

# Easy Guide to PJ2T Antenna Switching

It's just two steps!

W0CG  
7 October 2013  
Rev. 1, 13 October 2013



# Background

We have a solution to the antenna switching system, but it's expensive. Thanks to good engineering by W9NJY and N0YY (and a little bit from me), and to the introduction of wonderful new products from Array Solutions, **we now could totally eliminate all of our manual coax switches**. All of the switches described in this tutorial would be eliminated and you'd simply use a selector at each station to instantly get the antenna you want. No more wheeling a chair across to the switch console. No more bumping your legs on switch panels.

The technical solution is very elegant, but the cost using off the shelf equipment from WX0B would exceed about \$4,000. (And our Treasury is at nearly zero right now.)

That very high cost suddenly makes our present coax switches look like **things of beauty**. Cheap and reliable. Unless we win the lottery, we are stuck with those switches for now.

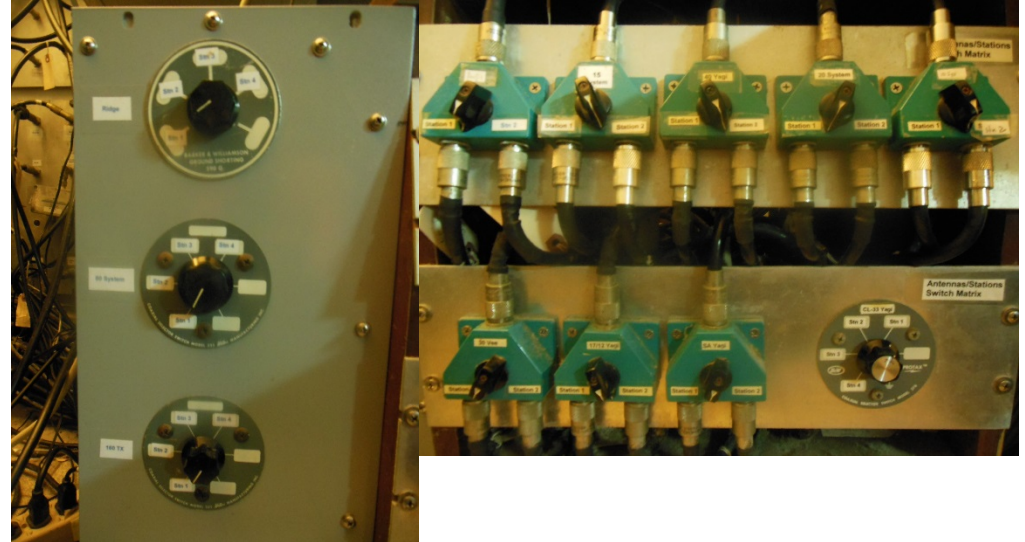
**So let's all learn to use them. The next slides make it easy.**

Here's a reminder of how much fun we have in Curacao. But you would have even MORE fun knowing exactly how to switch in the antennas!



# OVERVIEW: Switching in the antenna you want is a **TWO STEP** procedure:

1. Point the desired antenna to your station (Station 1, 2, 3, or 4) using one of the 12 Master Antenna Distribution Switches under the Station 1 linear. (Detail follows.)

