Note:
1. This assembly contains some optional portions. Use of these components better mimics field geometry, but may not be required for the assembly to be used for practice. These items are noted at the part and assembly steps.
Step 1:

1. Screw 3, 5, 4 to 1 1.25" #6 screws, Pre-drill

2. After the frame is assembled flip over and add 14

3. Attach and staple 13 to the bottom of 3

Note:

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±1/16
ANGULAR: MACH ±1° BEND ±1°
TWO PLACE DECIMAL ±.01
THREE PLACE DECIMAL ±.001

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL

NEXT ASSY USED ON
FINISH

APPLICATION DO NOT SCALE DRAWING

TITLE: Team Version
Loading Bay

SIZE DWG. NO. REV
A TE-20000 A

SCALE: 1:24 WEIGHT: SHEET 3 OF 16

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Step 2 and 3:

Note:
1. Attach 6 to 2 with 1.25" #6 screws, Pre-drill
2. Attach 12 to the bottom of 6
3. Mirror for step 3
Step 4:

Note:
1. Attach 7 to 8 with 50lb Cable Ties
2. Start from bottom leave the middle loose until top is tight
3. This is Optional

Step 5:

Note:
1. Attach 11 to 10 with 50lb Cable Ties
2. Start from bottom leave the middle loose until top is tight
3. Attach 9 to 10 with 50lb Cable Tie
4. This is Optional
Notes:
1. Attach step 2 and 3 to step 1 using 120lb cable ties.
2. Attach step 4 and 5 to step 1 using 50lb cable ties.
Notes:
1. Material: 15/32" AC or CDX Plywood
2. Fillet corners are optional

Notes:
1. Material: 15/32" AC or CDX Plywood
2. Fillet corners are optional

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL: ±1/16
ANGULAR: MACH: ±1° BEND: ±1°
TWO PLACE DECIMAL: ±.01
THREE PLACE DECIMAL: ±.001

TITLE: Team Version Loading Bay

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Notes:
1. Material: 15/32" AC or CDX Plywood
2. Fillets are optional
Notes:
1. Material: 15/32" AC or CDX Plywood
2. QTY shown for 1 chute
3. This Part is Optional
Note:
1. Material: 15/32" AC or CDX Plywood
2. This Part is Optional
TE-20000-08
QTY (1)

Note:
1. Material: 1/8" Hard board
2. Add relief cuts on the front face from 2" to 12" at 1/2" spacing roughly 1/16 or less depth
3. QTY shown for 1 chute
4. This Part is Optional

Dimensions are in inches
Tolerances:
- Fractional ±1/16
- Angular: Mach ±1° Bend ±1°
- Two place decimal ±.01
- Three place decimal ±.001

Interpret geometric tolerancing per:

Material

Finish

Application

Do not scale drawing

UNLESS OTHERWISE SPECIFIED:

Title: Team Version
Loading Bay

Size: A

Drawing No.: TE-20000

Scale: 1:24

Weight: 

Sheet 11 of 16

Scale: 1:24

Weight:
TE-20000-09
QTY (1)

Note:
1. Material: 1/8" Hard board
2. Add relief cuts on the front face from 2" to 12" at 1/2" spacing roughly 1/16" or less depth
3. This Part is Optional

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±1/16
ANGULAR: MACH ±1° BEND ±1°
TWO PLACE DECIMAL ±.01
THREE PLACE DECIMAL ±.001

TITLE:
Team Version
Loading Bay

A

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Note:
1. Material: 2" x 4" Pine

Note:
1. Material: 2" x 2" Pine
Note:
1. Material: 2" x 4" Pine

Note:
1. Material: 2" x 4" Pine
Vision_LoadingBay
QTY (4)

Notes:
1. 2" Wide, 3M 8830 Scotchlite Reflective Material

TE-20000-12
QTY (2)

Notes:
1. 2" wide Hook

TE-20000-13
QTY (1)

Notes:
1. 2" wide Hook

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL: ±1/16
ANGULAR: MACH ±1° BEND ±1°
TWO PLACE DECIMAL: ±.01
THREE PLACE DECIMAL: ±.001

