

*Phaser Digital Mode Transceiver*

# Enclosure Kit



**Revision A.11**

(April 9, 2020)

**Midnight Design Solutions**

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## 1 Introduction

This a custom enclosure kit for the [Phaser Digital Mode Transceiver](https://midnightdesignsolutions.com/phaser/). (<https://midnightdesignsolutions.com/phaser/>) The kit is comprised of interlocking fiberglass panels designed to be soldered together along the inside mating edges, thus providing a strong and attractive case for the Phaser. All panels have red soldermask to present nice, shiny surfaces, and the front and rear panels are silkscreened with labels for all the included controls and indicators.

The Enclosure Kit includes all parts pictured in this manual and can be assembled within about one hour.

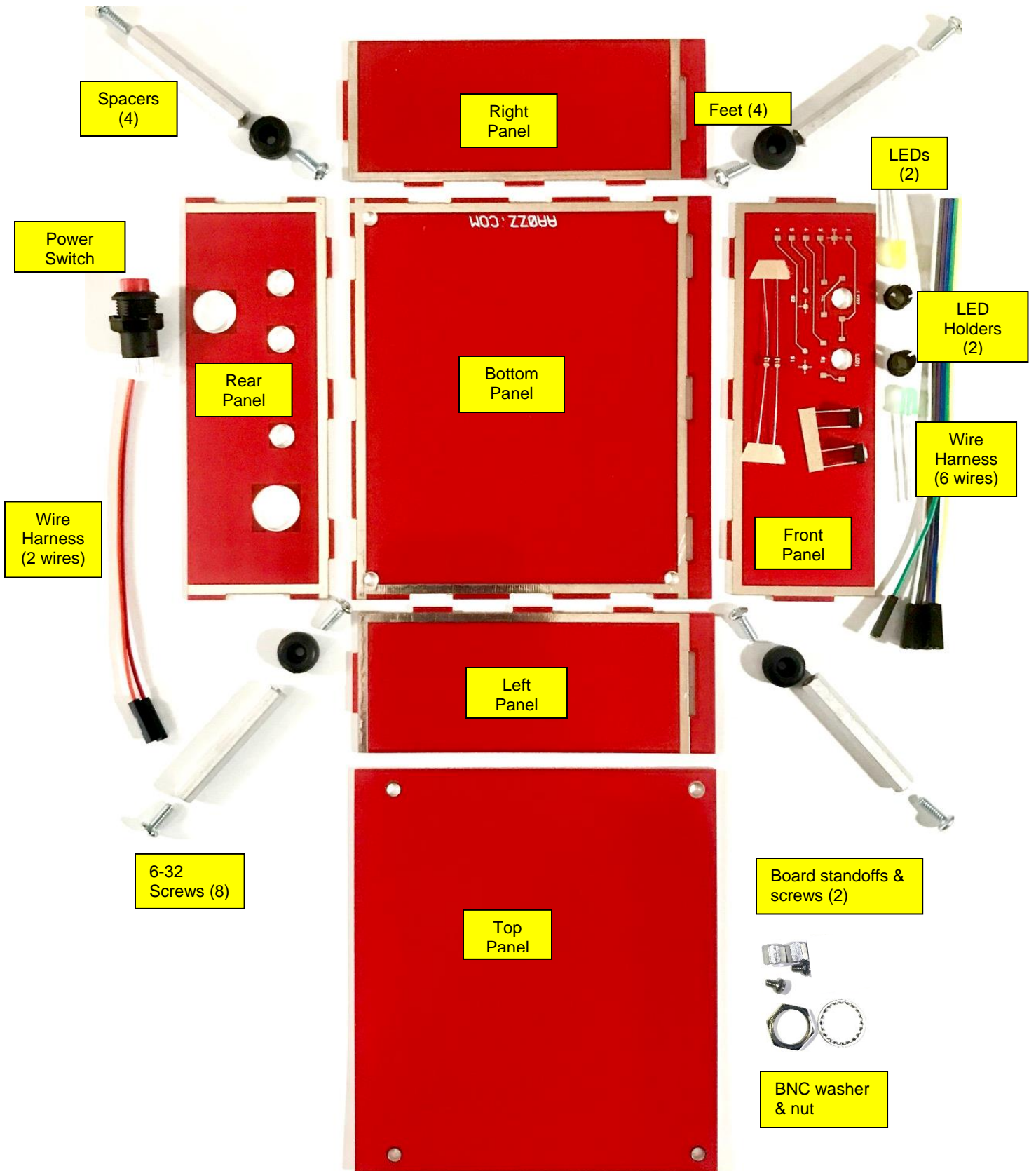
## 2 Building the Enclosure

Different methods may be used to build the enclosure. Read through these suggested approaches and see what makes most sense to you. Details of each approach follow.

