

Instruction Book for

ELECTRONIC CONTROL SYSTEM

QAS 78-138JD

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1. General Description

The intent of this manual is to provide a comprehensive overview of the QAS generator set used in conjunction with the John Deere Level 12 electronic control system (JDEC).

The manual will provide operational instruction of the interaction between the generator set and the JDEC engine control system. The manual will also provide instruction of engine diagnostics provided by the JDEC system. See instruction manual also provided in document holder. Wiring diagrams can be found inside the cubicle panel.

2. System Overview

The JDEC system utilizes an electronic control unit (ECU) to monitor and adjust all engine operating parameters such as fuel delivery, engine timing, speed control and engine fault diagnostic. The ECU is located beneath the fuel pump. Software loaded into the ECU is factory installed and must not be tampered with or adjusted. The software is calibrated for a particular generator set application. The engine is certified for emissions at 1800 RPM only and the generator will not run without the ECU properly installed.

The JDEC system utilizes sensors placed at various engine ports to monitor:

- 1) Engine oil pressure
- 2) Coolant temperature
- 3) Fuel temperature
- 4) Intake air temperature
- 5) Fuel injection
- 6) Crank position

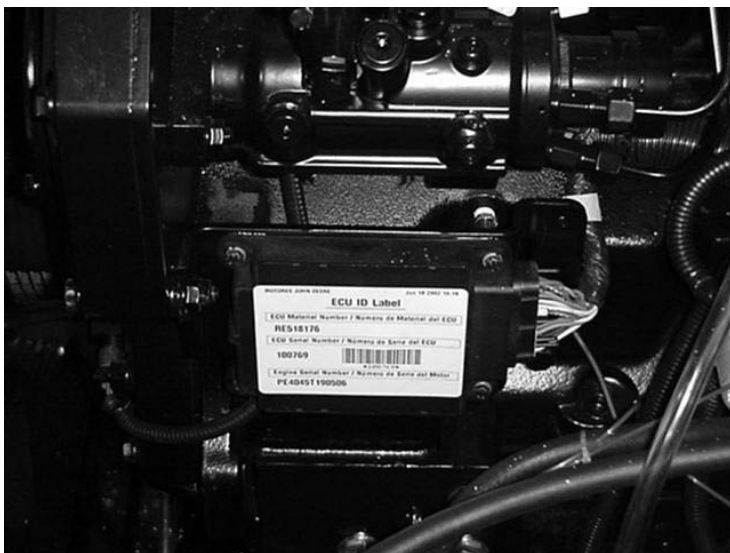


Figure 1. Electronic Control Unit

The JDEC system also provides diagnostic indication through a blink code system on the control panel. Diagnostics are also available by using the 9-pin diagnostic connector on the wiring harness. Communication with the ECU can be achieved through a laptop computer and the John Deere Diagnostic Service Tool (DST). The appropriate John Deere software must be used for this to work (See diagnostic procedure section later in this manual).

The JDEC system on the QAS generator works in conjunction with the Atlas Copco engine control module located on the electrical panel.

The Atlas Copco engine control module provides the following with LED indication:

- 1) Start/Stop function
- 2) Air inlet preheat for cold starting
- 3) Alternator charging failure indication
- 4) Low oil pressure safety shutdown
- 5) High coolant temperature shutdown
- 6) Low coolant level shutdown
- 7) Over speed shutdown
- 8) Under voltage shutdown

The Atlas Copco control module utilizes independent switches and sensors to monitor engine oil pressure and coolant temperature.

IMPORTANT - Note that only the Atlas Copco switches will provide engine shutdown. The JDEC switches will only provide sensor information to the ECU and diagnostics. Also note that speed control is isochronous at 60 Hz by the JDEC system and is **not** adjustable.

The JDEC system and the Atlas Copco control module are linked through the 21 pin Deutsch connector located next to the air filter. The 21 pin connector shown in Figure 2 marks the interface point between the John Deere wiring harness and the Atlas Copco wiring harness.

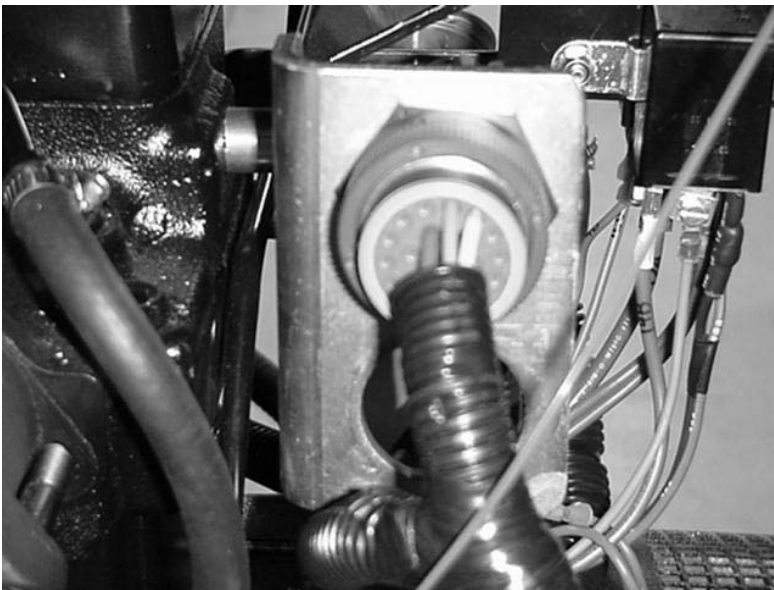


Figure 2 – Deutsch connector

3. Diagnostic Functions

Full diagnostic capability is available through JDEC. A label has been provided inside the control panel door to identify blink code warnings.

Blink Code System

Engine related problems are indicated by a warning lamp on the control panel. If the ECU detects an engine fault, the indicator lamp on the control will either, light and remain lit (major fault), or will continuously blink (minor fault).

If the lamp lights and remains lit (without blinking), the ECU has detected a major fault and the engine must be shut down immediately. To access the fault, turn the unit on and push the diagnostic access button for a few seconds. The code will begin to blink. It may be necessary to shut down the engine and restart to initiate the blink sequence.

There are two types of codes:

- 1) Active
- 2) Stored

If there is an active code in the ECU buffer, the lamp will blink code “32”. The lamp will blink three times, pause, and then blink two more times. The active code will then blink. If there are stored codes in the ECU buffer then the lamp will blink code “33”. Then the stored code will blink. If there are no codes the lamp will blink code “88”.

For example, if the ECU has an active code “66” in the buffer and a stored code of “28” the following sequence will occur once the blink code system has been initialized:

- 1) Blink 3 times, pause, blink 2 times
- 2) Blink 6 times, pause, blink 6 times
- 3) Blink 3 times, pause, blink 3 times
- 4) Blink 2 times, pause, blink 8 times

The cycle will be repeated until power is removed from the control module. Below is a list of possible engine fault codes, the definition of the code, how the warning lamp will respond to each code, and the set point when the fault occurs.

2 Digit Code	Definition	ECU warning Lamp
18	Engine coolant temperature input voltage high	Blink
19	Engine coolant temperature input voltage low	Blink
21	Sensor supply voltage high	Blink
22	Sensor supply voltage low	Blink
23	Engine oil pressure input voltage high	Blink
24	Engine oil pressure input voltage low	Blink
25	Manifold air temperature input voltage high	Blink
26	Manifold air temperature input voltage low	Blink
28	ECU error	Blink
32	When reading blink codes, signifies start of active fault codes	-
33	When reading blink codes, signifies start of stored fault codes	-
37	Fuel temperature input voltage high	Blink
38	Fuel temperature input voltage low	Blink
39	Crank position input error	Blink
42	Engine over speed moderate or extreme	Blink
54	ECU power down error	Blink

2 Digit Code	Definition	ECU warning Lamp
55	CAN error	Blink
62	Engine coolant temperature high - least severe	Blink at 108° C
63	Engine coolant temperature high - moderately severe	Blink at 113° C
64	Engine oil pressure moderately low	Blink at 165-350 kPA abs. (10-36 psi)
65	Engine oil pressure extremely low	ON at 135-280 kPA abs. (5-26 psi)
66	Manifold air temperature moderately high	Blink at 150° C for “T” engines Blink at 100° C for “H” engines
68	Fuel de-rate	-
69	Engine coolant temperature high – most severe	ON at 118° C
71	Pump control valve closure too long	Blink
72	Pump control valve closure too short	Blink
73	Pump solenoid circuit open	ON
74	Pump solenoid circuit severely shorted	ON
75	Pump control valve closure not detected	Blink
76	Pump solenoid circuit moderately shorted	ON
77	Pump solenoid current high	ON
78	Security violation	Blink
79	Internal ECU error	ON
81	Fuel temperature moderately high	ON at 120° C
82	Engine protection shutdown	ON
83	Auxiliary engine shutdown switch active	ON
88	When reading blink codes, signifies no fault codes in buffer	-

To trouble shoot JDEC engine related problems see John Deere technical manual CMT331 for full diagnostic procedures.

Diagnostic Service Tool

To allow real time access to the ECU, it is highly recommended that the John Deere Service Advisor tool be used to actively trouble shoot engine related problems. The service tool can be acquired from any John Deere parts dealer. The software can be down loaded free from John Deere. See you local distributor. Access to the ECU can be achieved through the nine pin Deutsch connector found on all John Deere wiring harnesses. The software will allow the user to scan all ECU function parameters as well as the ability to clear all stored engine fault codes.

4. Engine Service

The new Tier 2 engines require a good maintenance schedule to provide optimum performance. There are changes to the fuel filter and oil filter from Tier 1 engines.

Oil Filter – The engine is equipped with a special oil filter. The engine comes with factory filled break-in oil. Change oil and filter after 100 hours of use. After the break-in period, change the oil and filter every 250 hours. See Engine manual for additional information, extended oil change intervals may apply if the use of John Deere specified oil and filter is used.

Fuel Filters - Atlas Copco has provided a 10 micron primary fuel/water separator used in conjunction with the John Deere 2 micron final fuel filter. A good maintenance schedule must be provided to adequately protect against fuel filter plugging. Both filters have a see through bowl at the bottom of the filter to visually check for contaminants. See the John Deere operator's manual for proper service intervals related to the fuel filters.

Cooling System – The cooling system requires the use of adequate coolant with supplemental coolant additives to protect the engine from cylinder liner pitting and corrosion. A coolant that meets the ASTM 6210 or 6211 performance criteria is John Deere COOL-GARD pre-diluted coolant, available from John Deere. The benefit of the pre-diluted coolant is that no mixing of the coolant, water and additives is required. See John Deere manual for other information including mixing of the coolant, water and additives if COOL-GARD pre-diluted coolant is not used. NEVER use automotive coolants as they do not meet the performance criteria for heavy duty diesel engines.