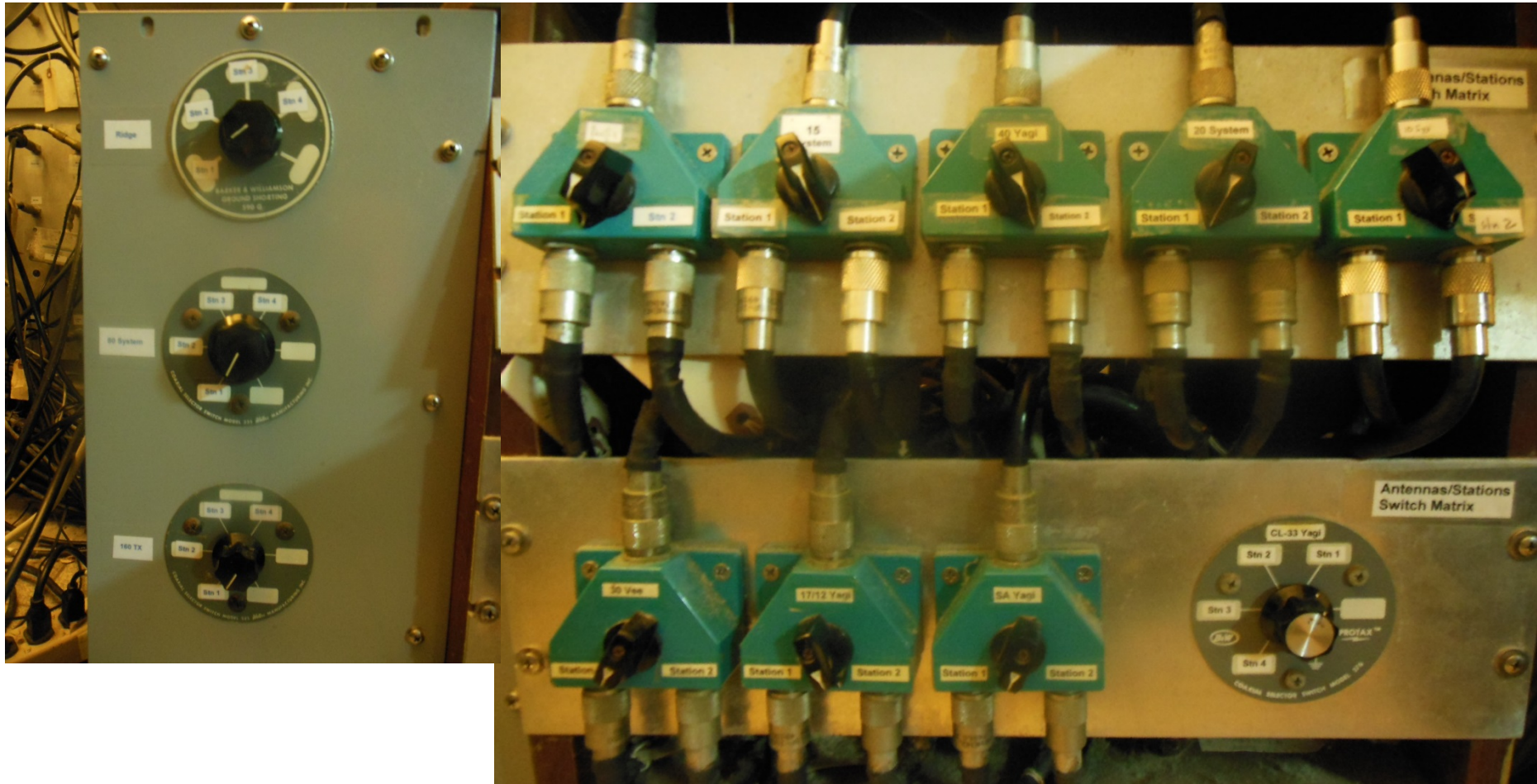


2. Use the coax switches at your station (Station 1, 2, 3, or 4) to connect that antenna to your transceiver/amp. (Detail follows.)



# Step 1: Point the desired antenna to your station

There are 12 choices. Count up the 12 switches below.