Approach 1: Fully assemble the case without soldering, holding in place with tape on the corners or with rubber bands or duct tape around it. Then solder all four edges and four corners.

Approach 2: Assemble and tack solder one edge at a time. After all four edges are tacked on and aligned, add additional solder tack points. Solder all four corners.

The enclosure parts kit looks like at first (next page) ...



## 3 Assembly

### 3.1 File/Sand Board Edges

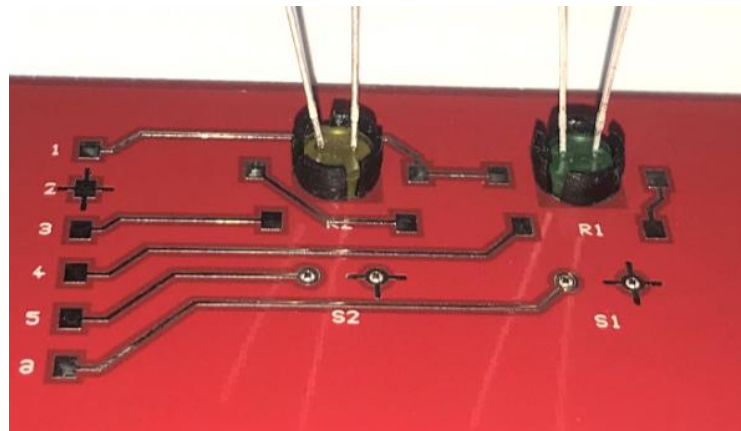
Sand or file all of the edges. You will be happy that you took the time to do this since it feels much better when in use. Use a fine-tooth mill file or a sanding block. You could put a piece of sandpaper on the workbench and hold the piece vertically as you run it back and forth over the sandpaper. Be very careful not to sand any of the soldermask surfaces!

### 3.2 Attach LEDs to Front Panel

Insert the two black plastic LED holders into the front panel holes at the LED positions.

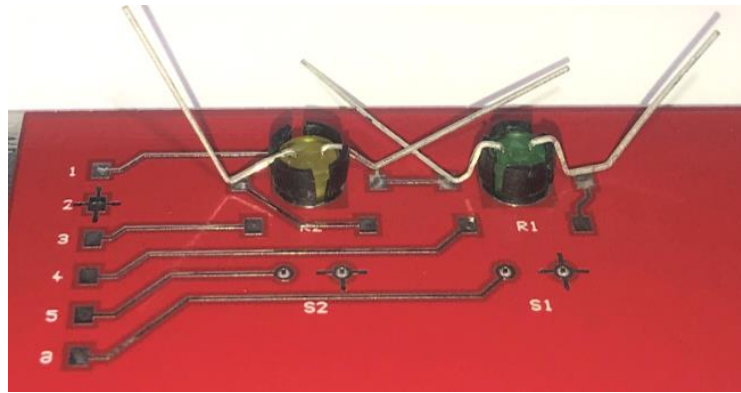


From the back of the Front Panel, push the two LEDs into the respective holder (green LED at the FT8 position, yellow LED at the ALT position). Using needle nose pliers or a flat blade screw driver, press the LEDs into the holder from the rear while holding the panel in your hand or against your leg. It will require strong effort, but the LED will eventually “pop” into the holder and protrude a little from it on the front side of the panel



Turn the longer lead of each LED such that they point toward the middle (toward each other).

Using needle nose pliers, bend each LED lead over tightly against the black holder and position the lead down on top of the pad directly to the left/right of the LED. Solder the lead to the tab (four places) and snip off excess lead lengths.



### 3.3 Attach Resistors to Front Panel

Attach the 1K resistors at the pads for R1 and R2. Bend each resistor lead down to touch the pad, solder in place and snip off excess lead lengths.



### 3.4 Attach Ribbon Cable to Front Panel

Locate the 8-wire ribbon cable and cut to 4.5-inches, resulting in a cable with the female receptacles on one end.

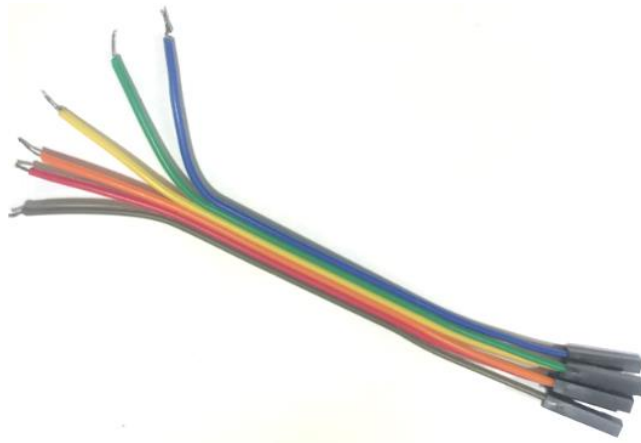


Remove TWO wires by peeling them back (together) ... place them aside for later use, leaving the other SIX wires intact.

