This manual covers the products listed below:

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
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<tbody>
<tr>
<td>069600</td>
<td>HDX780 Riding Trowel, HATZ 74HP Diesel T4, 12ft</td>
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</tbody>
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**NOTICE**

This manual, or a copy of it, must be kept with the machine at all times. There is a manual storage container located on the machine for your convenience.
Allen Engineering Corporation (“Allen”) warrants its products to be free of defects in material or workmanship for:

TWO YEARS FROM END USER’S DATE OF PURCHASE

Warranty period begins on the date of purchase by the End User of the product. All warranty is based on the following limited warranty terms and conditions, including the disclaimer of implied warranties and consequential damages.

1. Allen’s obligation and liability under this warranty is limited to repairing or replacing parts if, after Allen’s inspection, there is determined to be a defect in material or workmanship. Allen reserves the choice to repair or replace.

2. If Allen chooses to replace the part, it will be at no cost to the customer and will be made available to the Allen Distributor, Dealer, or Rental Center from whom the End User purchased the product.

3. Replacement or repair parts, installed in the product, are warranted only for the remainder of warranty period of the product as though they were the original parts.

4. Allen does not warranty engines or batteries. Engine warranty claims should be made directly to an authorized factory service center for the particular engine manufacturer. Batteries are not warranted due to unknown treatment during transport, etc, and any battery claims should be directed to the battery manufacturer.

5. Allen’s warranty does not cover the normal maintenance of products or its components (such as engine tuneups and oil & filter changes). The warranty also does not cover normal wear and tear items (such as belts and consumables).

6. Allen’s warranty will be void if it is determined that the defect resulted from operator abuse, failure to perform normal maintenance on the product, modification to product, alterations or repairs made to the product without the written approval of Allen. Allen specifically excludes from warranty any damage to any trowels resulting from an impact to the rotors.

7. Impact damage to gear boxes is not covered under the Allen warranty and is deemed customer abuse.

8. Allen will pay shop labor on warranty items at the Allen Shop Labor Rate in existence on the date of the warranty claim. An Allen labor chart will determine the time allowed to complete a repair and will govern the shop labor hours that will be allowed.

9. Allen will pay freight on warranty replacement parts at worldwide standard ground rates. No warranty replacement parts will be shipped air freight at the expense of Allen. Allen only pays outbound freight charges when sending warranty replacement parts to the customer via ground service. Allen does not pay any inbound freight. However, if Allen determines this to be a warranted item, only then will Allen reimburse the customer for inbound freight at standard ground rates.

10. ALLEN ENGINEERING CORPORATION’S WARRANTY POLICY WILL NOT COVER THE FOLLOWING: TAXES; SHOP SUPPLIES; ENVIRONMENTAL SURCHARGES; AIR FREIGHT; TRAVEL TIME; LOSS OF TIME; INCONVENIENCE; LOSS OF RENTAL REVENUE; RENTAL COSTS OF EQUIPMENT USED TO REPLACE THE PRODUCT BEING REPAIRED; LOSS OF USE OF THE PRODUCT; COMMERCIAL LOSS; OR ANY OTHER CHARGES WHATSOEVER OR ANY LIABILITIES FOR DIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGE OR DELAY.

11. ALLEN ENGINEERING CORPORATION MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED. THIS LIMITED WARRANTY IS IN LIEU OF THE WARRANTY OF MERCHANTABILITY AND FITNESS. THERE ARE NO OTHER WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THIS DOCUMENT.

12. No Allen employee or representative is authorized to change this warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of Allen Engineering Corporation.
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This manual provides information and procedures to safely operate and maintain the Allen Machine.

For your own safety and protection from personal injury, carefully read, understand, and observe the safety instructions described in this manual. Keep this manual or a copy of it with the machine at all times.

Always operate this machine in accordance with the instructions described in this manual. A well maintained piece of equipment will provide many years of trouble free operation.

This manual is divided into the following sections:

SECTION 1 SAFETY
SECTION 2 OPERATIONS
SECTION 3 SERVICE
SECTION 4 ACCESSORIES

Complete any warranty requirements as specified by the engine manufacturer in their instructions found inside the manual box located on the back of the riding trowel operator’s seat.

Your engine and clutch is not manufactured by Allen Engineering Corporation, Inc, and therefore is not covered under Allen Engineering Corporation, Inc warranty.

Your engine manufacturer should be contacted if you wish to purchase a parts manual or a repair manual for your engine.

Refer to enclosed owners engine manual for complete O&M instructions. See your battery manufacturer for battery warranty.
Sound & Vibration Testing

Sound Pressure Level Information:
Sound pressure is “A” weighted. Measured at the operators ear position while the ride-on trowel is operating at full throttle on concrete in a manner most often experienced in “normal” circumstances. Sound pressure may vary depending upon the condition of the concrete. Hearing protection is always recommended.

Vibration Level Information:
The vibration level indicated is the maximum RMS (Root Mean Square) velocity value obtained at the handle grip while operating the ride-on trowel on curing concrete in a manner most often experienced in “normal” circumstances. Values were obtained from all three axes of motion. The values shown represent the maximum RMS value from these measurements.

<table>
<thead>
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<th>Summary Data Of Sound And Vibration Testing</th>
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</thead>
<tbody>
<tr>
<td>Operator Ear SPL</td>
</tr>
<tr>
<td>- dB (A)</td>
</tr>
</tbody>
</table>

This information was acquired from sound and vibration analysis tests conducted at Allen Engineering Corporation test facilities.
Your Dealer has Allen Engineering Corporation trained mechanics and original Allen replacement parts. Always contact the Allen Dealer who sold you this machine for Allen Certified repairs and replacement parts.

Place Allen Dealer information below for future reference.

Dealer Name: ____________________________________________
Phone #: (___) - ___- ___________________________
Address: ____________________________________________
City:_________________________________________ State:__________ Zip:_______
Salesman: ____________________________ Mobile Phone:________________
Additional Comments: ____________________________________________

---

**NOTE**

ALL INFORMATION, SPECIFICATIONS, AND ILLUSTRATIONS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE AND ARE BASED ON THE LATEST INFORMATION AT THE TIME OF PUBLICATION.

The “PARTS & DECALS MANUAL” contain illustrated parts lists for help in ordering replacement parts for your machine. Follow the instructions below when ordering parts to insure prompt and accurate delivery:

1. All orders for service parts - include the serial number for the machine. Shipment will be delayed if this information is not available.

2. Include correct description and part number from the “PARTS & DECALS MANUAL”

3. Specify exact shipping instructions, including the preferred routing and complete destination address.

4. **DO NOT** return parts to AEC without receiving written authorization from AEC. All authorized returns must be shipped pre-paid.

5. When placing an order, please contact the AEC dealer nearest you.
Manufacturer's Codes:
When ordering parts or requesting service information, you will always be asked to specify the model and serial numbers of the machine. The legends below specifically defines each significant character or group of characters of the Model Number and Serial Number codes.

Model Number
HDX 780

Model
Series

Serial Number
The serial number found on the identification plate is a ten digit format. The model number identifies your machine and will ensure that you receive the correct replacement parts.

Serial Number Example
780 01 20 001

Sequence Number
Year
Month
Model

Unit Identification Plate Location:
An identification plate listing the model number and the serial number is attached to each unit and is located on the rear lower left side of mainframe. Refer below for serial number and model number location. This plate should not be removed at any time.

Please record the information found on this plate below so it will be available should the identification plate become lost or damaged. When ordering parts or requesting service information, you will always be asked to specify the model and serial numbers of the machine.

FILL IN FOR FUTURE REFERENCE

Model Number: 
Serial Number: 
Date Purchased: 
Purchased From: 

NAMEPLATE
Machine Specifications

- Horse Power: 74 HP
- Fuel Capacity: 13 Gal
- Retardant Capacity: 6 Gal
- Steering System: Hydraulic
- Hydraulic Capacity: 20.25 Gal
- Number of Operating Lights: 6
- Height: 64-1/4"
- Length: 147-3/4"
- Width: 68-1/4"
- Dry Weight: 2836 lbs
- Panning Width: 140"
- Rotor Center Distance: 79.5"
- Rotor Diameter: 60"
- Rotor Speed: 10-135 RPM
- Lifting: 2-point, Top-Mounted
Hatz Engine Information

Model: 4H50TIC
Fuel Type: Diesel
Horsepower [KW]: 74 [55]
Engine Idle RPM: 900
Engine Full RPM: 2800
Engine Type: Liquid - Cooled
Number of Cylinders: 4
Bore x Stroke, in. [mm]: 3.3 x 3.5 [84 x 88]
Displacement (in³): 119.10
Injection System: Direct Injection
Injection Pressure [PSI]: 26,100.0
Compression Ratio: 17.5:1
Cooling System: Liquid
Direction of Rotation Rev.: Clockwise
Engine Oil Capacity in gallons: 1.85
Dry Weight, lbs: 562

Dimensions:

- Length, in. [mm]: 36.5
- Width, in. [mm]: 27.0
- Height, in. [mm]: 31.8

Emission Certifications:

- EPA Non-Road LSI Tier 4 Certified
- EU Stage III B Certified
Intake Side

<table>
<thead>
<tr>
<th>REF. #</th>
<th>PART NAME</th>
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<td>1</td>
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<td>Oil Filler Plug, Top (Option)</td>
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<td>3</td>
<td>Oil Filter</td>
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<td>4</td>
<td>Main Fuel Filter</td>
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<tr>
<td>5</td>
<td>Side Oil Drain Screw</td>
</tr>
<tr>
<td>6</td>
<td>Fuel Pre-Filter</td>
</tr>
<tr>
<td>7</td>
<td>Drain Plug with Integrated Water Level Sensor</td>
</tr>
<tr>
<td>8</td>
<td>Electric Fuel Pump</td>
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<tr>
<td>9</td>
<td>Engine Type Plate</td>
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<td>10</td>
<td>Starter (Low Mounting Position)</td>
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<td>11</td>
<td>Dipstick</td>
</tr>
<tr>
<td>12</td>
<td>Oil Filler Plug, Bottom (Option)</td>
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<td>13</td>
<td>Oil Filler Plug, Middle (Option)</td>
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<td>Crankcase Ventilation</td>
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Exhaust Side

<table>
<thead>
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<th>REF. #</th>
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<td>11</td>
<td>Fan</td>
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</table>
SECTION 1
SAFETY
CALIFORNIA PROPOSITION 65 WARNING
Gasoline engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.
Safety-Alert Signs
This manual contains Safety-Alert Signs, as defined below, which must be followed to reduce the possibility of improper service damage to the equipment or personal injury. Read and follow all Safety-Alert Signs included in this manual.

**NOTE**

*NOTE* defines an operating procedure, condition, etc. which is essential to highlight that contains useful or important information.

