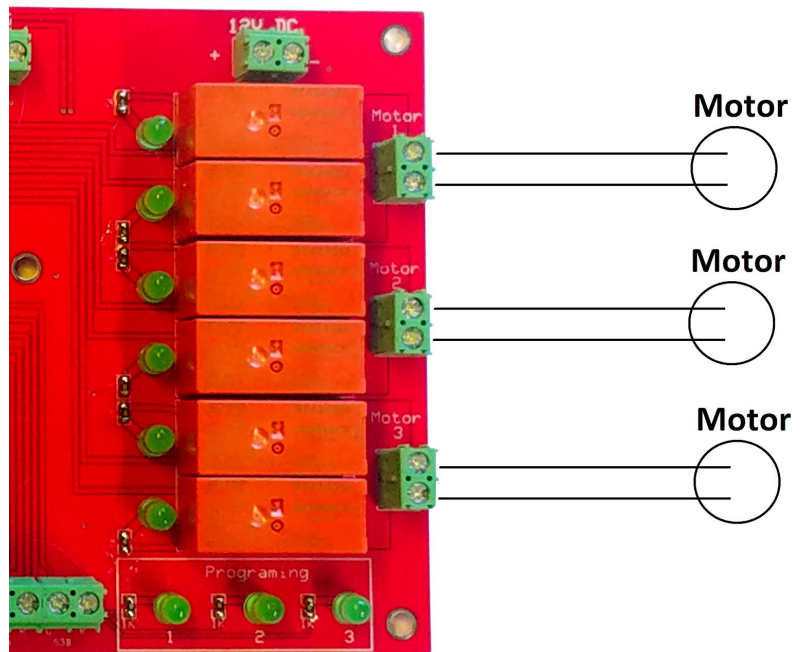
Alternate wiring using limit switches:
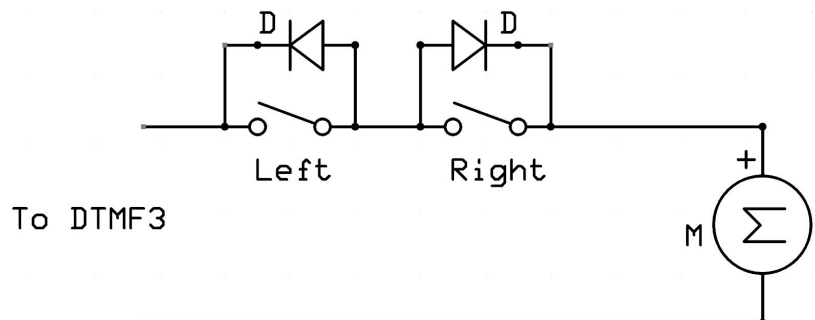
4: General Operation

With the power on the DTMF3 will sit idle until a valid ID is entered on the correct frequency. To activate a switch you must know the switch ID and frequency it is on. If you only use one radio channel then all you need is the switch ID.

On your radio press and hold the PTT (transmit) button. While holding the PTT button enter the desired switch ID and then the command key. The command keys are: * (star) for mainline and # (pound) for diverging. Then let go of the PTT key. A switch operation should look like this:

Ptt press   2 8 6 # Ptt release   *signal goes red then the switch moves and signal goes green*

If there is or was a train on the switch within the last 10 seconds and track detection is enabled the switch will NOT throw until the train has been clear of the track detection for at least 10 seconds.

Note: Some radios will play back the DTMF tones as you enter them on your radio, likewise any other radios on that channel will play back the tones. Other radio users will hear the tones in their earpieces and over their radios so it is recommended to warn other uses that DTMF tones are in use or dedicate a channel to only DTMF switches.

