OB7

COLLABORATIVE ROBOT
USER MANUAL

NEXT GENERATION COLLABORATIVE ROBOTS

VERSION 0.6

JUNE 2018

Designed and Manufactured In the USA

CONTACT

Address

Productive Robotics Inc.
1033 Cindy Lane Carpinteria,
CA 92013 United States

Phone & Fax

Phone: 805-244-9300
Sales: 805-244-9300 ext. 7001
Support: 805-244-9300 ext. 7117

Online

info@productiverobotics.com
sales@productiverobotics.com
www.productiverobotics.com

productive robotics™

OB7 COLLABORATIVE ROBOT
USER MANUAL

VERSION 0.6

JUNE 2018

OB7 COLLABORATIVE ROBOT
USER MANUAL
TABLE OF CONTENTS

PREFACE

PREFACE

SAFETY NOTICE

Do not operate or power your robot before reading this:

Robots, including OB7, can be dangerous. By definition, the robot alone does not constitute the complete machine or system. A Risk Assessment, performed by a qualified person or team, is absolutely necessary to understand the risks associated with operating any robot. The specific considerations and guidelines for performing a Risk Assessment are beyond the scope of this manual. The Risk Assessment must be performed on the entire machine, system and environment. Steps must be taken to mitigate all risks identified during the Risk Assessment. These steps may include, but are not limited to: the addition of safety equipment and/or guarding, education and training of staff, factory and shop organization, signage, and/or other measures. Risk Assessment and mitigation is the responsibility of the robot integrator and/or end user. Because the robot is only one component of the entire system, it is not possible for the robot manufacturer to perform the necessary Risk Assessment.   While a Risk Assessment is mandatory, it can only reduce and mitigate risks and can not guarantee safety under all circumstances. Comprehensive safety rules, a safe Work environment and a strong culture of safety are important factors in creating a safe Working environment.

Operation of robots, and all industrial machinery is governed by regulations and laws specific to each location. It is the responsibility of the robot integrator and end user to assure that the entire system, including the robot, are in compliance with all regulations and laws. The following is a partial list of documents that may be relevant or useful:

- ISO10218-2 Robots and Robotic Devices- Safety Requirements

- ISO/TS 15066-2016 Technical Report for Industrial Robots and Robot Systems, Safety Requirements

- ISO12100:2010 or later Safety of Machinery - General principles of design, Risk Assessment and risk reduction

- ANSI B11.0-2010 Safety of Machinery: General Requirements and Risk Assessment

- CSA Z434-2014

- US1740

GENERAL SAFETY CONSIDERATIONS

Before operating your robot, and while performing the Risk Assessment, consider the following:

- Do not operate the robot or any associated machinery in any manner not considered in the Risk Assessment.

- Establish and set up the appropriate safety settings in the robot's and other equipment's software.

- Provide system passwords only to personnel who are sufficiently trained and responsible in operation of the robot

- Never override any safety functions or equipment.

- Provide instructions for use of the entire system.

- Do not operate the robot or system without the necessary safety equipment as identified by the Risk Assessment.

- Assure a clean, uncluttered and organized Workplace.

- Provide appropriate signage.

- Provide appropriate Personal Safety Equipment.

- Assemble a single file containing this manual, the Risk Assessment, and all associated technicial information.

- Assure that the robot arm and all associated equipment are securely fastened in place.

- Locate the emergency stop switch, and the robot control tablet, outside the robot's reach and in a location which may be accessed without entering the robot's operating area.

- Do not operate the robot or any associated machinery if it is damaged.

- Be certain that all settings are correctly configured

- Do not modify the robot. If modified, the robot's performance can not be assured and may become dangerous in ways not predictable during the Risk Assessment.

- Never climb on the robot.

- Do not use the robot in explosive environments.

- Do not use the robot in medical or human life critical applications.

- Do not use the robot without performing a Risk Assessment.

- Do not power on or use the robot in applications in which the specifications or performance of the robot is inadequate for the job.

- Do not use the robot without sufficiently rated safety equipment as specified by Risk Assessment.

- Do not use the robot at speeds, forces or power levels beyond those specified, or safe.

- Even under reduced speed and force operation, the robot may contact other objects or parts of itself which can present risk of injury due to crushing or pinching.

- Even under reduced speed and force operation, sharp portions of the end effector, or sharp objects carried by the end effector can present risk of injury.

- OB7's payload limit is 5kg (11 lbs). The payload limit includes the weight of the end effector. Exceeding this limit can result in potential injury as well as damage to the robot.

LIMITATION OF LIABILITY

It is the intention of this manual to provide an overview of the safety requirements for operating a robot. It is the responsibility of the robot integrator and end user of the robot to ensure that the robot, the associated machinery and the environment are safe. Productive Robotics can make no warranty that the OB7 robot will not cause damage or injury, even if all safety regulations, suggestions and instructions are followed. No instructions, or representations to the contrary, by Productive Robotics employees, resellers, representatives, or any other person or document, may contradict this. Productive Robotics and its employees do not provide Risk Assessments.

DISCLAIMER

Every effort has been taken by Productive Robotics Inc. to ensure that the information in this user manual is accurate and verifiable. However, this publication is an evolving document and may contain technical, typographic, or other errors. Productive Robotics may make changes to this document at any time without notice, and therefore, the reader should use it as a guide only.

To view the latest version of this document, see the "help" menu on your OB7 control tablet.

HOW TO USE THIS MANUAL

Icons Used in This Manual:

This icon indicates that hazards may be present with the equipment. This documentation provides information on the nature of potential hazards and any actions which have to be taken to avoid them.

This symbol refers to tips to help maximize performance.

DOCUMENT CHANGE RECORD

DATE	VERSION	DESCRIPTION
01/29/2018	0.5	First issue for review
01/31/2018	0.5.1	• Added an Instrucional Documents Section on page 112 that includes: • *OB7 Software Instructions on page 113* • *OB7 Final QC Checklist page on page 114* • *Exporting Diagnostics Data From OB7 on page 115* • Updated graphic on page 17 • Updated *Installing the GEI* on page 22 • Added an entry in *Start OB7* on page 27
03/09/2018	0.5.2	• Updated Request for OB7 Password sheet on page 11 • Added Robot Stand Dimensions on page 111 • Updated OB7 Software Update Instructions on page 113
06/18/2018	0.6	• Updated General Safety Considerations on page 8 • Updated annotations on graphic on page 17 • Updated graphic on page 26 • Updated Installing the General Equipment Interface on page 22-24 • Updated General Equipment Interface Digital Inputs on page 47-49 • Updated Ins and Outs on page 44-45 • Updated Jog Screen graphic and copy on page 57 • Added page for technical specifications on page 117 • Added section Cleaning the Fan Filter on page 121

REQUEST FOR OB7 PASSWORD

I have read and understand the safety warnings in the OB7 instruction manual. I understand the relevant safety regulations and practices governing robot operation in my location. A thorough Risk Assessment for the application of OB7 has been performed. The risks and hazards have been identified, and the necessary measures and/or safety equipment needed to eliminate or reduce these risks have been taken.   I understand that a similarly thorough Risk Assessment and reduction must be performed if/when OB7 is moved to a new location or application. I have educated all employees and/or other persons Working with or near OB7 in the possible risks, and will continue to educate future employees or persons who may come in contact with OB7. I understand that operating OB7 beyond limited speed, force and power poses additional risks. I understand that a password is required to enable OB7 to operate beyond certain speed, force and power levels. I understand that password access should be shared only with personnel that have been sufficiently trained, and only after the aforementioned Risk Assessments and hazard reduction steps have been performed.

Person Authorizing: _____

Title: _____

Signature: _____

OB7 Robot ID code: _____

Serial Number: _____

Return Email: _____

Productive Robotics will return the master password for your OB7 in the space provided here:

Robot Master Password: _____

To obtain the password for your robot, complete, scan, and email this page to Productive Robotics at: passwords@productiverobotics.com

GETTING STARTED WITH OB7

GETTING STARTED WITH OB7

UNPACKING THE OB7 STAND

OB7 arrives in a single carton. If you've purchased a stand with your OB7 it will arrive in a small wooden crate.

Before unpacking your OB7, you should prepare its mounting location.

ASSEMBLING THE OB7 STAND

⚠️ The components of your OB7 robot stand are heavy. This is intentional to keep the robot stable as it moves and carries objects. Always use two people to move or lift heavy or awkward components.

Step 1: Remove the 12 screws securing the top of the crate. Lift off the top of the crate.

Remove 12 screws.

Lift off top of crate.
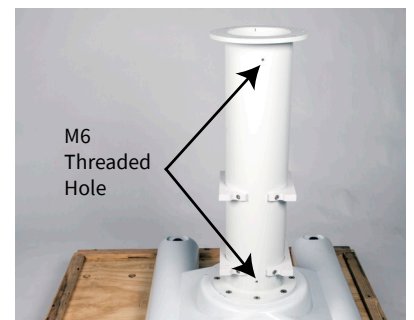

OB7 Robot Stand In Crate

Step 2: Install the column. Cut the ties holding the column to the crate. Mount the column as shown using the 8 M8 screws and the Allen wrench provided. Tighten the screws securely.

Cut the tie downs.


Install column with 8 M8 screws.

M6 Threaded Hole

Rear-view of stand. Note that the 2 threaded holes in the column go towards the back of stand.

Step 3: Remove the stand from the crate. Clip the ties holding the stand down to the crate base. Remove the wood spacers from under the sides of the stand and remove the wood strip from the edge of the crate. Then, roll the stand off the crate.

Clip tie down straps.
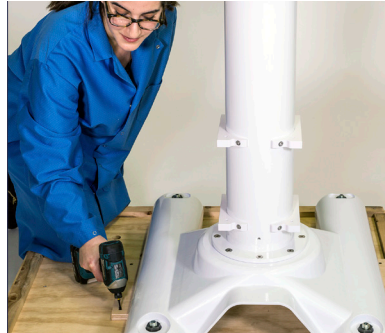
Remove screws from spacers (both sides).

Remove spacers.

Remove wood strip.

Roll stand off of crate.

ASSEMBLING THE OB7 ASSEMBLY TABLE

If you have purchased the OB7 assembly table, follow these steps to assemble and install it on the OB7 Stand.

The OB7 assembly table attaches to the top of the stand column with 4 M8 screws. Use two people to install the assembly table on the column.

Use two people to install the OB7 assembly table.

Using 4 M8 screws, attach the OB7 assembly table to the top of the stand column.

OB7 Assembly Table Installed on Stand

UNPACKING OB7

Step 1: Open the carton and remove the control computer, tablet, and other components from the package and set them aside.

Robot

Gripper (optional)

General Equipment Interface (Optional)

Instruction Manual

Robot Computer

Cables

M8 Mounting Screws

Tablet Dock/Stand

Emergency Stop

5mm Allen Wrench

OB7 Control Tablet
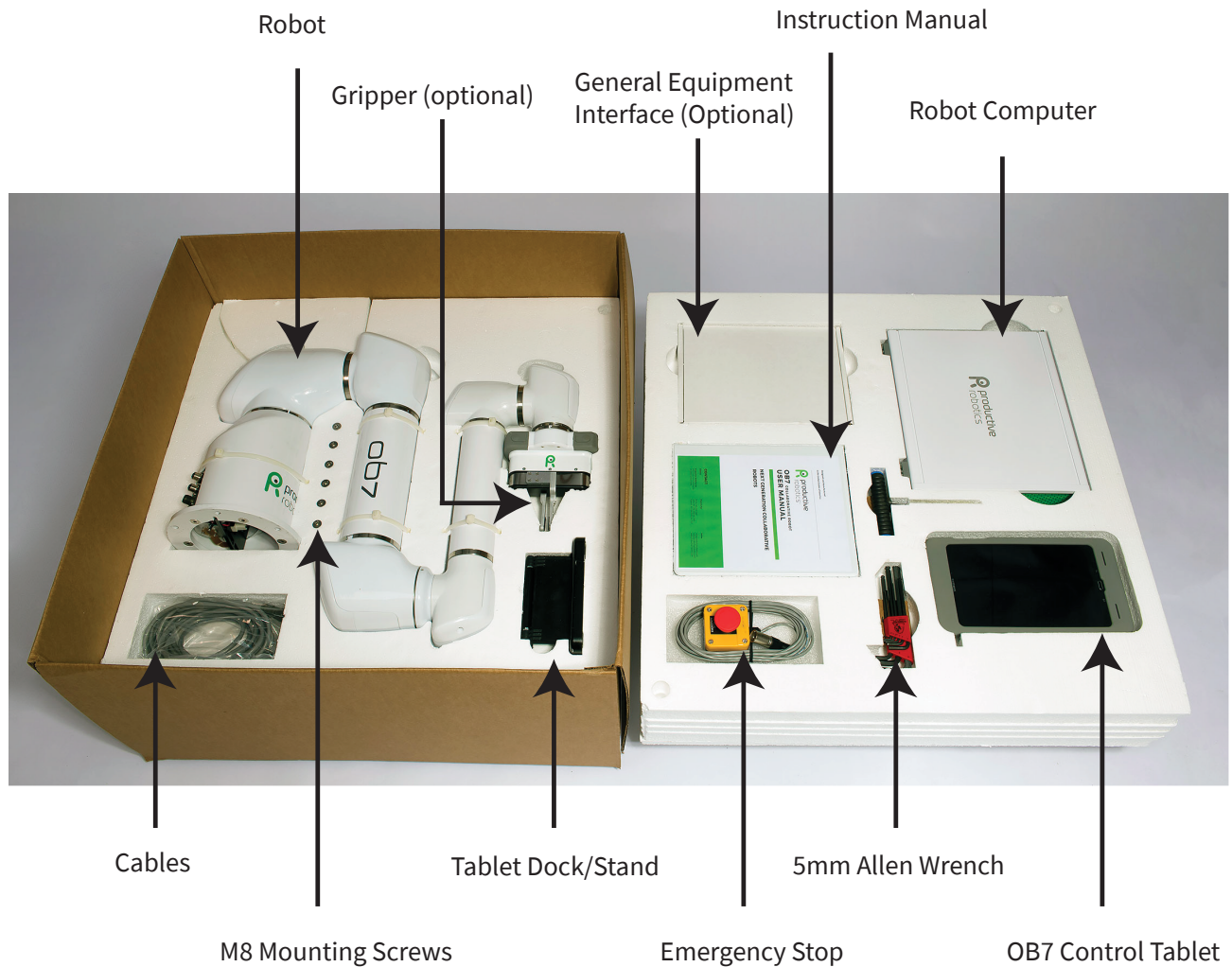
All OB7 Components Inside the Package Before Unpacking

Step 2: Remove OB7 keeping it attached to the foam packaging. DO NOT remove OB7 from the foam packaging yet.   After removing, clip ONLY the tie which is around the base of OB7. Do not clip the other ties yet.

Make sure to keep OB7 in its foam package. This will make it easier to handle OB7 while mounting it on the stand in step 4.
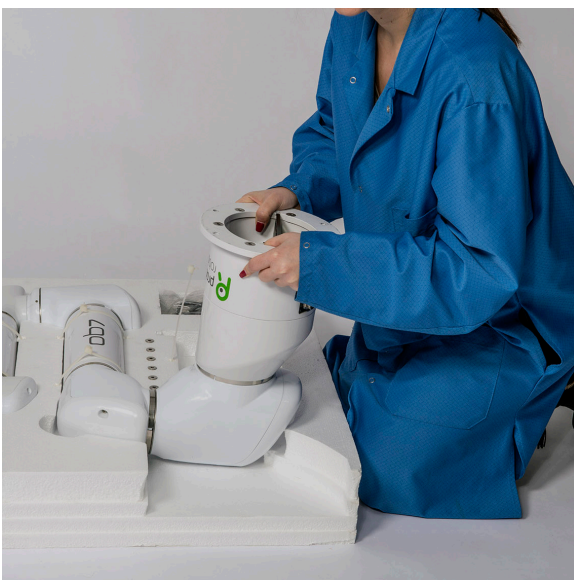

Remove OB7 out of the box. Do not remove OB7 from the foam package.

Clip only the holding base.

Step 3: Rotate the base over 180 degrees. Note that as you rotate the base, the lights on the OB7's joints may illuminate or flash. This is normal.

Rotate base 180 degrees.

Rotate base 180 degrees.

Step 4: Use two people for this step. Using the 6 screws provided, mount OB7. Tighten the mounting screws securely. After securely mounting OB7, clip the remaining ties and remove the foam packaging.

Note: The OB7 weighs 26 kg, or 58 lbs. Use two people to lift OB7 onto its mounting.

Place OB7 in package onto mounting.

Tighten 8 mounting screws securely.

Clip remaining renting ties and remove packaging.

Step 5: Install the computer and power supply.

Install computer and power supply shelves.

UPS   Computer

Install computer on UPS power supply.

Step 6: Install the cables.

Network Cable to Robot

Network Connection

Wifi Antenna

Power Switch

Emergency Stop

Tablet USB Cable

Mains Power Cable

Power Cable to Robot
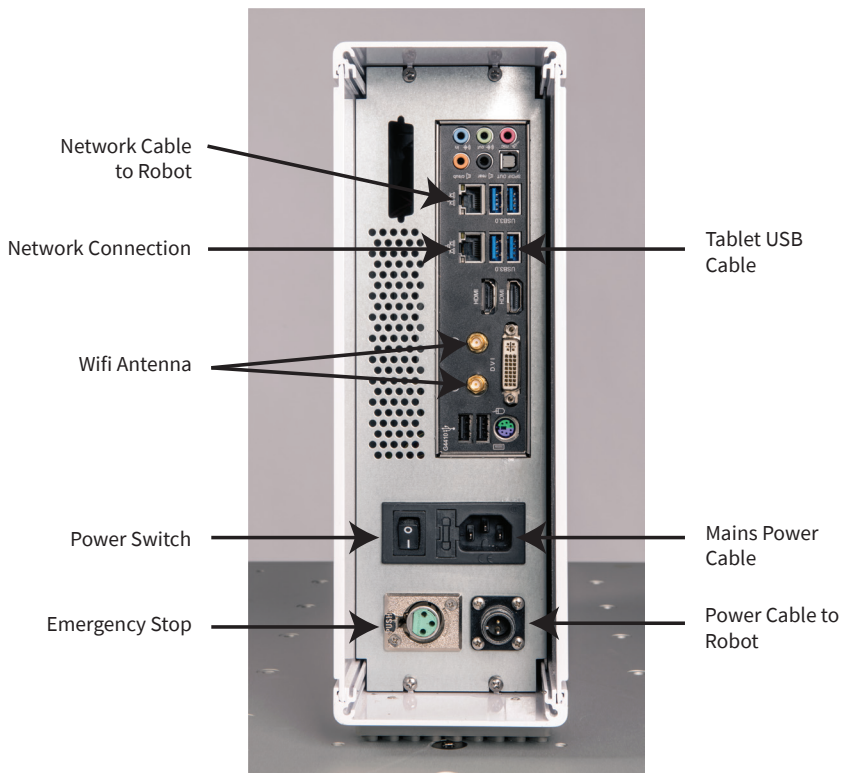
Back of OB7 PC

Back of OB7 PC

Cable Routing In the Channel

USB Camera

Network Cable to
General Equipment
Interface

Network to
Computer

Power Cable to
Robot Computer
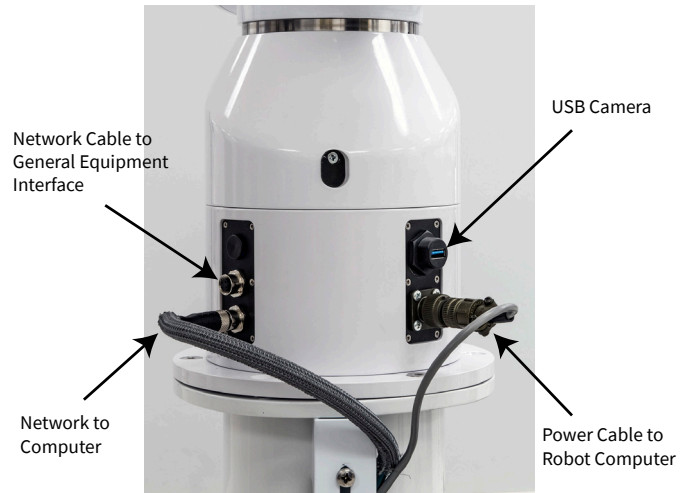
Cables Plugged Into J1

Install Cover on Back of PC.

Power to Robot Computer

Step 7: Locate the control tablet and the Emergency Stop switch in the location chosen for your installation.

Locate Control Tablet

Locate Emergency Stop

Refer to your Risk Assessment when considering the location of your control tablet and emergency stop button.

OB7 is now ready for use!

INSTALLING THE GENERAL EQUIPMENT INTERFACE (OPTIONAL)

General Equipment Interface plugs into the base of OB7.

The General Equipment Interface is used to connect your OB7 with other equipment. The General Equipment Interface has connections for 8 signal inputs, 8 control outputs, and 4 analog inputs. If more inputs or outputs are required, additional General Equipment Interface units can be connected. The inputs are "optically coupled" for safety which provides complete electrical isolation between OB7 and the equipment being connected. The outputs are SPDT relays further allowing complete electrical isolation between OB7 and the equipment being connected.

The analog inputs are not electrically isolated and care must be taken when using these inputs. The General Equipment Interface plugs into the base of OB7. A separate power supply is included for power.

If OB7 is to be moved between multiple locations, it is suggested that the General Equipment Interface to be installed on the external equipment and not on OB7 itself. This allows OB7 to be moved by simply unplugging the network cable connection from the General Equipment Interface at one station and plugging it into a second unit at the next station. This avoids disconnecting the wiring at each station, or the need the build dedicated cabling harnesses at each station.

GENERAL EQUIPMENT INTERFACE

Digital Inputs:	+5 to +24V input
Digital Outputs:	+2 amps maximum per output
Analog Inputs:	+10V maximum input
+24V output:	1 amp maximum
+12V output:	1 amp maximum
+5V output:	1 amp maximum

SAFETY EQUIPMENT WIRING

Digital Inputs 5&6 and 7&8 can be configured for safety sensing devices such as a laser curtain, laser scanner, safety floor mat, etc. Safety rated device provide two (redundant) outputs for each sensor. Inputs 5&6 can be configured for one safety sensor, Inputs 7&8 for another.   When used as safety inputs, both inputs 5&6 or 7&8) must be activated to indicate safe operation. If either input is deactivated, a safety stop (or slowdown) signal is activated. When configured for safety inputs, OB7 can be set to either stop, or slow to collaborative speed, when the safety signal deactivates. If both sets of safety inputs are used, OB7 can be configured to slow to collaborative speed when one signal activates, and stop completely when the other signal activates.

Safety System Wiring
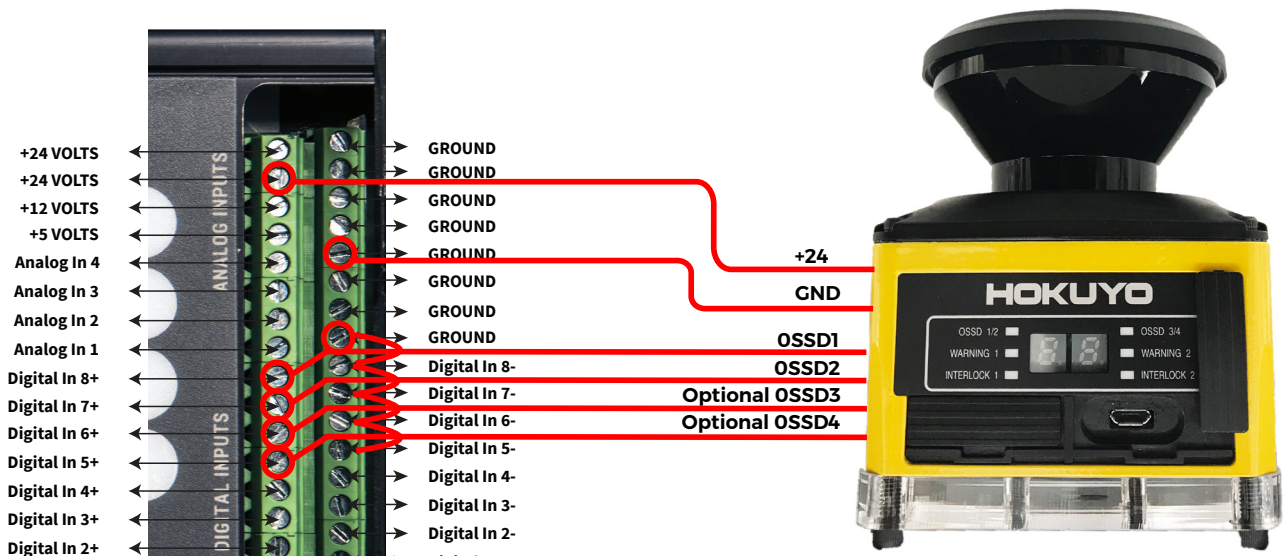
QUICK START

OB7 is designed to be intuitive and easy to use. Most operations require little or no instruction. By design, OB7 is inherently safe when its power, force and speed are limited to "human safe" levels. OB7 starts up with these power, force and speed limits in place. You may freely experiment with teaching OB7. (Please note of course that any machinery can pose safety risks and that proper Risk Assessments are required for all robot operations. See Sect 1 on Risk Assessment.)

Of course OB7's capability is not limited by human safe levels. By following proper safety practices, OB7 can operate at substantial speeds, with maximum force and payload. Always perform a complete Risk Assessment for every application of OB7, which may require additional safeguards to be employed. A password is required for OB7 to operate at speeds and forces exceeding "human safe limits".

OB7 is now ready to start. The following "Quick Start" directions will get OB7 running. We'll Learn how to teach OB7 a simple job, and OB7 will be ready to "Learn" and get right to "Work".

OB7 LIGHTS

Each of OB7's joints light up. The color of the lights indicate the current status of OB7. For safety purposes ensure that the OB7 is located such that the lights are visible to persons approaching the robot.

Solid Red: Emergency Stop

Solid Orange: Non-collaborative Running

Solid Blue: Idle

Pulsing Orange: Non-collaborative Paused

Pulsing Blue: User controlled motion (dragging)

Flashing Red: Error

Solid Green: Collaborative Running or Learning

White: Initializing

Pulsing Green: Collaborative Paused

Fast Flicker Yellow/Blue: Updating Firmware

Joint 7

Joint 6

Control Handle

Camera

Gripper

Joint 4

Joint 5

Joint 3

Joint 2

Joint 1

Control Tablet

Uninterruptable
Power Supply

Control Computer

Rolling Stand

OB7

Set Position   Set Position

Close Gripper   Open Gripper

Open Gripper

Camera   Close Gripper

Release Arm   Release Arm

OB7 Control Handle

Battery:
This icon indicates the charge level of the battery.

When using the control tablet wired, this normally should be at 100%.

When using the control tablet wirelessly, this icon indicates when the tablet needs to be returned to its dock for charging.

Help:
Tap this icon to access the help instructions.

Settings:
Tap this icon to access the settings and setup information for OB7.

Learn:
Tap this icon to teach OB7 a new job.

Learn

Work

productive robotics

Messages appear here.

Work:
Tap this icon to start OB7 working on a job.

OB7 Tablet Home Screen
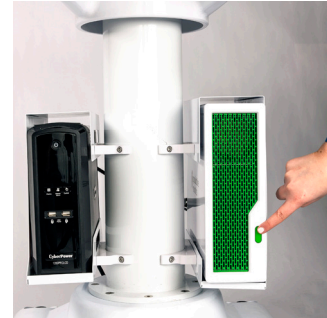
START OB7

Plug it in. Turn it on.

⚠️ Before Operating OB7, always perform a Risk Assessment.

Plug in OB7.

Turn on tablet.

Turn on the power to OB7.

Release Emergency Stop (E-Stop) button.

E-Stop button activated.

E-Stop released.

OB7 lights are blue, which means that OB7 is ready to Learn or Work.

OB7 is now ready to Learn. Notice the lights on the joints. They should all now be blue. That means OB7 is idle, bored, and ready to Learn or to Work.

🔍 When you press the Emergency Stop switch, or power down OB7, the power will be cut and the arm will droop down. If you are powering down OB7 to move it, or for the night, first position OB7 into a safe position so it will not hit anything as it droops.

Unlike most robots, OB7 moves freely when it is not Working. While idle, you can push OB7 around easily by hand. If you push OB7 by grasping the handle, it will stay wherever you leave it when you release the handle. Alternately, if you push OB7 without grasping the handle, OB7 will return to its original position when you stop pushing it.

Push OB7 around. Notice that its arm is free and easy to push. Release the arm and notice that it gently returns to position.
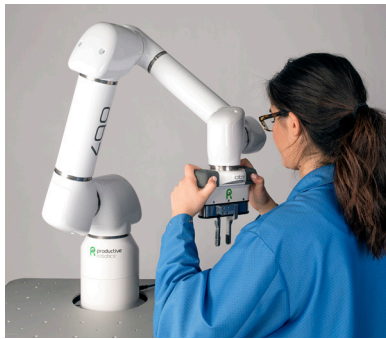
OB7 can be easily moved using the control handle.

OB7 arms can be easily pushed and returned back to position.

Move OB7 to a position. Take hold of the control handle. Move OB7 into any position you choose. When you release the handle, OB7 will stay where you've left it.

Use the control handle to move OB7 into a position.

Open and close the gripper:

*Press ▶I◀ to close the gripper.*

Press ◀I▶ to open the gripper.

OB7 learns its tasks without programming. Teaching OB7 a job is as simple as showing it what to do. Here is a quick introduction to teaching a simple job to OB7. For this quick lesson, we will teach OB7 to move an object from a conveyor belt into a box. Here it goes:

Tell OB7 it's time to Learn, and give this job a name.
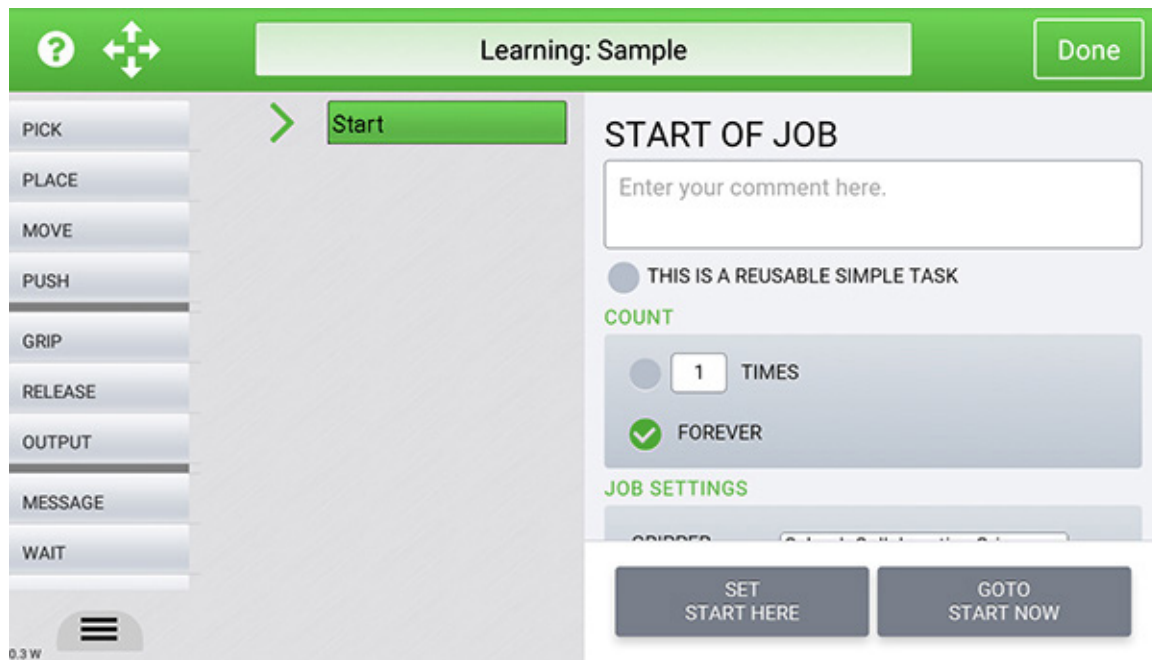
Press "Learn".
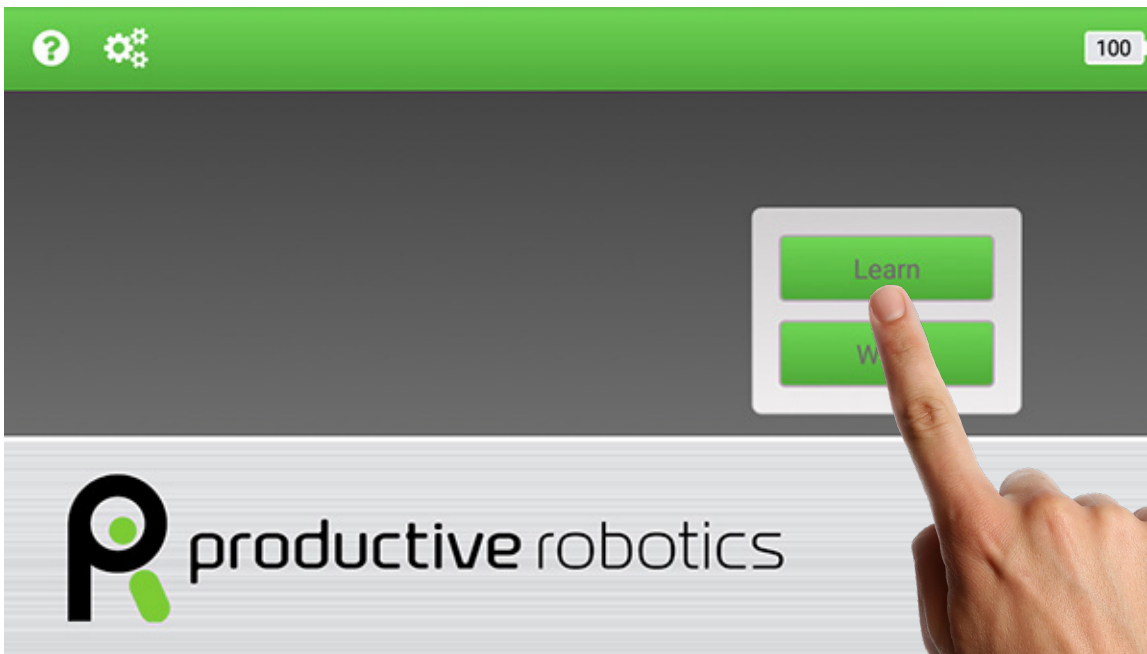
Press "Learn".

Press "New Job".
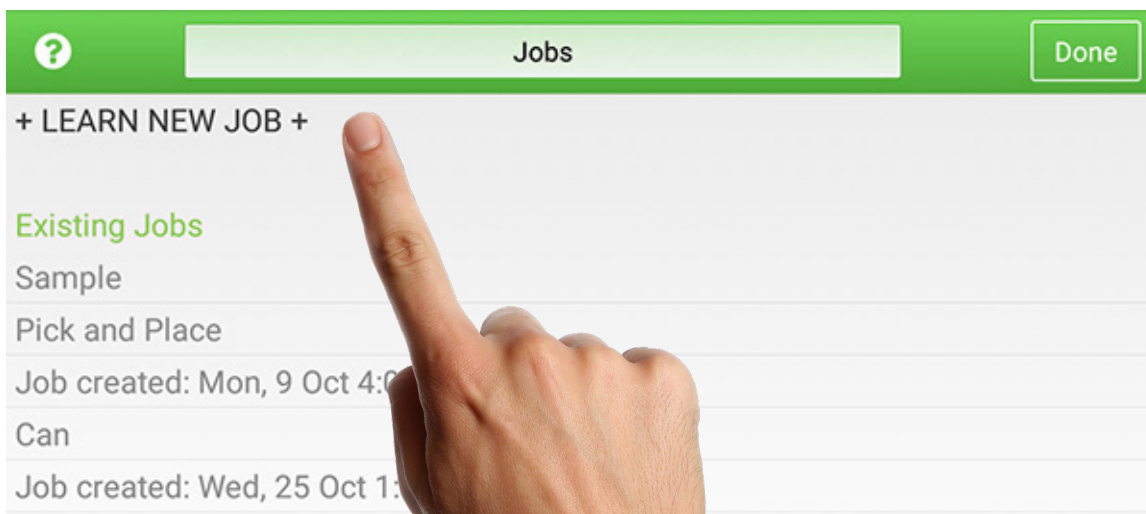
Press "New Job".

OB7 is ready to Learn.

The "Learning" screen is displayed when OB7 is ready to Learn a new job.

OB7 has not learned anything in this job yet. First, let's give the job a name. Tap the title bar where it says "Learning:" and enter the name for this job.

Enter name of job. For Example, "Sample".

Next, show OB7 how to pick up an object. Move OB7 to place the gripper in position to pick up the chosen object. Then, press the ▶◄ button to close the gripper.   OB7 learns how to pick up this object.
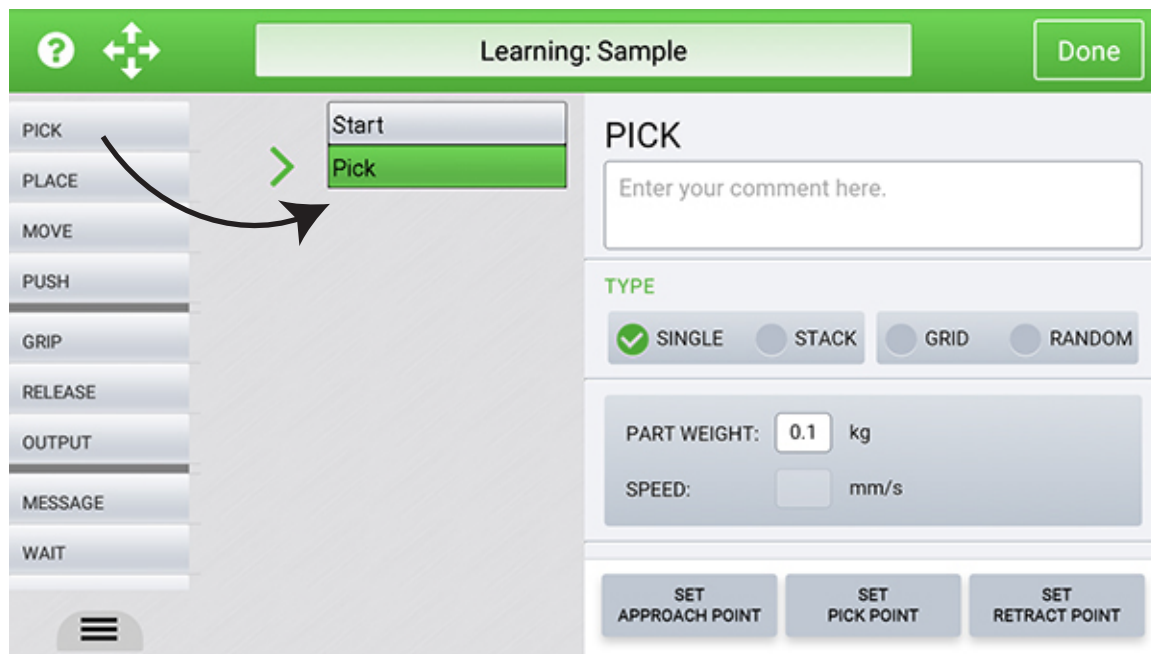

Position OB7 to pick up the object.

Press ▶◄ to close the gripper.

OB7 has now learned how to pick up this object. Notice that OB7 confirms this by adding the ⟨PICK⟩ tile to the job.

OB7 learns how to pick up the object and automatically adds a ⟨PICK⟩ tile to the job.

Next, we show OB7 where to place the object. Move OB7 to locate the object in the position where it should be placed. Then, press the ◄▮► button to open the gripper. OB7 learns where to place the object.

Move to place position.

*Press ◄▮► to open the gripper.
and release the object.*

OB7 has now learned where to place the object. Again, OB7 automatically inserts a PLACE tile into the job.
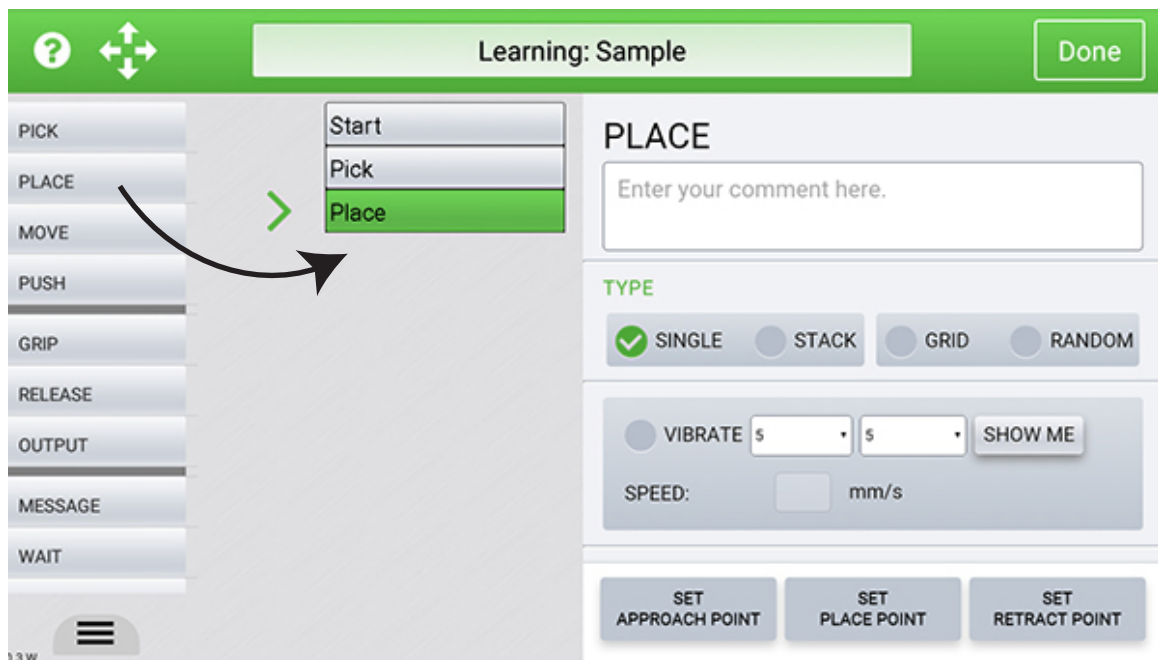
OB7 learns how to place the object and automatically adds a PLACE tile to the job.

Now let's put OB7 to Work and watch what it has learned:

Press "Done".
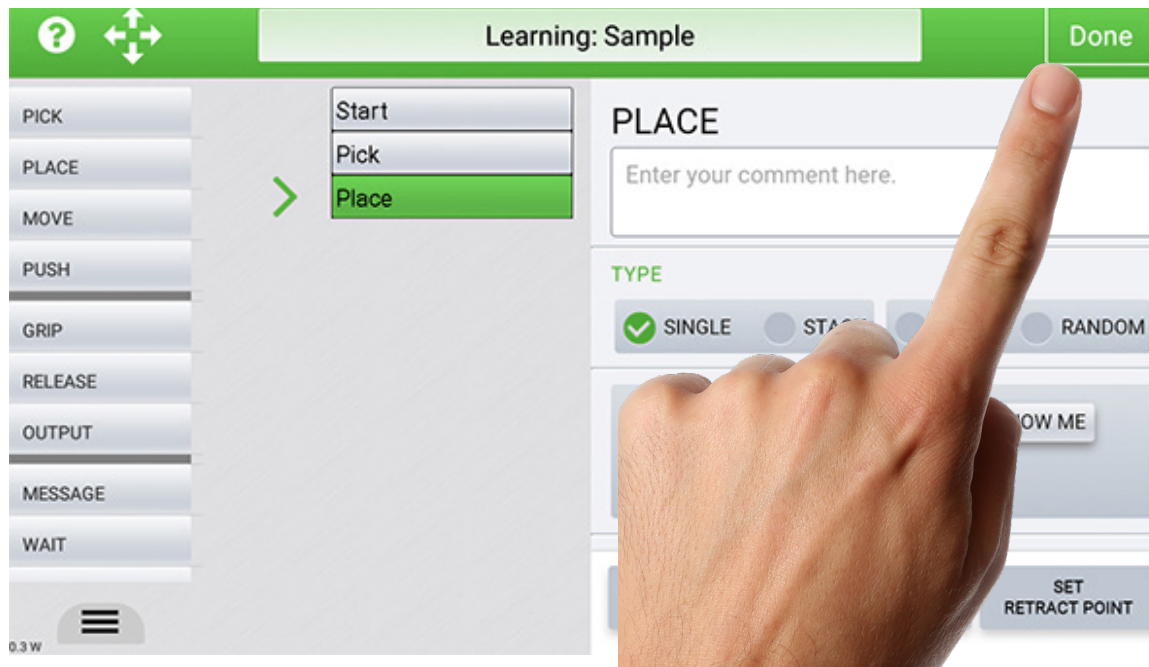
Press "Done".

Press "Work".
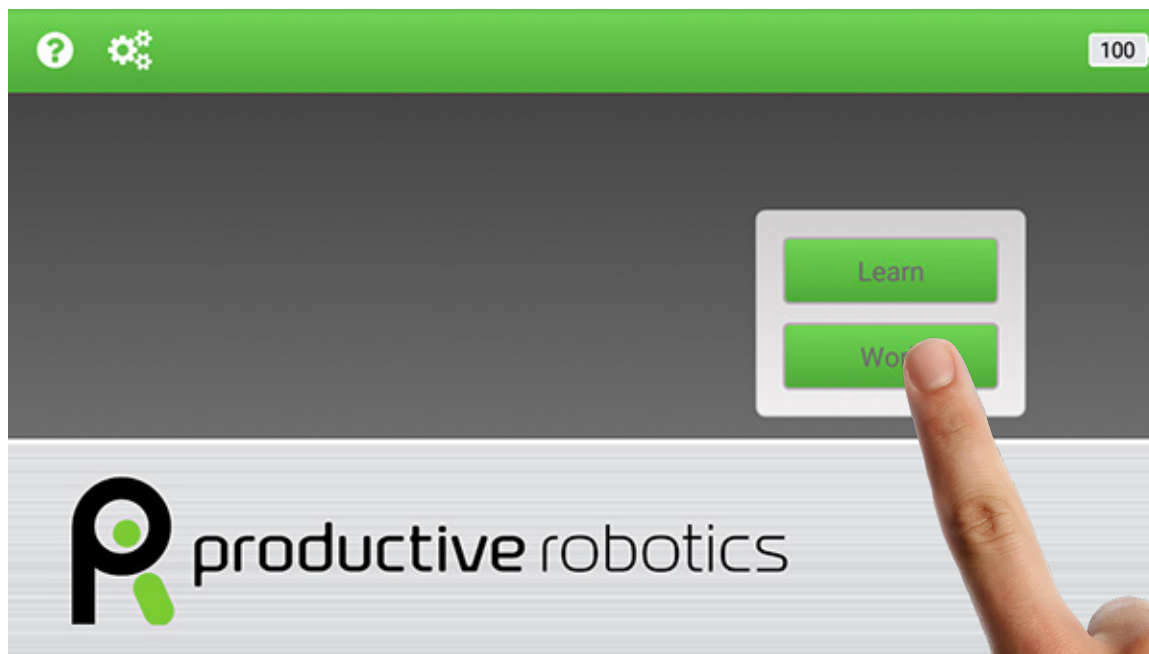
Press "Work".

Select the job.
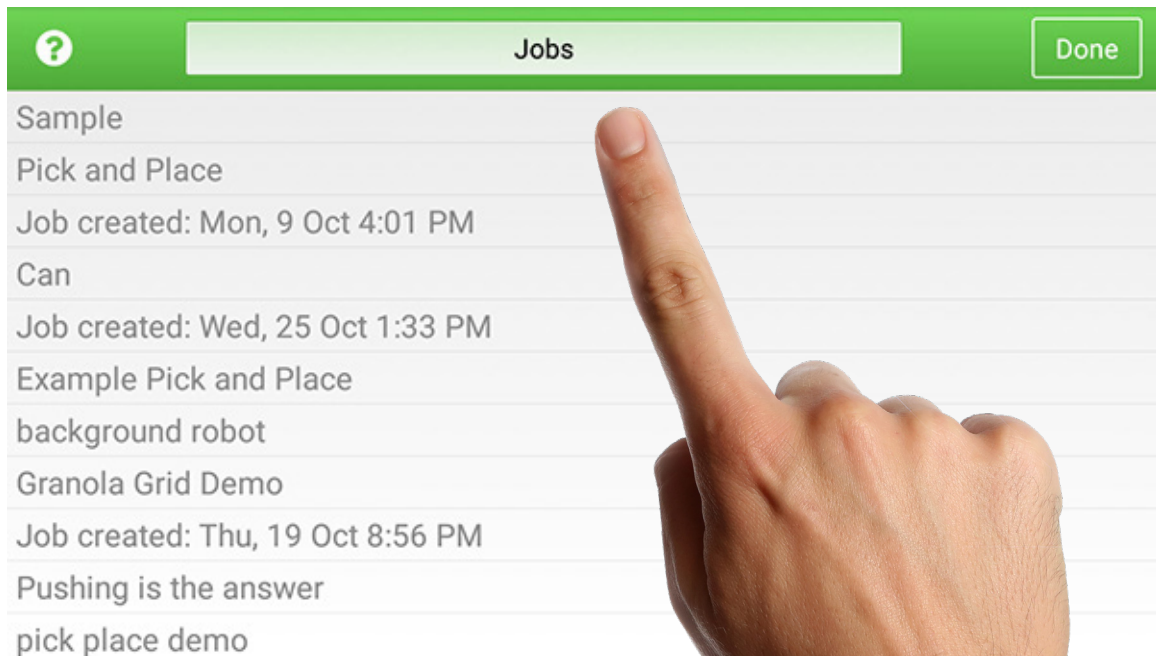
Tap the job to run.

Start the job. Press "Go".
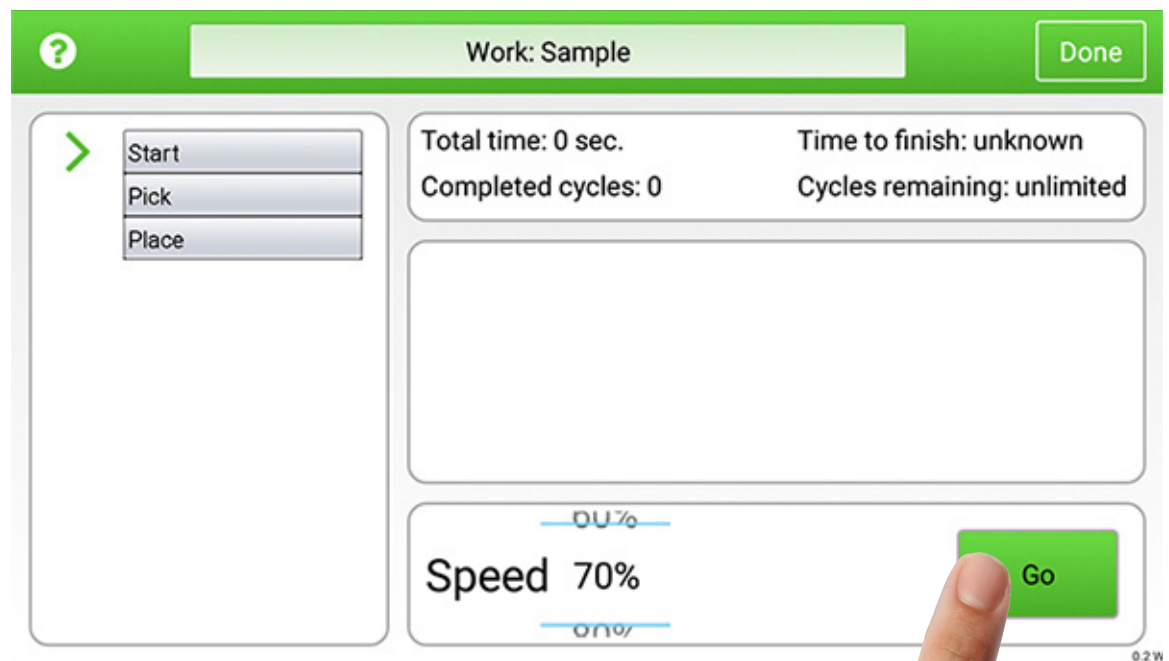
Press "Go".