**EMERGENCY**

*EMERGENCY* is used for the identification of safety equipment, first aid, or emergency egress locations.

**NOTICE**

*NOTICE* used to convey safety information on labels and signs.

**CAUTION**

*CAUTION* is indicative of a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**WARNING**

*WARNING* Indicative of a potentially hazardous situations that could result in death or serious injury

**DANGER**

*DANGER* indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
Some states require that in certain locations arrestors be used on internal combustion engines. A spark arrestor is a device designed to prevent the discharge of spark or flames from the engine exhaust. It is often required when operating equipment on forested land to prevent the risk of fires. Consult the engine distributor or local authorities and make sure that you comply with regulations regarding spark arrestors.

<table>
<thead>
<tr>
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<tr>
<td>![Symbol]</td>
<td>Lethal exhaust gas hazards</td>
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<td>![Symbol]</td>
<td>Explosive fuel hazards</td>
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<td>![Symbol]</td>
<td>Burn hazards</td>
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<td>![Symbol]</td>
<td>Rotating parts/crush hazards</td>
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<td>![Symbol]</td>
<td>Pressurized fluid hazards</td>
</tr>
<tr>
<td>![Symbol]</td>
<td>Hydraulic fluid hazards</td>
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</table>

Potential hazards associated with the operation of this equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety notes.
SECTION 1
SAFETY

Operating Safety

WARNING

Familiarity and proper training are required for the safe operation of this equipment! Equipment operated improperly or by untrained personnel can be dangerous! Read the operating instructions contained in both this manual and the engine manual and familiarize yourself with the location and proper use of all controls.

- **ALWAYS** read, understand, and follow procedures in the Operator’s Manual before attempting to operate the equipment.

- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.

- **NEVER** operate this machine while under the influence of drugs or alcohol.

- **NEVER** allow anyone to operate this equipment without proper training. People operating this equipment must be familiar with the risks and hazards associated with it.

- **NEVER** touch the engine or muffler while the engine is on or immediately after it has been turned off. These areas get hot and may cause burns.

- **NEVER** use accessories or attachments that are not recommended by AEC. Damage to equipment and injury to the user may result.

- **NEVER** operate the machine with the belt guard missing. Exposed drive belt and pulleys create potentially dangerous hazards that can cause serious injuries.

- **NEVER** leave machine running unattended.

- **DO NOT** run the machine indoors or in an enclosed area such as a deep trench unless adequate ventilation, through such items as exhaust fans or hoses, is provided. Exhaust gas from the engine contains poisonous carbon monoxide gas; exposure to carbon monoxide can cause loss of consciousness and may lead to death.

- **ALWAYS** remain aware of moving parts and keep hands, feet, and loose clothing away from the moving parts of the equipment.

- **ALWAYS** close fuel valve on equipped engines when machine is not being operated.

- **ALWAYS** store the equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children.
Internal combustion engines present special hazards during operation and fueling. Read and follow the warning instructions in the engine owner’s manual and the safety guidelines below. Failure to follow the warnings and safety guidelines could result in severe injury or death.

- **DO NOT** run the machine indoors or in an enclosed area such as a deep trench unless adequate ventilation, through such items as exhaust fans or hoses, is provided. Exhaust gas from the engine contains poisonous carbon monoxide gas; exposure to carbon monoxide can cause loss of consciousness and may lead to death.

- **DO NOT** smoke while operating the machine.

- **DO NOT** smoke when refueling the engine.

- **DO NOT** refuel a hot or running engine.

- **DO NOT** refuel the engine near an open flame.

- **DO NOT** spill fuel when refueling the engine.

- **DO NOT** run the engine near open flames.

- **ALWAYS** refill the fuel tank in a well-ventilated area.

- **ALWAYS** replace the fuel tank cap after refueling.

- **ALWAYS** keep the area around the muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite the debris and start a fire.
Poorly maintained equipment can become a safety hazard! In order for the equipment to operate safely and properly over a long period of time, periodic maintenance and occasional repairs are necessary.

- **ALWAYS** disconnect the battery before servicing the equipment.
- **DO NOT** attempt to clean or service the machine while it is running. Rotating parts can cause severe injury.
- **DO NOT** crank a flooded engine with the spark plug removed on gasoline-powered engines. Fuel trapped in the cylinder will squirt out the spark plug opening.
- **DO NOT** test for spark on gasoline-powered engines if the engine is flooded or the smell of gasoline is present. A stray spark could ignite the fumes.
- **DO NOT** use gasoline or other types of fuels or flammable solvents to clean parts, especially in enclosed areas. Fumes from fuels and solvents can become explosive.
- **ALWAYS** turn engine off and remove key from machine before performing maintenance or making repairs.
- **ALWAYS** handle blades carefully. The blades can develop sharp edges which can cause serious cuts.
- **ALWAYS** keep the area around the muffler free of debris such as leaves, paper, cartons, etc. A hot muffler could ignite the debris and start a fire.
- **ALWAYS** replace worn or damaged components with spare parts designed and recommended by AEC Corporation.
- **ALWAYS** disconnect the spark plug on machines equipped with gasoline engines, before servicing, to avoid accidental start-up.
- **ALWAYS** relieve all pressure in the air, oil and cooling systems before disconnecting any lines, fittings or related items. Escaping fluid under pressure has sufficient force to penetrate skin causing serious personal injury, **DO NOT** check for leaks your hands.
- **ALWAYS** switch off the power supply at the battery disconnect before adjusting or maintaining the electrical equipment.
- **ALWAYS** keep the machine clean and labels legible. Replace all missing and hard-to read labels. Labels provide important operating instructions and warn of dangers and hazards.
- **ALWAYS** wear rubber gloves to avoid personal injury, when you treat fluids used in machine. In case of contact with skin, immediately wash off.
ALWAYS DO A THOROUGH INSPECTION OF THE SLINGS, CHAINS, AND HOOKS BEFORE ATTEMPTING TO LIFT THE MACHINE!

OSHA has set forth guidelines which detail the use of Rigging Equipment for Material handling. This guideline is found under

**OSHA Standard Number: 1926.251**

Please read and follow all guidelines found in this standard.

- **Removal from service.**
  - Synthetic web slings shall be immediately removed from service if any of the following conditions are present:
    - ACID OR CAUSTIC BURNS
    - CUT
    - EDGE CUT
    - MELTING OR CHARRING
    - ABRASIONS
    - PUNCTURE
    - WELD SPATTER
    - BROKEN OR WORN STITCHES
    - DAMAGED EYE
    - EMBEDDED MATERIALS
    - TENSILE BREAK
    - MISSING OR ILLEGIBLE TAG
    - No UV Degradation
    - Made From UV Exposure
    - UV DEGRADATION
    - RED CORE YARN
    - KNOT
    - CRUSHED WEBBING
    - SNAG
    - DAMAGED HARDWARE

*(OSHA 1926.251(e)(8))*
Lifting Safety

- When lifting the machine, all personnel must be clear of the machine.
- **DO NOT** stand near or under the machine while it is being lifted.

**Lifting instructions using a hoist:**

- An optional lifting harness is available for purchase. Part number 064798
- Place slings, chains or hooks through each lifting point on the machine. Use a sling or chains connected to a central lifting device. Ensure that all lifting devices have sufficient weight-bearing capacity.
- **ALWAYS** shutdown engine before transporting.
• Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer “gross vehicle weight rating.”

• **ALWAYS** inspect the hitch and coupling for wear. Never tow a trailer with defective hitches, couplings, chains, etc.

• Check the tire air pressure on both towing vehicle and trailer. Trailer tires should be inflated to 50 psi cold. Also check the tire tread wear on both vehicles.

• **ALWAYS** make sure the trailer is equipped with a safety chain.

• **ALWAYS** properly attach trailer’s safety chains to towing vehicle.

• **ALWAYS** make sure the vehicle and trailer directional, backup, brake and trailer lights are connected and working properly.

• DOT Requirements include the following:
  - Connect and test electric brake operation.
  - Secure portable power cables in cable tray with tie wraps.

• The maximum speed for highway towing is 55 MPH unless posted otherwise. Recommended off-road towing is not to exceed 15 MPH or less depending on type of terrain.

• Avoid sudden stops and starts. This can cause skidding, or jack-knifing. Smooth, gradual starts and stops will improve towing.

• Avoid sharp turns to prevent rolling.

• Trailer should be adjusted to a level position at all times when towing.

• Raise and lock trailer wheel stand in up position when towing.

• Place chock blocks underneath wheel to prevent rolling while parked.

• Place support blocks underneath the trailer’s bumper to prevent tipping while parked.

• Use the trailer’s swivel jack to adjust the trailer height to a level position while parked.

• Use tie downs to ensure machine does not move during transportation.
This section details the proper technique to utilize the lifting bridle system in a safe manner to install concrete finishing pans.

(NOTE: Images are for illustration purposes only)

1. Attach the lifting bridle to the machine shown in section "Lifting Safety"

2. Slowly lift the machine in a safe manner to a height that is required to safely install the pans. This is typically 6"-8" above floor level.

3. Carefully slide the pans under the machine making sure that you are aware of the corners on the blades as they are sharp.

4. Align the pans so that the clips will not be crushed when the machine is lowered back down.

5. Slowly lower the machine down onto the pans. Make sure the blades are going into the proper gaps. (Typically the pans can only be installed one way)

6. Once the machine is on securely on the ground with the pans underneath, remove the lifting bridle from the machine.

7. Start the machine and slowly increase the throttle until the blades begin turning and engaging the pans. The machine is now ready to finish the concrete utilizing the pans.

**NOTE**: Utilizing the lifting sling (bridle) and the dolly jacks are intended only for site transportation and the installation of pans and blades. DO NOT use them for regular maintenance without the additional use of jack stands to insure stability of the machine.

Use a lifting sling (bridle) with a capacity of at least 2:1 weight ratio for the equipment being hoisted.

[See section "ACCESSORIES" for appropriate lifting harness part number]
This section details the proper technique to utilize the Dolly Jack system in a safe manner to install concrete finishing pans.

(NOTE: Images are for illustration purposes only)

Use the appropriate set of lifting jacks that are designed for the machine you are lifting.
[See section "ACCESSORIES" for appropriate dolly jack part number]

1. Attach the front and rear dolly jacks into the machine at the receiving tube locations.

2. Slowly lift the machine in a safe manner to a height that is required to safely install the pans. This is typically 6"-8" above floor level.

3. Carefully slide the pans under the machine, making sure that you are aware of the corners of the blades as they are sharp.

4. Align the pans so that the clips will not be crushed when the machine is lowered back down.

5. Slowly lower the machine down onto the pans. Make sure the blades are going into the proper gaps. (Typically the pans can only be installed one way)

6. Remove the dolly jacks from the machine

7. Start the machine and slowly increase the throttle until the blades begin turning and engaging the pans. The machine is now ready to finish the concrete utilizing the pans.

NOTE: Utilizing the lifting sling(bridle) and the dolly jacks are intended only for site transportation and the installation of pans and blades. DO NOT use them for regular maintenance without the additional use of jack stands to insure stability of the machine.
**SECTION 2 OPERATIONS**

**Safety Decals**

- **DECAL - Left Cup Holder**
  - PART #: 069102
  - QTY: 1

- **DECAL - Pressure Ports**
  - PART #: 070129
  - QTY: 1

- **DECAL - Diesel Only**
  - PART #: 069104
  - QTY: 1

- **DECAL - Fuse Panel**
  - PART #: 070128
  - QTY: 1

- **DECAL - Retardant Only**
  - PART #: 065655
  - QTY: 1

- **DECAL - AEC Info / Warranty**
  - PART #: 068457
  - QTY: 1

- **DECAL - Retardant Only**
  - PART #: 065655
  - QTY: 1

- **DECAL - HYDR. PRESS. WARNING**
  - PART #: 070402
  - QTY: 1

- **DECAL - Hydraulic Fluid**
  - PART #: 065668
  - QTY: 1

- **DECAL - Drop Hazard**
  - PART #: 065656
  - QTY: 2

- **DECAL - T4 Compliant**
  - PART #: 070658
  - QTY: 1

- **DECAL - T4 Compliant**
  - PART #: 070658
  - QTY: 1

- **DECAL - PROP 65**
  - PART #: 069225
  - QTY: 1

- **DECAL - Grease Plate Daily**
  - PART #: 066133
  - QTY: 2
SECTION 2
OPERATIONS
Introduction to HDX780

This machine is built with user safety in mind. However, it can present hazards if improperly operated and serviced. Follow operating instructions carefully.

If you have any questions about operating or servicing this equipment, please contact your Allen Engineering Dealer or AEC Customer Service at 800-643-0095 or 870-236-7751.

The HDX780 riding trowel is a modern high production machine. Finishing rate will vary depending on the operators skill and job conditions. This riding trowel has ten finishing blades.

The Super Heavy Duty (SHD) Gearboxes are designed to provide exceptional performance with low maintenance and trouble free use under some of the worst conditions.

All Allen Engineering HDX780 Riders are equipped with a safety shutdown switch and a low oil warning for added job safety and engine protection. Operating time between fuel refills is approximately 2-1/2 to 3 hours depending on rotor speeds.
Before Starting Procedures

Before operation each day check for the following:

1. All guards, side screens and panels are in place
2. All safety and information signs are in place and legible
3. Engine, Gearbox, and Hydraulic Oil levels are correct.
5. Check the battery level
6. Condition of air filter on engine.
7. Condition of riding trowel arms and blades.
8. Verify that daily maintenance of grease points have been performed.
9. Check operating controls for proper operation and adjustment
10. Check speed control operation before and after starting engine for proper operation
11. Check the steering left and right, for proper operation
12. Check for any hydraulic leaks
13. Remove any loose objects that could interfere with the operation of the trowel

**Note:** If there is any indication that faulty equipment exists, shutdown safely, inform the proper authority and **DO NOT** operate the riding trowel until the problem has been fixed.

Starting Procedures

Turn ignition switch key to the start-position, immediately release key when engine starts. Allow engine to warm up for 5 minutes before operating riding trowel.

⚠️ **CAUTION**

Operating the starter for more than 5 seconds can damage the starter or engine. If engine fails to start release the switch and wait 15 seconds before operating starter again.
1. Operator Seat - Rotors will not spin unless operator is seated. Seat is adjustable.
2. Left Joystick - Used to move the rider forward and backward
3. Right Joystick - Used to move the rider forward, backward, left & right.
4. Key Switch - Used to start that machine.
5. Dual Pitch Switch - Increases or decreases the pitch of both rotors simultaneously
6. USB - Dual USB plugs. 2.1A @ 5VDC MAX
7. Foot Control - Used to control rotor speed.
9. Lifting Point - Used to raise and lower the machine
10. Engine Coolant Access - Used to access the engine coolant
11. Hydraulic Fluid Reservoir - Where the hydraulic fluid is stored
12. Machine Lights - Used to illuminate the surrounding work area
13. Water Spray Button - (located on the left joystick) used to spray water on the work surface
14. Left Blade Pitch - switch used to change the pitch of the left blades
15. Right Blade Pitch - switch used to change the pitch of the right blades
16. Engine Speed Switch - Changes the engine speed from "Idle" to "Full"
17. Light Switch - Turns the machine LED lights on or off
18. Cruise Control Switch - Turns the machine cruise control on/off
19. High Oil Pressure - When lit, change oil filter
20. Tool Holder - Store hand tools here
21. Cup Holder - Holds your favorite beverage
22. Engine Module - Controls engine RPM, shows fuel level, controls/monitors multiple other features
23. Fuse Box - Holds electrical fuses and relays
24. Muffler - Used to control exhaust sound and direction
26. Retardant Reservoir - Holds the retardant fluid
27. Water Bucket - Holds water for finishing
28. Air Filter - Filters the engine air
29. Battery - 12VDC, 700 Cold Crank Amperes (CCA)
30. Screed Blade - Used to smooth and finish concrete
31. Tie Down - Use these to secure the machine during transport.
32. Coolant Reservoir - Used for recovery of coolant when engine is hot
33. Spray Nozzle - Used to spray retardant on concrete
34. Machine Cover - Cover for rotors (DO NOT STEP)
Operating The Riding Trowel

To utilize your Allen Engineering **HDX780** rider to its fullest capacity the machine should be driven in the direction the operator is facing. This will finish the widest possible area while giving the operator an excellent view of the slab surface about to be troweled. When the machine reaches the end of the slab make a 180 degree turn and repeat the straight line of direction to the other end of the slab. To familiarize a new operator with the riding trowel the following steps should be taken.

**NOTE**

All items in this manual are describe from the operator “Sitting On Machine” or **SOM** for short.

1. Location of all Operating Controls
   A. Right Pitch Control
   B. Joystick (Forward & Reverse)
   C. Joystick (Left & Right, Forward & Reverse)
   D. Left Pitch Control
   E. Right Foot Pedal
   F. Retardant Spray Pushbutton

2. Steering the Riding Trowel
   A slight “feathering motion” forward and backward with the left hand joystick is required to move the machine in a straight path to the left. The same motion is required of the right joystick to move to the right.

<table>
<thead>
<tr>
<th>Position</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forward</td>
</tr>
<tr>
<td>2</td>
<td>Reverse</td>
</tr>
<tr>
<td>3</td>
<td>Rotate Clockwise</td>
</tr>
<tr>
<td>4</td>
<td>Rotate Counter-clockwise</td>
</tr>
<tr>
<td>5</td>
<td>Sideways - Left</td>
</tr>
<tr>
<td>6</td>
<td>Sideways - Right</td>
</tr>
</tbody>
</table>
3. Stopping the Trowel
To stop the trowel’s movement, let go of the joysticks [B] and [C]. They will return to their neutral position. Also release pressure on the right foot pedal [E].

⚠️ CAUTION

This machine is equipped with a seat kill switch mechanism. If in need of an emergency stop, simply turning the key off or raising off the seat even while holding the right foot pedal down, will stop the engine from running.

4. With the operator in the seat, show him the functions of the joysticks [B] and [C] and how to start the machine.
A hard level concrete slab with water on the surface is an ideal place for an operator to practice with the machine. For practice pitch the blades up approximately 1/4 inch on the trailing edge. Start by making the machine hover in one spot and then practice driving the machine in a straight line and making 180 degree turns. Best control is achieved at full engine RPM.

⚠️ CAUTION

After starting engine, fully engage the throttle. This allows the engine to warm up quicker and also engages the torque converter. At this time the machine’s rotors will begin turning so long as foot pedal [E] is engaged.

⚠️ CAUTION

DO NOT use excessive pressure on the joysticks. Excessive pressure does not increase the reaction time of the machine and can damage steering controls.

5. Engine Speed
The engine has two primary speed settings: Idle (1200 RPM) & Full (3400 RPM)

The engine will start at idle speed. This machine is equipped with a Cold Weather Start circuit, meaning that the engine RPM will not increase above idle speed until the hydraulic oil has reached an optimum temperature. The operator can activate the RPM toggle to FULL during this period, however the RPM will not increase until that optimum temperature is achieved.

There is a seat sensor on the machine that will not allow the engine RPM to go above idle speed if the operator is not seated. Therefore, the operator must be seated AND the Cold Weather Start circuit must be disengaged in order for to achieve full RPM speed.
6. **Cruise Control**
   This machine comes standard with a cruise control function. The cruise will allow the operator to remove their foot off the foot pedal and still maintain rotor function.

   To use the cruise control, enable the foot switch so that the rotors engage, then pull up on the cruise control button. To release the cruise control, press down on the center button on the cruise control then pull up slightly to disengage.

7. **Pitch Adjustment**
   Different pitch angles are needed as you work the different stages of the concrete. When changing or setting pitch (angle of trowel blades), slow the machine down, set the desired degree of pitch on the left side of the machine and then adjust the right side to match.

   To change the pitch, the operator will use the rocker switch located at the top of either joystick. By pressing the rocker switch towards the inside, the pitch will decrease, pressing the switch toward the outside of the joystick will increase the pitch level. (see Figure 2.5).

![Figure 2.5 Pitch Adjustment](image)

<table>
<thead>
<tr>
<th>Working Conditions of Concrete</th>
<th>Suggested Working Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1: Wet surface working stage</td>
<td>0°</td>
</tr>
<tr>
<td>Stage 2: Wet plastic working stage</td>
<td>5°</td>
</tr>
<tr>
<td>Stage 3: Plastic working stage</td>
<td>10°</td>
</tr>
<tr>
<td>Stage 4: Semi-hard working stage</td>
<td>15°</td>
</tr>
<tr>
<td>Stage 5: Hard finishing stage (Burnishing)</td>
<td>20°</td>
</tr>
</tbody>
</table>

8. **Enable Machine Blades**
   The machine trowel blades are enabled by the foot pedal (E). Hold down the pedal to enable the rotors to begin turning, release pressure off the pedal to stop the rotors.
The Murphy PowerView 380 features robust, multifunction displays for advanced monitoring of multiple electronic engines.

