



Frequently Asked Questions

for



- I** Idle
- M** Mitigation
- P** Power
- A** Automation
- C** Control

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Change Log

Revision	Revision Date	Brief Description of Change
A	August 15, 2024	Pre-Release Drafts
B	August 18, 2024	Initial Release

Table of Contents

1.	Section 1: Introduction to the IMPAC System	1
2.	Section 2: System Operation.....	2
2.1.	How will this system change my workday?	2
2.2.	How do I turn the IMPAC system on?.....	2
2.3.	Why do I need to remove the key after I press the Equipment Activation Button?	2
2.4.	How long do I have to remove the key when activating my equipment?	2
2.5.	How do I turn the IMPAC system off?.....	2
2.6.	What is the ZeroDRAW feature?.....	2
2.7.	How do I activate ZeroDRAW?.....	2
2.8.	When will the truck engine automatically start and stop?.....	3
2.9.	Can I park the truck inside the shop?	3
2.10.	Should the engine high-idle when in Park?	3
2.11.	How do I prevent the IMPAC system from high-idling?.....	4
2.12.	Can I use the equipment without high-idling?.....	4
2.13.	Can I leave the breakers on all the time?	4
2.14.	How do I activate the air compressor?	4
2.15.	How do I Boost-Start the chassis battery on the MRU/RAV?	4
2.16.	How do I Jump-Start a down customer vehicle?	4
2.17.	Can I jump-start a vehicle battery under 4VDC?.....	5
3.	Section 3: System Servicing and Testing.....	6
3.1.	Are additional steps needed when performing electrical system testing, starting system testing, or charging system testing on the chassis?	6
3.2.	Can I connect a battery charger to the chassis battery during PM service?	6
3.3.	Are additional steps needed to replace the chassis battery?.....	6
3.4.	Is it OK to connect additional circuits/loads directly to the chassis battery?.....	7
3.5.	Is it OK to connect additional circuits/loads directly to the IMPAC batteries?	7
4.	Section 4: Diagnostics and Basic Troubleshooting.....	8
4.1.	If the Equipment Activation button is illuminated, why won't the air compressor start?.....	8
4.2.	Why does the engine Start / Stop Override button LED stay lit while in ZeroDRAW mode?.....	8
4.3.	Why can't I just roll my key to the Run position to activate the equipment?.....	8
4.4.	Are any of the tools and equipment powered while not in Equipment Activation mode?	9

4.5. What happens if I leave the key in and never press the Equipment Activation button while the engine is running?..... 9

4.6. How do I wake up the IMPAC to temporarily power the service body? 9

4.7. Where can I get additional information about the IMPAC system?..... 10

This document applies to the below application type.	
Chassis Make	Isuzu
Chassis Model	NPR
Chassis Year	2024 - 2025
ZeroRPM Product	IMPAC
ZeroRPM Software	PDM v01.01.01
	PLC v6.00.00
	HMI v06.01.02

SECTION 1: INTRODUCTION TO THE IMPAC SYSTEM

The Idle Mitigation Power Automation Control (IMPAC) system is a vehicle energy management system that provides power to electrical tools and equipment in a mobile repair unit (MRU) or rapid assist vehicle (RAV) during vehicle repair operations. The IMPAC system includes 4kWh of energy storage capable of delivering high power for 12VDC loads as well as 120VAC power for an air compressor and electrical tools. When the state of charge (SOC) of the IMPAC batteries is low, the vehicle is in Park, and the equipment has been activated (indicated by a solid green light on the Equipment Activation button), the IMPAC system automatically turns on the engine to recharge the IMPAC batteries using the vehicle alternator. The IMPAC batteries can also be recharged via an integrated charger when the vehicle is connected to 120VAC shore power. The IMPAC system also monitors the vehicle's 12VDC lead-acid battery and keeps it charged during driving and repair operations.



NOTE: LithiumIron™ is the trade name for the LiFePO₄ (lithium iron phosphate) batteries used in the IMPAC system; they will be referred to as “IMPAC batteries” from this point onward. This type of battery is generally considered the safest type of lithium-ion battery available on the market. The IMPAC battery cells include a patented, built-in pressure relief valve that greatly reduces the risk when compared to other chemistries and mechanical cell designs.