MEET OB7

MEET OB7

OB7 can be used in many different configurations: On a stand, on stand with assembly table, and on a ceiling mount (not pictured).

OB7 on Stand
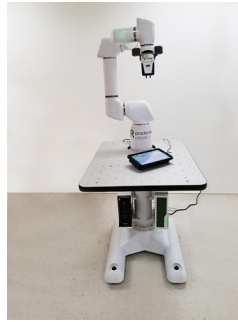
OB7 on Stand With Assembly Table

OB7 has 7 joints which allows maximum flexibility.

Joint 6
Joint 7
Joint 4
Joint 5
Joint 3
Joint 2
Joint 1
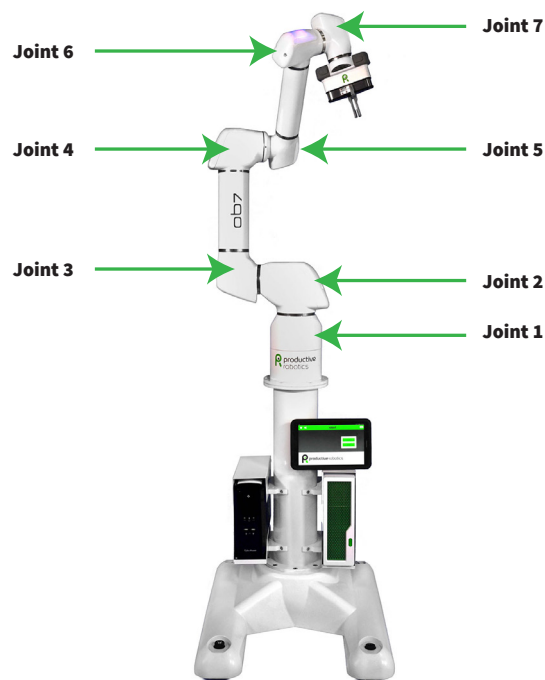
OB7's 7 Joints

OB7's 7 joint arm has the capability to reach around objects.

The OB7 control handle allows you to teach without requiring programming.

OB7 Control Handle
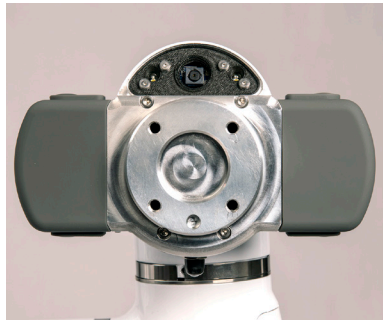
ISO standard tool mounting ISO9409-1-50-4-M6.
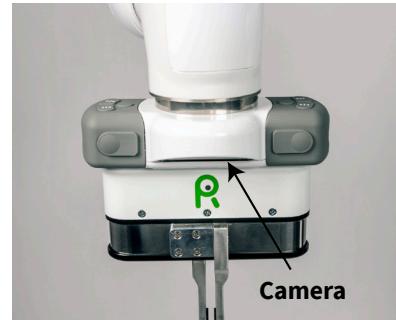
OB7 USB 2.0 Camera
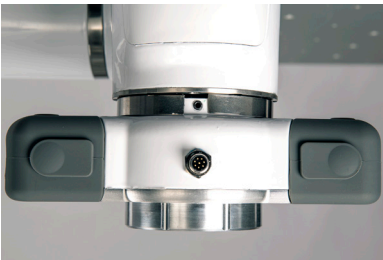
End of Arm Interface Connector

OB7 will Work with many types of grippers (often called "End Of Arm Tooling").

OB7 Parallel Gripper

Robotiq 82 Gripper

Suction Gripper

Remember that weight of the gripper is included in the total payload weight.

OB7 CONTROL TABLET

Easy to teach does not mean OB7 is limited in its operation. Complex jobs can be set up using the OB7 control tablet. All job settings and parameters are entered using the OB7 tablet.

HOME

Battery:
This icon indicates the charge level of the battery.

When using the control tablet wired, this normally should be at 100%.

When using the control tablet wirelessly, this icon indicates when the tablet needs to be returned to its dock for charging.

Help:
Tap this icon to access the help instructions.

Settings:
Tap this icon to access the settings and setup information for OB7.

Learn:
Tap this icon to teach OB7 a new job.

Messages appear here.

Work:
Tap this icon to start OB7 working on a job.

Home Screen

Live Help (Coming Soon):
Chat live with Productive Robotics
technical support.

I/O help:
Instructions for interfacing OB7 to
external devices.

Instruction Manual:
A complete copy of this instruction manual
can be found here.

| Help | Done |

Instruction Manual

I/O Help

Live Help

About

Diagnostics

Designed and Manufactured
In the United States of America

productive
robotics

OB7 COLLABORATIVE ROBOT
USER MANUAL

**NEXT GENERATION COLLABORATIVE
ROBOTS**

CONTACT

Address

Productive Robotics Inc.
1033 Cindy Lane Carpinteria,
CA 93013 United States

Phone & Fax

Phone: 805-244-9300
Sales: 805-244-9300 ext. 7001
Support: 805-244-9300 ext. 7117

Online

info@productiverobotics.com
sales@productiverobotics.com
www.productiverobotics.com

Diagnostics:
Various diagnostic information which may be
important in the event of any technical problems.

About:
Information about your OB7 robot,
including software versions.

Help Screen

Robot Info:
General information about your OB7 including contact information and general machine settings.

Grippers:
Setup information specific to each gripper used by OB7.

Ins and Outs:
Menus and settings related to interfacing OB7 with external equipment.
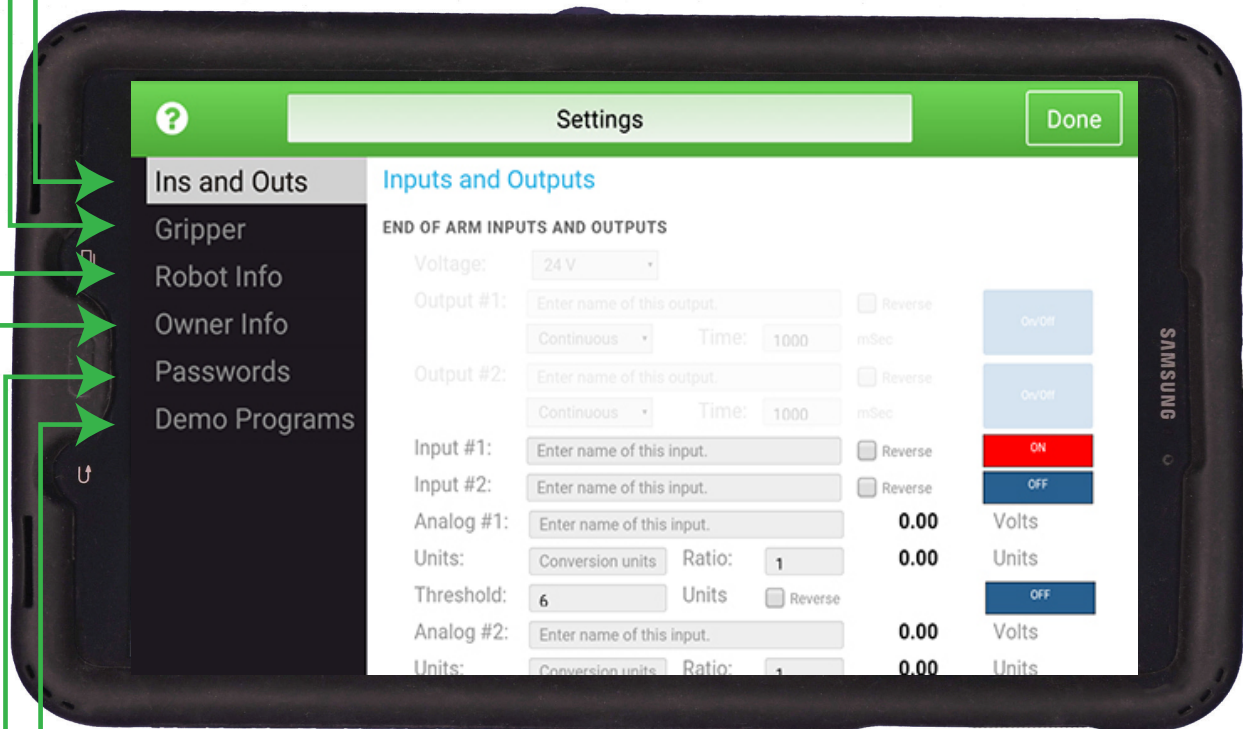
Demo Jobs:
Preprogrammed sample and demonstration jobs.

Passwords:
Passwords are used to allow OB7 to operate above "human safe" speeds and forces.

Owner Info:
Contact information for OB7 owner and operators for sending email and text message warnings and error message.

Settings Screen

OB7 provides input and output connections at the end of the arm on the handle. These inputs and outputs are available to power and/or control end of arm tooling.   Use Productive Robotics cable part number: CBL801 to connect your end of arm devices.

⚠️ Note that the inputs and outputs are not current limited or electrically isolated from OB7 Exceeding the voltage or current ratings can cause permanent damage to the OB7 control handle, and possibly other components within OB7.

End of Arm Inputs and Outputs

These signals are located on the 8 pin connector on the back of the OB7's control handle.

Pin 1 White   Analog input 1
Pin 2 Brown   Analog input 2
Pin 3 Green   Digital Input 2
Pin 4 Yellow   Digital Input 1
Pin 5 Gray   0V/12V/24V   1 amp maximum
Pin 6 Pink   Output 2
Pin 7 Blue   Output 1
Pin 8 Red   Ground
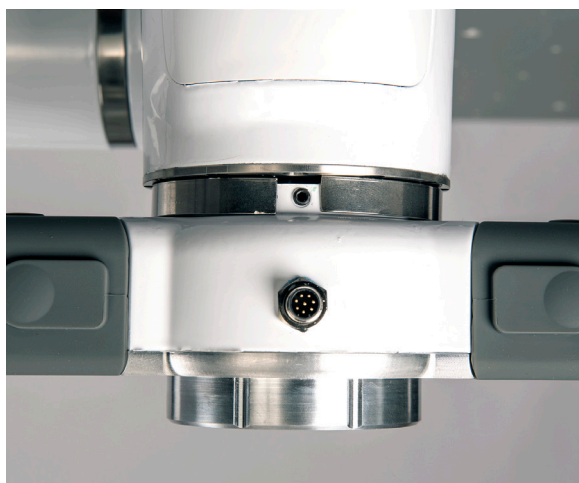
End of Arm Interface Connector

Voltage (Gray Wire)

Sets the voltage level on Pin 5 (Gray wire). The voltage can be set to: Off, 12V or 24V

Output #1 (Blue wire)

Input: Enter the name of the signal.

Continuous: OB7 will set this output to be either on or off.

Pulse: OB7 will send a pulse to this output for the time specified.

Time: Duration of pulse if this output is set to "pulse".

Reverse: When this output is turned "on" or pulsed, it will normally be "open" or disconnected. When the "Reverse" box is checked, the signal will reverse. "On" or "pulse" till take the output to ground.

Output #2 (Pink wire)

This output's settings function identically to Output #1.

Digital Input #1: (Yellow wire)

Input #1: Enter the name of the signal.

Reverse: Leave this box unchecked if the signal is "on" when the voltage is high. Check this box for the signal to be "on" when the voltage is low.

Digital Input #2 (Green wire)

This input's settings function identically to Digital Input #1.

Analog Input #1 (White wire)

This signal reads a voltage between 0 and 12V, or, a current between 0 and 20 milliamps.

Input #1: Enter the name of the signal.

Units: Enter the name of the units being measured. For example: if this input is connected to a scale, the units might be "pounds", "oz", or "Kg", etc.

Ratio: Enter the ratio of the units to volts input. For example: the device might output 1 volt per pound measured. In this case enter 1.

Threshold: Enter the threshold in units between "on" and "off". That might be "pass"/"fail" or

"yes"/"no".   This threshold is used by OB7 when considering whether this signal is "on" or "off" (or "pass"/"fail", etc)

Reverse: Leave this box unchecked if the signal is "on" when the voltage is high. Check this box for the signal to be "on" when the voltage is low.

Analog Input #2 (Brown wire)

This input's settings function identically to Analog Input #1.

Digital Input #1 - #8

Input: Enter the name of the signal

Reverse: Leave this box unchecked if the signal is "on" when the voltage is high. Check this box for the signal to be "on" when the voltage is low.

Digital Output #1 - #8

Input: Enter the name of the signal.

Continuous: OB7 will set this output to be either On or Off.

Pulse: OB7 will send a pulse to this output, for the time specified.

TIme: Duration of pulse if this output is set to "Pulse"

Reverse: When this output is turned "on" or Pulsed, it will normally be "open" or disconnected. When the "Reverse" box is checked, the signal will reverse. "On" or "pulse" till take the output to ground.

Analog Input #1 - #4

This signal reads a voltage between 0 and 12V, or, a current between 0 and 20 milliamps.

Input: Enter the name of this signal.

Units: Enter the name of the units being measured. For example: if this input is connected to a scale, the units might be "pounds", "oz", or "Kg", etc.

Enter the ratio of the units to volts input. For example: the device might output 1 volt per pound measured. In this case enter 1.

Threshold: Enter the threshold in units between "on" and "off". That might be "pass"/"fail" or "yes"/"no".   This threshold is used by OB7 when considering whether this signal is "on" or "off" (or "pass"/"fail", etc).

Reverse: To reverse the status of this measurement (on to off, etc.) check this box.

If OB7 is to be moved between multiple locations, it is suggested that the General Equipment Interface to be installed on the external equipment and not on OB7 itself. This allows OB7 to be moved by simply unplugging the network cable connection from the General Equipment Interface at one station and plugging it into a second unit at the next station. This avoids disconnecting the wiring at each station, or the need the build dedicated cabling harnesses at each station.

Network Cable to Robot

Network Cable to Additional General Equipment Interface

Fuse 2 Amps

24 volt Power Input

Connections to external equipment
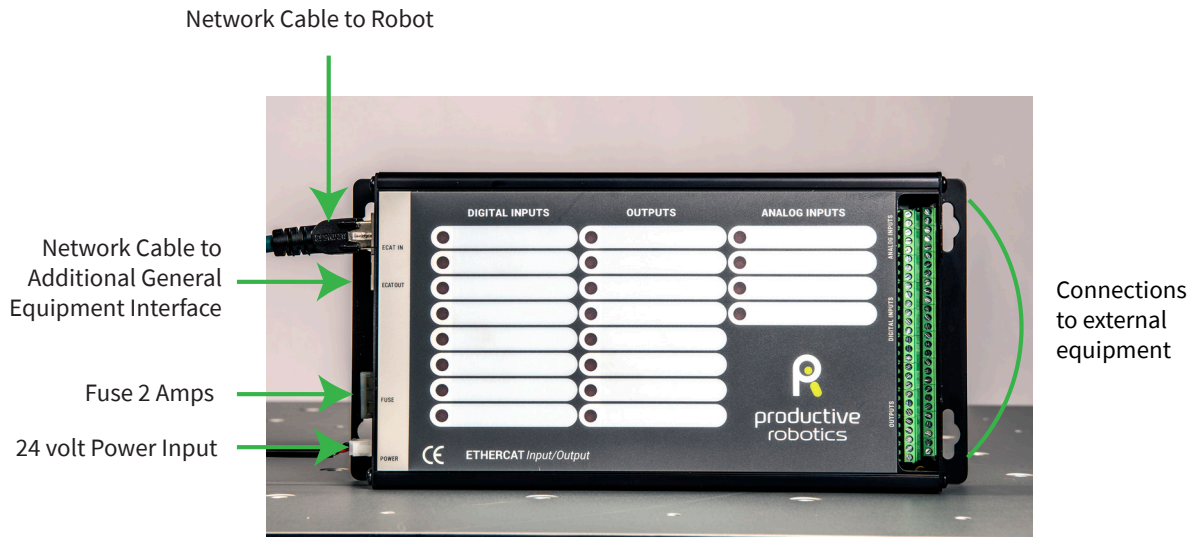
General Equipment Interface plugs into the base of OB7.

GENERAL EQUIPMENT INTERFACE	
Digital Inputs:	+5 to +24V input
Digital Outputs:	+2 amps maximum per output
Analog Inputs:	+10V maximum input
+24V output:	1 amp maximum
+12V output:	1 amp maximum
+5V output:	1 amp maximum

General Equipment Interface Wiring Worksheet

Job Title _____   **Date** _____

_____ +24 VOLTS	GROUND _____
_____ +24 VOLTS	GROUND _____
_____ +12 VOLTS	GROUND _____
_____ +5 VOLTS	GROUND _____
_____ Analog In 4	GROUND _____
_____ Analog In 3	GROUND _____
_____ Analog In 2	GROUND _____
_____ Analog In 1	GROUND _____
_____ Digital In 8+	Digital In 8- _____
_____ Digital In 7+	Digital In 7- _____
_____ Digital In 6+	Digital In 6- _____
_____ Digital In 5+	Digital In 5- _____
_____ Digital In 4+	Digital In 4- _____
_____ Digital In 3+	Digital In 3- _____
_____ Digital In 2+	Digital In 2- _____
_____ Digital In 1+	Digital In 1- _____
_____ Relay # 4 NO	Relay # 8 NO _____
_____ Relay # 4 COM	Relay # 8 COM _____
_____ Relay # 4 NC	Relay # 8 NC _____
_____ Relay # 3 NO	Relay # 7 NO _____
_____ Relay # 3 COM	Relay # 7 COM _____
_____ Relay # 3 NC	Relay # 7 NC _____
_____ Relay # 2 NO	Relay # 6 NO _____
_____ Relay # 2 COM	Relay # 6 COM _____
_____ Relay # 2 NC	Relay # 6 NC _____
_____ Relay # 1 NO	Relay # 5 NO _____
_____ Relay # 1 COM	Relay # 5 COM _____
_____ Relay # 1 NC	Relay # 5 NC _____

OB7 General Equipment Interface Connections

External Device

Analog In 4
Analog In 3
Analog In 2
Analog In 1
Digital In 8+
Digital In 7+
Digital In 6+
Digital In 5+
Digital In 4+
Digital In 3+
Digital In 2+
Digital In 1+
Relay # 4 NO
Relay # 4 COM
Relay # 4 NC
Relay # 3 NO

GROUND
GROUND
GROUND
GROUND
Digital In 8-
Digital In 7-
Digital In 6-
Digital In 5-
Digital In 4-
Digital In 3-
Digital In 2-
Digital In 1-
Relay # 8 NO
Relay # 8 COM
Relay # 8 NC
Relay # 7 NO

+5-+24V
0V

Analog Device

+24 VOLTS
+24 VOLTS
+12 VOLTS
+5 VOLTS
Analog In 4
Analog In 3
Analog In 2
Analog In 1
Digital In 8+
Digital In 7+
Digital In 6+
Digital In 5+
Digital In 4+
Digital In 3+
Digital In 2+
Digital In 1+
Relay # 4 NO
Relay # 4 COM

GROUND
GROUND
GROUND
GROUND
GROUND
GROUND
GROUND
GROUND
Digital In 8-
Digital In 7-
Digital In 6-
Digital In 5-
Digital In 4-
Digital In 3-
Digital In 2-
Digital In 1-
Relay # 8 NO
Relay # 8 COM

Safety System Wiring

OB7 I/O	HOKUYO
+24 VOLTS	GROUND
+24 VOLTS	GROUND
+12 VOLTS	GROUND
+5 VOLTS	GROUND
Analog In 4	GROUND — +24
Analog In 3	GROUND — GND
Analog In 2	GROUND — OSSD1
Analog In 1	GROUND — OSSD2
Digital In 8+	Digital In 8- — Optional OSSD3
Digital In 7+	Digital In 7- — Optional OSSD4
Digital In 6+	Digital In 6-
Digital In 5+	Digital In 5-
Digital In 4+	Digital In 4-
Digital In 3+	Digital In 3-
Digital In 2+	Digital In 2-

Different Analog Device

+24 VOLTS	GROUND
+24 VOLTS	GROUND
+12 VOLTS	GROUND
+5 VOLTS	GROUND
Analog In 4	GROUND
Analog In 3	GROUND
Analog In 2	GROUND
Analog In 1	GROUND
Digital In 8+	Digital In 8-
Digital In 7+	Digital In 7-
Digital In 6+	Digital In 6-
Digital In 5+	Digital In 5-
Digital In 4+	Digital In 4-
Digital In 3+	Digital In 3-
Digital In 2+	Digital In 2-
Digital In 1+	Digital In 1-
Relay # 4 NO	Relay # 8 NO
	Relay # 8 COM

External Switch or Relay Contacts

+24 VOLTS		GROUND
+24 VOLTS		GROUND
+12 VOLTS		GROUND
+5 VOLTS		GROUND
Analog In 4		GROUND
Analog In 3		GROUND
Analog In 2		GROUND
Analog In 1		GROUND
Digital In 8+		Digital In 8-
Digital In 7+		Digital In 7-
Digital In 6+		Digital In 6-
Digital In 5+		Digital In 5-
Digital In 4+		Digital In 4-
Digital In 3+		Digital In 3-
Digital In 2+		Digital In 2-
Digital In 1+		Digital In 1-
Relay # 4 NO		Relay # 8 NO
Relay # 4 COM		Relay # 8 COM
Relay # 4 NC		Relay # 8 NC
		Relay # 7 NO

Connection of 2 Robots

OB7 # 1				OB7 # 2		
+24 VOLTS		GROUND		+24 VOLTS		GROUND
+24 VOLTS		GROUND		+24 VOLTS		GROUND
+12 VOLTS		GROUND		+12 VOLTS		GROUND
+5 VOLTS		GROUND		+5 VOLTS		GROUND
Analog In 4		GROUND		Analog In 4		GROUND
Analog In 3		GROUND		Analog In 3		GROUND
Analog In 2		GROUND		Analog In 2		GROUND
Analog In 1		GROUND		Analog In 1		GROUND
Digital In 8+		Digital In 8-		Digital In 8+		Digital In 8-
Digital In 7+		Digital In 7-		Digital In 7+		Digital In 7-
Digital In 6+		Digital In 6-		Digital In 6+		Digital In 6-
Digital In 5+		Digital In 5-		Digital In 5+		Digital In 5-
Digital In 4+		Digital In 4-		Digital In 4+		Digital In 4-
Digital In 3+		Digital In 3-		Digital In 3+		Digital In 3-
Digital In 2+		Digital In 2-		Digital In 2+		Digital In 2-
Digital In 1+		Digital In 1-		Digital In 1+		Digital In 1-
Relay # 4 NO		Relay # 8 NO		Relay # 4 NO		Relay # 8 NO
Relay # 4 COM		Relay # 8 COM		Relay # 4 COM		Relay # 8 COM
Relay # 4 NC		Relay # 8 NC		Relay # 4 NC		Relay # 8 NC
Relay # 3 NO		Relay # 7 NO		Relay # 3 NO		Relay # 7 NO
Relay # 3 COM		Relay # 7 COM		Relay # 3 COM		Relay # 7 COM
Relay # 3 NC		Relay # 7 NC		Relay # 3 NC		Relay # 7 NC
Relay # 2 NO		Relay # 6 NO		Relay # 2 NO		Relay # 6 NO
Relay # 2 COM		Relay # 6 COM		Relay # 2 COM		Relay # 6 COM
Relay # 2 NC		Relay # 6 NC		Relay # 2 NC		Relay # 6 NC
Relay # 1 NO		Relay # 5 NO		Relay # 1 NO		Relay # 5 NO
Relay # 1 COM		Relay # 5 COM		Relay # 1 COM		Relay # 5 COM
Relay # 1 NC		Relay # 5 NC		Relay # 1 NC		Relay # 5 NC

OB7 # 1

OB7 # 2

This section is used to configure a gripper for OB7. You may have any number of grippers. This configuration information is used by OB7 in order to know how to activate or control the gripper.