5: Adding signals
A: Wiring diagram
Connect all POSITIVE connections on lights together and bring back directly to positive power supply. The DTMF3 switches negative. This means the outputs on the board act as a switch between load and ground. Connect each individual light's NEGATIVE to the corresponding output on the DTMF3. Note the DTMF3 has labels and sub labels "S1A" means signal 1 aspect A (top aspect) and then there are G and R connections representing green and red lights. Now we see "S1B". This is signal 1 aspect B (bottom aspect) and again G and R connections. The same is true for signals 2 and 3.
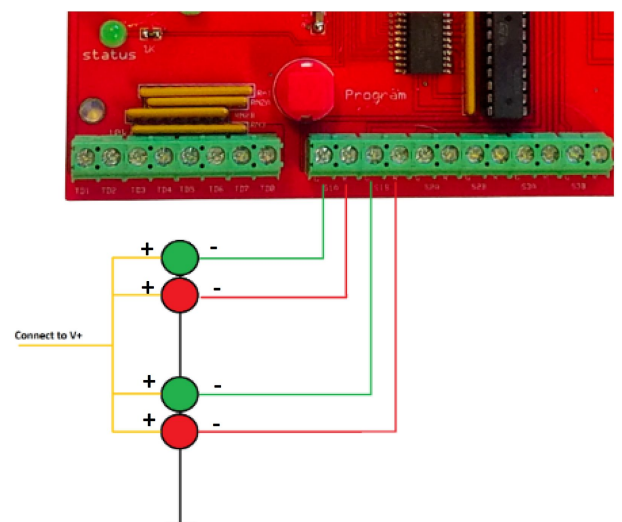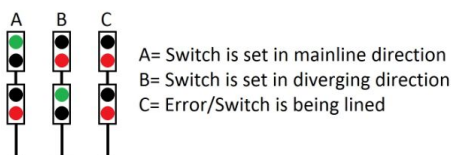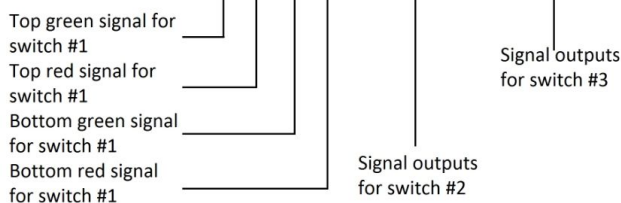
B: Power requirements

The DTMF is able to support up to 500mA and up to 24V on its signal outputs. If additional power is required please follow the following wiring diagram to add relays.

+12v

To Load

To DTMF3

NO

NC
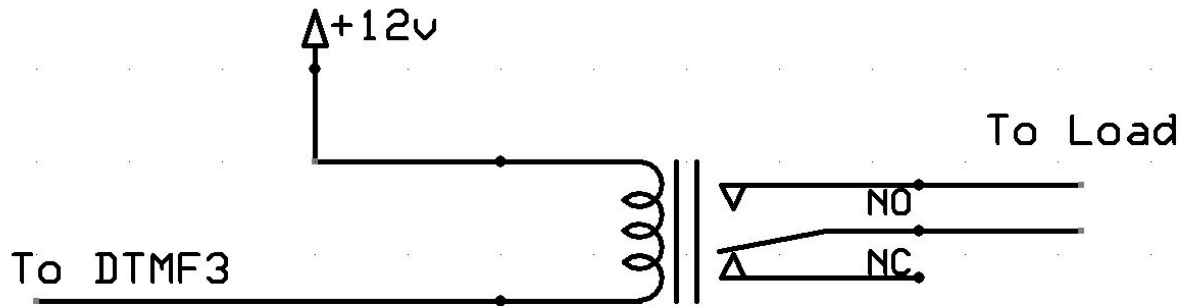
6: Adding Track Detection

Here we show 2 possible ways to do track detection. One features a relay, the other, some kind of switch or contacts. (We offer a track detection module for use with all DCCE products. See "TDx6"). In order to operate the track detection input simply connect it to ground (0V). DO NOT CONNECT DIRECTLY TO THE RAILS! Damage to the DTMF3 by connecting directly to the rails will result in a void of warranty!