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL

NEXT ASSY USED ON
FINISH

APPLICATION
DO NOT SCALE DRAWING

PROPRIETARY AND CONFIDENTIAL
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Notes:
1. 1/8" Hardboard
ITEM NO. | PART NUMBER | DESCRIPTION | QTY.
--- | --- | --- | ---
1 | TeeNut_.25_20 | Soft Wood Fiber Tee Nut | 4
2 | TE-20001-01 | 050AC Top | 1
3 | TE-20001-02 | 050AC Side | 2
4 | TE-20001-03 | 2x4x55 | 2
5 | TE-20001-04 | 2x4x30 | 2
6 | TE-20001-05 | 2x4x30 | 4
7 | TE-20001-06 | 2x4x23 | 2
8 | TE-20001-07 | 2x4x22.875 | 4
9 | TE-20001-08 | 12d6234 Triangle Manufacturing | 1
10 | TE-20001-09 | 2" Hook | 2
11 | TE-20002 | Control Panel | 1
12 | hex_.25_20_4.5_partial | Steel Hex Head Screw, 1/4"-20 x 4-1/2" long, partially threaded | 4
13 | washer_flat_.25 | Flat Washer for 1/4" Screw | 4

REVISIONS

<table>
<thead>
<tr>
<th>ZONE</th>
<th>REV.</th>
<th>DESCRIPTION</th>
<th>DATE</th>
<th>APPROVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1, 6-B2</td>
<td>A</td>
<td>Fixed Description of TE-20001-03, Fixed drawing for TE-20001-01</td>
<td>1/6/2020</td>
<td>NTW</td>
</tr>
</tbody>
</table>
*PLEASE NOTE: DUE TO MATERIAL THICKNESS, DIMENSIONS MAY VARY BY UP TO 1/8" FROM THE ACTUAL FIELD. PLEASE REFER TO THE FIELD DRAWINGS IF YOU THESE DIFFERENCES WILL AFFECT YOUR ROBOT DESIGN.
Step 1:
1. Attach 4 to 2 with 1.25" #6 wood screw.
2. Attach 7 to 2 with 1.25" #6 wood screw.
3. Pre-drill if needed.

Notes:
1. Insert 1 in 5, 2 places.
2. Attach 5 to 3 with 1.25" #6 wood screw.
3. Attach 8 to 3 with 1.25" #6 wood screw.
4. Attach 6 to 3 with 1.25" #6 wood screw.
5. Pre-drill if needed.
6. Attach 10 to the bottom.
7. Repeat for second leg.
Step 4:

Notes:
1. Attach Step 1 to Step 2 and 3 as shown.
2. Use 12 to bolt together.

Step 5:

Notes:
1. Attach 9 to Step 4 with 10-32 hardware.
2. Align with pre-drilled holes and access holes.
Step 6:

Notes:
1. Attach 11 to Step 5 with 10-32 hardware.
2. Use the drilled access holes for hardware access.
Notes:
1. 15/32 (1/2") AC or CDX plywood
Notes:
1. 15/32 (1/2") AC or CDX Plywood
Notes:
1. 2" x 4" Lumber, Pine

Notes:
1. 2" x 4" Lumber, Pine
TE-20001-05
QTY (4)

30.00

Notes:
1. 2" x 4" Lumber, Pine

TE-20001-06
QTY (2)

23.00

Notes:
1. 2" x 4" Lumber, Pine
Notes:
1. Triangle Lazy Susan with 4 clips
2. From KOP
Notes:
1. Material: 2" Hook, Adhesive Backed
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TE-20002-01</td>
<td>025 AC, Top Disk</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>TE-20002-02</td>
<td>050 Poplar Dowel</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>TE-20002-03</td>
<td>025 AC, Bottom Disk</td>
<td>1</td>
</tr>
</tbody>
</table>

**Control Panel**

UNLESS OTHERWISE SPECIFIED:

- DIMENSIONS ARE IN INCHES
- TOLERANCES:
  - FRACTIONAL: ±1/16
  - ANGULAR: MACH ±1° BEND ±1°
  - TWO PLACE DECIMAL: ±.01
  - THREE PLACE DECIMAL: ±.001
- INTERPRET GEOMETRIC TOLERANCING PER:
- MATERIAL
- NEXT ASSY USED ON
- FINISH
- APPLICATION
- DO NOT SCALE DRAWING

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Step 1:

Notes:
1. Attach ② 10x to ③ 1x with 1.125" #6 screw

Step 2:

Notes:
1. Attach ① 1x to ② 10x with 1.125" #6 screw
Note:
1. Material 1/4 AC Plywood
2. Pre-drill with countersunk bit for #6 screw and 3/32" bit
Note:
1. Material 1/4 AC Plywood
2. Pre-drill with countersunk bit for #6 screw and 3/32" bit
Note:
1. Material 0.5" poplar dowel
2. Pre-drill 3/32
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TE-20003-01</td>
<td>0.5 AC Lower Face</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>TE-20003-02</td>
<td>025 BC plywood</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>TE-20003-03</td>
<td>0.5 AC face back goal</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>TE-20003-04</td>
<td>2x4x48 pine</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>TE-20003-05</td>
<td>2x4x75 pine</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>TE-20003-06</td>
<td>2x4x37 pine</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>TE-20003-07</td>
<td>050 AC Side</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>TE-20003-08</td>
<td>050AC deflector</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>TE-20003-09</td>
<td>050AC roof</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>TE-20003-10</td>
<td>050 gusset</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>TE-20003-11</td>
<td>2x4x43</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Hook_2_48</td>
<td>Hook_2_48</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>TeeNut_.25_20</td>
<td>Soft wood fiber tee nut</td>
<td>6</td>
</tr>
<tr>
<td>14</td>
<td>Vision_PowerPort</td>
<td>2&quot; wide 3m vision tape</td>
<td>3</td>
</tr>
<tr>
<td>15</td>
<td>hex_.25_20_3.5</td>
<td>Steel Hex Head Screw, 1/4&quot;-20 x 3.5 long, fully threaded</td>
<td>6</td>
</tr>
</tbody>
</table>

**Material**

<table>
<thead>
<tr>
<th>Material</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>15/32” ACor CDX Plywood</td>
<td>4 sheets</td>
</tr>
<tr>
<td>2’x4’x8’ Pine</td>
<td>10</td>
</tr>
<tr>
<td>2’ Hook</td>
<td>96”</td>
</tr>
<tr>
<td>2” Vision Tape</td>
<td>54”</td>
</tr>
<tr>
<td>wood screw 1.25”</td>
<td>~110</td>
</tr>
<tr>
<td>wood screw 2.5”</td>
<td>~40</td>
</tr>
<tr>
<td>50lb Cable tie</td>
<td>10</td>
</tr>
<tr>
<td>1/4-20 x 3.5” bolt</td>
<td>6</td>
</tr>
<tr>
<td>1/4-20 Softwood T nut</td>
<td>6</td>
</tr>
</tbody>
</table>
Notes:
1. Attach 4, 5, 11 together to form a frame. Pre-drill and use 2.5" wood screws.
2. Attach 12 to the bottom of the frame use staples to hold in place
3. Attach 1 to the frame. Pre-drill and use 1.25" wood screws.
4. Insert 13 into the outer most drilled holes of 4
Notes:
1. Attach 4, 5, and 11 to form a frame. Pre-drill and use 2.5" wood screws.
2. Attach 12 to the bottom of 4.
3. Attach 10 to the frame. Pre-drill and use 1.25" wood screws.
4. Insert 13 to the two outside holes of 4.
Front Upper Frame Assembly

Notes:
1. Attach 14 to 2 to lower portion of opening.
2. Attach 4 and 6 together to form a frame. Pre-drill and use 2.5" wood screws
3. Attach 2 to the frame. Pre-drill and use 1.25" wood screws
4. Insert 13 to the center hole of 4 on the lower portion of the frame
Back Upper Frame Assembly

Notes:
1. Attach 4 and 6 together to form a frame. Pre-drill and use 2.5" wood screw.
2. Attach 3 to the frame. Pre-drill and use 1.25" wood screw.
3. Insert 13 to 4 in the center hole.
Note:
1. Attach the Front Lower Frame Assembly and Front Upper Frame Assembly together with 15.
**Details:**

1. Attach Back Lower Frame Assembly and Back Upper Frame Assembly together with 15

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Tolerances</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractional</td>
<td>1/16</td>
<td>TE Power Port</td>
</tr>
<tr>
<td>Angular</td>
<td>Mach 1°</td>
<td></td>
</tr>
<tr>
<td>Two Place Decimal</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>Three Place Decimal</td>
<td>.001</td>
<td></td>
</tr>
</tbody>
</table>

**Interpret Geometric Tolerancing Per:**

- Material
- Finish
- Application
- Do Not Scale Drawing

**Notes:**

- UNLESS OTHERWISE SPECIFIED:

  - DIMENSIONS ARE IN INCHES
  - TOLERANCES:
    - Fractional: 1/16
    - Angular: Mach 1° BEND 1°
    - Two Place Decimal: .01
    - Three Place Decimal: .001

- INTERPRET GEOMETRIC TOLERANCING PER:
  - Material
  - Finish
  - Application
  - Do Not Scale Drawing

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Notes:
1. Attach 7 to the outside of the lower two frames on both sides. Pre-drill and use 1.25" wood screws.
2. Attach 7 to the inside of the upper two frames on both sides. Pre-drill and use 1.25" wood screws.
3. Assemble on its side on the ground.
Notes:

1. Attach 9 to upper frame assembly with 1.25" wood screws.

2. Attach 8 to 9 and upper back assembly with 50lb Cable ties.
Notes:
1. Material: 15/32 (1/2") AC or CDX Plywood

Notes:
1. Material: 15/32 (1/2") AC or CDX Plywood
Notes:
1. Material: 15/32 (1/2") AC or CDX Plywood
2. 10X $\phi .25\left[\frac{1}{4}\right]$ THRU optional if adding deflector
Notes:
1. Material: 15/32 (1/2") AC or CDX Plywood
2. This is an optional part
Notes:
1. Material: 15/32 (1/2") AC or CDX Plywood
2. This is an optional part
Notes:
1. 2x4" Pine Lumber
Notes:
1. 2x4" Pine Lumber

Notes:
1. 2x4" Pine Lumber
Vision_PowerPort
QTY (3)

(2.00)  (60.00°)

Notes:
1. 2" Wide, 3M 8830 Scotchlite Reflective Material

Hook_2_48
QTY (2)

(2.00)

Notes:
1. 2" wide Hook

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRAC TIONAL ±1/16
ANGULAR: MACH 1° BEND ±1°
TWO PLACE DECIMAL ±.01
THREE PLACE DECIMAL ±.001

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL
FINISH
APPLICATION

DO NOT SCALE DRAWING
### Material List

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>hex_.25_20_1.5</td>
<td>Steel Hex Head Screw, 1/4&quot;-20 x 1-1/2&quot; long, fully threaded</td>
</tr>
<tr>
<td>2</td>
<td>Pan_.25_20_2.5</td>
<td>Pan Head 1/4-20 x 2.5&quot;</td>
</tr>
<tr>
<td>3</td>
<td>tape</td>
<td>tape (duct, gaffers, electrical, or equivalent)</td>
</tr>
<tr>
<td>4</td>
<td>TE-20004-20</td>
<td>Generator Switch Top Level</td>
</tr>
<tr>
<td>5</td>
<td>TE-20004-21</td>
<td>A Frame, Assembled</td>
</tr>
<tr>
<td>6</td>
<td>TE-20004-24</td>
<td>Hard Stop Assembled</td>
</tr>
<tr>
<td>7</td>
<td>TE-20004-42</td>
<td>Side Plate</td>
</tr>
<tr>
<td>8</td>
<td>UBolt_.3125_2_3.75</td>
<td>U Bolt 5-16 x 2 x 3-3/4</td>
</tr>
</tbody>
</table>

**Notes:**
1. Material list for entire assembly shown on Sheet 2.
Note:
1. For full assembly of TE-20004, we recommend having 8 people and 2 ladders which allow reaching ~10’.

<table>
<thead>
<tr>
<th>Material</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; x 4&quot; x 8’</td>
<td>36</td>
</tr>
<tr>
<td>1/2” Plywood</td>
<td>3</td>
</tr>
<tr>
<td>1-1/4” Schedule 40 Black Iron Pipe</td>
<td>2</td>
</tr>
<tr>
<td>1-1/4” Black Iron Floor Flange</td>
<td>2</td>
</tr>
<tr>
<td>1/4-20 TeeNuts</td>
<td>32</td>
</tr>
<tr>
<td>1/4-20 x 1.5” Hex Head Bolts</td>
<td>48</td>
</tr>
<tr>
<td>1/4-20 x 2.5” Pan Head Bolts</td>
<td>16</td>
</tr>
<tr>
<td>1/4-20 Wing Nuts</td>
<td>32</td>
</tr>
<tr>
<td>1/4” Washers</td>
<td>64</td>
</tr>
<tr>
<td>5/16 x 2 x 3-3/4” U Bolts</td>
<td>4</td>
</tr>
<tr>
<td>Tape</td>
<td>1 roll</td>
</tr>
<tr>
<td>2.5” Screws</td>
<td>~30</td>
</tr>
<tr>
<td>1.5” Screws</td>
<td>~60</td>
</tr>
</tbody>
</table>

Shield Generator
Shield Generator

Dimensions are in inches.

Tolerances:
- Fractional: ±1/16
- Angular: MACH ±1° BEND ±1°
- Two Place Decimal: ±0.01
- Three Place Decimal: ±0.001

Interpret geometric tolerancing per:

Material

Next Assy Used On

Finish

Application

Do not scale drawing
Step 1:

Note: Pole of 4 may be between 84" and 120".

