

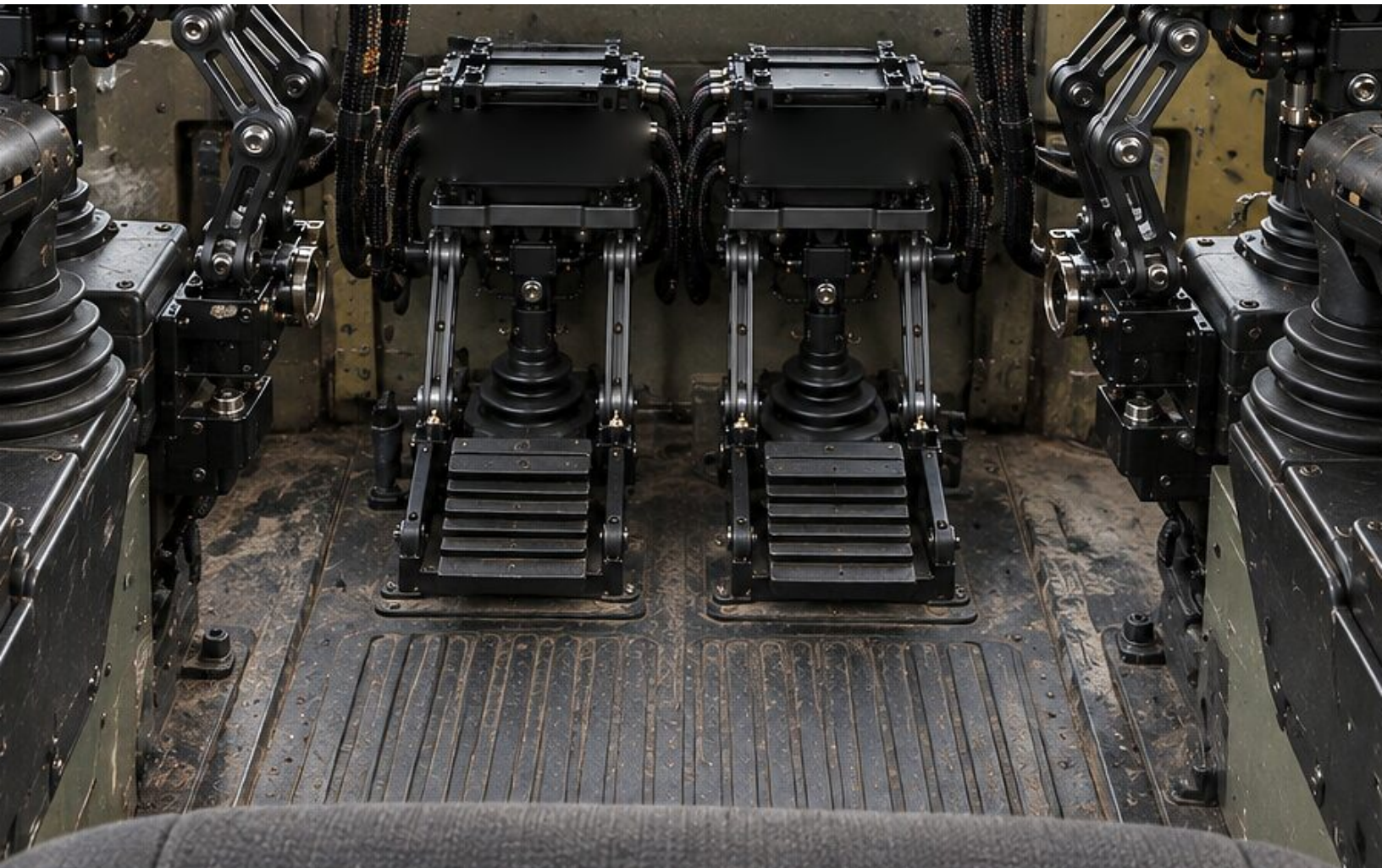


CDNS AUTONOMY

RESPONDER CS-810

THE EMERGENCY-SERVICES PROFILE OF CDNS AUTONOMY

A removable operator for the excavator, dozer, loader or tractor an agency already owns: the machine goes into the hazard and the crew stays out.



13

ACTUATOR
MODULES ACROSS
THE FAMILY

1

WIRE INTO THE
MACHINE: A FUSED
ACCESSORY FEED

0

RADIOS AND
SATELLITE
RECEIVERS
ABOARD

24 VDC

FAMILY-WIDE; 12 V
CONVERSION IN
THE FIT KIT

3

SAFE STATES, ONE
SET PER TASK
BEFORE THE CALL

7

AUTHORITY
MODES,
MAINTENANCE
HELD APART

AT A GLANCE

WHAT THE UNIT BRINGS TO THE CAB. WHY THE SEAT STAYS EMPTY.

Reach, lift, mass and endurance stay the host machine's own figures: the unit adds an operator, not a chassis. Its own figures are counted in modules, wires, modes and states, and its case is the seat it empties.

THE SEAT, EMPTIED

THE MACHINE GOES IN; THE CREW STAYS OUT

Fire ground, structural collapse, hazmat, flood and wildfire earthworks put the seat inside the exposure. Responder sends the agency's own machine onto that ground with nobody in the seat.

YOUR FLEET

THE IRON THE AGENCY ALREADY OWNS

It works the controls a person works, so an older machine counts the same as a new one. Nothing is cut, wired or reprogrammed, and the same machine takes a crew again the moment the unit lifts out.

DECIDED PER TASK

A SAFE STATE SET BEFORE THE CALL

On a burning structure or a failing slope, stopping to wait for a person can itself be the harm. Each task carries its own safe state, chosen ahead of the call and never in the moment.

ONE REFUSAL

NEVER OPERATES A WEAPON

The line refuses one thing: it never operates a weapon and never fires anything. Human safety comes first, and the wired stop and the manual release on every actuator always remain.

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01 · SPECIFICATION

FIT, CONTROL, AUTHORITY, SAFETY. THE UNIT'S FIGURES, NOT THE MACHINE'S.

The functional specification of Responder CS-810, grouped the way a fleet buyer and a safety officer read it. No reach, lift, mass or endurance figure appears here, because those belong to the machine the unit sits in.

01 HOST MACHINES AND FIT

PARAMETER	VALUE	BASIS
Engineering plant	Excavators, dozers, loaders, graders	a machine family on the Responder profile: hazardous earthworks, debris and rubble, route support
Terrain and base support	Tractors and implement carriers	a machine family on the Responder profile: firebreaks, snow and ice, terrain maintenance
Logistics and handling	Forklifts, telehandlers, material handlers	a machine family on the Responder profile: remote depots, hazardous handling, yard logistics
Customer-defined families	A machine family the agency names	a specific conversion follows an engineering survey and qualification
Model year	Not a requirement	the interface is the human interface; a machine with no CAN bus, ECU or firmware is worked like new iron
Changes to the host machine	None: nothing cut, wired, drilled, welded or reprogrammed	the conversion happens on the unit's side of the line
Supported list	One qualified configuration at a time	each machine surveyed, fitted with its own kit, calibrated and recorded
Reference machines	The group's own excavator, dozer and wheel loader	where the engineering-plant family's first configurations are worked out

02 SEAT, DOCK AND MOUNTING

PARAMETER	VALUE	BASIS
Operator's place	The operator's own seat	the unit's body in a cradle resting on the OEM seat pan
Restraint	The machine's own lap belt	threaded fore and aft through a closed tunnel between the cradle rails
Dock	The machine's own seat-belt anchors and pins	fitted once, ahead of any call; it stays with the machine when the unit lifts out
Installation	Mechanical throughout	nothing welded and nothing drilled; every part built to come off and move to the next machine
Removal	Lifts out in minutes	the operator station returned to baseline and inspected; the machine standard again

PARAMETER	VALUE	BASIS
Between callouts	The unit stays in its case	the machine works as it always has, with a person in the seat

03 CONTROLS WORKED

PARAMETER	VALUE	BASIS
Actuator modules	13 across the family	working the machine's own joysticks, levers, wheel, pedals and switches
Interface families	6	dual-axis hand control, rotary control, linear foot control, discrete control, instrument observation, dynamic-state sensing
Controls worked	The machine's own joysticks, levers, wheel, pedals and switches	controls the manufacturer fitted for a person to use
Steering	From the centre of the machine's own wheel	through a machine-specific adapter plate; the wheel undrilled and the rim free for a person's hands
Steering drive	Back-driveable through a mechanical torque limiter	wheel position sensed independently; the adapter engages the wheel, not the column
Travel levers	A split clamp with a compliant insert	no drilling, no adhesive and no permanent change to the lever
Control force	Limited by machine type	the type is set in the software first; no control sees more force than that kind of machine should
Key rotation	Excluded from the actuator set	a key is a human authority token; a person starts the machine
Parking-brake control	Only through a higher-integrity module	under a completed machine-specific safety case with independent state confirmation; never the unit's stop path

04 ELECTRICAL, DATA AND SENSING

PARAMETER	VALUE	BASIS
Host bus connection	None	no link to the machine's CAN bus, ECU or firmware
Wires into the machine	1: a fused feed from the accessory point	the only conductor that crosses between the unit and the machine
Supply	24 VDC family-wide	a 12 V machine takes its conversion in the fit kit
Unit network	CAN 2.0 and Ethernet, wired only	the unit's own harness; that network never meets the machine's
Wireless	Never carries the safety loop or a motion command	a rule of the line, not a setting
Radios and satellite receivers aboard	0	guidance is preset, fibre or onboard optical-AI
Instruments	Read by a camera aimed at the dash	gauges, warning lights and displays observed rather than depended on

PARAMETER	VALUE	BASIS
Perception	Onboard and passive	the unit's own cameras and proximity sensing; the machine's sensors are never used
Attitude	Measured on the unit's own instruments	the angle between house and tracks read optically, with nothing touching the machine's swing electronics
Network segregation	Machine-control and safety networks kept apart from service and mission networks	a lost or compromised external link cannot create actuator authority

05 GUIDANCE AND AUTHORITY

PARAMETER	VALUE	BASIS
Guidance tiers	3: preset at the dock, an optical fibre to a stand-off station, onboard optical-AI	selected for the task; no fourth tier and no radio option
Authority modes	7: off, manual, assist, approach, teleoperation, autonomous, maintenance	maintenance held apart from the working chain
Mechanical states	5: OEM, installed and disengaged, armed, autonomous control, fault or safe	tracked independently of the authority mode
Authority order	Independent safety first; every person above the software	authority runs one way; each layer is built with a limit it cannot cross, and sensing can remove authority but never create it
Task authorization	A named person on the crew	before anything moves, machine by machine and callout by callout
Line authorization	A lease, signed and time-limited	issued and withdrawable by Canadian Shield; delivered by wire or at the dock, never by radio
Withdrawal or expiry	A safe stop, then the minimum-risk condition	the unit stays installed and will not run until re-authorized; the agency's machine is never touched
Rule sets and firmware	Signed and sealed	a hardware root of trust runs nothing unsigned; no debug access on a shipped unit
Tampering	Ends in a safe stop and a retained log	a property of the build, not a setting
Keys	Held in Canada	every change that reaches a machine is signed, and the authority to sign it is held there
Machine identity	Runs only on the machine it was set up for	a mismatch leaves no motion authority; wrong-side or wrong-configuration seating is blocked at armed
Starting the machine	A person, every session	the unit never turns a key, and never starts, wakes or inspects a machine

06 SAFETY FUNCTIONS

PARAMETER	VALUE	BASIS
Stop	Wired into the unit's own safety controller	no software in the path; it stays down once pressed, with a pull-lanyard wired into the same path
Manual release	On every actuator: one hand, no tool	performed by a spring, so it releases with the air gone and the power off
Clearing a stop	A person at the machine, with a separate reset	no stop is cleared from a distance, by a clock or by a message
Independent safety controller	Its own hardware, power and wiring	it can hold the machine, take run permission away, dump the energy and prove neutral; it cannot start, arm or grant authority
Loss of power to a safety output	Falls safe	by spring or by design; holding the machine anywhere else takes power
Approach sensing	On the machine, wired	a person inside the zone stops the machine, and a person at the machine clears it; it can remove authority and never create it
External sensing	Can remove authority; never creates it	a clear picture is never a reason to proceed
Task safe states	One of three, set per task before the call	never improvised; stopping in place is not always the safe answer
After the safe state	The minimum-risk condition, then a person is called	whichever safe state the task reached
Degraded state quality	The task slows, stops, asks for human review or prohibits the skill	below the threshold set for the task; unknown state is a valid state
The machine's own safeguards	Left in place and working	seat belt, lockout lever, park brake, horn and lights checked working at every pre-start
Lockout and tagout	A written procedure	for service with the unit fitted, and for stripping the unit and the dock off a machine

07 ENVELOPE AND SCOPE

PARAMETER	VALUE	BASIS
Work area	Defined by someone on the crew	the boundary can only narrow the task, never widen it
Task limits	Speed, slope, reach and distance from the line	limits, not suggestions to the planner
Callouts in scope	Wildfire guard and fuel breaks; structural collapse; contaminated ground and spill; flood and breach closure; debris and rubble clearance; a slope after a failure	each with a defined work area and a person on hand to authorize and watch it
Route opening	In scope only with the route closed	the route is closed to traffic while the machine works it, or the task is refused

PARAMETER	VALUE	BASIS
People inside the work area	Refused	a rescue with people inside the machine's reach is refused
Public traffic within reach	Refused	on every profile
Smoke on the fire ground	Can blind the sensing	the wildfire task's safe state covers it
Fitment	For a task, for an authorized period	never permanent and unattended; the dock stays, the unit does not
Production rate or response time	Neither is offered	the unit empties a seat
Weapons	Never operates a weapon; never fires anything	the line's one refusal

08 RECORD, SUSTAINMENT AND TRAINING

PARAMETER	VALUE	BASIS
Record	Every act on one chained record	the person's and the machine's; nothing deleted
Configuration record	13 domains	host platform, human controls, machine kit, energy, compute, sensors, harness, software, calibration, skills, safety, maintenance and release
Calibration	Every coupled control, every day it works	through neutral, limits and return; nothing trusted from the day before
Commissioning	A safety act, per machine	a defined sequence, completed before the configuration is signed and sealed with a rollback package
Coupler liner or insert change	Invalidates commissioning	the short proof runs again before motion authority returns
Way of working in the seat	Chosen by a person before every session	there is no default and no last-used, and the record carries the name of whoever chose
New behaviour	By signed release only	runtime learning gathers evidence and cannot promote a behaviour on its own
Training	By role: operator, maintainer, depot, engineering support	controlled publications for installation, operation, maintenance, recovery and safety; measured as independence
Repair	Serialized line-replaceable units and machine-family spares kits	depot repair and secure re-image in Canada and in selected allied depots
Updates	Offline and signed	authenticity, compatibility and rollback checked before install; a named person signs for each
Ownership	The agency owns the machine and the hardware	the configuration and application are Canadian Shield's, licensed and revocable

09 STANDARDS, PATENT AND EXPORT

PARAMETER	VALUE	BASIS
Standards named at design	ISO 12100 · ISO 13849 · ISO 17757 · ISO 19014	an architecture of ISO 13849 for the safety functions, with independent means of removing control; a safety design built toward ISO 17757

PARAMETER	VALUE	BASIS
Safety case	Per machine, per task, per configuration	never generic
Patent	Patent pending	the designs on the line
Export	Subject to Canadian government permits, issued per shipment	export posture counsel-first

02 · THE PROFILE

THE SEAT IS WHERE PEOPLE GET HURT. RESPONDER TAKES IT.