This is a living document and will be updated as additional questions and user feedback are received.

SECTION 2: SYSTEM OPERATION

2.1. How will this system change my workday?

Answer: Instead of using a genset or the chassis engine, you will press the Equipment Activation button to activate the equipment in your service body. The equipment will be powered primarily via engine-off power from the IMPAC system.

2.2. How do I turn the IMPAC system on?

Answer: If the engine is not already running, start the engine, then engage the parking brake, then hold the Equipment Activation button for one second, and finally remove the key from the ignition within five seconds. The light on the Equipment Activation button will turn solid green.

2.3. Why do I need to remove the key after I press the Equipment Activation Button?

Answer: This is a safety protocol that ensures the system cannot be activated until the key has been fully removed from the ignition.

2.4. How long do I have to remove the key when activating my equipment?

Answer: If the key has not been removed within five seconds after the equipment has been activated, the green light will turn off and you must press the Equipment Activation button again to reinitiate the sequence.

2.5. How do I turn the IMPAC system off?

Answer: If the system is active, simply reinsert the key into the ignition and roll it to the Run position, then roll the key back and remove it from the ignition. This will deactivate the equipment, and the light on the Equipment Activation button will turn off. However, the ZeroDRAW™ feature will be active for 10 minutes after the key is removed from the ignition.

2.6. What is the ZeroDRAW feature?

Answer: When the IMPAC system has been deactivated and the green ring around the Equipment Activation button is not illuminated, ZeroDRAW will cause the IMPAC system to provide power to the equipment inside the body (except the compressor and the Jump-Start feature) for 10 minutes.


2.7. How do I activate ZeroDRAW?

Answer: ZeroDRAW is activated automatically for 10 minutes any time the equipment has been deactivated by turning the truck off and removing the key. It can also be activated by rolling the key to the Run position, waiting one second, and then rolling the key back off without activating the equipment.

2.8. When will the truck engine automatically start and stop?

Answer: There are multiple scenarios that may cause the vehicle to automatically start and stop while the equipment is activated:


- a) Any time the IMPAC batteries hit the low state of charge (SOC) set point of 25%, the vehicle will start to recharge the batteries until they reach 60% SOC, at which point the engine will stop.
- b) Under certain high-load conditions, the engine will start to increase the power available.
- c) If the air compressor fails to start, the chassis engine will start using the high-output alternator to increase the voltage supply to be high enough for the compressor to start.
- d) In rare cases, if the IMPAC batteries have a fault, the system will start the engine to allow the alternator to power the truck until the batteries can be serviced.


 **NOTE:** If the Engine Start/Stop switch is turned on, the engine will start and continue running until the Engine Start/Stop switch is turned off.

2.9. Can I park the truck inside the shop?

Answer:

- a) Yes, if the equipment has not been activated (i.e., the green light on the Equipment Activation button is not illuminated).
- b) No, if the equipment has been activated (i.e., the green light on the Equipment Activation button is illuminated).

 **WARNING:** If the truck is parked inside a building while the equipment has been activated, the IMPAC system could automatically start the engine, potentially resulting in injury or death.

 **NOTE:** If you would like to use the equipment while parked inside a building, the vehicle must be connected to shore power. When the truck is plugged into shore power, the IMPAC system prevents the engine from starting automatically.


2.10. Should the engine high-idle when in Park?

Answer:

- a) Yes, if the equipment has been activated (i.e., the green light on the Equipment Activation button is illuminated).
- b) Yes, if the equipment has not been activated (i.e., the green light on the Equipment Activation button is not illuminated) when the chassis air conditioning is on.

2.11. How do I prevent the IMPAC system from high-idling?

Answer: Do not activate the equipment, turn off the chassis air conditioning, and then set and release the parking brake.

 **NOTE:** If the air conditioning has been on, you must turn it off, then release the parking brake while holding the service brake, and then set the parking brake to reset the high-idle module.

2.12. Can I use the equipment without high-idling?

Answer: No. See Section 2.11.

2.13. Can I leave the breakers on all the time?

Answer: Yes. You should leave the breakers on because IMPAC manages load shedding.

2.14. How do I activate the air compressor?

Answer: Press and release the Air Compressor Request switch for one second, then release it after the equipment has been activated, or when shore power is plugged in and the Compressor on Shore Power feature has been activated by pressing F4.

