



COVID-19 Test Booth Instruction Manual

A low-cost solution for safer drive-up testing
COVID-19 Health Care Worker Protection Project

SAND2020-4531 O

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COVID-19 Health Care Worker Protection Project April 2020

This work sought to design and construct a simple, easy-to-use outdoor shelter for healthcare workers providing walk-up testing for COVID19. The rugged enclosure is designed to be easily cleaned between patients and is resistant to ammonia, chlorine, H₂O₂, iso-propyl alcohol, and ethanol. The sealed chamber, with positive pressure and attached arm sleeves, reduces the amount of PPE required while still providing the worker with sufficient protection. This system is a hybrid modeled after similar structures in use in Boston MA and South Korea.

FINAL DIMENSIONS: 52"x100"	MATERIAL COST: \$3,206.87	BUILD TIME: 8 hours
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Materials used for this project:

Qty	Item	Ordering specification
7	T-slotted framing single four slot rail, silver, 1.5" square, hollow, 8'	McMaster-Carr part #47065T102
2	T-slotted framing single four slot rail, silver, 1.5" square, hollow 10'	McMaster-Carr part #47065T102
18	Silver corner bracket 3" long for 1.5" high rail T-slotted framing	McMaster-Carr part #47065T241
2	Black Plastic Pull Handle 4-1/2" Long for T-Slotted Framing	McMaster-Carr part #47065T54
16	T-Slotted Framing Panel Gasket for 1.5" High Rail, 6.5' Long	McMaster-Carr part #5537T871
1	HDPE white solid panel 48" x 48" x 1/4"	McMaster-Carr part #9785T151
1	HDPE white solid panel 48" x 96" x 1/4"	McMaster-Carr part #9785T161
4	T-Slotted Framing Rail-to-Rail Hinge for 1-1/2" High Rail	McMaster-Carr part #47065T348
1	Sandbag 14" Wide x 26" High, Orange Polypropylene Plastic	McMaster-Carr part #4540T3
4	T-Slotted Framing Solid Acrylic Panel, 8' x 4'	McMaster-Carr part #47065T324
1	2" to 12" Adjustable Large-Diameter Hole Saw for Sheet Metal	McMaster-Carr part #30885A12
1	3/16" Diameter Cutting Bit for Adjustable Large-Diameter Hole Saw	McMaster-Carr part #30885A18
4	Aluminum Unthreaded Spacer 5/8" OD, 1" Long, for 1/4" Screw Size	McMaster-Carr part #92510A786
1	Lift-and-Drop Barrel Slide-Bolt Latch Zinc-Plated Steel, 3" Wide x 1-9/16" High	McMaster-Carr part #1441A53
1	Routing Eyebolt with Nut, 5/16"-18 Thread, 1" Shank	McMaster-Carr part #9489T65
1	Routing Eyebolt with Nut, 5/16"-18 Thread, 2" Shank	McMaster-Carr part #47065T327
20	T-Slotted Framing Drop-in Nut with Spring Loaded Ball, 5/16"-18 Thread Size	McMaster-Carr part #47065T327
1	Black-Oxide Alloy Steel Socket Head Screw 10-32 Thread Size, 1-3/4" Long, Partially Threaded	McMaster-Carr part #91251A352
1	Low-Strength Steel Hex Nut Zinc-Plated, 10-32 Thread Size	McMaster-Carr part #90480A195
1	Black-Oxide Alloy Steel Socket Head Screw 5/16"-18 Thread Size, 1-3/8" Long	McMaster-Carr part #91251A620
1	Medium-Strength Steel Hex Nut Grade 5, Zinc-Plated, 5/16"-18 Thread Size	McMaster-Carr part #95462A030
22	T-Slotted Framing Silver Flush 90 Degree Angle Bracket for 1.5" High Rail	McMaster-Carr part #3136N158
1	Foam sheet, 1/2" Thick, 54" Wide, 5' Length	McMaster-Carr part #85175K89
1	Axial Confined Space Fan, 1/3 HP, 3200 rpm Blower/Fan Speed	Grainger order item #1UFG6
1	DeWalt Chop Saw for Metal	McMaster-Carr part #4213A21



Tools

- 14" Multicutter saw with 66T blade
- Electric drill
- 3/16" hex wrench
- 1/4" hex wrench (for door handle only)
- 1/8" thick putty knife
- Rubber mallet
- Marker
- 4–6 ft step ladder

Assembly Notes

- Two people are needed to assemble the booth.
- Peel back 2" of packing paper to expose edges of all acrylic and HDPE panels before assembly.
- Slide required brackets into appropriate slots before completing corner and edge assembly.
- Do not tighten down brackets until adjustments have been made.
- Complete the assembly in three steps: I. Box Construction, II. Door Construction, and III. Final Assembly.

