

Install Guide

FarmDefender™ FD-84D — Depth rock detection

Version	v2.2
Revised	2026-08-15
Applies to	All FD-84D systems shipped on or after 2026-05-04

FarmDefender™ Depth FD-84D — Install Guide

Document version: 2.2 (2026-08-15) **System serial:** <SERIAL> (e.g. FD-84D-26-0001)

The kit ships fully built. Every cable is cut, terminated, labeled, and tested before it leaves our shop. Your install is mechanical mounting and plugging in labeled, gender-keyed connectors — no crimping, no cutting, no software setup. Plan on most of a day with basic hand tools; a second set of hands helps for the outer cameras. Two reference drawings are attached at the back of this guide — keep them open while you work: 1. System Layout — to-scale top view of the bar: every camera position, switch and ECU location, fold hinges, and cable cuts. 2. Cable Map — every ethernet run, which port it lands on, and where the fold service loops go.

Before you mount anything: height sets the camera count

Each camera sees a strip of ground whose width depends entirely on **how high it is mounted**. Higher mount, wider strip, fewer cameras needed to cover the bar.

This kit is built for a 2.5 m (8' 2") mount height. If your machine can only carry the cameras lower, the same bar needs more of them:

Mount height	Each camera covers	45' bar	60' bar	84' bar
1.5 m (4' 11")	2.5 m (8' 3")	8	10	15
2.0 m (6' 7")	3.4 m (11')	6	8	11
2.5 m (8' 2") — this kit	4.2 m (13' 9")	5	6	9
3.0 m (9' 10")	5.0 m (16' 6")	4	5	7

The trade is yours to make. Building a boom to carry the cameras higher costs steel once; mounting low costs cameras on every kit. On an 84' bar the difference between a 1.5 m and a 2.5 m mount is six cameras.

Don't go above 3 m. Past that a 6 cm (2.5") rock stops being enough pixels for the detector to call reliably. Higher is better only up to a point.

If your mount height isn't 2.5 m, call us before you install — (406) 271-6400. We'll confirm the right count and send the cameras and cables to match.

Where to mount: rearmost first, then as high as you can

In this order:

- 1. Rearmost unobstructed position.** The cameras must see ground the machine

has already worked — the surface as it will be left. Mount ahead of the openers and you are mapping ground that is about to be disturbed.

- 1. Nothing in the field of view.** A hitch, an air line, or a frame member sitting in front of a camera blanks out a strip of ground **the full length of every pass**, and nothing on the dashboard will tell you it happened. On a tow-between cart, a boom high on the cart gets you height but often puts the hitch and implement straight into the view. The furthest-back position usually beats it.

- 1. Then height**, within the 2.0–3.0 m band above.

Sight along each camera position before you drill anything. Ground you can't see, you can't map.

Kit contents

Check everything off before you start. If anything is missing or damaged, **stop and call (406) 271-6400** before mounting.

Item	SKU	Qty
Depth camera assembly (sealed camera + case + 18" pigtail), labeled C1-C9	FD-CAM-D	9
Central ECU (sealed case: compute + GPS + 2 TB storage + PoE switch)	FD-ECU-D	1
Wing switch box (5-port PoE switch, sealed, pre-pigtailed)	FD-SW-D	2
Camera mount kit (ring clamp + worm-gear clamp, for 4" toolbar pipe)	FD-MOUNT-D-4P	9
Outer camera bridge cable, 4.5 m (E1, E4, E6, E9)	FD-CBL-E045	4
Inner camera bridge cable, 1.5 m (E2, E3, E7, E8)	FD-CBL-E015	4
Center camera bridge cable, 2.5 m (E5)	FD-CBL-E025	1
Wing uplink cable, 10 m (U1, U2 — cross the fold)	FD-CBL-E10	2
GPS antenna + 3 m coax	—	1
Starlink Mini + router	—	1
Power kit: implement-light plug pigtail, inline fuse, 2x 480 W 12V->48V converters, labeled power drops	—	1
Split-loom, zip-ties, spares/field-repair kit	—	1 box

Tools you provide: 3 mm hex key, flat screwdriver or 5/16" nut driver (worm-gear clamps), tape measure, marker, side cutters for zip-ties.

Step 1 — Mark the camera positions

Measure from the **center of the bar** outward and put a marker tick at each position. The System Layout drawing shows the same numbers to scale.

Pair	From center
C1 / C9	11.64 m / 38.2' (outermost)
C2 / C8	8.73 m / 28.6'
C3 / C7	5.82 m / 19.1'
C4 / C6	2.91 m / 9.5' (innermost)
C5	center (0)

A tick within an inch or two is fine — the spacing sets camera overlap, and there's about 30% built in. If a tick lands on an obstruction (clamp, bracket, hose), shift it the minimum needed and keep going.

Step 2 — Mount the cameras

C1-C4 go on the left wing (outer->inner), **C5 center**, C6-C9 right wing (inner->outer). Every camera case is labeled; match the label to your tick marks.

1. Open the ring clamp, seat it on the 4" pipe at the tick, and close it with the worm-gear clamp.
2. **Lens points straight down** (or 15° back if your build record card specifies) — sight down the bar; the camera faces should all match.
3. Point the camera's **pigtail connector toward the rear** of the bar, out of the way of trash flow.
4. Snug the worm-gear clamp — the rubber liner does the gripping. **Don't crush the printed ring**; tight enough that you can't rotate the case by hand is right.

Step 3 — Mount the wing switch boxes

One per wing, on the bar **inboard of the fold hinge** — the System Layout marks the spot (about 7.6 m / 25' out from center). This keeps four cameras per wing on a short run and only the uplink crossing the fold.

- Cable glands face **down** so water can't sit on them.
- Sheltered spots (behind the bar, under a frame member) beat exposed ones.

Step 4 — Mount the ECU, GPS, Starlink, and converters

- **Central ECU** — center frame, sheltered, within 2 m of the toolbar centerline. Typical mount: 4x 1/4"-20 bolts through the case flange to a flat plate.
- **GPS antenna** — highest point with clear sky, within 3 m of the ECU (that's the coax length). Cab roof works.
- **Starlink Mini** — clear sky view; cab roof or air-cart frame.
- **Power converters** — sheltered, near the ECU, close to where tractor power arrives.

Step 5 — Route the cables

Every cable is labeled at **both ends** with its name and where each end goes (CAM end / SW end / ECU end). Route first, connect after — it's easier to adjust a run before anything is plugged in.

Cable	From -> To	Length	Route
E1	Camera C1 -> Left switch port 1	4.5 m	Along the bar, outer left wing
E2	Camera C2 -> Left switch port 2	1.5 m	Along the bar
E3	Camera C3 -> Left switch port 3	1.5 m	Along the bar
E4	Camera C4 -> Left switch port 4	4.5 m	Along the bar, crosses toward the hinge
E5	Camera C5 -> ECU port 4	2.5 m	Bar to center frame
E6	Camera C6 -> Right switch port 4	4.5 m	Mirror of E4
E7	Camera C7 -> Right switch port 3	1.5 m	Along the bar
E8	Camera C8 -> Right switch port 2	1.5 m	Along the bar
E9	Camera C9 -> Right switch port 1	4.5 m	Along the bar, outer right wing
U1	Left switch port 5 -> ECU port 2	10 m	Crosses the left fold hinge
U2	Right switch port 5 -> ECU port 3	10 m	Crosses the right fold hinge

- Run everything in the supplied split-loom. Zip-tie every 12-18". Leave ~6" of slack at every connector so nothing is under tension.
- At each **fold hinge**, leave the uplink a generous **service loop** — the Cable Map shows the shape. The cable should curve through the full fold travel, never pinch or stretch.

Step 6 — Connect

Match the labels, then push to seat — you'll feel the wedgelock click.