Notes:
1. Add 4x 3 to 4 as shown. Wrap the pipe at least 2x.
Step 2:
QTY: 2

Notes:
1. Assembly can be assembled standing upright or on its side.
2. Attach 5 and 5 to 7 using 1 into TeeNuts.
3. Repeat on other side.
Step 2

Consider placing weights (sandbags, cinder blocks, ROBOT batteries, etc) on bases to help keep in place in addition to humans supporting the assemblies.

Notes:
1. Space **Step 2** assemblies as shown. If upright, people should support assemblies.
Step 4:

Notes:
1. Place Step 1 on top of Step 2 and connect with 4x 8. Ensure the connection is snug, but will be fully tightened in a later step.
2. We recommend:
   1. Lifting Step 1 with a minimum of 3 people but recommended 4 people. It is a heavy lift with a very high center of mass.
   2. Practicing lifting Step 1 before putting in place.
   3. 1 person support each Step 2 assembly.
   4. After Step 1 is on top of Step 2, bring 2 ladders and have 2 additional people place and secure 8 while remaining people support the assembly.
Notes:
1. Slide 6 through Step 1 and connect to Step 2 using 2 screws into TeeNuts.
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TE-20004-01</td>
<td>1-1/4&quot; Schedule 40 Black Iron Pipe, Full</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>TE-20004-02</td>
<td>1-1/4&quot; Schedule 40 Black Iron Pipe, Cut</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>TE-20004-03</td>
<td>1-1/4&quot; Floor Flange</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>TE-20004-04</td>
<td>Top</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>TE-20004-05</td>
<td>Pole Holder, Face, Rung</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>TE-20004-06</td>
<td>Center</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>TE-20004-07</td>
<td>Cross Bar Gusset</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>TE-20004-08</td>
<td>Pole Holder, Face, Pivot</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>TE-20004-09</td>
<td>Pole Holder, Large, Pivot</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>TE-20004-10</td>
<td>Pole Holder, Small, Pivot</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>TE-20004-11</td>
<td>Hanger to Brace Mount</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>TE-20004-12</td>
<td>Side Leg</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>TE-20004-13</td>
<td>Center Leg</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>TE-20004-14</td>
<td>Cross Bar, Top</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>TE-20004-15</td>
<td>Cross Bar, Bottom</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>TE-20004-16</td>
<td>Pole Holder, Rung</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>TE-20004-17</td>
<td>Brace Leg</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>TE-20004-18</td>
<td>Pole Holder, Support, Pivot</td>
<td>4</td>
</tr>
</tbody>
</table>
NOTE:
1. Only pieces that pivot are shown here. Approximate mass of pivoting system is 111 lbs.
Step 1: Qty: 2 (Repeat Step 1 for a total of 2 sub-assemblies)

Note:
Attach 12 and 12 with 2.5" screws, alternating screws on top and bottom. Pre drill if needed.

Step 2: Qty: 2 (Repeat Step 2 for a total of 2 sub-assemblies)

Note:
Align 14 and 15 to be flush on one side.
Attach 14 and 15 with 2.5" screws, alternating screws on top and bottom. Pre drill if needed.

Step 3: Qty: 2 (Repeat Step 3 for a total of 2 sub-assemblies)

Note:
Attach 18 and 18 with 2.5" screws, alternating screws on top and bottom. Pre drill if needed.
Step 4:
Qty: 1

Note:
Attach 13 and 13 with 2.5" screws, alternating screws on top and bottom. Pre drill if needed.

Step 5:
Qty: 2 (Repeat Step 5 for a total of 2 sub-assemblies)

Note:
Attach 17 and 17 with 2.5" screws, alternating screws on top and bottom. Pre drill if needed.

Step 6:
Qty: 2 (Repeat Step 6 for a total of 2 sub-assemblies)

Note:
Using the threads on 2, attach 2 to 3. 2 should be firmly attached but should not extend out the back of 3.
Step 7: Qty: 2 (Repeat Step 7 for a total of 2 sub-assemblies)

Note:
Align holes. The assembly from Step 6 can be used as a guide to ensure holes are properly aligned. Attach 16 and 16 with 2.5” screws, alternating screws on top and bottom. Pre-drill if needed.

Step 8: Qty: 2 (Repeat Step 8 for a total of 2 sub-assemblies)

Note:
Attach 5 to either side of the Step 7 assembly using 1.5” screws. Ensure the bottom and sides are flush. Pre-drill if needed.