It’s capable of monitoring multiple engines and machine parameters on an easy to-read 3.8-inch (97mm) QVGA monochrome LCD. The display is capable of handling sophisticated engine diagnostics as well as basic engine alarm/shutdown. Customize the PV380 display using the PowerVision Configuration Studio®, an intuitive tool designed to make customization simple. Using the software tool, users can tailor basic graphics, designate screen layout and define custom parameters. The PV380 is equipped with five tactile push buttons to quickly access a convenient menu. In addition, a back-lit and heated graphic display with LEDs indicate alarm or shutdown status.

Flat Screen Display
A 3.8” QVGA monochrome LCD screen displays gauges, soft key commands and fault messages as well as menu options for setup and configuration.

Soft Keys and Commands
The five tactile push buttons on the bottom of the display correspond to the options available for the screen being displayed.

Alarms
Red and amber warning LEDs; set point triggered output for external piezo buzzer or shut-down relay.
Specifications:
- AEC Part #: 066227
- Display: 3.8” Monochrome LCD
- Resolution: QVGA, 320 x 240 Pixels
- Orientation: Landscape
- Back-lighting: LED, White
- Flash Memory: 2Mb
- RAM: 256kb
- Operating Voltage: 6-36 VDC
- Power Consumption: 10 Watt
- Communications: CAN 2.0B & RS485 (Modbus)
OPERATOR INTERFACE HOME SCREEN: This screen (shown above) is the instrument cluster screen and is where you will start to navigate to all other menus.

**BUTTON ONE:** This button will swap the language between English and Spanish.

**BUTTON TWO:** This button will display the Engine Fault Codes and the I/O Status Screen. By selecting I/O status, you will then be able to see real time status of the Machine ID points, Seat Switch status, Cold Start status, Desired Engine Speed, and Run/Idle Status.

**BUTTON THREE:** This button will allow a person to change the screen brightness, screen contrast, units of measure, and language. Use button 1 to move the selection “UP”, use button 2 to move the selection “DOWN”, button 3 will verify the selection, use button 5 to return to the home screen.

**BUTTON FOUR:** Directs you to the Service Reminder screen. The first screen will give an overview of the current state of all the service reminders that are set. To cycle through/reset the reminders, press OK (button 3), then press the down arrow (button 1) and select “+” (button 3). This will reset the selected option back to the appropriate service interval. To cycle through the different service options, press “+” (button 3) when the selection arrow is at the top.

**BUTTON FIVE:** This will alternate the top row of readouts to provide more real time engine process data. The top row will either display an “Engine Torque / Load RPM” option or a “Cool Temp / Fuel Temp” option.
FUNCTIONS:

- **Cold Start** - When the hydraulic oil is too cold, the engine will automatically ramp up to “cold start” RPM to allow the machine to warm to an acceptable operating temperature. The status of this function can be viewed on the I/O Status screen under “OIL TEMP”.

- **Run/Idle** - The rocker switch to the right of the operator will toggle the machine between RUN RPM and IDLE RPM after the hydraulic oil has reached temperature. The status of this function can be viewed in the IO STATUS Screen under “CC,RN”.

- **Seat Switch** - The machine cannot be in RUN RPM unless the seat switch is made. If the operator stands up while in run RPM, the machine will return to IDLE RPM. The status of this function can be viewed in the IO STATUS screen under “SEAT SW”.

- **Lift-Off** - When lifting the machine off the slab, with no operator in the seat, someone can hold the Run/Idle Rocker to achieve a higher Engine RPM for 5 seconds and press the foot pedal while the machine is being pulled from the concrete.

The start up screen will display for 5 seconds once power is supplied to the control unit (the machine key is turned on). This screen will display the Allen logo, the Machine Series Name, and the relevant software information that is needed for troubleshooting.
SECTION 3
SERVICE
Periodic Maintenance Schedule

The table below lists basic trowel and engine maintenance. Refer to OEM engine manufacturer's Operation Manual for additional information on engine maintenance. A copy of the engine operator's manual was supplied with the machine when it was shipped.

<table>
<thead>
<tr>
<th>Maintenance Schedule</th>
<th>Description</th>
<th>Daily</th>
<th>20 Hrs</th>
<th>200 Hrs</th>
<th>500 Hrs</th>
<th>1K Hrs</th>
<th>4K Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSPECT</td>
<td>Inspect Engine Oil Level</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect Hydraulic Oil</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect Air Filters</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect Radiator Fins</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect Radiator Coolant</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect for Leaks</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check poly V-belt</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect all Hardware</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect Belts</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect Wiring</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect Battery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inspect Exhaust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Inspect Coolant Hoses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Inspect Catalyst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>ACTION</td>
<td>Control Linkage Lubrications</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Change Engine Oil &amp; Filter</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Change Hydraulic Oil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Change Fuel Filters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Change Oil Separator Element</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Change Air Filters</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drain Water Separator</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Replace Fan Belt</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clean Entire EGR System</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Change Coolant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

*Replace Hydraulic Fluid with Hydraulic Oil 68 (DTE26) or Equivalent*

- Change the type of engine oil according to the ambient temperature.
- When using oil of different brands from the previous one, be sure to drain all the previous oil before adding the new engine oil.
### Replacement Filters

<table>
<thead>
<tr>
<th>Item</th>
<th>Part #</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>065851</td>
<td>Pre-Fuel Filter</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>065852</td>
<td>Fuel Filter</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>065853</td>
<td>Oil Separator</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>065854</td>
<td>Oil Filter</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>065855</td>
<td>Air Filter - Secondary</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>065856</td>
<td>Air Filter - Primary</td>
<td>1</td>
</tr>
</tbody>
</table>
Occasionally it may be necessary to jump start a weak battery. If jump starting is necessary the following procedure is recommended to prevent starter damage, battery damage, and personal injury.

**WARNING**

Jump starting a battery incorrectly can cause the battery to explode resulting in severe personal injury or death. Do not smoke or allow any ignition sources near the battery and do not start a frozen battery.

**WARNING**

Electrical arcing can cause severe personal injury. Do not allow positive and negative cable ends to touch.

1. Use a battery of the same voltage (12V) as is used with your engine.
2. Attach one end of the positive booster cable (red) to the positive (+) terminal of the booster battery. Attach the other end to the terminal of your engine battery.
3. Attach one end of the negative booster cable (black) to the negative (-) terminal on the booster. Attach the other end of the negative cable to your engine battery.
4. Jump starting in any other manner may result in damage to the battery or the electrical system.

**CAUTION**

Over cranking the engine can cause starter damage. Allow 5 minutes for starter to cool if engaged for more than 15 seconds.

**CAUTION**

When using lights or high amperage draw accessories, idle the engine for a period of 20 minutes to bring the battery to charge state.
Lift Lever Adjustment Procedure

• Damage to and/or replacement of a trowel arm can change the adjustment of the lift lever. This can unbalance the trowel arms and cause the riding trowel to wobble during operation. To operate smoothly the lift lever on all trowel arms must be adjusted the same to ensure that the riding trowel is balanced correctly.

• Adjusting the trowel arms is accomplished by using the optional trowel arm alignment jig AEC PN 016863. The service manual that is included with the alignment jig describes in detail the steps to perform this procedure and to check the flatness and straightness of the trowel arms.

NOTE

Make sure that there is no pitch in the blades before attempting to remove a trowel arm.

• The steps below described the general procedure to remove the trowel arms to be aligned.