OB7 comes pre-programmed to use certain grippers. If another gripper is to be used with OB7, its information must be entered here.
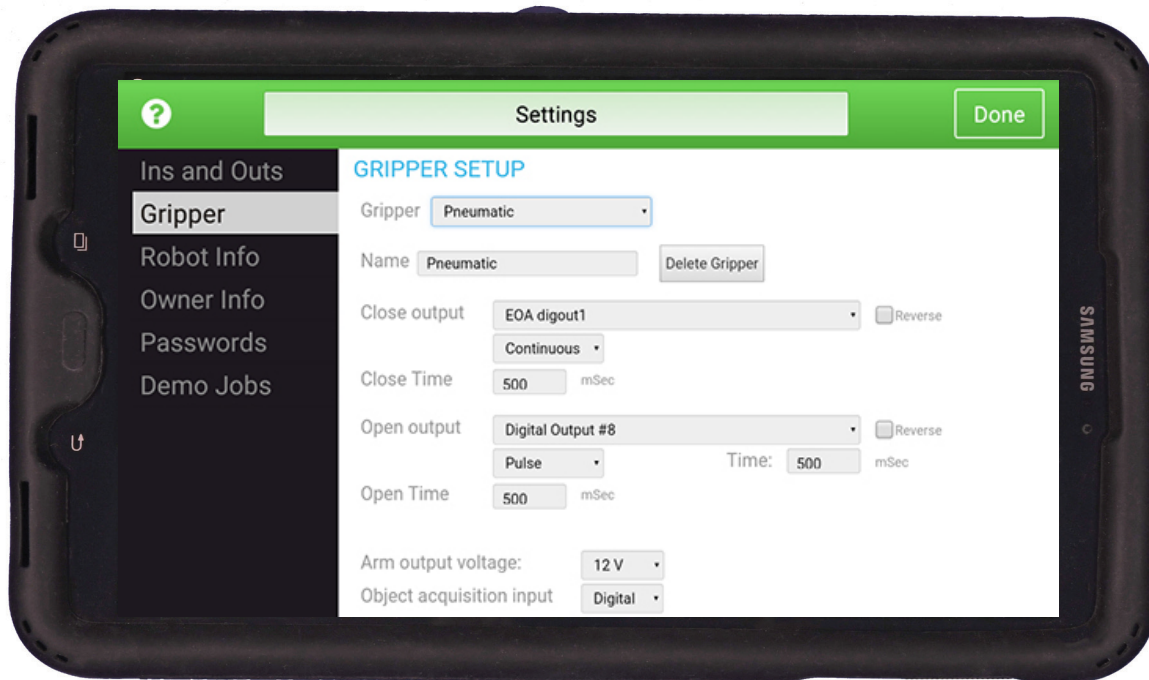
Gripper: Select the gripper to be edited.

Name: Enter the name of the gripper.

Close Output: Select the signal that OB7 should use to close the gripper.

Close Time: Set the time it takes for the gripper to fully close.

Open Output: Select the signal that OB7 should use to open the gripper.

Open Time: Set the time it takes for the gripper to fully open.

Arm Output Voltage: Select the voltage required to power this gripper.

Object Acquisition Input: Select the input signal that informs OB7 that the gripper has closed on, or grasped, an object. If this is a vacuum gripper, this signal tells OB7 that the vacuum has been created and the suction cup has hold of the object.

Center of Mass (X,Y and Z): enter the distance from the center of mass of the gripper to tool plate flange on OB7. Generally, X and Y are zero, and Z measures the distance from the center of mass of the gripper to the tool mounting plate flange on OB7

Width: Enter the default open and close widths of this gripper. Note: This function is not available on all grippers.

Speed: Enter the opening and closing speed for the gripper as a % of the fastest rate. Note: This function is not available on all grippers.

Max Force: Set the maximum force to be applied to the object grasped. Note: This function is not available on all grippers.

Reference gripper now: This button will cycle the gripper. Note: This function is not available on all grippers.

ROBOT INFO

This screen is used to set up basic configuration of you robot.
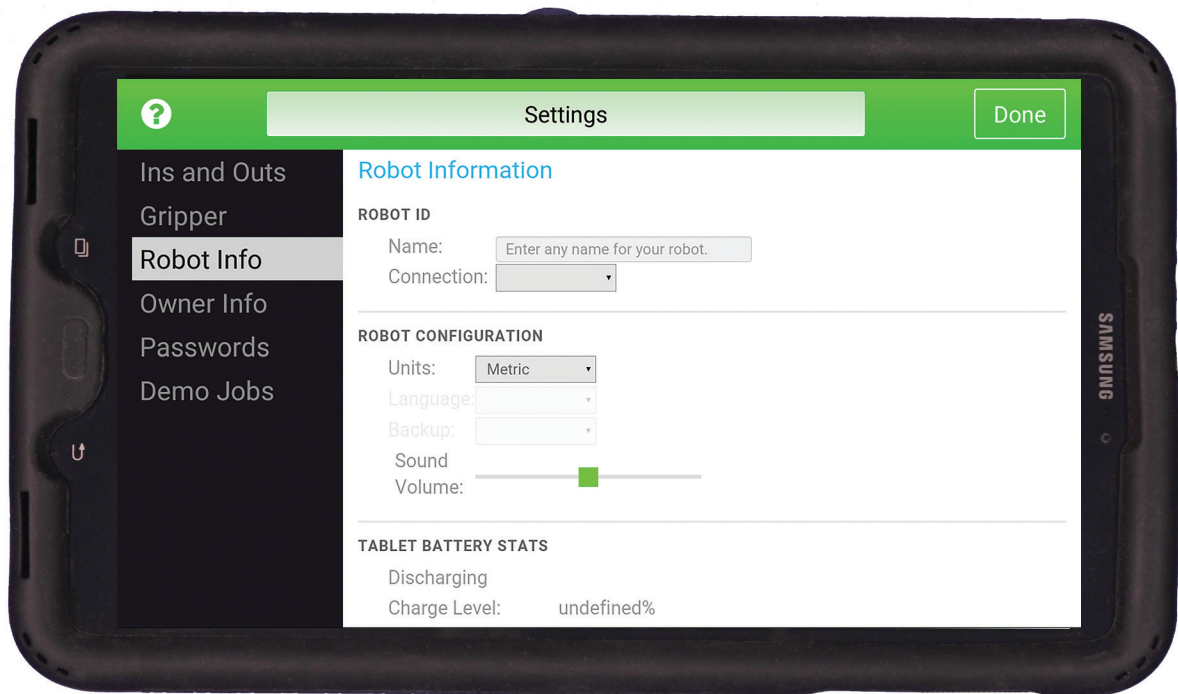
Robot ID:

Name: Enter the name of your robot. This name will be used in reports, notifications and when connecting the control tablet wirelessly. This name is displayed on the top of the table on the home screen.

Connection: Select whether the control tablet is connected to the robot with a USB cable or wirelessly.

This screen is used to set the contact information.

Company: Enter the Company Name and Address. This information is used for reports and service.

OB7 provides for contact information from three people in your organization. This contact information is used when requesting service or technical support. It is also used for OB7 to send status information while Working on a job. The three contacts are:

Primary Contact:

Technical Contact:

Operator Contact:

The email address is used to send notifications according to the selected criteria. To receive SMS (text) messages from your robot, enter the email address used by your mobile phone provider to send an SMS message. Contact your mobile phone service provider if you are not certain of this email address.

Notify: OB7 can send emails or text messages periodically as it Works. It will send a message under the following conditions when selected.

Cycle Finished: OB7 will send a message each time it completes one cycle of all the job operations, before starting over again.

Job Finished: OB7 will send a message when the job completes and stops running.

Minor Error: OB7 will send a message if a minor error occurs which does not stop the running of the job. An example of this could be when OB7 attempts to pick up an object but misses and has to try again.

Major Error: OB7 will send a message when a major error occurs. A major error is one which stops the running of the job. An example of this could be if OB7 bumps into something and stops running due to a force overload.

Email Gateway: Enter the IP address of the email gateway used by your netWork for sending out email messages.

PASSWORDS

OB7 provides for 6 categories of passwords:
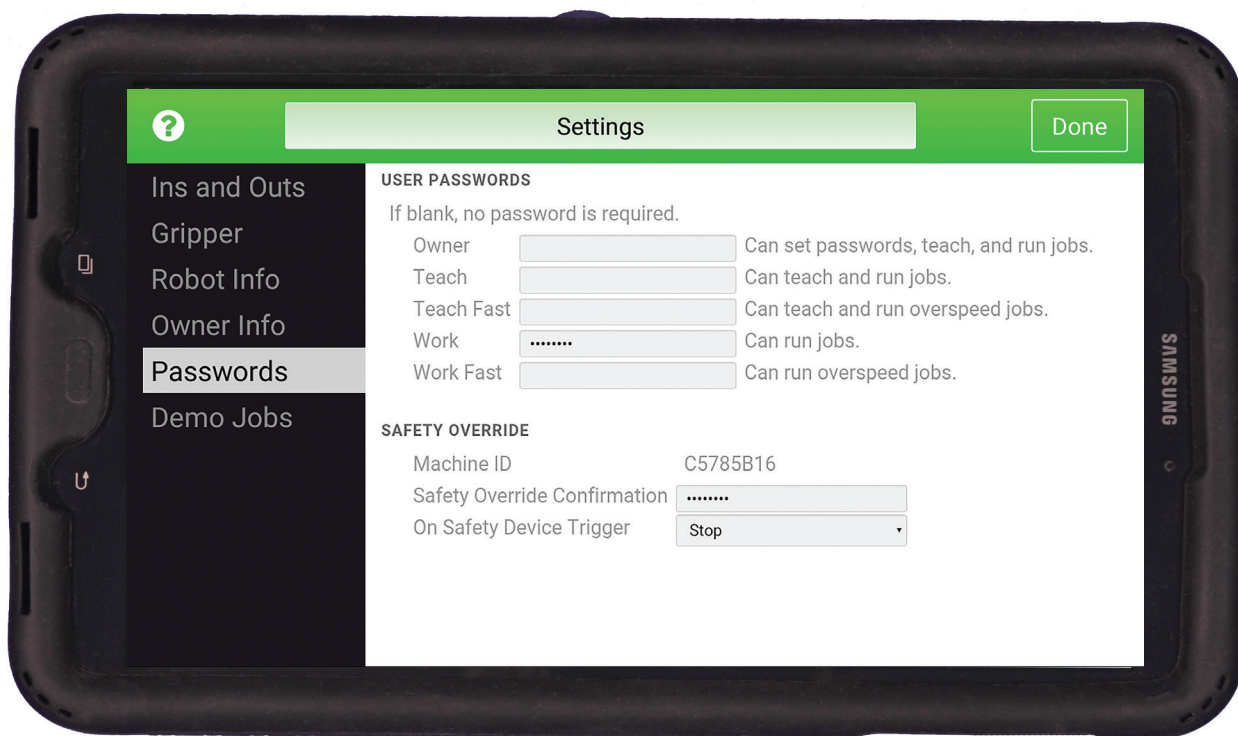
1. **Safety Override:** A SAFETY OVERRIDE CONFIRMATION code must be entered before OB7 can operate faster, or with more force, than specified as "human safe" according to ISO1028-1. Without the SAFETY OVERRIDE CONFIRMATION code, OB7 is restricted to "human safe" speeds and forces. After the confirmation code has been entered, a series of operational passwords may be entered.

2. **Owner Password:** The OWNER PASSWORD is the master password for OB7. If this password is blank, then OB7 will be restricted to "human safe" speeds and forces. Once this password is supplied, OB7 will be able to move at higher speeds and forces. The OWNER PASSWORD overrides all of the following passwords. When the OWNER PASSWORD is entered in there will be no restrictions as to robot speeds and forces. Access to the OWNER PASSWORD should be restricted to persons fully knowledgeable of robot operation, safety and the Risk Assessments performed in this robot installation.

3. **Teach:** If the TEACH password is left blank, then OB7 may be taught new jobs without entering a password. If a TEACH password is supplied, then this password will be required to teach or modify any OB7 jobs. In either case, jobs will be restricted to "human safe" speeds and forces.

4. **Teach Fast:** If the TEACH FAST password is left blank it will not be possible to teach OB7 to function <u>above</u> "human safe" speeds and forces. The TEACH FAST PASSWORD is necessary to teach or modify jobs in excess of "human safe" speeds or forces. Access to the TEACH FAST password should be restricted to persons fully knowledgeable of robot operation, safety and the Risk Assessments performed in this robot installation.

5. **Work:** If the Work password is left blank, then OB7 jobs may be run without entering a password. If a Work password is supplied, then this password will be required to run any OB7 jobs. In either case, jobs will be restricted to "human safe" speeds and forces.

6. **Work Fast:** If the Work FAST password is left blank it will not be possible to run OB7 jobs in excess of "human safe" speeds and forces. The Work FAST PASSWORD is necessary to run jobs in excess of "human safe" speeds or forces. Access to the Work FAST password should be restricted to persons fully knowledgeable of robot operation, safety and the Risk Assessments performed in this robot installation.

System passwords are used to restrict certain operations to authorized personnel only.

DEMO PROGRAMS

Certain demonstration programs are stored in this section.

JOG

The jog controls are accessed by pressing the ✛ icon during Learning. The jog controls cause OB7 to lock and allow fine adjustments to position.

The jog controls move the position of the gripper on OB7. They do not specifically control the joints individually. Rather, OB7 coordinates the movement of all the joints so that the gripper moves in a straight line in X, Y or Z (vertically), as the jog controls are pressed.

When the jogging operation is changed from linear moves (X, Y and Z) to rotational moves, OB7 coordinates the movement of the joints so that the object being gripped rotates in its current position. The jog controls are intended for fine positioning. Larger position movements of OB7 are made by manually positioning the robot.

Each control direction has two speeds of movement. Pressing closer to the center of the control causes OB7 to move slowly. Pressing at the outside of the control causes OB7 to move at a higher speed.

Each control has two methods of operation, Incremental movement, and Continuous Movement. Tapping the control will cause OB7 to move in a small increment in the direction specified. Tapping close to the center of the control will cause OB7 to move in steps of 0.1mm. Tapping at the outside of the control will cause OB7 to move in steps of 1mm.   When the rotational controls are used, tapping the control will cause OB7 to move in increments of 0.5 degrees and 2 degrees respectively.
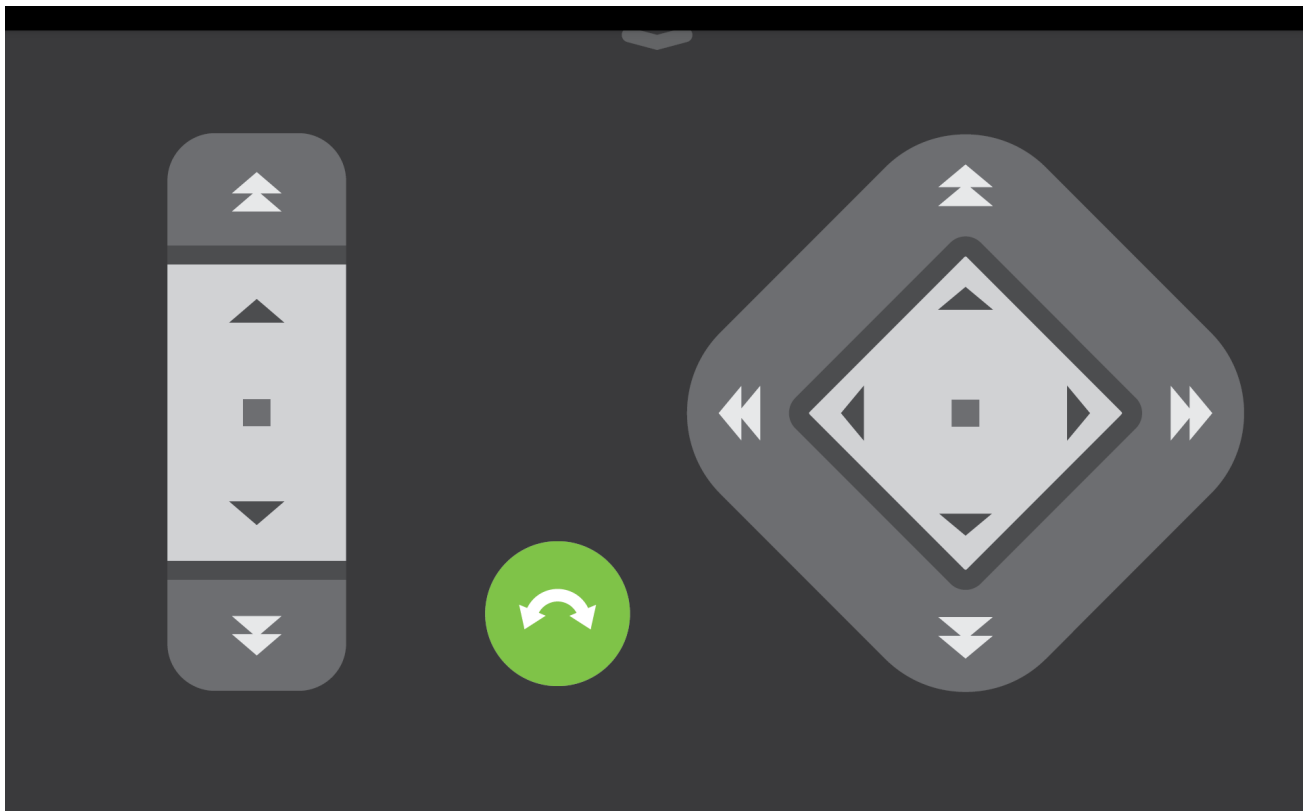
The Jog screen, showing straight line movement controls
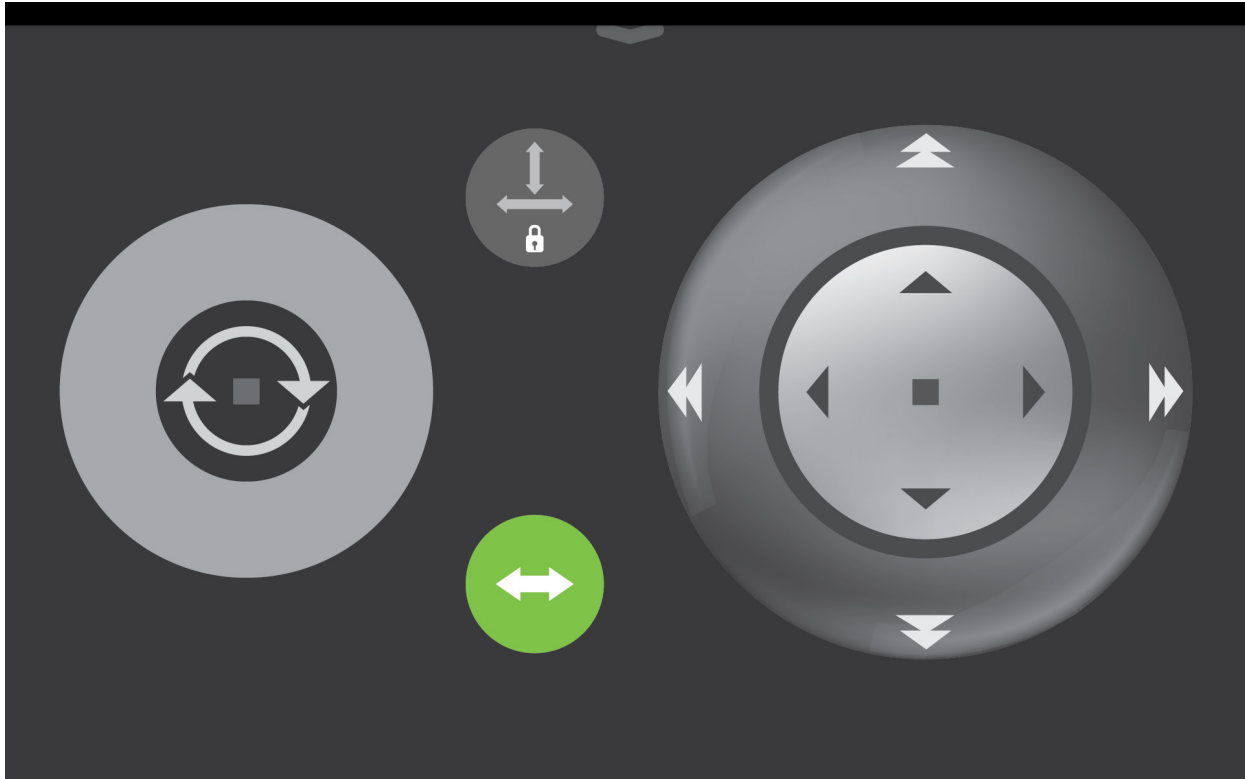
Rotational Movement Controls

Moves the gripper vertically up or down.	Rotates object in gripper.
Moves the gripper forward, backwards, left or right.	Switches jog controls from rotational controls to straight line controls.
Switches jog controls from straight line moves to rotational controls	Press this button to move the gripper to vertical or horizontal.
Rolls the gripper on its axis.	Tap or swipe to close this screen.

Camera screen.
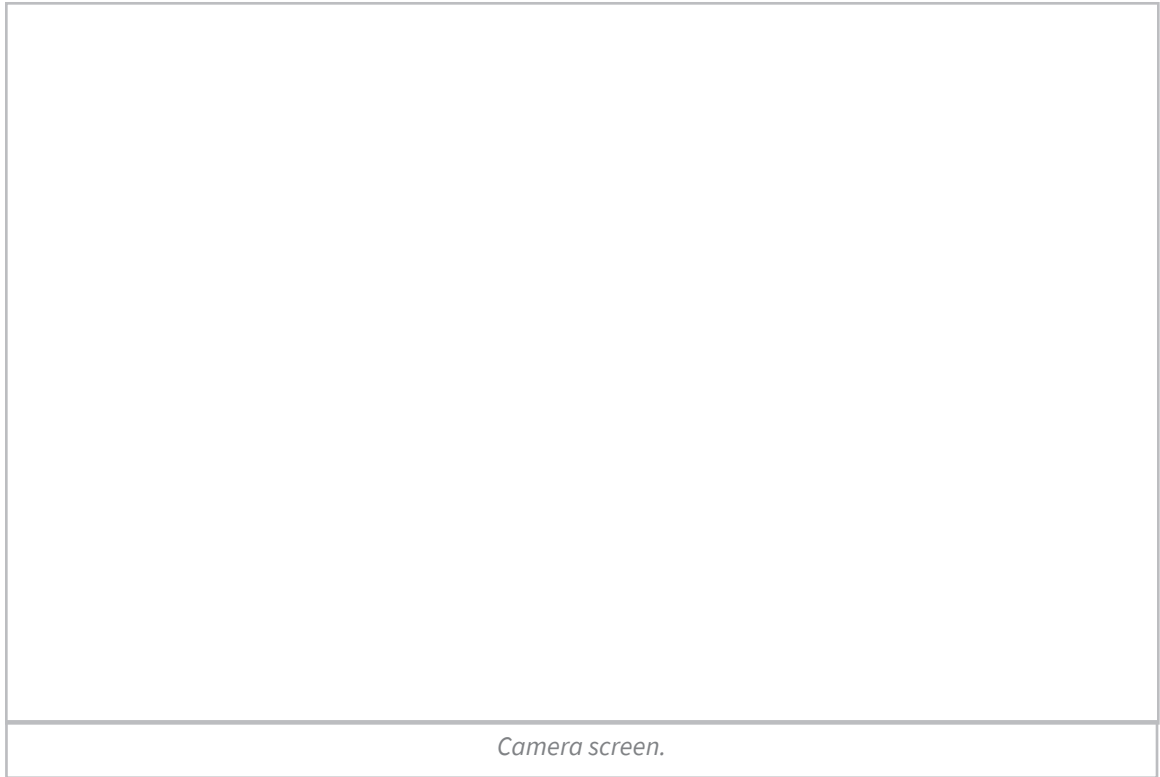
LEARN

OB7 learns by using "control tiles". Each control tile (or more simply called, "tile") is named with the type of operation that OB7 will perform.

There is a separate control tile for each operation that OB7 understands, and they are all located in the column on the left side of the screen.

The column of tiles in the middle of the screen are all the operations that OB7 has learned for this job. In the picture shown here, only the "Start" operation has been learned so far. All jobs begin with a Start tile. The Start tile specifies the general information about the job.

The right half of the screen contains the details for each tile in the job. As OB7 learns, it automatically fills in these details. Some details of an operation will be entered directly in this area by you. For example: you might enter the number of times you wish OB7 to repeat the job.
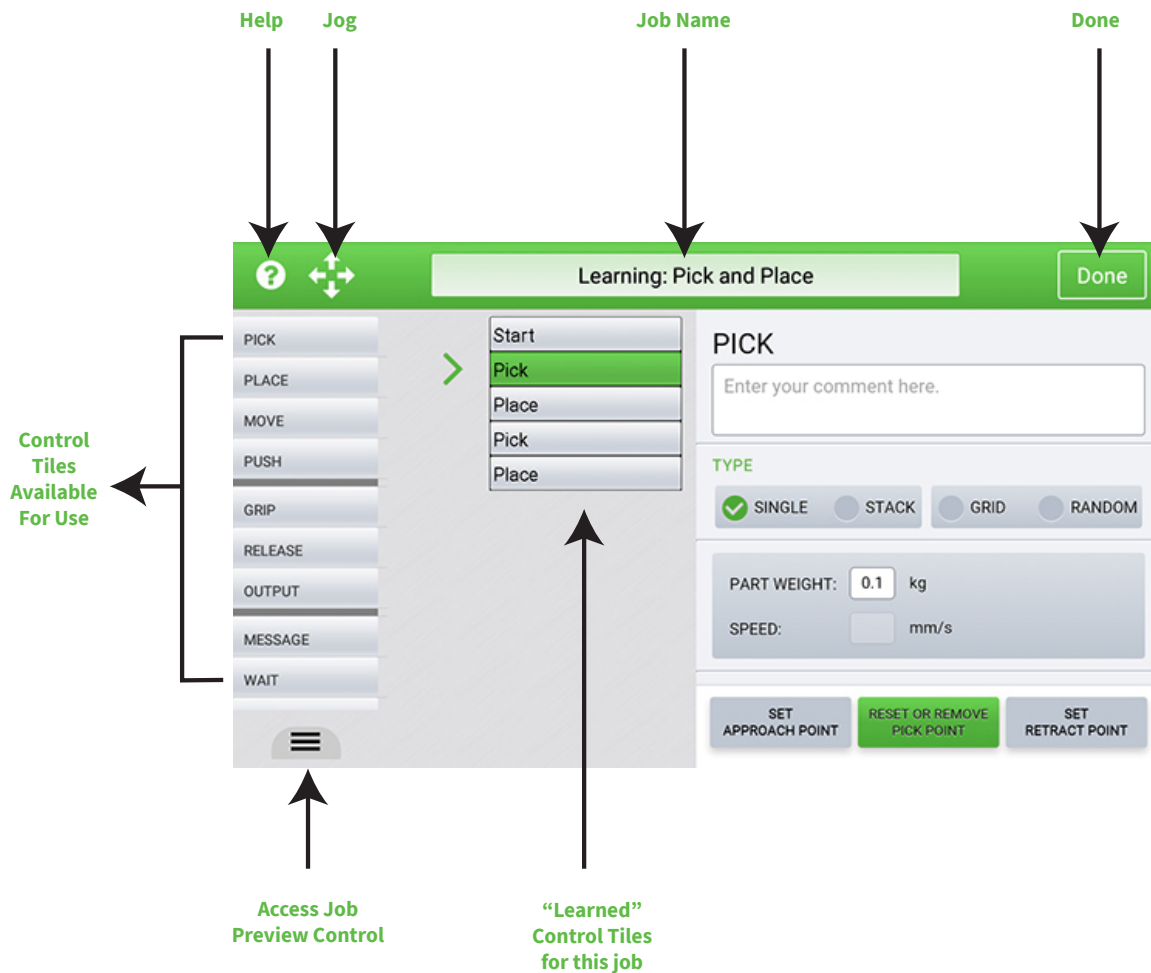
Learn Screen

WORK

The Work screen displays the job OB7 will perform. The column of tiles on the left side are the same tiles you saw when OB7 was Learning the job.