Step 9: Qty: 1

Note:
Attach 6 to either side of the Step 4 assembly using 1.5” screws. Ensure the bottom and sides are flush. Pre-drill if needed.
Step 10:
Qty: 1

Note:
Attach Step 6 to either side of the Step 9 assembly using 1.5" screws. Pre drill if needed. Add additional screws as needed to ensure the Step 9 assembly is rigidly connected.
Step 1:
Qty: 1

Note:
Attach 4 to 2X Step1 as shown, using 1.5" screws. Pre drill if needed.
Note:
Attach Step 10 to Step 11 as shown, using 1.5" screws. Pre drill if needed.
Be careful to ensure that Step 10 is centered on Step 11, and that 2 is parallel to the top of 4.
Note:
Align Step 8 with Step 12 by sliding Step 8 onto 2 and align with edge of 12. Attach 2X Step 8 to Step 12 as shown, using 1.5" screws. Pre drill if needed.
Step 13

Note:
Flip Step 13 over and attach 4 with 1.5" screws. Ensure holes in both part 4 are aligned (consider using 1 to align the holes). Pre drill if needed.
Add 1.5" screws to connect 5 to Step 13 in the same manner as was done in Step 13. Pre drill if needed.
Note:

Step 2 will come close to [12] but won't touch.

---

**DETAIL G**
SCALE 1 : 6

Attach [7] to [Step 2] and [13].
Note:
Flip over and repeat Step 15 on the other side. Pre drill if needed.
**Note:**
Attach 2X 8 to Step 5 as shown using 1.5" screws. Pre drill if needed.
Attach Step 3 as shown using 1.5" screws. Pre drill if needed.

**Note:**
Attach 9 and 10 to Step 17 as shown using 1.5" screws. Ensure the holes are aligned and not blocked (consider using 1 to align the holes). Pre drill if needed.
Step 18: Qty: 1

Note:
Slide 2x [Step 18] and [Step 16] onto 1 as shown above. Position [Step 16] in approximately the center of the bar.

Consider either standing ends of [Step 16] on 2" x 4" since the center will not sit flush on the floor due to 3 OR consider placing 1 on something apx. 60" tall to allow [Step 16] to be lifted off the ground.
Note:
Attach 2X 11 to Step 18 and Step 16 using 1.5" screws. Pre drill as needed.

Consider placing 1 on something apx. 60" tall to allow the assembly to be lifted off the ground - this will help the assembly be perpendicular to the ground once 11 is screwed in place.
Optional: Disassembly for Storage

Note:
Screws can be removed from (1) to allow Step 18 and Step 16 to be removed from (1) to allow for more compact storage.
Note:
2. 86" is the recommended pipe length. Longer pipe may allow easier access to robot.

Note:
Material: 1-1/4" Schedule 40 Black Iron Pipe

Note:
Material: 1-1/4" Black Iron Floor Flange
Home Depot PN (Store SKU): 564331
Notes:
1. Instructions and quantities shown are for 1 assembly. 4 assemblies total are needed.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>hex_.25_20_1.5</td>
<td>Steel Hex Head Screw, 1/4&quot;-20 x 1-1/2&quot; long, fully threaded</td>
</tr>
<tr>
<td>2</td>
<td>Pan_.25_20_1.5</td>
<td>Pan Head 1/4-20 x 2.5&quot;</td>
</tr>
<tr>
<td>3</td>
<td>TE-20004-22</td>
<td>A Frame, Top</td>
</tr>
<tr>
<td>4</td>
<td>TE-20004-23</td>
<td>A Frame, Bottom</td>
</tr>
<tr>
<td>5</td>
<td>TE-20004-41</td>
<td>Front and Back Plate</td>
</tr>
<tr>
<td>6</td>
<td>washer_flat_.25</td>
<td>Flat Washer for 1/4&quot; Screw</td>
</tr>
<tr>
<td>7</td>
<td>wing_.25_20</td>
<td>Steel Wing Nut, 1/4&quot;-20, 31/64&quot; Base Diameter</td>
</tr>
</tbody>
</table>

UNLESS OTHERWISE SPECIFIED:
- DIMENSIONS ARE IN INCHES
- TOLERANCES:
  - FRACTIONAL: ±1/16
  - ANGULAR: MACH ±1° BEND ±1°
  - TWO PLACE DECIMAL: ±0.01
  - THREE PLACE DECIMAL: ±0.001
- INTERPRET GEOMETRIC TOLERANCING PER:
  - MATERIAL