I. BOX CONSTRUCTION

Front Panel

1. Place one 8' x 4' acrylic panel on protected work surface, ensuring all packing paper is peeled away from edges.
2. Insert both 8' sides of acrylic panel into two 8' T-slot rails.
3. Insert both 4' sides of acrylic panel into two 47 1/8" T-slot rails.
4. Secure corners with four 90° angle surface brackets (Fig. 1).



Figure 1. 90° angle surface bracket



Right Panel

1. Flip front panel over.
2. Insert an 8' x 4' clear acrylic sheet into the front panel (Fig. 2).



Figure 2. Right panel

3. Secure two 47 1/8" T-slot rails to the right panel using one corner bracket and two 90° angle surface brackets (Fig. 3).

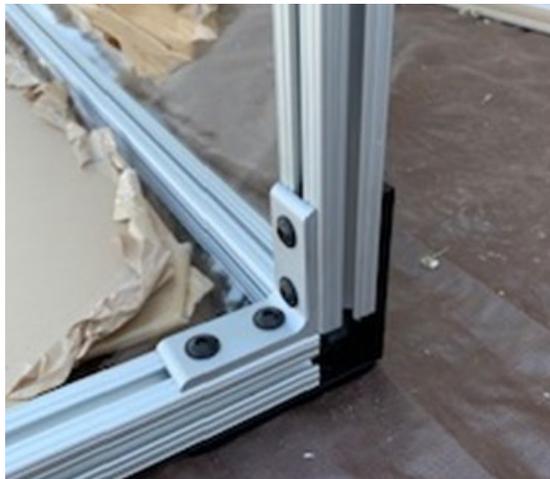


Figure 3. Corner bracket



Top Panel

1. Insert opaque 4' x 4' HDPE sheet into top of front panel.
2. Secure HDPE sheet with 47 1/8" T-slot rails and four 90° angle brackets (Fig. 4).



Figure 4. HDPE top panel

Left Panel

1. Insert left acrylic panel into T-slot rail.
2. Secure left panel with a 47 1/8" T-slot rail using one corner bracket and two 90° angle surface brackets (Fig. 5).



Figure 5. Left panel



Door Frame

The following directions are for a right-handed door.

1. Attach T-slot rails and brackets as shown in Fig. 6. You will need two 8 ft rails, two 47 1/8" rails, one 72 7/8" rail, four 90° surface brackets, and 12 corner brackets.



Figure 6. Door frame

II. DOOR CONSTRUCTION

Repeat front panel assembly instructions with 8 ft X 4 ft opaque HDPE for door (Fig. 7).



Figure 7. HDPE door



III. FINAL ASSEMBLY

1. Flip door and place on constructed box (Fig. 8).



Figure 8. Placement of door on box

2. Secure door to box with three hinges (Fig. 9). *Attach only with the provided screws. Screws from other hardware are the wrong length.*



Figure 9. Hinges

3. Adjust panels with gentle pressure and/or tapping with a rubber mallet to ensure the box and door are square.
4. Tighten down all corner and 90° surface brackets on box and door.
5. Drill a 9 1/8" air intake hole in center of opaque top panel (Fig. 10). *Place air intake as close to front panel as possible. Use the glove-connecting ring clamp as a template for best placement.*



Figure 10. Air intake hole

6. Remove all shavings, and clean air intake hole with ethanol or other compatible solvent.
7. Secure flange to air intake hole (Fig. 11).



Figure 11. Air intake hole with flange installed

Caution: Two people are needed to stand the box up. Take care not to crush body parts or objects.