Connectors are gender-keyed: camera-side and switch-side ends are physically different, so a cable cannot go into the wrong style of port. If a connector won't seat, you have the wrong end or the wrong port — check the label, don't force it.

Wing switch port	Connects to
1	Outermost camera (C1 / C9)
2	C2 / C8
3	C3 / C7
4	Innermost camera (C4 / C6)
5	Uplink to the Central ECU

Central ECU port	Connects to
1	(internal — factory wired)
2	Left wing uplink (U1)
3	Right wing uplink (U2)
4	Center camera C5
5	Spare / service (leave capped)

Finish with the GPS coax (finger-tight on the SMA — don't crank it) and the Starlink cable.

Step 7 — Power

Wire in this order, connecting the tractor plug **last**:

1. Labeled 48 V drops from the converters -> ECU, left switch, right switch, Starlink. All gender-keyed; match the labels.
2. Converter inputs -> the 10 A inline fuse holder (fuse **out**).
3. Fused lead -> the 7-pin implement-light plug pigtail.
4. Insert the fuse, plug into the tractor.

Everything powers from the implement-light circuit: key on = system on, key off = system off. There is no power button and no shutdown procedure.

Step 8 — First boot

1. **Visual check** — every connector mated, no exposed conductors, glands snug, loom tied.
2. **Tractor ignition on** — boot is automatic, about a minute.
3. Phone or tablet -> **Starlink WiFi** -> browser -> **<http://farmdefender-depth.local:8080>**

4. Watch the camera dots come up — all 9 should go **green** within ~2 minutes, each with a climbing frame counter. Tap any dot to see that camera's live view — a quick way to confirm which camera is which and that nothing is blocked.
5. **GPS** goes to **FIX** with sky view (won't lock in a shed). The **capture gate** shows CAPTURE DISABLED until the machine is inside one of your field boundaries — that's normal in the yard.

One camera stays red? Re-seat its bridge cable at both ends (listen for the click), wait 30 seconds. Still red — swap its cable with a neighbor's; if the problem follows the cable, call us for a replacement. If it stays at the position, call us about the camera.

Step 9 — Fold test

Fold the wings up and back down. Then:

- Check both fold service loops — curving, not pinched, not pulled taut at full fold.
- Re-check the dashboard: **9 / 9 cameras green**.

Adjust zip-ties at the hinge if the loop moved, and you're done.