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Note: subassemblies can nest for storage
Step 1:

Note:
1. Assembly can be done with parts upright, on the ground, or on their side.
2. Attach 3 to 4 using 2x 2 into TeeNuts.
Step 2:

Notes:
1. Attach 5 to 3 using 1, 2x 6, and 7.
2. Repeat on remaining holes on 3 and 4.
Step 3:

Notes:
1. Repeat Step 2 on other side.
Notes:
1. Instructions and quantities shown are for 1 assembly. 4 assemblies total are needed.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TE-20004-35</td>
<td>Bottom, Top Gusset</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>TE-20004-36</td>
<td>Bottom, Bottom Gusset</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>TE-20004-37</td>
<td>Bottom, Bottom</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>TE-20004-38</td>
<td>Bottom, Side</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>TE-20004-39</td>
<td>Bottom, Top</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>TeeNut_.25_20</td>
<td>1/4-20 Tee Nut</td>
<td>2</td>
</tr>
</tbody>
</table>
Notes:
1. Insert 6 into 4 using a hammer or mallet as needed.
Step 2:

TeeNut facing out

Note:
1. Align 3, Step 1, 5.
2. Use 2.5" Screws to attach. Predrill as needed.
Step 1

**Note:**

1. Screw 3, Step 1, to 2 with 1.5" screws. Pre drill as needed.
2. Repeat.
3. Screw 5, Step 1 to 1 with 1.5" screws. Pre drill as needed.
4. Repeat.
Step 4:

Note:

1. Flip over and repeat Step 3.
Step 5:

Note:

1. Optional: Add hook to the bottom of 3.

Hook can be added here.
NOTE:
Material: 1/2" Plywood

A Frame, Bottom
NOTES:
Material: 2" x 4" Pine Lumber
NOTES:
Material: 2" x 4" Pine Lumber

TE-20004-39
QTY: 1

This face and holes align with face and holes of TE-20004-29 (A Frame, Top)

Material: 2" x 4" Pine Lumber

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL \pm \frac{1}{16}
ANGULAR: MACH \pm 1° BEND \pm 1°
TWO PLACE DECIMAL \pm .01
THREE PLACE DECIMAL \pm .001
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
APPLICATION
DO NOT SCALE DRAWING

A Frame, Bottom

A
TE-20004-22
REV

SHEET 10 OF 10

 SCALE: 1:18 WEIGHT:
Notes:
1. Instructions and quantities shown are for 1 assembly. 4 assemblies total are needed.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TE-20004-25</td>
<td>Top, Cross Gusset</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>TE-20004-26</td>
<td>Top, Bottom Gusset</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>TE-20004-27</td>
<td>Top, Top</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>TE-20004-28</td>
<td>Top, Side Leg</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>TE-20004-29</td>
<td>Top, Bottom</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>TE-20004-30</td>
<td>Top, Middle</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>TeeNut_.25_20</td>
<td>1/4-20 Tee Nut</td>
<td>4</td>
</tr>
</tbody>
</table>
Step 1:
Qty: 2

Notes:
1. Insert 7 into 4 using a hammer or mallet as needed.
Notes:
1. Insert 2X (7) into (5) using a hammer or mallet as needed.
Notes:
1. Align Step 2, Step 1, 3.
2. Use 2.5" Screws to attach. Predrill as needed.
Notes:
1. Screw Step 3 and Step 1 to 1 with 1.5" screws. Pre drill as needed.
2. Repeat.
3. Screw Step 2 and Step 1 to 2 with 1.5" screws. Pre drill as needed.
4. Repeat.

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±1/16
ANGULAR: MACH 1° BEND ±1°
TWO PLACE DECIMAL ±.01
THREE PLACE DECIMAL ±.001

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL

FINISH

NEXT ASSY

USED ON

APPLICATION

DO NOT SCALE DRAWING

TITLE: A Frame, Top

SIZE A

DWG. NO. TE-20004-23

REV A

SCALE: 1:16

WEIGHT:

SHEET 6 OF 13
Step 5:

Note:
1. Flip over and repeat Step 4.
Step 6:

Corner of 6 should be touching Step 1.

Notes:
1. Align 6 to Step 1.
Step 7:

Notes:
1. Screw 6 and Step 1 to 1 with 1.5" screws. Pre drill as needed.
2. Repeat.
Step 8:

Note:
1. Flip over and repeat Step 7.
**TE-20004-27**

QTY: 1

3

5.65
[5-9/16”]

1.75
[1-3/4”]

4.84

2.31
[2-5/16”]

2X Ø .34 THRU

2X 70.00°

Notes:
Material: 2” x 4” Pine Lumber

**TE-20004-28**

QTY: 2

4

47.75
[47-3/4”]

47.75
[47-3/4”]

70.00°

29.56
[29-9/16”]

22.38
[22-3/8”]

1.75
[1-3/4”]

.56
[9/16”]

.56
[9/16”]

2X .28 THRU

Ø .31 THRU
[5/16” Drill Bit]

2X .56 [9/16”]

1.50
[1-3/4”]

13.13
[13-1/8”]

12.00

.56
[9/16”]

.56
[9/16”]

2X 70.00°

1.50
(3.50)

**Notes:**
Material: 2” x 4” Pine Lumber
TE-20004-29
QTY: 1

2X 70.00°

.56
[9/16”]

46.50
[46-1/2”]

1.75
[1-3/4”]

This face and holes align with face and holes of TE-20004-39
(A Frame, Bottom)

Notes:
Material: 2” x 4” Pine Lumber

TE-20004-30
QTY: 1

24.69
[24-11/16”]

Notes:
Material: 2” x 4” Pine Lumber
Notes:
1. Instructions and quantities shown are for 1 assembly. 2 assemblies total are needed.

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TE-20004-32</td>
<td>Hard Stop with Holes</td>
</tr>
<tr>
<td>2</td>
<td>TE-20004-33</td>
<td>Hard Stop</td>
</tr>
<tr>
<td>3</td>
<td>TeeNut_.25_20</td>
<td>Soft wood fiber tee nut</td>
</tr>
</tbody>
</table>

**ITEM NO.** | **PART NUMBER** | **DESCRIPTION** |
--- | --- | --- |
1 | TE-20004-32 | Hard Stop with Holes |
2 | TE-20004-33 | Hard Stop |
3 | TeeNut_.25_20 | Soft wood fiber tee nut |

**UNLESS OTHERWISE SPECIFIED:**
- **DIMENSIONS ARE IN INCHES**
- **TOLERANCES:**
  - **FRACTIONAL:** ±1/16
  - **ANGULAR:** MACH ±1° BEND ±1°
  - **TWO PLACE DECIMAL:** ±.01
  - **THREE PLACE DECIMAL:** ±.001
- **INTERPRET GEOMETRIC TOLERANCING PER:**
- **MATERIAL:**
- **FINISH:**
- **APPLICATION:**

**DRAWN:**
- **CHECKED:**
- **ENG APPR.:**
- **MFG APPR.:**
- **Q.A.:**
- **COMMENTS:**

**TITLE:** Hard Stop Assembled

**SIZE** | **DWG. NO.** | **REV.** | **SCALE:** 1:12 | **WEIGHT:** | **SHEET:** 1 OF 5
Hard Stop
Assembled

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±1/16
ANGULAR: MACH ±1° BEND ±1°
TWO PLACE DECIMAL ±.01
THREE PLACE DECIMAL ±.001

INTERPRET GEOMETRIC TOLERANCING PER:

MATERIAL

FINISH

NEXT ASSY USED ON

APPLICATION DO NOT SCALE DRAWING

DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:

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TITLE:
Hard Stop Assembled

SIZE DWG. NO. REV
A TE-20004-24

SCALE: 1:16 WEIGHT: SHEET 2 OF 5
NOTES:
Material: 2" x 4" Pine Lumber

NOTES:
Material: 2" x 4" Pine Lumber

TE-20004-32
QTY: 1

TE-20004-33
QTY: 2

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL: ±1/16
ANGULAR: MACH ± 1° BEND ± 1°
TWO PLACE DECIMAL: ± .01
THREE PLACE DECIMAL: ± .001
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
APPLICATION
DO NOT SCALE DRAWING

DRAWN
CHECKED
ENG APPR.
MFG APPR.
Q.A.
COMMENTS:

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Step 1:

Notes:
1. Insert 4x 3 into 1 using a hammer or mallet as needed.
Step 2:

Notes:
1. Attach 2 to 2 using 2.5" screws. Then attach to Step 1 using 2.5" screws. Make sure 3 are exposed.
Note:
1. Material: 1/2" Plywood
2. Qty: 8 needed
3. Remove sharp edges.
Notes:
1. Material: 1/2" Plywood
2. Qty: 4 needed
3. Remove sharp edges.

Material: 1/2" Plywood

**Rough Draft**

Side Plate

**TE-20004-42**

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