To start OB7 on this job, press "Go".

You can select the speed for OB7 to Work from 10%-100% (full speed).

The amount of time spent Working and the number of times the job has repeated are shown in the top right.

The large empty area in the middle will display pictures taken while OB7 Works, as well as any important messages while Working.

Help   Job Name   Done

Work: Pick and Place   Done

> Start
Pick
Place
Pick
Place

Control Tiles In This Job

Total time: 0 sec.   Time to finish: unknown
Completed cycles: 0   Cycles remaining: unlimited

90%

Speed 100%   Go
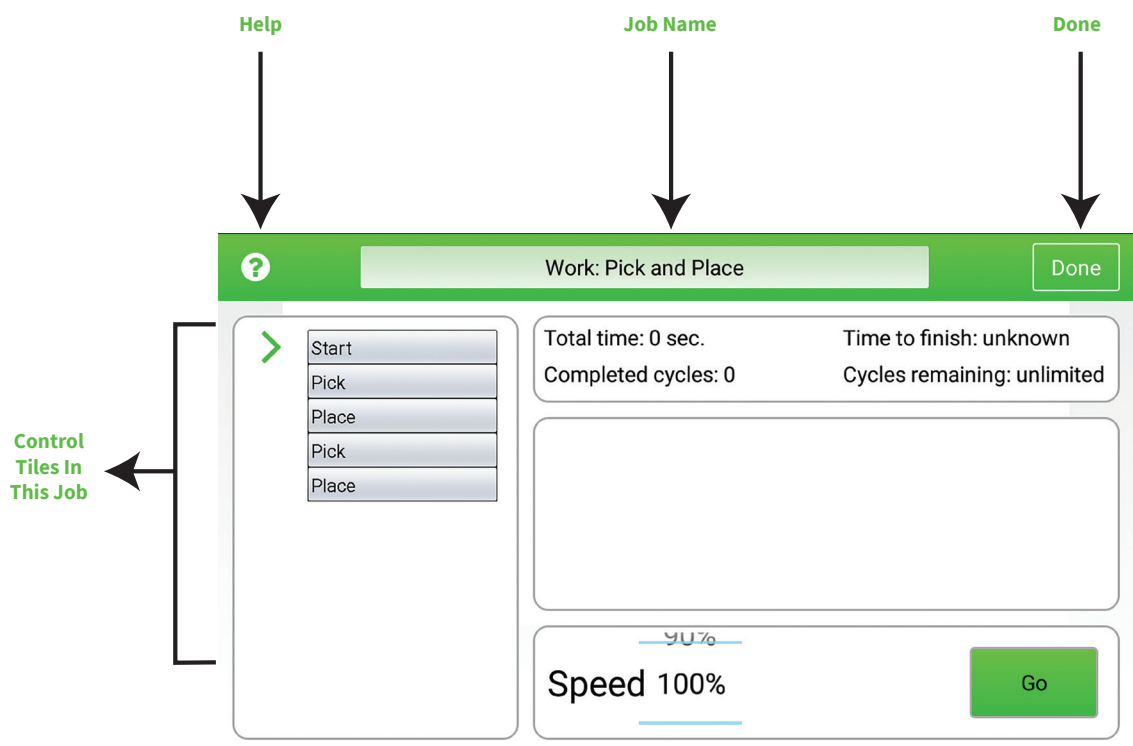
Work Screen

JOB SELECT

The Job Select screen appears whenever OB7 is to Learn a job, edit a job, or Work on a job. Select the job to be accessed from this screen
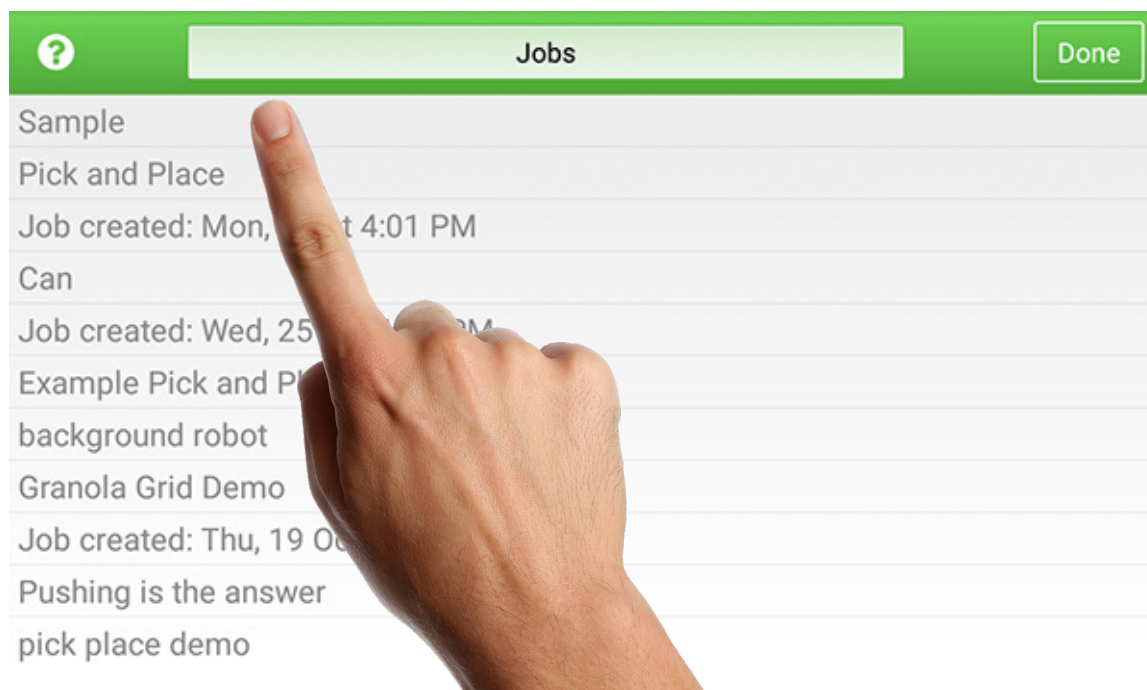
Job Select Screen

OB7 learns some operations when you "drag" their tiles into the job. For example: if you want OB7 to pause and wait for something in the middle of a job, you would add the ⌈ WAIT ⌉ tile.

Simply "drag" the tile into the job and "drop" it into the job where you would like OB7 to wait.
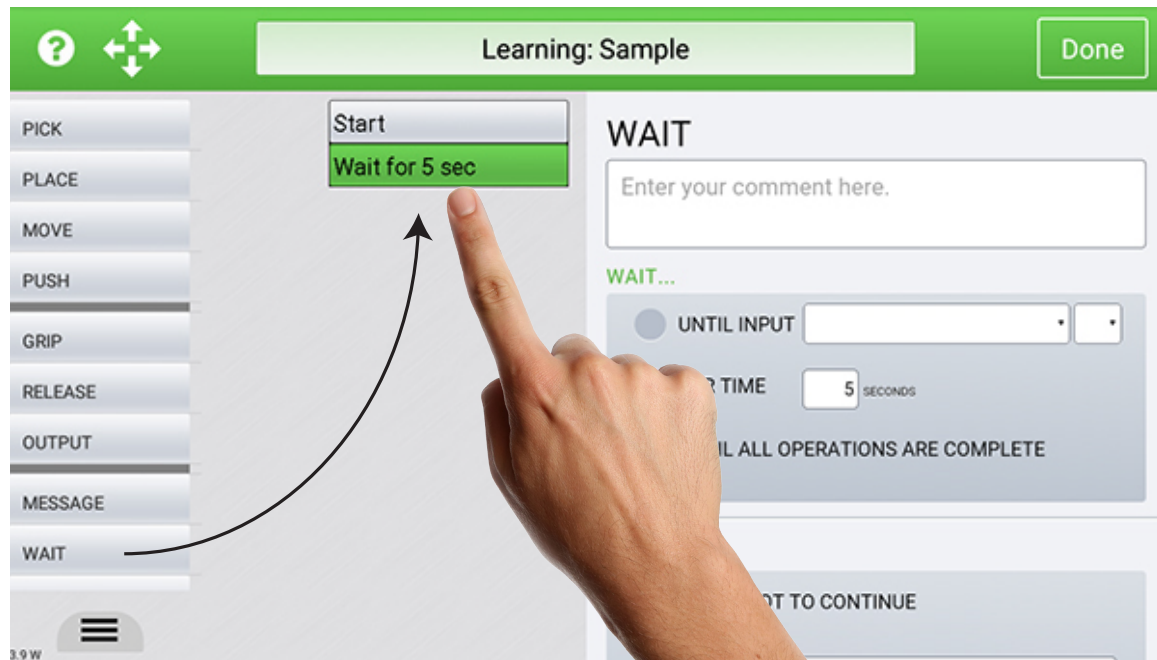
Use your finger to drag the tile into the job.

OB7 CONTROL FUNCTIONS

OB7 CONTROL FUNCTIONS

OB7 CONTROL HANDLE

Set Position

Set Position

Close Gripper

Open Gripper

Open Gripper

Close Gripper

Camera

Release Arm

Release Arm
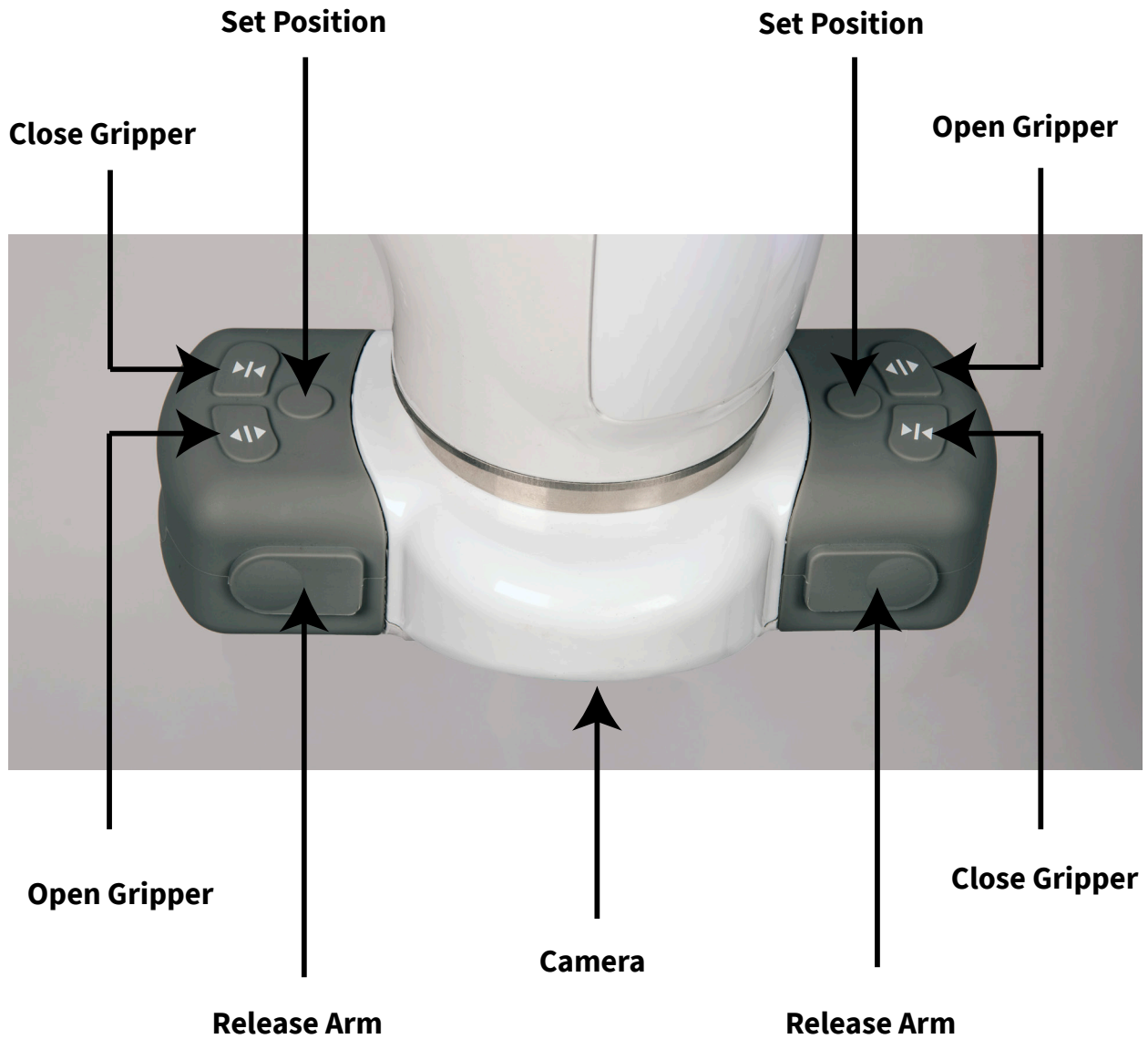
OB7 CONTROL TILES

OB7 learns its jobs without programming or coding. This does not limit OB7 to simple tasks or operations. All OB7 jobs, both simple and complex, are composed of OB7 *Command Tiles*. OB7 command tiles contain all the various OB7 operations and allow you to set up even the most sophisticated operations.

OB7 Command Tiles are added automatically as you show OB7 its job. (See the quick start section.)

For more complex operations, you can add OB7 command tiles simply by dragging them into the job.
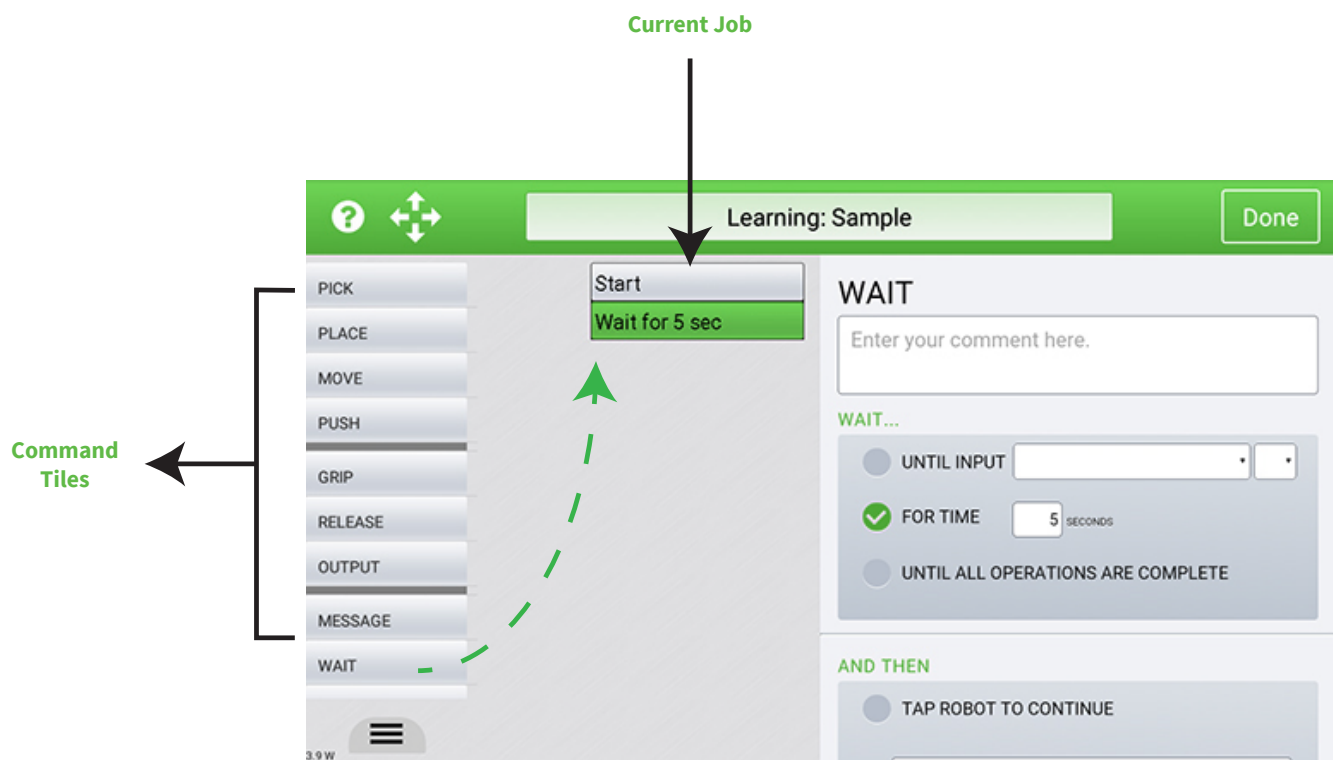
See "help" screen on tablet for most current instructions.

A ⌐Start⌐ tile is the first tile in every job. The ⌐Start⌐ tile holds the general information for this job. That includes: The type of gripper used, the speed to run the job, as well as several other items.

Comment: Enter a descriptive comment in the comment box. This comment will be displayed in the list of jobs to help you remember what the job does.

Enter descriptive comment.

This is a reusable simple task: If this is only a portion of a larger job and you want OB7 to do this task in other jobs, check this box. For example: If this job opens the door on your machine, you can re-use it within every job that operates the machine. In this way, OB7 will automatically know how to open the door to this machine next time it learns a new job on this machine. When you make a job a "reusable simple task" it will become another command tile that is available when Learning jobs. The next time OB7 learns a job for this machine, it can use this tile.

Count

Set number of times: Enter a number to specify how many times you would like this job to repeat. If you want this job to repeat indefinitely, check the "forever" box instead of entering a number.

Specify how many times you would like the job to repeat or check "Forever".

Job Settings

Gripper: Select the gripper being used for this job. Normally, OB7 already knows which gripper is installed and you don't need to change this.

Speed: Enter the speed at which to run this job. A password will be required in order to run this job at any speed faster 250mm/sec.

Select the type of gripper and enter the speed.

Tools

Tools are any equipment necessary for the robot to Work this job. A "tool" can be a machine, assembly fixture, conveyor belt, stacking bin, or anything else that must be present for this job to Work. "Tools" are identified with a QR code plaque. Before the robot will begin Working, it will look for the QR code plaque on each of the "tools". If it is not found, you will be alerted and the job will not run.

Add a tool that is necessary to complete the job.

Start

Start Point: You may set a starting position for each job, but it is not required. If you set a starting position, the robot will move to this position first, before starting the job.

Press the "Set Start Point" button to set a start point. If you wish to change or remove the start point press the same button again.

Go To Start Point: If you have set a Start Point for this job, pressing this button will cause the robot to move to this position. Note that you will need to hold this button down while the robot is moving to the starting position. If you release the button, the robot will stop moving.

Set a start point for the job or select "Go to start".

When OB7 learns to pick up an object, the PICK tile will be added to the job. Normally, OB7 will add this tile automatically when it picks up the object during Learning. It is also possible for you to insert this tile into the job manually by dragging it and dropping it into the job sequence. If you add this tile manually, you will also need to set the pick up position manually. The PICK operation is very powerful. With this tile, OB7 can Learn to pick up more than one single object. It can pick up many objects in succession, from stacks of objects, grid placements of objects, or just randomly.   The PICK tile also tells OB7 how to pick up the object, and how to move when picking up the object.

Comment: Enter any comments here. You might choose to enter a comment about the object that is being picked up. Entering a comment is optional.

Enter descriptive comment.

Single

A "single" pick tells OB7 that only one object will be picked up and that it will be picked up from a single predefined location. Unless you tell OB7 otherwise, it will assume that you are only intending to pick up a "single" object. This is the most common. When teaching OB7 a more complex pickup pattern, you will change the pick up type here.

Unless specified otherwise, OB7 assumes there is a "single" pick from a single predefined location.

Stack

If you check this box, OB7 will know that it must pick up objects off a stack. It will know that each successive object is lower than the one before it.   When you select a stack, OB7 will ask for the number of objects to pick up off the stack. It will also ask how tall the stack is, or alternately, how tall one single object is.

Select "Stack" to tell OB7 to pick up objects off a stack.

Grid

When grid is selected it tells OB7 that there is a group of objects to be picked up and that they are arranged in a grid pattern. In the case of a grid pattern, it is necessary to show OB7 three corners of the grid, and to enter the number of objects in each dimension of the grid. OB7 will automatically pick up each object in succession according the the grid spacing. Note that it is also possible to have a GRID of STACKS. In this case OB7 will Work in layers, picking up all items in the grid from one layer, before descending to subsequent layers in the stack.

Use these buttons to set the corners of the grid.

Select the corner of the grid to be learned by pressing the corner 1, 2 or 3. button. Position OB7 in the corner position of the grid and press the "Set Position" button on the handle. Repeat this for each of the 3 corners. Corner 1 is the upper left, Corner 2 is the upper right, Corner 3 is the lower right. When OB7 runs the job, it will pick starting in corner 1, then Work toward corner 2. After reaching corner 2, OB7 will move to the next row.
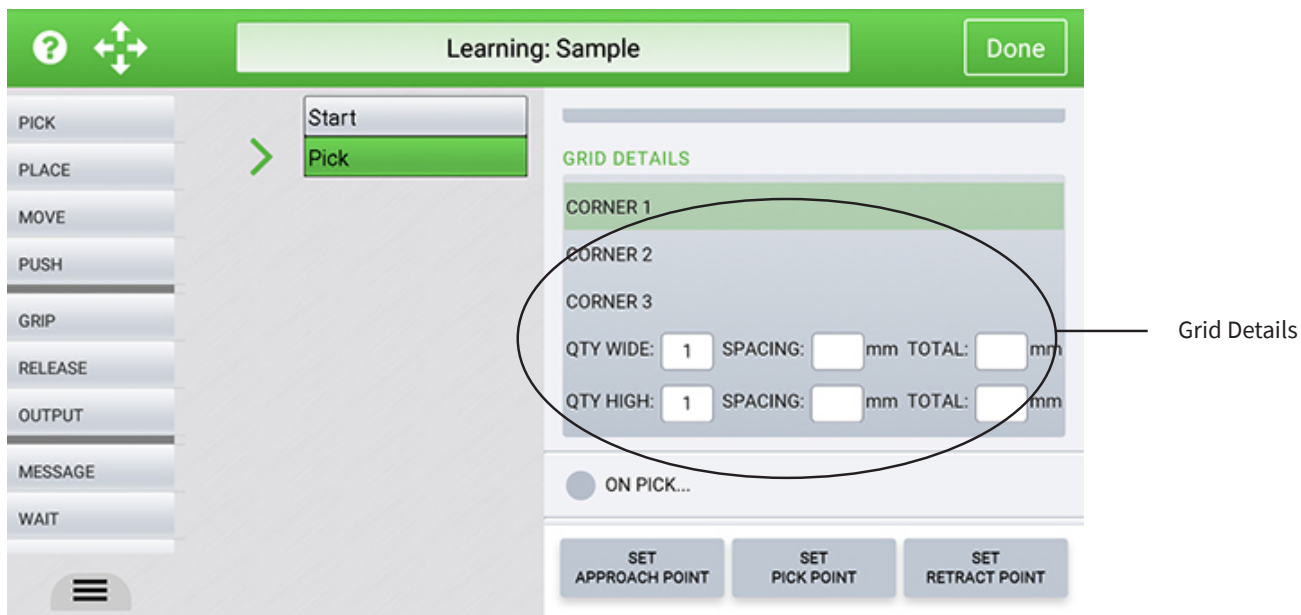
Select "Grid" to tell OB7 to pickup a group of objects and specify the corners in the grid pattern.

Random

If your objects are not placed in a precise grid, you can ask OB7 to pick them up from random locations, by checking this box. If you choose random locations, you must show OB7 where those locations are.

Select "Random" to tell OB7 to pickup a group of objects from random locations.

You may also pick stacks of objects into grid or random placements. OB7 will pick up all the objects of one stack before moving on to the next grid or random position.

Part Weight: Enter the weight of the object you are picking up here.

Speed: If you would like OB7 to move at a different (usually slower) speed when picking up the object, you can enter it here. For example: When picking up a delicate object, it is common to tell OB7 to move at a slower speed, just like you do when grasping something delicate. It is not necessary to enter anything here.
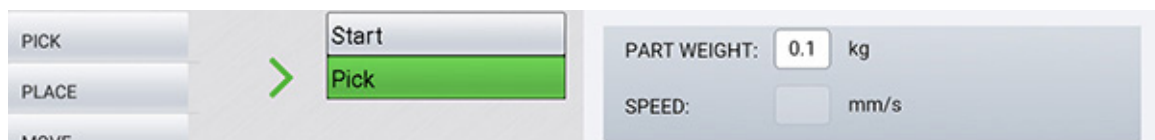
Enter part weight and the speed at which you would like OB7 to move.

