

DEM TRS Transmit / Receive Sequencer Rev C

Specifications

Operating Voltage: +8 - 16 VDC	Sequenced Steps: 4
Full Sequenced Time: \cong 500 ms, User adjustable	Outputs: 8
Outputs Sink or Source: 2.5 Amps max./ @ 30VDC or less 0.6 A @ 125VAC	Keying: PTT-L (Ground) Sinks 1 mA. PTT-H (+1.5-16 VDC) Source 2 mA.

Operation:

The DEM TRS is a SMD version of our previous W5LUA design sequencer with relays. The sequencer has the same functions as the previous revision with some physical changes. The sequencer is activated by either a push to talk to ground (PTT - L) or by applying a + 1.5 - 16 VDC (PTT-H). When activated, an R/C timing circuit in combination with a voltage divider network, begins to turn on each individual op-amp, (the LM324D has 4 total), 1st through 4th in sequence. The op-amps in turn drive their respected switching transistor and relay circuits. When the PTT circuit is released, the sequencer moves back to the resting state in the reverse order. Each of the 4 sequenced stages have 2 separate isolated outputs (8 total) that may be selected to produce a voltage, (High) or a connection to ground (LOW) in either transmit or receive. This provides many switching functions and output combinations that should fit any requirement. The outputs may be changed or altered at any time if your station's requirements change by referring to the setup matrix. The sequencer operates with a standard 13.8 VDC and its "High" outputs have a 2 amps switching capacity but is limited by the total current capacity supplied to the board. A modification may be made to switch any other voltage than the operating voltage.



Board Version

Installation of the board version (the TRSB) is not critical. Use all 6 mounting holes. Most importantly are the two holes for the connector. When received, the connector will be bolted to the circuit board. It can remain that way if desired and the other four mounting holes may be mounted on "stand-offs" to allow clearance for the connector. Be sure to use the DB-15 hardware of the mating connector to firmly attach it. The provided LED's will have long leads and you may remove or adjust their length to accommodate your installation.

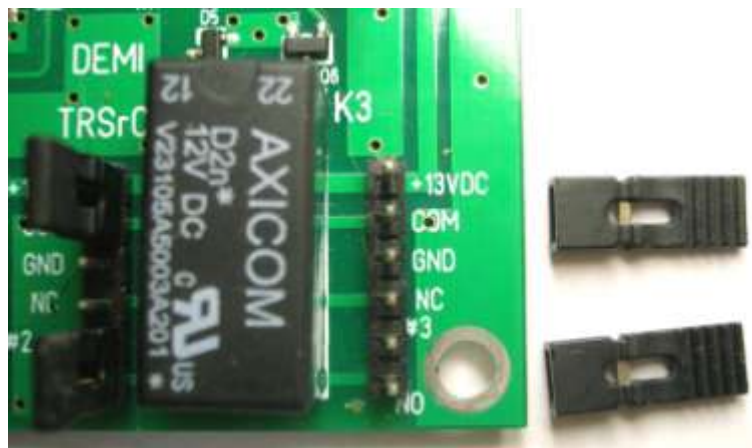
The board as is, it is ready to test. Follow the 15 pin connector pin out on the next page and chose and wire as desired. All stages and positions are not required to be utilized but if all are wired, you will always have the option to change the set up at any time. If your plans include switching a voltage other than the standard 13.8VDC, you may make provisions by connecting this voltage to any of the stages or positions COM connection. Understand that the relay contacts are power rated so as the voltage increases, the current decreases. Limit to 75 watts per pole.

Sequencer Matrix

The pin outs and matrix on the following page indicate what signals will be on the specified connector pin of the 15 pin HD connector. The mating connector can be wired with only the output required if desired or all 8 can be configured. The relay numbers K1-K4 coincide with the sequence steps. The sequencer in its resting state will be in RX. Applying a PTT signal will transfer the sequencer to the TX state in order of 1 - 4. Removing the PTT signal will allow the sequencer to go back to the RX or resting state in reverse order or 4 - 1. The two outputs of ever step may be selected as a normally open circuit or normally closed with either a “Low” connection to ground, “High” connection to the operating voltage of the sequencer. They are isolated.