1. Block up pressure plate [A] using a wooden block.
2. Remove stabilizer ring from spider assembly (only on available models).
3. Remove blades from trowel arms.
4. Loosen hex head cap screw [B] and remove it and the external star washer from the spider boss.
5. Remove trowel arms from spider boss with lift levers in place.
6. Clean flats on trowel arm before placing it in the trowel arm jig (PN 016863).
7. Perform the alignment procedures as outlined in the alignment jig service manual (PN 047427).
8. Re-attach trowel arm to spider boss and blades to trowel arms.
9. Tighten down hex head cap screw to secure trowel arm in place.
10. Reattach stabilizer ring (only on available models).
<table>
<thead>
<tr>
<th>SPN Code</th>
<th>FMI Code</th>
<th>Fault Check Description</th>
<th>Fault Detection Condition</th>
<th>Possible Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>3</td>
<td>Signal Range Check High for APP2</td>
<td>If the signal exceeds the applicable threshold APP_uRaw2SRCHigh_C (2388mV) a signal range violation is detected after the debouncing.</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td>If the signal is below the applicable threshold APP_uRaw2SRCLow_C (280mV) a signal range violation is detected after debouncing.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Signal Range Check High for APP1</td>
<td>If the signal exceeds the applicable threshold APP_uRaw1SRCHigh_C (4775mV) a signal range violation is detected after debouncing.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td>If the signal is below the applicable threshold APP_uRaw1SRCLow_C (740mV) a signal range violation is detected after the debouncing.</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>3</td>
<td>In case of dual analog accelerator pedal, it is the plausibility check between APP1 and APP2 and in case of potentiometer switch accelerator pedal, it is the plausibility check between APP1 and idle switch</td>
<td>If the permitted maximum for the difference of both the input signals APP_uDiffMax_mp is exceeded this is reported in the DFC_st.DFC_SynAPP via the DSM.</td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>3</td>
<td>SRC High for Environment Pressure</td>
<td>The sensor raw value is lesser than or equal to Fl_SRCFuelP.uMax_C</td>
<td>fuel tank empty, fuel filter blocked, wiring harness or pre supply pump itself defective</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>SRC low for Environment Pressure</td>
<td>The sensor raw value is lesser than or equal to Fl_SRCFuelP.uMin_C</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>3</td>
<td>Low fuel pressure error monitoring</td>
<td>Engine speed Epm_nEng greater or equal to Fl_nStrtMonFuelP_C, and Fuel pressure value Fl_pFuelP is lesser than the curve output Fl_pFuel-Spd_CUR</td>
<td></td>
</tr>
<tr>
<td>97</td>
<td>15</td>
<td>Water in Fuel Detected</td>
<td>Water in Fuel Detected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Fuel Level Un-plausible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>0</td>
<td>Maximum Oil Pressure Error in Plausibility Check</td>
<td>The oil temperature Oil_tSwmp is equal to or greater than the limit Oil_tLimP_C and the oil pressure Oil_pSwmp is greater than the threshold Oil_pMaxP_mp.</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Minimum Oil Pressure Error in Plausibility Check</td>
<td>The oil pressure Oil_pSwmp is less than the threshold Oil_pMinP_mp.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Oil_uRawPSwmp &lt; Oil_SRCP-Swmp.uMax_C (4772mV)</td>
<td>Oil_uRawPSwmp &gt; Oil_SRCP-Swmp.uMax_C (4772mV)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Oil_uRawPSwmp &lt; Oil_SRCP-Swmp.uMin_C (234mV)</td>
<td>Oil_uRawPSwmp &lt; Oil_SRCP-Swmp.uMin_C (234mV)</td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>0</td>
<td>Physical Range check high for air pressure at the upstream of intake valve sensor</td>
<td>If the signal Air_pSensPlntkVUs is greater than Air_PhysRngPlntkVUs.Max_C for a duration DDRC_DurDeb.Air_tiPhysRngHiPlntkVUsDebDef_C , then a physical range check high error is reported.</td>
<td>Over boost condition, Possible Blocked Waste Gate</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Physical Range check low for air pressure at the upstream of intake valve sensor</td>
<td>If the signal Air_pSensPlntkVUs is less than Air_PhysRngPlntkVUs.Min_C for a duration DDRC_DurDeb.Air_tiPhysRngLoPlntkVUsDebDef_C , then a physical range check low error is reported.</td>
<td>Under Boost, Possible Turbo-Charger Defective</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Diagnostic fault check for SRC high in air pressure upstream of intake valve sensor</td>
<td>The sensor raw signal Air_uRawPlntkVUs (voltage) is above Air_SRCPPlntkVUs.uMax_C</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Diagnostic fault check for SRC low in air pressure upstream of intake valve sensor</td>
<td>The sensor raw signal Air_uRawPlntkVUs (voltage) is below Air_SRCPPlntkVUs.uMin_C</td>
<td></td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
<tr>
<td>----------</td>
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<td>----------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>105</td>
<td>0</td>
<td>Physical Range Check high for Charged Air cooler down stream temperature</td>
<td></td>
<td>Physical Range Check high for Charged Air cooler down stream temperature</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Physical Range Check low for Charged Air cooler down stream temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>The sensor raw signal \text{Air_uRawTCACDs (voltage) is above Air_SRCTCACDs. uMax_C (4803mV).}</td>
<td>The sensor raw signal \text{Air_uRawTCACDs (voltage) is above Air_SRCTCACDs. uMax_C (4803mV).}</td>
<td>wiring harness or component</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>The sensor raw signal \text{Air_uRawTCACDs (voltage) is above Air_SRCTCACDs. uMax_C (318mV).}</td>
<td>The sensor raw signal \text{Air_uRawTCACDs (voltage) is above Air_SRCTCACDs. uMax_C (318mV).}</td>
<td></td>
</tr>
<tr>
<td>107</td>
<td>3</td>
<td>SRC High for Controller Mode Switch</td>
<td>Wiring Harness or Component</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>SRC Low for Controller Mode Switch</td>
<td>Wiring Harness or Component</td>
<td></td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Error Path for Clog Detection in Air Filter</td>
<td>Air Filter Clogged / Sensor Value Okay?</td>
<td></td>
</tr>
<tr>
<td>108</td>
<td>0</td>
<td>Ambient Air Pressure Sensor Range Check Max-Error</td>
<td></td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Ambient Air Pressure Sensor Range Check Min-Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Fault Check Max Signal Range Violated for Ambient Air Pressure Sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Fault Check Min Signal Range Violated for Ambient Air Pressure Sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>0</td>
<td>Physical Range Check High for CEngDsT</td>
<td>The sensed sensor signal CEngDsT\textsubscript{tSens} is greater than CEngDsT\textsubscript{PhysRng.Max}_C</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Physical Range Check Low for CEngDsT</td>
<td>The sensed sensor signal CEngDsT\textsubscript{tSens} is less than CEngDsT\textsubscript{PhysRng.Min}_C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>The Sensor Raw Signal: CEngDsT_uRaw (Voltage) is Above CEngDsT_SRC.uMax_x_C (4957mV)</td>
<td>The sensor raw signal CEngDsT_uRaw (voltage) is above CEngDsT_SRC.uMax_C.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>The Sensor Raw Signal: CEngDsT_uRaw (Voltage) is Below CEngDsT_SRC.uMin_C (359mV)</td>
<td>The sensed raw voltage value CEngDsT_uRaw is less than CEngDsT_SRC.uMin_C.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Engine Coolant Temp Too High Plausibility Error</td>
<td>An “ERROR” is reported if the engine coolant temperature CEngDsT_t is greater than an threshold CEngDsT_tMax_T_C.</td>
<td>Less Cooling Water, Water Pump Defective, Water Cooler Blocked</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Defect Fault Check for Absolute Plausibility Test</td>
<td>coolant temperature did not reach the threshold temperature</td>
<td>Sensor Value Problem</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>Defect Fault Check for Dynamic Plausibility Test</td>
<td>rise in coolant is not reached the minimum rise of coolant temperature</td>
<td></td>
</tr>
<tr>
<td>111</td>
<td>17</td>
<td>Low Coolant Level Error</td>
<td>If the Coolant Level is Low, i.e. if the message ClntLv_st is set.</td>
<td>Lowe Coolant Level; Coolant Level Sensor Defective; Wiring Harness Defective</td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
<tr>
<td>----------</td>
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<td>---------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>157</td>
<td>3</td>
<td>Sensor Voltage Above Upper Limit</td>
<td>If the raw sensor voltage RailP_uRaw exceeds the limiting value RailP_SRC.uMax_C (4662.30mV) a fault will be detected. If the uncorrected raw sensor voltage RailP_uRawNoCor_mp exceeds the limiting value RailP_AdcMaxVal_C (4900mV) a fault will be detected.</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td>4</td>
<td>Sensor Voltage Below Lower Limit</td>
<td>If the raw sensor voltage RailP_uRaw falls below the limiting value RailP_SRC.uMin_C (250mV) a fault will be detected.</td>
<td>High Engine Load with Low Fuel Level and High Ambient Temperature</td>
<td></td>
</tr>
<tr>
<td>168</td>
<td>0</td>
<td>Physical Range Check High For Fuel Temperature</td>
<td>The sensor raw signal BattU_uRaw (voltage) is above BattU_uHiBatt_C.</td>
<td>Very Cold Ambient Temperature</td>
</tr>
<tr>
<td>1</td>
<td>Physical Range Check Low For Fuel Temperature</td>
<td>The sensor raw signal BattU_uRaw (voltage) is below BattU_uLoBatt_C.</td>
<td>Very Cold Ambient Temperature</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SRC High for Fuel Temperature Sensor</td>
<td>The sensor raw signal BattU_uRaw (voltage) is above BattU_uSRCMa_C.</td>
<td>Wiring Harness or Component</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SRC Low for Fuel Temperature Sensor</td>
<td>The sensor raw signal BattU_uRaw (voltage) is below BattU_uSRCMin_C.</td>
<td>High Engine Load with Low Fuel Level and High Ambient Temperature</td>
<td></td>
</tr>
<tr>
<td>174</td>
<td>0</td>
<td>Physical Range Check High for Fuel Temperature</td>
<td>The sensed sensor signal FuelT_tSens is greater than FuelT_PhysRng.Max_C</td>
<td>Very Cold Ambient Temperature</td>
</tr>
<tr>
<td>1</td>
<td>Physical Range Check Low for Fuel Temperature</td>
<td>The sensed sensor signal FuelT_tSens is less than FuelT_PhysRng.Min_C</td>
<td>Very Cold Ambient Temperature</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SRC High for Fuel Temperature Sensor</td>
<td>The sensor raw signal BattU_uRaw (voltage) is above BattU_uSRCMa_C (4933mV).</td>
<td>Wiring Harness or Component</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SRC Low for Fuel Temperature Sensor</td>
<td>The sensor raw signal BattU_uRaw (voltage) is below BattU_uSRCMin_C (310mV).</td>
<td>Wiring Harness or Component</td>
<td></td>
</tr>
<tr>
<td>175</td>
<td>0</td>
<td>Physical Range Check High for Oil Temperature</td>
<td>If the signal Oil_tSensSwmp is greater than Oil_PhysRngT.Max_C for a duration DDRC_DurDeb.OilT_tiPhysRngHiTDebDef_C, then a physical range check high error is reported</td>
<td>Too high load on engine; Sensor mis-adjusted or wiring harness</td>
</tr>
<tr>
<td>1</td>
<td>Physical Range Check Low Oil Temperature</td>
<td>If the signal Oil_tSensSwmp is smaller than Oil_PhysRngT.Min_C for a duration DDRC_DurDeb.OilT_tiPhysRngLoTDebDef_C, then a physical range check low error is reported</td>
<td>Sensor Mis-adjusted or Wiring Harness</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SRC High for Oil Temperature</td>
<td>The sensor raw signal Oil_uRawTSwmp (voltage) is above Oil_SRCT.uMax_C (5200.4mV)</td>
<td>Wiring Harness or Component</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SRC Low for Oil Temperature</td>
<td>The sensor raw signal Oil_uRawTSwmp (voltage) is below Oil_SRCT.uMin_C (0mV)</td>
<td>Oil extremely hot, maybe misuse of engine (tuning) wiring harness or component</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Oil Temperature too High Plausibility Error</td>
<td>The Oil temperature Oil_tSwmp is greater than the threshold Oil_tMax_T_C</td>
<td>Oil extremely hot, maybe misuse of engine (tuning) wiring harness or component</td>
<td></td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
<tr>
<td>----------</td>
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<td>---------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>190</td>
<td>2</td>
<td>DFC for camshaft offset angle exceeded</td>
<td>DFC for camshaft offset angle exceeded</td>
<td>Wiring Harness or Camshaft Sensor Defect or Wrong Mounting Position or Tone Wheel Mis-adjusted</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>In between of several camshaft revolutions there are too many or too less camshaft edges present or the distance or the series of the camshaft edges is unplausible. The defect debounce counter EpmCaS_ctErrSigDef is incremented at each inplausible camshaft revolution, reaches the counter the threshold EpmCaS_numErrSigDef_C the error is set. If the monitoring range is left, the debounce counter is reseted.</td>
<td></td>
<td>Tone Wheel Defective</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>In between of several crankshaft revolutions there is not any camshaft edge present. The defect debounce counter EpmCaS_cNoSig reaches the threshold EpmCaS_numNoSigDef_C. If the monitoring range is left, the debounce counter is reseted.</td>
<td></td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td>652</td>
<td>3</td>
<td>General Short Circuit</td>
<td>Short Circuit of an Injector</td>
<td>Wiring Harness or Injector Cylinder</td>
</tr>
<tr>
<td>653</td>
<td>5</td>
<td>Open Load</td>
<td>Open Load Error of an Injector (interruption of an electric connection)</td>
<td>Wiring Harness or Injector Load Drop Cylinder</td>
</tr>
<tr>
<td>654</td>
<td>3</td>
<td>General Short Circuit</td>
<td>Short Circuit of an Injector</td>
<td>Wiring Harness or Injector Cylinder</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Open Load</td>
<td>Open Load Error of an Injector (interruption of an electric connection)</td>
<td>Wiring Harness or Injector Load Drop Cylinder</td>
</tr>
<tr>
<td>677</td>
<td>3</td>
<td>Short Circuit to Battery Error</td>
<td></td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Short Circuit to Ground Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Over Temperature Error on ECU Power-stage for Starter</td>
<td></td>
<td>Over Temperature Error on ECU Power-stage for Starter</td>
</tr>
<tr>
<td>976</td>
<td>2</td>
<td>Diagnostic fault check non plausibility of COM message</td>