Pick Locations

Set, Reset or Remove Pick Position: It is not normally necessary to press this button to set the Pick position. OB7 learns this position automatically when you pick up the object during Learning. If you need to change the position, you can use this button. OB7 will change the pick location to the current position at the time you press this button. This button is most commonly used when you want to adjust the pick position by a small amount after OB7 has already learned the job. The button will turn green after the point has been set. If you press it again you will you will be prompted to either change the position, or erase it.

Set, Reset or Remove Approach Position: Use this button to set the direction from which OB7 approaches the pick position. It is not normally necessary to set this position. OB7 will automatically approach the object from above. Sometimes, it is desirable to approach the object from the side, or another direction. Use this button to tell OB7 which direction to approach the object from. An example of this is when picking an object off a shelf when there is another shelf above it. The button will turn green after the point has been set. If you press it again you will you will be prompted to either change the position, or erase it.

Set, Reset or Remove Retract Position: Use this button to set the direction OB7 moves after picking up the object. It is not normally necessary to set this position. OB7 will automatically move straight up after picking up the object. Sometimes, it is not desirable to move straight up after picking up the object. You can use this button to tell OB7 which direction to move after picking up the object. An example of this is when picking an object off a shelf when there is another shelf above it. The button will turn green after the point has been set. If you press it again you will you will be prompted to either change the position, or erase it.
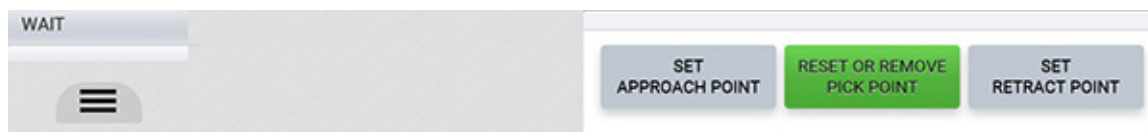
Set Approach Point, Pick Point, or Retract Point.

On Pick:

When picking up an object from another machine, it is usually necessary for the machine to release its hold on the object. Use this selection to activate another machine during the pick operation.

Output: Check here in order to signal the other machine to release the object. Select the output to use for this signal.

Wait Input: Check here if it is necessary to wait for the machine to signal that it has released the object. Select the input to check for this signal.

Wait Time: Check here to add a time delay before moving away with the object.

Specify the "Pick" options (used when OB7 must communicatewith another machine).

Gripper Override

Closed Width: Normally the gripper will close fully when picking up and object. In some cases it is desirable to limit the amount the gripper will close. This could be when picking up an easily crushed object. You can limit the amount the gripper closes by entering in that number here. Note: This function is not available on all models of grippers or on vaccum grippers.

Speed: It is sometimes desirable to slow the speed at which the gripper closes. This can be useful when picking up fragile objects. Normally the gripper will close at full speed. To decrease the closing speed, enter the desired percentage of speed here. Note: This function is not available on all models of grippers or on vaccum grippers.

Force: Use this entry to override the amount of force the gripper will apply to the object it is acquiring. Note: This function is not available on all models of grippers or on vaccum grippers.

Reverse Gripper Direction

Checking this box will cause the gripper to open when picking up an object. An example would be picking up a cylinder from the inside.

All of these override functions require a gripper with these control capabilities.

Use the "Override Gripper Settings" to specify the width, speed, and force for picking up delicate objects.

When OB7 learns to place an object, the [PLACE] tile will be added to the job. Normally, OB7 will add this tile automatically when it places up the object during Learning. It is also possible for you to insert this tile into the job manually by dragging it and dropping it into the job sequence. If you add this tile manually, you will also need to set the [PLACE] position manually. The [PLACE] operation is very powerful. With this tile, OB7 can Learn to place more than one single object. It can place many objects in succession, from stacks of objects, grid placements of objects, or just randomly.   The [PLACE] tile also tells OB7 how to place the object, and how to move when placing the object.
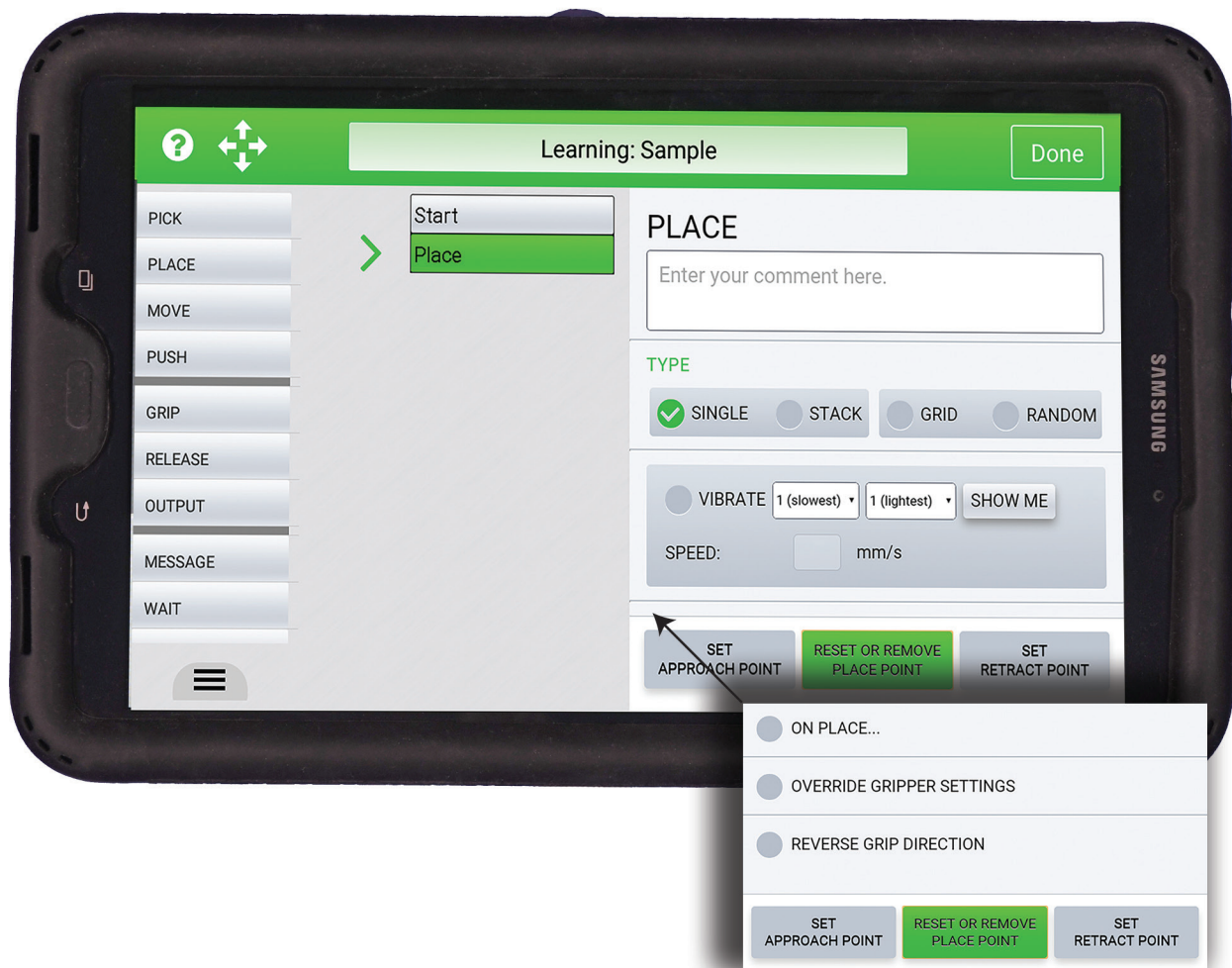
Comment: Enter any comments here. You might choose to enter a comment about the object that is being placed. Entering a comment is optional.

Enter descriptive comment.

Single

A "single" place tells OB7 that only one object will be placed and that it will be placed from a single predefined location. Unless you tell OB7 otherwise, it will assume that you are only intending to place a "single" object. This is the most common. When teaching OB7 a more complex place pattern, you will change the place type here.
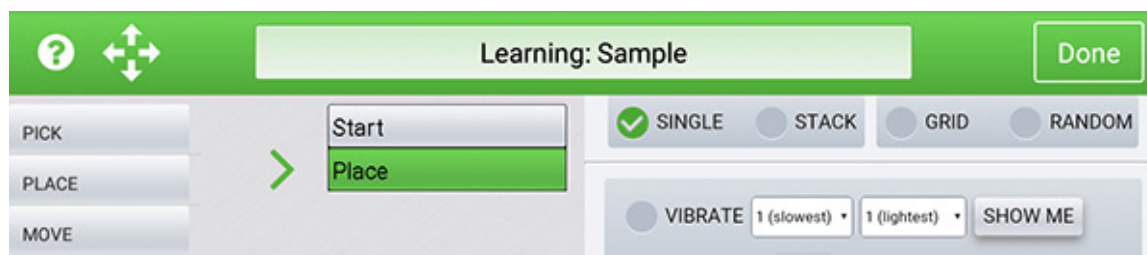
Unless specified otherwise, OB7 assumes there is a "single" place to a single predefined location.

Stack

If you check this box, OB7 will know that it must place objects off a Stack. It will know that each successive object is lower than the one before it.   When you select a Stack, OB7 will ask for the number of objects to place off the stack. It will also ask how tall the Stack is, or alternately, how tall one single object is.


Select "Stack" to tell OB7 to place objects on to a stack.

Grid

When GRID is selected it tells OB7 that there is a group of objects to be placed and that they are arranged in a grid pattern. In the case of a grid pattern, it is necessary to show OB7 three corners of the grid, and to enter the number of objects in each dimension of the grid. OB7 will automatically place each object in succession according the the grid spacing.   Note that it is also possible to have a GRID of STACKS. In this case OB7 will Work in layers, placing all items in the grid from one layer, before continuing up to subsequent layers in the stack.

Use these buttons to set the corners of the grid:

Select the corner of the grid to be learned by pressing the corner 1, 2 or 3. button. Position OB7 in the corner position of the grid and press the "Set Position" button on the handle. Repeat this for each of the 3 corners. Corner 1 is the upper left, Corner 2 is the upper right, Corner 3 is the lower right. When OB7 runs the job, it will place starting in corner 1, then Work toward corner 2. After reaching corner 2, OB7 will move to the next row.
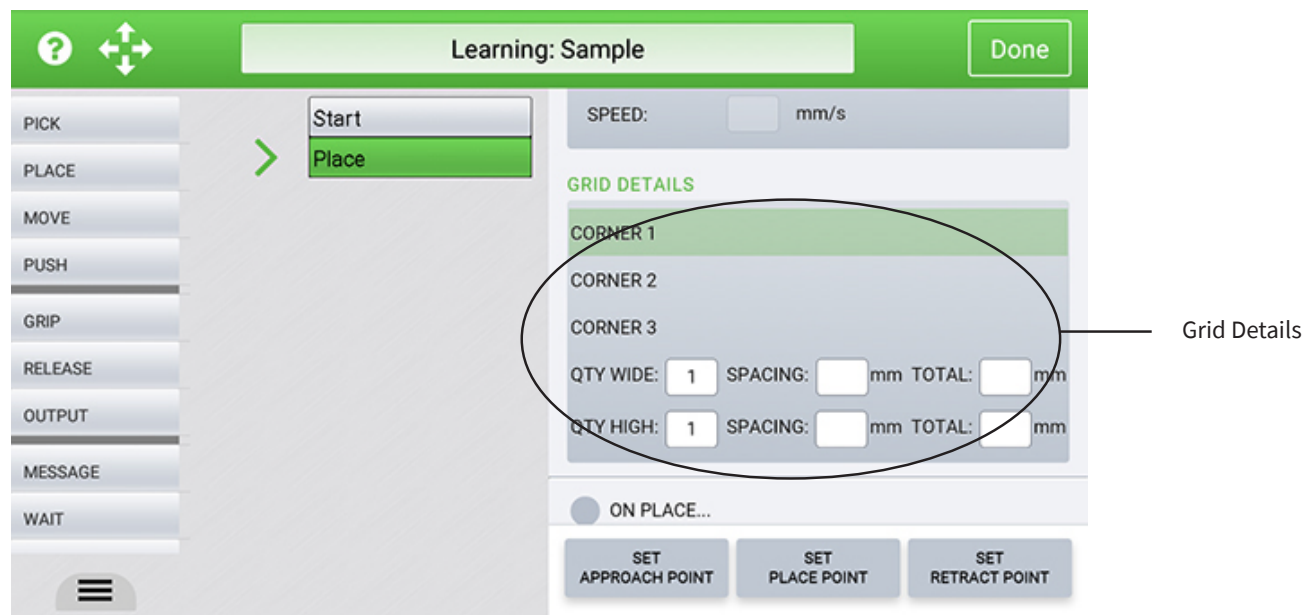

Select "Grid" to tell OB7 to place a group of objects and specify the corners in the grid pattern.

Random

If your objects are not to be placed in a precise grid, you can ask OB7 to place them at random locations by checking this box. If you choose random locations, you must show OB7 where those locations are.

You may also place Stacks of objects into grid, or random placements. OB7 will place all the objects of one stack before moving on to the next grid or random position.
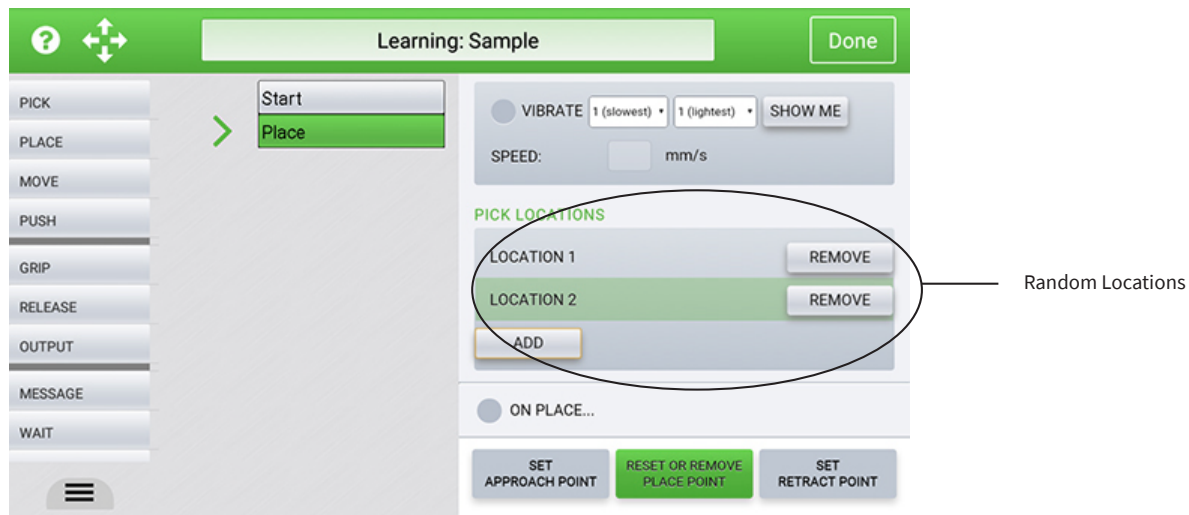
Select "Random" to tell OB7 to place objects into random positions.

Speed: If you would like OB7 to move at a different (usually slower) speed when placing the object, you can enter it here. For example: When placing a delicate object, it is common to tell OB7 to move at a slower speed, just like you do when grasping something delicate. It is not necessary to enter anything here.
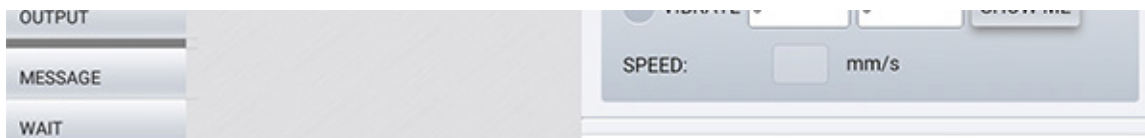

Enter the speed at which you would like OB7 to move.

Set, Reset or Remove Place Position: It is not normally necessary to press this button to set the place position. OB7 learns this position automatically when you pick up the object during Learning. If you need to change the position, you can use this button. OB7 will change the place location to the current position at the time you press this button. This button is most commonly used when you want to adjust the place position by a small amount after OB7 has already learned the job. The button will turn green after the point has been set. If you press it again you will you will be prompted to either change the point, or erase it.

Set, Reset or Remove Approach Position: Use this button to set the direction from which OB7 approaches the place position. It is not normally necessary to set this position. OB7 will automatically approach the object from above. Sometimes, it is desirable to approach the object from the side, or another direction. Use this button to tell OB7 which direction to approach the object from. An example of this is when placing an object on a shelf when there is another shelf above it. The button will turn green after the point has been set. If you press it again you will you will be prompted to either change the point, or erase it.

Set, Reset or Remove Retract Position: Use this button to set the direction OB7 moves after placing the object. It is not normally necessary to set this position. OB7 will automatically move straight up after placing the object. Sometimes, it is not desirable to move straight up after placing the object. You can use this button to tell OB7 which direction to move after placing the object. An example of this is when placing an object on a shelf when there is another shelf above it. The button will turn green after the point has been set. If you press it again you will you will be prompted to either change the point, or erase it.
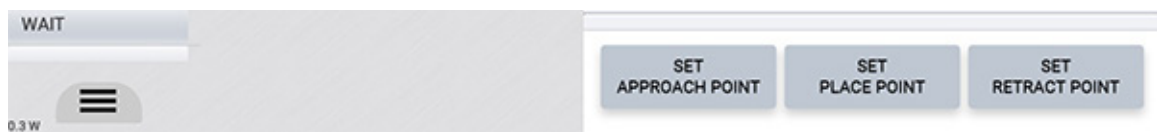
Set Approach Point, Pick Point, or Retract Point.

On Place:

When placing an object into another machine, it is sometimes necessary for the machine to take hold of the object. For example: a machine tool must close its chuck or vice. Use this selection to activate another machine during the place operation.

Output: Check here in order to signal the other machine to grasp the object. Select the output to use for this signal.

Wait Input: Check here if it is necessary to wait for the machine to signal that it has grasped the object. Select the input to use for this signal.

Wait Time: Check here to add a time delay before moving away after releasing the object.

Specify the "Place" options if OB7 needs to place an object into another machine.

Gripper Override

Closed Width: Normally the gripper will open fully when placing an object. In some cases it is desirable to limit the amount the gripper will open. You can limit the amount the gripper closes by entering in that number here.

Speed: It is sometimes desirable to slow the speed at which the gripper opens. This can be useful when precisely placing objects. Normally the gripper will open at full speed. To decrease the opening speed, enter the desired percentage of speed here.

Force: Use this entry to override the amount of force the gripper will apply to the object it is acquiring.

All of these override functions require a gripper with these control capabilities.

Use the "Override Gripper Settings" to specify the width, speed, and force for picking up delicate objects.

Reverse Gripper Direction

Checking this box will cause the gripper to close when placing an object. An example would be placing a cylinder from the inside.

Stop Before Approach: This setting causes OB7 to pause at the Approach Point, before putting down the object. This causes OB7 to move more gently when placing the object.

Vibrate: This causes OB7 to Vibrate the object as it is placed. This can be useful for fitting a component into a tight space. Wen Vibrating, you can select both the speed (from a slow "wiggle" to a fast "buzz", and the size of the movement as it "wiggles" or "buzzes". Hold down the SHOW ME button to preview this movement.

Speed: This sets the speed at which OB7 approaches when placing the object, and exits after placing the object. For delicate placements, set this to a lower speed.

The ⌈ MOVE ⌉ tile is added when it is necessary for OB7 to move through a complex or circuitous path. (In many cases it is unnecessary add this tile or to specify a particular move path. OB7 moves automatically to ⌈ PICK ⌉ and ⌈ PLACE ⌉ positions without the need to add a specific ⌈ MOVE ⌉ .) When a more complex path is necessary in a job, the ⌈ MOVE ⌉ tile is used. Normally, the ⌈ MOVE ⌉ tile and path will be added automatically as OB7 learns the job. This happens when the "move position" button on the handle is pressed. A ⌈ MOVE ⌉ tile may have as many positions or as complex a path as needed. Each time the move button on the gripper is pressed, OB7 learns to move through this position. The paths which OB7 moves through may be as simple as a direct move in a straight line, or may be along a very complex. As OB7 learns it's move, it stores the details in the ⌈ MOVE ⌉ tile. In most cases the best practice is to specify as few move positions as possible. OB7 will automatically move smoothly through the positions.

It is NOT necessary to tell OB7 explicitly where to move. OB7 will automatically find its own way between positions. For example: In a Pick and Place operation, OB7 will find its own way from the Pick up position to the Place position. In some cases, there may be obstacles between these locations. When this occurs, you can instruct OB7 to ⌈ MOVE ⌉ around the obstacle.

Comments: You can enter a comment or description of the job here.

Enter descriptive comment.

You may also specify how you would like OB7 to move. The details include:

Stop At End of Move: OB7 will move smoothly at a constant speed through the move positions set in this `MOVE` tile. If the ● STOP AT THE END OF THE MOVE   option is selected OB7 will gently come to a stop briefly at the end of the move, before proceeding with the rest of the job. If this option is not selected, OB7 will proceed directly with the rest of the job when this move is finished. In most cases this option is NOT selected.

This option pertains only when the move is followed by another movement. For example, you may have a `MOVE` between a `PICK` and a `PLACE`.   In this example, checking this option will tell OB7 that it must stop briefly before approaching the position where it will Place the object.

Stop at end of move.

Waypoints

OB7 will move smoothly and continuously through all the "waypoints" set in the `MOVE` tile. Each waypoint may be given a name if desired. It is also possible to move directly to a particular waypoint while teaching OB7 in order to inspect it. The waypoint may also be moved, or deleted while teaching the job to OB7.


Specify the waypoints.

Overrides

Speed: This option will tell OB7 to proceed through this move at a particular speed. Ordinarily OB7 will move at the speed set in the ⌐Start⌐ tile. Use this option if you want OB7 to move at a different speed.

Force: Use this option to limit the force that OB7 may apply as it makes this move.

OB7 will normally set its force limits according to the maximum force specified as "human safe" by the ISO10218-1 specification. If it is desired to change this to a different force limit, it is entered here. If the force limits are to be increased above the normal setting, a password will be required. The force limits can be decreased without the need to enter a password.
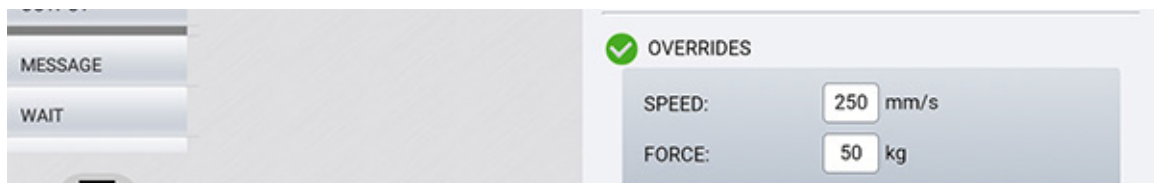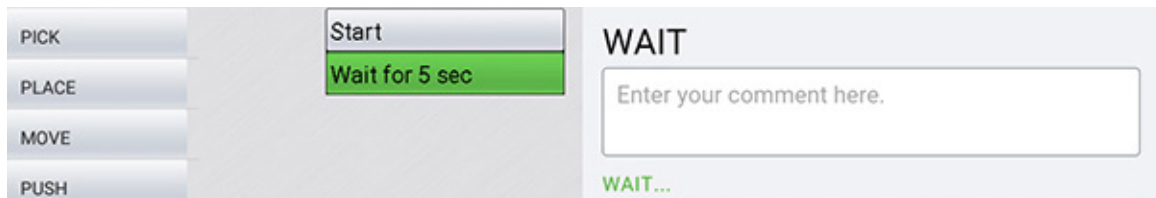

Enter the speed and force.

WAIT TILE

OB7 will always try to progress through its job directly and without pausing. In cases where OB7 must wait for someone or something, you can add a ☐ WAIT ☐ tile to the job. OB7 can wait for various reasons.

Comment: Enter any comments here. Entering a comment is optional.
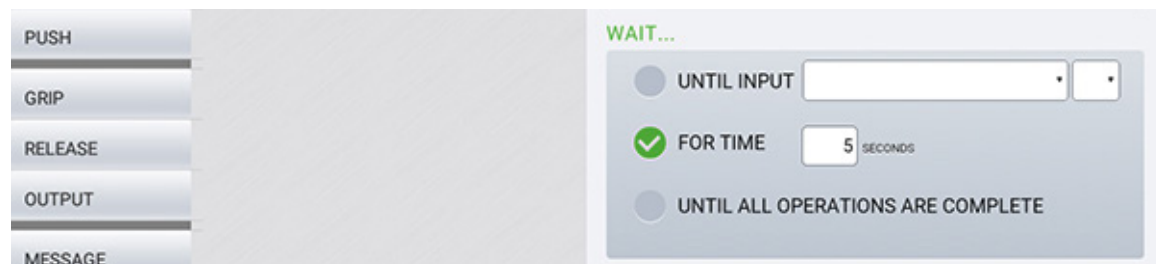
Enter descriptive comment.

Until Input: OB7 will wait until an input signal is either on or off. For example: OB7 might wait until another machine finishes its cycle before removing a part.

For Time: OB7 will pause for the amount of time specified.

Until All Operations Are Complete: If any operations are in process OB7 will pause until they are complete. An example of such an operation would be for the gripper to close on an GRIP operation.

Enter wait criteria.

The [WAIT] may include any combination, or none, of these conditions.