2.15. How do I boost-start the chassis battery on the MRU/RAV?

Answer: Press the Boost Start MRU/RAV switch to boost the MRU/RAV chassis battery from the IMPAC batteries. The chassis battery must be 4VDC or above.

2.16. How do I jump-start a down customer vehicle?

Answer: Press the Jump-Start Customer Vehicle switch for one second, then release it after the equipment has been activated. This feature will use the chassis alternator and the IMPAC batteries to jump off a vehicle with a low battery that is 4VDC or above.

2.17. Can I jump-start a vehicle battery under 4VDC?

Answer: The battery must be tested to determine its condition. A QR code will appear on the IMPAC display any time the customer battery voltage is less than 4VDC. Scan the QR code and follow the instructions.



Figure 1 – Jump-Start QR Code

SECTION 3: SYSTEM SERVICING AND TESTING

3.1. Are additional steps needed when performing electrical system testing, starting system testing, or charging system testing on the chassis?

Answer: Yes. Press the hybrid disconnect to separate the IMPAC system from the vehicle and return the electrical system to a “factory-like” state. See Figure 2 for more information.

NOTE: This also puts the truck into an override mode which disables the automatic start/stop of the engine, and the chassis electrical system will be connected to only the chassis battery (not the IMPAC batteries).

NOTE: If you are using a diagnostic tool, open the hood so CAN communication between the chassis and IMPAC controllers is disabled.

3.2. Can I connect a battery charger to the chassis battery during PM service?

Answer: Press the hybrid disconnect to separate the IMPAC system from the vehicle and return the electrical system to a “factory-like” state. See Figure 2 for more information.

3.3. Are additional steps needed to replace the chassis battery?

Answer: Yes. Press the hybrid disconnect to separate the IMPAC system from the vehicle and return the electrical system to a “factory-like” state. See Figure 2 for more information.



Figure 2 – Battery Maintenance Procedure Label

3.4. Is it OK to connect additional circuits/loads directly to the chassis battery?

Answer: No. You should never connect loads directly to the chassis battery. Additional loads are to be connected to the terminal stud on the frame rail labeled “AUX LIFTGATE AND ADDITIONAL LOADS” (see Figure 3).

NOTE: The junction stud bracket which contains the terminal stud is installed on the chassis frame to the rear of the chassis battery box.

NOTE: If additional loads are connected to the terminal stud, the fasteners must be torqued to 120 in-lbs (+/- 5%).

