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SO2R SWITCH PROJECT NO. 2
## By K8JHR

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Design Goals and Objective:

To design and build a Single Operator Two Radio (SO2R) Switch that enables the operator to instantly switch the following devices to one of two radios saving desk space, simplifying station layout, and enhancing operator convenience.

> 1 or 2 separate microphones,
> 1 or 2 headsets/headphones,
> 1 PTT button or straight code key,
> 1 iambic, single, or dual dual paddle code key or paddle,
> 1 linear amp key line.

SO2R SWITCH PARTS LIST

Quantity	Part No.	Description	@ Price	Total Price
1	BK-BU 947	TEN-TEC B-Series 9"x4"x7" Project Enclosure	$44.23	$44.23
2		8-pole, 2-throw Rotary Switch	$8.00	$16.00
6		Insulated Panel Mount Female RCA Jacks	$1.00	$6.00
1		3-pin XLR Female Jack	$2.50	$2.50
10		3.5 mm (1/8") TRS Jacks	$1.00	$10.00
2	MFJ-5082	Pre-wired 8-Pin microphone cable – 8-pin Foster Plug at one end; unterminated (with stripped and tinned leads) at the other end	$9.00	$18.00
5.5 ft		Spools 22 gauge insulated hookup sire - 3 colors	$.30	$1.65
4 ft		Light gauge 3-conductor shielded audio cable	$.50	$2.00
2		Self-tapping screws to secure XLT jack (on hand)	N/C	N/C
			TOTAL (LESS SHIPPING) :	$100.38

Construction Notes:

The most difficult task is charting the respective wiring assignments. Wiring was accomplished according the table of pin and jack wiring assignments that appears on Page 3, infra.

ROTARY SWITCH ASSIGNMENTS
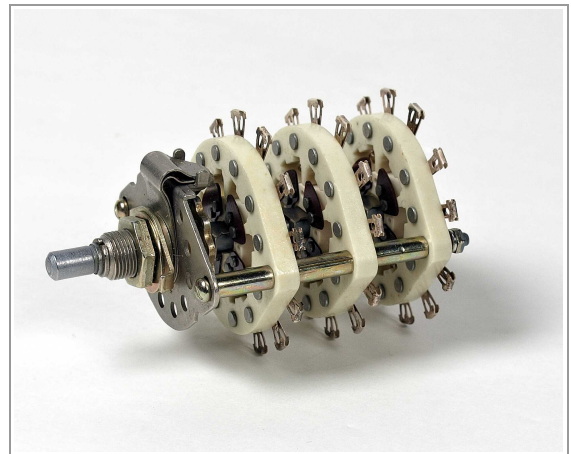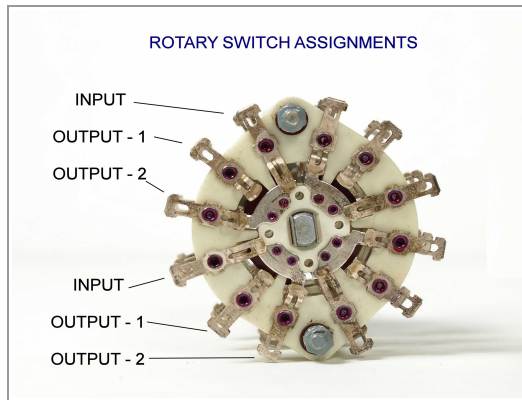
Common, readily available component parts were used: 3-pin XLR microphone jack; RCA phono jacks; ¼ inch TRS phone jacks; and two (2) Russian military surplus 12-pole, 2-throw (two position) rotary switches. Two (2) pre-wired microphone cables (MFJ-5082) simplified and simplified construction.

Project Enclosure:

TEN-TEC manufactures a line of steel and aluminum project enclosures, which are an ideal cabinet for this type of project. The Model BK-947 project enclosure is 9" w x 4" d x 7" d. The B-Series project enclosures are available with blue or black 0.036" powder coated steel covers with .062" eggshell white painted aluminum front and rear panels making it durable and solid. The enclosure has an unpainted internal aluminum chassis with a multi-position shelf that can be used for a variety of purposes. It was left out of this project to provide more internal space.

TEN-TEC BK-947 PROJECT BOX
Internal: Width: 9" Height: 4" Depth: 7"
OD W: 9.410" H: 4.100" D: 7.560"

Preparing the Enclosure:

Front Panel and Rear Panel Templates, indicating the exact placement of all jacks and switches, were prepared in advance. They were trimmed and taped to each panels, respectively. Each hole was marked and started with a center punch to keep the drill bits from wandering as holes were drilled. Some holes were formed, shaped, or improved using a step drill bit, which is a very handy tool that makes more round, exacting holes than a standard twist drill bit.


Mounting the Components:

The XLR and phono jacks mount from the outside. Phone jacks mount from the inside. It is recommended to drill the mounting holes on the front and back panels before installing the jacks and other components.

After drilling and deburring the mounting holes, prepare 7 inch leads and solder them to the various jacks before mounting them to the rear panel. Each set of wire leads is twisted or braided, or made from shielded 3-conductor audio cable, and labeled as to its specific function. Next, the unterminated leads are soldered to the appropriate and respective pins on the rotary switches.
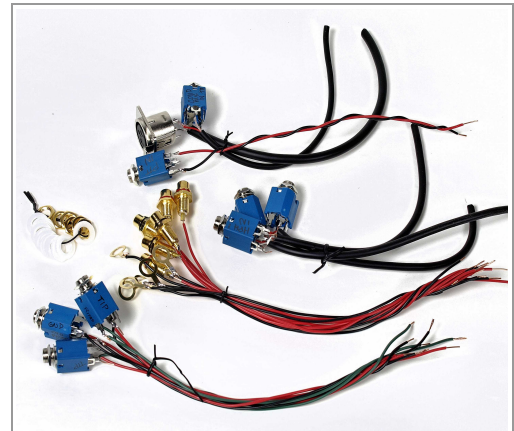
Mark each set of connectors on the rotary switches with a number from 1 through 12 to facilitate final wiring and testing.
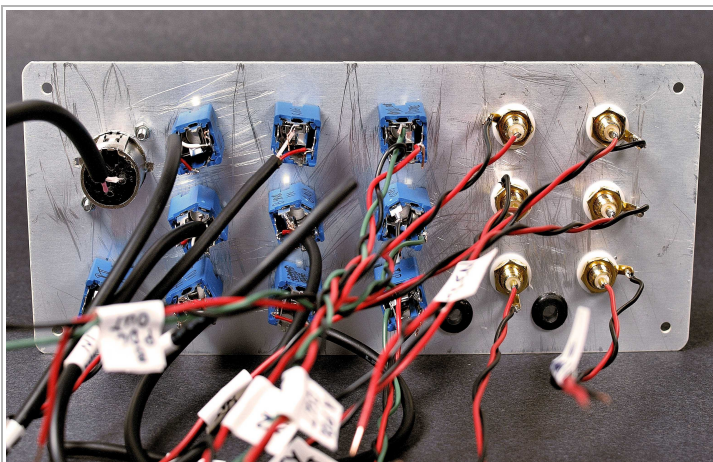
Mounting the wired jacks is easy. The hard part is keeping track of all the various leads while soldering their unterminated ends to the rotary switches. Follow the wiring assignments on the next page.

☐ Cells with light blue shading are options which may or may not have been implemented on this project.