<td>The sensed raw value PTOSwt_uSens is less than the minimum threshold MoFPTO_uThresCalMsgA[n] or PTOSwt_uSens is more than the maximum threshold MoFPTO_uThresCalMsgA[n+1] (wherein n=0,2,4,6), whenever MoFPTO_swtSigSelCalMsg is equal to 0.</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Diagnostic fault check for max error of COM message</td>
<td>The sensed raw value PTOSwt_uRaw is more than PTOSwt_SRC.uMax_C when MoFPTO_swtSigSelCalMsg is equal to 0.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Diagnostic fault check for min error of COM message</td>
<td>The sensed raw value PTOSwt_uRaw is less than PTOSwt_SRC.uMin_C when MoFPTO_swtSigSelCalMsg is equal to 0.</td>
<td></td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
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<td>-----------------</td>
</tr>
<tr>
<td>1076</td>
<td>5</td>
<td>Open Load of Metering Unit Input</td>
<td>Detecting on Open Load Fault in the Metering Unit</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Over Temperature of Device Driver of metering Unit</td>
<td>Detection of a Metering Unit Power Stage Over-temperature</td>
<td>Output Stage of ECU Defect or Wiring Harness</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Short Circuit to Battery in the High Side of the MeUn</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Short Circuit to Battery of Metering Unit Output</td>
<td>Detecting a Short Circuit Low Side to Battery Voltage in the Metering Unit</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Short Circuit to Ground in the High Side of the MeUn</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>Short Circuit to Ground of Metering Unit Output</td>
<td>Detecting a Short Circuit Low Side to Ground in the Metering Unit</td>
<td></td>
</tr>
<tr>
<td>1108</td>
<td>15</td>
<td>Diagnostic Fault Check to Report the Error Due to Cooling Injection in Over Run</td>
<td>Error in the plausibility of Current Energizing Time when Over Heat Protection Injection Active with maximum Permitted Energizing Time</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Diagnostic Fault Check to Report the Error Due to Over Run</td>
<td>The current energizing time is greater than the maximum permitted energizing time after overrun demand by the driver.</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>1109</td>
<td>11</td>
<td>Injection Cut Off Demand (ICO) for Shut Off Coordinator</td>
<td>The un-debounced defect detection takes place in the standard ICO mode $\text{EngICO}<em>{\text{stMode,C}}=0$ with an ICO ($\text{Mo}</em>{\text{stICOMsg}}$) requested and an engine speed $\text{Epm}<em>{\text{nEng}}$ greater than $\text{EngICO}</em>{\text{nCtOffStdICO,C}}$ (1700rpm). The un-debounced defective detection takes place in the comfortable ICO mode ($\text{EngICO}<em>{\text{stMode,C}}=1$) with requested ICO ($\text{Mo}</em>{\text{stICOMsg}}$) and an engine speed $\text{Epm}<em>{\text{nEng}}$ greater than $\text{EngICO}</em>{\text{nCtOffCmftICOHard,C}}$ (1700rpm).</td>
<td>ECU Internal Defect</td>
</tr>
<tr>
<td>1136</td>
<td>3</td>
<td>SRC high for ECU temperature sensor</td>
<td>The Sensed raw voltage value $\text{TECU}<em>\text{SRC%,uMax,C}$ is greater than $\text{TECU}</em>\text{SRC%,uMax,C}$</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>SRC low for ECU temperature sensor</td>
<td>The Sensed raw voltage value $\text{TECU}<em>\text{SRC%,uMin,C}$ is less than $\text{TECU}</em>\text{SRC%,uMin,C}$</td>
<td></td>
</tr>
<tr>
<td>1244</td>
<td>3</td>
<td>Signal range check low error of pressure control valve AD-channel</td>
<td></td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Signal range check high error of pressure control valve AD-channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Open load of pressure control valve output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Over speed detection in component engine protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Over temperature of device driver of pressure control valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Short circuit to battery in the high side of the pressure control valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Short circuit to battery of pressure control valve output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Short circuit to ground in the high side of the pressure control valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>Short circuit to ground of the pressure control valve output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
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</tr>
<tr>
<td>1769</td>
<td>11</td>
<td>Over-speed Detection in Component Engine Protection</td>
<td>Exceeding of the Engine-Speed Threshold EngPrt_nOvrSpd_C</td>
<td>Over-speed Caused By Driver</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>DFC for Valve Position Sensor Voltage SRC High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>DFC for Valve Position Sensor Voltage SRC Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Permanent Governor Deviation for Valve</td>
<td>The negative limit for the governor deviation EGRVlv_GovDvtMonCal.rDvtMin_C has been exceeded and the governor deviation has been persistent longer than the applicable time from EGRVlv_tIDebGovDvtDef_CUR.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Over-speed Caused by Driver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2791</td>
<td>13</td>
<td>DFC for Valve Position Sensor Voltage SRC High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>DFC for Valve Position Sensor Voltage SRC Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Permanent Governor Deviation for Valve</td>
<td>The negative limit for the governor deviation EGRVlv_GovDvtMonCal.rDvtMin_C has been exceeded and the governor deviation has been persistent longer than the applicable time from EGRVlv_tIDebGovDvtDef_CUR.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Over-speed Caused by Driver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2802</td>
<td>11</td>
<td>EEPROM Read Error Based on the Error for more Blocks</td>
<td>If Selector Erase (Only Flash) Cannot be performed or successfully completed an error will be registered</td>
<td></td>
</tr>
<tr>
<td>3509</td>
<td>2</td>
<td>Error Sensor Supplies 1</td>
<td>The sensor supply voltage is monitored by an HW comparator. If the sensor supply voltage lies outside of the switching thresholds a fault is output. The detection thresholds are defined by the hardware and cannot be calibrated.</td>
<td>1.) Wiring harness 2.) Component defect 3.) ECU internal defect</td>
</tr>
<tr>
<td>3510</td>
<td>2</td>
<td>Error Sensor Supplies 2</td>
<td>The sensor supply voltage is monitored by an HW comparator. If the sensor supply voltage lies outside of the switching thresholds a fault is output. The detection thresholds are defined by the hardware and cannot be calibrated.</td>
<td>1.) Wiring harness 2.) Component defect 3.) ECU internal defect</td>
</tr>
<tr>
<td>3511</td>
<td>2</td>
<td>Error Sensor Supplies 3</td>
<td>The sensor supply voltage is monitored by an HW comparator. If the sensor supply voltage lies outside of the switching thresholds a fault is output. The detection thresholds are defined by the hardware and cannot be calibrated.</td>
<td>1.) Wiring harness 2.) Component defect 3.) ECU internal defect</td>
</tr>
<tr>
<td>3597</td>
<td>3</td>
<td>Short Circuit to Battery Error at Actuator Relay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3598</td>
<td>3</td>
<td></td>
<td></td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
<tr>
<td>----------</td>
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</tr>
<tr>
<td>5324</td>
<td>11</td>
<td>Array of DFC’s for Failure in i+1(^{th}) Glow Plug</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5325</td>
<td>4</td>
<td>Array of DFC’s for Short Circuit in i+1(^{th}) Glow Plug</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5326</td>
<td>11</td>
<td>Array of DFC’s for Failure in i+1(^{th}) Glow Plug</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5327</td>
<td>4</td>
<td>Array of DFC’s for Short Circuit in i+1(^{th}) Glow Plug</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5327</td>
<td>11</td>
<td>Array of DFC’s for Failure in i+1(^{th}) Glow Plug</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20201</td>
<td>19</td>
<td>SPI/COM-Errors of the Cy320</td>
<td>When Any Peripheral Monitoring Function Reports an Error</td>
<td></td>
</tr>
<tr>
<td>20220</td>
<td>2</td>
<td>Diagnostic Fault Check to Report the NTP Error in ADC Monitoring</td>
<td>Error in the check with the No-Load Test Pulse Operation.</td>
<td></td>
</tr>
<tr>
<td>20220</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the ADC Test Error</td>
<td>Implausible ADC test errors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>It is checked whether MoCADC_ctDebTst &gt;= MoCADC_ctDebTst_C (15 Events).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If yes the error is set. The diagnosis is carried out in the 40-ms interval.</td>
<td></td>
</tr>
<tr>
<td>20220</td>
<td>14</td>
<td>Diagnostic Fault Check to Report the Error in Voltage Ratio in ADC Monitoring</td>
<td>Implausible ADC test errors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>It is checked whether MoCADC_ctDebVltgRatio &gt;= MoCADC_ctDebVltgRatio_C (15 Events).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If yes the error is set. The diagnosis is carried out in the 40-ms interval.</td>
<td></td>
</tr>
<tr>
<td>20221</td>
<td>11</td>
<td>Diagnostic Fault Check to Report Errors in Query-/Response-Communication</td>
<td></td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If there is no active shut-off path test (MoCSOP_stCsvSdfMsg == TRUE) and the error counter MoCom_stErrMM or MoCom_stErrFC is &gt;= MOCCOM_MM_STATUS_LIMIT_ERRORS (5) there is an undebounced defect detection</td>
<td></td>
</tr>
<tr>
<td>20222</td>
<td>11</td>
<td>Diagnostic Fault Check to Report Errors in SPI-Communication</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>If there is no active shut-off path test (MoCSOP_stCsvSdfMsg == TRUE) and the error counter MoCom_stErrMM or MoCom_stErrFC is &gt;= MOCCOM_MM_STATUS_LIMIT_ERRORS (5) there is an undebounced defect detection</td>
<td></td>
</tr>
<tr>
<td>20223</td>
<td>11</td>
<td>Diagnostic Fault Check to Report Multiple Error While Checking the Complete ROM-Memory</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If multiple errors are detected while testing the complete ROM-memory (irreversibles error bit 2 in MoCMem_st is set) there is an undebounced defect detection</td>
<td></td>
</tr>
<tr>
<td>20224</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Accelerator Pedal Position Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Implausible accelerator pedal voltage. The two voltage values (ADC_VAL1 ADC_VAL2) detected by the accelerator pedal are not plausible to each other.</td>
<td></td>
</tr>
<tr>
<td>20225</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Engine Speed Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Implausible engine speed. The engine speed value calculated in level 2 (MoFESpd_nEngL2_mp) and Epm_nEngLRes (engine speed from level 1) are not plausible to each other.</td>
<td></td>
</tr>
<tr>
<td>20226</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Plausibility Error Between Level 1 Energizing Time and Level 2 Information</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Implausible injection quantity. It is tested if MoFinjDat_ctDebETErr &gt;= MoFinjDat_ctDebETErr_C (5 Events).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In case of this the error is set. This diagnosis is processed in the 40ms interval.</td>
<td></td>
</tr>
<tr>
<td>20227</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Error Due to Plausibility Between the Injection Begin v/s Injection Type</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Implausible start of energizing angles. It is tested if MoFinjDat_ctDebPhErr &gt;= MoFinjDat_ctDebPhErr_C (5 Events). In case of this the error is set. This diagnosis is processed in the 40ms interval.</td>
<td></td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
<tr>
<td>----------</td>
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</tr>
<tr>
<td>20228</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Error Due to Non-Plausibility in ZFC Implausible energising times. The energising times of the zero fuel quantity calibration ZFC MoFinjDat_tPil1ZFCETCor and MoFinjDat_tPil2ZFCETCor are tested on their plausible value ranges.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20229</td>
<td>11</td>
<td>Diagnosis Fault Check to Report the Demand for Normal Mode Due to an Error in the PoI2 Quantity Implausible PoI2 efficiencies. The efficiency of PoI2 MoFMode_facPoI2Eff_mp is tested of its plausible value range. Or an unplausibility is detected during monitoring of the operation mode resp. ramp time counter transgression.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20230</td>
<td>11</td>
<td>Diagnosis Fault Check to Report the Error to Demand for an ICO Due to an Error in the PoI3 Efficiency Factor Error in the PoI2 shut-off. The quantity MoFQntCor_qPoI2 is tested of its shut-off value in normal mode.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20231</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Error Due to Injection Quantity Correction Implausible wave correction parts of the injection quantity correction. The plausibility is displayed by the measuring points MoFQntCor_stPiI1ErrAct_mp MoFQntCor_stM11ErrAct_mp and MoFQntCor_stPoI2ErrAct_mp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20232</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Plausibility Error in Rail Pressure Monitoring The rail pressure of level 1 is checked after a calibratable ramp debounce of MoFRailP_ctRmp_C (240ms) in case of a SRC error. If the value lies outside a calibratable window an irreversible error is detected and reported to the DSM after an error debouncing of MoFRailP_ctDebErr_C (760ms). Also in case of a rail pressure gradient error reported by the level 1 The error is reported after a debounce time MoFRailP_ctDebGradMax_C (2550ms). Additionally the error will be reported after a debounce time MoFRailP_ctDebGradMax_C if level 2 detects a gradient error and level 1 is not reporting it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20233</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Error Due to Torque Comparison FStSys_stStrtRlsCAN_mp = TRUE).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20234</td>
<td>11</td>
<td>Diagnosis of Curr Path Limitation Forced by ECU Monitoring Level 2 The setpoint path of the rail pressure control (PthLead_trqInrCurr ) is limited by the limitation torque (EngTrqPtd_trqLim ) of the functional control unit monitoring.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20235</td>
<td>20</td>