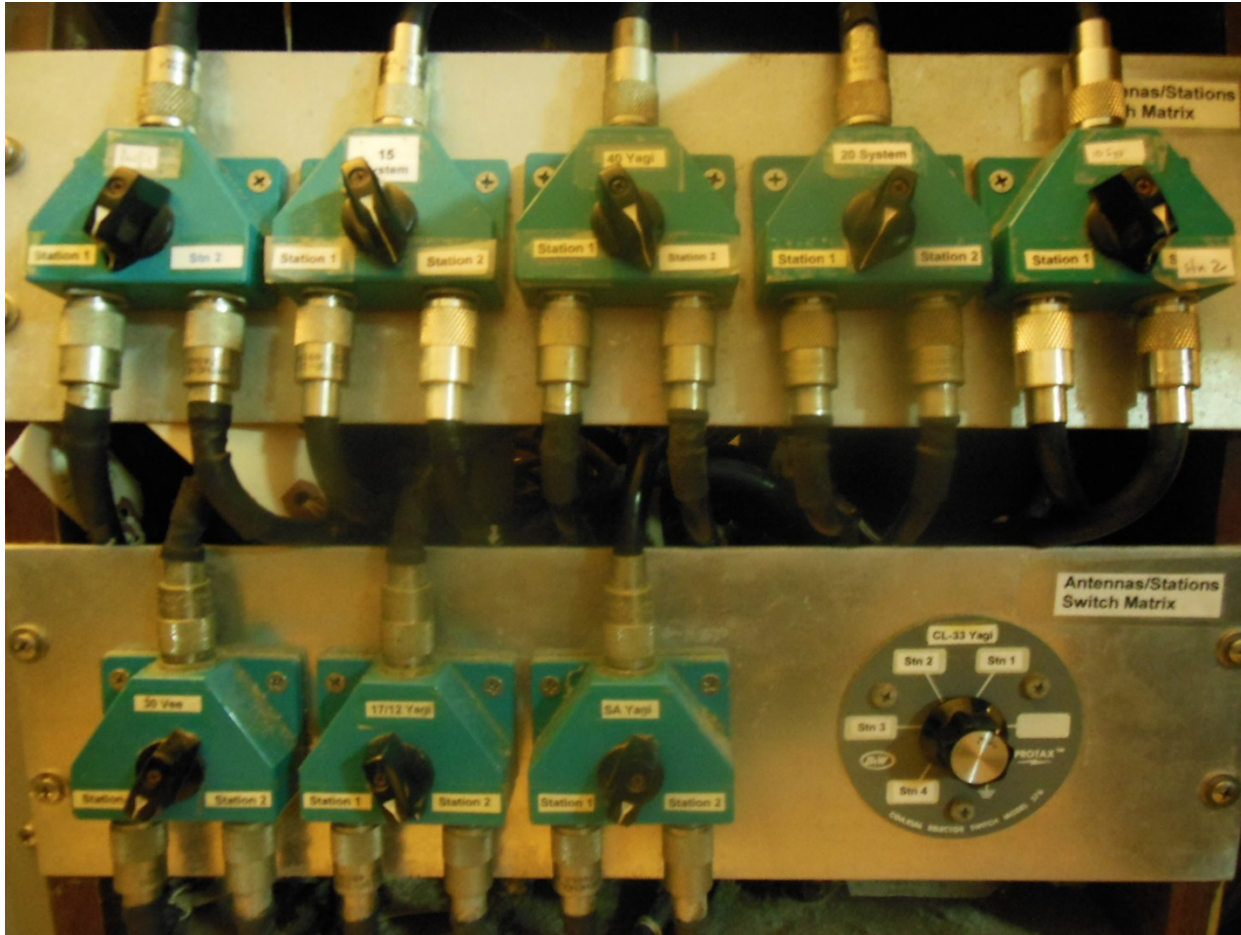


# Step 1: Point the desired antenna to your station (the first 3 of the 12 switches)



- At the top, “Ridge Other than Tribander” can be pointed to Station 1, 2, 3, or 4 with the rotary switch.
  - “Ridge Other than Tribander” means at present the Ridge 80 meter vee and two future Ridge antennas. (The Bencher Skyhawk Europe Tribander is NOT selected using this switch. Selecting the Bencher is very easy as shown on a following slide.)
- In the middle, the “80 System” can be pointed to Station 1, 2, 3, or 4 with the rotary switch.
  - The “80 System” is the black switch box on the top of the desk left of Station 1. It gives you choice of the 2 element 80 US vee or the 3 element Europe loops. Three future 80 antennas are also selectable with this box.
- At the bottom, the “160 TX” antenna (Inverted L) can be pointed to Station 1, 2, 3, or 4 with the rotary switch.

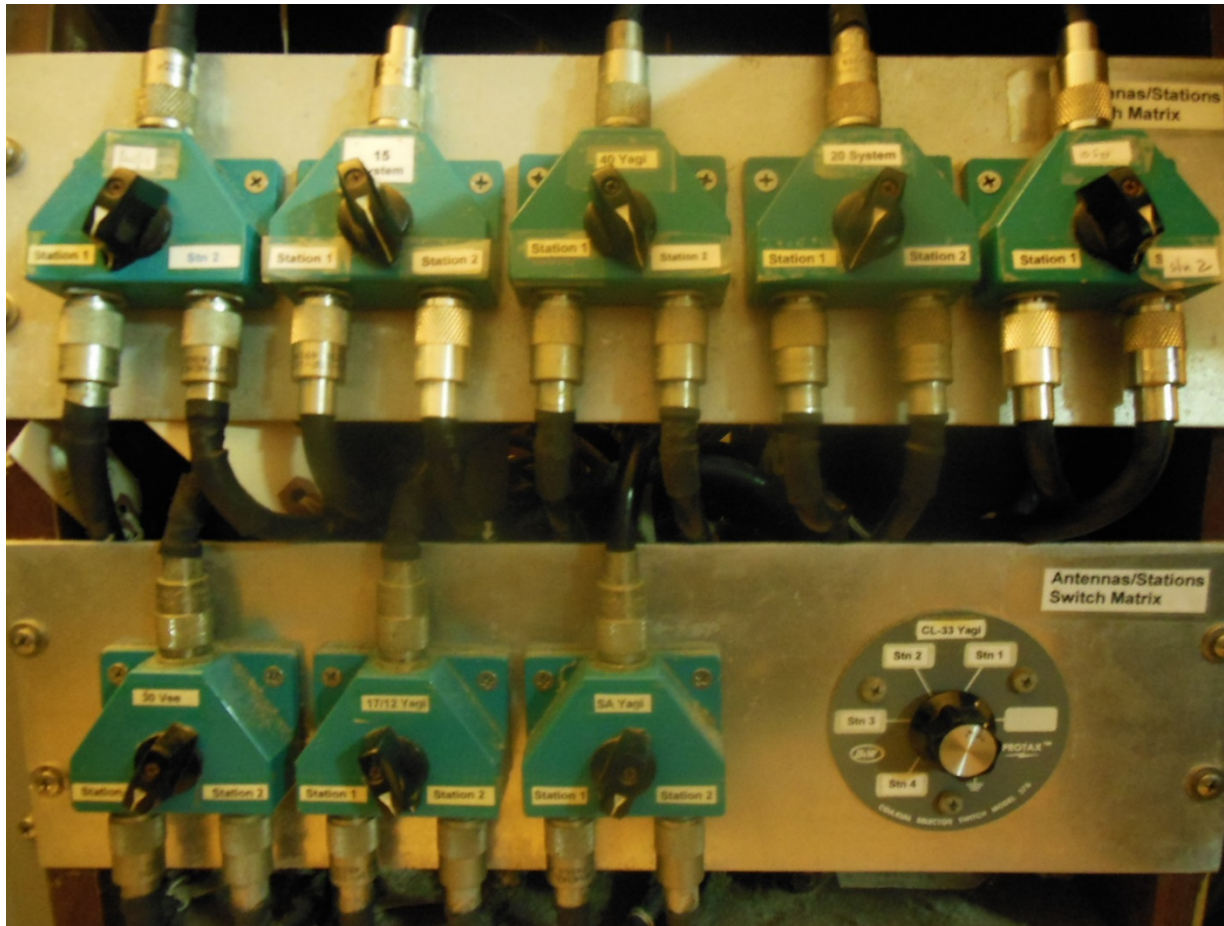
# Step 1: Point the desired antenna to your station (the next 2 of the 12 switches)



- Top left: The “Pacific Tribander” can be pointed to Station 1 or Station 2. There is presently no way to point it to Station 3 or 4.
- Next switch: The “15 System” can be pointed to Station 1 or Station 2.
  - The “15 System” is the 15 blue StackMatch box. It gives you a choice of “US/JA”, “Europe (Yard)”, or “Europe (Ridge)”, or any combination.
  - (“Europe (Ridge)” is the Bencher Skyhawk via the triplexer.)
  - From Station 2 the 15 System can be pointed onward left in the room to Station 3 using the blue switches like shown below.
  - The same way, at Station 3 it can be pointed onward left to Station 4.



# Step 1: Point the desired antenna to your station (the rest of the 12 switches)



- Middle Switch, Top Row: The “40 Yagi” can be pointed to Station 1 or 2.
  - From there it can be pointed onward left in the room to Station 3 or 4 using the blue switches like in the prior slide.
- Next Switch: The “20 System” is the blue 20 Stackmatch. It works exactly like the 15 meter StackMatch box.
- Top Right Switch: The “10 System” StackMatch box works exactly like the “20 System” and “15 System” StackMatch boxes.
- Bottom Left Switch: The “30 Vee” can be switched to Station 1 or 2. At present there is no capability to point it to Stations 3 or 4.
- Next Switch: The “12/17 Yagi” works exactly like the “30 Vee” above.
- Next Switch: The “SA Yagi” (South America) works exactly like the above two.
- Rotary Switch: The C-3E/H rotatable tribander can be pointed to Station 1, 2, 3, or 4.



## Step 1: Set Ridge Switch



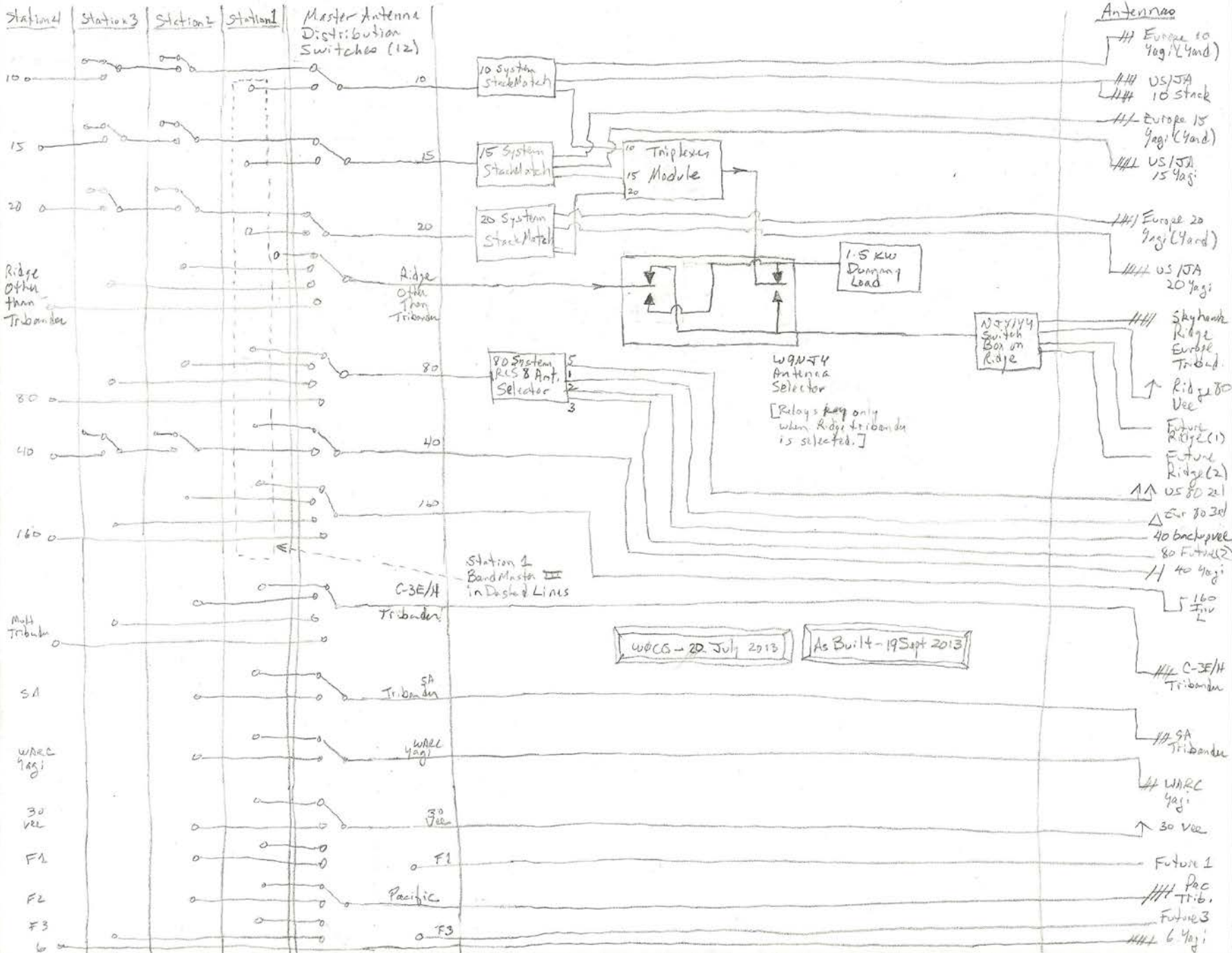
- To use the “Europe (Ridge)” tribander be sure that the antenna switch is “On” and selected to Position 4. (This will automatically turn on the triplexer fans.)
- For “Ridge Other than Tribander” antennas (such as the “Ridge 80 Vee”), be sure the correct switch position is selected.

# You're Halfway Done

- Step 1 is complete.
- You have used one of the 12 Master Antenna Distribution Switches to point the antenna you need to your station.
  - You may also have used one or more of the green Daiwa switches to point your selected antenna onward left in the room to Station 3 or 4.

# A Graphic Makes It Clear

- Carefully study the diagram on the next slide.
- This is how things are wired following the September work trip.
- Read it right to left, noting that it is arranged on the page the same way as our shack: the antennas come in the wall at the right, then come Stations 1, 2, 3, 4 moving right to left on the diagram.
- Count up the 12 switches in this diagram that we just covered. (In addition there are two “future” cable sets: F1 and F3.)
- The role of the switches and the triplexer are vividly clear from this diagram.
- **Everything “flows” right to left in the room through the coax switches**
- (This diagram does NOT show the detail of the selector switches at each individual station.)
- (The 6 meter yagi is hard-cabled to Station 4 only. No switches any more.)



Ridge other than Tribander

Ridge other than Tribander

Station 1 Band Master in Dashed Lines

WPCS - 20 Jul 2013

As Built - 19 Sept 2013

## Step 2: Use the coax switches at your station to connect the antenna to the transceiver/amp – Station 1

- Station 1 is represented by the white box at the top left.
- Follow left to right from this white box and select the antenna you want.
- If you select “Next Switch” and then “Next Switch” again (follow the white lines rightward), that goes to the automatic box at the right.
- The automatic box then selects 160 through 10 automatically based on which band button you pushed on the radio.
- (The photo shows our old automatic box. Now we have a new BandMaster III box. The photo is out of date.)



## Step 2: Use the coax switches at your station to connect the antenna to the transceiver/amp – Station 2

- Station 2 is represented by the white box at the bottom right.
- Follow right to left in the photo and select the antenna you want.
- You may need to hopscotch from the right box (following the arrowhead) to the left box to get the antenna you need.
- If you are selecting 40, 20, 15, or 10 be sure the blue switch at the bottom goes to Station 2. (You *should* have already set the blue switch in Step 1.)



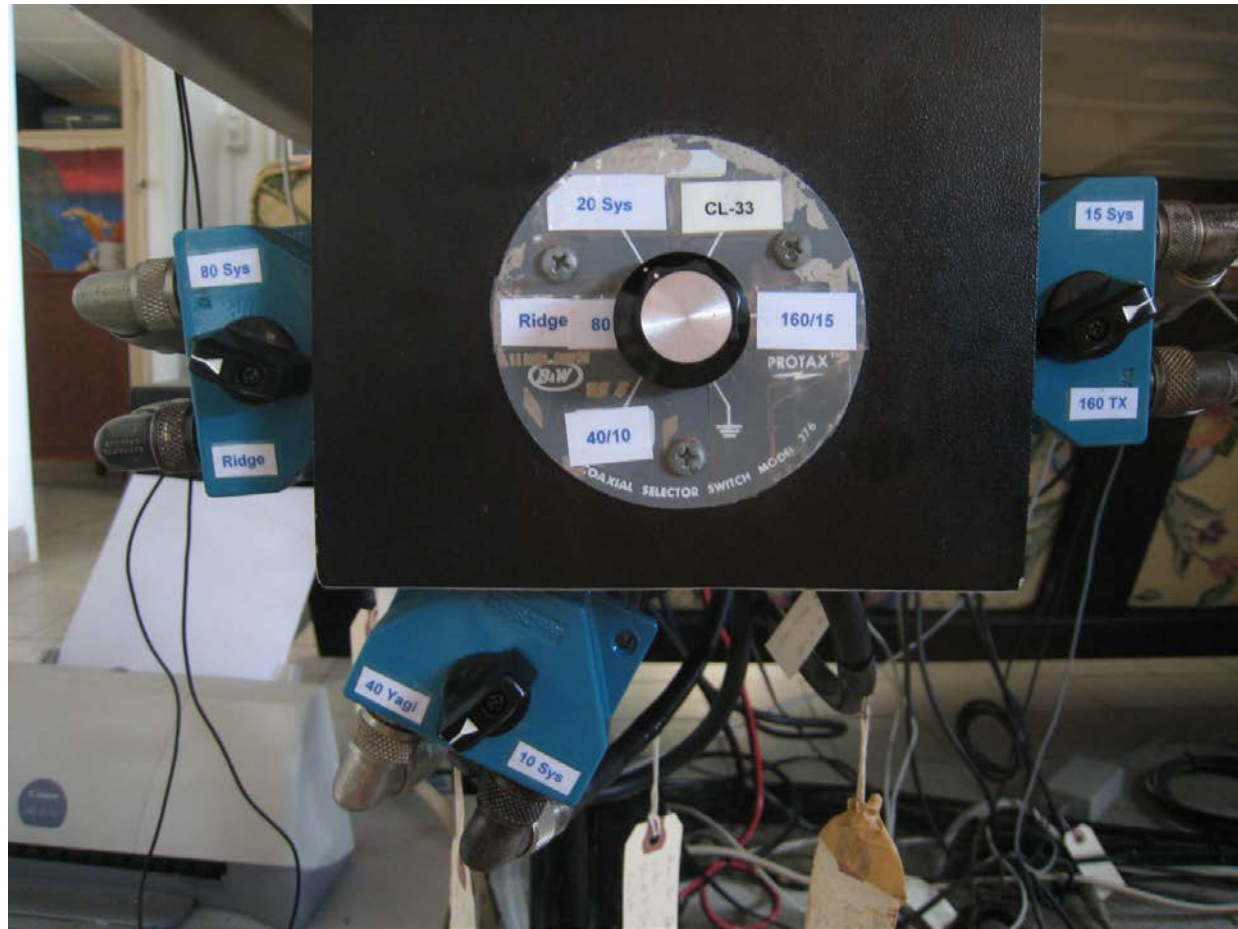
## Step 2: Use the coax switches at your station to connect the antenna to the transceiver/amp – Station 3

- Station 3 is represented by the white box at the bottom right.
- From here, it works just like Station 2. Select the antenna you want
- You may need to hopscotch from the right box to the left box.
- Check that you have the blue switch correct if you are using 40, 20, 15, or 10.
- (Also be sure the correct band is selected on the filter panel box.)



## Step 2: Use the coax switches at your station to connect the antenna to the transceiver/amp – Station 4

- Simple. Select the desired antenna using the switches.
- Since Station 4 is the end of the line, there is no hopscotching.
- (At this station you will need to manually cable in the correct W3NQN bandpass filter on top of the amp.)





That ends the tutorial, but here's some nice-to-know background info.

# Review of PJ2T TX Antennas

- You now know how to select the antennas.
- But what are the antennas I'm selecting?



# PJ2T TX Antennas

- Europe (Ridge) Tribander
  - Bencher Skyhawk 10 element trapless yagi, 15 ft up on Ridge tower, fixed Europe
- Europe (Ridge) 80 Vee
  - Wire vee fed through WX0B balun at center
  - We manually adjust the length of one side (by folding back wire) for CW or SSB
  - Direction favors Europe
  - Feedpoint is 25 ft above ground
- Europe 20 (Yard)
  - Optimized Hy-Gain 205-BAS 5 element monobander on 34 foot boom, height is 90 feet
- Europe 15 (Yard)
  - Optimized home brew 5 element monobander on 35 foot boom, height 82 feet
- Europe 10 (Yard)
  - Optimized home brew 5 element monobander on 24 foot boom, height 74 ft
- 40 Yagi
  - Cushcraft 40-2CD with W6QHS mechanical mods, height 107 ft, rotatable

# PJ2T TX Antennas

- Pacific Tribander
  - Mosley TA-34 XL four element trap tribander; used to be Europe Ridge antenna
  - Height 67 ft on Europe tower, fixed 270 degrees (Pacific)
- South America Tribander
  - Stock Cushcraft A-3S 3 element trap tribander, height 45 ft, fixed 150 degrees (South America)
- 80 Meter 3 el Loop (Europe)
  - Three elements fixed Europe; knife switches in each element select CW or SSB
  - Apex is about 70 ft high
- 160 TX Inverted L
  - Fed through unun transformer at base; top is 95 feet; about 45 radials including under the new part of the house
- WARC 12/17 Yagi
  - Stock Cushcraft A-3WS 3 element trap dual bander, height 65 ft; rotatable
- 6 Meter Yagi
  - W5WVO design modified Cushcraft 5 element with extended boom; height 88 ft; rotatable

# PJ2T TX Antennas

- Multiplier Tribander
  - Force 12 C-3E/H trapless tribander, 18 foot boom, 79 ft high, rotatable
- 80 meter US/JA 2 element wire vee beam
  - Feedpoint height 75 ft
- Emergency backup 40 inv vee
  - 70 ft up US/JA tower; legs collapsed and parallel to tower; connected to “80 System” box
- US/JA 20 Yagi
  - Optimized Hy-Gain 205-BAS, 34 foot boom; height 71 ft
- US/JA 15 Yagi
  - Home brew 5 element, 36 foot 3 inch boom, based on K3LR design and parts; height 65 ft
- US/JA 10 Stack
  - 5 over 5 stack using stock Cushcraft short wideband yagis; carefully optimized heights (48 and 32 ft) and feedline phasing
- 30 Vee
  - Inverted vee; feedpoint height 60 ft
- 2 Meters
  - Cushcraft Ringo Ranger, extensively modified to survive salt air

