Super Cruiser G10S

Operator's Manual

GOLDACRES

Australia's World Class Sprayers

For further information about any of the products shown please visit - www.goldacres.com.au.

All information in this operator's manual is based on the latest product information available at the time of printing. The policy of Goldacres is one of continuous improvement and as such, Goldacres reserve the right to alter any specifications and designs without notice and without incurring any obligation regarding such changes.

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Chapter 1

INTRODUCTION

Welcome

Congratulations on your purchase of a Goldacres Super Cruiser. For more than a quarter of a century Goldacres has supplied Australian farmers with quality, innovative and technologically advanced product application solutions - equipment designed in Australia for Australian conditions.

Goldacres not only produce Australia's finest range of product application equipment - we also keenly value the unique relationship we enjoy with owners of our equipment. We are pleased to welcome you as a Goldacres owner and look forward to making your applications as efficient as possible.

Please use this comprehensive resource to gain a full understanding of your equipment, and don't hesitate to contact your Goldacres Dealer or Goldacres for further information.

Roger Richards
General Manager

GOLDACRES - RESELLER TERMS AND CONDITIONS OF SALE

Goldacres Goods are only available for purchase upon the terms and conditions set out below.

Interpretation

1. In terms and conditions:
(1) "Goldacres" means Goldacres Trading Pty. Ltd. A.C.N. 061 306 732 trading as Goldacres Agricultural Equipment (its successors and assigns) which is the seller of the Goods;
(2) "Purchaser" means the purchaser of the Goods;
(3) "Goods" means the products and, if any, the services sold or provided by Goldacres to the Purchaser;
(4) "GST Act" and "GST" are given the meanings referred to in a New Tax System (Goods and Services Tax) Act 1999.
(5) "PPSA" means the Personal Property Securities Act 2009 (Clth) (as amended);
(6) Nothing in these terms and conditions shall be read or applied so as to exclude, restrict or modify or have the effect of excluding, restricting or modifying, any condition, warranty, guarantee, right or remedy implied by law (including the Competition and Consumer Act 2010) and which by law cannot be excluded, restricted or modified.

General

2. (1) The Goods and all other products or services provided by Goldacres are provided subject to these terms and conditions. These terms and conditions and any terms and conditions incorporated herein by virtue of clause 3 hereto shall prevail over all other terms and conditions of the Purchaser or otherwise to the extent of any inconsistency.
(2) These terms and conditions may not be modified or amended without the expressed written consent of Goldacres endorsed by the Managing Director of Goldacres Trading P/L.

Additional Terms and Conditions

3. From time to time Goldacres may provide additional or extended warranties in respect of certain goods and/or services. Where such additional or extended warranties are provided to a Purchaser in writing they will be incorporated into these terms and conditions provided that in the event of any inconsistency between these terms and conditions and the terms of any additional or extended warranty, the provisions of the additional or extended warranty shall prevail.

Goldacres quotations.

4. Unless previously withdrawn, Goldacres quotations are open for acceptance within the period stated therein or, when no period is stated, with 14 days only of the quotation date. Goldacres reserves the right to refuse any order based on any quotation within 7 days of receipt of the order.

Packing

5. The cost of any special packing and packing materials used in relation to the Goods shall be at the Purchaser's expense notwithstanding that such cost may have been omitted from any quotation.

Shortage

6. The Purchaser waives any claim for shortage of any Goods delivered if a claim in respect thereof has not been lodged with Goldacres within (7) seven days from the date of receipt of the Goods by the Purchaser.

Specifications, etc: Catalogues, etc: Quantities

7. All specifications, (including but not limited to: drawings, particulars of weights, volumes, capacities, dimensions, load factors) are approximate only and any deviation shall not be taken to vitiate any contract with Goldacres or form any claim against Goldacres. The descriptions, illustrations, and performances contained in catalogues, price lists and other advertising matter do not form part of the contract of sale of the Goods. Where specifications, drawings or other particulars are supplied by the Purchaser, Goldacres' price is made on estimates of quantities required. Should there be any adjustments in quantities above or below the quantities estimated by Goldacres and set out in a quotation, then any such increase or decrease shall be adjusted on a unit rate basis according to unit prices set out in the quotation.

Performance, Capacities, Chemicals, Liquids, Application Methods, Environmental Effects

8. Any performance, volumes, and/or capacity figures given by Goldacres are estimates only. Goldacres shall be under no liability for damages for failure to obtain such figures unless specifically guaranteed in writing and any such written guarantee shall be subject to the recognised tolerances applicable to such figures. The suitability of chemicals and other liquids for any application and the application methods and the environmental effects shall be the sole decision and responsibility of the Purchaser and the user of the Goods. Goldacres gives no warranty as to the suitability of any chemicals or other liquids for any application, nor the application methods nor the environmental effects, which may result from the use of the Goods. Goldacres shall be under no liability for damages arising out of the use of any chemicals, liquids, or mixtures in the Goods nor for any application, nor for the application methods nor for the environmental effects, which may result from the use of the Goods.

Delivery/Service Times

9. The delivery times and service times made known to the Purchaser are estimates only and Goldacres shall not be liable for late delivery, non-delivery or delay and under no circumstances shall Goldacres be liable for any loss, damage or delay occasioned by the Purchaser or its customers arising from the late or non-delivery or late installation of the Goods.

Loss or damage in transit

10. Goldacres is not responsible for any loss or damage to Goods in transit. Goldacres shall render the Purchaser such assistance as may be necessary to press claims on carriers provided that the Purchaser shall have notified Goldacres and the carriers immediately the loss or damage is discovered on receipt of Goods and shall lodge a claim on the carrier within three days of the date of receipt of the Goods. Insurance of Goods in transit is the responsibility of the Purchaser.

Limit of Liability

11. (1) Goldacres liability for Goods manufactured by it is limited to:
(a) where the law implies consumer guarantees into these terms and conditions pursuant to Part 3.2 Division 1 of Schedule 2 to the Competition and Consumer Act 2010 (C'th") ("consumer guarantees") which cannot be excluded and Goldacres breaches a consumer guarantee, the loss and damage the Purchaser is entitled to at law which cannot be excluded by these terms and conditions;
and, in all other cases
(b) making good any defects by repairing the same or at Goldacres option by replacement within a period not exceeding either 1000 hours or twelve calendar months, whichever comes first, after the Goods have been dispatched provided that:
(i) the defects have arisen solely from faulty materials or workmanship;
(ii) the Goods have not received maltreatment inattention or interference;
(iii) accessories of any kind used by the Purchaser are manufactured or approved by Goldacres;
(iv) where applicable, the seals on the Goods remain unbroken;
(v) there has been no improper adjustment, calibration or operation;
(vi) the use of accessories including consumables, hardware or software (not manufactured by Goldacres) has been approved in writing by Goldacres;
(vii) no contamination or leakage has been caused or induced;
(viii) any modification to the Goods have been authorised in writing by Goldacres;
(ix) there has been no inadequate or incorrect use, storage, handling or application of the Goods;
(x) there has been no use or operation of the Goods outside of the physical, electrical or environmental specifications of the Goods;
(xi) there has been no inadequate or incorrect site preparations;
(xii) there has been no inadequate or improper maintenance of the Goods;
(xiii) it has not been caused by fair wear and tear; and
(xiv) firstly the Goods have been thoroughly inspected and any damage (from whatever cause) to the Goods (and in particular – the structure, welding, seams, bolts, booms) has been repaired prior to the Goods being operated, used driven or moved and on each occasion the tanks are filled; and
(xv) there has been no failure to comply with the requirements of all present or future laws or regulations relating to the Goods and/or the use and/or the operation of the Goods; and
(xvi) there has been no failure to maintain a record of hours of operation (which record shall contain full details of all inspections, repairs and maintenance) and produce same to Goldacres at the time of the claim;
(xvii) the defective Goods or any damaged part of the Goods are promptly returned free of cost to Goldacres or a representative of Goldacres;
(xviii) all warranty related repairs have been carried out with the prior authorisation of Goldacres;
(2) If Goods or any part thereof are not manufactured by Goldacres, in particular engines, engine accessories, transmissions, transfer cases, differentials, tyres, tubes, batteries, radios and UHFs, the guarantee of the manufacturer thereof shall be accepted by the Purchaser and is the only guarantee given to the Purchaser in respect of the Goods or that part provided always that this clause does not seek to exclude the consumer guarantees;
(3) In the case of hydraulic systems, Goldacres shall replace defective parts in accordance with clause 11(1) of these conditions, provided that the failure of the part was not related to contamination within the system, Goldacres shall not be liable for labour in the case of repairing hydraulic system defects;
(4) Goldacres will not accept liability for damage attributed to fair wear and tear including but not limited to fair wear and tear to nozzles, chains, belts, filters, brake pads, polyethylene bushes and liquid pump valves, valve O-rings, diaphragms and seals;
(5) Goldacres shall not be liable for and the Purchaser releases Goldacres from any claims in respect of faulty or defective design of any Goods supplied unless such a design has been wholly prepared by Goldacres and the responsibility for any claim has been specifically accepted by Goldacres in writing and in any event Goldacres liability hereunder shall be strictly limited to the replacement of defective parts in accordance with paragraph 11(1) of these conditions provided always that this clause does not seek to exclude the consumer guarantees;
(6) Except as provided herein, all express and implied warranties, guarantees and conditions under statute or general law as to the merchantability, description, quality, suitability or fitness of the Goods for any purpose or as to design, assembly, installation, materials or workmanship or otherwise are hereby expressly excluded and Goldacres shall not be liable for physical or financial injury, loss or damage or for consequential loss or damage of any kind arising out of the supply, layout, assembly, installation or operation of the Goods or arising out of Goldacres negligence or in any other way whatsoever;
(7) The benefit of any warranty provided under these terms and conditions shall only be available to the Purchaser and shall not be transferable by the Purchaser;
(8) The warranties provided under these terms and conditions do not extend to second hand or used Goods that may be sold by Goldacres.

12. Goldacres liability for breach of a consumer guarantee is hereby limited (in the case of goods and services not used for personal, domestic or household purposes) to:
(1) in the case of Goods, any one or more of the following:
(a) the replacement of the Goods or the supply of equivalent Goods;
(b) the repair of the Goods;
(c) the payment of the cost of replacing the Goods or acquiring the equivalent Goods;
(d) the payment of having the Goods repaired; or
(2) in the case of services;
(a) the supplying of the services again; or
(b) the payment of the cost of having the services supplied again.

Prices

13. (1) Unless otherwise stated in writing by Goldacres, all prices quoted by Goldacres are inclusive of GST for supplies within Australia and exclusive of GST for exports outside of Australia. Prices quoted are those ruling at the time of quotation or the date the price is given and are based on rates of freight, insurance, customs, duties, taxes, exchange, shipping expenses, sorting and stacking charges, cartage, cost of materials and other charges affecting the cost of production ruling on that date and any alterations thereto either before acceptance of or during currency of the contract shall be to the Purchaser's account.
(2) For the purpose of 38-185 of the GST Act, the day upon which the seller gives the invoice for the supply shall be the date of the invoice.

Payment

14. (1) The purchase price in relation to the Goods and the cost of the service shall be payable without deduction and or set off and payment thereof shall be made on or before the thirteenth day of the month following the delivery of the Goods or performance of the services unless other terms of payment are expressly stated in writing.
(2) A decreasing or increasing adjustment and or the issuing of an adjustment note, pursuant to Division 21 and Division 29-C of the GST Act, shall not, in any way, constitute a release, waiver, and or forgiveness of the debt incurred by the Purchaser.

Interest on overdue payments

15. If Goldacres is not paid for any Goods or services on the due date specified in this agreement without prejudice to any other right or remedy, all outstanding money shall bear interest at the rate set, pursuant to the Penalty Interest Rates Act, Victoria, 1986, as such money, together with interest shall be recoverable forthwith from the Purchaser.

Rights in relation to Goods.

16. (1) Title to the Goods supplied by Goldacres to the Purchaser shall remain with Goldacres until the total amount due in respect of the Goods and all monies owing to Goldacres have been paid in full (the "Debts"). Risk in the Goods shall pass to the Purchaser upon delivery.
(2) The Purchaser shall have the right to resell Goods but only as fiduciary agent and trustee for Goldacres by way of bona fide sale at full market value and in the ordinary course of its business.
(3) Until all the Debts have been paid in full:
(a) the Purchaser shall take custody of the Goods as trustee, fiduciary agent and bailee for Goldacres;
(b) the Purchaser shall keep the Goods separate from any other goods and properly marked, stored, protected and insured;
(c) the Purchaser must hold all of the money it receives ("Proceeds"):
(i) from the sale of any property into which Goods supplied have been incorporated; and
(ii) from the sale of Goods or provision of services including the Goods supplied by the Goldacres as bailee, fiduciary agent and trustee for Goldacres, but the Purchaser need not hold on trust any money exceeding the amount of the Debts at the time the money is received.
(d) The Purchaser expressly acknowledges that it is bound by the fiduciary obligation created in the preceding paragraph and acknowledges that:
(i) it must hold the Proceeds on trust for Goldacres;
(ii) it must place the whole of the Proceeds in an account separate from its own moneys (the "Proceeds Account");
(iii) it must maintain the Proceeds Account separate from its own moneys at all times.
(iv) it must maintain proper records for the Proceeds Account.
(v) it must not assign or encumber any book debts arising from sales made in circumstances set out in clauses 16(c)(i) and (ii) or do any other act in derogation of Goldacres' legal or beneficial interests; and
(vi) it must account to Goldacres on demand for all moneys standing to the credit of such account.
(e) For the purposes of identification of different consignments of Goods purchased from Goldacres and receipt of Proceeds, the Purchaser agrees that the principle of "Last In, First Out" shall be applied to any items that cannot be distinguished.
(f) Goldacres may trace the Proceeds in equity.
(4) Goldacres may at any time, without notice to the Purchaser and without prejudice to any other rights which it may have against the Purchaser, terminate any contract connected with the Goods and the bailment referred to in clause 16(3) and enter upon any premises owned or occupied by the Purchaser where Goldacres reasonably believes the Goods may be stored, and repossess the Goods without liability for any damaged caused, and subsequently dispose of the Goods at Goldacres' discretion if:
(a) the Debts are not paid in accordance with these terms and conditions or any other contract or arrangement between Goldacres and the Purchaser; or
(b) Goldacres receives notice of or reasonably believes that:
(i) a third person may attempt to levy execution against the Goods; or
(ii) the Purchaser is insolvent (within the meaning of the Corporations Act 2001) or bankrupt; or
(iii) the Purchaser has entered into any arrangement or composition with its creditors, gone into liquidation, or has appointed a receiver, a receiver and manager or administrator.
(5) If after repossession under clause 16(4) Goldacres sells the Goods, Goldacres shall account to the Purchaser for any proceeds of sale (less expenses of repossession and sale) that exceeds the amount of the outstanding Debts.
(6) If any Goods belonging to Goldacres are disposed of by the Purchaser or an insurance claim is made in respect of them, Goldacres shall be entitled to trace the sale or insurance proceeds, which proceeds shall be held by the Purchaser in a separate bank account on trust for Goldacres.
(7) The Purchaser agrees and acknowledges that in the event it sells Goods to a third party on account, it will include in its terms and conditions of sale a provision under which the Purchaser retains title to the Goods until such time that the total amount due in respect of the Goods and all monies owing to the Purchaser have been paid in full by that third party debtor. The Purchaser also agrees and acknowledges that in these instances, it will register its PMSI in accordance with the PPSA in respect of its security interest in the Goods.

PPSA provisions

17. (1) The Purchaser acknowledges that these terms and conditions constitute a security agreement for the purposes of section 20 of the PPSA and that a security interest exists in all Goods (and any associated Proceeds from their sale) previously supplied by Goldacres to the Purchaser (if any) and in all in future Goods (and any associated Proceeds from their sale) that may be supplied to the Purchaser by Goldacres.
(2) The Purchaser acknowledges that Goldacres has a first ranking purchase money security interest ("PMSI") (as defined in section 14 of the PPSA) in the Goods and the Purchaser must not jeopardise such ranking (whether by act or omission).
(3) The Purchaser acknowledges that it has received value as at the date of first delivery of the Goods and has not agreed to postpone the time for attachment of the security interest (as defined in the PPSA) granted to Goldacres under these terms and conditions.
(4) The Purchaser will execute documents and do such further acts as may be required by Goldacres to register the security interest granted to Goldacres under these terms and conditions under the PPSA.
(5) Until ownership of the Goods passes, the Purchaser must not give to Goldacres a written demand or allow any other person to give Goldacres a written demand requiring Goldacres to register a financing change statement under the PPSA in respect of Goldacres' interest in the Goods.
(6) The Purchaser must indemnify Goldacres and on demand reimburse Goldacres for all costs and expenses incurred by Goldacres in respect of these terms and conditions including but not limited to Goldacres registering its security interest in the Goods, lodging, discharging or amending any financing statement or financing change statement, or otherwise complying with the PPSA.
(7) The Purchaser agrees (other than as provided in these terms and conditions) not to sell, lease, mortgage, deal with, dispose of or create or attempt to create any other security interest in or affecting the Goods unless and until the Purchaser's Debts have been satisfied.
(8) The Purchaser waives its rights under the following provisions of Chapter 4 of the PPSA:
(a) to receive a notice on enforcement action against liquid assets (section 121(4),
(b) to receive a notice to seize collateral (section 123);
(c) to receive a notice of disposal of Goods by Goldacres purchasing the Goods (section 129);
(d) to receive a notice to dispose of Goods (section 130);
(e) to receive a statement of account following disposal of Goods (section 132(2));
(f) to receive a statement of account if no disposal of Goods for each 6 month period (section 132(4));
(g) to receive notice of any proposal of Goldacres to retain Goods (section 135(2));
(h) to object to any proposal of Goldacres to either retain or dispose of Goods (section 137(2));
(i) to redeem the Goods (section 142);
(j) to reinstate the security agreement (section 143);
(k) to receive a notice of any verification statement (section 157(1) and section 157(3);
(9) The rights Goldacres may have under the PPSA are supplementary and in addition to those set out in these terms and conditions and do not derogate from the rights and remedies of Goldacres under these terms and conditions or under any other statute or under general law.
(10) The Purchaser must give 10 business days prior written notice of any proposed change in the Purchaser's name or other identifying characteristics and details.

Purchasers property

18. Any property of the Purchaser under Goldacres' custody or control shall be entirely at the Purchaser's risk as regards loss or damage caused to the property or by it.

Storage

19. Goldacres reserves the right to make a reasonable charge for storage if delivery instructions are not provided by the Purchaser within (14) fourteen days of a request by Goldacres for such information.

Returned Goods

20. Goldacres shall not be under any obligation to accept Goods returned by the Purchaser and will do so only on terms to be agreed in writing in each individual case.

Goods sold

21. All Goods to be supplied by Goldacres shall be described on the purchase order agreed by Goldacres and the Purchaser and the description on such purchase order modified as so agreed shall prevail over other descriptions including any Purchaser's specification or enquiry.

Cancellation

22. No order may be cancelled except with the consent in writing and on terms, which will indemnify Goldacres against all losses.

No waiver

23. The failure of any party to enforce the provisions of these terms and conditions or to exercise any rights expressed in these terms and conditions shall not be a waiver of such provisions or rights and shall not affect the enforcement of this agreement. The exercise by any party of any of its rights expressed in this agreement shall not preclude or prejudice such party from exercising the same or any other rights it may have irrespective of any previous action taken by that party.

Force Majeure

24. If by reason of any fact, circumstance, matter or thing beyond the reasonable control of Goldacres is unable to perform in whole or in part any obligation under these terms and conditions then Goldacres shall be relieved of that obligation under these terms and conditions to the extent and for the period that it is so unable to perform and shall not be liable to the Purchaser in respect of such inability.

Passing of risk

25. Risk in the Goods shall pass to the Purchaser upon delivery of the Goods to the Purchaser or collection of the Goods by the Purchaser's agent or carrier as the case may be.

Exclusion of liability

26. To the extent permitted by law Goldacres shall not be liable to the Purchaser in contract or in tort arising out of, or in connection with, or relating to, the performance of the Goods or any breach of these conditions or any fact, matter or thing relating to the Goods or error (whether or not it is negligent or a breach of contract) in information supplied to the Purchaser or a user before or after the date of the Purchaser's or user's use of the Goods and Goldacres shall be under no liability for damages arising out of the use of any chemicals, liquids, or mixtures in the Goods, nor for any application, not for the application methods nor for the environmental effects, which may result therefrom or from the use of the Goods.

Exclusion of representations and arrangements

27. To the extent permitted by law the terms and conditions supersede and exclude all prior and other discussions, representations (contractual or otherwise) and arrangements relating to the supply of the Goods or any part thereof including, but without limiting the generality of the foregoing, those relating to the performance of the Goods or any part thereof or the results that ought to be expected from using the Goods.

Place of contract

28. The contract for sale of the Goods and the provision of the services is made in the State of Victoria and the Purchaser agrees to submit all disputes arising with Goldacres to the courts of such State and any court competent to hear appeals therefrom.

Chapter 2

SAFETY

General

The following pages outline important safety information. At Goldacres safety is a high priority. These safety and warning instructions MUST be followed to ensure the safe operation of your Goldacres equipment.

Explanation of key terms used in this operator's manual are:

Danger

You will be killed or seriously hurt if you don't follow instructions

Warning

You can be seriously hurt if you don't follow instructions

Caution

You can be hurt if you don't follow instructions

Note

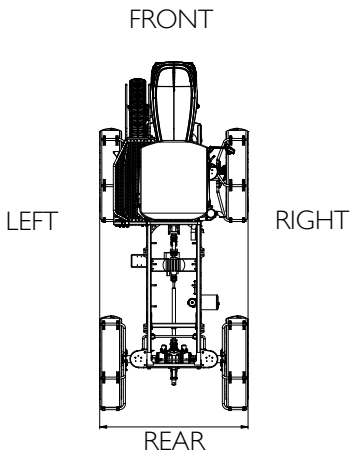
Is used to notify people of installation, operation or maintenance information that is important but not hazard related.

The Operator

All operators of this equipment should be adequately trained in the safe operation of this equipment. It is important that all operators have read and fully understand the operator's manual prior to using this equipment.

All new operators should be trained in an area without bystanders or obstructions and become familiar with the machine prior to operation.

Machine Orientation



Safety Precautions

Notes

- Goldacres Super Cruiser's mechanical drive system delivers efficient, positive power to the ground for superior traction.

  However, should your Super Cruiser become bogged and the wheels subsequently locked, do not engage first gear and maximise engine revs.

  With the wheel 'locked' in a bog situation, transmitting full power WILL DAMAGE the driveline.

  Goldacres recommends that bog situations are addressed prudently by using the assistance of a tow vehicle. Doing otherwise can cause significant driveline damage and VOID WARRANTY

- Always read, and understand, the operator's manual prior to operation of this equipment.
- It is the responsibility of the operator to ensure that there are no decals missing from the equipment and that any damaged, or missing, decals are replaced prior to operation.
- Goldacres equipment ordered, or operated, outside the guideline limitations may not be warranted by Goldacres for successful performance. Operators working outside these limitations do so at their own risk, unless specific advice has been sought from, and provided by, Goldacres in writing.
- Inspect the equipment thoroughly for damage and wear before operation.
- Lubricate the equipment as per recommended requirements before operating.
- Do not operate the equipment while under the influence of any drugs, alcohol or if excessively tired.
- Make sure that the equipment complies with all relevant road regulations when transporting.
- Goldacres equipment uses several materials that may be harmful to the environment. Potentially harmful waste used with Goldacres equipment includes such items as oil, fuel, coolant and batteries. If these items are disposed of incorrectly the waste can threaten the surrounding environment and ecology. The waste products can leech into surrounding water sources and contaminate the area.
- When draining fluids from the equipment use appropriate, leak proof containers. Do not use food or beverage containers because someone may consume the contents by mistake.

Cautions

- A supply of fresh water should be with the equipment at all times.
- Water tanks are not designed for use with diesel fuel or any flammable liquid.
- Do not use this machine in ambient temperatures exceeding 40 degrees Celsius.
- Ensure that all bolts are tightened and secured before operation.
- Do not travel at excessive speeds over rough terrain. The superior ride characteristics of this machine can disguise the impact of rough terrain, on the driveline and suspension system on the machine. After impact with gutters, sinkholes, rocks etc. stop the machine and inspect for damage.
- When leaving the machine always isolate the batteries by turning the isolator key off and removing it.

Towing & Transporting the Machine

- A disabled machine is best transported on a drop deck trailer. Use chains to secure the machine via the tie down attachment point located under the front and rear axles.
- The machine must not be towed unless the engine is running (as the steering and brakes require engine power to operate). Before towing, the front & rear tail shaft should be disconnected, due to the risk of damage to the transmission. While towing do not travel at a speed greater than 10 km/h.
- An operator must steer and brake the machine under tow.

Continued over page

- The park brake needs to be manually released if engine is not able to run.
- Check the wheel nut tension on a regular basis. The torque and inspection frequency is outlined in the maintenance section.
- Brake performance should be checked regularly. The inspection frequency is outlined in the maintenance section.

Service the Cooling System Safely

- At operating temperature the fluids in the cooling system are under pressure. Only remove the radiator cap when the engine is turned off and has cooled down.
- Loosen off the cap slowly to relieve the pressure, and then remove the cap completely.
- Coolant can be added when the engine is cool and turned off.

  If the coolant is warm and more needs to be added, start the engine and then add more coolant.

Maintaining Batteries

The machine is supplied with sealed, non service batteries. The battery electrolyte contains sulfuric acid; this is a highly dangerous liquid and should be handled with the greatest degree of care.

The acid can cause blindness, burn skin and dissolve clothing. Batteries also produce hydrogen gas (especially when charging), so do not place flames or sparks near the batteries.

A vigilant operator can avoid these hazards by:

1. Wearing the correct personal protective equipment.
2. Avoid spilling or dripping electrolyte.
3. If the case is damaged, place into a plastic collection tray ready for disposal.

Emergency Measures:

- If the electrolyte gets in your eyes, flush your eyes with clean water for at least 15 minutes, then get immediate medical assistance.
- Also thoroughly wash all other affected areas on your body with water and remove all clothing.
- If you swallow any electrolyte seek medical attention immediately.

Continued over page

Safety Precautions

Support Machine Safely

Before raising the machine off the ground;

- ✓ Park on a flat level, firm area and engage the park brake.
- ✓ Where possible before lifting the machine, empty the bin.
- ✓ Chock all wheels that remain on the ground.
- ✓ Securely lift the machine using a jack and support the machine on work stands.
- × Do not rely solely on the jack before working under the machine.
- × Do not support the machine using materials that may crumble.
- × Do not work under the machine when supported solely by a jack.

Changing Wheels and Tyres

An experienced person with the correct equipment should mount the wheels on the machine.

When changing a wheel on the machine ensure that the machine is on firm level ground and the wheels are chocked.

Tyre Maintenance

Maintain correct tyre pressure at all times. Inflation of tyres above or below the recommended pressure exerts additional pressure on the tyre, which may result in tyre damage.

Extreme caution is required during the inflation of tyres. If the tyre is inflated at a rapid rate separation and/or explosion of the rim can occur. This event can inflict serious or fatal injuries to the operator.

- ✓ Always use a tyre inflation gauge.
- ✓ Be proactive and continually check the condition of your tyres.
- × Do not weld, heat or modify the rim.

Maintenance Warning (Crush Hazard)

Never attempt to maintain axles, wheels or components within the vicinity of the wheels with the engine running.

Burn Risk

- Ensure safety around the entire exhaust system on the machine
- Ensure safety around the hydraulic tank and all hydraulic lines when at operating temperature.

Warnings

- Any unauthorised modifications to this equipment may affect its function and create a serious safety risk.
- Keep clear of overhead obstructions – especially power lines as contact can be fatal.
- Never attempt to clean parts by blowing with mouth.
- Never attempt to siphon chemicals or other substances by sucking.
- It is imperative that the vehicle manufacturer's specifications be checked and all instructions for use when transporting, or towing, be adhered to at all times.
- Care should be taken when loading the vehicle to ensure that the gross weight of the equipment does not exceed its carrying and braking capacity specified by the vehicle manufacturer.
- Suitable care should be taken when driving the vehicle. Consideration should be given to both the carrying capacity of the vehicle and the gradient of the terrain when determining the speed at which the vehicle can be driven safely.
- Ensure that the maximum speed of the vehicle when loaded is within the vehicle manufacturer's limitations.
- Ensure equipment is securely fastened, or attached, to vehicle at all times.

Personal Protective Equipment (PPE)

Always wear close fitting clothing and safety equipment designed for the job.

- Exposure to loud noise over an extended period can cause impairment or loss of hearing. Be active in the conservation of your hearing and wear appropriate hearing protection at all times.

Continued over page

- Chemicals can be harmful to humans, appropriate PPE should be used when handling chemicals.

  Always refer to the chemical manufacturers label for guidelines on the appropriate PPE to use with the chemical/s you are using.

Goldacres also suggest that you read and understand the following Australian standards:

- Australian Standard for Chemical protective clothing AS3765
- Australian Standard for Respiratory protection devices AS1715
- Call 131 126 (Aust)

Airborne Particles

- Always stand well clear of equipment during operation.
- When heating and welding components, ensure that all paint and other such materials are removed. Often hazardous airborne particles and fumes are generated from welding and heating.

Do Not Heat Pressurized Fluid Lines

When conducting any process on the machine that involves heat; be aware of pressurized fluid lines in the vicinity of your work area.

Pressurized lines can be easily cut when the heat over shoots the target object.

Do Not Carry Passengers

Do not stand or carry passengers on the steps or platform when the equipment is in motion or when the booms are being folded or unfolded.

Fluids Under Pressure

Fluids escaping from high pressure lines can cause serious injury to skin. Hydraulic oil can easily penetrate human skin. This hazard can be avoided by relieving the pressure in the system.

Do not disconnect any hoses, nozzles or filters while equipment is operating. Disconnecting these components while under pressure may result in uncontrolled fluid discharge which may be hazardous.

When the repair is complete ensure that all fittings and lines are secured before re-applying pressure.

Machine Operation

- High speed turning places severe stresses on the wheels and axles and should be avoided.
- Modification of the machine to increase maximum speed is STRICTLY PROHIBITED. This machine is designed for a maximum speed of 50 km/h. This speed must only be used on suitable terrain conditions. All components i.e. tyres, brakes, suspension, steering and chassis are designed and built to this maximum speed.
- MAXIMUM SPEED WHEN CORNERING, TURNING AT AN ANGLE GREATER THAN 45° OR DRIVING ON A SLOPE OR UNEVEN TERRAIN IS 5KM/H. When fitted with narrow wheel track and with high centre of gravity, the machine may become unstable when turning at excessive speed or when operating on excessively steep terrain.
- The Goldacres Super Cruiser is fitted with a roll-over protection structure (ROPS), incorporated into the frame of the cabin. To minimize the risk of injury in the event of an accident, the operator and anyone in the training seat must wear seat belts at all times.
- The Goldacres Super Cruiser is equipped with one training seat. Any further passengers will not be protected by the ROPS and must be kept off the machine. Do not stand or carry passengers on the steps or platform when the machine is in motion.
- To minimize the risk of injury in the event of an accident, the operator must be wear seat belt at all times.
- Before leaving the machine the engine must be shut off, the transmission placed in neutral and the park brake engaged. NEVER ENGAGE THE PARK BRAKE WHILE THE Machine IS MOVING. DAMAGE TO THE TRANSMISSION MAY RESULT.

Continued over page

Safety Precautions

Re-Fuelling Safety

- Handle fuel with extreme caution. Do not refuel the machine while smoking or near open flames or sparks.
- Always stop the engine before refueling the machine.
- To prevent fires always keep the machine clean of grease, debris and dirt.
- Do not use current emitting devices when re-fuelling.

Collision Prevention and Warning Lights

- Before operating the machine check with the relevant road management authorities for information regarding safe and legal transport on public roads in the state where the machine is being operated.
- To assist in the prevention of collisions with other road users the machines are fitted with warning lights and signs in accordance with Vic Roads regulations.
- The machine is fitted with a reverse warning beeper when the machine is put into reverse.
- The Super Cruiser can only be driven on public roads during daylight hours.
- Keep lighting and signs in good order and replace any damaged or faulty fixtures.

Working at Heights

Please contact your local government on the restrictions and safety requirements needed to operate at heights.

- There is a risk a falling if a person has "climbed" onto the machine.
- Do not "climb" on machine to get access.
- Use ladder or work platform to get access to parts or areas of the machine above local government restrictions.

Slippery Surfaces

- The surface of the platform has raised portions to stop slipping.
- The platform surface needs to be kept clean of mud and other material to help stop slipping.

Dangers

- Check work area for overhead powerlines. Contact between the machine and powerlines can result in serious injury or death.
- Do NOT walk on machine platform when near power lines.
- NEVER start the engine when standing on the ground. Only start the engine from the operator's seat, with the transmission in neutral. Possible injury or death can occur by starting the machine through other methods.
- Never exit the cabin while the machine is in motion.
- Diesel engine exhaust fumes are harmful and can cause severe sickness or death. If it is necessary to run the engine in an enclosed area use an exhaust pipe extension. If an exhaust pipe extension is unavailable ensure that all doors are fully open and the room is well ventilated.

Rotating Drive Line Entanglement

- Rotating drives can cause serious injury or even death when entanglement occurs. Keep hands, feet, hair and clothing away from all moving parts to prevent injury. Never operate this machine with covers, shrouds, or guards removed.

Personal Protective Equipment (PPE)

Always wear close fitting clothing and safety equipment designed for the job.

Chemicals can be harmful to humans, appropriate PPE should be used when handling chemicals. Always refer to the chemical manufacturers label for guidelines on the appropriate PPE to use with the chemicals you are using.

Goldacres also suggest that you read and understand the following Australian standards:

- Australian Standard for Chemical protective clothing AS3765
- Australian Standard for Respiratory protection devices AS1715

Airborne Particles

Always stand well clear of equipment during operation.

Fluids Under Pressure

DO NOT disconnect any hoses, nozzles or filters while equipment is operating. Disconnecting these components while under pressure may result in uncontrolled fluid discharge which may be hazardous.

When the repair is complete ensure that all fittings and lines are secured before re-applying pressure.

Safety Decals

Understanding safety decals and their purpose assists in the safe operation of your machine. Safety decals are there for your protection and it is the responsibility of the owner operator to replace damaged and/or missing safety decals.

Regularly review safety decals with operators. It is very important to ensure that all new machine components and replacement parts include current hazard identification decals.

Replacement safety decals can be ordered from your Goldacres dealer. Part numbers and descriptions of the decals on this machine can be found in the parts manual supplied.

Fire Extinguisher

It is recommended that a fire extinguisher be fitted to your machine.

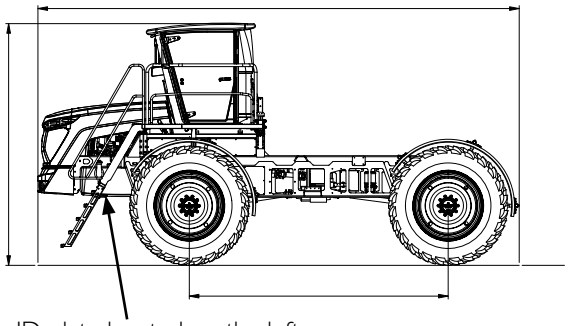
A dry chemical fire extinguisher ABE approved for wood, paper, flammable liquid and live electrical equipment fires.

First Aid kit

It is recommended that a first aid kit be added to your machine.

Identification

When ordering parts or requesting service information for your machine it is important to quote the serial number of your machine, and the purchase date, in order to receive accurate information. The location of the serial number plate on your machine is shown in the picture below.



ID plate located on the left hand chassis rail near steps.

Parts Ordering

When ordering parts from your Goldacres dealer, please quote:

- Serial No.
- Part No. required
- Part Description
- Quantity Required

The parts manual supplied with this machine includes all the relevant information that you need when ordering parts from your dealer. When returning parts to a Goldacres dealer, for service or repair all parts MUST be cleaned thoroughly before sending them. Dealers cannot expose technicians to the many potentially hazardous substances that are in use.

NOTE: Please ensure that all parts are clearly labelled with the owner's details, and a brief description of the fault. Dealers are not liable for the return of any goods to a Goldacres Dealer. The goods must be returned to the point of sale.

Genuine Goldacres parts only should be used on Goldacres equipment.

Chapter 3

GENERAL INFORMATION & SPECIFICATIONS

General

Chassis

The chassis is an all steel construction, that is fully welded for superior strength. The chassis is grit blasted, primed and then protected by the Goldacres paint process for excellent chemical resistance and durability.

Paint Colours

Wheels:	N23 Neutral Grey
Steel work:	G13 Dark Green
Steel work:	N61 Black

Australian Standards AS2700

Cabin

The cabin features panoramic views surrounding the machine and is customised to suit spraying applications. The rate controller and all key spraying functions are within easy reach of the operator

Further information on the cabin can be found in the "Cabin" chapter.

Machine Limitations

All Goldacres equipment is subject to operating limitations, it is the operator's responsibility to ensure that this equipment is being operated within these limitations and appropriately to the operating conditions at hand.

Goldacres do not endorse use of this machine for spraying at speeds greater than 20 km/hr and should not be used in ambient temperatures exceeding 40 degrees Celsius.

Each individual boom section has a maximum delivery of 35 litres per minute with clean filters fitted. With clean filters fitted, the maximum combined flow of all boom sections is limited to 140 litres per minute, or 50% of the pump flow, whichever is the lesser amount.

Goldacres Super Cruiser mechanical drive system delivers efficient, positive power to the ground for superior traction.

However, should your Super Cruiser become bogged and the wheels subsequently locked, do not engage first gear and maximise engine revs.

With the wheel 'locked' in a bog situation, transmitting full power WILL DAMAGE the driveline.

Goldacres recommends that bog situations are addressed prudently by using the assistance of a tow vehicle. Doing otherwise can cause significant driveline damage and VOID WARRANTY

Custom Built Equipment

Where the owner of this machine has requested that custom built equipment or options be fitted to this machine it is necessary to understand that custom fabrication and engineering is subject to many variables. Goldacres cannot fully field test all custom built options prior to despatch, and owners of new machines fitted with custom built equipment or options need to understand that the functionality of these items may require refining in order to operate as desired.

Suspension

The Super Cruiser is fitted with 5 link airbag axle suspension to provide excellent ride and comfort. Further information on the suspension can be found in the "lubrication and maintenance" chapter.

Air Conditioning

The cabin is climate controlled and a carbon filter is installed to ensure operator safety.

Further information can be found in the "lubrication and maintenance" chapter.

Continued over page

General

Hydraulics

Electric over hydraulic valves are standard on Super Cruiser models. The hydraulic functions are then controlled from electric switches in the cabin. The valve block is located at the rear of the machine mounted on the centre section.

Ladder

The Ladder is to be used as access to the platform and cabin by the operator. Always face the ladder and retain three points of contact with the ladder at all times when ascending and descending. The ladder is only lifted to the raised position when the key is turned on and the handbrake is released. The operator must take care when operating the handbrake when there is a person close to the ladder as it may move unexpectedly. In an emergency the ladder can be lowered by either, Applying the handbrake, turning off the ignition or removing the air supply hose from the air cylinder.

Wheels and Tyres

The tyre pressure needs to be checked regularly (check every 8 to 12 hours of operation) and maintained at the required tyre pressure.

There are many factors concerning the appropriate tyre pressure for a particular tyre and load. For example, the tyre size, rim type, tyre status (driven or free rolling), load, speed, haul length and ply rating all need to be considered when determining the tyre pressure.

Note: If a tyre is replaced with a different brand or size, please contact the supplier for correct air pressures to suit the load carrying capacity of this machine.

For further information on wheels & tyres refer to Chapter 10 'Lubrication & Maintenance'.

GA8700354

MAX SPEED FULLY LOADED IS 25 KM/H		RECOMMENDED TYRE PRESSURE	
TYRE BRAND	TYRE SIZE	KPA	PSI
HARVEST	520/85R46 173A8/169D	240	35
AGRIMAX	520/85R46 158A8 (20.8 R46)	262	38

Note: PSI = Kpa x 0.145
Example: 240Kpa x 0.145 = 34.8 PSI

Continued over page

Dimensions

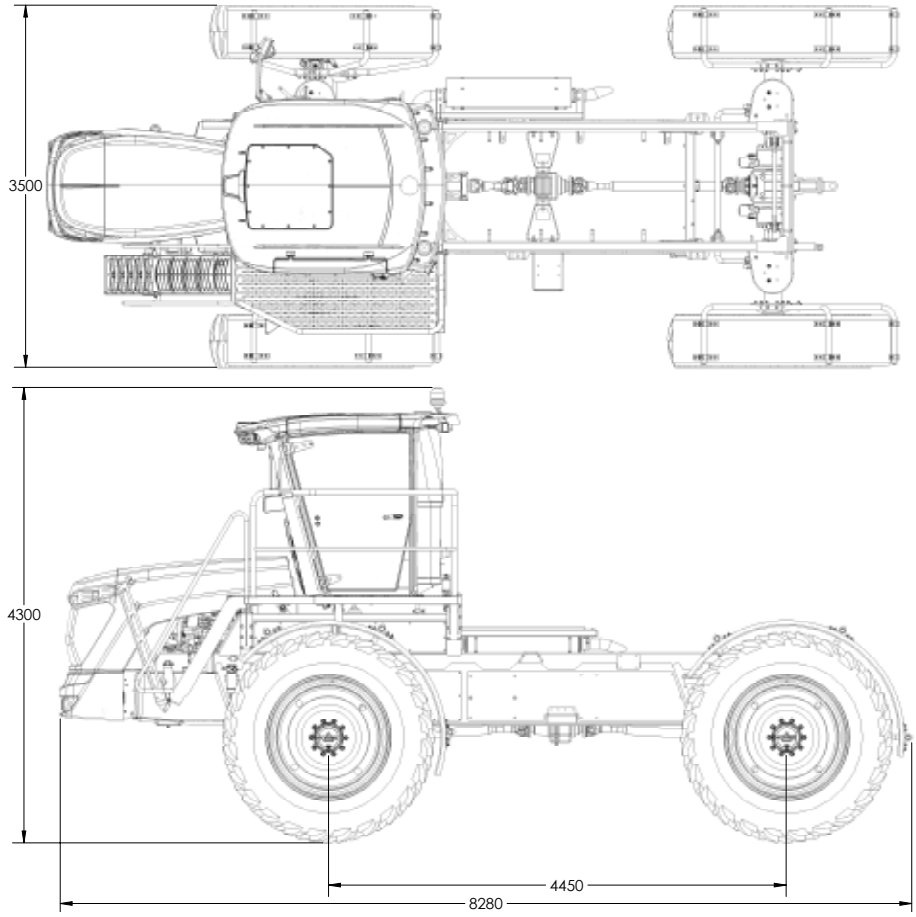
The following information is provided as a guide only.

Variations in dimensions may occur without notification. To ensure that the dimensions are accurate for your sprayer it is recommended that you measure your sprayer individually.

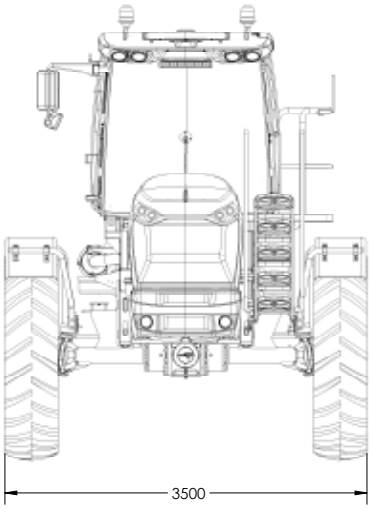
Note: The Super Cruiser is approx 4.3m in height and with aerials on the roof, can be much higher.

Check the regulations in your state for maximum vehicle height restrictions. When driving the Super Cruiser on roads it may be necessary to remove aerials to meet the required height restrictions.

Aerials on the roof may also need to be removed to meet clearance requirements for over head power lines, while on the road and also in some paddocks.



Sprayer height is based on 520/85 R46 tyres fitted and with air bags deflated.



FRONT HEIGHT	WIDTH	TOTAL LENGTH	WHEEL-BASE
4.3 m	3.5 m	8.28 m	4.45 m

Chapter 4

CABIN

Key Features

Above: training seat shown folded up

NO.	FEATURE
1.	Over Head Console
2.	Side Arm Rest Console
3.	Rear Corner Console
4.	Operators Seat
5.	Steering Wheels And Controls
6.	Training Seat
7.	Fire Extinguisher (Under Training Seat)
8.	Storage Area/Fridge - when optioned (Under Training Seat)
9.	Power Distribution Box
10.	Engine Monitor CAN
11.	Fold out Cup Holder
12.	Storage Area (under operators seat)
13.	Operator Seat Belt
14.	Fridge Switch (when fridge optioned)

Armrest Controls - Raven Controller

NO.	FEATURE
1.	GPS / Rate controller
2.	Engine Monitor CAN
3.	Cruise Resume + / Set -
4.	Auto Steer Resume
5.	Spreader ON/OFF
6.	Blank
7.	Transmission Shifter
8.	Cruise ON/OFF - RPM Raise ON
9.	Blank
10.	Blank
11.	GPS ON/OFF
12.	Centre Diff Lock ON/OFF
13.	Rear Diff Lock ON/OFF
14.	Park Brake ON/OFF

Operator Seat

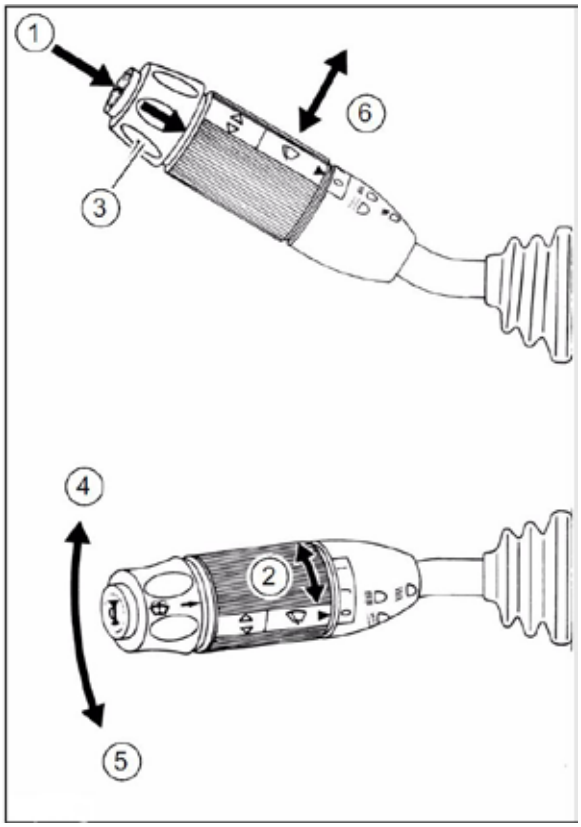
NO.	FEATURE	INSTRUCTIONS
1.	Fore / Aft Adjustment	By lifting this lever the seat can be slid backwards or forward to the desired position.
2.	Fore / Aft Locking lever	Release this lever to enable the Fore & Aft adjustment of the seat, and engage to lock the seat to the desired position.
3.	Seat Depth Adjustment	To adjust the depth of the seat cushion, pull the handle upwards. By moving the seat cushion backwards the desired seating position can be reached.
4.	Seat Pan Angle Adjustment	To adjust the angle of the seat pan, pull the handle upwards. By exerting pressure on or off the front or rear part of the seat pan it can be moved to the desired position.
5.	Height Adjustment	By lifting this lever air will be pumped in to the airbag suspension. By lowering this lever air is exhausted from the air bag.
6.	Tilt	The lever on the right hand side of the seat allows the back rest to be tilted forward or rearward. Pulling the lever forward releases the back rest so it can be repositioned.
7.	Arm Rest Adjust	By turning this knob the arm rest can be lowered or raised to suit.
8.	Lumbar	By turning this handle the lumbar in the back of the seat will increase or decrease the pressure on the operators back.
9.	Seat Belt	Operator lap seat belt must be fitted when ever the operator is seated in the cabin.

Steering Column

NO.	FEATURE	INSTRUCTIONS
1.	Steering Column Adjust	• Hold the steering wheel with your hand • Press the lever at the rear end with your foot. With the lever pressed down, set the steering column to the desired position with your hand • Release lever The desired position is now locked.
2.	Tilting the Steering Column	• Hold the steering wheel with your hand • Push lever to the top • With the lever pushed up, tilt the steering column to the desired position with your hand • Release lever The desired position is now locked.
3.	Steering Wheel Height Adjust	• Hold the steering wheel with your hand • Turn lid a quarter of a turn anti-clockwise • Set the steering wheel to the desired position by hand • Turn lid a quarter of a turn clockwise The desired position is now locked.

Multifunction Switch

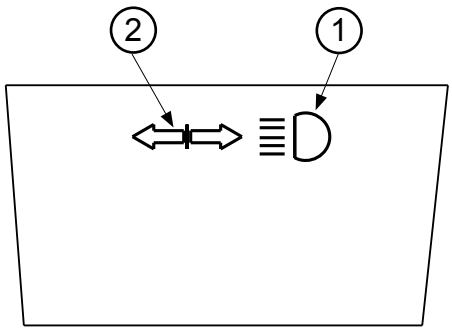
The multifunction switch is located on the left hand side of the steering column.



NO.	FEATURE
1.	Horn
2.	Windscreen iper • 0 = Off • J = Intermittent • I = Constant
3.	Windscreen washer
4.	Right turn signal indicator
5.	Left turn signal indicator
6.	High Beam/ Low beam/ Head light flasher

Vehicle Information Unit

The vehicle information unit is located on the rear of the steering column, although other icons may be visible, only blinkers and high beam are used.



NO.	FEATURE
1.	Headlights high Beam
2.	Right/Left Turn signal indicator

Over Head Components

NO.	FEATURE
1.	Air conditioning
2.	Mirror Adjuster
3.	Lights
4.	AM/FM Radio/CD player
5.	UHF 2 Way Radio
6.	Hazard Lights
7.	Rotating Beacons

Air Conditioning

The automatic air conditioner regulates the temperature and humidity of the air in the cabin.

The following operating modes are available:

- Fully automatic

Ideal for high outside temperatures.

- Manual ventilation system

Automatic mode with manual fan speed setting.

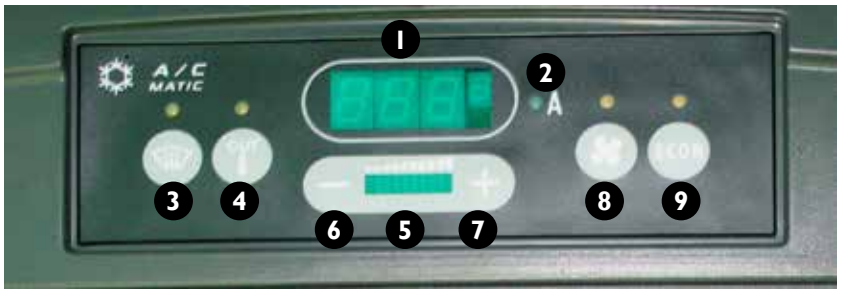
- ECON

Automatic mode without cooling function.

- Drying the cab windows

Continuous compressor operation at maximum fan speed

Overview of Controls



Switching the Automatic Air Conditioner on

- Switch the ignition on and start the engine

After switching the ignition on, the software version appears in the display (1) for 3 seconds.

After that, the unit carries out a self-test which takes 20 seconds max. The keys are now enabled for operation.

The operating mode and the display will remember the same settings from the last time the machine was running.

Activating Fully Automatic Operation

In fully automatic mode the air conditioner compressor, heater and the ventilation are automatically controlled so that the pre-set cab temperature is achieved as quickly as possible and then kept constant.

This operating mode is ideal at high outside temperatures.

Activating fully automatic operation:

- Switch off cab windows drying (3), manual ventilation (8) and ECON (9) operating modes

The indicator lights (3), (8) and (9) are OFF.

Indicator light (2) lights up. Fully automatic mode is active.

At outside temperatures below 10°C, the automatic system shuts down the air conditioner compressor.

Activating the Manual Fan

In manual fan operation, the heater and depending on the setting, the air conditioner compressor are automatically regulated to the pre-set set point. The fan speed can be set manually.

This offers the opportunity of setting a lower fan speed and slower temperature adaptation in case of large deviations between cab and outside temperature.

Activating the manual fan:

- Press button (8)

Indicator light (8) lights up. Manual venting is active.

Continued over page

Air Conditioning

Current fan speed is shown on the display (5). One bar represents a 10% speed increment between 0 and 100 %.

To reduce the fan speed:

- Press button (6) once per 10% speed decrease

To increase the fan speed:

- Press button (7) once per 10% speed increase

The changed setting is activated after 5 seconds.

Activating ECON Mode

In ECON mode, the air conditioner compressor is shut down. The heater and – depending on the setting – the ventilation are controlled automatically.

- Use this mode when cooling is not required

Activating the ECON mode

- Press button (9)

Indicator light (9) lights up. Indicator light (2) goes out. The ECON mode is active.

Drying the Cab Windows

For drying the cab windows, the compressor is on constantly at maximum fan speed. The heater is set to the pre-set set value.

Drying the cab windows:

- Press button (3)

Indicator light (3) lights up. The drying mode is active. The fan is set to maximum speed.

To change the fan speed, see 'Activating the manual fan'.

Setting the Cab Temperature

The display (1) shows the currently set temperature.

To decrease temperature:

- Press button (6)

To increase temperature:

- Press button (7)

Temperature may be adjusted in 1°C or 2°F increments depending on units selected (See 'Changing the temperature unit') per press of button.

The automatic air conditioner adjusts the cab temperature to the set value. During this process, the fan speed may rise quickly so that the cab temperature reaches the pre-set set point more quickly. Such as on a very hot day. When the cab temperature approaches the set value, the fan speed will be reduced again.

Changing the Temperature Unit

The temperature display can be switched between degrees Celcius and degrees Farenheit.

- Press buttons (4) and (6) simultaneously for up to 3 seconds to switch between unit modes

Repeating the above step will cycle between the two unit modes.

Displaying the Outside Temperature

- Press button (4).

Indicator light (4) lights up. The display (1) shows the outside temperature.

Adjusting the Air Conditioner Air Flow

The air flow is distributed inside the cab by fully adjustable nozzles. Each nozzle can be adjusted directionally or turned on/off to suit the individual needs of the user.

Eg. To heat the leg area, close all upper vents and direct air flow from the lower vents to the floor.

AM/FM Radio

The entertainment radio is fitted to the panel in front of the operator on the roof. It consists of a radio tuner as well as single CD player. A Bluetooth compatible phone system is installed in the unit.

Operational instructions can be found in the entertainment radio manual supplied with this manual.

UHF Two Way Radio

There is a UHF two way radio mounted on the roof cavity near the entertainment radio. This radio is powered up through the electrical panel and has a fused circuit.

Operational instructions can be found in the UHF Two Way Radio manual supplied with this manual.

Map Light

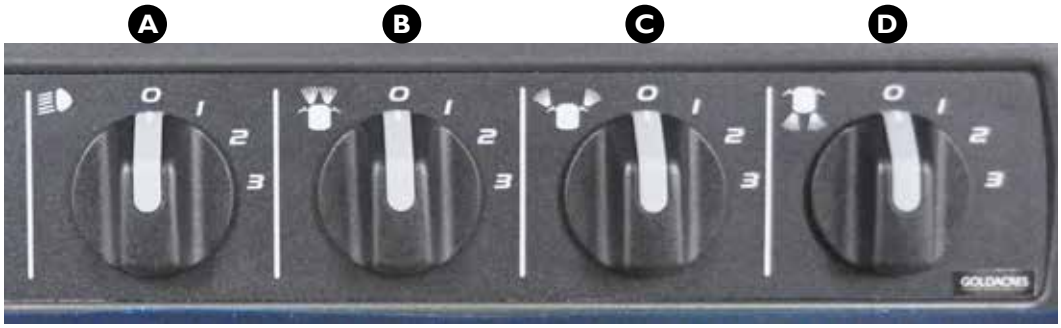
The map light has two separate lights that can be operated together or individually.

The switch on the left turns the front map light on and off. This light is fixed and cannot be aimed.

The switch on the right operates the rear map light. This light is directional and can be aimed as desired.

NOTE: The map lights only operate when the ignition key is in the 'accessories' or 'run' position.

Lighting



ITEM	FEATURE	POSITION	FUNCTION
A	Head Lights	0	Off
		1	Cab interior lights, Tail Lights, Outer Boom Marker lights.
		2	Headlights + All of the above
		3	-
B	Front Work Lights Inner & Outer	0	Off
		1	Inner Front Work lights
		2	Outer front work lights
		3	-
C	Not Used	0	-
		1	-
		2	-
		3	-
D	Rear Work Lights	0	Off
		1	Rear work lights, Night Pro LED boom lights
		2	-
		3	-

Note: To cycle between high and low beam the steering column multi function stick is used. The head lights must be turned on overhead first.

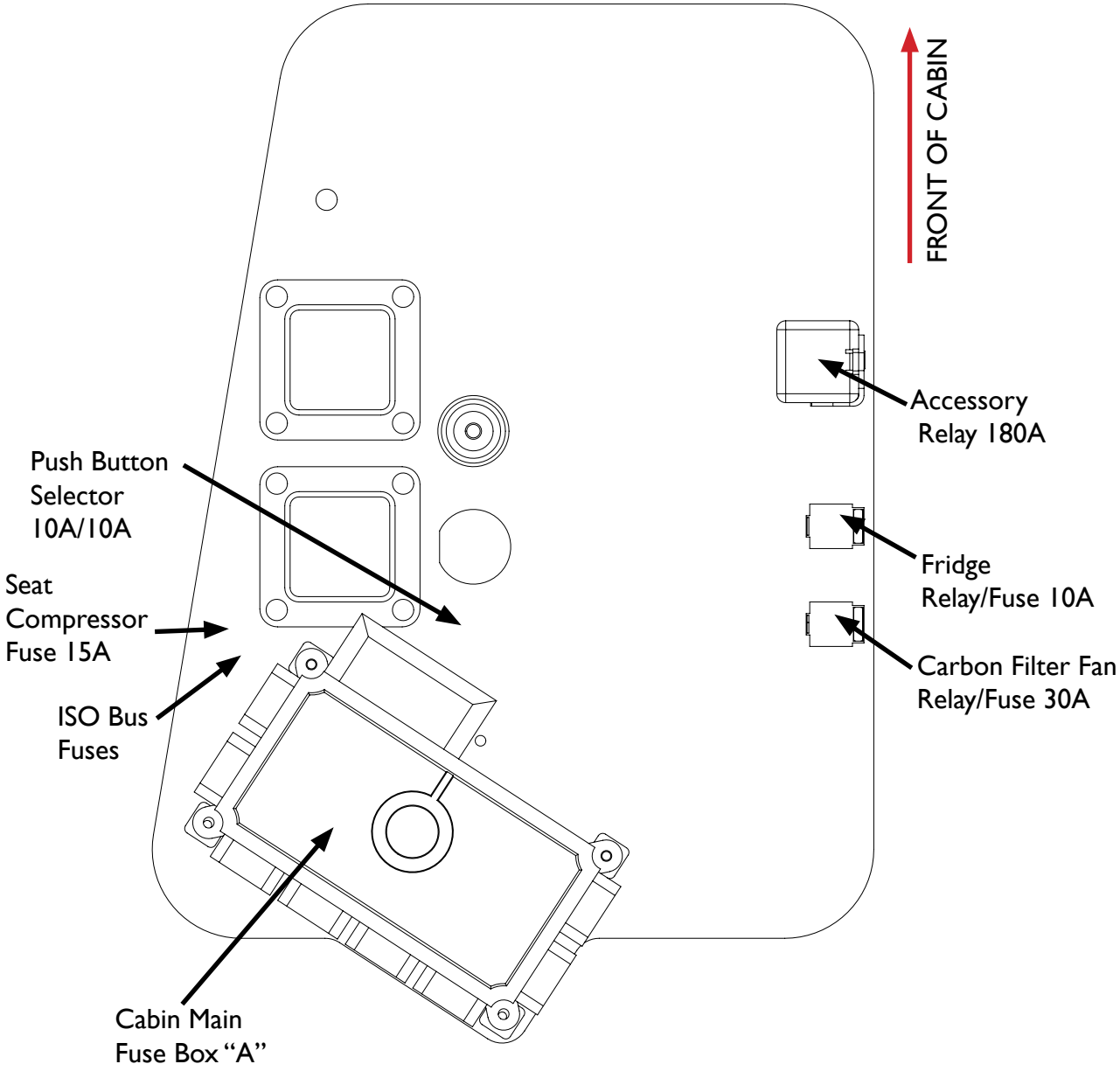
Note: Front and rear work lights will not function unless the headlight switch is in position 1 or 2.

Rear Corner Console

NO.	FEATURE
1.	Ignition Key
2.	Fuel Gauge
3.	Aux USB Power Supply
4.	Park Brake/Low Air Warning Light (also audible alarm)
5.	Cigarette Lighter
6.	Carbon Filter Fan Switch
7.	Glass Breaking Hammer (emergency use only)
8.	Engine/Transmission Diagnostic Connector
9.	12V Sockets

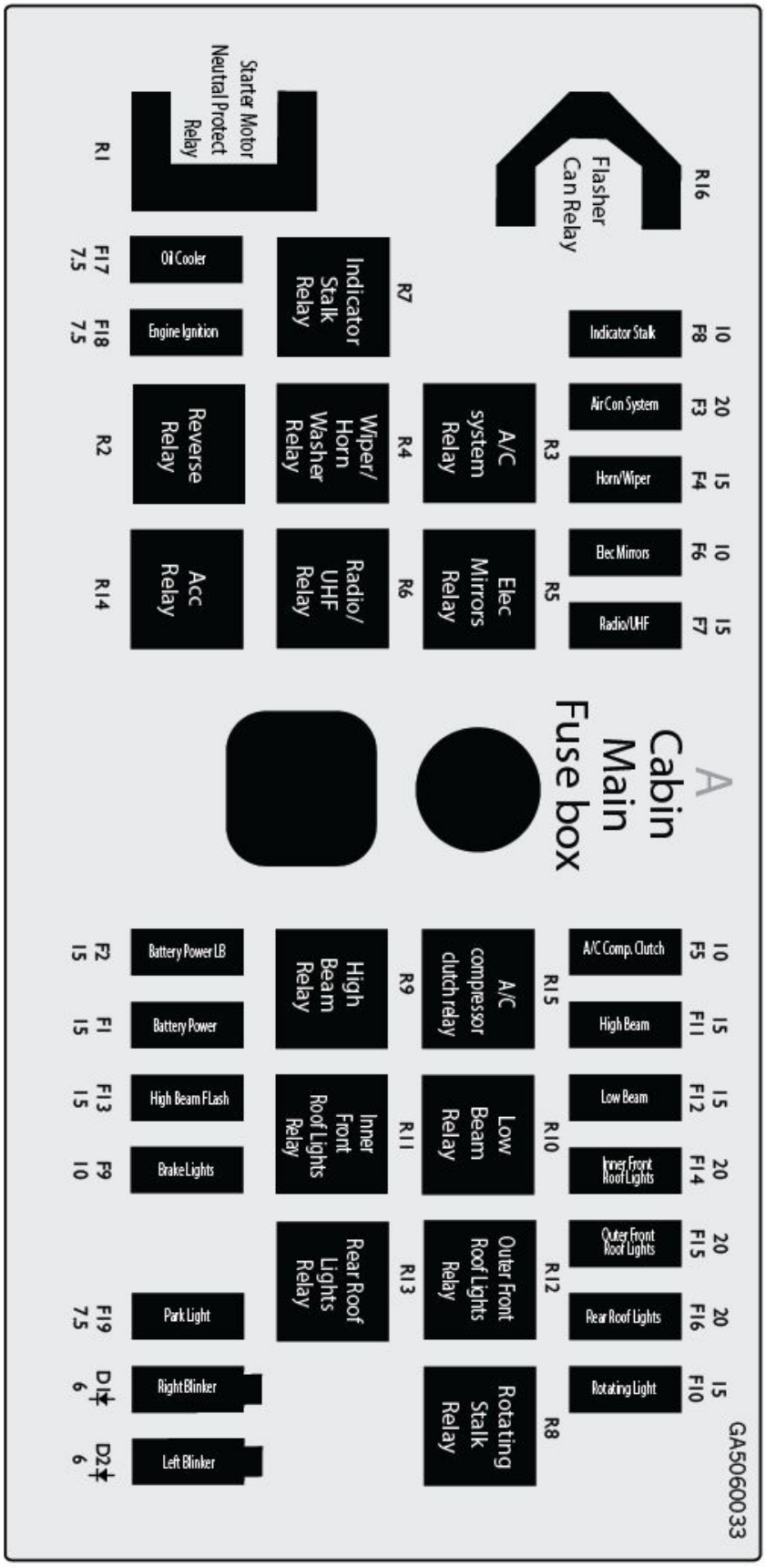
Power Distribution Box

The power distribution box is located on the floor to the right of the operators seat. The box contains fuses and relays. To gain access locate the two black knobs of the hold down clips on the top front of the cover. Turn them about 90 degrees to unclip and then lift. Be careful not to force them as they can break. You can then slide the cover forwards. The location of the fuses and relays are shown below.



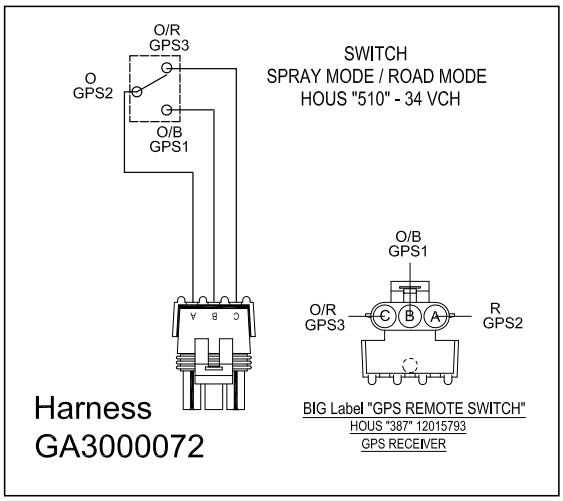
Configuration of the main fuse box will depend on options selected.

Power Distribution Box - Cabin Main

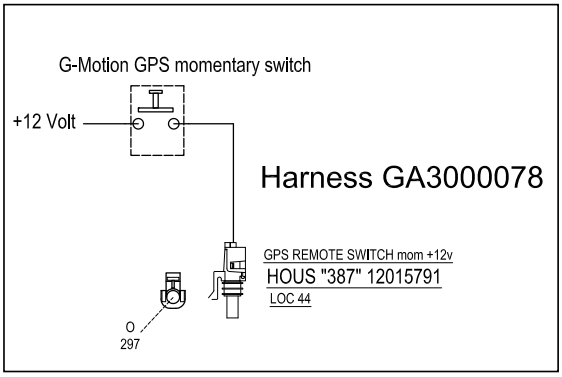


Power Distribution Box - Optional Equipment

Optional equipment may to be added to the power distribution box via the provided connectors found inside.



GPS REMOTE SWITCH - for the connection to an auto steer system. The cable has a 3 pin male weather pack plug for the customer to connect their Auto steer system.



GPS REMOTE SWITCH - mom +12v" is for the connection of the G-Motion GPS momentary switch from the joystick.

CANtrak System

Understanding GEM

Generic Engine Monitor (GEM) software runs on a CANtrak display with five soft keys, providing a flexible and intuitive Human-Machine Interface (HMI). The 5 soft keys access a graphical menu structure that uses standard and easily-understood icons to indicate the key's current function. This enables the operator to select the required engine and transmission data and display it in the following formats:

- Analogue gauges
- Digital values
- Multi-gauge/data (a combination of above)
- Historical trend graphs
- Current or stored alarm messages

Additionally, various diagnostic screens are available, allowing detailed investigation of the engine and transmission data stream. By accessing the Configuration menu, users can customise some of the displayed data to show, for example, metric or imperial units, and various parameters such as the full-scale reading of gauges.

Pressing any of the first 4 keys (GEM keys are numbered 1 to 5, from left to right) brings up the top level 'button bar' (navigation menu).

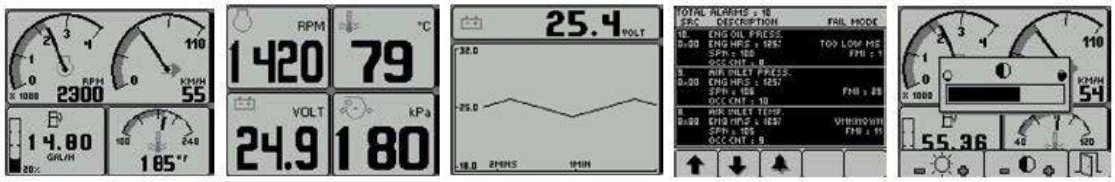
Continued over page

CANtrak System

GEM presents a context dependent 'button bar' above the push buttons if any key from 1 to 4 is pressed - it disappears after 5 seconds of inactivity. This 'top level' button bar shows the basic structure of GEM:

NO.	FEATURE	FUNCTION
1.	Tri Display, or Main Engine Display	Repeat presses cycle the fuel computer through various modes.
2.	Quad Display	(User configurable). Repeat presses cycle the display around 3 different quad view options..
3.	Uni Display	Showing data history (configurable). Repeat presses cycle display through available parameters.
4.	Active alarm display	Holding the button brings up stored alarms..
5	Contrast and Lighting Adjustment	Or - if held for 3 seconds - the configuration menu..

Left to right: Key 1-5, examples of screen images after keys are pushed.



Getting Started

When power is applied to the display, a start-up screen displays for approximately 7 seconds while the unit performs a self test . If the unit makes a long 'beeping' sound, self-test has failed. Users can attempt to rectify the fault by restoring factory defaults (see Configuration section); if the fault persists, contact your supplier for guidance.

The 'Splash Screen' is displayed on boot up.

After the start up screen disappears, GEM starts displaying readings on its virtual gauges if it is connected to an active source of data. GEM displays the 'main engine display' or tri-screen on initial start up, but note that after use this changes to the screen that was last displayed (see Preferred Screen Store section for details). GEM display modes are detailed in the following sections.

Gem's Soft Keys

GEM's soft keys simplify the operator interface. In use, GEM displays a 'button bar' directly above the soft keys when any of the first 4 keys (keys 1 to 4, starting from the left) are pressed - with icons representing the current function of each key. The picture at the top of the page shows the main button bar, with icons 1 to 4 representing the gauges and alarms available, and icon 5 an 'exit door'. Repeat presses of these buttons toggles around the display options available. The button bar will disappear after approximately 5 seconds if no further keys are pressed.

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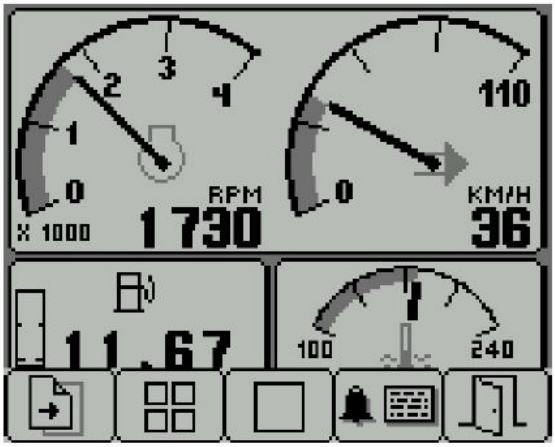
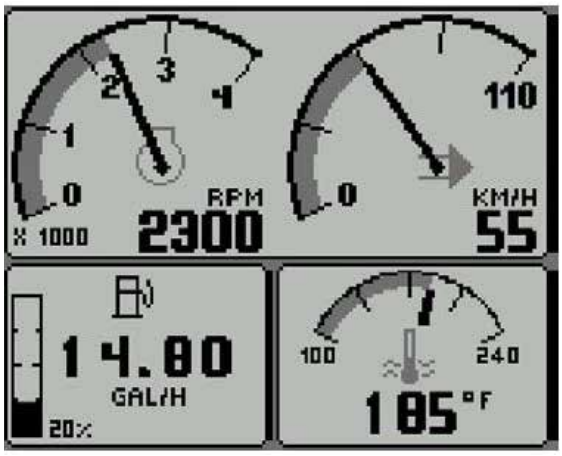


- Key 1: Pages icon indicating that further presses cycle through options for the screen being viewed (in this instance fuel computer modes for the main engine display)
- Key 2: Quad display mode
- Key 3: Uni display mode
- Key 4: Alarm display mode
- Key 5: Exit door

The Tri Display or Main Engine Display (Key 1)



Tri Display or main engine display, accessed via key 1.
NOTE: Metric units are shown by default but others may be selected via the configuration menu.

This GEM display mode provides three independent windows, and is intended to show the most frequently-accessed vehicle data (RPM, speed, temperature and fuel).

To select Tri Display, press any of the first 4 keys to show the top-level button bar, and then key 1 (the left-hand key). The parameters displayed on this page cannot be changed, apart from the fuel computer window which is explained below. However, attributes such as units and scales may be changed - see the Configuration menu section for details (note that user-defined views of vehicle data are available in the next GEM mode: Quad Display).

Tri Display - Fuel Computer Modes

An example of a fuel computer mode

- Instantaneous Fuel Rate: (volume/hour)
- Average Trip Fuel Rate: If Total Fuel and Engine Hours are available it is calculated since last trip fuel/hours reset using: trip fuel/trip hours [volume/hour]
- Average Distance Per Volume: If Vehicle Speed or Vehicle Distance and the Total Fuel is available then it is calculated since last trip fuel/distance reset using: distance/volume
- Total Engine Hours: If Total Engine Hours is available
- Trip Engine Hours: Since last trip hours reset
- Trip Fuel: Since last trip fuel reset
- Total Distance: If Total Distance is available
- Trip Distance: If Total Distance is available then it is calculated since last trip distance reset. If Total Distance is not available, but Trip Distance is, then this is displayed.
- Fuel Remaining: If Tank Capacity is entered, Tank Full is reset, and Total Fuel Used is available, then Fuel Remaining is calculated using: Tank Capacity – (Total Fuel Used – Trip Fuel). Evaluation assumes Engine Fuel Used is cumulative and not zeroed on power up.

Continued over page

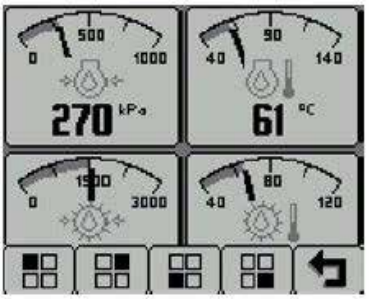
Distance Remaining: If the data required for Fuel Remaining and Average Distance Per Volume is available, it is calculated using: Average Distance Per Volume x Fuel Remaining

NOTE: Reset - which affects all resettable fuel computer parameters - is performed by allowing the button bar to disappear and pressing and holding key 1 for at least 3 seconds. If the button bar is visible then the display will move to the next parameter before the Reset. Setting Fuel Tank Reset and Total Fuel Tank Data is performed via the Configuration menu.

The Quad Display (key 2)

Quad display mode provides 4 gauges. To select it, press any of the keys 1 to 4 to show the top-level button bar and then key 2. Repeat presses of key 2 cycle the display around 3 separate quad screens: as a default these screens show 4 digital gauges (RPM, temperature, battery voltage, oil pressure), 4 analogue gauges (same as digital), and 4 alternative analogue gauges. All 12 gauges may be selected and configured by users, providing a simple means of creating application-specific views of engine data. Gauges are selected via quad display's 'adjust mode', by pressing key 5 (noted by an arrow icon) when GEM is running quad display and the button bar is visible. In adjust mode, corresponding key presses cycle the display through available parameters. The selected configuration is stored even when power is removed; adjust mode is exited by pressing key 5.

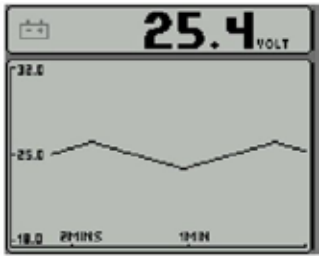
The 3 default displays available in quad-display



Adjust mode, which allows users to select the gauges displayed.

The Uni Display (key 3)

GEM's Uni display mode plots data history in one large window - in an X-Y graph format similar to a pen plotter. This mode is selected by pressing any of the first 4 keys to show the top-level button bar and then key 3. Data is shown in graph form, with the most recent data scrolling from right to left. The viewed time range may be adjusted in the Configuration menu from 2 minutes to 8 hours in six steps. Maximum and minimum values of the Y axis (the reading span) are adjusted automatically to give an optimum view of data. The parameter displayed is selectable by repeatedly pressing key 3 while in the graph display mode. The parameters that may be displayed are listed in the next section.



Example graph display plotting battery voltage.

CANtrak System - Parameters Monitored

Engine and Transmission Parameters Monitored

This table lists the engine and transmission parameters that can be displayed by GEM and which may be shown in user-configurable Quad Display and Uni Display modes (a tick indicates the parameter may be selected). DB is an abbreviation for GEM's internal database, which stores all data transmitted from the engine/transmission. It can be accessed via the Configuration menu. (Note that this list is current at the time of going to press, new parameters are continually being added - the latest list may be found in the latest GEM data sheet available at <http://www.cantrak-int.com>).

Abbreviations: The units 'MPG' and 'Gal' denote US gallons. For non-US Imperial gallons (UK, Canada, etc) units, these units are denoted as IMPG or IGal. N = nautical. KTS = Knots.

NOTE: If a parameter is not available, it will not be possible to select it. If the parameter becomes unavailable while in view, '- - -' is displayed.

Icon	Parameter	Tri	Quad	Uni	DB
	MISCELLANEOUS				
None	Torque converter lock-up				√
F N R	Current gear		√		√
F N R	Selected gear		√		√
	Accelerator position (%)		√		√
None	Transmission output shaft speed (RPM)				√
None	Transmission input shaft speed (RPM)				√
	Engine speed (RPM)	√	√	√	√
	Engine torque (%)		√		√
	Engine oil level (%)		√		√
	Coolant level (%)		√		√
	Fan speed (%)		√		√
	Vehicle speed (km/h, MPH or KTS)	√			√
	Engine hours (h)	√			√
	Trip engine hours (h)	√			√

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CANtrak System - Parameters Monitored

Icon	Parameter	Tri	Quad	Uni	DB
	FUEL & DISTANCE				
	Trip distance (km, Miles, NMiles)	√			√
	Distance remaining (km, Miles, NMiles)	√			√
	Total distance (km, Miles, NMiles)	√			√
	Fuel rate (L/h, Gal/h or IGal/h)	√		√	√
	Average trip fuel rate (L/h, Gal/h or IGal/h)	√			√
	Fuel level (%)	√			√
	Fuel remaining (L, Gal or IGal)	√			√
	Trip fuel (L, Gal, IGal)	√			√
None	Total fuel used (L, Gal, IGal)				√
	Instantaneous fuel economy (Km/L, MPG or IMPG)	√			√
	Average fuel economy (Km/L, MPG or IMPG)	√			√

Icon	Parameter	Tri	Quad	Uni	DB
	PRESSURE (can be kPa, PSI or bar)				
	Fuel pressure		√	√	√
	Barometric pressure		√		√
AUX 1	Auxiliary pressure		√		√
	Turbo pressure		√	√	√
	Air inlet pressure		√	√	√
	Air filter differential pressure		√		√
None	Injector metering rail 1 pressure				√
None	Injector metering rail 2 pressure				√
	Coolant pressure		√	√	√
	Engine oil pressure	√	√	√	√
	Transmission oil pressure		√	√	√

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CANtrak System - Parameters Monitored

Icon	Parameter	Tri	Quad	Uni	DB
	ELECTRICAL				
	Internal voltage (V)		√	√	√
	Battery voltage (V)		√	√	√
	Battery current (A)		√		√
	Alternator current (A)		√		√
	TEMPERATURE (can be ºC or ºF)				
	Coolant temperature	√	√	√	√
	Engine intercooler temperature		√		√
	Engine oil temperature		√	√	√
	Transmission oil temperature		√	√	√
	Turbo oil temperature		√		√
	Fuel temperature		√		√
	Inlet manifold temperature		√	√	√
	Air inlet temperature		√		√
	Exhaust temperature		√	√	√
	Auxiliary temperature		√		√

CANtrak System - Alarms

Active and Stored Alarm Lists

Active alarms. When an active/current alarm is received, a flashing pop-up window appears overlaid on the current screen in use, showing details of the current alarm. If the alarm is 'red/stop' category (this is J1939 terminology for a serious problem, e.g. low oil pressure), GEM activates its internal sounder (beeping noise), and the External Alarm Output or Pin 11 (if available on the CANtrak you have chosen)

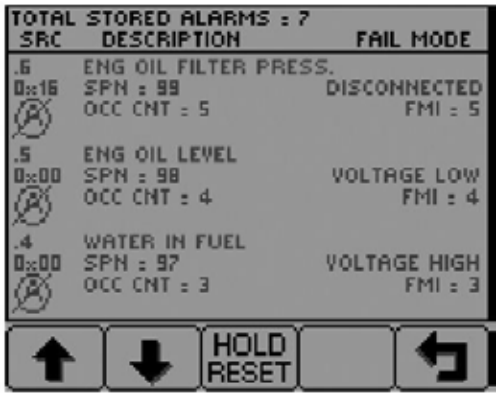
.

Example alarm message, plus alarm list screens showing unacknowledged conditions (black background) and acknowledged alarms (grey background). After acknowledgement, the exit key (open door icon) becomes active. J1939 - standard abbreviations are used wherever possible.

NOTE: 'MS' = Most Severe, "MOD"= Moderately Severe and "LS" = Least Severe.

The alarm list is accessed by pressing any key while an alarm pop-up is displayed, or by pressing any of the first 4 keys to show the button bar, and then key 4. This screen displays all current active alarms; when entered, Pin 11 External Alarm Output is deactivated (if the function is available). Alarms not yet acknowledged are shown in grey on black. Alarms already acknowledged are shown in black on grey. If engine Hours data is available, the list indicates when the alarm was initiated. When first entering the screen, the list automatically displays the most recent alarm. The list can be scrolled using keys 1 and 2. This screen cannot be exited until all alarms have been acknowledged by pressing key 3. Alarm messages are automatically cleared from the list when no longer received by GEM.

Stored alarms. Alarms stored by engine/transmission ECU's (i.e. not active or current but old/historical alarms) may be viewed by pressing and holding key 4 while the active alarm list screen is visible. On entry to this page, GEM sends a data request to the engine/transmission. The engine/transmission sends the stored alarm data to GEM, which is decoded and displayed in a similar fashion to active alarms. GEM displays an error message if there is no response from the engine/transmission. If the engine/transmission supports the erasure of stored alarms, they may now be erased by holding key 3.



Example of stored alarms list

CANtrak System - Engine Fault Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	J1939 SPN Description	Cummins Description
111	629	12	Red	Controller #1	Engine Control Module Critical internal failure - Bad intelligent Device or Component
115	612	2	Red	System Diagnostic Code # 2	Engine Speed/Position Sensor Circuit lost both of two signals from the magnetic pickup sensor - Data Erratic, Intermittent, or incorrect
122	102	3	Amber	Boost Pressure	Intake Manifold Pressure Sensor Circuit – Voltage Above Normal, or Shorted to High Source
123	102	4	Amber	Boost Pressure	Intake Manifold Pressure Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
124	102	16	Amber	Boost Pressure	Intake Manifold 1 Pressure - Data Valid but Above Normal Operational Range - Moderately Severe Level
131	91	3	Red	Accelerator Pedal Position	Accelerator Pedal or Lever Position Sensor Circuit - Voltage Above Normal, or Shorted to High Source
132	91	4	Red	Accelerator Pedal Position	Accelerator Pedal or Lever Position Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
133	974	3	Red	Remote Accelerator	Remote Accelerator Pedal or Lever Position Sensor Circuit – Voltage Above Normal, or Shorted to High Source
134	974	4	Red	Remote Accelerator	Remote Accelerator Pedal or Lever Position Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
135	100	3	Amber	Engine Oil Pressure	Oil Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
141	100	4	Amber	Engine Oil Pressure	Oil Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
143	100	18	Amber	Engine Oil Pressure	Oil Pressure Low – Data Valid but Below Normal Operational Range - Moderately Severe Level
144	110	3	Amber	Engine Coolant Temperature	Coolant Temperature Sensor Circuit – Voltage Above Normal, or Shorted to High Source
145	110	4	Amber	Engine Coolant Temperature	Coolant Temperature Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
146	110	16	Amber	Engine Coolant Temperature	Coolant Temperature High - Data Valid but Above Normal Operational Range - Moderately Severe Level
147	91	1	Red	Accelerator Pedal Position	Accelerator Pedal or Lever Position Sensor Circuit – Abnormal Frequency, Pulse Width, or Period
148	91	0	Red	Accelerator Pedal Position	Accelerator Pedal or Lever Position Sensor Circuit – Abnormal Frequency, Pulse Width, or Period
151	110	0	Red	Engine Coolant Temperature	Coolant Temperature Low - Data Valid but Above Normal Operational Range - Most Severe Level
153	105	3	Amber	Intake Manifold #1 Temp	Intake Manifold Air Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
154	105	4	Amber	Intake Manifold #1 Temp	Intake Manifold Air Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
155	105	0	Red	Intake Manifold #1 Temp	Intake Manifold Air Temperature High – Data Valid but Above Normal Operational Range - Most Severe Level
187	3510	4	Amber	5 Volts DC Supply	Sensor Supply Voltage #2 Circuit – Voltage Below Normal, or Shorted to Low Source

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CANtrak System - Engine Fault Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	J1939 SPN Description	Cummins Description
193	520199	3	Amber	Cruise Control	Cruise Control (Resistive) Signal Circuit - Voltage Above Normal, or Shorted to High Source
194	520199	4	Amber	Cruise Control	Cruise Control (Resistive) Signal Circuit - Voltage Below Normal, or Shorted to Low Source
195	111	3	Amber	Coolant Level	Coolant Level Sensor Circuit - Voltage Above Normal, or Shorted to High Source
196	111	4	Amber	Coolant Level	Coolant Level Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
197	111	18	Amber	Coolant Level	Coolant Level - Data Valid but Below Normal Operational Range - Moderately Severe Level
199	1661	4	Amber	Engine Automatic Start Lamp	Engine Automatic Start Lamp Driver Circuit - Voltage Above Normal, or Shorted to High Source
211	1484	31	None	J1939 Error	Additional Auxiliary Diagnostic Codes logged - Condition Exists
212	175	3	Amber	Oil Temperature	Engine Oil Temperature Sensor 1 Circuit - Voltage Above Normal, or Shorted to High Source
213	175	4	Amber	Oil Temperature	Engine Oil Temperature Sensor 1 Circuit - Voltage Below Normal, or Shorted to Low Source
214	175	0	Red	Oil Temperature	Engine Oil Temperature - Data Valid but Above Normal Operational Range - Most Severe Level
221	108	3	Amber	Barometric Pressure	Barometric Pressure Sensor Circuit – Voltage Above Normal, or Shorted to High Source
222	108	4	Amber	Barometric Pressure	Barometric Pressure Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
227	3510	3	Amber	5 Volts DC Supply	Sensor Supply Voltage #2 Circuit – Voltage Above Normal, or Shorted to High Source
231	109	3	Amber	Coolant Pressure	Coolant Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
232	109	4	Amber	Coolant Pressure	Coolant Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
233	109	18	Amber	Coolant Pressure	Coolant Pressure - Data Valid but Below Normal Operational Range - