OWNER'S MANUAL

C-Series

Sensor Forks

Includes:

- Camera Forks
- Optional Auxiliary Camera

Manual Number 9015676

cascade® corporation

CONTENTS

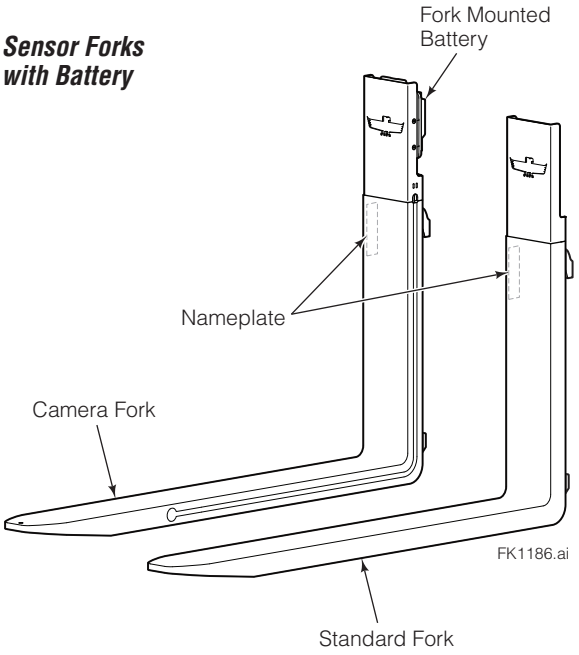
INTRODUCTION

About This Manual

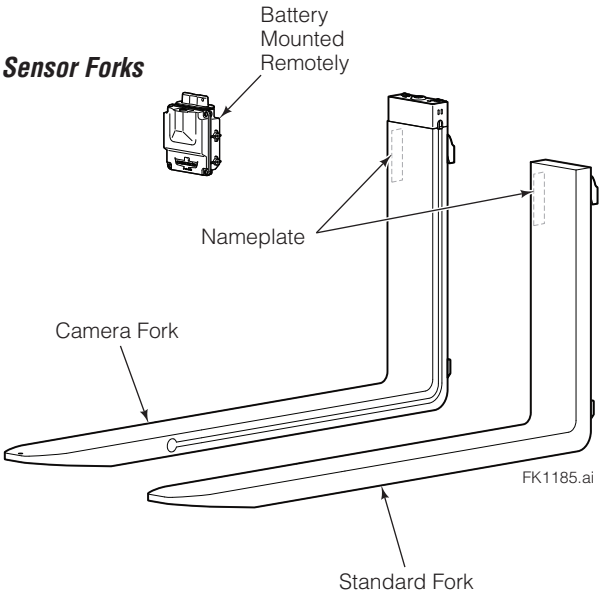
This user manual is for Cascade C-Series Sensor Forks. It contains Installation Instructions, Using the Display, Using the System, Battery, User Settings and Periodic Maintenance.

In any communication about the forks, refer to the product catalog and serial numbers stamped on the nameplate. If the numbers are found missing, the numbers are stamped on the right (below the nameplates) shank of each fork.

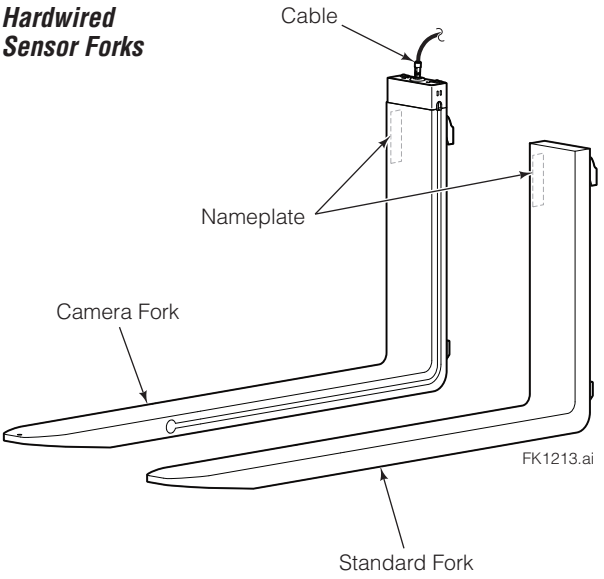
Sensor Forks with Battery



Sensor Forks



Hardwired Sensor Forks



Special Definitions

The statements shown, appear throughout this manual where special emphasis is required. Read all **WARNINGS** and **CAUTIONS** before proceeding with any work. Statements labeled **IMPORTANT** and **NOTE** are provided as additional information of special significance or to make the job easier.

WARNING – A statement preceded by **WARNING** is information that should be acted upon to prevent **bodily injury**. A **WARNING** is always inside a ruled box.

CAUTION – A statement preceded by **CAUTION** is information that should be acted upon to prevent machine damage.

IMPORTANT – A statement preceded by **IMPORTANT** is information that possesses special significance.

NOTE – A statement preceded by **NOTE** is information that is handy to know and may make the job easier.

IMPORTANT: Field alterations may impair performance or capability and could result in loss of warranty. Consult Cascade for any required modifications.

CAUTION: The Camera Forks and Sensor Forks camera is not an navigational device. It is intended to aid operators for load position visibility purposes.

Warnings

WARNING: Display use – Not designed for use while driving the truck. Operators must, at all times:

- Be aware of risk to pedestrians, bystanders and themselves.
- Always look in the direction of and keep a clear view in the path of travel, in any direction the truck is traveling.

It is the operator's responsibility to avoid distracted or impeded operation of the equipment while using any display. Failure to do so may result in severe personal injury or death.

WARNING: The Sensor Forks System (including auxiliary camera option) is not a safety device. It is intended to reduce pallet/bin damage and aid operators.

WARNING: Do not operate the system unless trained and a authorized lift truck driver.

WARNING: On both of the sensor forks is a designation stamping or nameplate for capacity. The maximum capacity is for the **fork pair** and load center is stamped.

WARNING: Residual risk exists to pedestrians and to bystanders in the work area. Operate lift truck and Sensor Forks System in a safe work area and in compliance with facility, local and national standards and rules.

WARNING: This product contains a Class 1 laser. Do not look into the sensor's laser beam. Looking directly into the beam may result in eye injury. **EN/IEC 60825-1:2014**

Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, dated June 24, 2017.

WARNING: Wear appropriate protective gear, goggles, steel toe boots and gloves during installation and periodic maintenance procedures.

Battery (Backpack Equipped)

Operating Temperature Range:

-4°F to 140°F (-20°C to 60°C)

Charging Temperature Range:

32°F to 113°F (0°C to 45°C)

IMPORTANT: Keep battery clean and dry. Store battery with a charged state between 40-60% and in an environment below 68°F (20°C), low humidity, without dust and corrosive gas.

NOTE: Refer to Appendix for complete battery data.

Sensor Forks

Storage Temperature Range:

-4°F to 140°F (-20°C to 60°C)

Operating Temperature Range:

32°F to 104°F (0°C to 40°C)

NOTE: For every 1,000 ft (304.8 m) of elevation, the operating temperature is derated 33°F (0.5°C).

Maximum Operating Temperature Rate of Change:

50°F (10°C) per hour

IMPORTANT: Keep sensor forks clean and dry. Store battery with a charged state between 40-60% and in an environment below 120°F (50°C), low humidity, without dust and corrosive gas.

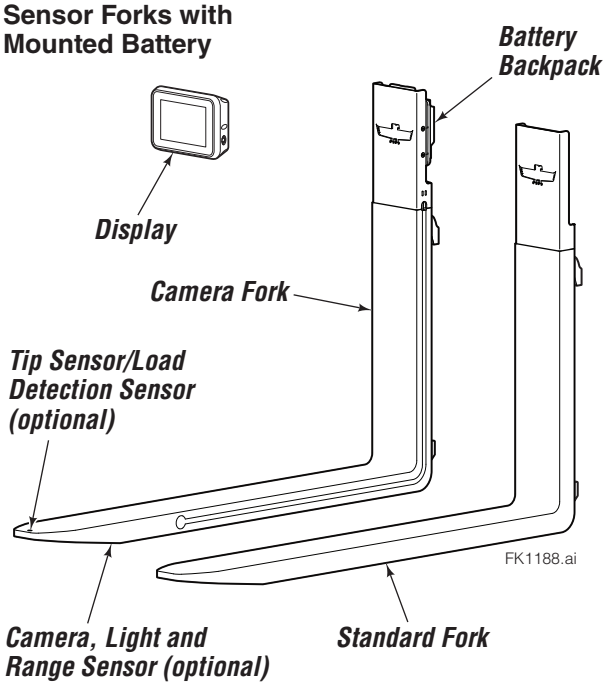
About Operation

This section contains operating instructions for Cascade Sensor Forks system. It will help you avoid common errors which often cause damage to the equipment or product being handled.

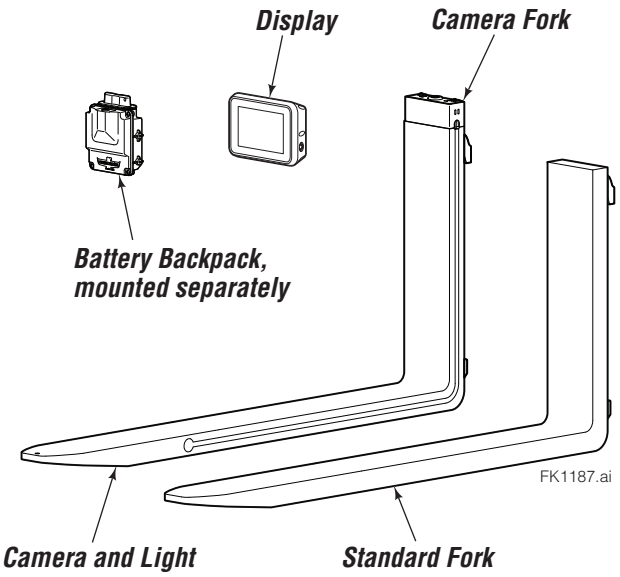
This information is intended to simplify operator understanding about effective and safe Sensor Forks system use and operation. Read this information thoroughly before operating the system. Be sure you know and understand all operating procedures and safety precautions. If you have any questions or don't understand a procedure, ask your supervisor.

Emphasize Safety! Most accidents are caused by operator carelessness or misjudgment. You must watch for poorly maintained equipment and hazardous situations and correct them.

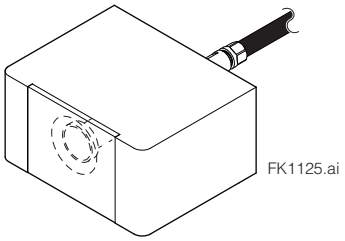
Sensor Forks with Mounted Battery



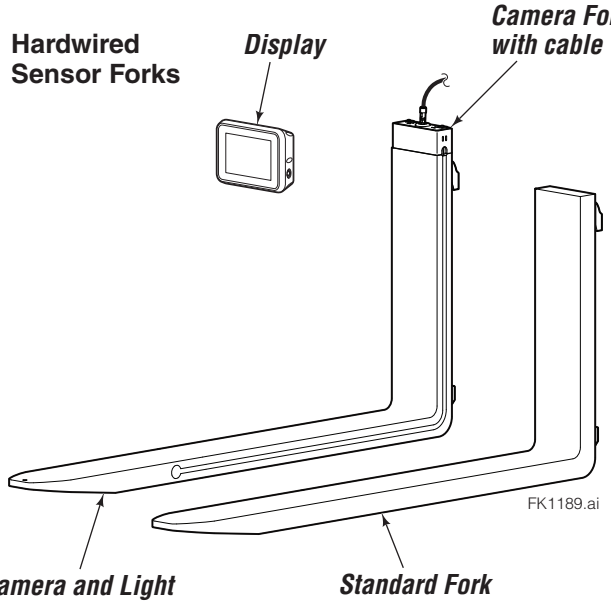
Sensor Forks



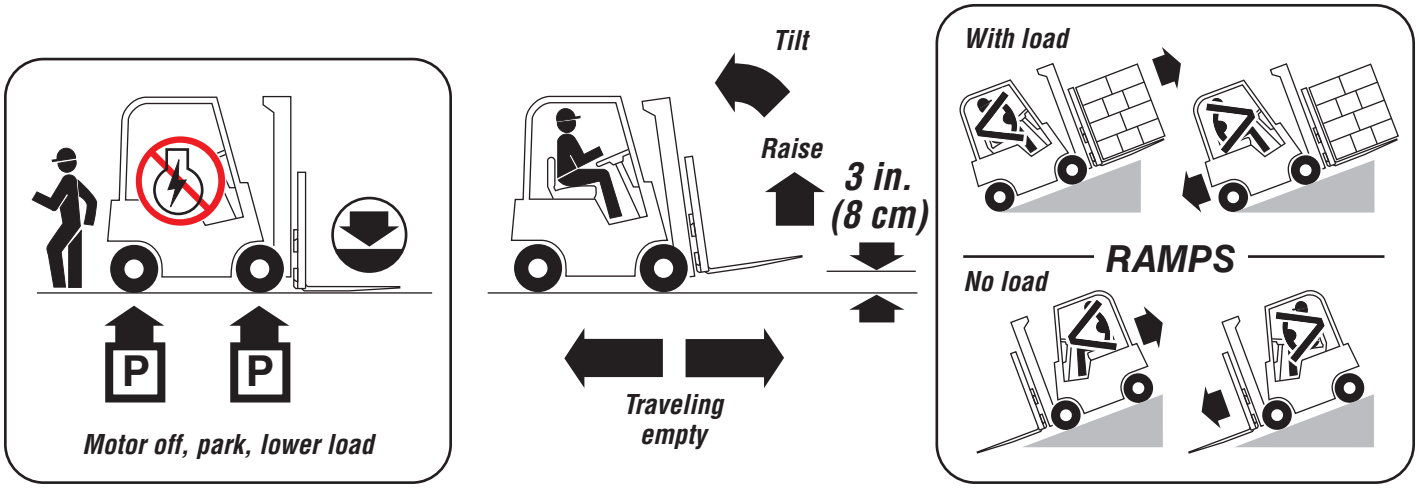
Auxiliary Camera (Optional)



Hardwired Sensor Forks



Safety Rules – Industrial Lift Trucks



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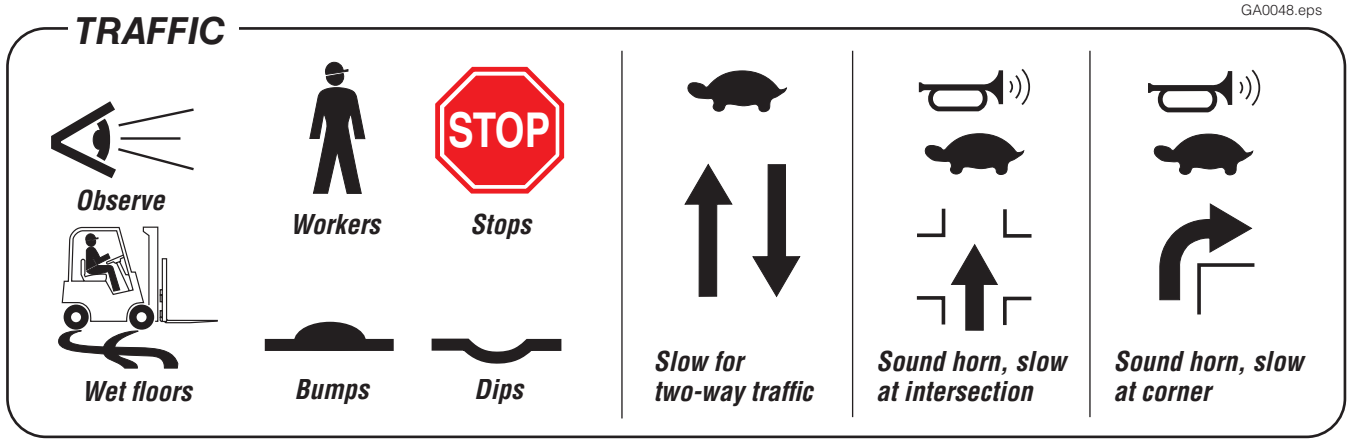
TRAFFIC

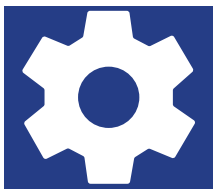


Screen Buttons

Return – Returns to Previous Screen.

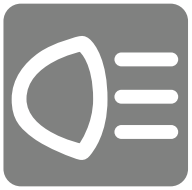
Home – Returns to the Home Screen.

Check – Accept the changes and save.



Settings – Go to Settings Menu

NOTE: Button is accessed by touching the top area of the screen.



Light (touch control) – Toggle light On/Off

Camera (touch control) – Toggle between main and auxiliary

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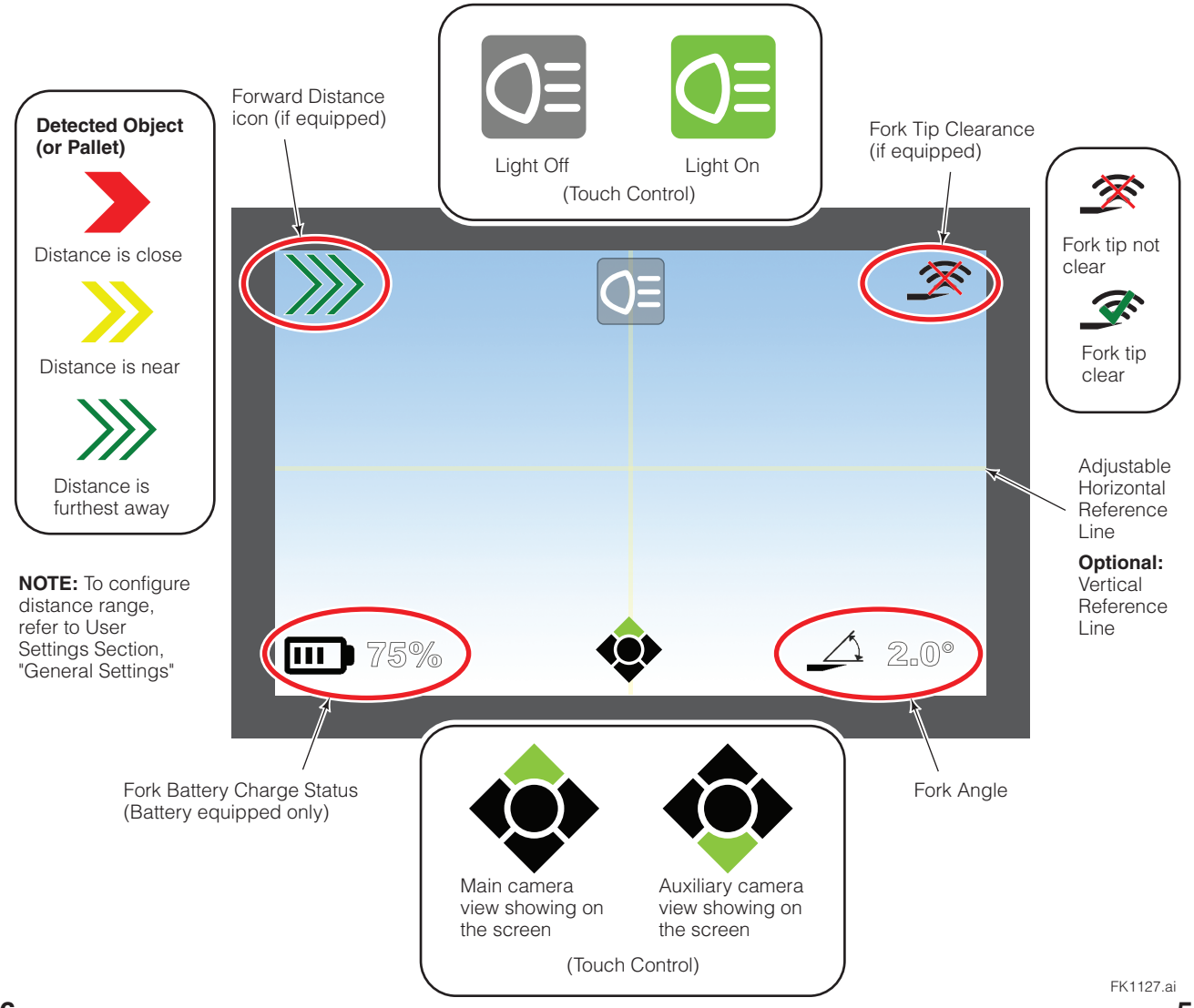
Display Home Screen



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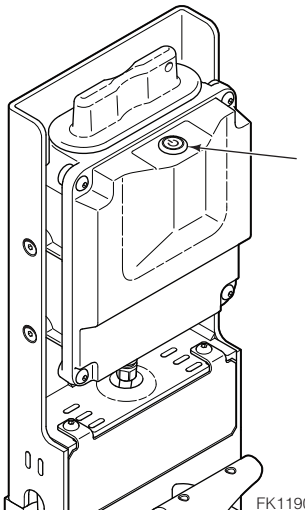
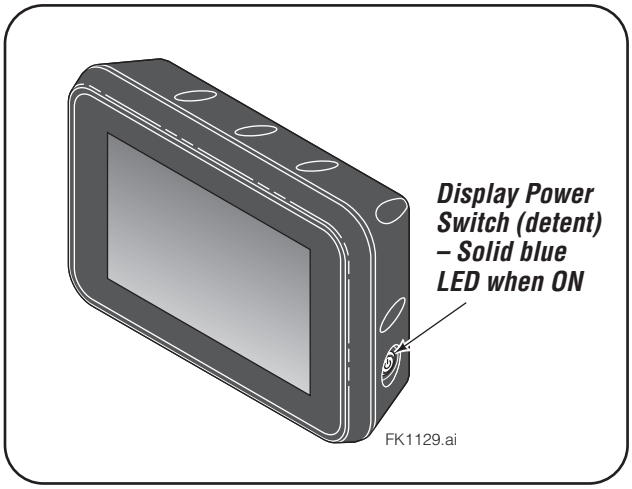
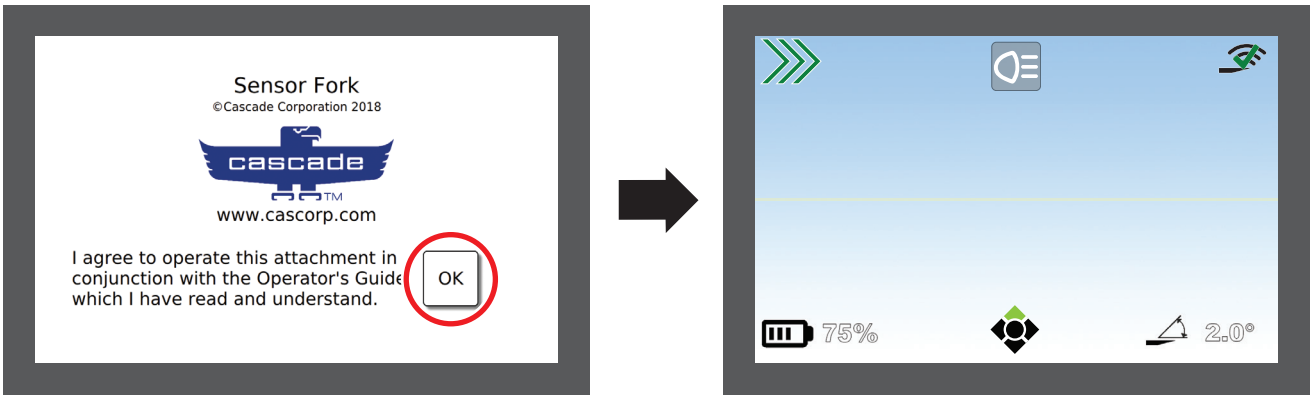
Basic Operation

1 ***If required, power "On" the backpack (if equipped) and then the display.***

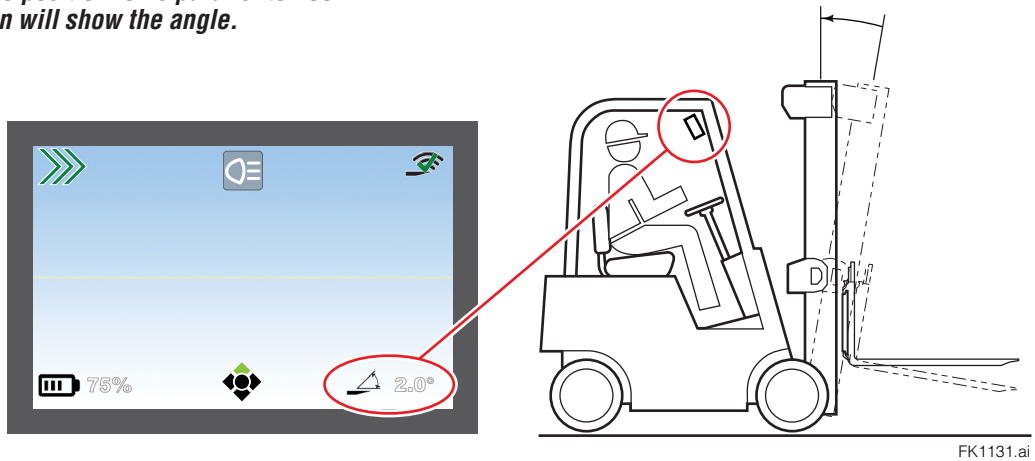




2 ***Read Acknowledgement statement and press the "OK?" button to continue.***



3 ***Tilt mast to position forks parallel to floor. The screen will show the angle.***

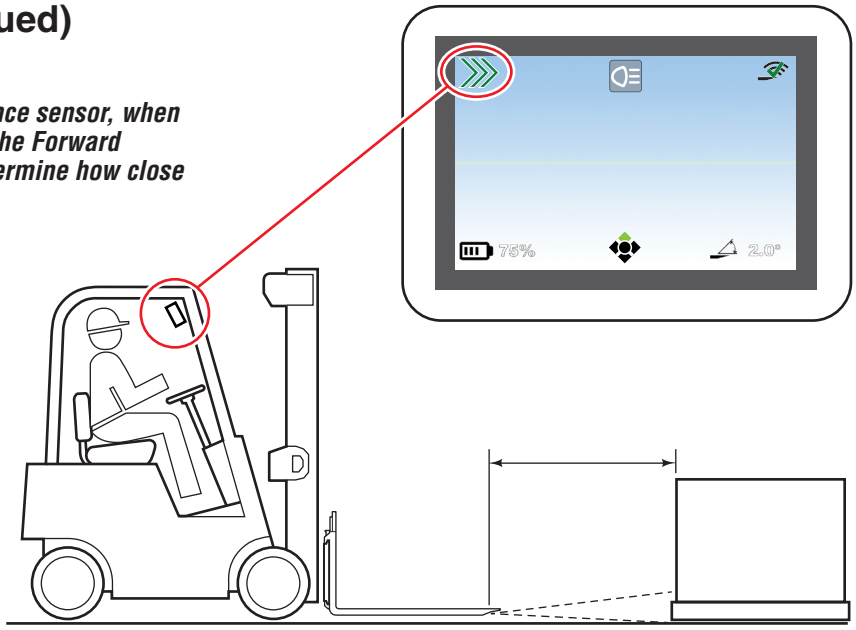


Basic Operation (continued)

4 *Approach a load.*

If equipped with Forward Distance sensor, when two meters from the load, use the Forward Distance icon as a guide to determine how close to the load the forks are.

CAUTION: The Camera Forks and Sensor Forks camera is not an navigational device. It is intended to aid operators for load position visibility purposes.



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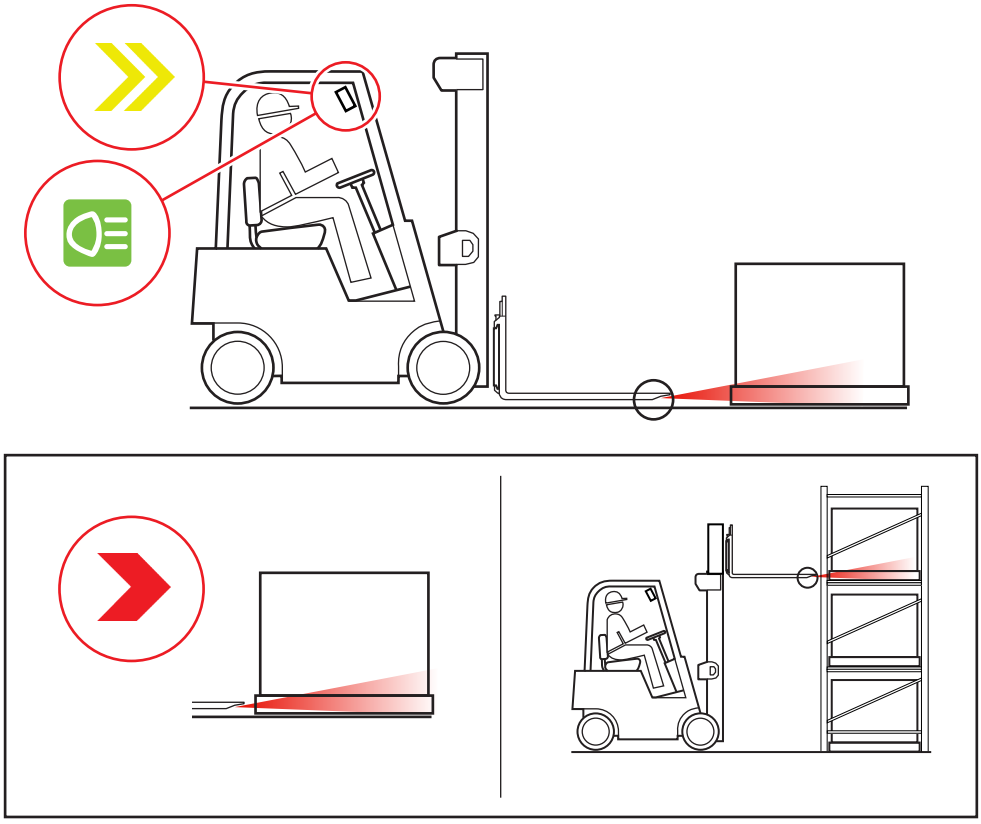
5 *Use the light and camera to aid with positioning the forks with the load.*

If equipped with Forward Distance sensor, note that the Forward Distance icon changes as the forks progress closer to the load.



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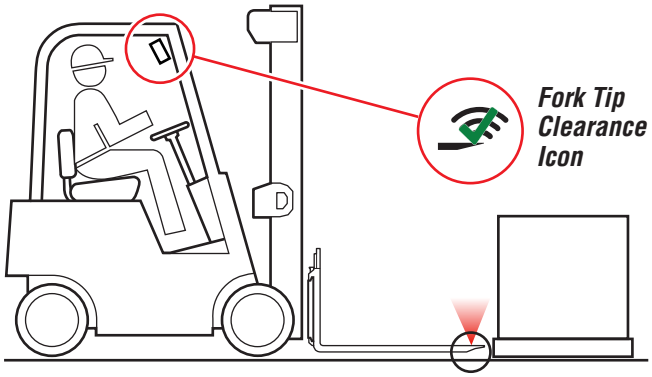
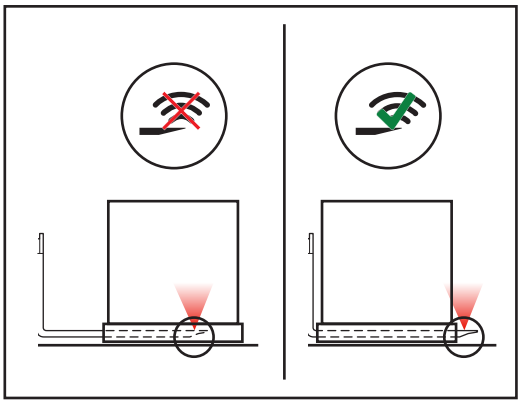
Basic Operation (continued)

6 *As the forks pass through the pallet (or under load), continue to use the camera and light.*

NOTE: While forks move through the pallet (or under the load), the Forward Distance sensor (if equipped) will be unreliable. Once the fork tips are beyond the pallet (or load), the sensor will detect the object (wall, pallet, etc.).



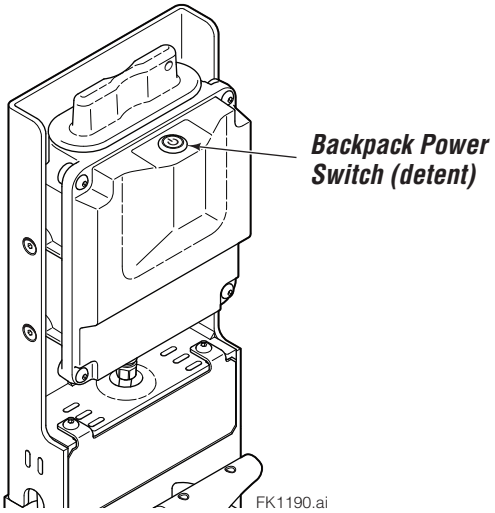
If equipped with Fork Tip Clearance sensor, the sensor's icon will show an "X" on the arcs.

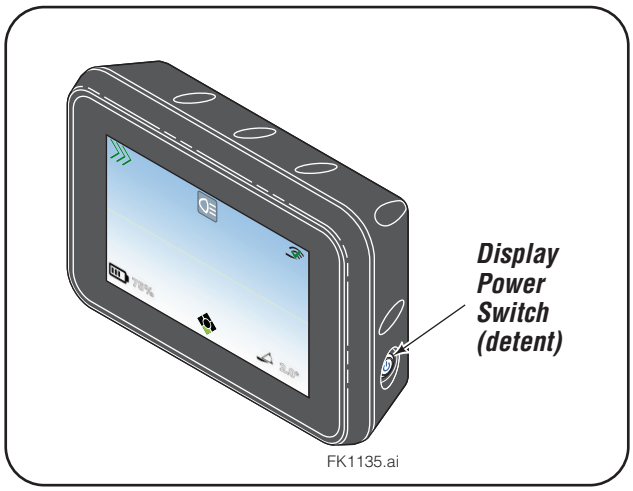


Once the fork tips are beyond the pallet (or load), the screen will show a check mark on the Fork Tip Clearance icon.

7 *Once the load is on the forks, operate the truck and attachment per operator guides.*

Turn Power 'Off'





WARNING: The safe operation and maintenance of industrial trucks is regulated by Occupational Safety and Health (OSHA) regulations 1910.178 and American National Standards Institute (ANSI) Safety Standard for Powered Industrial Trucks, ANSI B56.1. When operating and maintaining industrial trucks equipped with attachments you should pay particular attention to the following sections of these regulations. You should be familiar with all sections of these regulations. **Ask your employer for the complete regulations.**

(a) **General Requirement**

(4) Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturers prior written approval. Capacity, operation and maintenance instruction plates, tags or decals shall be changed accordingly.

(5) If the truck is equipped with front-end attachments other than factory installed attachments, the user shall request that the truck be marked to identify the attachments and show the appropriate weight of the truck and attachment combination at maximum elevation with load laterally centered.

(6) The user shall see that all nameplates and markings are in place and maintained in a legible condition.

(e) **Safety Guards**

(2) If the type of load presents a hazard, the user shall equip fork trucks with a vertical load backrest extension in accordance with (a)(2) following.

(a)(2) All new powered industrial trucks acquired and used by an employer after February 15, 1972 shall meet the design and construction requirements for powered industrial trucks established in the "American National Standard for Powered Industrial Trucks, Part II, ANSI B56.1", except for vehicles intended primarily for earth moving or over-the-road hauling.

(l) **Operator Training**

Only trained and authorized operators shall be permitted to operate a powered industrial truck. Methods shall be devised to train operators in the safe operation of powered industrial trucks.

(m) **Truck Operations**

(1) Trucks shall not be driven up to anyone standing in front of a bench or other fixed object.

(2) No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty.

(3) Unauthorized personnel shall not be permitted to ride on powered industrial trucks. A safe place to ride shall be provided where riding of trucks is authorized.

(4) The employer shall prohibit arms or legs from being placed between the uprights of the mast or outside the running lines of the truck.

(5i) When a powered industrial truck is left unattended, load engaging means shall be fully lowered, controls shall be neutralized, power shall be shut off and brakes set. Wheels shall be blocked if the truck is parked on an incline.

(5ii) A powered industrial truck is unattended when the operator is 25 feet or more away from the vehicle which remains in his view, or whenever the operator leaves the vehicle and it is not in his view.

(5iii) When the operator of an industrial truck is dismounted and within 25 feet of the truck still in his view, the load engaging means shall be fully lowered, controls neutralized and the brakes set to prevent movement.

(6) A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock or platform or freight car. Trucks shall not be used for opening or closing freight doors.

(10) A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward.

(n) **Traveling**

(4) The driver shall be required to slow down and sound the horn at cross isles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall be required to travel with the load trailing.

(7i) When ascending or descending grades in excess of 10 percent, loaded trucks shall be driven with the load upgrade.

(7iii) On all grades the load and load engaging means shall be tilted back if applicable, and raised only as far as necessary to clear the road surface.

(o) **Loading**

(1) Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.

(2) Only loads within the rated capacity of the truck shall be handled.

(3) The long or high (including multiple-tiered) loads which may affect capacity shall be adjusted.

(4) Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load.

(5) A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load.

(6) Extreme care shall be used when tilting the load forward or backward, particularly when high tiering. Tilting forward with load engaging means elevated shall be prohibited except to pick up a load. An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack. When stacking or tiering, only enough backward tilt to stabilize the load shall be used.

(p) **Operation of the Truck**

(1) If at any time a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the truck shall be taken out of service until it has been restored to safe operating condition.

(q) **Maintenance of Industrial Trucks**

(1) Any power-operated industrial truck not in safe operating condition shall be removed from service. All repairs shall be made by authorized personnel.

(5) All parts of any such industrial truck requiring replacement shall be replaced only by parts equivalent as to safety with those used in the original design.

(6) Industrial trucks shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer, nor shall they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts. Additional counter-weighting of fork trucks shall not be done unless approved by the truck manufacturer.

(7) Industrial trucks shall be examined before being placed in service and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Such examinations shall be made at least daily. When industrial trucks are used on a round-the-clock basis, they shall be examined after each shift. Defects when found shall be immediately reported and corrected.

Standard Sensor Forks

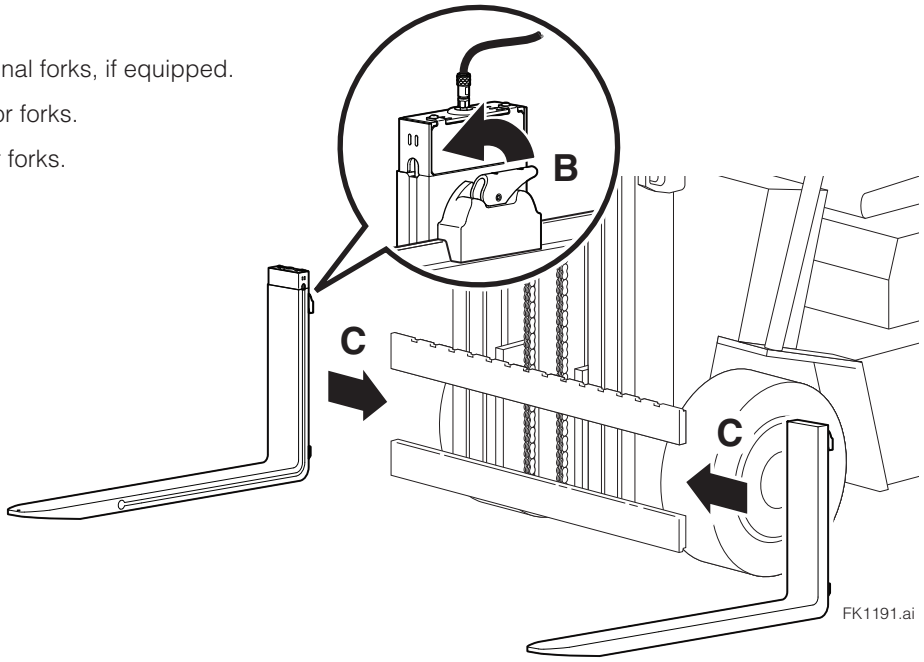
1 **Remove backrest, if required**

2 **Install forks**

A Remove original forks, if equipped.

B Unlock sensor forks.

C Install sensor forks.



3 **Install backrest**

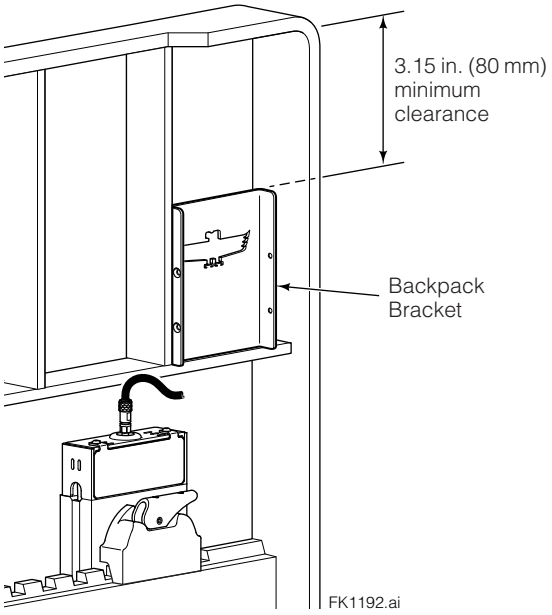
For reassembly, tighten Cascade backrests to 145 ft.-lbs. (195 Nm). For other backrests, refer to OEM recommendations.

4 **Install backpack bracket**

Find a suitable location on the attachment's backrest to install the backpack bracket with the following guidelines:

- The bracket should be clear of load and mast interference.
- Allow for easy access to install the backpack mounting screws, battery and cable connections.
- Allow 3.15 in. (80 mm) minimum clearance above the bracket.

Tack weld the bracket as necessary.



Standard Sensor Forks (continued)

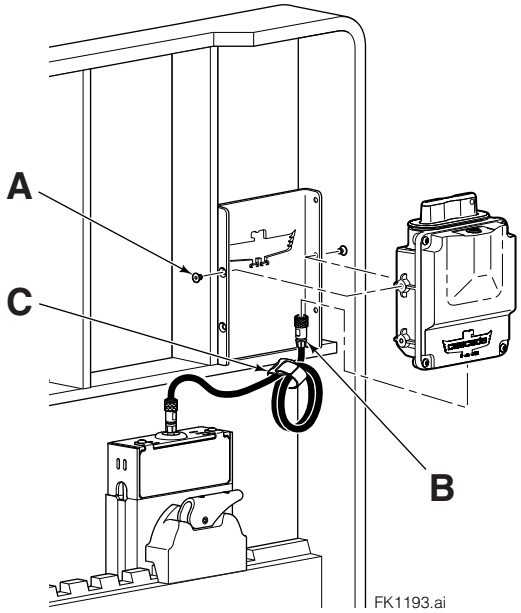
5 Install backpack

A Install backpack and tighten capscrew to 30 in.-lbs. (3 Nm).

B Connect cable to backpack.

C Coil cable and wrap in reusable Velcro tie. Verify the cable is clear of moving parts.

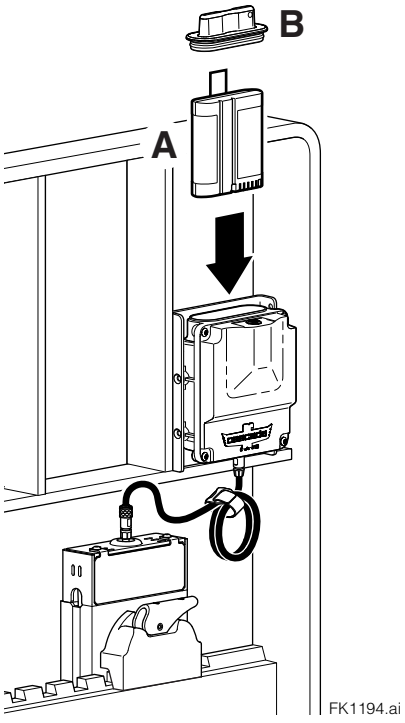
NOTE: If needed, extension cables are available.



6 Install battery into backpack

A Use the battery tab to position the battery in the Backpack.

B Secure Battery Backpack cap with wire provided and install into backpack.



7 Display Installation

For mounting and connecting the display, refer to Display Installation, page 17.

NOTE: For Sensor Forks with Remote Backpack Installation, refer to page 10. For Hard Wired Sensor Forks Installation, refer to page 13.

Sensor Forks with Fork Mounted Backpack

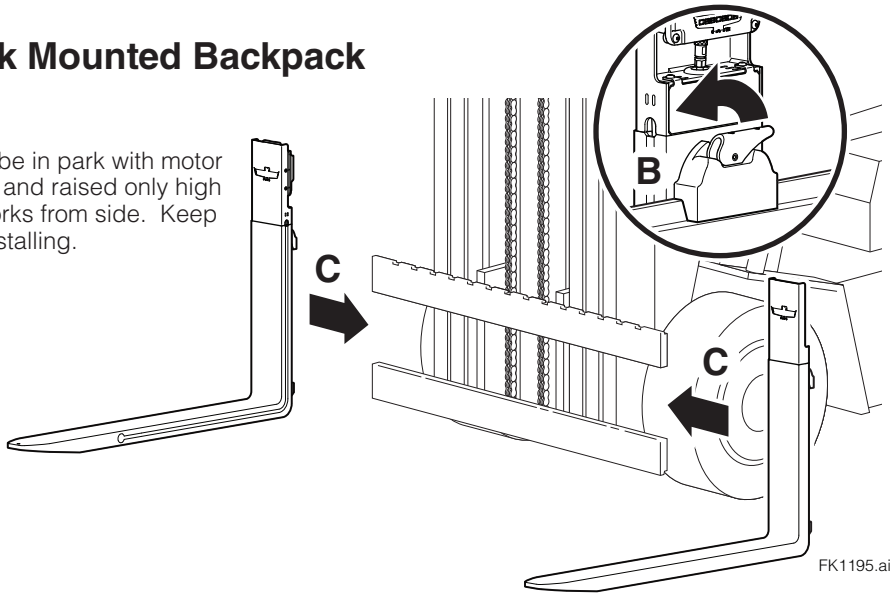
1 Install forks

IMPORTANT: Truck must be in park with motor off. Mast must be vertical and raised only high enough to install sensor forks from side. Keep feet clear of forks when installing.

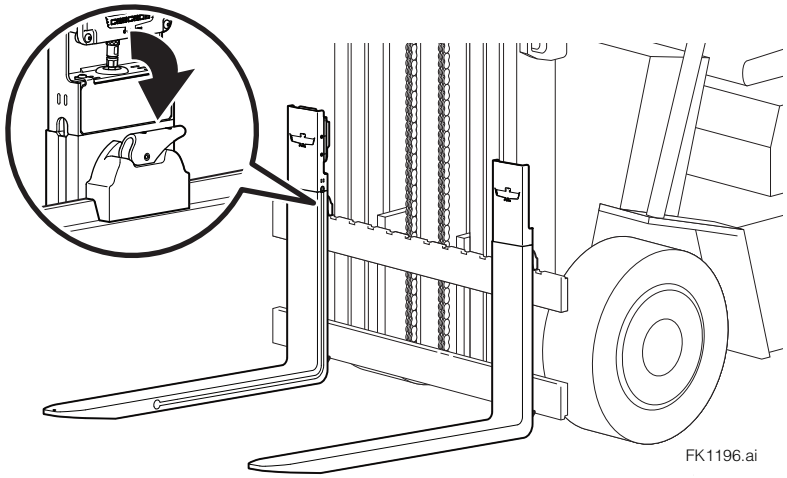
A Remove original forks.

B Unlock sensor forks.

C Install sensor forks.



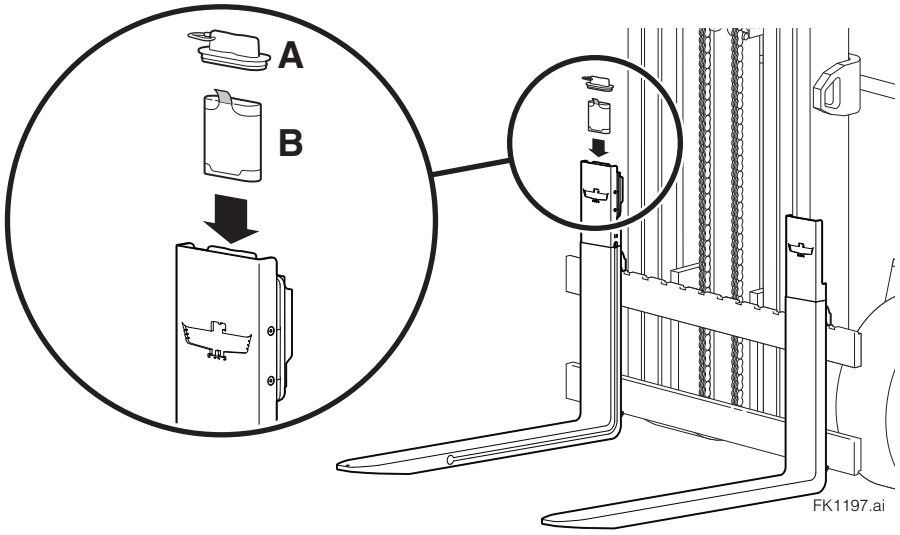
2 Lock forks



3 Install battery into fork backpack

A Remove Battery Backpack cap.

B Use the battery tab to position the battery in the Backpack.



Hard Wired Sensor Forks

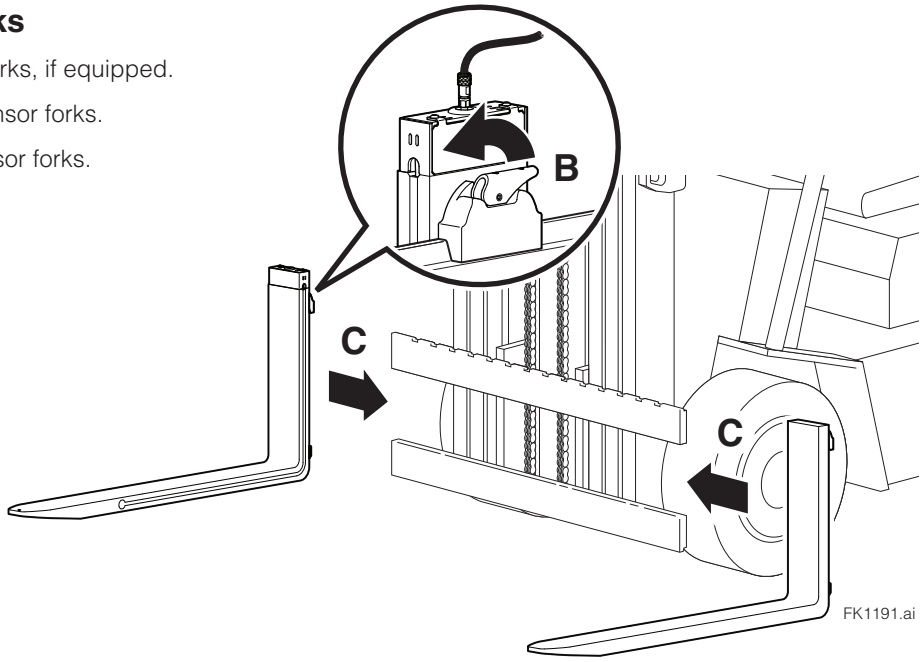
1 **Remove backrest, if required**

2 **Install forks**

A Remove forks, if equipped.

B Unlock sensor forks.

C Install sensor forks.



3 **Install backrest**

Tighten Cascade backrests to 145 ft.-lbs. (195 Nm). For other backrests, refer to OEM recommendations.

4 **Install Internal Reeving Kit, Ethernet Cable Reel or Communications Kit (not included)**

Internal Reeving Kits

Follow the instructions provided by OEM. Use CAT6 Ethernet cable with Weipu connectors.

NOTE: Additional jumpers or extensions cables are available for any installation style.

Extension Cables

Length	Part No.
9.84 in. (250 mm)	6976771
19.70 in. (500 mm)	6949183
39.37 in. (1000 mm)	6975092
70.87 in. (1800 mm)	6975093
98.42 in. (2500 mm)	6971929

Hard Wired Sensor Forks (continued)

4 Install Internal Reeving Kit, Ethernet Cable Reel or Communications Kit (not included) (continued)

Ethernet Cable Reel Installation (Part no. 6945857)

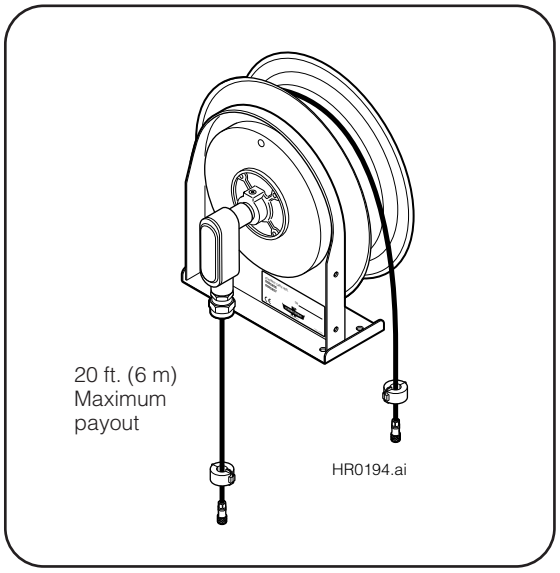
A Install the cable reel (including prewind), junction block and secure the cable to the junction block as described in Ethernet Cable Reel User Manual, part no. 6946057.

IMPORTANT: If required, allow additional cable length for fork positioning and sideshifting movement.

B Install the display. Refer to page 17.

C Connect the cable ends as shown.

NOTE: If needed, extension cables are available. Refer to table below.



Extension Cables

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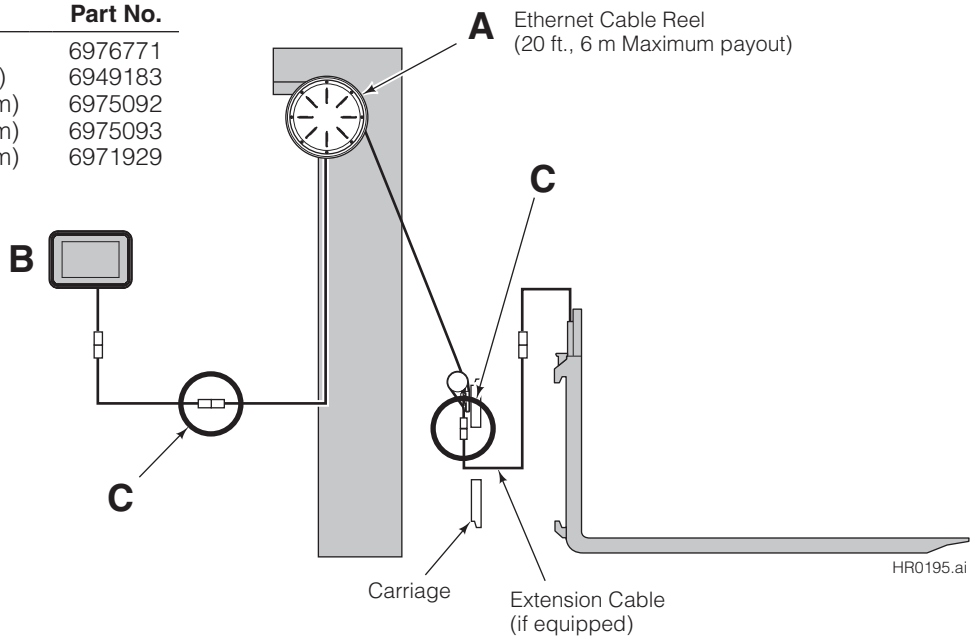
70.87 in. (1800 mm)	6975093
98.42 in. (2500 mm)	6971929



D Inspect cables for extreme flexing or straining. Relieve tension to extend cable life.

Hard Wired Sensor Forks (continued)

4 Install Internal Reeving Kit, Ethernet Cable Reel or Communications Kit (not included) (continued)

Communication Kit Installation

A Verify the communication kit is designed for Sensor kit 6976368, 6976369, 6976370, 6976371 or 6976372.

B Install communication kit on the same side of the Sensor Fork. For complete installation procedure, refer to installation instructions 6844330, included with the communication kit.

C Install the display. Refer to page 17.

D Connect the cable ends as shown.

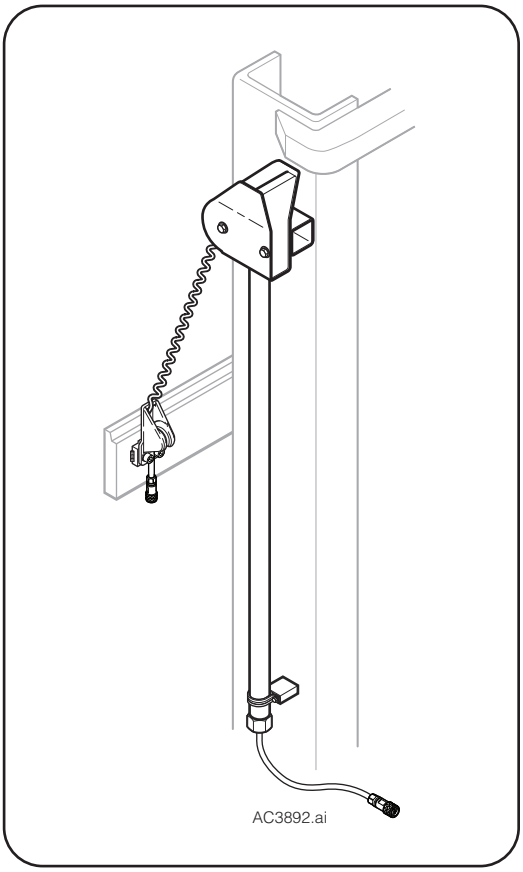
IMPORTANT: Supplied ferrites should be located as close to the top of the fork and display.

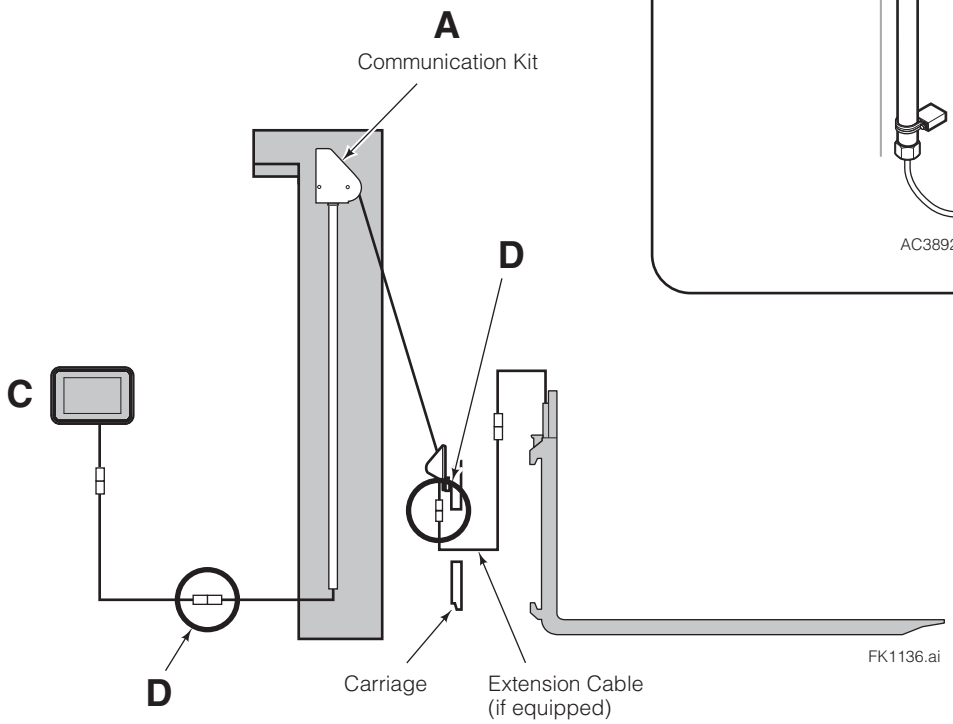
Extension Cables

Length	Part No.
9.84 in. (250 mm)	6976771
19.70 in. (500 mm)	6949183
39.37 in. (1000 mm)	6975092
70.87 in. (1800 mm)	6975093
98.42 in. (2500 mm)	6971929

E Inspect cables for extreme flexing or straining. Relieve tension to extend cable life.

Communication Kit Part No.	Overall Lowered (in.)	Maximum Mast Fork Height (in.)
6976368	77	166
6976369	78 - 83	189
6976370	84 - 93	218
6976371	94 - 101	240
6976372	102 - 120	320





Hard Wired Sensor Forks (continued)

5 Verify Camera Settings

A From the main screen, tap anywhere along the top of the screen to access the drop-down Settings Bar.

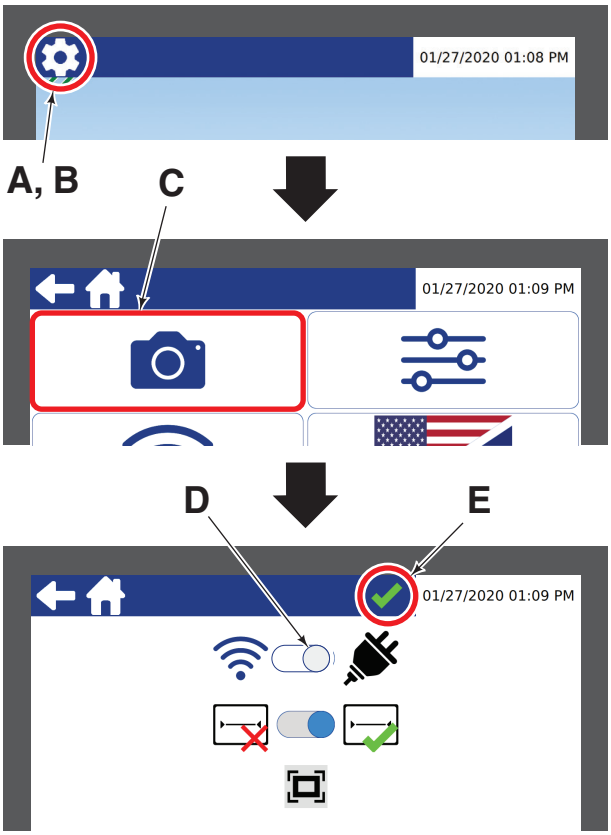
B Tap on the cog icon to access User Settings.

C Tap on the camera icon.

D Verify that the WiFi/Wired Toggle is set to the plug icon for hard wired applications and WiFi icon for the fork mounted backpack applications.

E Tap on the check mark to accept and save the settings.

Note: For Auxiliary Camera (if equipped) Settings refer to User Settings Section, "Change Camera Settings", on page 24.



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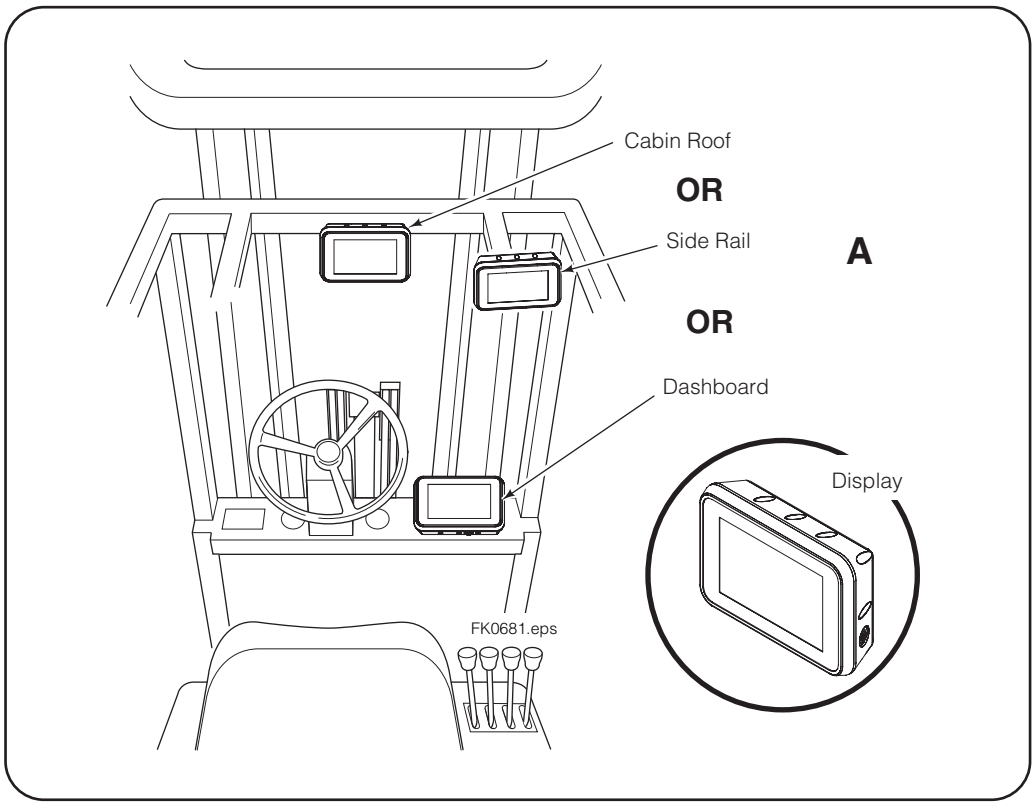
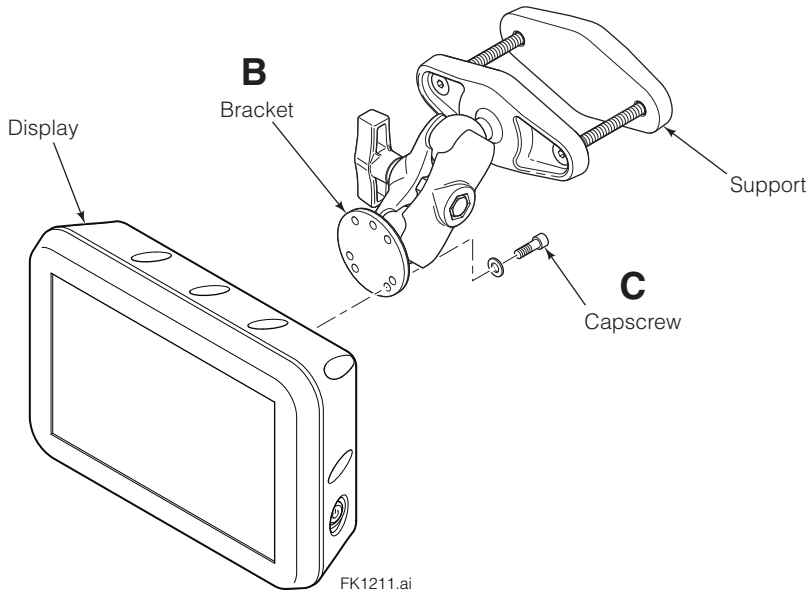
1 Locate and mount the display

A Find a suitable location for readout and easy access to display.

B Install bracket to the support.

C Install the display to the bracket/support assembly.





2 Connect display to truck power

Disconnect the cable from the negative battery terminal or as directed by OEM truck manual.

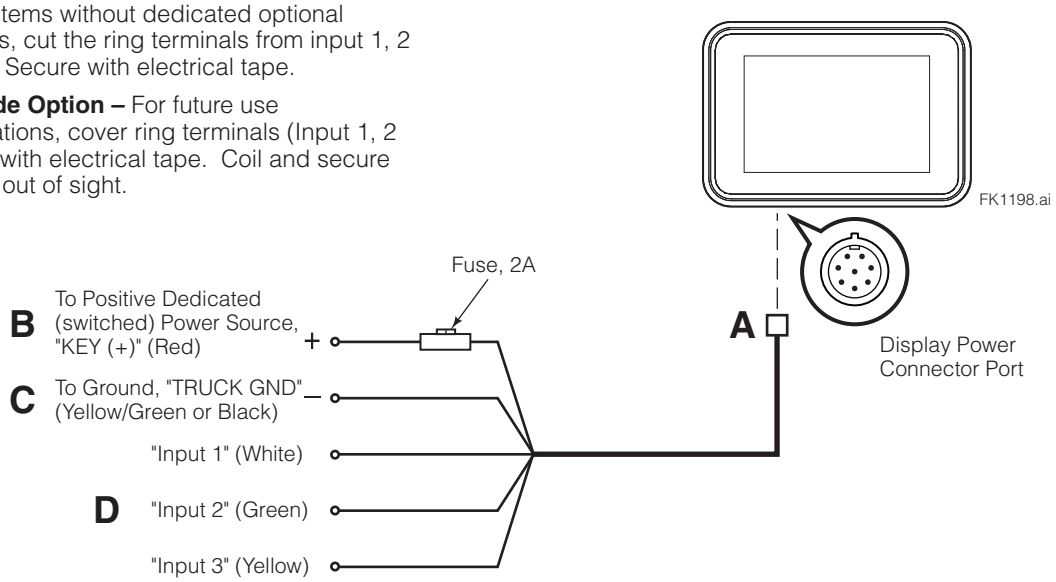
A Connect the power cable to the display.

B Connect the power cable terminal, labeled “Key (+)", to a positive power source.

C Connect the power cable terminal, labeled "Truck Gnd", to ground.

D For systems without dedicated optional features, cut the ring terminals from input 1, 2 and 3. Secure with electrical tape.

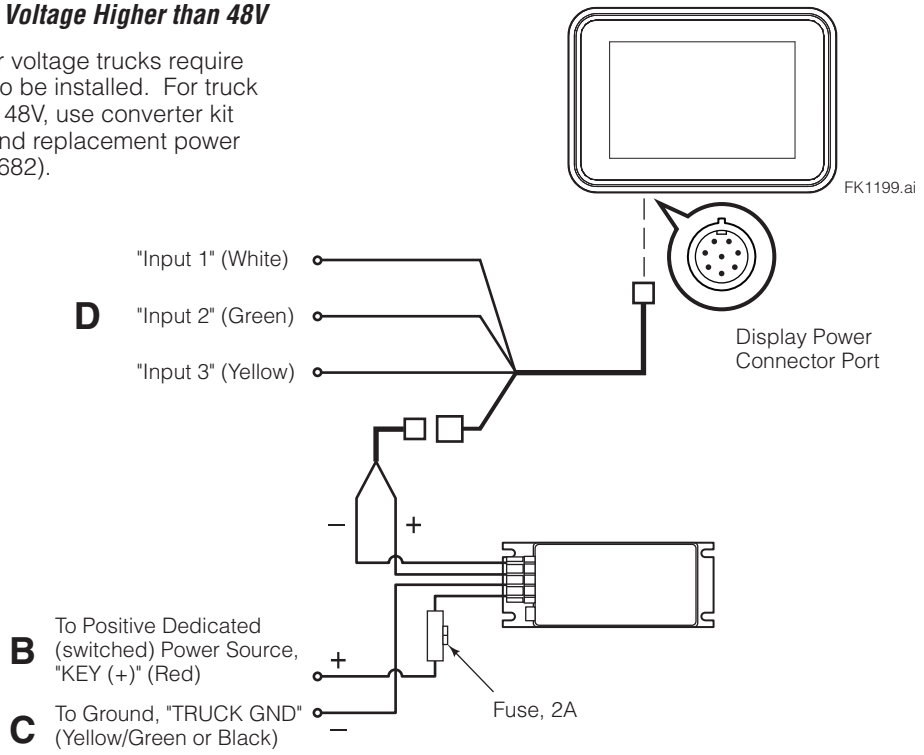
Upgrade Option – For future use applications, cover ring terminals (Input 1, 2 and 3) with electrical tape. Coil and secure cables out of sight.



NOTE: For dedicated optional features "Auxiliary Camera Installation Section", step 3 and User Setting Section "Change General Settings".

Truck Equipped with Voltage Higher than 48V

IMPORTANT: Higher voltage trucks require a voltage converter to be installed. For truck voltages higher than 48V, use converter kit (part no. 6882798) and replacement power cable (part no. 9015682).



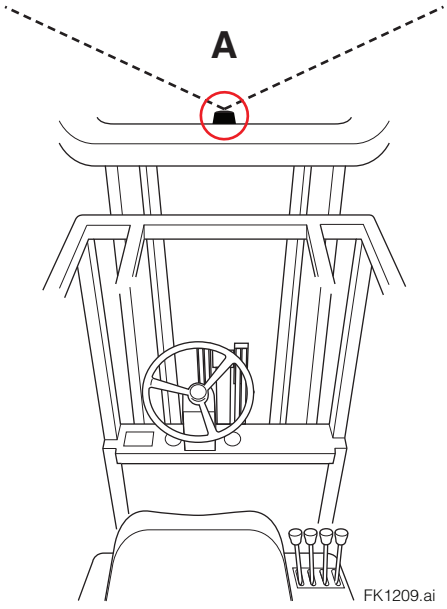
Auxiliary Camera Installation (if equipped)

1 Locate and mount auxiliary camera

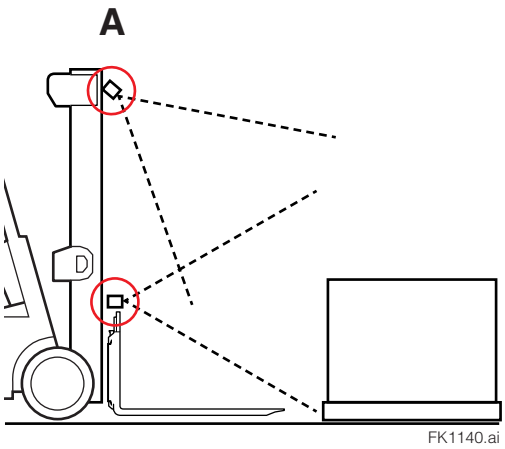
IMPORTANT: Not intended to be used for navigation or safety purposes. See all **WARNINGS** on page 2.

A Determine a suitable location for auxiliary camera.

NOTE: Choose a location with 130° field of vision.



Horizontal Field of Vision
(Drivers View)



Vertical Field of Vision
(Side View)

B **Carriage Mounting –** Install kit mounting bracket. Use the bracket to tack weld or drill holes to secure the bracket using hardware.

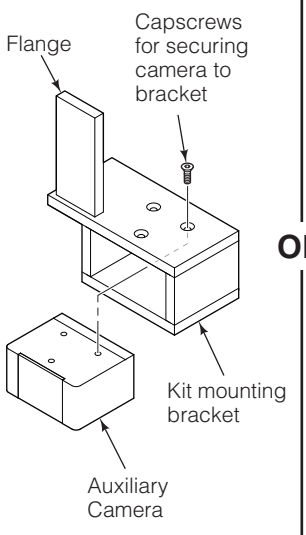
RAM® Mounting – Install mounting assembly to a suitable location, such as a tube.

C **Carriage Mounting –** Install the auxiliary camera to bracket using the hardware provided.

RAM® Mounting – Secure the camera to the ball mount using the hardware provided.

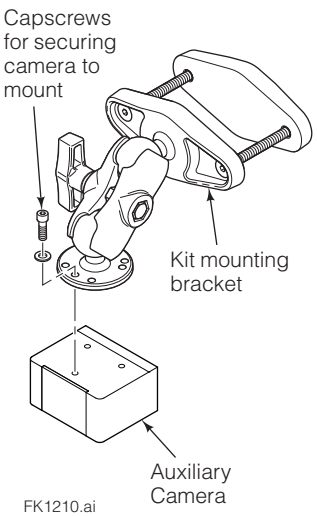
B,C Mounting Options

Carriage Mounting



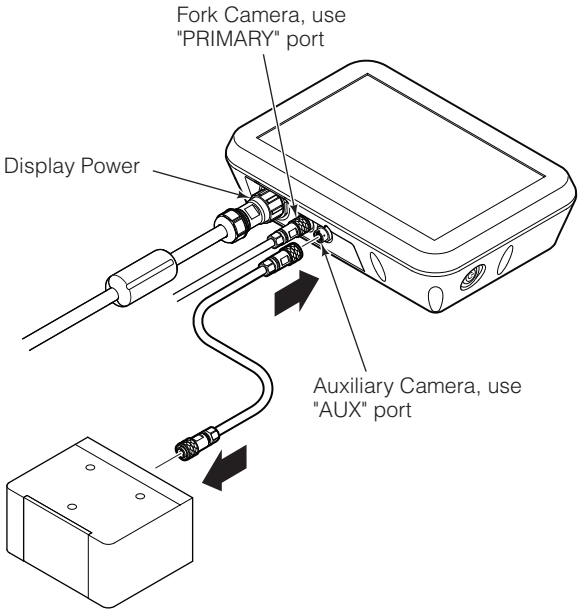
OR

RAM® Mounting



2 Connect cable to auxiliary camera and route to display

NOTE: Secure cable using Velcro cable ties.

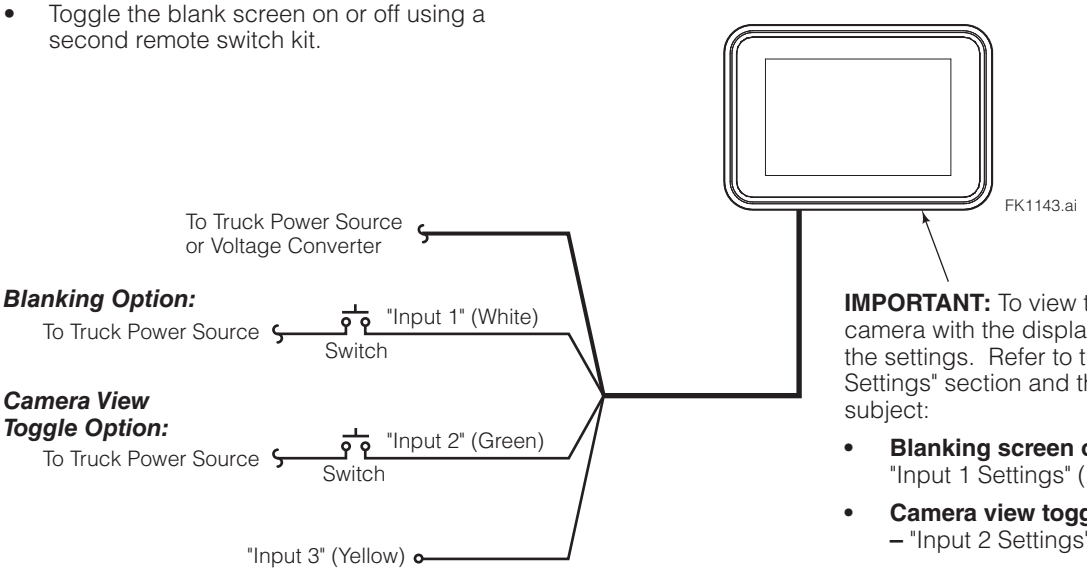


3 Install user-supplied switch to power cable

NOTE: The switch mechanism is customer supplied, provided separately by the truck OEM/ dealer or by agreement with Cascade.

The camera can be configured as follows:

- Toggle between primary and auxiliary camera with a remote switch kit.
- Using the display to toggle between views.
- Toggle the blank screen on or off using a second remote switch kit.



IMPORTANT: To view the auxiliary camera with the display, update the settings. Refer to the "User Settings" section and the following subject:

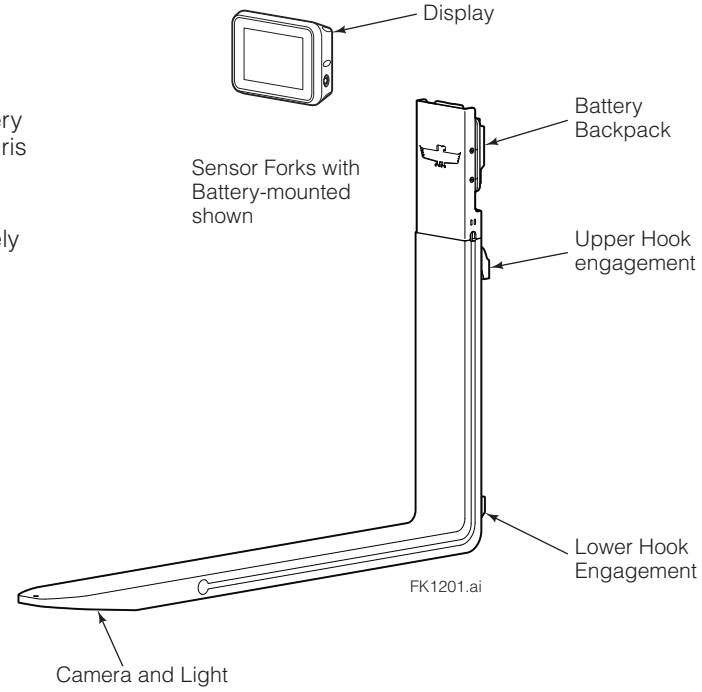
- **Blanking screen option –** "Input 1 Settings" (page 26)
- **Camera view toggle option –** "Input 2 Settings" (page 27)

Daily Inspection

IMPORTANT: Truck must be in park with motor off. Keep feet clear of forks when inspecting.

Prior to each shift of truck operation, complete the following procedures:

- Verify the system is working correctly.
- Check the lens covering the camera and light. As necessary, clean the lens with alcohol free lens wipe and remove any debris near the camera.
- When the battery pack is changed, inspect the battery backpack for damage and debris. Remove any debris found. Verify capscrews are tight.
- For applications with moving forks or sideshift equipped attachments, check that wiring moves freely and undamaged.
- **Fork Mounted Backpack –** Battery should be fully charged and battery cover secured.
- **Backrest Mounted/Remote Backpack –** Check mounting capscrews and enclosure capscrews are secure.



2000-Hour Maintenance

After 2000 hours of truck operation, forks in use shall be inspected at intervals of not more than 12 months (for single shift operations) or whenever any defect or permanent deformation is detected. Severe applications will require more frequent inspection.

Inspect fork hooks and carriage bar clearance

NOTE: Use Go/No-Go Wear Gauge Part No. 209560 (Class II) or 209561 (Class III).

A Inspect the fork lower hooks and carriage bar. If the gauge fits between the carriage bar and lower hook, repair or replacement is needed.

B Inspect the upper carriage bar. If the gauge arrow touches the carriage bar, repair or replacement is needed.

C Inspect the fork upper hooks. If the gauge arrow touches the hook, repair or replacement is needed.

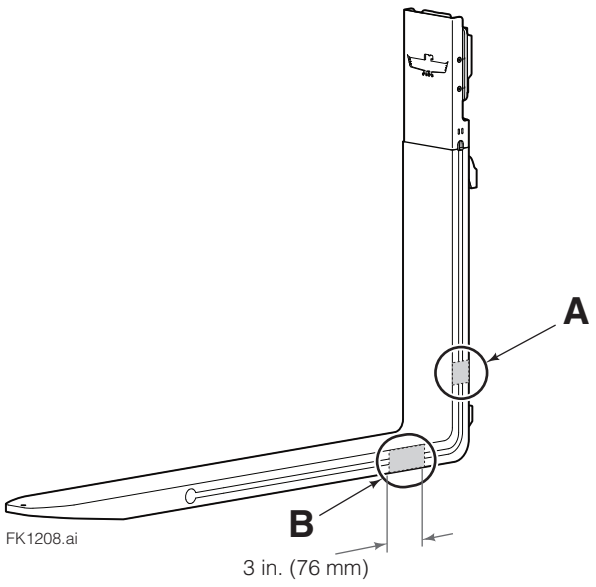
Inspect forks

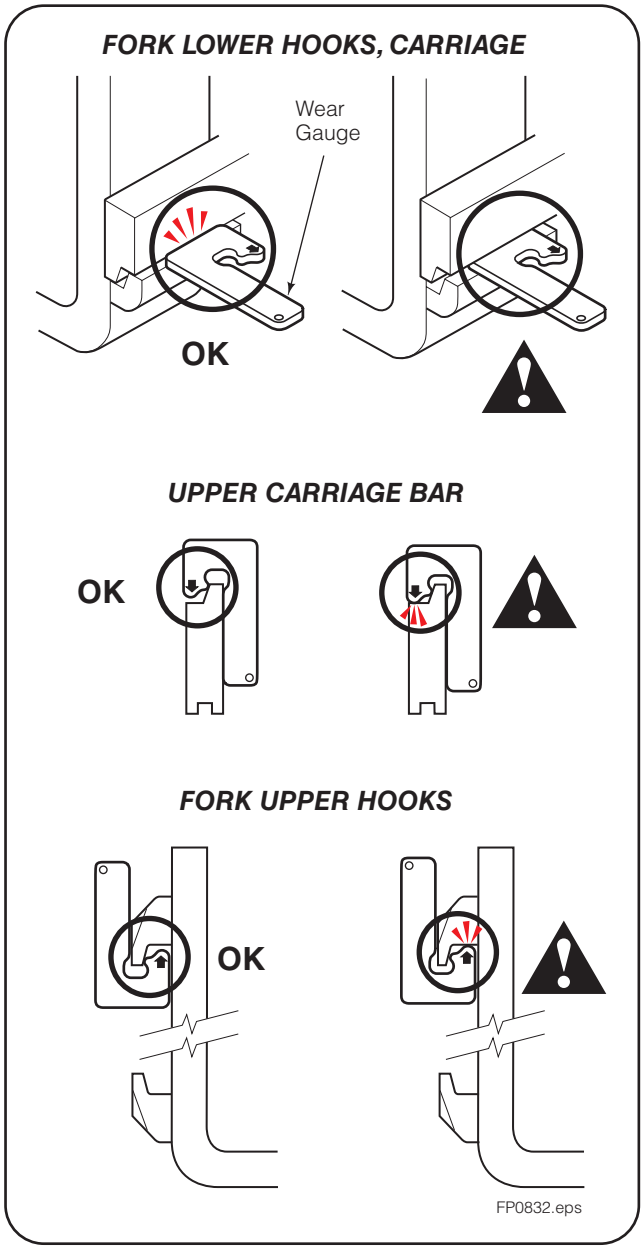
NOTE: Use fork calipers on forks up to and including 4 in. (100 mm) thick. Fork calipers indicate a 10% wear factor if the calipers can pass over the blade cross-section.

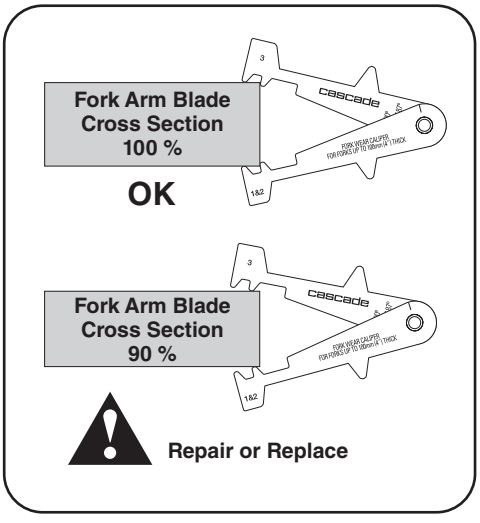
A Measure the fork shank thickness with the caliper outer teeth approximately 2 in. (50 mm) above top of blade.

B Position the caliper inner teeth on the fork arm blade approximately 3 in. (76 mm) out from the face of the shank.

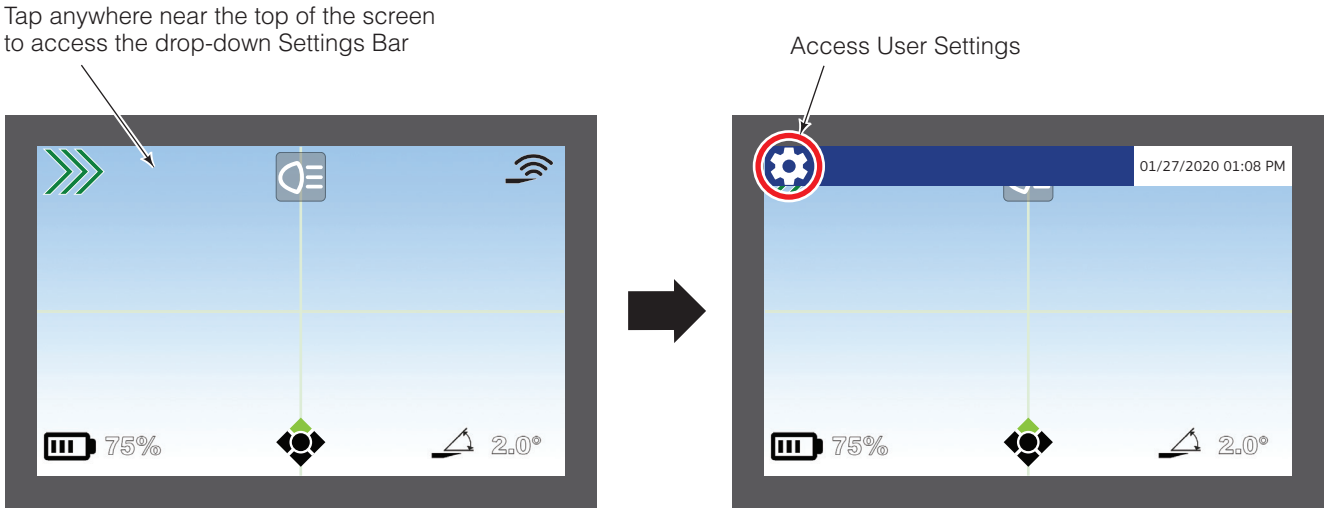
- If the inside teeth of the caliper hit the fork, it has less than 10% wear and requires no replacement.
- If the inside teeth of the caliper pass over the fork freely, the fork must be taken out of service. The fork has 10% wear and 20% reduction in capacity.



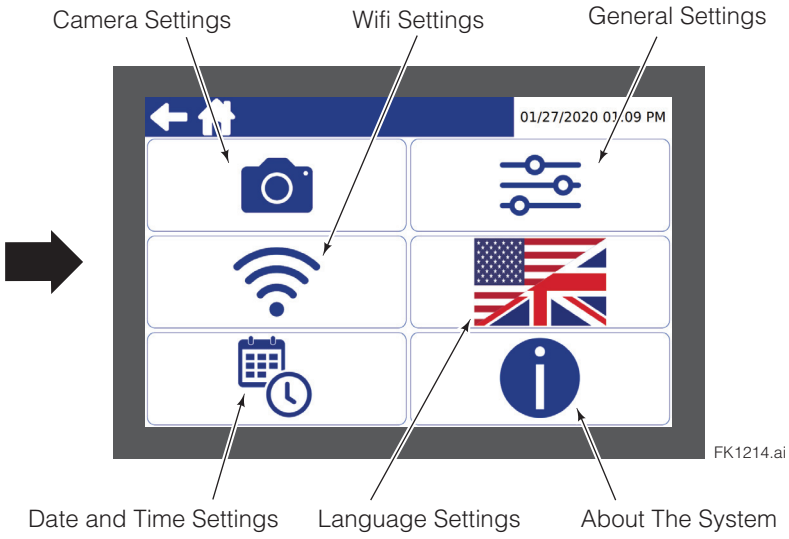




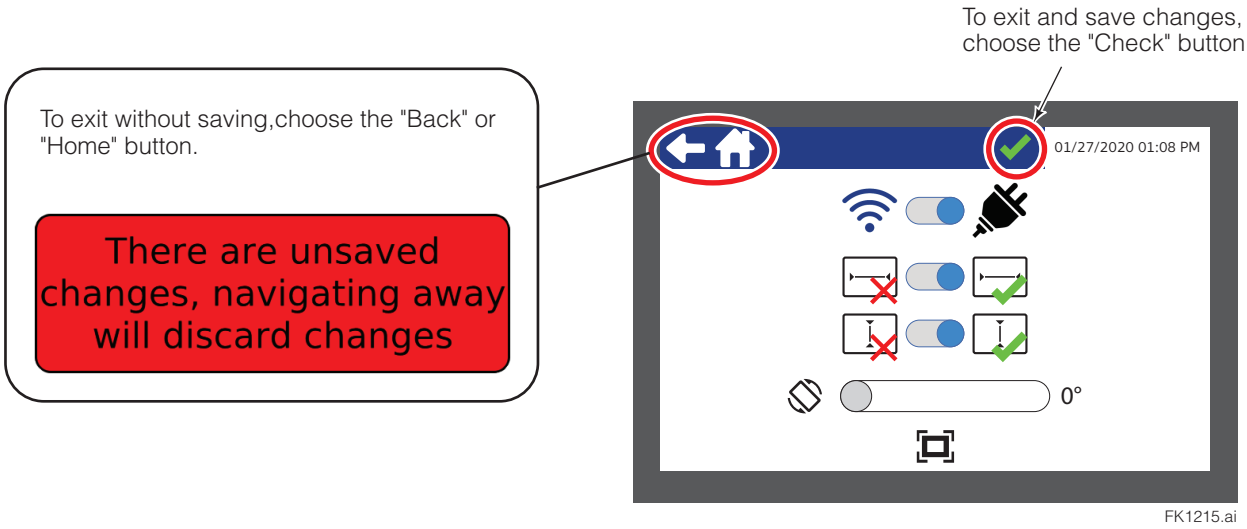
Access User Settings



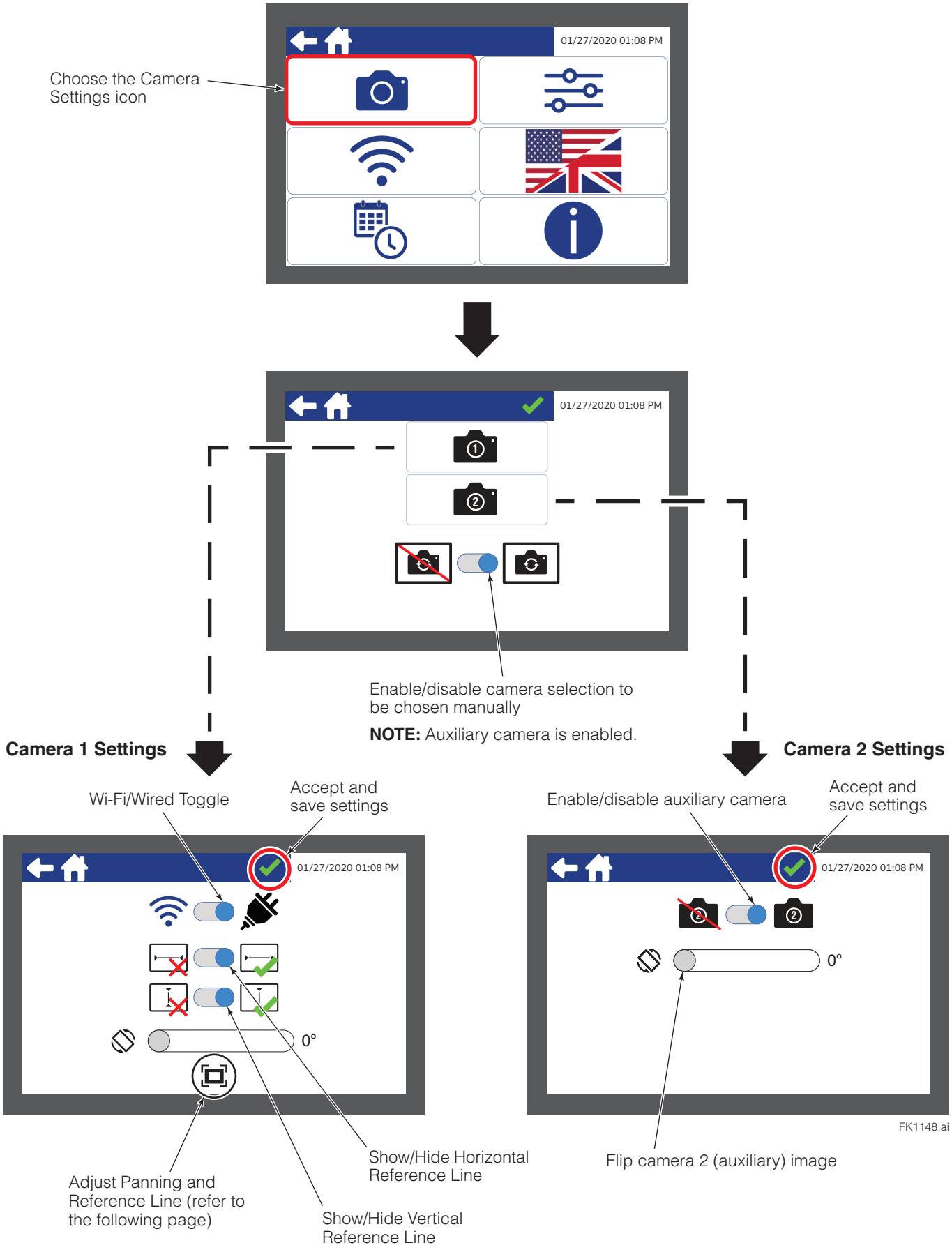
Choose a setting:



Exit User Settings

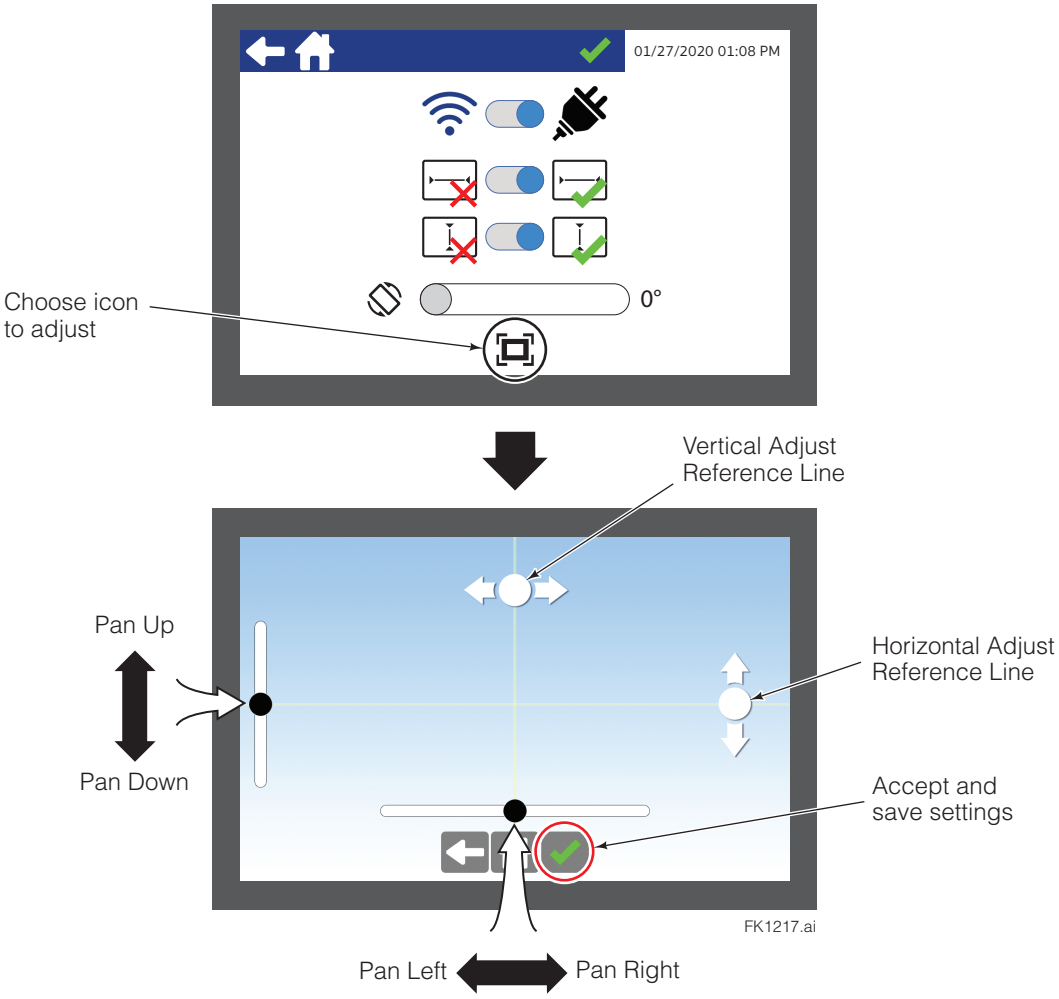


Change Camera Settings

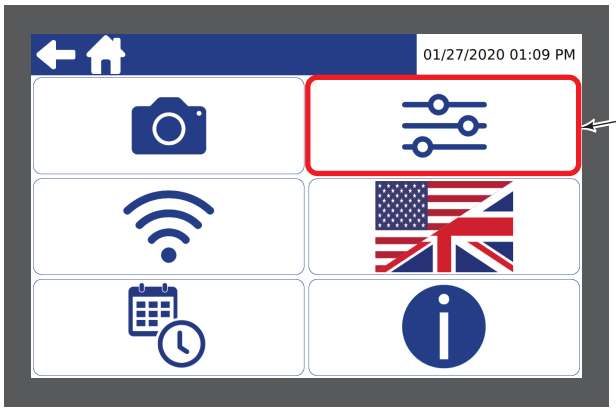


Change Camera Settings

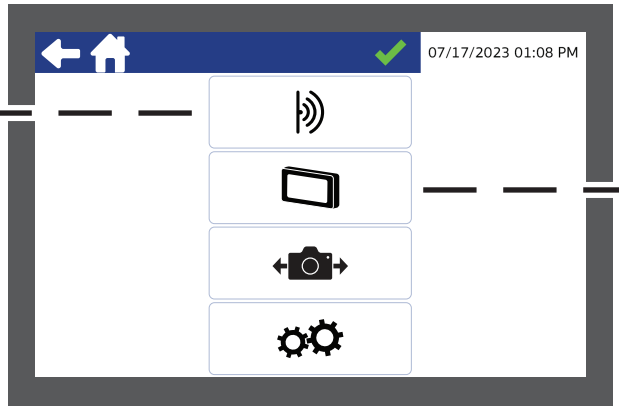
Adjust panning and reference line:



Change General Settings



Choose the General Settings icon.

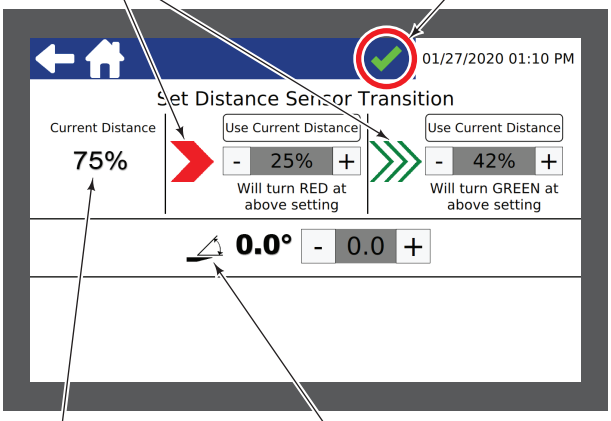


Fork Sensor Settings

Input 1 Settings (Blanking option)

Set transition points (red and green) that the object has passed a predetermined percentage to or from the fork.

Accept and save settings

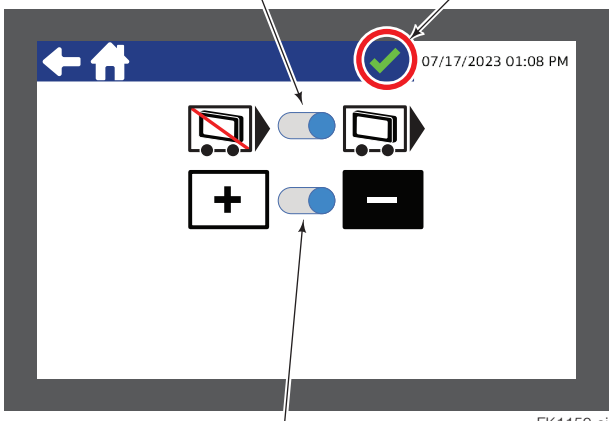


Distance from sensor to object (maximum 6.5 feet, 2 m)

Zero Level Sensor

Enable/Disable manual blanking. Operator touches anywhere on the screen.

Accept and save settings



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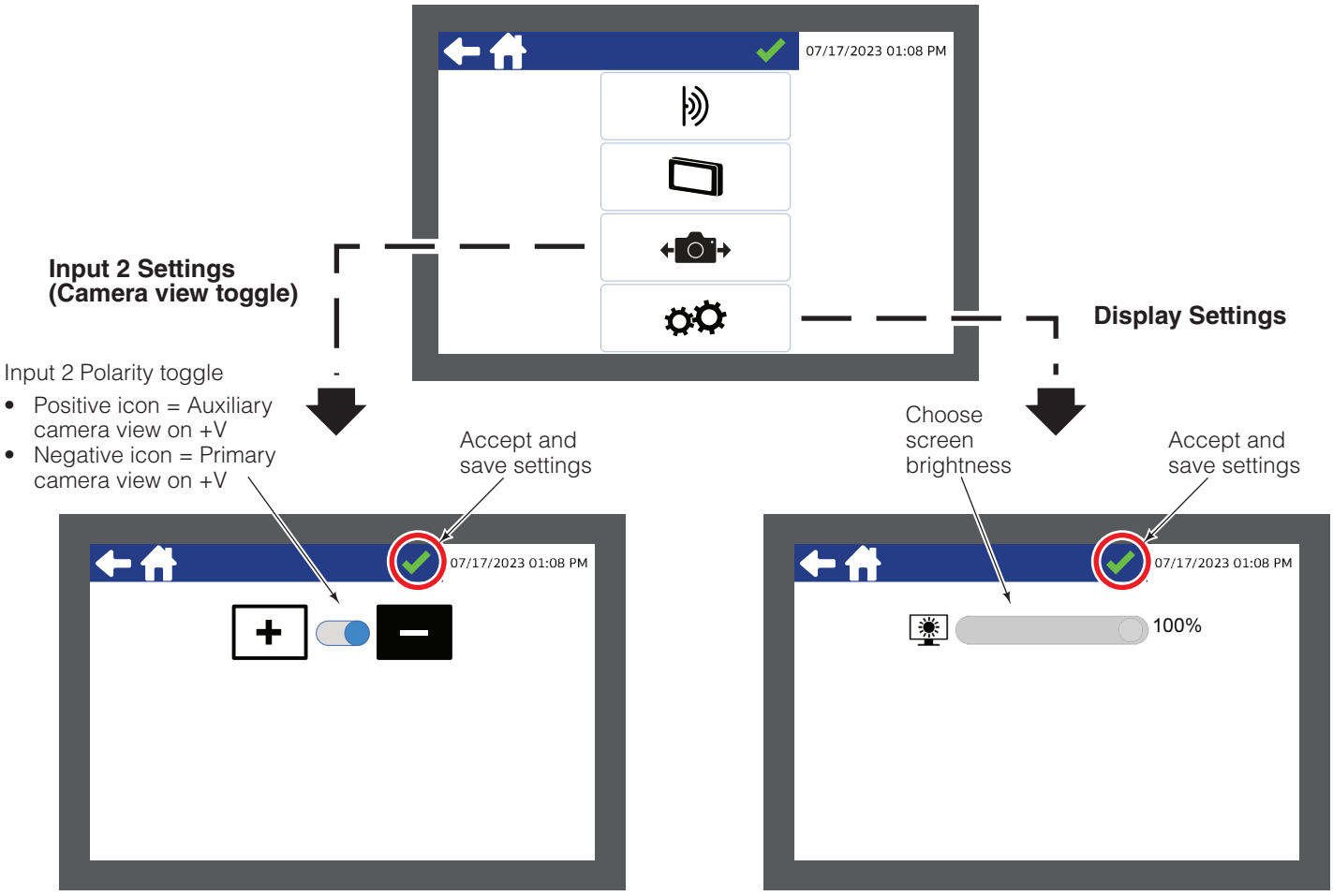
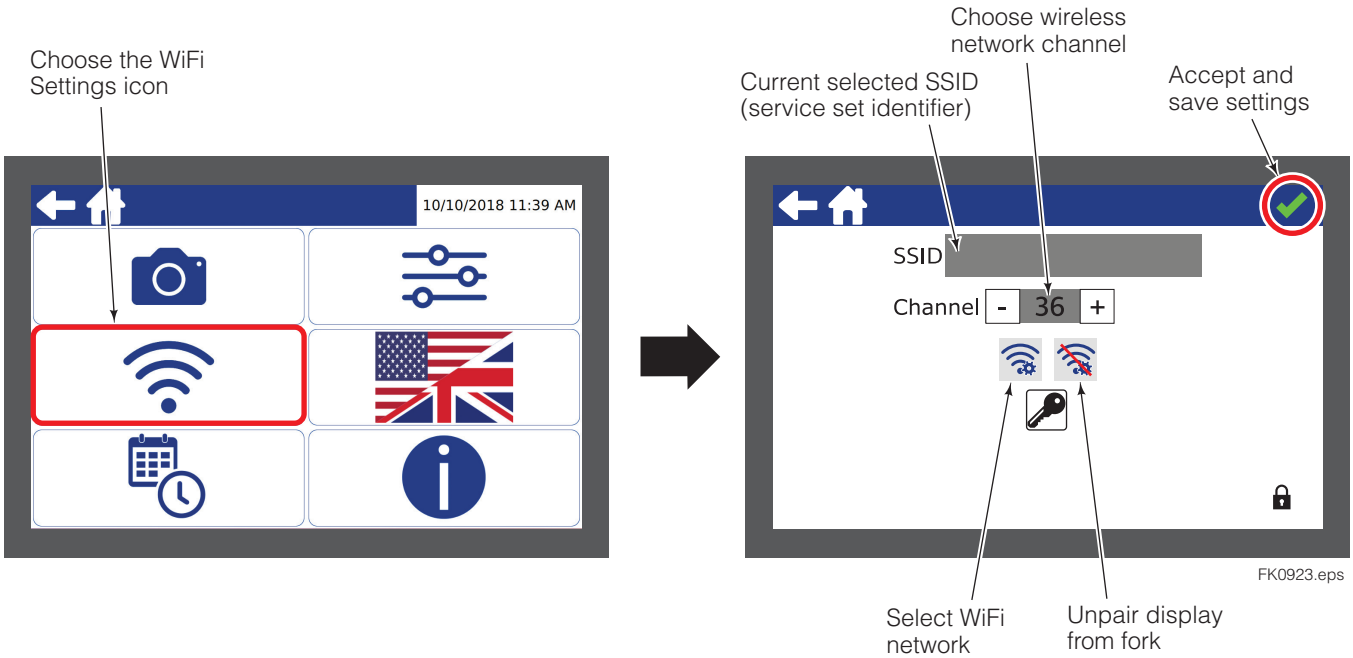
Input 1 Polarity toggle

- Positive icon = Blank screen on +V
- Negative icon = Illuminate screen on +V

Change General Settings



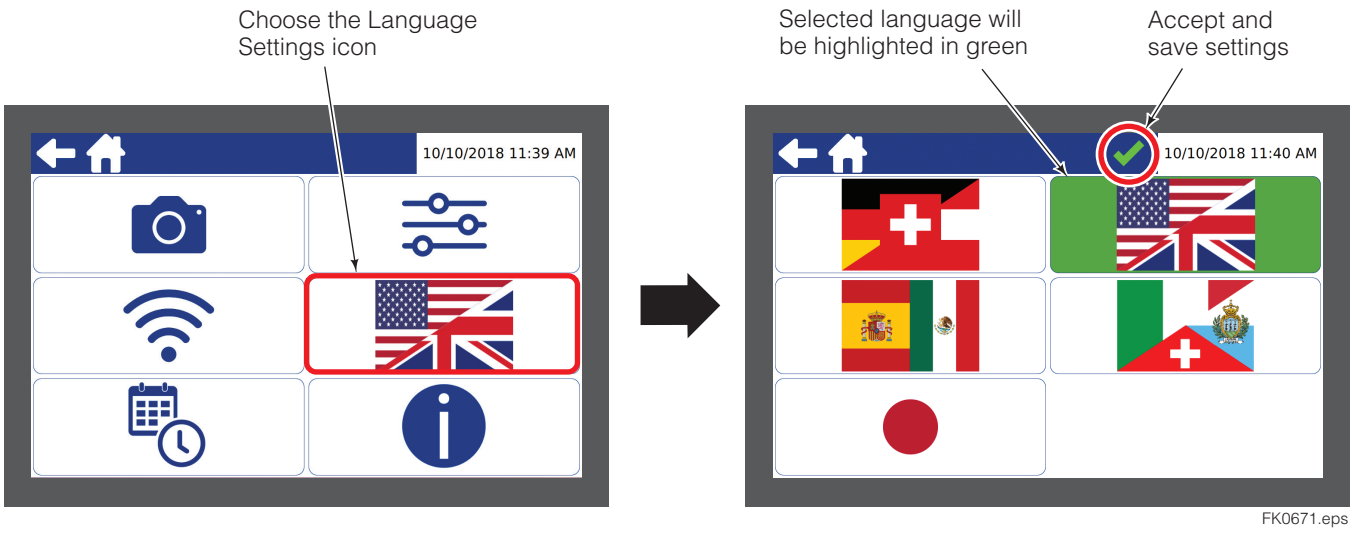
Change WiFi Settings



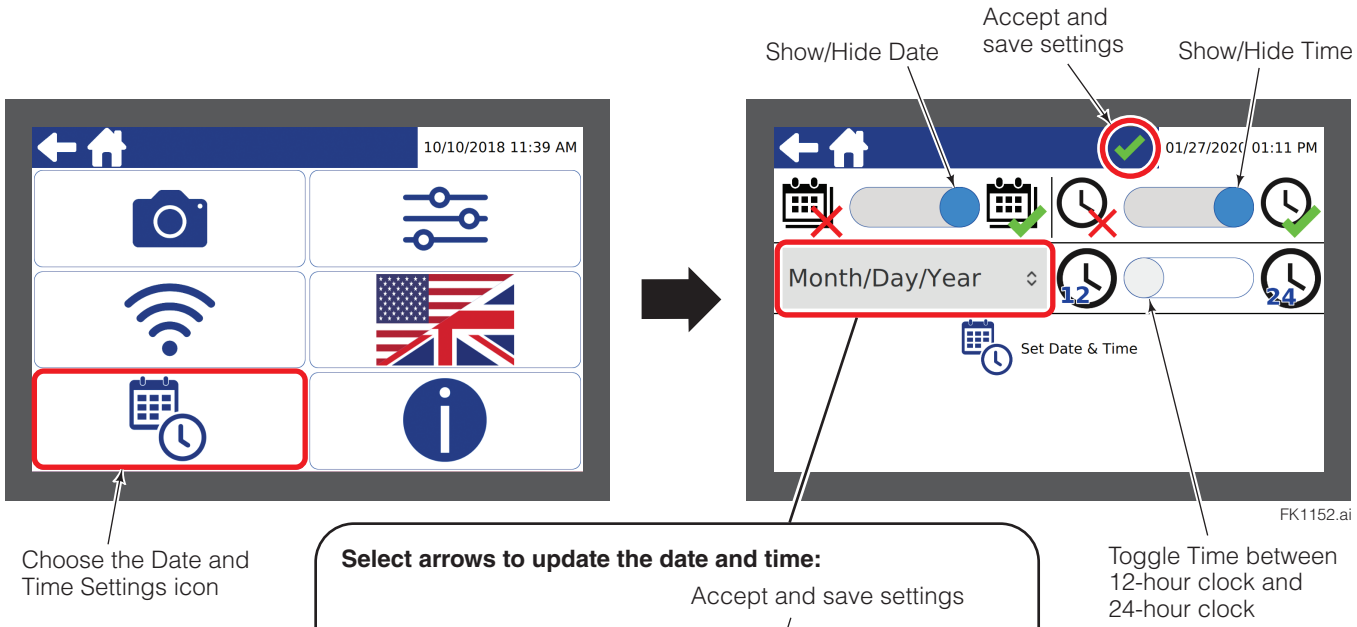
NOTE: After pairing, wait at least two minutes for the battery backpack to reboot.

IMPORTANT: Before unpairing the display, the fork must be powered on.

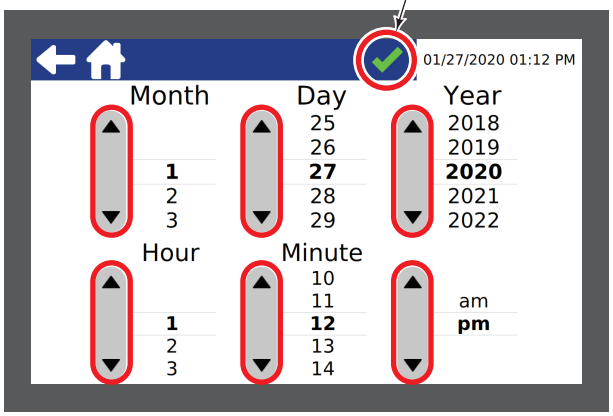
Change Language Settings



Change Date And Time Settings

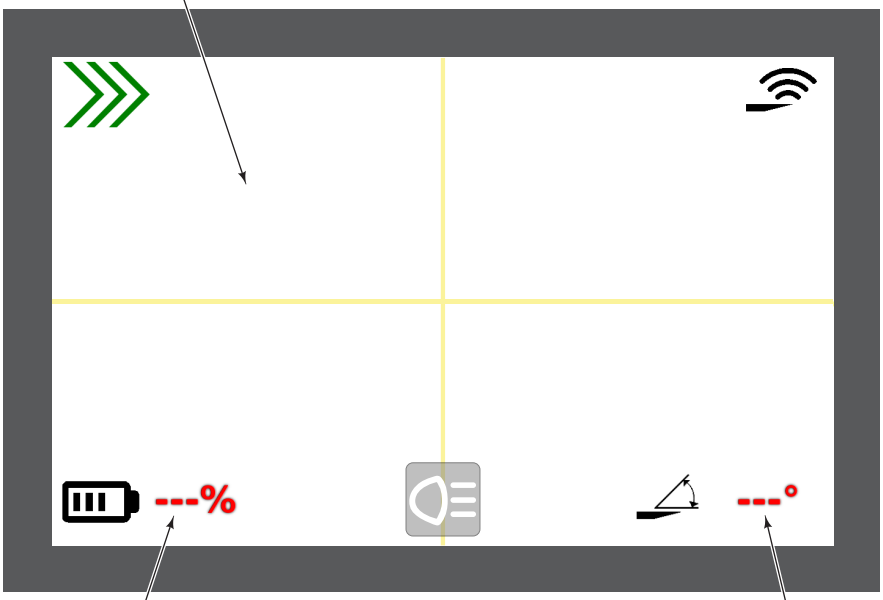


Select arrows to update the date and time:



Display Errors

Blank or Frozen Image –
No signal to the display from the camera



No signal to the display from the fork battery

No signal to the display from the angle sensor

To correct these errors:

Backpack Equipped Systems –

- Verify fork battery is charged and seated properly in the housing.
- Verify the power is on.
- Verify WiFi connection. Look for an SSID number and check that it matches the number on the side of the display.
  - If pairing is required, refer to Service Section, "Pairing the Display with Backpack", page 26.

    NOTE: After pairing, wait at least two minutes for the battery backpack to reboot.

Hard Wired Systems –

- Verify all cable connections are secure. Unplug and reconnect cables (align red dots) firmly at the display. Continue to follow the cable, checking the connections, to the camera as necessary.

  CAUTION: Avoid forcing the connectors, the pins may be damaged.
- Power off the display and wait for 10 seconds. Power on the display.

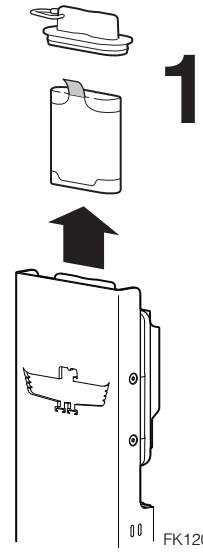
If the problem does not resolve, contact Cascade Service Department. Take a photo of the screen to assist with further troubleshooting.

Charging Fork Battery

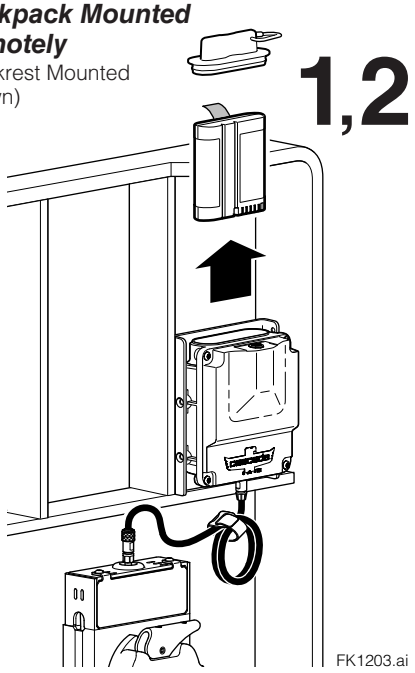
1 Remove Battery Backpack cap.

2 Use the battery tab to lift the battery out of the Backpack.

Sensor Forks with Fork Mounted Backpack

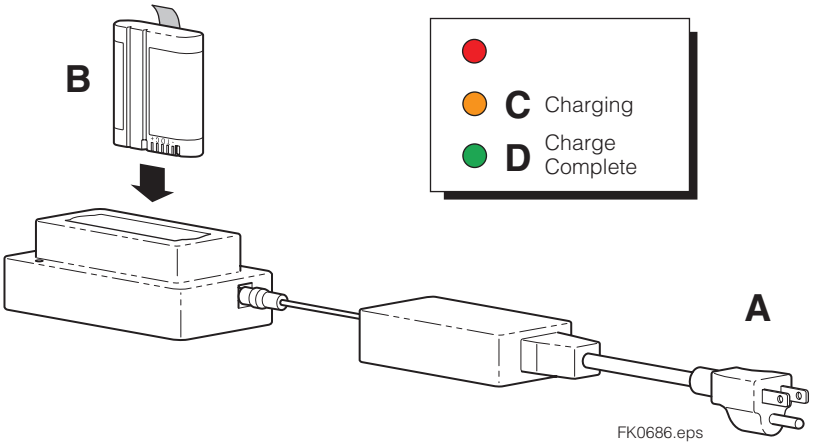


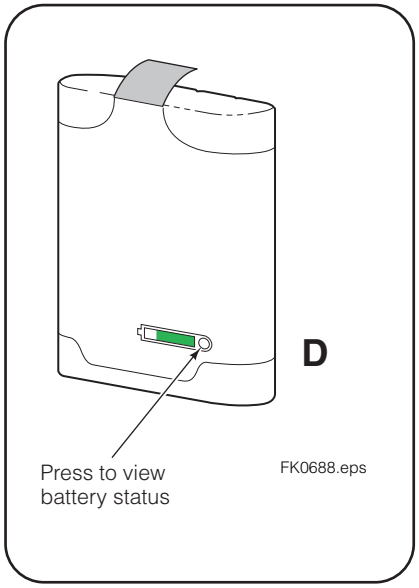
Backpack Mounted Remotely
(Backrest Mounted Shown)



3 Charge the battery as follows:

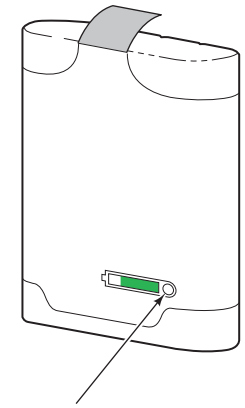
- **A** Plug the power adapter into 110V source.
- **B** Seat the battery into the charger. The green and red LEDs will blink.
- **C** The power adapter LED will show amber and is charging.
- **D** Once the battery is completely charged, the power adapter LED will show green and is no longer charging. The battery will also show a full status on battery status (press button).





4 Return battery in backpack, securing cap.

Battery LED Status Indication



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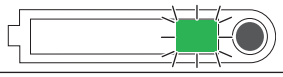
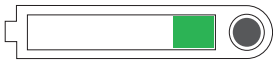
LED	Battery Percentage
	Less than 10%
	10 to 25%
	26 to 50%
	51 to 75%
	76 to 100%

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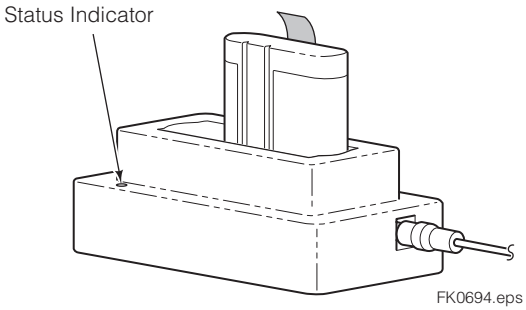
Charger LED Status Indication



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LED	LED Behavior	Meaning
	One time blink	Charger is ready to use
	Blinks for a period of time	Initializing
	Solid	Battery is charging
	Solid	Battery is charged and ready to use
	Continuous Blinking	Battery is too hot or cold. **Cold Battery –** Battery will charge once sufficiently warm. **Hot Battery –** Remove battery and cool down.
	Solid	Battery is damaged or is not the correct battery.

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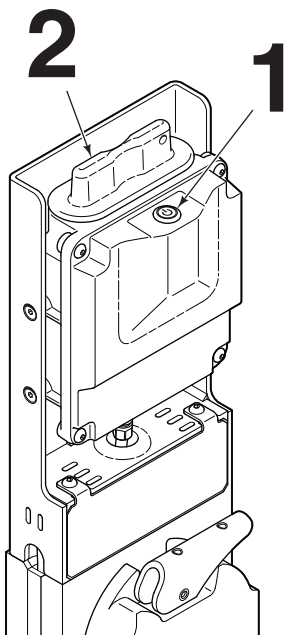
Pairing the Display with Backpack

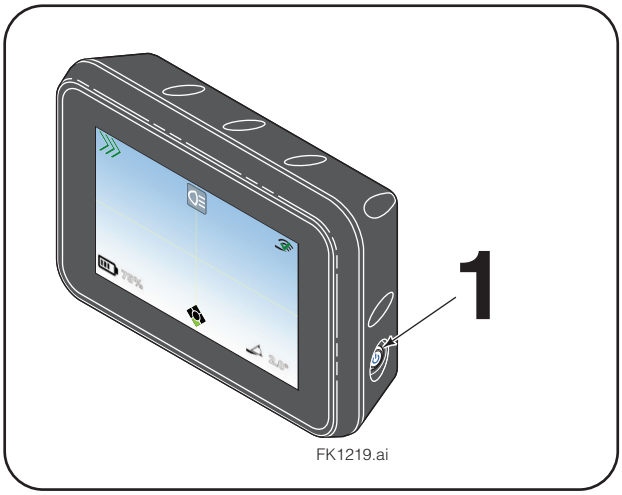
NOTE: Verify Camera 1 is set to WiFi.

In situations where the display and backpack are not communicating, perform the following procedure:

1 Verify that the display and sensor fork are both powered "On". The detent switches will show blue.

2 On the Sensor Fork, remove Battery Cap from the backpack.



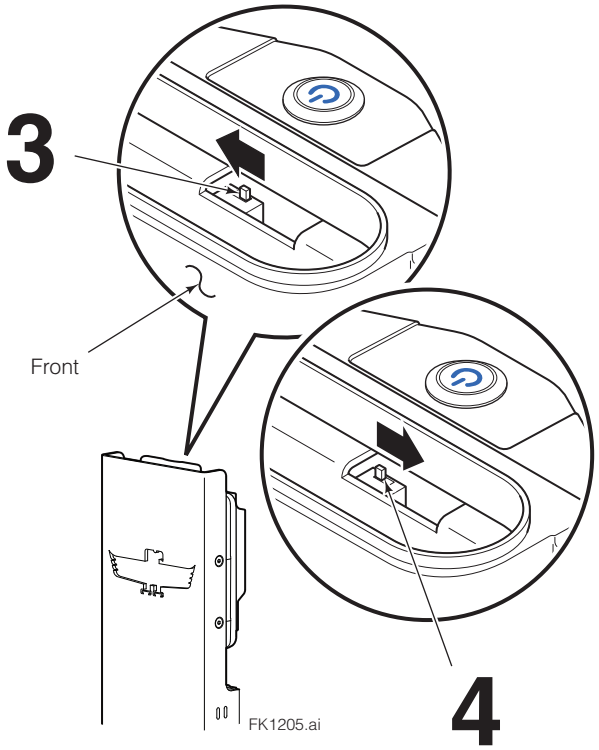


3 Locate the tan switch in the backpack, as shown. Use a small tool to move the switch outward (right direction, from drivers view).

NOTE: If necessary, loosen the backpack from the mounting to gain access to the switch.

4 Wait 10 seconds. Move the switch inward (left direction, from driver's view), to the original position. Note that the backpack power light will flash momentarily.

