

- Blinking: indicates that either the Field Management System is preset for the MATCH or it's during a MATCH and the corresponding ROBOT has lost connectivity.
- Off: indicates that the MATCH has not started yet, but the ROBOT is linked and disabled. – If the amber LED is on, the E-stop button has been pressed.
- One Timer (in the PORTAL adjacent to PLAYER STATION 1): displays the official time remaining in AUTO, TELEOP, and TIMEOUTS and marked with white tape along the bottom edge.
- Field Management System hardware and wiring: mostly located below the center PLAYER STATION shelf.

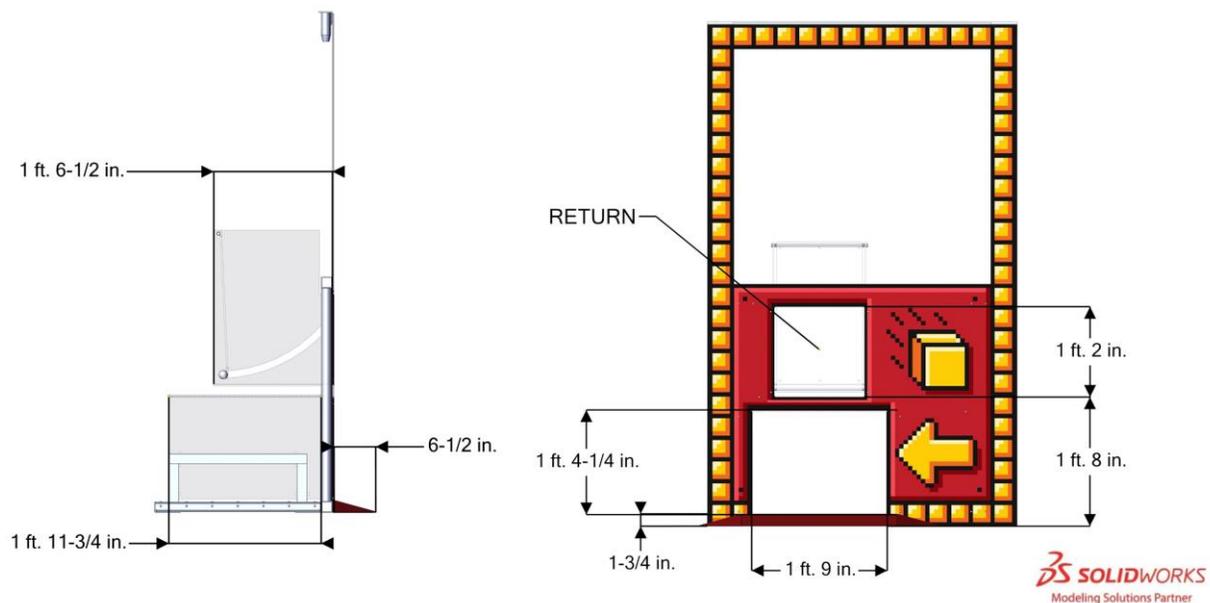
3.6.2 EXCHANGE

An EXCHANGE is a polycarbonate wall 6 ft. 5 ¾ in. (~197 cm) tall by 4 ft. (~122 cm) wide located between PLAYER STATION 1 and PLAYER STATION 2 and used by ROBOTS to deliver POWER CUBES to HUMAN PLAYERS. HUMAN PLAYERS can then either place POWER CUBES in the VAULT or feed them back to the ROBOT through the RETURN.

Each EXCHANGE has a lower opening 1 ft. 4 ¼ in. (~41 cm) tall and is 1 ft. 9 in. (~53 cm) wide used to deliver POWER CUBES to the HUMAN PLAYER. A small ramp, 1 ¾ in. (~4 cm) tall by 6 ½ in. (~17 cm) deep, leads to a series of conveyor rollers. The conveyor rollers are spun by the HUMAN PLAYER to move the POWER CUBE through a polycarbonate tunnel that is 1 ft. 11 ¾ in. (~60 cm) deep.

Each EXCHANGE also features a RETURN used to deliver POWER CUBES to ROBOTS. The RETURN opening is a 1ft. 2 in. (~36 cm) square, centered above the lower opening and is located 1 ft. 8 in. (~51 cm) above the carpet. Behind the RETURN opening is a 1 ft. 6 ½ in. (~47 cm) deep polycarbonate chute. The chute features a swinging wall designed to push the POWER CUBE onto the FIELD.

Figure 3-18: EXCHANGE

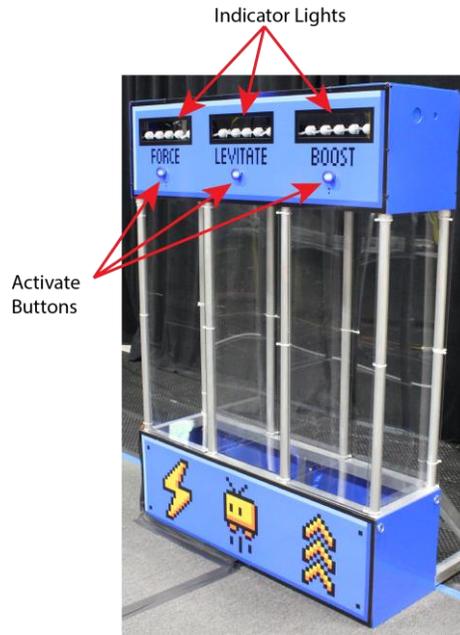


3.6.3 VAULT

The VAULT is an aluminum and plastic structure used by HUMAN PLAYERS to turn POWER CUBES in to POWER UPS. There are three (3) columns within the VAULT. Each column is 1 ft. 1-1/2 in. (~34 cm) wide by 3 ft. 3-1/4 in. (~100 cm) tall with the bottom located 1 ft. 3-1/2 in. (~39 cm) above the carpet. Each of the three (3) columns in the VAULT correspond to a POWER UP. When standing in the

ALLIANCE STATION and facing the open columns of the VAULT the column to the left is the FORCE POWER UP, the center column is the LEVITATE POWER UP and the column on the right is the BOOST POWER UP.