Relay

NO

NC

Connect to 0V

Switch

SW
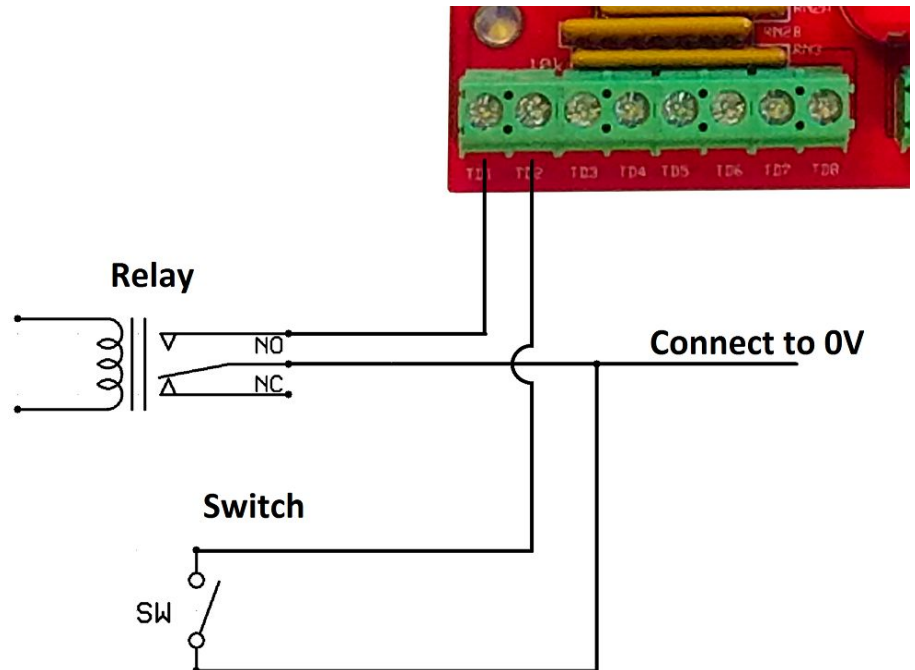
7: Troubleshooting

A: One switch does not throw at all

Try reprogramming the switch ID and check the timing set on that switch. Setting the timing to 000 will disable that switch. Ensure you are on the correct frequency and that the tethered radio is operational and the volume is set to at least 50% but no more than 80%. Ensure you are properly pressing the digits on your radio while holding down the PTT button the entire time. The DTMF3 may not register fast button presses, try slowing down. On the flip side, waiting more than 5 seconds between button presses will result in a timeout and you will need to start over. Try replacing the ULN2803A chip in the top socket. (Available from DCCE)

If the problem persists please contact DC Custom Electronics for further assistance.

B: Switch does not throw in one direction

Ensure that you are pressing the correct command key (* star or # pound). Check to see if the receiver radio is set to 50% - 80% volume. Check for proper wiring of limit switches. Try holding the command key for 1 second after entering the switch ID. Try replacing the ULN2803A chip in the top socket. (Available from DCCE)

If the problem persists please contact DC Custom Electronics for further assistance.

C: All Switches do not throw

Check to make sure that the DTMF3 is powered on. Make sure the receiver radio is turned on and volume is set to 50% - 80%. Unplug and replug in the 2.5mm jack on the side of the receiver. Check the operating frequency and correct it if needed. Try reprogramming the switch IDs. Try replacing the ULN2803A chip in the top socket. (Available from DCCE)

If the problem persists please contact DC Custom Electronics for further assistance.

D: Signal is dark

Check all wiring and make sure there are no breaks in the wire. Check for burned lights by connecting them directly to power. Throw the switch using DTMF and check for other lights. Finally replace the ULN2803A chip in the bottom 2 sockets. (Available from DCCE)

If the problem persists please contact DC Custom Electronics for further assistance.

E: Track detection does not work/works sometimes

Check all wiring. Ensure contactors are closing and grounding the input. Test the input by jumping it directly to ground, if the switch will not throw in this condition then the input is working. If the switch throws with the input grounded contact DCCE for further assistance.

If the problem persists please contact DC Custom Electronics for further assistance.