Install checklist

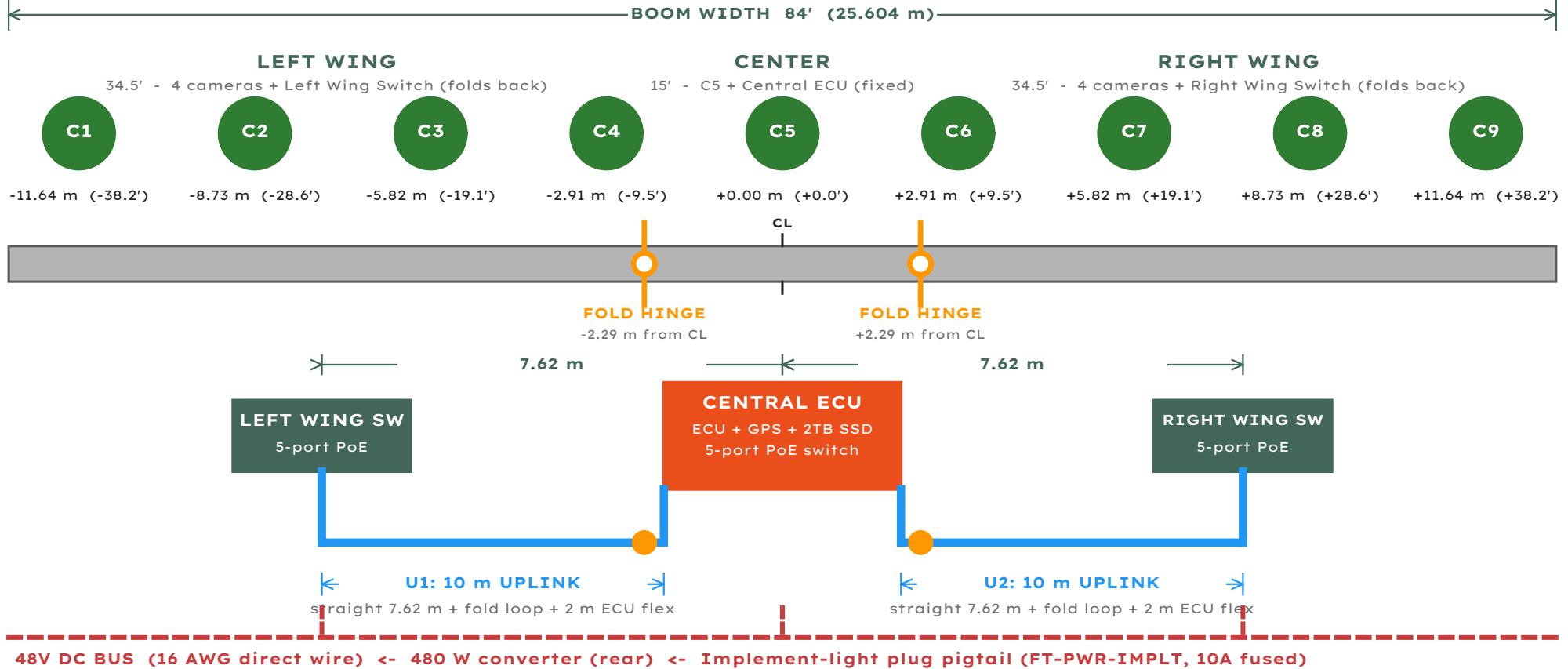
- [] Mount height confirmed and camera count matches the sizing table
- [] Every camera has a clear, unobstructed view of worked ground
- [] 9 cameras mounted at marked positions, lenses aligned, connectors aft
- [] Wing switches inboard of fold hinges, glands down
- [] ECU, GPS antenna, Starlink, converters mounted
- [] E1-E9 + U1/U2 connected per the port tables, loomed and tied
- [] Fold service loops formed at both hinges
- [] Power chain complete, fuse in
- [] Dashboard: 9/9 cameras green, GPS FIX outdoors
- [] Fold test passed

Day-to-day operation lives in the **User Manual** — link emailed at ship time and downloadable at farmtech.us. If anything in this install doesn't match your machine, **call (406) 271-6400** — a two-minute call beats an improvised mount.

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System Layout

Top-down, to scale. Cameras + switches + ECU all clamp to the seeder pipe. Cable cuts in the band at bottom; full per-cable spec on next page.



CABLE CUTS (11 bridges + 22 pigtails = ~50 m Cat5e)

- 4.5 m x 4** OUTER cams C1, C4, C6, C9 -> wing SW
- 1.5 m x 4** INNER cams C2, C3, C7, C8 -> wing SW
- 2.5 m x 1** C5 -> ECU (extra slack for ECU mount)
- 10 m x 2** UPLINKS U1, U2 wing SW -> ECU (crosses fold + ECU flex)

INSTALL NOTES

- Boom height 2.5 m, camera tilt 15 deg backward
- Cameras + switches + ECU all clamp to the seeder pipe (FT-ENC-008)
- Cam pigtails: trim supplied 2 m camera cable to 18" (bend lays on pipe at 6" mark)
- GPS antenna at cab/roof, 3 m SMA coax to ECU. Service loop on uplinks at fold.

FarmDefender™ Depth — Ethernet Cable Map

FD-84D | Reference drawing | All ethernet cuts

WIRING RULE: every pigtail end is a FEMALE receptacle; every bridge cable end is a MALE plug. Bridges mate pigtail-to-pigtail, so connections cannot be mixed up. All cables ship pre-cut, terminated, and labeled — the lengths below are reference for routing and service.