<td>Diagnosis of Lead Path Limitation Forced by ECU Monitoring Level 2 The setpoint path of the air system (PthLead_trqInrLead ) is limited by the limitation torque (EngTrqPtd_trqLim) of the functional control unit monitoring.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20236</td>
<td>21</td>
<td>Diagnosis of set Path Limitation Forced by ECU Monitoring Level 2 The quantity setpoint path (PthLead_trqInrSet) is limited by the limitation torque (EngTrqPtd_trqLim ) of the functional control unit monitoring.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20238</td>
<td>3</td>
<td>Diagnostic Fault Check to Report “ABE Active” Due to over-voltage detection In the case of a non active shut-off path test (MoCSOP_stActMsg == FALSE) whose debounce OCWDA_CTDEBSOPNOTACTV* 10ms has expired (counter OCWDA_ctDebSOPNotActv = 0) and an active ABE wire due to over-voltage a defect detection takes place.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20238</td>
<td>4</td>
<td>Diagnostic Fault Check to Report “ABE Active” Due to under-voltage detection In the case of a non active shut-off path test (MoCSOP_stActMsg == FALSE) whose debounce OCWDA_CTDEBSOPNOTACTV* 10ms has expired (counter OCWDA_ctDebSOPNotActv = 0) and an active ABE wire due to undervoltage there is an undebounced defect detection after the battery voltage BattU_u keeps greater than OCWDA_uBattMin_C (8V) longer than the debounce time OCWDA_CTUBATTMX(100ms).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20238</td>
<td>11</td>
<td>Diagnostic Fault Check to Report “WDA Active” due to Errors in Query-/Response Communication In the case of a non active shut-off path test (MoCSOP_stActMsg == FALSE) whose debounce OCWDA_CTDEBSOPNOTACTV* 10ms has expired (counter OCWDA_ctDebSOPNotActv = 0) and an active WDA wire a defect detection takes place.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
<tr>
<td>----------</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>20238</td>
<td>14</td>
<td>Diagnostic Fault Check to Report “WDA/ABE Active” due to unknown reason</td>
<td>In the case of a non active shut-off path test (MoCSOP_stActMsg == FALSE) whose debounce OCWDA_CTDEBSOPNOTACTV* 10ms has expired (counter OCWDA_ctDebSOPNotActv = 0) and an active ABE wire due to undervoltage there is an undebounced defect detection after the battery voltage BattU_u keeps greater than OCWDA_uBattMin_C (8V) longer than the debounce time OCWDA_CTUBATTMX (100ms).</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>20251</td>
<td>20</td>
<td>Visibility of Software Resents in DSM</td>
<td>The evaluation of the reset reason will be done after every reset. Depending on the configured visibility of the current reset one of the fault checks in the array will be set.</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>20276</td>
<td>11</td>
<td>Diagnostic Fault Check to Report the Remote Accelerator Pedal Position Error</td>
<td>Implausible accelerator pedal voltage. The two voltage values (ADC_VAL1, ADC_VAL2), detected by the accelerator pedal, are not plausible to each other. If RMTAPP with LIS is used, defect is detected if there is a implausibility with LIS and RMTAPP1 voltage.</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>20282</td>
<td>3</td>
<td>Short Circuit to Battery on Out1 Error for H-Bridge</td>
<td>Short Circuit to Battery at Out1 of TLE7209/CJ230 Error</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Short Circuit to Battery on Out2 Error for H-Bridge</td>
<td>Short Circuit to Battery at Out2 of TLE7209/CJ230 Error</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Short Circuit to Ground on Out1 Error for H-Bridge</td>
<td>Short Circuit to Ground at Out1 of TLE7209/CJ230 Error</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Short Circuit to Ground on Out2 Error for H-Bridge</td>
<td>Short Circuit to Ground at Out2 of TLE7209/CJ230 Error</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Open Load Error for Power-stage</td>
<td>Open Load Error Monitoring for TLE7209/CJ230</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Over Temperature Error for H-Bridge</td>
<td>Over Temperature Error Monitoring for TLE7209/CJ230</td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>DFC for Coding Error when Different Coding Words were Received in a coding cycle</td>
<td>No Load Error for Low Voltage System</td>
<td>Glowing Problems</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Short Circuit to Battery Error for Low Voltage System</td>
<td></td>
<td>Glowing Problems</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Short Circuit to Ground Error for Low Voltage System</td>
<td></td>
<td>Glowing Problems</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Over Temperature Error on ECU Power-stage for Glow Plug Low voltage System</td>
<td></td>
<td>Glowing Problems</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>DFC for T30 Missing Error in GCU-T</td>
<td></td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>DFC for Coding Error when Selected Coding is not working</td>
<td></td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>DFC for faulty Diagnostic Data Transmission or Protocol Error</td>
<td></td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>DFC for glow Module Error in GCU-T</td>
<td></td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
<tr>
<td>----------</td>
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<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Diagnostic Fault Check to Report the Error in Over-Voltage Monitoring</td>
<td>Irreversible error bit 2 set in MoCSOP_st (counter MoCSOP_ctDebPSDia &gt;= MoCSOP_ctDebPSDia_C (2 Events) during over voltage detection of the SOP test).</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Loss of Synchronization Sending Bytes to the MM from CPU</td>
<td>Irreversible error bit 5 set in MoCSOP_st (counter MoCSOP_ctErrMMRespByte &gt; MOCSOP_MM_RESPBYTE_RESET_ERROR(10) within the SOP test) and state MOCSOP_STEP_ERROR reached due to time out.</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>DFC to set a Torque Limitation once an Error in Detected Before MoCSOP's Error Reaction is set</td>
<td>If an error was found by the SOP test but additionally the injector diagnostic reported an error (FId_MoCSOPInjDiagErr or FId_MoCSOPInjDiagDed are blocking) then only the test flag of every MoCSOP DFC will be set. Besides the error bits of DFC_MoCSOPErrNoChk will be set.</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>Wrong Set Response Time</td>
<td>Irreversible error bit 8 set in MoCSOP_st (counter MoCSOP_ctErrRespTime &gt; MOCSOP_MM_RESPTIME_RESET_ERRORS(2) within the SOP test) and state MOCSOP_STEP_ERROR reached due to time out.</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>Too Many SPI Errors During CoCSOP Execution</td>
<td>Irreversible error bit 6 set in MoCSOP_st (counter MoCSOP_ctErrSPI &gt;= MOCSOP_SPI_RESET_ERRORS(16) within the SOP test) and state MOCSOP_STEP_ERROR reached due to time out.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td>Diagnostic Fault Check to Report the Error in Under-voltage Monitoring</td>
<td>Irreversible error bit 3 set in MoCSOP_st (counter MoCSOP_ctDebPSDia &gt;= MoCSOP_ctDebPSDia_C during under voltage detection of the SOP test).</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>Diagnostic Fault Check to Report that WDA is not working correct</td>
<td>Irreversible error bit 1 set in MoCSOP_st (for example counter MoCSOP_ctDebSOPTst &gt;= MoCSOP_ctDebSOPTst_C (66 Events) or (MoCSOP_ctDebPSDia &lt; MoCSOP_ctDebPSDia_C (2 Events)) AND (MoCSOP_qCyl-Num &gt;= MoFInjDat_numCyl_C (4) ) during the MM SOP test).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OS Timeout in the Shut Off Path Test. Failure Setting the Alarm Task Period</td>
<td>Irreversible error bit 7 set in MoCSOP_st (counter MoCSOP_ctErrOSTimeout &gt; MOCSOP_MM_OSTIMEOUT_RESET_ERRORS(2) within the SOP test) and state MOCSOP_STEP_ERROR reached due to time out.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diagnostic Fault Check to Report that the Positive Test Failed</td>
<td>Irreversible error bit 10 set in MoCSOP_st (bit MOCSOP_RSLTRDY_BP(0) of the return value from lnjVlv_SOPTst() set to one, and bit MOCSOP_SUCCESS_BP(1) set to zero).</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diagnostic Fault Check to Report the Timeout in the Shut Off Path Test</td>
<td>Irreversible error bit 0 set in MoCSOP_st (counter MoCSOP_ctDebSOPTst &gt; MoCSOP_ctDebSOPTst_C (66 Events) during SOP test).</td>
<td></td>
</tr>
<tr>
<td>22040</td>
<td>19</td>
<td>Timeout Error on CAN-Receive-Frame TSC1TE</td>
<td>Timeout of TSC1_TE message. The message is not received for 40 ms (TimeoutCount = 4, selected task cycle = 10 ms, FRMSCH_RXMODE1) and the defect debouncing time DDRC_DurDeb.Com_tTSC1TETODebDef_C is passed and the TSC1 message is enabled and there is no busoff (i.e Com_stSAEJ1939RxEn- bl[12],6 is set to 1)</td>
<td>CAN Transmitter DPF System</td>
</tr>
<tr>
<td>22058</td>
<td>19</td>
<td>Reported SPI and COM-Errors of a Cy146</td>
<td>Short circuit in injection bank 0 (all injectors of the same bank can be affected)</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>23350</td>
<td>4</td>
<td>Short Circuit</td>
<td>Short circuit in injection bank 0 (all injectors of the same bank can be affected)</td>
<td>Wiring Harness or Injector Short Circuit</td>
</tr>
<tr>
<td>23352</td>
<td>4</td>
<td>Short Circuit</td>
<td>Short circuit in injection bank 1 (all injectors of the same bank can be affected)</td>
<td></td>
</tr>
<tr>
<td>23354</td>
<td>12</td>
<td>CY33X is Defect</td>
<td>Chip Error in the CY33x Power Stage Component</td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>23550</td>
<td>12</td>
<td>Defective T50 Switch</td>
<td>The debounced signal is high (T50_st == 1) for a period longer than DDRC_DurDeb.T50_tErrDebDef_C (50ms)</td>
<td>Switch Defective or is Active for a Long time</td>
</tr>
<tr>
<td>SPN Code</td>
<td>FMI Code</td>
<td>Fault Check Description</td>
<td>Fault Detection Condition</td>
<td>Possible Causes</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-------------------------</td>
<td>---------------------------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
| 0        | 23613   | Maximum Positive Deviation of Rail Pressure Exceeded | If the rail pressure governor deviation Rail_pDvt exceeds the limiting value based on the engine speed Rail_pMeUnDvtMax_CUR an error will be detected. | 1. Leakage in the high pressure section  
2. Injection nozzle stuck in open position  
3. Worn high pressure pump  
4. Worn injector (to high injector back flow quantity)  
5. Fuel filter clogged up  
6. PSP (electric pre-supply pump) output too low |
| 1        | 0       | If the rail pressure governor deviation Rail_pDvt falls below the limiting value Rail_pMeUnDvtMin_CUR and if the CP3 delivery quantity MeUn_dvolSet falls to the threshold Rail_MeUnMon.dvolSet_Min_C (~350 mm$^3$/s) an error will be detected. | If the rail pressure governor deviation Rail_pDvt falls below the limiting value Rail_pMeUnDvtMin_CUR and if the CP3 delivery quantity MeUn_dvolSet falls to the threshold Rail_MeUnMon.dvolSetMin_C an error will be detected. | 1. Metering unit is stuck in open position  
2. Zero delivery throttle clogged up  
3. Metering unit without power due to electrical error.  
4. Pressure after zero-delivery throttle too high. |
| 2        | 0       | If the rail pressure RailP_pFlt exceeds the limiting value Rail_MeUnMon.pFltMax_C (1.750.000 hPa) an error will be detected. | If the rail pressure RailP_pFlt exceeds the limiting value Rail_MeUnMon.pFltMax_C an error will be detected. | 1. Metering unit is stuck in open position  
2. Zero delivery throttle clogged up  
3. Metering unit without power due to electrical error.  
4. Pressure after zero-delivery throttle too high. |
<p>| 24       | 0       | Leakage is detected based on fuel quantity balance | If the high pressure pump delivery quantity (MeUn_dvolSet) exceeds the plausibility limit of the volume flow balance (evaluated over the product life and supplemented to include tolerances) Rail_dvolMonMax_mp, an error will be detected. | Maladjusted rail pressure sensor, defective high pressure pump, leakage, Possible error in the low pressure stage, Back flow too low |</p>
<table>
<thead>
<tr>
<th>SPN Code</th>
<th>FMI Code</th>
<th>Fault Check Description</th>
<th>Fault Detection Condition</th>
<th>Possible Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>23614</td>
<td>0</td>
<td>Maximum Rail Pressure Exceeded</td>
<td></td>
<td>Maximum Rail Pressure Exceeded</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Maximum Rail Pressure Exceeded (Second Stage)</td>
<td></td>
<td>Maximum Rail Pressure Exceeded (Second Stage)</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Maximum Positive Deviation of Rail Pressure Exceeded</td>
<td></td>
<td>Maximum Positive Deviation of Rail Pressure Exceeded</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>Maximum Negative Rail Pressure Deviation with Closed Pressure Control Valve Exceeded</td>
<td></td>
<td>Maximum negative Rail Pressure Deviation with Closed Pressure Control Valve Exceeded</td>
</tr>
<tr>
<td>23895</td>
<td>13</td>
<td>Check of Missing injector Adjustment Value Programming</td>
<td>Detection if the monitoring for missing or faulty programming of the injector adjustment values is active and: • the checksum of the injector adjustment code words is not correct or • the basic correction quantity in at least one injector checkpoint has exceeded the admissible limits or • no injector adjustment values could be read due to faulty EEPROM access.</td>
<td>IMA not programmed</td>
</tr>
<tr>
<td>23896</td>
<td>13</td>
<td>Check Of Missing Injector Adjustment Value Programming</td>
<td></td>
<td>IMA Not Programmed</td>
</tr>
<tr>
<td>23897</td>
<td>13</td>
<td>Check Of Missing Injector Adjustment Value Programming</td>
<td></td>
<td>IMA Not Programmed</td>
</tr>
<tr>
<td>23898</td>
<td>13</td>
<td>Check Of Missing Injector Adjustment Value Programming</td>
<td></td>
<td>IMA Not Programmed</td>
</tr>
<tr>
<td>23906</td>
<td>3</td>
<td>Short Circuit to Battery of Pre-Supply Pump Output</td>
<td></td>
<td>Wiring Harness or Component</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Short Circuit to Ground of Pre-Supply Pump Output</td>
<td></td>
<td>Wiring harness or Component</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Open Load of Pre-Supply Pump Output</td>
<td></td>
<td>Wiring harness or Component</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Over Temperature Error on ECU Powerstage for Pre-Supply Pump</td>
<td></td>
<td>ECU Internal Fault</td>
</tr>
<tr>
<td>24000</td>
<td>0</td>
<td>Error Path SPN1 Matching of DM1DCU Message</td>
<td>The error is set in this DFC if received SPN number match with Com_numDM1DCUSPN1_CA</td>
<td>CAN Transmitter</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Function Monitoring: Fault in the Monitoring of the Start Control</td>
<td></td>
<td>ECU Internal Fault</td>
</tr>
</tbody>
</table>