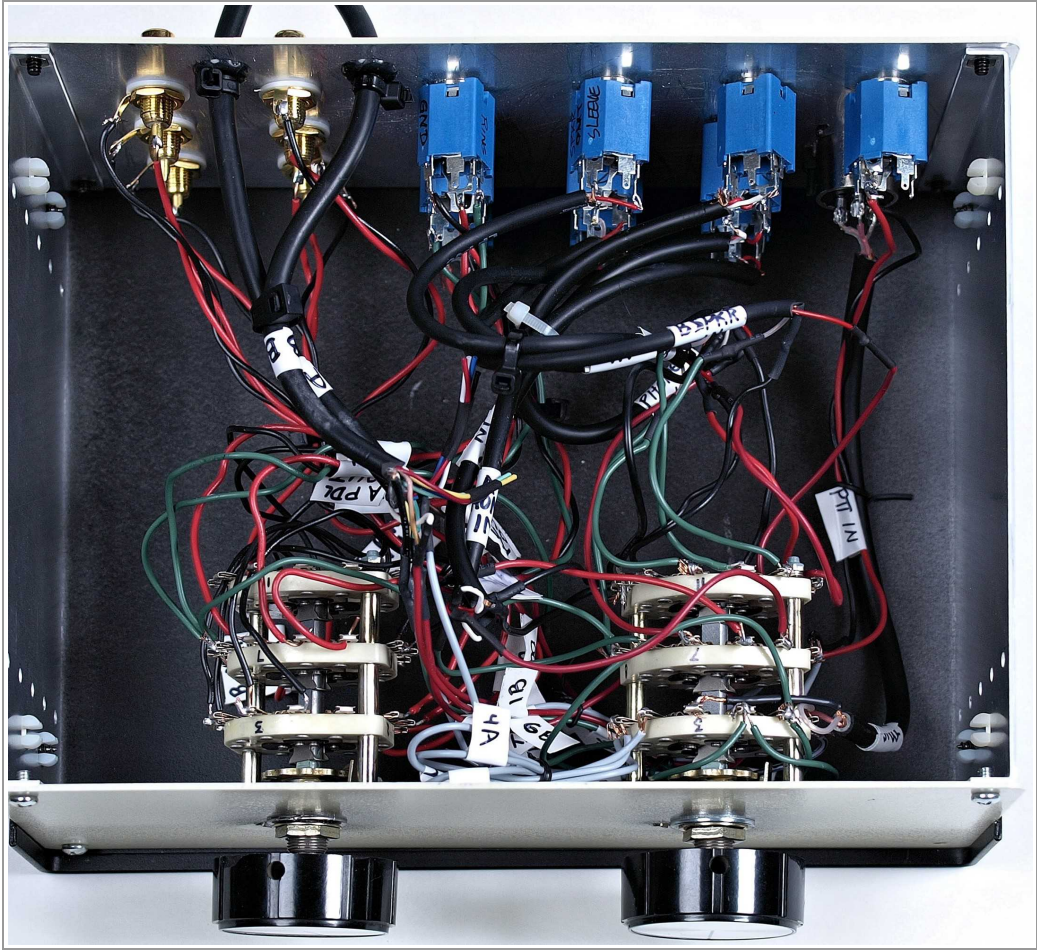|		Rotary Switch No. 1				
MICROPHONE						
Line Function	Rotary Switch Pin No.	Omni VII 8-Pin Foster Jack /Cable	TS-590s 8-Pin Foster Jack /Cable	TRS PTT Switch IN	3-Pin XLR Female Jack	Electret Condenser Mic TRS jack (not used this project – can be added later – with TRS and XLR A/B switch)
Mic Signal	1	Rig Pin 8 brown to Rotary Pin 1A	Rig Pin 1 white to Rotary Pin 1B		XLR 2 to Rotary Pin 1 – main pin	TRS Tip to Rotary Pin 1 – main pin
Mic Neutral						
Mic Ground	3	Rig Pin 7 shield to Rotary Pin 3A	Rig Pin 7 shield to Rotary Pin 3B		XLR Pin 3 to Rotary Pin 3 – main	TRS Sleeve to Rotary Pin 3 – main pin
Mic Bias Voltage	4	Rig Pin 2 black to Rotary Pin 4A	Rig Pin 5 yellow to Rotary Pin 4B			TRS Ring to Rotary Pin 4 – main pin
PTT Actuate	5	Rig Pin 6 green to Rotary Pin 5A	Rig Pin 2 black to Rotary Pin 5B	TRS Tip to Rotary Switch Pin 5 main		
PTT Ground	6	Rig Pin 5 yellow to Rotary Pin 6A	Rig Pin 8 brown Rotary Pin 6B	TRS Sleeve to Rotary Pin 6 main		
SPEAKER / HEADPHONES						
Line	Rotary Switch Pin No.	Omni VII TRS 1	TS-590s TRS 2	TRS to Headphone Out	TRS Speaker System Out	RCA in From DSP-zx599	RCA in From DSP-zx599
L Channel	7	Tip from Rig to Rotary Switch 7A	Tip from Rig to Rotary Switch 7B	To Rotary Switch 7 main			
R Channel	8	Tip from Rig to Rotary Switch 8A	Tip from Rig to Rotary Switch 8B	To Rotary Switch 8 main			
Ground	9	Tip from Rig to Rotary Switch 9A	Tip from Rig to Rotary Switch 8B	To rotary switch 9 main			
L Channel	10				Tip to Rotary Switch 10 main	TRS tip to Rotary Switch 10A	TRS tip to Rotary Switch 10B
R Channel	11				Ring to Rotary Switch 11 main	TRS ring to Rotary Switch 11A	TRS ring to Rotary Switch 10B
Ground	12				Sleeve to Rotary Switch 12 main	TRS sleeve to Rotary Switch 12A	TRS sleeve to Rotary Switch 12A