And Then

After the above `WAIT` condition(s) has or have occurred, the subsequent portion of the `WAIT` begins. This portion causes the job to `WAIT` for operator input. A message can be displayed and OB7 will wait for the operator to acknowledge the message. The message may be acknowledged either by tapping "continue" on the tablet, or by tapping OB7 directly on one if it's joints, as shown:

Tap Robot to Continue: If this option is selected, OB7 will continue waiting, AFTER the condition above is satisfied, for the operator to tap the robot. When the operator Taps OB7, it will continue on with the job.
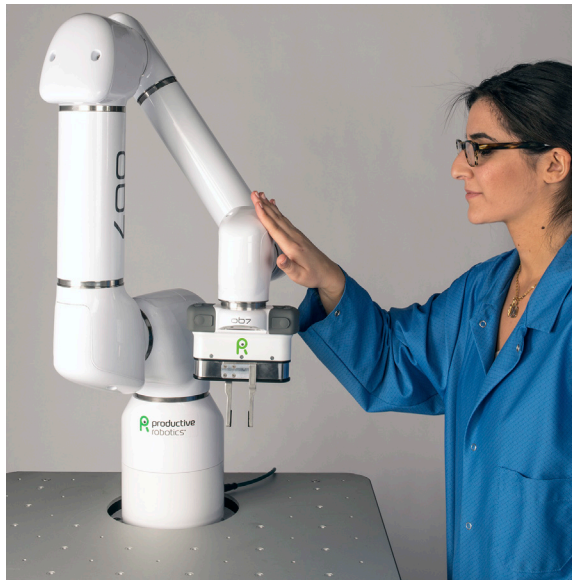
Tap on OB7's joint to acknowledge a message.

Message: If you enter anything into this box, this message will be presented on the control tablet while OB7 waits. You may tap OB7 anywhere on its arm. OB7 is most sensitive to being tapped near its gripper. You may also continue by pressing "continue" on the tablet.

Say the Message: By checking this option, OB7 reads the message and says it out loud while waiting.
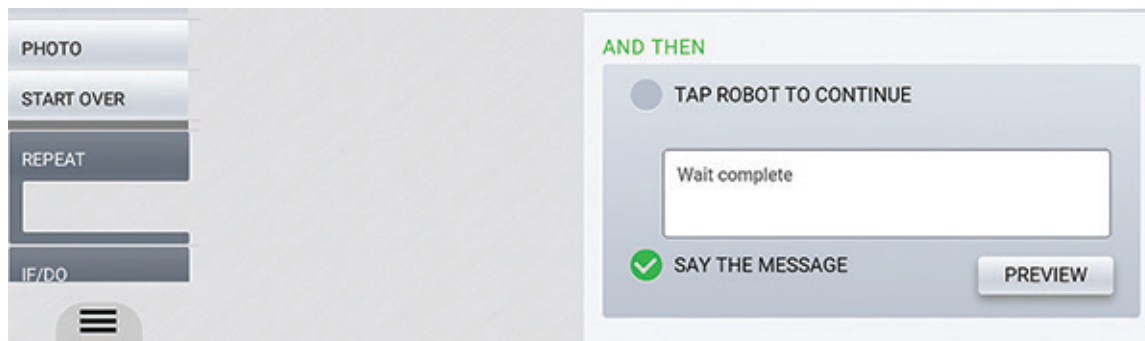
Specify the wait options.

GRIP TILE

The ⎡ GRIP ⎤ tile is used when it is desired to manually grasp an object without needing to move it as with a normal ⎡ PICK ⎤. For example: A grip may be used to hold an object in position while an operator, or a welder, Works on the object.

If you would like OB7 to close the gripper, or activate a vacuum gripper, without performing a ⎡ PICK ⎤ operation, you can insert a ⎡ GRIP ⎤ tile into the job. The ⎡ GRIP ⎤ tile tells OB7 to activate the gripper, without automatically approaching and picking up the object. When using the ⎡ GRIP ⎤ tile, the gripper will activate at the current location of the robot without any additional movements or options to pick up multiple objects (e.g. a stack or grid).
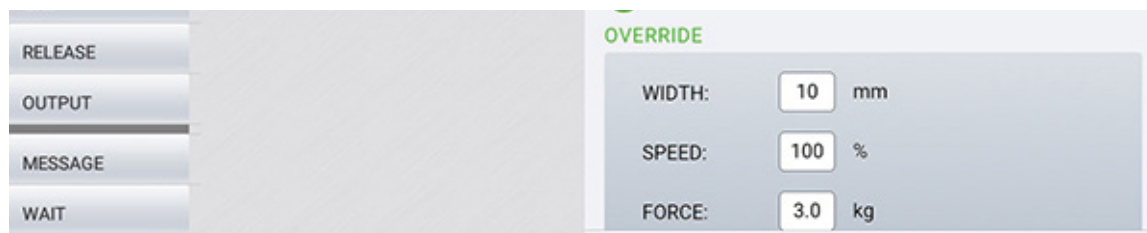
Wait for Gripper to Close: The job will pause until the gripper has fully closed on the object. If a vacuum gripper is being used, this will cause the job to pause until the vacuum is sensed.

Override Gripper Settings

Closed Width: Normally the gripper will close fully when picking up and object. In some cases it is desirable to limit the amount the gripper will close. This could be when picking up an easily crushed object. You can limit the amount the gripper closes by entering in that number here.

Speed: It is sometimes desirable to slow the speed at which the gripper closes. This can be useful when picking up fragile objects. Normally the gripper will close at full speed. To decrease the closing speed, enter the desired percentage of speed here.

Force: Use this entry to override the amount of force the gripper will apply to the object it is acquiring.

Use the "Override Gripper Settings" to specify the width, speed, and force for picking up delicate objects.

All of these override functions require a gripper with these control capabilities.

Grip Now: This button will cause the gripper to activate immediately when pushed. This button is only used while OB7 is Learning. This option is not present when OB7 is performing the job.

Release Now: This button will cause the gripper to release immediately when pushed. This button is only used while OB7 is Learning. This option is not present when OB7 is performing the job.

Select "Grip Now" or "Release Now".

RELEASE TILE

The RELEASE tile is used when it is desired to manually release an object without needing to place it as with a normal PLACE . (For example: A RELEASE may be used to release an object which was being held waiting for a person to take it from the robot.)

Comment: Enter any comments here. Entering a comment is optional.

Enter descriptive comment.
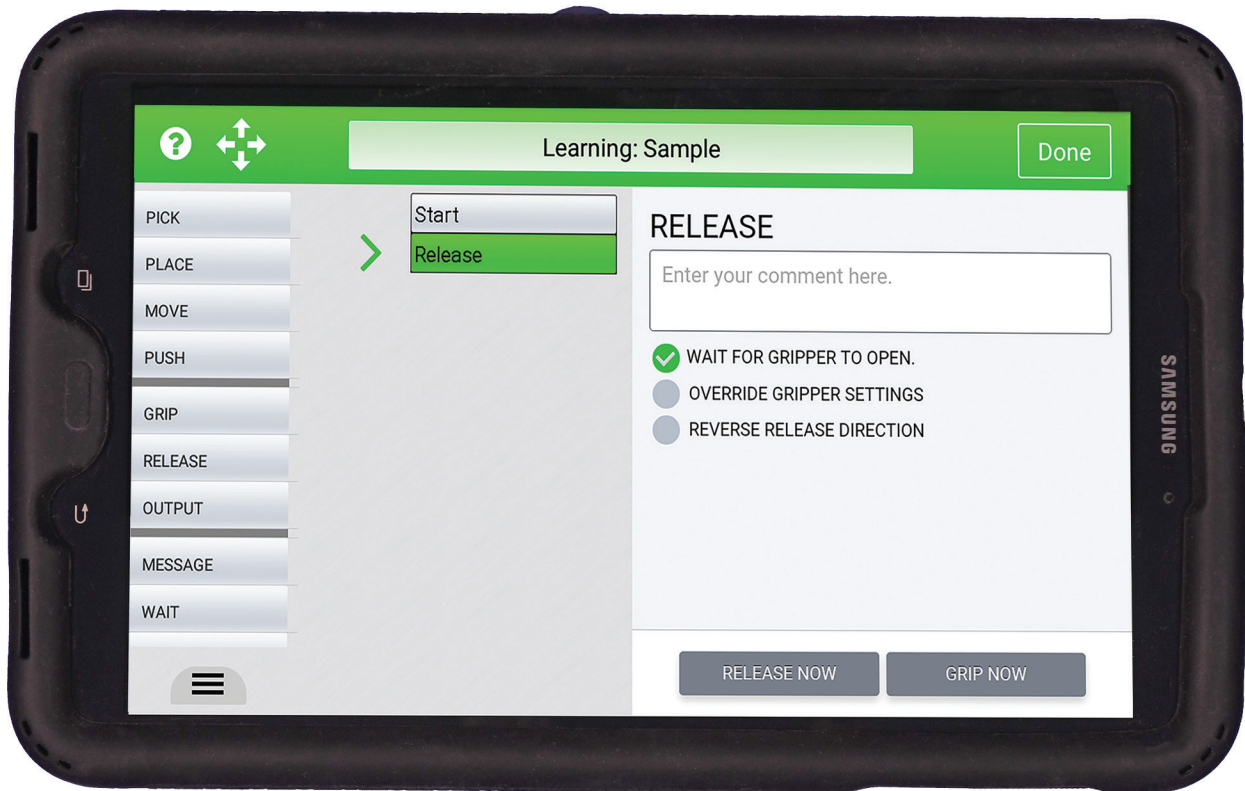
Wait for Gripper to Open: The job will pause until the gripper has fully opened or it has fully released the object. If a vacuum gripper is being used, this will cause the job to pause until the vacuum is released.

Override Gripper Settings
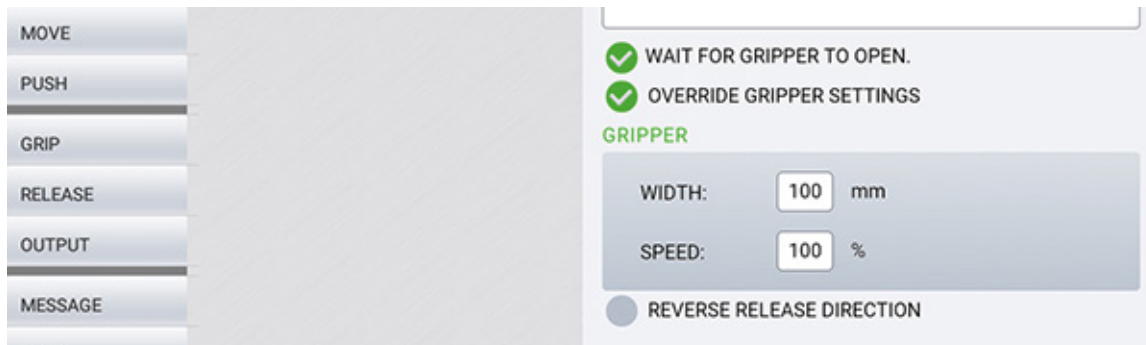
Open Width: Normally the gripper will open fully when releasing the object. In some cases it is desirable to limit the amount the gripper will open. This could be to keep the cycle time of this job as short as possible. You can limit the amount the gripper opens by entering in that number here.

Speed: It is sometimes desirable to slow the speed at which the gripper opens. This can be useful to prevent the object from shifting position as it is released. Normally the gripper will open at full speed. To decrease the opening speed, enter the desired percentage of speed here.

If you are using a vacuum gripper:

Vacuum turn off delay time: Set an extra time delay to assure that the vacuum grip has fully released before continuing.

Reverse Release direction: This option will cause the gripper to close when releasing. This is necessary if an object is gripped from its inside.

Set the Override Gripper Settings to limit the amount OB7 will open.

All of these override functions require a gripper with these control capabilities.

Release Now: This button will cause the gripper to release immediately when pushed. This button is only used while OB7 is Learning. This option is not present when OB7 is performing the job.

Grip Now: This button will cause the gripper to activate immediately when pushed. This button is only used while OB7 is Learning. This option is not present when OB7 is performing the job
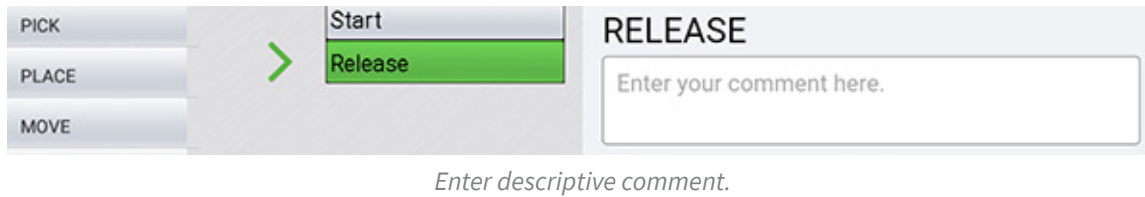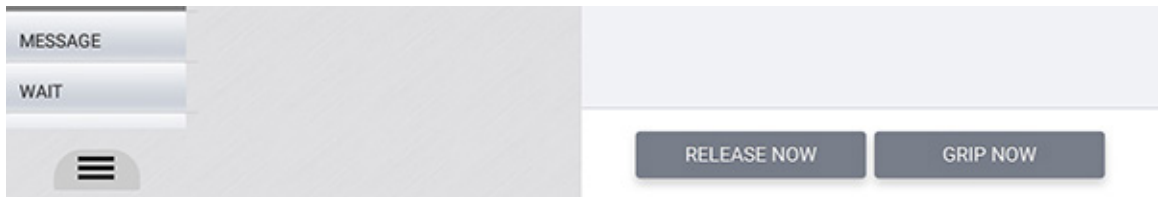

Select "Grip Now" or "Release Now".

The ⌊PUSH⌋ tile is used to push with a predetermined force. The push will start at the "Start position" of the push, and will proceed until it reaches the "end position" or until the full force is reached. ⌊PUSH⌋ is useful for pushing a button on a machine's control panel, or holding an object firmly in place in a fixture while it is being clamped or bonded.

Comment: Enter any comments here. You might enter a comment that describes what the robot is pushing. Entering a comment is optional.

Enter descriptive comment.

Force: The force entry sets how hard OB7 should push. You can enter kilograms or pounds.

Vibrate: When pushing an object into position, it can be useful to wiggle or vibrate the object as it is pushed. This helps it drop in, or "seat" more easily. Set the speed from slowest (a "wiggle") to fastest ("a vibration or "buzz"). Set the amplitude of the movement from smallest to largest. A slow speed setting causes the OB7 to "wiggle" the part as it pushes it in. A high speed setting causes the part to vibrate or "buzz" as it is inserted.

Vibrate Speed: Select the speed of the vibration. A slow vibration appears as a gentle wiggle. A fast vibration causes the object to "buzz".

Vibrate Strength: Select the force of the vibration, from lightest (0) to hardest (10).

Show Me: Press this button and OB7 will "wiggle" or "vibrate" the part according to your settings. Most people have a good intuitive "feel" for how much movement would be necessary. The "Show Me" button will give you a "preview" of how OB7 will perform this step.

Set the force, vibration speed, and vibration strength.
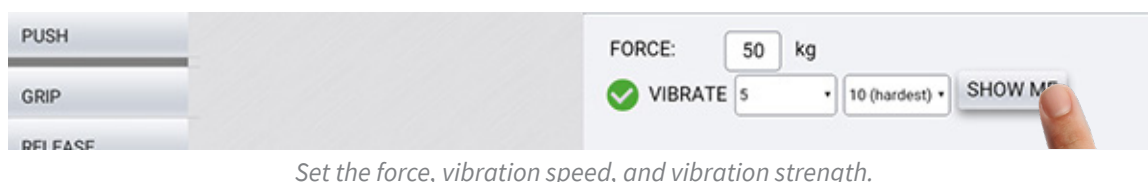
OB7 can take pictures of its Work for record keeping or inspection purposes. Add the PHOTO tile at any point you would like OB7 to take a picture. Normally, OB7 would MOVE to the position for the picture and then take the picture.

You can select either a small (approx 1 Meg pixel) or large (approx. 5 Meg pixel) image. The pictures taken by OB7 are cataloged by the name of the job, cycle number, date and time. The pictures from OB7 are stored in the cloud database along with job backup and robot performance data. They can be accessed or downloaded at any time.
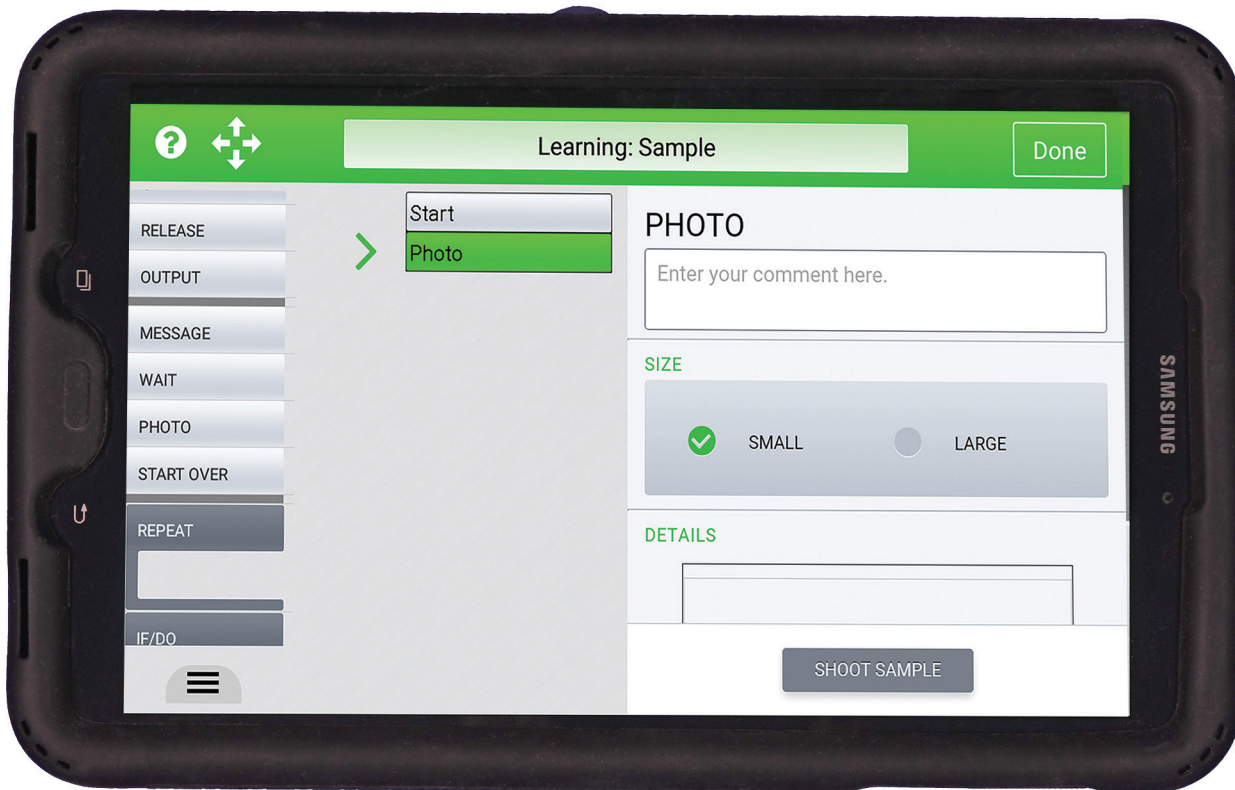
This requires a subscription to the Productive Robotics Robot Monitoring Cloud service.

Shoot Sample: Press this button to take a sample picture. The sample image will be displayed on the control tablet in the space provided.
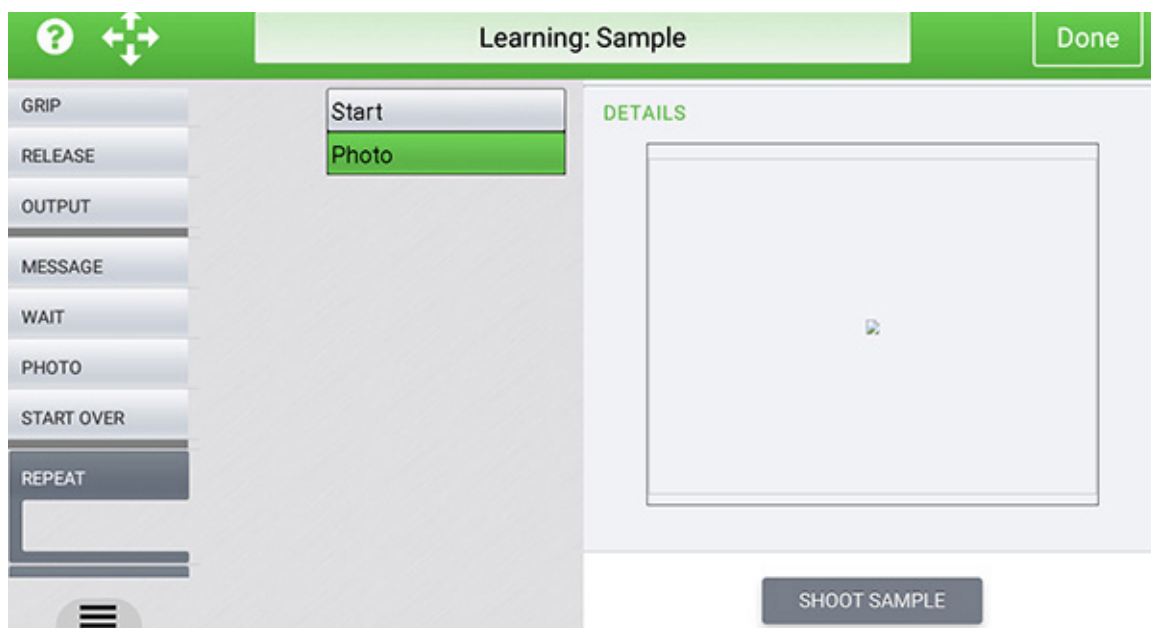
Press "Shoot Sample" to take a sample picture.

Comment: Enter any comments here. You might enter a comment that reminds you what you're taking a picture of. Entering a comment is optional.
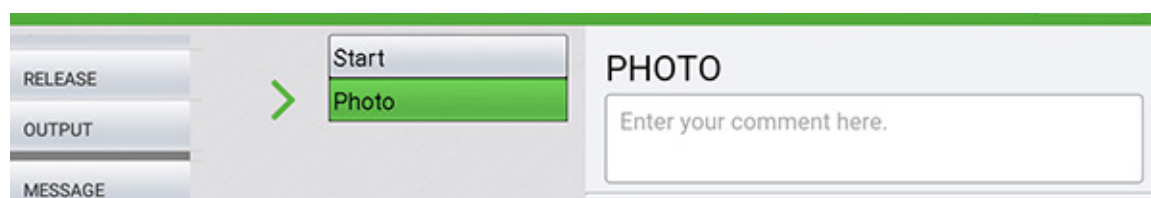
Enter descriptive comment.

Large Image: Check this option to capture a large image file. The large image is approximately 5M pixels.

Small Image: Check this option to capture a small image file. The small image is approximately 1M pixels.
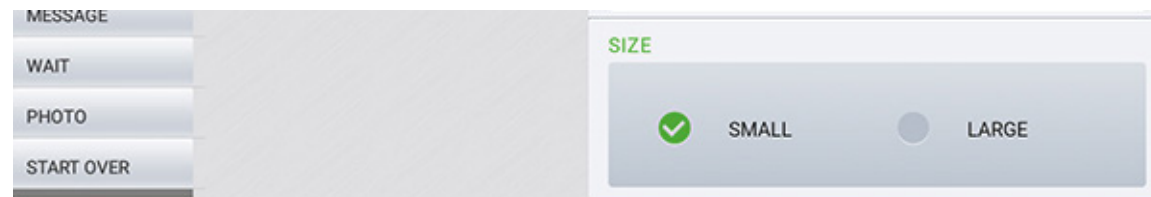
Select small or large image.

OUTPUT TILE

The OUTPUT tile is used to tell OB7 to turn on an output signal. The output signal may be used to initiate some action on a machine.   The output signal could come from the OB7 General Equipment Interface, or it might come from the End of Arm output plug.