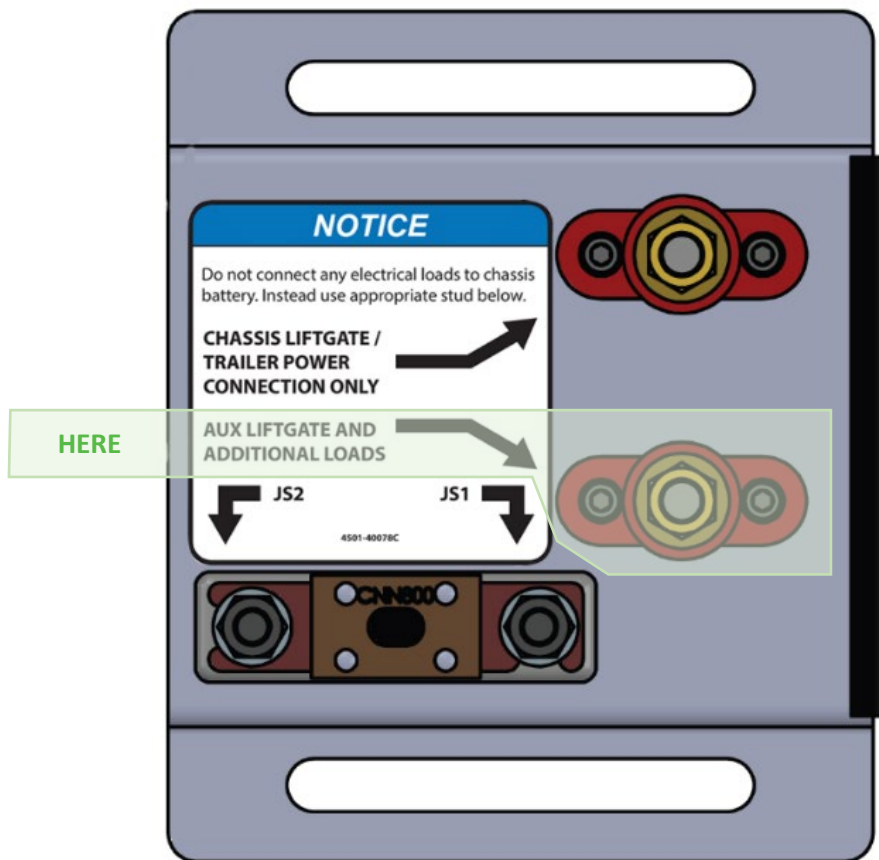


Figure 3 – Junction Stud Bracket

3.5. Is it OK to connect additional circuits/loads directly to the IMPAC batteries?

Answer: No. You should never attach loads directly to the IMPAC batteries. They are housed in a sheet-metal enclosure which should not be opened by technicians.

SECTION 4: DIAGNOSTICS AND BASIC TROUBLESHOOTING

4.1. If the Equipment Activation button is illuminated, why won't the air compressor start?

Answer: There are multiple reasons the compressor may not start.

- a) Inverter Load Too High – Using a combination of high-power-demand 110VAC loads prevents the compressor activation button from sending the signal to the compressor; this is intended to prevent the inverter from being overloaded. To indicate this, the IMPAC display will show the message, “Inverter Load Too High”.
- b) Stall Protection Active – If the compressor fails to start due to the load on the inverter being too high while starting the compressor motor, the IMPAC system will auto-start the truck and then try to start the compressor again. If the compressor fails to start a second time, this could indicate the compressor has a mechanical failure; in this case, the IMPAC system will not reactivate in an effort to protect the inverter. To indicate this, the IMPAC display will show the message, “Stall Protection Active”.
- c) Case Too Cold – If the compressor case is below 45°F, it will not operate until the integrated compressor heating system warms the compressor case to above 45°F. To indicate this, the IMPAC display will show the message, “Case Too Cold”.

4.2. Why does the engine Start / Stop Override button LED stay lit while in ZeroDRAW mode?


Answer: This LED is active any time the engine is unable to automatically start/stop while the IMPAC system controller is awake.

4.3. Why can't I just roll my key to the Run position to activate the equipment?

Answer: The IMPAC system requires a specific process to engage Equipment Activation mode. The engine must be on, the parking brake must be set, the Equipment Activation button must be pressed (indicated by the green light around the button being solid), and then the key must be removed from the ignition.

 **NOTE:** You must ensure the truck is in an environment that is safe to automatically start and stop the engine.

4.4. Are any of the tools and equipment powered while not in Equipment Activation mode?
Answer: All equipment except the compressor and jump-start is active when plugged into shore power, when the engine is running without the equipment activated, or when the system is in the 10-minute ZeroDRAW period immediately following equipment deactivation.

 **NOTE:** ZeroDRAW is activated for 10 minutes (unless the SOC reaches 35% first) any time the equipment is deactivated by removing the key. It can also be activated by rolling the key to the Run position, waiting one second, and then rolling the key back off without activating the equipment.

4.5. What happens if I leave the key in and never press the Equipment Activation button while the engine is running?

Answer: The engine will continue to run, and the compressor and jump-start will be disabled.

4.6. How do I wake up the IMPAC to temporarily power the service body?

Answer: Activate the 10-minute ZeroDRAW feature by rolling the key to the Run position, waiting one second, and then rolling the key back off without activating the equipment.

4.7. Where can I get additional information about the IMPAC system?

Answer: The visor quick-start label and the large quick-start label on the front of the IMPAC system explain the five switches on the IMPAC system that will be used in daily operation. These labels include a QR code (see Figure 4) that opens a web page with the following contents:

1. Quick-Start Guide (QSG)
2. System Orientation Card (SOC)
3. Frequently Asked Questions (FAQ)
4. System Overview Guide (SOG)
5. Operator Guide (OG; Coming Soon)


 **NOTE:** The IMPAC download switch is for use only when servicing the system with the aid of a trained technician.



Figure 4 – Quick-Start Guide QR Code