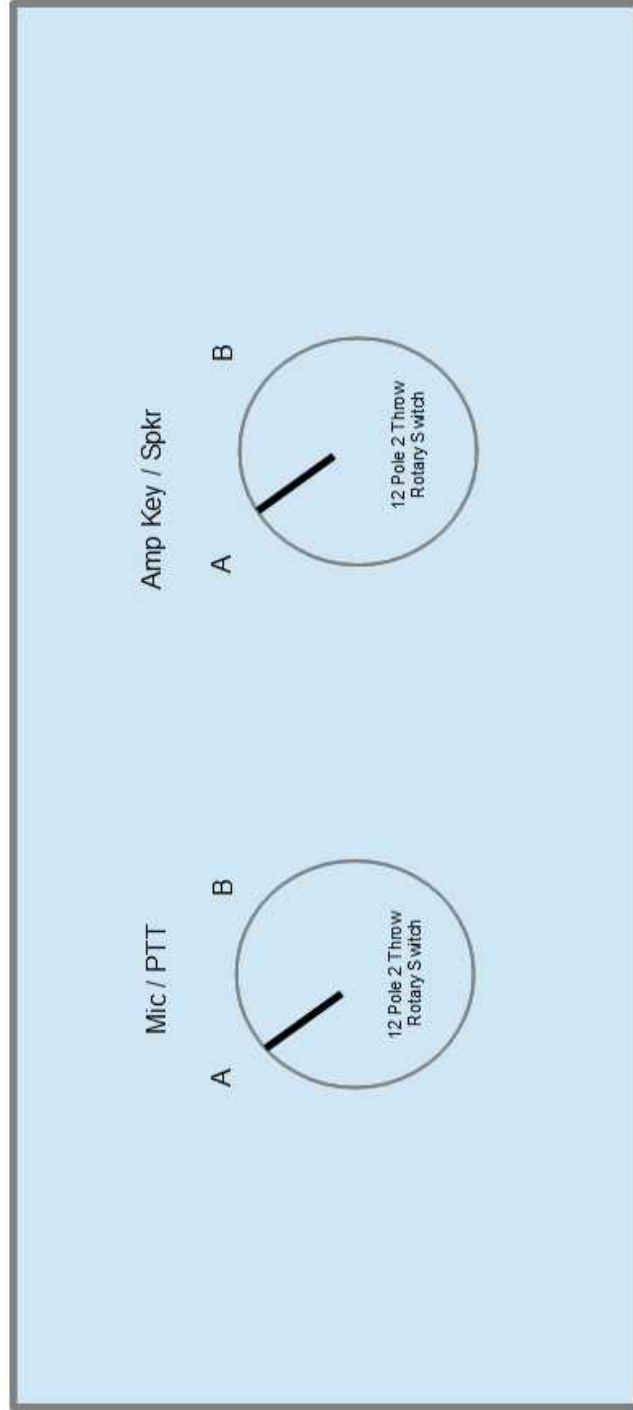|		Rotary Switch No. 2					
		AMP KEY LINE					
Line	Rotary Switch Pin No.	RCA 1 To Amp Key Out	RCA 2 to Amp Key In	RCA 3 to Amp PTT In	RCA 4 O VII TX EN	RCA 5 O VII TX OUT	RCA 6 TS-590s Amp Key Out
O VII TX EN	1	Center Pin to Rotary Switch 1 main			Center Pin to Rotary Switch 1A		
O VII TX OUT	2		Center Pin to Rotary Switch main 2			Center Pin to rotary Switch 2A	
O VII TX EN Ground	3	Ground to Rotary Switch 3 main			Ground to Rotary Switch 3A		
O VII TX OUT Ground	4		Ground to Rotary Switch 4 main			Ground to Rotary Switch 4A	
590 Activate	5			TRS shield to Rotary Switch 5 main			Center Pin to Rotary Switch 5B
590 Common	6			TRS tip to Rotary Switch 6 main			Ground to Rotary Switch 6B
		CODE KEY					
Line	Rotary Switch Pin No.	Omni VII TRS 3	TS-590s TRS 4	TRS Code Key IN			
L Channel	7	Rig Tip to Rotary Switch 7A	Rig Tip to Rotary Switch 7B	Paddle Tip to Rotary Switch 6 main			
R Channel	8	Rig Ring to Rotary Switch 8A	Rig Ring to Rotary Switch 8B	Paddle Ring to Rotary Switch 7 main			
Ground	9	Rig Sleeve to Rotary Switch 9A	Rig Sleeve to Rotary Switch 9B	Paddle Sleeve to Rotary Switch 8 main			