Fire ground, structural collapse, hazmat, flood and wildfire earthworks, rubble and route clearance: a machine is built for that ground, and the seat inside it is not.

Responder CS-810 is a self-contained unit that sits in the operator's seat of a machine an agency already owns, under that machine's own lap belt, and works the joysticks, levers, pedals and switches the manufacturer fitted. A camera reads the dash. It never connects to the machine's CAN bus, ECU or firmware; the only wire between the two is a fused feed from the accessory point. When the seat is needed again the unit lifts out, in minutes, and the machine is standard.

The purpose is to put the machine into the fire, the flood, the collapse or the contaminated ground and leave the person outside it, standing where the water, the slope or the plume is not.

Responder is one of two profiles on the CDNS Autonomy line. Defender CS-820 carries the same unit into defence engineering. The hardware does not change between them; the rule set does: the tasks each may run, the movement space it may use, and the safe state it goes to when something falls outside the rules.

DOCTRINE**AI PLANS. RULES GOVERN. HUMANS AUTHORIZE. SAFETY HAS VETO.**

On a callout the planner proposes the moves, the rule set written for that task bounds them, a named person on the crew authorizes the job before anything moves, and the stop and the manual release can only take the machine's authority away, never grant it.

03 · THE CALLOUTS

WHERE THE MACHINE GOES IN.
WHERE IT IS NEVER SENT.

Earthwork that comes with fire, rescue, hazmat and disaster response, on machines the agency already runs, each with a defined work area and a person on hand to authorize and watch it.



FIRE GROUND WILDFIRE GUARD AND FUEL BREAKS Cutting line ahead of a fire and holding a guard on ground a crew would rather not stand on for the time it takes. Heat, smoke and a moving front are the seat's exposure.	STRUCTURAL COLLAPSE A STRUCTURE THAT IS STILL MOVING Clearing what a collapse left standing before anyone has to walk under it. The machine works the footprint with nobody inside its reach, and people go in when it has stopped.	HAZMAT CONTAMINATED GROUND AND SPILL Working ground where the hazard is in it, not only on top of it, downwind of a plume nobody should breathe for a shift. The machine sits in the hot zone; the person authorizing it does not.
FLOOD FLOOD AND BREACH CLOSURE Berms and closures across moving or open water, and the rock and fill work that goes with them. The failing embankment is the one the seat would sit on.	RUBBLE DEBRIS AND RUBBLE CLEARANCE Moving what a disaster left behind so that people and vehicles can move again, before anyone has to walk the pile.	ROUTE ROUTE OPENING Reopening a road or an access route so the rest of the response can follow it in. The route is closed to traffic while the machine works it, or the task is refused.

TASK	VERDICT
Wildfire guard and fuel breaks	In scope; smoke can blind the sensing, and the task's safe state covers it
Structural collapse	In scope

TASK	VERDICT
Contaminated ground and spill	In scope
Flood and breach closure	In scope
Debris and rubble clearance	In scope
Route opening	In scope only with the route closed
A slope after a failure	In scope
Rescue with people inside the work area	Refused: people within the machine's reach
Public-road work during a response	Refused: public traffic within reach of the machine

The group's own crews have closed rock causeways and breaches across open water at Weed Lake, Alberta, working an amphibious excavator off the rock and a boat, with a person in the seat throughout. Responder is written for that ground, and for that seat.

04 · PROGRAMMED IN ADVANCE

THE TASK, THE SPACE, THE SAFE STATE. ALL THREE SET BEFORE THE CALL.

Three things define every Responder task before the call comes, and on the seats this profile fills, stopping to wait is not always the safe answer.

1. **The task** What the machine is allowed to do, written with entry conditions, an operating envelope and the perception confidence it needs before it moves. A situation the rules do not cover goes to the safe state and waits on a person.
2. **The movement space** A work area and a boundary that someone on the crew has defined. The boundary can only narrow the task, never widen it, and speed, slope, reach and distance from the line are limits rather than suggestions to the planner.
3. **The safe state** What the machine does when authorization ends, a limit is crossed or the sensing degrades. It is chosen for that task ahead of the call, because the moment a limit is crossed is the wrong moment to decide what safe means.

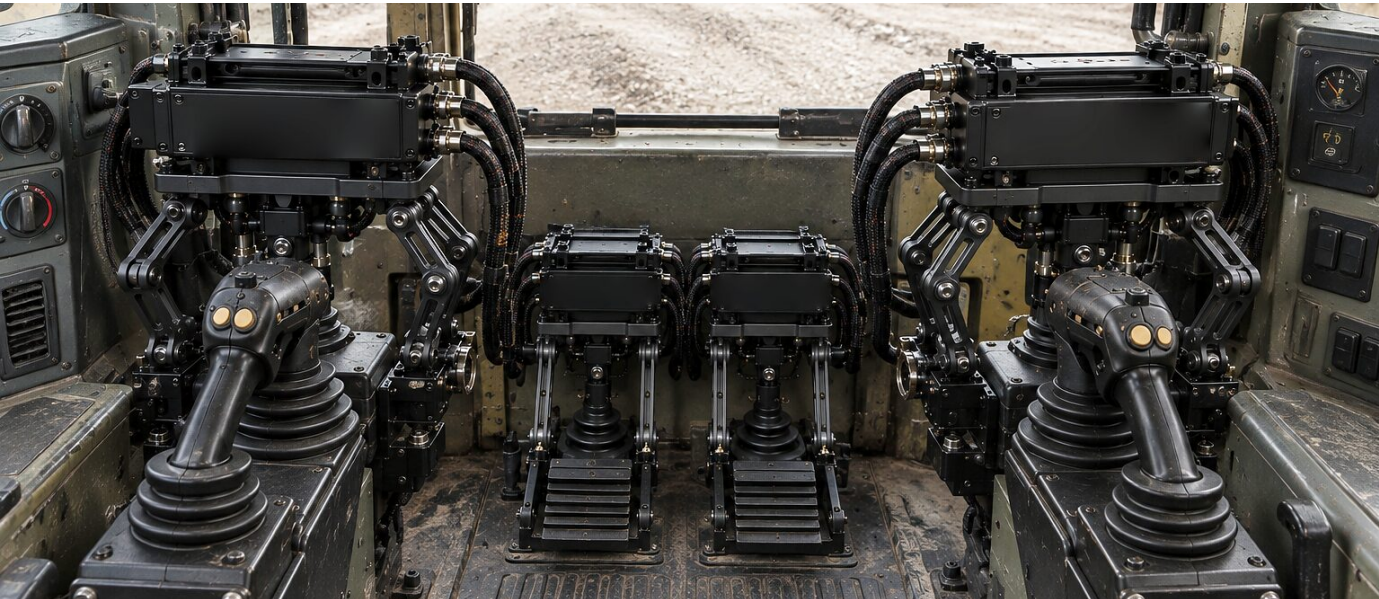
In a burning structure or on a failing slope, a machine that stops and waits for a person can itself put a person in harm's way. So each task carries its own defined safe state, one of three, and stopping is not the only answer. Which one applies is set by the task and never improvised after the fact. If the machine reaches that state and stays there, it drops to the minimum-risk condition and a person is called.

Uncertainty narrows what the machine may do. When the quality of what it knows falls below the threshold set for the task, the task system slows, stops, asks for human review or prohibits the skill. None of this bends the authority chain for the tempo of an emergency: the rules ship sealed and signed, a person authorizes the task before it runs, and the physical stop and the manual release on every actuator always remain.

05 · IN THE CAB

A CRADLE, A BELT AND THE MACHINE'S OWN CONTROLS.
NOTHING WELDED, NOTHING DRILLED.

The unit is restrained by equipment the manufacturer already fitted, and every actuator pins to a control the machine already has.



The unit's body sits in a cradle resting on the OEM seat pan, and the machine's own lap belt threads through a closed tunnel between the cradle rails, running fore and aft because nothing fits across. The dock is the machine's own seat-belt anchors and pins, fitted once and left with the machine. Nothing is welded and nothing is drilled, and every part is built to come off and move to the next machine.

Steering is driven from the centre of the machine's own wheel through an adapter plate made for that wheel. The wheel is not drilled, the rim stays free for a pair of hands, the drive is back-driveable through a mechanical torque limiter, and wheel position is sensed independently. Key rotation is left out of the actuator set, because a key is a human's authority token. The parking-brake control is worked only through a higher-integrity module under a completed machine-specific safety case, with independent confirmation of the brake's state, and it is never the unit's stop path.

INTERFACE FAMILY	WHAT IT IS IN THE CAB	WHAT THE KIT DOES WITH IT
Dual-axis hand control	Joysticks and tillers	A module pins to the control and works it through the travel learned on that machine
Rotary control	Steering wheels and rotary selectors	Driven from the wheel's centre through a machine-specific adapter plate, the rim left free
Linear foot control	Brake, throttle and travel pedals	Worked through the stroke and released the way the machine's own return intends
Discrete control	Buttons, switches and selectors	One position at a time; the key stays a person's authority token
Instrument observation	The dash, displays and indicators	A camera reads them, so nothing is taken off the machine's bus

INTERFACE FAMILY	WHAT IT IS IN THE CAB	WHAT THE KIT DOES WITH IT
Dynamic-state sensing	Attitude, external perception and linkage state	Carried on the unit, on the unit's own wiring, borrowing nothing from the host

- ✓ Installed and disengaged, the hand coupler parks on the grip, force-free.
- ✓ Travel levers take a split clamp with a compliant insert: no drilling, no adhesive and no permanent change to the lever.
- ✓ Brackets come off by hand on quick-release pins.
- ✓ A safety-relevant fault at one switch station escalates to a module fault rather than degrading quietly.

06 · THE BOUNDARY

ONE FUSED FEED CROSSES IN. THE REST RUNS ON THE UNIT'S OWN WIRING.

The whole electrical boundary between the unit and the machine is a single fused accessory feed. The unit reads the dash through a lens, senses the world with its own instruments, and carries nothing that transmits.

The unit never connects to the machine's CAN bus, its ECU or its firmware. Its actuators, controllers, stop network and sensing run on a harness of their own, and none of that harness lands on the machine's. Inside the unit, modules talk over CAN 2.0 and Ethernet, wired only, and supply is 24 VDC across the family; a 12 V machine takes its conversion inside the fit kit.

A camera is aimed at the dashboard, so gauges, warning lights and displays are read optically rather than depended on, and a machine that publishes nothing on a bus is as readable as one that publishes everything. Perception is onboard and passive: the unit carries its own cameras and proximity sensing and never borrows the machine's sensors. Attitude is measured on the unit's own instruments, and on a machine that rotates, the angle between house and tracks is read optically, so upperstructure attitude is never quietly substituted for chassis attitude.

Machine-control and safety networks stay segregated from service and mission networks, and the loss or compromise of an external link cannot create actuator authority. A link can ask for less, and never for more.

PATH	HOW IT TRAVELS
Motion commands	CAN 2.0 and Ethernet, on the unit's own wiring
The safety loop	Wired on its own; wireless never carries it
The authorization lease	By wire or at the dock, never by radio
Tier 2 guidance	An optical fibre to a person at a stand-off station
The machine's instruments	A camera on the dash, never the machine's bus
Power into the unit	One fused feed from the machine's accessory point
Radios and satellite receivers aboard	None

THE BOUNDARY

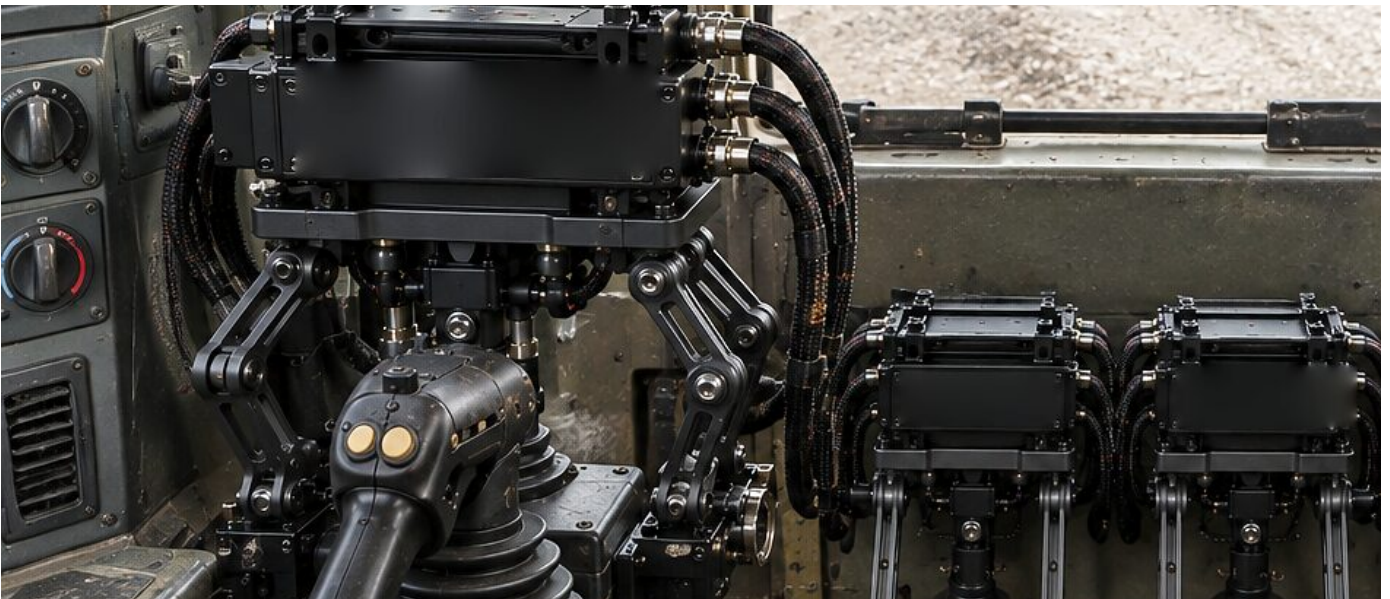
ONE WIRE IN. NO BUS, NO ECU, NO FIRMWARE.

A machine with no CAN bus, no ECU and no firmware is worked exactly like new iron, because the unit only operates what a person operates. There is no integration work to buy and no new fault codes waiting in the shop.

07 · ON THE DAY

FITTED ONCE, AHEAD OF ANY CALL. FILLED WHEN THE SEAT IS NEEDED.

The dock goes on once. What follows is the cycle a crew runs on the day, and the machine is standard again at the end of it.



1. **The dock goes in once** The dock anchors to the machine's own seat-belt anchors and pins, ahead of any call. The machine goes back to its ordinary work with a person in the seat and nothing changed, and the unit stays in its case until a seat needs filling.
2. **Set in and coupled** On the callout the unit sets into the dock and belts in, the couplers land on the machine's own controls, the camera is aimed at the dash, and the rule set for the task loads before anything moves.
3. **Every control, relearned** The unit works each coupled control through neutral, its limits and how it returns when released. Controls wear and no two machines are alike, so nothing is trusted from the day before.
4. **A named person authorizes the task** The lease arrives by wire or at the dock, the guidance tier is set, and a named person clears the task. It then runs inside its sealed rule set until it is done, authorization is withdrawn or a limit is crossed.
5. **The unit lifts out** When the task is done or the seat is needed again, the unit lifts out. Nothing was cut, wired or reprogrammed, and the machine is what its manufacturer built.

A person on the crew completes the pre-start and starts the machine, every session, and every item on the pre-start is answered by a person on the day. The unit never starts, wakes or inspects the machine.

Before every session a person also chooses whose way of working is in the seat. There is no default and no last-used, and the record carries the name of whoever chose.