8. Stand box up, using two people and taking care not to crush body parts or objects.
9. On the front panel, drill two 9 1/8" holes for glove assembly. Center of holes are located 4' 6" from the bottom of the box and 18" apart (Fig. 12). *Adjust glove placement holes for the comfort of the operator. Set glove holes for the tallest worker and use a step for shorter operators.*



Figure 12. Holes with flanges installed for gloves

10. Remove all shavings and clean glove placement holes with ethanol or other compatible solvent.
11. Affix flanges to glove holes.
12. On the left side of the door panel drill two 5/16" holes in HDPE for door handles. Use two 1 3/8" – 5/16" screws and nuts to secure handles to door. *Door handle placement can be adjusted for operator comfort.*
13. Completely seal exterior of box and door using panel gaskets (Fig. 13). *A spare corner bracket and hammer are effective at correctly seating the gasket between the panels and T-slot rails.*

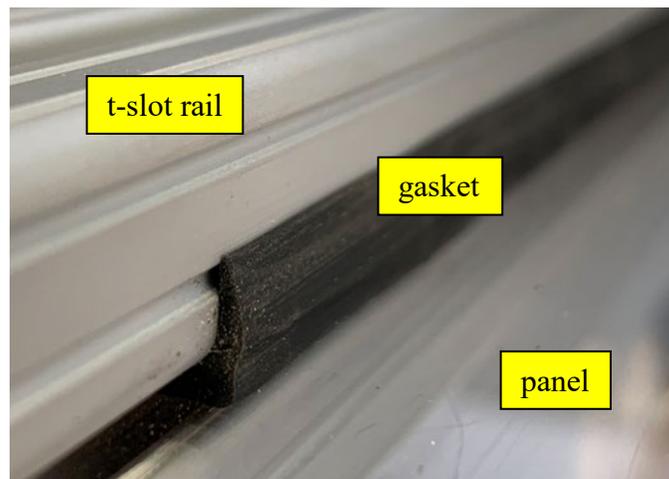


Figure 13. Panel gaskets



14. Completely seal all front panel interior seams with silicone (Fig. 14).

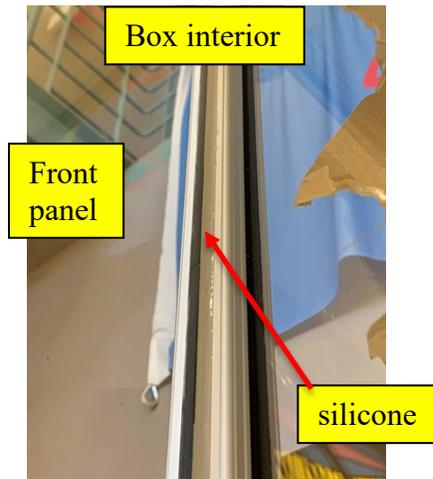


Figure 14. Silicone-sealed seam

15. Secure 2 ½" eyebolts to door and box exterior (Fig. 15). *These eyebolts are for securing the box when not in use. Position can be adjusted for operators' comfort.*

16. Drill four 5/16" holes in door for latch installation (Fig. 15). Use four 1 ¾" long 10-32 screws, four 10-32 hex nuts, and four aluminum spacers to install latch.

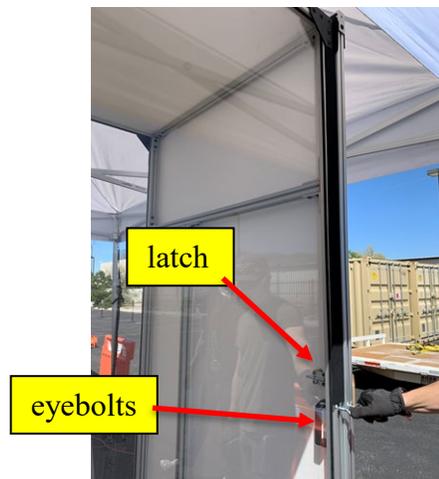


Figure 15. Eyebolts and latch

17. Position box on top of foam mat.



18. On bottom sides of the box attach two any-length t-slot rails with two corner brackets (Fig. 16). *These are to anchor box with sandbags.*



Figure 16. eyebolts

19. On top of box install two any-length T-slot rails with three corner brackets (Fig. 17). *This is to relieve strain and prop up air hose from confined-space fan.*



Figure 17. bracket to prop up air hose

20. Install air hose from confined-space fan to flange on top of box.
21. Install gloves to flanges on front of box.
22. Remove remaining protective paper from all panels.
23. Primary construction is complete (Fig. 18).
24. Before use, confirm air is flowing down across the front of the operator.



Figure 18. Completed assembly