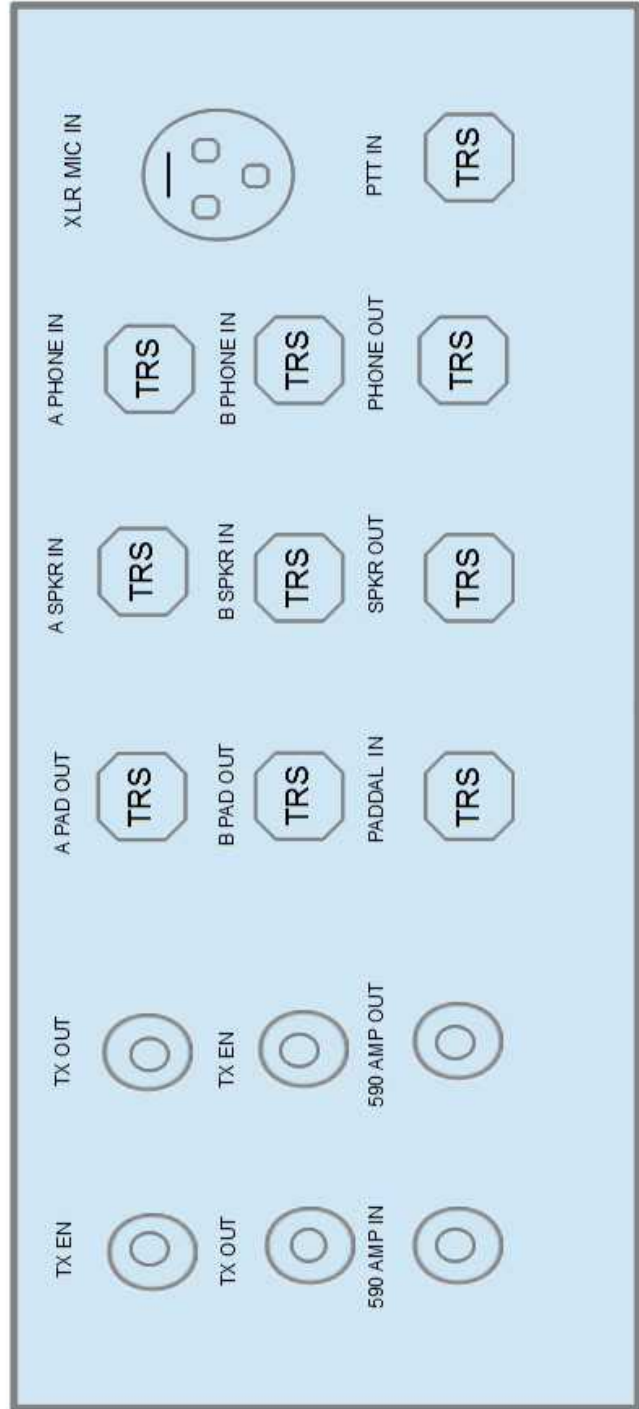|		**AMP KEY LINE - (Alternative not used this project)**					
Line	Rotary Switch Pin No.	RCA 1 To Amp Key Input	RCA 2 In from Omni VII	RCA 3 from TS-590s			
Amp Key Line	X	Center Pin to Rotary switch Y main	Center Pin to Rotary switch Y A	Center Pin to Rotary switch X B			
Return Line	Y	Ground to Rotary switch Y main	Ground to Rotary switch Y A	Ground to Rotary Switch Y B			

FRONT PANEL
LIFE SIZE TEMPLATE

9 X 4

Mic / PTT

A   B

12 Pole 2 Throw
Rotary Switch

Amp Key / Spkr

A   B

12 Pole 2 Throw
Rotary Switch

REAR PANEL
LIFE SIZE TEMPLATE

9 X 4

| XLR MIC IN | | |
| PTT IN | TRS | |

A PHONE IN	TRS	
B PHONE IN	TRS	
PHONE OUT	TRS	

A SPKR IN	TRS	
B SPKR IN	TRS	
SPKR OUT	TRS	

A PAD OUT	TRS	
B PAD OUT	TRS	
PADDAL IN	TRS	

TX OUT
TX EN
590 AMP OUT

TX EN
TX OUT
590 AMP IN

PREVIOUS PROJECT WIRING ASSIGNMENTS FOR REFERENCE						
DB-25 CONNECTOR	XLR MIC CONNECTOR	3.5 MM PTT PHONE CONNECTOR	6.5 MM HEADPHONES CONNECTOR	RCA Amp Key Line Jacks	MFJ-5082 TT Omni VII	MFJ-5082 Kenwood TS-590s
1 MIC SHIELD - Mic Ground	1 Shield - Ground				Pin 7 - Shield	Pin 7 - Shield
2 Signal Hot(+)	2 Signal Hot(+)				Pin 8 - Brown	Pin 1 - White
3 Signal Cold (-)	3 Signal Cold (-)				Pin 7 - Shield	Pin 7 - Shield
4 PTT Hot (+)		TIP			Pin 6 - Yellow	Pin 2 - Black
5 PTT Ground (-)		SHIELD			Pin 5 - Green	Pin 8 - Brown
6 Phones Left Hot (+)			TIP			
7 Phones Right Hot (+)			RING			
8 Phone Shield - Ground			SHIELD			
9 Amp Key Line Hot (+)				Yellow to Rig A Red to Rig B		

OMNI VII MIC CONNECTOR PIN ASSIGNMENTS	
Pin No.	Function
1	No Connection
2	Switched 10v
3	No Connection
4	No Connection
5	Ground
6	PTT Signal (+)
7	MIC Ground
8	MIC signal input

OMNI VII MIC

Figure 2-2. Front view, mic connector, on front panel of OMNI-VII
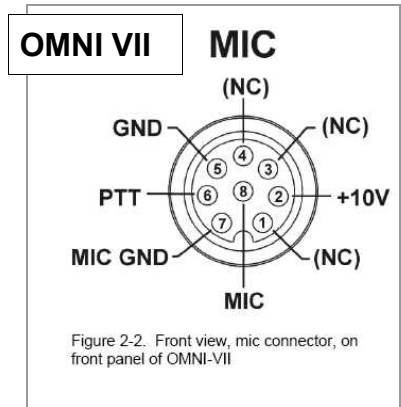
TS-590s MIC CONNECTOR PIN ASSIGNMENTS			
Pin No.	Pin Name	Function	I/O
1	MIC	MIC signal input	I
2	SS	MIC Standby (PTT) control	I
3	MD	MIC DOWN control	I
4	MU	MIC UP control	I
5	8A	Switched 8v	O
6	NC	No connection	-
7	MSG	MIC Ground	-
8	MCG	Ground	-

TS-590s MIC
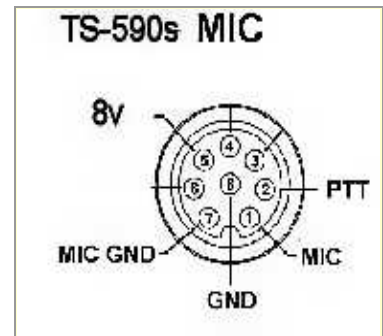
MFJ-5082 Cable
Wiring Color Assignments

1-WHITE
2-BLACK
3-BLUE
4-RED
5-GREEN
6-YELLOW
7-SHIELD
8-BROWN