When you set up OB7, you will name each signal. Select the signal name in the OUTPUT tile to tell OB7 which signal to activate.
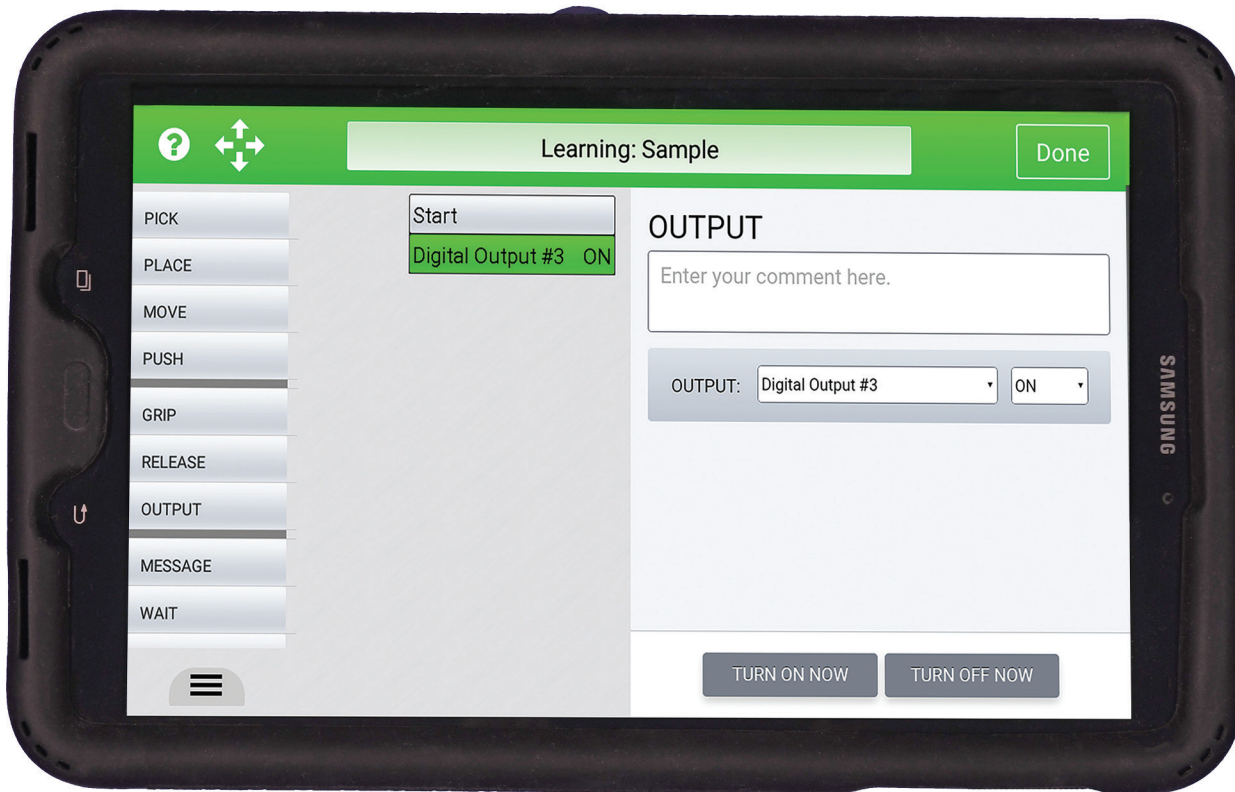
Comment: Enter any comments here. You might enter a comment that describes any details of what this output will do. Entering a comment is optional.

Enter descriptive comment.
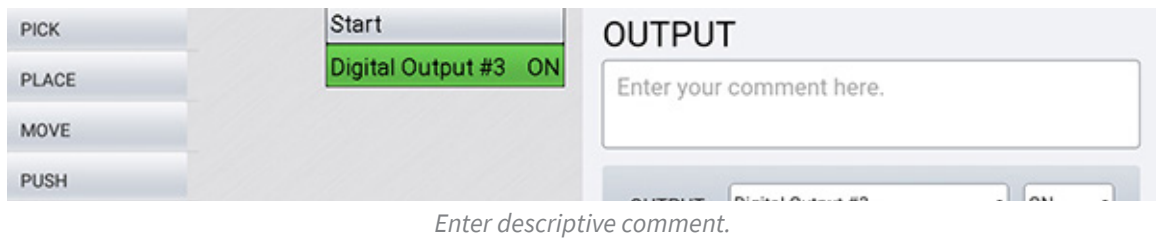
Output: Select the name of the signal and whether to turn it "on" or "off".

Select name of signal.
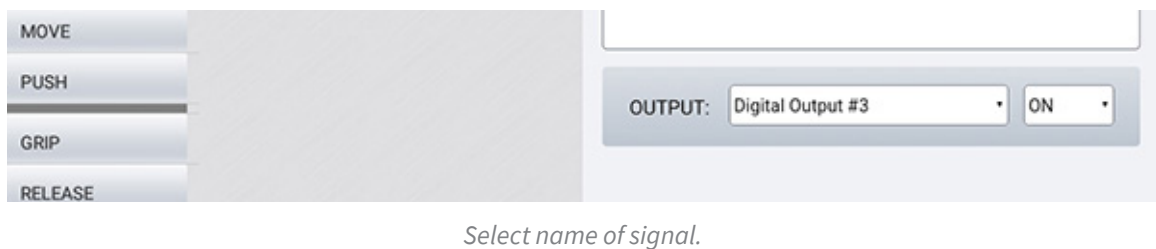
Turn On Now: Immediately turn ON the signal for testing purposes. Note that this button is only available while OB7 is Learning a job. Once OB7 begins to Work that job, these buttons are not available.

Turn Off Now: Immediately turn OFF the signal for testing purposes. Note that this button is only available while OB7 is Learning a job. Once OB7 begins to Work that job, these buttons are not available.

Select "Turn On" or "Turn Off" while OB7 is Learning.

REPEAT TILE

OB7 will repeat the entire job automatically, according to the settings in the `Start` tile. Sometimes, you will want OB7 to repeat only a portion of a job. You can tell OB7 which portion to `REPEAT` using this tile. The `REPEAT` tile will "wrap" itself around the portion of the job you want OB7 to repeat. Add the `REPEAT` tile to the job. Drag those steps of the job inside the `REPEAT` icon. OB7 will repeat this portion of the job, based on the rules you select.

Comment: Enter any comments here.   Entering a comment is optional.

Enter descriptive comment.
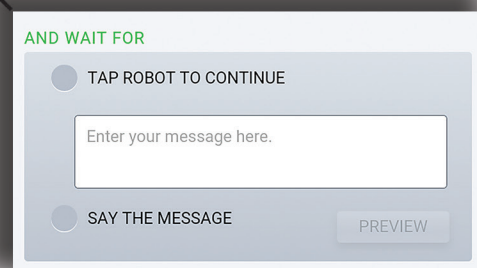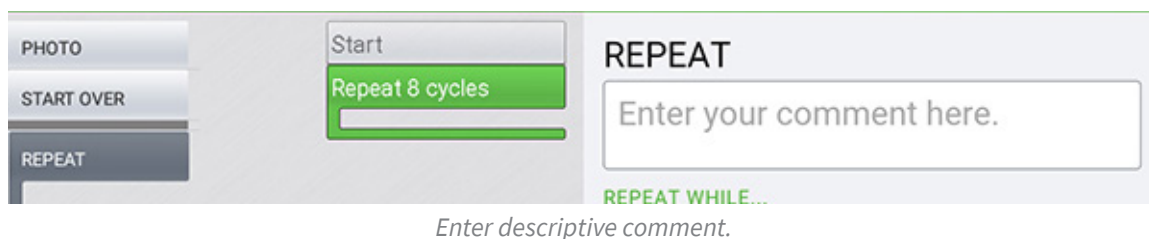
Repeat While

The portion of the job will repeat for as long as these conditions are true.

Repeat While Input: Select the input signal you would like OB7 to watch for. OB7 will continue repeating this portion of the job for as long as it sees this signal. For example: This might be a signal from another machine telling OB7 that bin still has room for more parts.   When the signal changes, indicating that there is no more room in the bin, OB7 will stop repeating this portion of the job and continue to the next part of the job (which might be to replace the full bin with an empty one).

Repeat while Cycles: OB7 will simply repeat this portion of the job for as many cycles as you specify. For example: This portion of the job may be used to tell OB7 how many parts to process before moving on to another part of this job.

Repeat Forever: OB7 will repeat this portion of the job until you stop it.

Repeat while Pick not Empty: Will cause the tiles inside to be repeated until the Stack or Grid supply of parts to Pick is empty.

Repeat while Place Not Full: Will cause the tiiles insideto be repeated until the   the Stack or Grid placements are full.

Set the conditions for OB7 to repeat portions of the job.
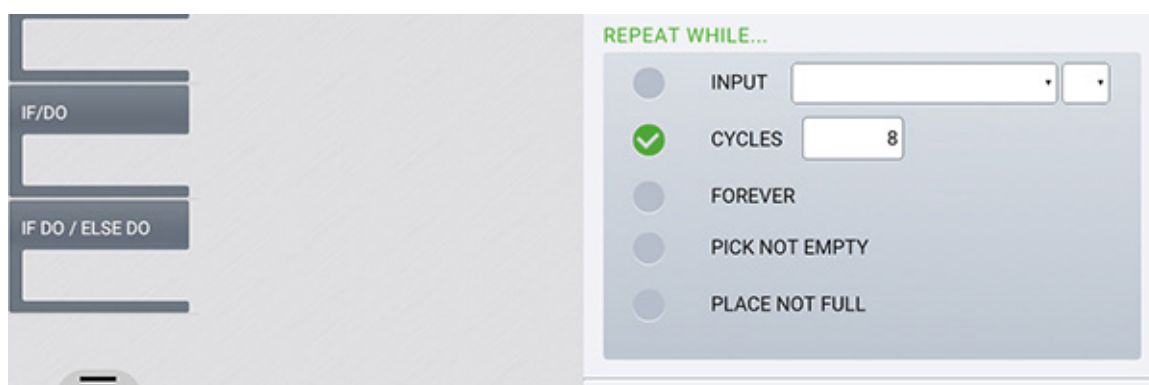
And Wait For

At the end of each cycle, OB7 will do the following:

Tap Robot to Continue: If this option is selected, OB7 will wait after each cycle of the repeat for the operator to tap the robot. When the operator Taps OB7, it will continue on with the job.

Message: If you enter anything into this box, this message will be presented on the control tablet while OB7 waits. You may tap OB7 anywhere on its arm. OB7 is most sensitive to being tapped near its gripper. You may also continue by pressing "continue" on the tablet.

Say the Message: By checking this option, OB7 reads the message and says it out loud while waiting.
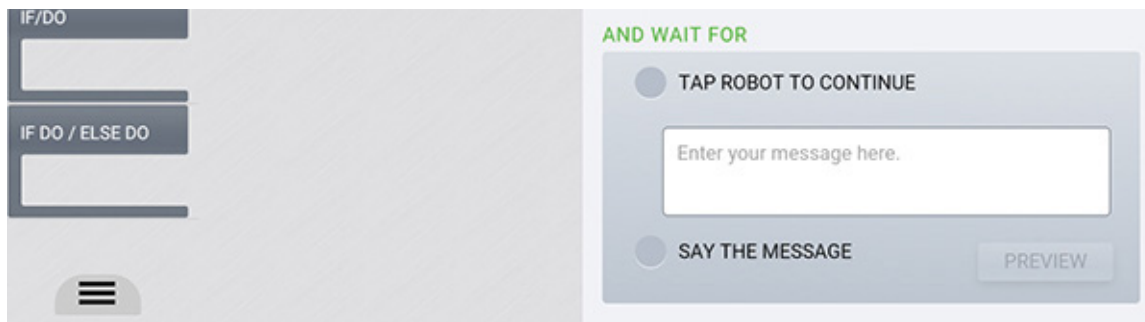
Set options for OB7 while waiting to be tapped by the operator.

IF/DO TILE

The `IF/DO` tile is used to tell OB7 to respond to a particular condition. If the condition is met, then the portion of the job that is inside the `IF/DO` tile will be done. If the condition is not met, then the portion of the job inside the `IF/DO` tile will be skipped. The conditions can be:

Comment: Enter any comments here. Entering a comment is optional.

Enter descriptive comment.

Input: Select the input signal you would like OB7 to watch for. When this signal appears, OB7 will perform this portion of the job. For example: This signal may specify that a bin has become empty. In this case, OB7 may perform the steps necessary to re-fill the bin.

Pick Empty: Select this input to tell OB7 what it should do when the Pick supply becomes empty. In a `PICK` and `PLACE` operation, the source of objects to `PICK` may eventually be empty. In this case this portion of the job may be to refill the pick objects. For example: Objects may be presented in a grid package. Once all the objects have been picked from the grid package, it will be necessary to discard the empty grid package and replace it with a full package before resuming the job.

Place Full: Select this input to tell OB7 what it should do when the Place package becomes full. In a `PICK` and `PLACE` operation, the package where the objects are `PLACE`'d will eventually become full. In this case this portion of the job may be to move the full package away and replace it with a new empty package. For example: Objects may be packed into a grid package. Once all the objects have been placed in the grid package, it will be necessary to move out the full package and replace it with a new, empty, package before resuming the job.

Set the conditions for OB7 to respond to.

The `IF DO / ELSE DO` tile is used to tell OB7 to respond to a particular condition. If the condition is met, then the portion of the job that is inside the `IF/DO` portion of this tile will be done.   If the condition is not met, then the portion of the job inside the `ELSE DO` tile will be done.

This tile functions similarly to the `IF/DO` tile, but give OB7 a choice between performing alternative parts of the job depending on the circumstances. For Example: The signal from a machine might specify which of two different stations are ready to receive parts. OB7 would use this signal to decide which station to place the part into.   The `IF DO / ELSE DO` tile will wrap itself around two different portions of the job. OB7 will perform ONLY ONE of these, depending on the circumstances.

The conditions can be:
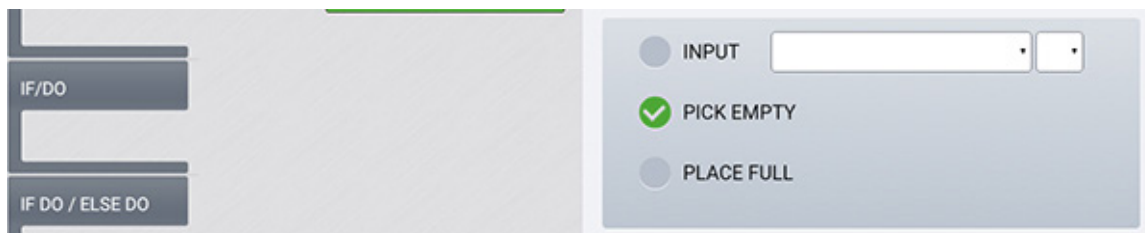
Comment: Enter any comments here. Entering a comment is optional.

Enter a descriptive comment.

Input: Select the input signal you would like OB7 to watch for. When this signal appears, OB7 will perform the portion of the job that is wrapped inside the IF/DO part of the tile. This is the upper half of the tile. If the signal is NOT present, OB7 will perform the portion of the job that is wrapped inside the ELSE DO part of the tile. This is the lower half of this tile.

Pick Empty: Select this input to tell OB7 what it should do when the Pick supply becomes empty. In a PICK and PLACE operation, the source of objects to PICK may eventually be empty. In this case this portion of the job may be to refill the pick objects. For example: Objects may be presented in a grid package. Once all the objects have been picked from the grid package, it will be necessary to discard the empty grid package and replace it with a full package before resuming the job.

Place Full: Select this input to tell OB7 what it should do when the PLACE package becomes full. In a PICK and PLACE operation, the package where the objects are PLACE 'd will eventually become full. In this case this portion of the job may be to move the full package away and replace it with a new empty package. For example: Objects may be packed into a grid package. Once all the objects have been placed in the grid package, it will be necessary to move out the full package and replace it with a new, empty, package before resuming the job.

Set the conditions for OB7 to respond to.

The ⬚MESSAGE⬚ tile is used by OB7 to send a message to a person. The message can be written out on the tablet, Spoken from the tablet, or emailed. The message will display on the tablet until an operator acknowledges it with a tap on the message on the tablet. If the message is spoken, it will be repeated until acknowledged. If the message is emailed, it will only be sent once.

The ⬚MESSAGE⬚ tile will display a message on the control tablet. The message to be displayed is entered into the "message" area provided.
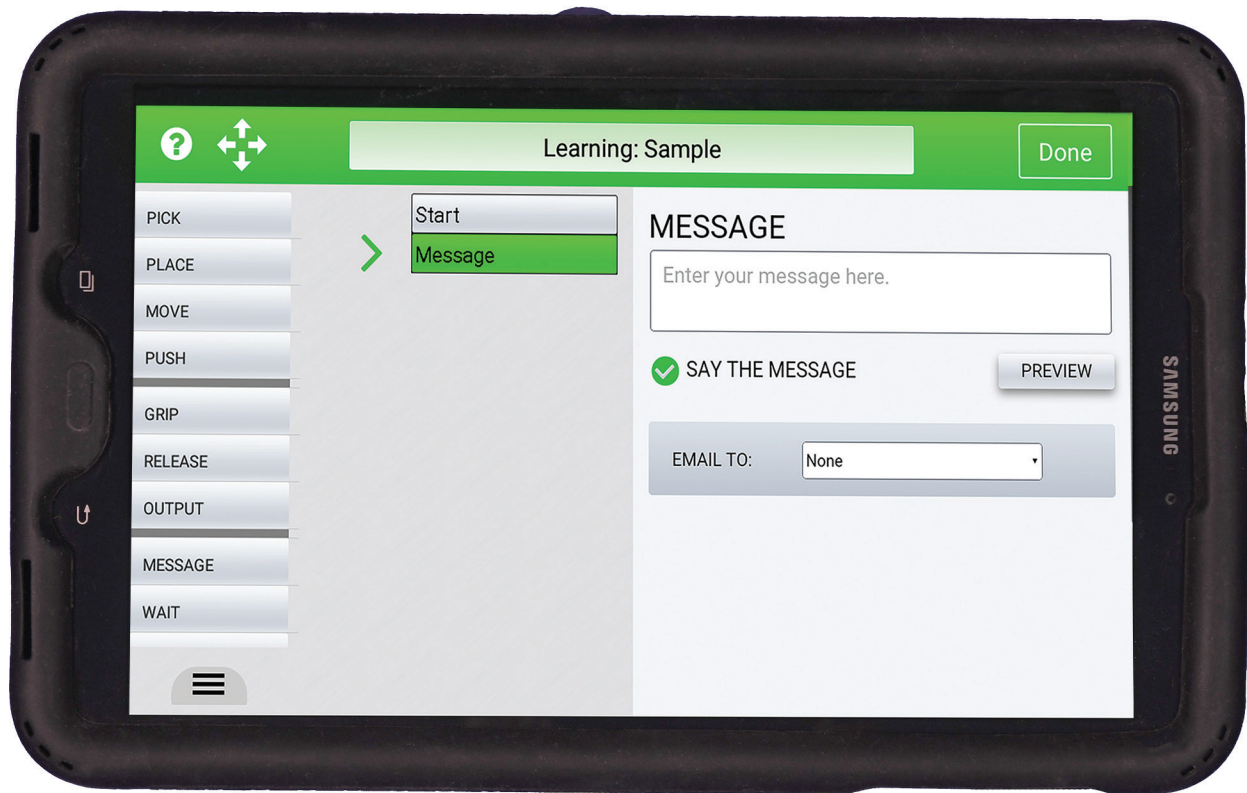
Say the message: By checking this option, OB7 read the message and says it out loud until it is acknowledged by the operator.

Email To: This message may be emailed by entering the email address here. (Note: this requires connection to the Productive Robotics Robot Monitoring Cloud Service).

The   START OVER   tile is used to restart the job from the beginning. The   START OVER   tile is
only used from within an   IF/DO   or   IF DO / ELSE DO   portion of the job. It is not necessary to use
a   START OVER   tile at the end of the job. OB7 will automatically start over at the end of the job
(according to the setting in the   Start   tile).

TECHNICAL DRAWINGS

TECHNICAL DRAWINGS

OB7 MOUNTING

Fasten using 6 x M8x1.25 90° Flat Head Bolts.
Base must be able to support 1000N (225 lbf)
on each bolt to ensure it does not fail when
the arm is in motion.

6 x ⌀ 9.00mm THRU ALL
⌀ 17.30mm X 90°

⌀ 195.0mm
[7.68in]
B.C.

⌀ 220.0mm
[8.66in]

⌀ 175.0mm
[6.89in]

Connectors require
clearance.

40deg

60deg

50deg

⌀ 6.04mm THRU
FOR 6mm REGISTRATION PIN

6.04mm X 7.00mm THRU
FOR 6mm REGISTRATION PIN

Center of Rotation
Center of Flange

22.5mm
[.89in]

Connectors require
clearance.

10.0mm
[.39in]

Joint - LARGE

107.0mm
[4.2 in]

⌀ 175.0mm
[6.89in]

⌀ 220.0mm
[8.66in]

229.6mm
[9.04in]

Productive Robotics
1035 Cindy Lane, Carpinteria, ca 93013
Phone (805) 576 1600 Fax (805) 576 1601

DESCRIPTION
OB7 Mounting Flange

SIZE A

PART NO.

DWG. NO.

REV.

SCALE 1:3

SHEET 1 OF 1

OB7 GRIPPER/TOOL MOUNTING

General Handle Dimensions

103

169

R43

R38

60

43

A

SECTION B-B
SCALE 1 : 1

1 X 45°

6.00

1 X 45°

14.50

B

This drawing outlines critical dimensions and hole callouts. Please refer to solid model for general geometric information.

Mounting Feature Details

DETAIL A
SCALE 1:1

Ø 31.50 +0.03 0.00

Ø 63.00 0.00 -0.05

(35.355)

4 x 90°

Ø 6.05 0.00 -0.03
⌶ 7 MAX

4 x M6x1.0 - 6H
⌶ 7 MAX

BC Ø 50.0

B

B

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MM.

TOLERANCES ARE
X.X = +/-.25mm
X.XX = +/-.1mm
X.XXX = +/-.01mm
UNLESS OTHERWISE SPECIFIED

MATERIAL
Alum 6061-T6

FINISH
Powercoat White

SURFACE FINISH

Handle Assy

APPROVALS		DATE
DRAWN	EL	8/24/2017
ENG	R.Martinez	7/12/2017
CHECKED	ZB	12/29/2017
APPR	ZB	12/29/2017

Productive Robotics
1035 Cindy Lane, Carpinteria, ca 93013
Phone (805) 576 1600 Fax (805) 576 1601

DESCRIPTION
Handle Mounting Plate
ISO 9409-1-50-4-M6

SIZE A PART NO. MAC801

SCALE 1:2 DWG. NO.

SHEET 1 OF 1 REV. B

REV.	DESCRIPTION	DATE	APPROVED
	Revisions		
A	RELEASE FOR PRODUCTION	8/24/2017	EL
B	Increased height of mounting boss.	10/4/2017	ZB

OB7 ROBOT STAND DIMENSIONS

Quantity per Machine:

[700mm]
27.6in

[599mm]
23.6in

[890.38mm]
35.1in

[978.56mm]
38.5in

[900mm]
35.4in

[455mm]
17.9in

[779.50mm]
30.7in

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MM [INCHES].

TOLERANCES ARE:
x.x = +/- .25 [+/- 0.010 in]
x.xx = +/- .1mm [+/- 0.004 in]
x.xxx = +/- .01mm [+/- 0.0004 in]
UNLESS OTHERWISE SPECIFIED

MATERIAL

FINISH

SURFACE FINISH

	APPROVALS	DATE
DRAWN CGT		02/13/18
ENG		
CHECKED		
APPR		

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION. IT MAY NOT BE REPRODUCED, TRANSFERED TO OTHER DOCUMENTS, DISCLOSED TO OTHERS OR USED FOR MANUFACTURING OR ANY OTHER PURPOSE WITHOUT PRIOR WRITTEN PERMISSION.
COPYRIGHT 2012-2014 PRODUCTIVE ROBOTICS

Productive Robotics
1035 Cindy Lane, Carpinteria, ca 93013
Phone (805) 576 1600 Fax (805) 576 1601

DESCRIPTION
Robot Stand Dimensions

SIZE A   PART NO.   DWG. NO.   REV.
SCALE 1:20   SHEET 1 OF 2

Robot Assembly Stand

MECHANICAL SPECIFICATIONS

OB7 WORKING ENVELOPE

**OB7 Working Area
Front View
Vertical Position**

**OB7 Working Area
Side View
Horizontal Position**

Reach Center
J2 Output
Center of Rotation

⌀ **1890**   ⌀ **1890**

Reach Center
J2 Output
Center of Rotation

346

346

⌀ **1935**

Reach Center
J1 Output
Center of Rotation

209

All dimensions in mm

All dimensions indicate
center of outer surface of
mounting boss on handle.

**OB7 Working Area
Top View
Horizontal Position**

Diagram of Reach Area

Productive Robotics
1035 Cindy Lane, Carpinteria, ca 93013
Phone (805) 576 1600 Fax (805) 576 1601

DESCRIPTION
OB7 Robot Working Area
For Public Use

SIZE	PART NO.		REV.
A	OB7		A
SCALE 1:20	DWG. NO.		SHEET 1 OF 1

PUB OB7

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS	
Robo Type	
Weight	
Maximum Payload	
Reach	
Joint Ranges	
Speed	
Repeatability	
Footprint	
Degrees of Freedom	
Control Box Size (W x H x D)	
Control Box I/O Ports	
Tool I/O Ports	
I/O Power Supply	
Communication	
Programming	
Noise	
IP Classification	
Cleanroom Classification	
Power Consumption	
Collaboration Operation	
Temperature	
Power Supply	
Calculated Operating Life	
Cabling	

INSTRUCTIONAL DOCUMENTS

INSTRUCTIONAL DOCUMENTS

OB7 SOFTWARE UPDATE INSTRUCTIONS

To Install the software update on your OB7 robot, follow these steps:

1. Download the software update and copy it onto a USB flash drive. This should be the only file on the flash drive and it should be a 2 gig or larger drive.

2. Insert the USB flash drive into any free USB port on the OB7 computer.

3. Tap the help icon in the upper left corner of the tablet (Circle with the question mark inside).

4. Tap "Diagnostics".

5. Tap "Update System".

6. Home OB7. The "home" position is with the arm pointing straight up. Press and hold the "Home" button until ob7 is pointing straight up.

7. When you are prompted, tap "OK" to return to the home screen and begin the update.

8. Wait for the update to complete. It will take several minutes.

EXPORTING DIAGNOSTICS DATA FROM OB7

1. Insert a USB flash drive into the robot controller computer.

2. Enter Help by tapping the question mark at the top left of the screen.

3. Enter Diagnostics by tapping the 'Diagnostics' selection from the list on the left of the screen.

4. Tap the button labeled 'Save Diagnostic Data' near the bottom of the screen.

5. A message indicating that saving is in progress should appear to the right of the button. Once diagnostic data has been saved, a message reading 'Save complete' will appear to the right of the button. The USB flash drive may now be removed.

6. Insert the USB flash drive into your computer. Diagnostic data is stored in the file named 'pr. logs'.

7. Email the file named: **pr.logs** to service@productiverobotics.com

CLEANING THE FAN FILTER

Step 1

Step 2

Step 3