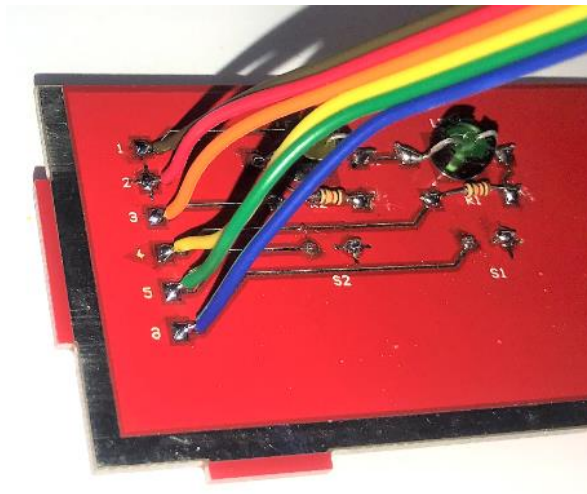
Using a razor blade (or equivalent), separate the wires about 1-inch back from the cut end of the cable. Spread these wires apart for the next step.

Using wire strippers, carefully strip off 1/4-inch of insulation from these 6 wires. Solder the exposed wires from each lead, being careful to have all strands together.

Cut each exposed wire such that only about 1/8-inch is exposed.



Solder one lead to each of the 6 vertically-aligned pads on the back-left side of the Front Panel. Make sure the wires are soldered somewhat perpendicular to the pad and tilted to the right, as shown in the photo below.



### **3.5 Attach Tactile Pushbuttons to the Front Panel**

Insert and solder each tactile switch to the FT8 and ALT positions from the outside of the Front Panel. Hold each flush to the surface to ensure proper alignment. There is no polarity.

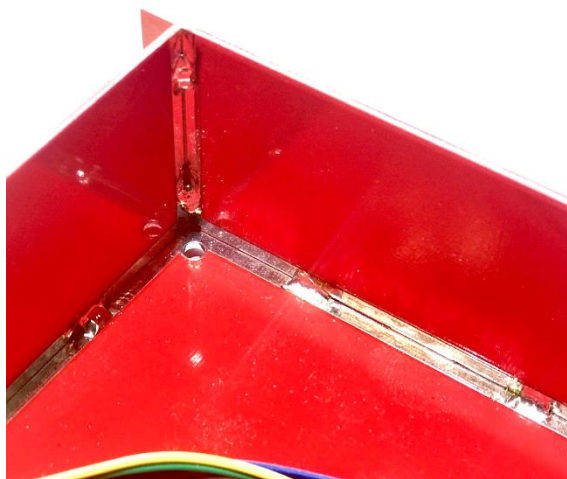
### **3.6 Assemble the Enclosure Panels**

Assemble the case - four edge pieces and the bottom - and hold it together with tape on the four corners or secure the pieces with several rubber bands as shown below.



Solder both mating edges simultaneously using a blunt-tipped soldering iron while feeding generous amounts of solder to the joint. Low wattage is sufficient if you hold the soldering iron tip in place long enough.

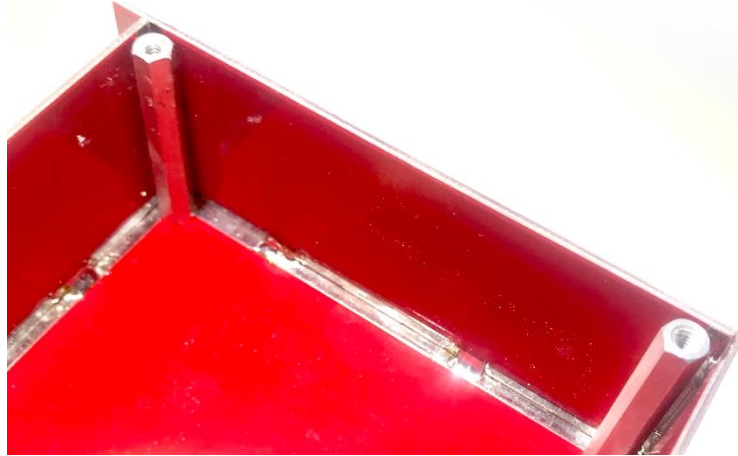
It is not necessary to solder the entire length of the mating edges. Essentially just “tack soldering” at two points along each edge will suffice. You may find it easier to do this by standing the box upright on an edge with the corner to be soldered on the bottom.



Remove the rubber bands and you will find the result being a very strong lower shell of an enclosure.

### **3.7 Install Corner Spacers**

Install the four 1-3/4 inch spacers in the inside corners of the case. For each spacer use a #6 screw through a rubber bumper and then through the case bottom and into the spacer.



### **3.8 Install 1x6 position pinheader at “J5” on Phaser pc board**

Solder the 1x6 pinheader at position “J5” (next to U12) on the Phaser pc board.

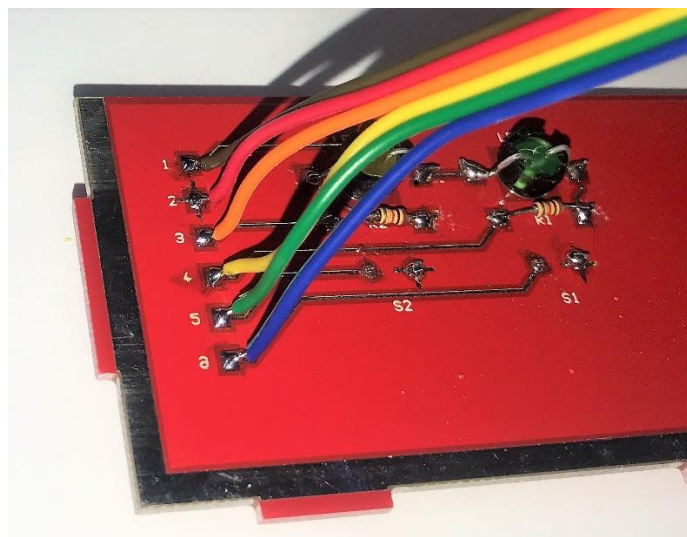
### **3.9 Install the Phaser Board**

Attach the two aluminum spacers using #4-40 screws to the bottom of the Phaser board at the mounting holes located closest to the front of the board.

Install the board into the enclosure as shown below. It may be a little tricky achieving this. Tip the board slightly toward the rear and insert the BNC through its hole the rear panel while lowering the front end past the front panel controls and wire harness as you push the board “rear-ward” until it drops to the floor of the enclosure.

Secure the board to the enclosure using the BNC hardware. This is all that’s necessary to hold the board in position. (Yes, the board does “float” a little, but that’s okay.)

Connect the 6-line wire harness from the front panel to the Phaser board at the 6-position pinheader J5.





The order of connections is shown below:

<u>Front Panel</u>		<u>Phaser J5</u>	
Pin 1	(3.3 volts)	Pin 1	(pin closest to center of Phaser pcb)
Pin 2	(ground)	Pin 6	
Pin 3	(yellow LED)	Pin 5	
Pin 4	(green LED)	Pin 2	
Pin 5	(Alt PB)	Pin 4	
Pin 6	(FT8 PB)	Pin 3	

### 3.10 Install Power Switch

Cut the 2-line wire harness to 2.5", strip and tin the bare wire ends, and solder to the pushbutton terminals.

Insert the Power Switch into the rear panel and secure with its plastic nut.

Remove the existing black jumper from the Phaser board behind the Power jack and insert the new 2-wire harness to this 2-position pinheader. The wires have no polarity, as they are merely bringing the DC power lines to/from the pushbutton, thus affording the user a convenient way to power the Phaser on and off.

### 3.11 Completed Inside View



### 3.12 Install Top Cover

Use the remaining four #6 screws to secure the top cover to the enclosure.

## 4 Parts List

Quantity	Description
4	Rubber bumper with hole
8	Machine Screw, 3/8", 6-32 threads
4	1.75" Spacers, 6-32 threads
1	Enclosure PCB set (6 pieces)
2	Aluminum (or Nylon) spacer (1/4")
2	Screw, #4-40
1	Ribbon cable, 8-wire
1	1x6 position Pinheader (for "J5" on Phaser pc board)
2	Resistors, 1K ohm
2	LEDs (yellow and green)
2	BNC nut & washer
1	Pushbutton, Power Switch
2	Pushbutton, tactile

## 5 Contact Us

If you have any questions, problems or part shortages, please contact George N2APB at [n2apb@MidnightDesignSolutions.com](mailto:n2apb@MidnightDesignSolutions.com)

## 6 Document Revision History

Rev A.4 – Baseline

Rev A.9 – Added revision date to cover page. Fixed typo for 'J5' in the wiring connections table in Section 3.9. Added missing photos throughout Section 3.

Rev A.10 – Added note in Section 3.9 for identification of J5 pin 1.

Rev A.11 – Fixed references to J5 and added photo Section 3.9.