This is not an exhaustive list of the error codes that are available. If an alternate code is shown that is not on this list, please contact Allen Engineering Service Department for details.
Machine Cleaning Procedure

When cleaning the machine, please adhere to the following information to ensure proper cleaning and to keep the machine in the best condition possible.

Power Washing Procedure:

**NOTICE**

- Ensure that the water pressure is below 2000 PSI (14 MPa)
- Always keep the water temperature below 180°F (80°C)
- Use a spray nozzle with at minimum 40° wide spray angle
- Keep the nozzle at least 1 foot (300mm) away from the machine
- Keep a perpendicular angle (90°) when cleaning over a decal.
  - Holding nozzle of a pressure washer at an angle different from 90° may lift the decal from the machine.
- Recommended using a safe cement dissolver, **BACK-SET** or similar, to remove hardened concrete.
- It is **NOT** recommended to use chemicals such as:
  - Muriatic Acid
  - Hydrochloric Acid
  - Hydrofluoric Acid
  - Sulfuric Acid
  - Phosphoric Acid
- To prevent build-up of concrete on the machine, use **BODY GUARD** or similar protection wax.

Filter Cleaning Procedure:

- Remove air filters and blow out with compressed air, **NOT** to exceed 80 PSI.
Popular Accessories

Trowel Blade, Combo, 8” X 23”, Gold Series
(only sold as set of 4)
Part Number: 041503G-4

Trowel Blade, Finish, 6” X 23”, Gold Series
(only sold as set of 4)
Part Number: 047973G-4

Trowel Blade, Finish, 6” X 23”, Plastic (Steel Reinforced)
(only sold as set of 4)
Part Number: 048342-4

Trowel Arm Alignment Jig
Part Number: 016863

Puller, Spider Service Tool, 6-Boss
Part Number: 048360
Float Pan, Clip On, 62.5” O.D., Universal Flat, 45° Lip Angle, 6-Blade
Part Number: 047390

Float Pan, Safety Catch, 62.5” O.D., Universal Flat, 45° Lip Angle, 6-Blade
Part Number: 047438

Lifting Bridle, 6,000 Pound Max, 2-Point x 3 Foot
Part Number: 064798

Dolly Jacks are available for HDX riders to make mobilization easier. These tires are foam-filled to help support the added weight of the machine and to help prevent flats. (Comes in set of 2)
Part Number: 039578-F
Parts Manual

In order to provide a premier experience to our customers, we have moved the “Parts” section out of this manual and placed it in a separate “Parts & Decals Manual”. This will allow us to provide any changes or other important information quicker to you, the customer. See below for ways to access the “Parts & Decals Manual”.

Mobile Device:
Scan this QR code with a compatible device (cellular phone, tablet, etc.)

![QR Code]

Computer:
Click the link below

HDX780 Parts and Decals Manual

Mail:
A physical copy of the parts manual can also be mailed to you upon request. Please contact Allen Engineering service department and one can be sent to you.

Allen Engineering
P.O. Box 819
Paragould, Ar.
72451, USA

Phone: 1.800.643.0095 (USA Only) / 1.870.236.7751
Fax: 1.800.643.0097 (USA Only) / 1.870.236.3934
## MANUAL REVISION DETAIL

<table>
<thead>
<tr>
<th>REVISION #</th>
<th>REVISION DATE</th>
<th>REVISION REFERENCE #</th>
<th>REVISION BY</th>
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<tbody>
<tr>
<td>-</td>
<td>02/20</td>
<td>Initial Release</td>
<td>MW</td>
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