08 · AUTHORITY AND THE STOP

AUTHORITY ONLY FLOWS DOWN. THE STOP SITS BELOW ALL OF IT.

Nothing runs until a named person clears it, and nothing that can expire, be withdrawn or be edited stands between a person at the machine and stopping it.

Independent safety outranks everything. A person comes next, and anyone at the machine can take control away with one hand, at any time. Every person outranks the software: the controller executes approved motion inside the machine's limits and cannot widen the envelope a person approved, and the planner proposes and cannot energize an actuator or grant itself authority. External sensing can remove authority and never create it.

RANK	WHAT STOPS IT	WHAT HAPPENS	WHO CLEARS IT
1	The stop and the pull-lanyard at the machine	Every drive loses its energy, with no software in the path	A person at the machine, with a separate reset
2	The manual release	One actuator comes away from its control, by spring, by hand	A person at the machine
3	Approach sensing on the machine	A person inside the zone stops the machine	A person at the machine, once the zone is clear
4	Authorization withdrawn, by wire or at the dock	A controlled stop at the next safe point, then the minimum-risk condition	Re-authorization; the unit stays installed and will not run until then
5	The planner's own stop	The software standing itself down	Nothing it does clears a stop above it

- ✓ The independent safety controller has its own hardware, power and wiring, and depends on nothing in the planning computer, its operating system or any model for a safety action.
- ✓ Everything it can do is a subtraction: hold the machine, take run permission away, dump the energy and prove neutral. A person at the machine clears its stop.
- ✓ Loss of the high-level computer is never read as permission to keep moving, and evidence that a control is back at neutral outranks a command saying it should be.
- ✓ The cameras, the planner, the network and the record can fail together, and the worst that follows is a stopped machine.
- ✓ The machine's own safeguards stay in place and keep working: the pilot lockout lever still cuts pilot pressure the way it did before the unit arrived.

09 · THE MACHINES

THE AGENCY'S OWN MACHINES. ANY MAKE, ANY AGE.

It fits the plant an agency already owns, because it works through the controls a person uses and never through the machine's electronics.

ENGINEERING PLANT

EXCAVATORS, DOZERS, LOADERS, GRADERS

The machines that dig, push and load: hazardous earthworks, debris and rubble, route support. The group's own excavator, dozer and wheel loader are the family's reference machines.

TERRAIN AND BASE SUPPORT

TRACTORS AND IMPLEMENT CARRIERS

Firebreaks, snow and ice, terrain maintenance and the work around a base or a camp, on the tractor a county already runs.

LOGISTICS AND HANDLING

FORKLIFTS, TELEHANDLERS, MATERIAL HANDLERS

Remote depots, hazardous handling and yard logistics, on the plant a depot already operates.

CUSTOMER-DEFINED

SPECIALTY FAMILIES

A machine family an agency names. A specific conversion follows an engineering survey and qualification.

MACHINE	WHAT THE UNIT WORKS
Tracked excavators	Two joysticks, two travel controls, the throttle dial and the machine's own pilot lockout lever
Dozers	Steering, forward-neutral-reverse, the gear selector, the parking brake, the blade and the ripper
Wheel loaders	Wheel steering, the pedals and the implement joystick
Compact track and skid steers	Joysticks and auxiliary functions in a compact cab
Backhoes	Driving controls at the front, hoe controls at the rear
Forklifts	Steering, directional control, throttle and brake, and the mast levers
Telehandlers	Steering, travel, the boom and the attachment controls
Tractors and implement carriers	Steering, pedals, implement controls, hydraulic valves and the power take-off

What a survey measures.

- Machine identity: make, model, year and cab trim, taken from the machine itself.
- Control geometry at the operator station: the seat, both consoles, the floor, the pedals, and the reach and travel of every control.
- Which of the six interface families are present, and how each control is driven.
- The machine's electrical system and the size of its steering wheel.

What a survey decides.

- Which modules the fit kit carries, from the family of thirteen.
- Whether the parking-brake control is in scope, which takes a completed machine-specific safety case.
- The operating envelope the machine's own limits allow, and the steps the daily calibration runs.
- Which family the machine belongs to, and whether the ground can carry the work at all.

- The task, the site and the shift the machine works, and whether the public ever comes within reach of it.

A mixed municipal or contractor fleet is one system, not one program per make and year, and older machines are often the ones with the seat problem in the first place. Each machine is surveyed, fitted with its own kit, calibrated every day it works and recorded, and the same fleet serves crewed and uncrewed work.

10 · TRAINING AND SUSTAINMENT

TRAINED BY ROLE, TO INDEPENDENCE. EVERY ACT ON ONE CHAINED RECORD.

Operators, maintainers, depot and engineering support are trained by role, repair is domestic, and every converted machine carries a record of exactly what is fielded on it.

OPERATOR

THE PERSON WHO SAYS GO

Clears the job, completes the pre-start, starts the machine, chooses whose way of working is in the seat and holds the stop, trained on the machine class, the task and what the display is saying.

MAINTAINER

THE PERSON WHO KEEPS IT STANDARD

Daily calibration and what its record means, module exchange and recalibration, field diagnostic tooling with bounded privileges, and the hand-back of the operator station.

DEPOT

REPAIR AND RE-IMAGE

Serialized line-replaceable units, machine-family spares kits, repair-triggered recalibration and secure re-image, in Canada and in selected allied depots.