Figure 3-19: Blue ALLIANCE VAULT



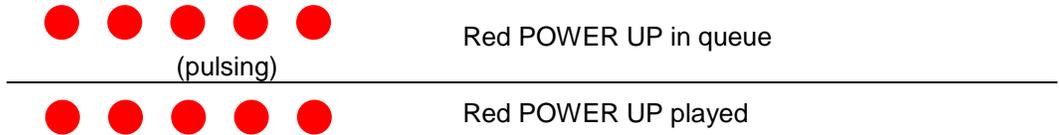
Caution, there are orientations where all three (3) POWER CUBES will not fit in a VAULT column, but if HUMAN PLAYERS place POWER CUBES logo side up they'll fit.

3.6.3.1 VAULT lighting

Lights at the top of each VAULT column display the POWER CUBE count for that column. The lights have the following states:

Table 3-2: VAULT Lighting

Color	Meaning
● ● ● ● ●	No POWER CUBES in column
● ● ● ● ●	One (1) POWER CUBE in column
● ● ● ● ●	Two (2) POWER CUBES in column
● ● ● ● ●	Three (3) POWER CUBES in column
● ● ● ● ● (pulsing)	Blue POWER UP in queue
● ● ● ● ●	Blue POWER UP played

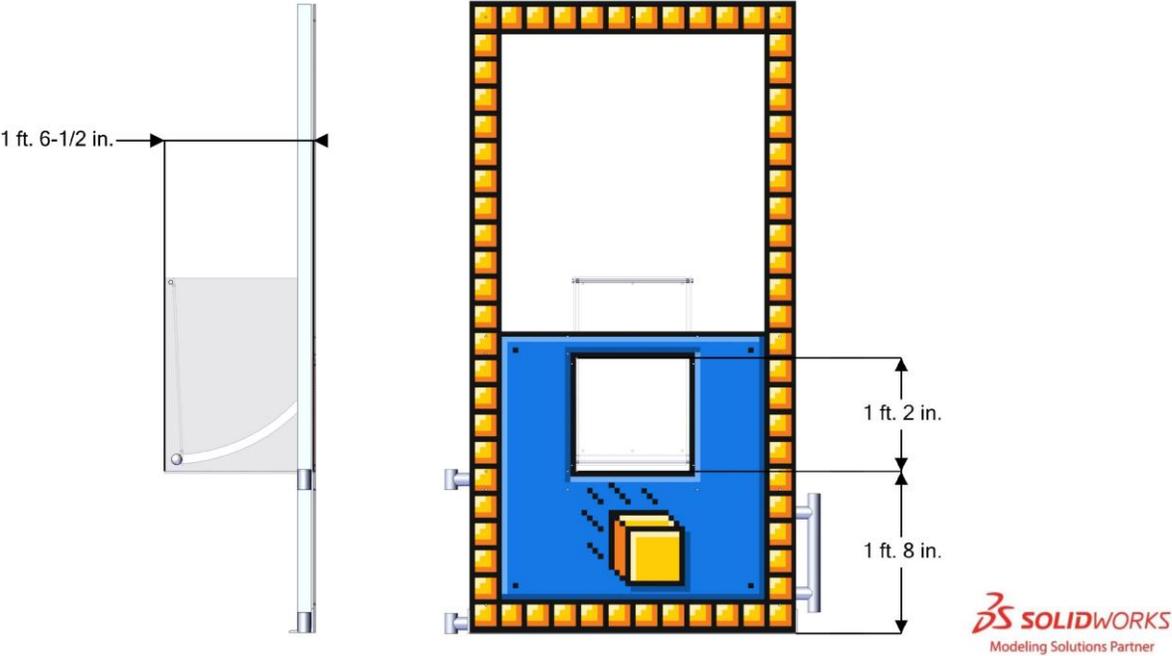


The lights illuminate one bulb per POWER CUBE and show one (1), two (2), three (3) or none (0) by lighting up from left to right. To play a POWER UP, the button corresponding to the column and associated POWER UP is pressed by the HUMAN PLAYER. Once played, all five (5) lights in the corresponding column are illuminated in the ALLIANCE color. If an ALLIANCE plays a POWER UP during the time when an opposing ALLIANCE's POWER UP is active, the POWER UP is queued, indicated by five (5) pulsing lights. See [Section 4.3 POWER UPS](#) for more details.

3.7 PORTAL

HUMAN PLAYERS may deliver POWER CUBES to ROBOTS through either of the PORTAL walls. Each PORTAL wall features a 1 ft. 2 in. (~36 cm) square opening, centered across the width of the panel and located 1 ft. 8 in. (~51 cm) from the carpet. Behind the opening is a 1 ft. 6 ½ in. (~47 cm) polycarbonate chute. The chute features a swinging wall that the HUMAN PLAYER uses to push the POWER CUBE onto the FIELD.

Figure 3-20: PORTAL



3.8 POWER CUBE

POWER CUBES are used to affect the position of the SCALE and SWITCH PLATES, and can be traded in for POWER UPS. A POWER CUBE is a 1 ft. 1 in. (~33 cm) wide by 1 ft. 1 in. (~33 cm) deep by 11 in. (~27 cm) tall HDPE milk crate covered in a yellow nylon (600 Denier) cover. The FIRST® logo covers the open face of the milk crate. Each POWER CUBE weighs 3 ½ lbs (~1.6 kg). POWER CUBES may be