5 The system will reboot. Wait approximately 2 minutes.



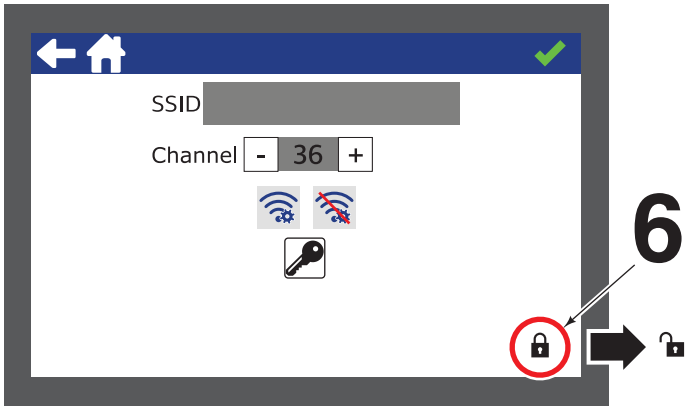
Pairing the Display with Backpack (continued)

6 On the display, touch and hold the "Locked Lock" icon for 10 seconds. The icon will change to an "Unlock Lock" icon.

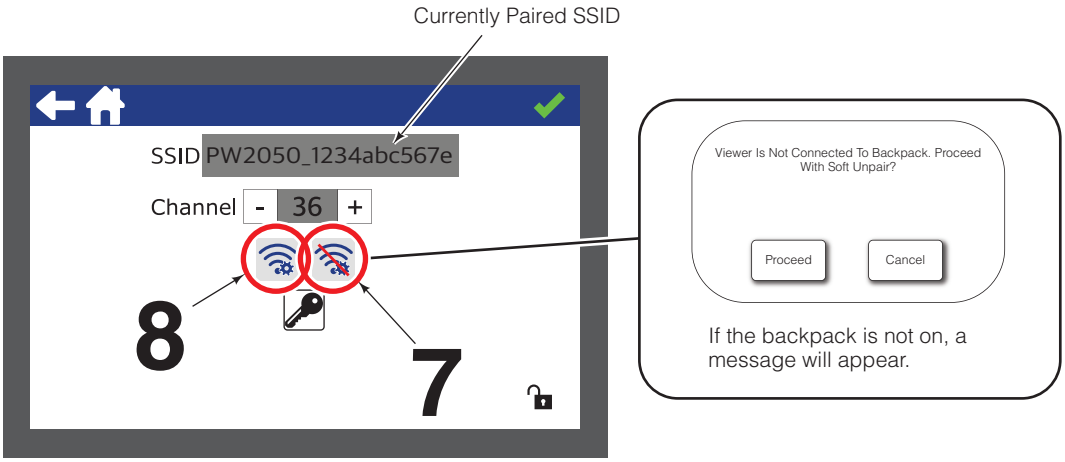
7 Verify that the SSID shown on the screen matches the SSID on the backpack label. The SSID will begin with "PW2050".

- If the SSID box is blank, continue to Step 7.
- If the ID is different, the display is paired to a different sensor fork. Touch "Unpair Indicator" icon. The SSID box will be blank after the display and fork are unpaired. Continue to Step 7.

8 Touch "Select WiFi Network" icon.



FK0928.eps

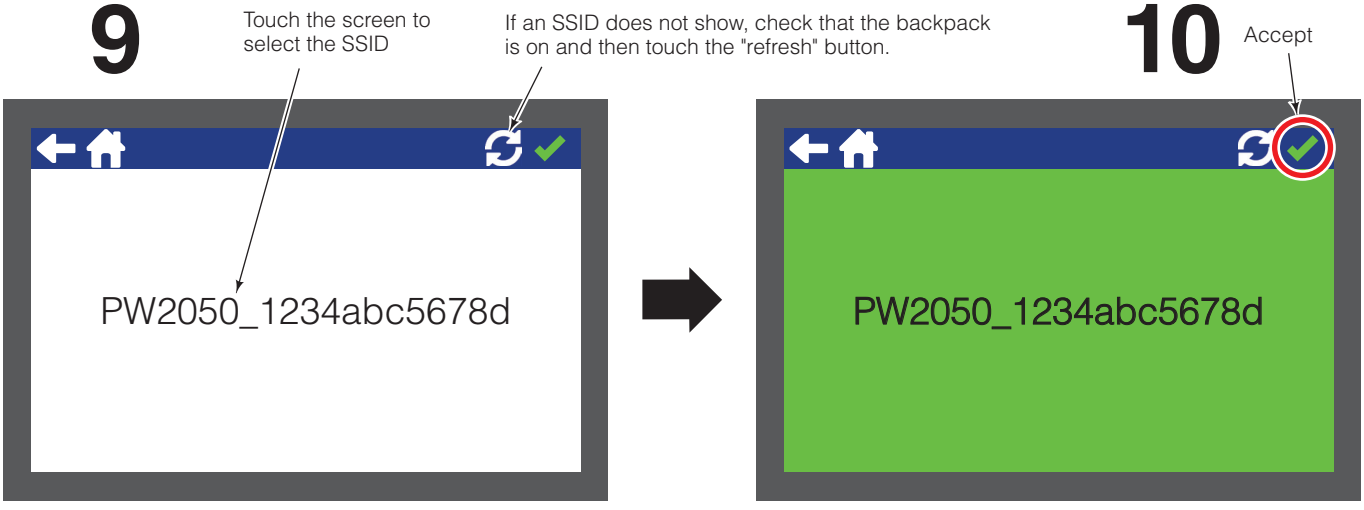


FK0929.eps

9 A wheel of dots will appear and spin. This may take several minutes to discover the backpack address (SSID). When the address appears, verify the SSID marked on the side of backpack. Touch the screen and the background will then turn green.

10 To accept the selection, touch the green check mark.

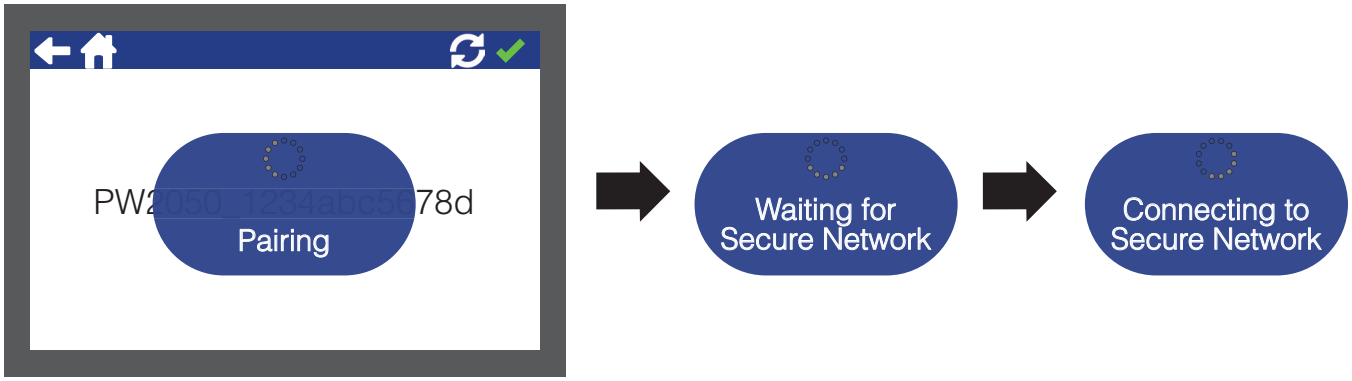
IMPORTANT: The background must be green before touching the green check mark.



FK0930.eps

Pairing the Display with Backpack (continued)

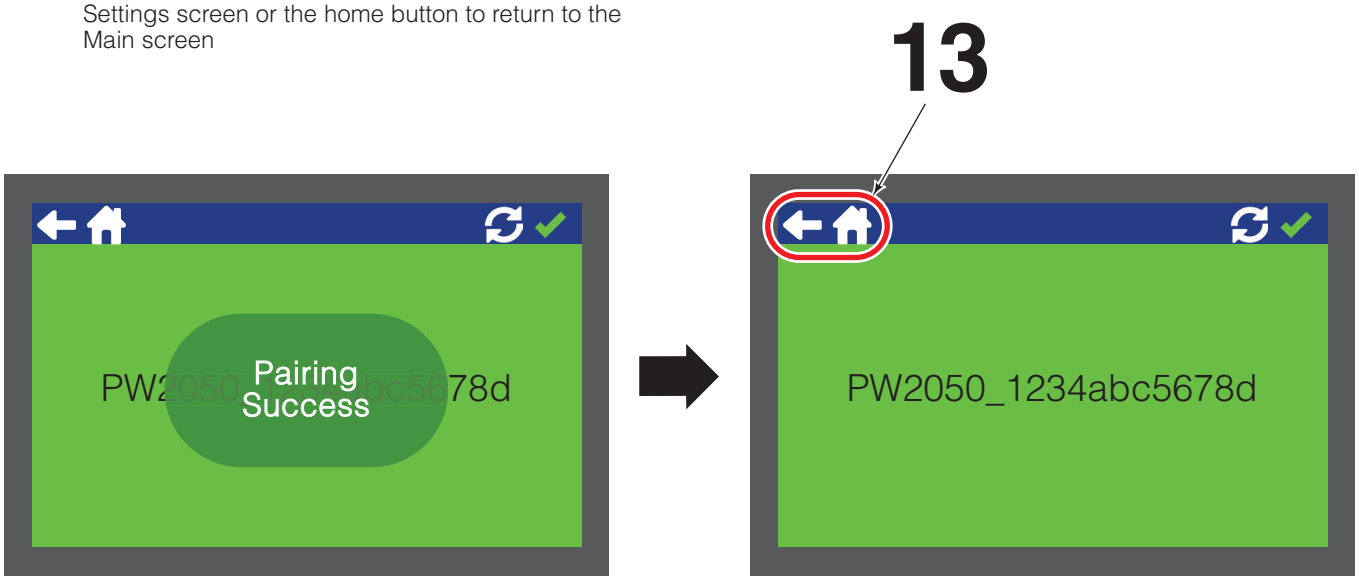
11 A blue oval will appear with "Pairing", then "Waiting To Secure Network" and lastly, "Connecting to Secure Network". This will take approximately 2 to 5 minutes.



FK0931.eps

12 After "Pairing Success" appears, the screen will fade to a green screen and address beginning with "PW2050".

13 Touch the upper left return arrow to return to the WiFi Settings screen or the home button to return to the Main screen



FK0932.eps

IMPORTANT: If this procedure **does not** pair the display to the fork hardware, power off the backpack battery and display. Wait 10 minutes and perform this procedure again.

IMPORTANT: If this procedure fails after a second attempt, contact Cascade. Be sure to take a video of the display screen, the setting on the WiFi screen, and the backpack Wifi SSID address label.

Tip Sensor Replacement

NOTE: This procedure can be performed with the fork remaining on the truck carriage or attachment.

1 Power off the sensor fork and remove the battery. Refer to "Charging Fork Battery", Step 1.

2 Perform **one** of the following:

- For servicing the fork remaining on the carriage or attachment, lift the fork to a convenient working height to access the cover plates located the underside of the fork.
- For servicing the fork on a work bench, unlock and remove the fork using site-specific procedures or local safety guidelines. Place the fork on a work bench with the shank down.

3 Remove the main cover plate and capscrews, using a 4 mm allen wrench. Set plate and capscrews aside.

4 Remove the capscrews and camera from the fork, using a 2.5 mm allen wrench. Note the cable routing and disconnect the cables from the camera by pulling the connector jacket straight back. Set camera and capscrews aside.

5 Remove the tip sensor plate (covering the cable channel) and capscrews, using a 2.5 mm allen wrench. Set plate and capscrews aside.

6 Remove the tip sensor and capscrew, using a 2.5 mm allen wrench. To remove from the fork cavity, push the sensor from top surface of the fork tip.

IMPORTANT: Contact Cascade for instructions on returning tip sensor.

7 Install new tip sensor in fork cavity and capscrews. Tighten capscrews to 27.4 in.-lbs. (3.1 Nm).

8 Guide the cable to the camera mounting, seating the cable in the sidewall grove and place the camera unit into the pocket. Tighten capscrews to 27.4 in.-lbs. (3.1 Nm).

IMPORTANT: Be careful to not pinch the sensor cable. Use a small flathead screwdriver to carefully hold the cable in the sidewall pocket when installing the camera unit.

9 Reconnect the main cable (8 pins) going into the fork.

NOTE: Align the red dots on the connectors and push forward until clicking into place.

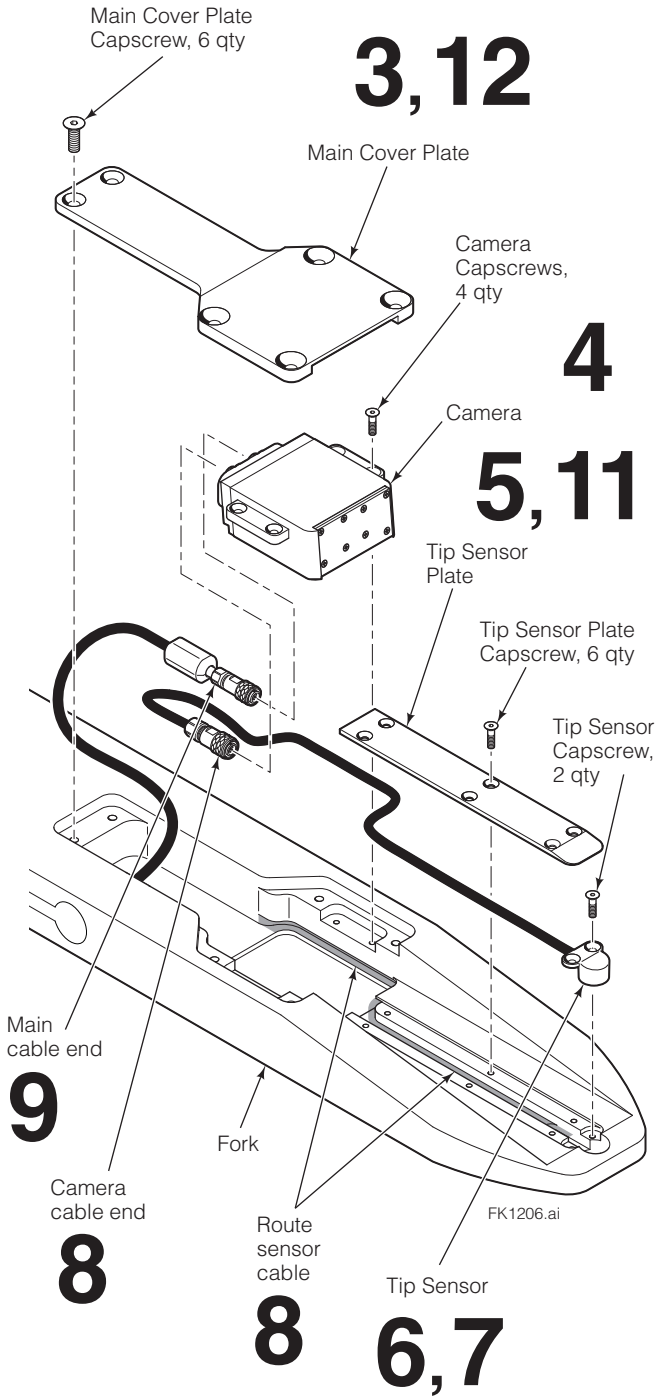
10 Refer to routing (Step 4) and loop the sensor cable to the back of the camera unit.

NOTE: Align the red dots on the connectors and push forward until clicking into place

11 Install the tip sensor plate and tighten capscrews to 27.4 in.-lbs. (3.1 Nm).

NOTE: The cover's taper should be oriented to the fork's front and match the taper of the fork.

12 Install the main cover and tighten capscrews to 95.6 in.-lbs. (10.8 Nm).



APPENDIX

Battery Data

Safety:

- Do not open or dismantle batteries.
- Do not expose batteries to heat or fire. Avoid storage in direct sunlight.
- Do not short-circuit a battery.
- Do not store batteries haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects.
- Do not remove a battery from its original packaging until required for use.
- Do not subject batteries to mechanical shock.
- In the event of a battery leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.
- Do not use any charger other than that specifically provided for use with the equipment. See also chapter "Charging".
- Observe the plus (+) and minus (–) marks on battery and equipment and ensure correct use.
- Do not mix batteries of different manufacture, capacity, size or type within a device.
- Keep batteries out of the reach of children.
- Keep batteries clean and dry.
- Secondary batteries need to be charged before use.
- Use only the battery in the application for which it was intended.
- When possible, remove the battery from the equipment when not in use.
- Do not store batteries longer than 1 month in discharged state.
- Do not storage batteries longer than 1 year without recharge.
- The battery must be recycled or disposed of properly.

Operating Temperature:		**Storage Temperature:**	
For charge:	0°C to +45°C	< 1 year:	-20°C to +20°C
For discharge:	-20°C to +60°C	< 3 month:	-20°C to +45°C
		< 1 month:	-20°C to +60°C

Recommendation: Store the battery at below 20°C, low humidity, no dust and no corrosive gas atmosphere. Store the battery with a state of charge between 40-60%.

Charging: Charge only with a SMBUS compliant charger, e.g. RRC-SMB-MBC. Refer also to the manufacturer's instructions or equipment manual for proper charging instructions.

Specifications:

Type	RRC2054
Voltage	15.00V
Capacity	3.20Ah
Max. charge current	2.17A
Max. charge voltage	17.40V
Max. discharge current	4.25A
Dimensions (L x W x H)	85.35mm x 77.65mm x 23.0mm (max.)
Weight	240g

Recycling: Recycle batteries according to national and local regulations. Contact your local representative for assistance. The batteries must be disposed only in a discharged state at the collection center. In case of not fully discharged batteries, provide for a risk against short circuits. Short circuits can be prevented by isolating the terminals with tape.

Declaration of conformity:
CE: The battery complies with the current regulations of the EU guidelines.
FCC: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Symbols: Explanation of symbols which are on the battery and/or in this manual.

	Caution, consult accompanying documents		UN Transportation Test
	Operator's manual; operating instructions		Recycling Symbol
	Mark of conformity to applicable European Directives		Dispose of this product according to local regulations.
	Regulatory Compliance Mark of Australia and New Zealand.		For Canada & USA: Please call 1-800-822-8837 for information on how to recycle this battery
	UL Recognized for Canadian and US market		China RoHS
	Recycling Symbol Taiwan		Regulatory Compliance Mark of Japan
	KC		EAC/Gost
	China CQC		India BIS

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Do you have questions you need answered right now?
Call your nearest Cascade Service Department.
Visit us online at www.cascorp.com

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