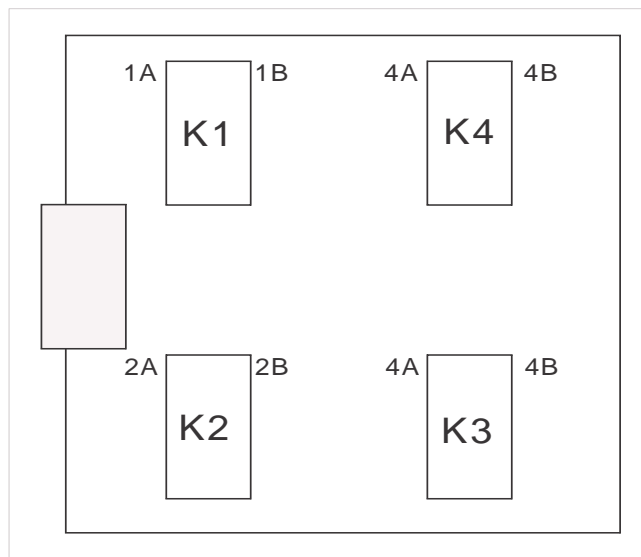
When the sequencer board is received it may have jumpers installed in our test position. To select your desired outputs, first determine what signal is to be switched, high or low. Insert a jumper on the relays “A” or “B” section of each position connecting the “COM” (the common connection of the relay) to either +13VDC or GND pin. K3B is shown to the left. Then select the relay’s output. The normally open (NO) and normally closed (NC) labeled pins are in the sequencers resting state or in Receive. If you jumper the output pin to the NC and have the common pin on the +13VDC. The output of that relay will be +13VDC in receive and open or Zero

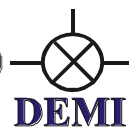
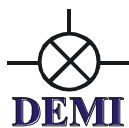
volts (not ground!) in transmit. Set up the steps and outputs as desired, test and if satisfied, indicate your selections on the matrix on the following page. Verify your selections and indicate them on the matrix. Also indicate the color of the jumper for ease of identification. Then select the type of keying for the sequencer (PTT-H or PTT-L) and install that jumper. It is ready for testing and it should be first done while not connected to your equipment. Use a VOM to verify.



DB15 Pin Out:

Pin #	Connection	Pin #	Connection
1	4A	9	GND
2	4B	10	2B
3	+DC	11	1A
4	3B	12	GND
5	3A	13	GND
6	1B	14	GND
7	GND	15	2A
8	PTT		





1		2		3		4	
A	B	A	B	A	B	A	B
RECEIVE		RECEIVE		RECEIVE		RECEIVE	
L	L	L	L	L	L	L	L
H	H	H	H	H	H	H	H
O	O	O	O	O	O	O	O
TRANSMIT		TRANSMIT		TRANSMIT		TRANSMIT	
L	L	L	L	L	L	L	L
H	H	H	H	H	H	H	H
O	O	O	O	O	O	O	O

Operation and Use:

A question that is asked most about this sequencer is “How should I fuse it in my system”. This is a question that is determined by its use. The complete unit can be fused but the size of fuse should be the total of all the switched circuits with margin plus 250 mA for the sequencer itself. If the fuse blows, nothing works. Most setups, this shouldn’t be a problem. But if you have an instance where 2 or 3 of the outputs are over 1 amp, then the safety margin could be exceeded. With a 4 Amp fuse on the input, and a dead short on the output of one of the stages, the current rating of the relay (2.5 Amps at 30VDC or less) can be exceeded before the fuse blows. So if you fuse the outputs, ones stage can blow a fuse and the others will still sequence. This is OK if it is a power amp or a preamp. You just won’t have any receive or transmit. But if a fuse blows on an output that is activating a RF relay, serious damage may be caused if you transmit high power into an open RF relay. So think it over, and plan it out. Try to keep to total current drain below 2 amps and fuse it with a fast blow version.

Parts List

Components			
C1	10 uF or 15 uF	Q1-Q4,Q6,Q7	MMBT3904
C2	10 uF	R1,R2,R5,R6-R14, R19-R22	10KΩ
D1-D6	MMBD914	R3	22KΩ
D7-D8	LED DIODE	R4	470Ω
IC 1	LM 324	R15-R18	1 MEGΩ
K1 - K4	DPDT Relay	R23	1 KΩ