ENGINEERING SUPPORT

NEW MACHINES, NEW TASKS

The survey and qualification path that adds a machine to the supported list, and the signed release that carries a new skill to a unit.

- ✓ Controlled publications for installation, operation, maintenance, recovery and safety, so the crew that runs the machine also services and recovers the system.
- ✓ Calibration intervals and repair-triggered recalibration rules.
- ✓ Obsolescence management for compute, storage, sensors and connectors, with long-term support branches and stated release support windows.
- ✓ Offline update with authenticity, compatibility and rollback checks, and no update reaching a machine without a named person signing for it.
- ✓ Recovery without a network: signed images and recovery media for every supported field version.
- ✓ Every field issue linked to the exact configuration it occurred on.

Every act on a shift, the person's and the machine's, lands on one chained record, and nothing is deleted; a correction is a new entry naming the one it corrects. Behind it sits the configuration record, thirteen domains from the host platform and its human controls to the skills, safety, maintenance and release, and a skill loads only against the configuration it was frozen for. The agency owns the machine and the hardware. The configuration and the application

that make it Responder CS-810 are Canadian Shield's, licensed and revocable, so Canadian Shield can withdraw the operator and can never reach the machine.

11 · SCOPE

BUILT NEVER TO DO THESE.
THE REASON SITS BESIDE EACH.

Every row is a property of how the unit is built, not a setting an agency can change.

IT NEVER	BECAUSE
Operates a weapon, or fires anything	Human safety comes first, on every line. It is the line's one refusal.
Starts the machine	A key is a human authority token. Key rotation is left out of the actuator set on purpose, and a person starts the machine.
Works with public traffic within reach	Public-traffic work is refused on every profile. The work area is closed ground with a person authorizing it.
Runs with people inside the work area	The seat is what it empties. A rescue with people inside the machine's reach is refused.
Stays fitted permanently and unattended	It is fitted for a task, authorized for a period, and lifted out. The dock stays; the unit does not.
Connects to the machine's CAN bus, ECU or firmware	It works the controls a person works. The one wire is a fused feed from the accessory point, and nothing is cut, wired or flashed to accept it.
Carries a radio or a satellite receiver	Guidance is preset, fibre or onboard optical-AI, and wireless never carries the safety loop or a motion command.
Runs outside its rule set, or while de-authorized	The rules ship sealed and signed; a de-authorized unit stays installed and will not run, and the agency's machine is never touched.
Promises a production rate or a response time	It empties a seat. Neither a rate of work nor a time to arrive is offered.

12 · GUIDANCE

PRESET, FIBRE OR ONBOARD. THE TASK DECIDES THE TIER.

Responder runs the same three guidance tiers as Defender. The tier is chosen for the task rather than for the customer, and there is no fourth tier and no radio option.

TIER 1

PRESET AT THE DOCK

The task program is loaded when the unit is set into the dock. While it runs nothing is emitted and nothing is received, so there is no link to deny and no emission to find.

TIER 2

AN OPTICAL FIBRE TO A STAND-OFF STATION

An optical fibre runs back to a person at a stand-off station, out of the seat and authorizing every decision that matters. It is a physical line, not a channel in the radio bands.

TIER 3

ONBOARD OPTICAL-AI

Perception and planning run on the unit inside the sealed rule set, with no emissions, no link and no satellite. The planner proposes, the rules govern, a person authorized the task and safety keeps its veto.

13 · DOCTRINE AND SAFETY

ONE REFUSAL ON THE LINE. HUMAN SAFETY COMES FIRST.

The lines that hold on every Responder task, for every agency and on every machine.

- ✓ The line's one refusal: Responder never operates a weapon and never fires anything.
- ✓ Human safety comes first, on every line. Nobody in harm's way: the machine goes into the hazard, and the person who authorizes and watches the job stands outside it.
- ✓ AI plans, rules govern, humans authorize, safety has veto. The wired stop and the manual release on every actuator always remain, outside every rule set and outside the authorization.
- ✓ A person starts the machine, every session. No task runs with people inside the machine's reach or with public traffic within it.
- ✓ No radio and no satellite receiver aboard. Wireless never carries the safety loop or a motion command, and the authorization arrives by wire or at the dock.
- ✓ It never connects to the machine's CAN bus, ECU or firmware. A fused feed from the accessory point is the only wire, and the machine is standard again when the unit lifts out.

THE CONVERSATION

NAME THE CALLOUT YOU CANNOT CREW SAFELY.
THEN THE MACHINE THAT ANSWERS IT.

Tell us which machines the agency runs and the seat you would rather nobody sat in. The reply names which of them the line covers and what a first task on your own ground would look like. Every enquiry is screened before any discussion, and supply is subject to Canadian export permits issued per shipment.

Start a screened enquiry at cdnshield.ca/enquiries.

DOCUMENT	CDN-PROD-SPC-016 · Responder CS-810 · Specification sheet
REVISION	R1.0 · issued 2026-09-10
WEB VERSION	cdnshield.ca/cdns-autonomy/spec-sheets/responder · carries the current revision
RELATED SHEETS	Defender CS-820
ISSUED BY	Canadian Shield · cdnshield.ca

Patent pending. Export-controlled: international transfer is subject to Canadian government permits. Designations and profile names are current as issued and subject to change without notice. Nothing on this sheet is an offer, a commitment or a representation to any government body.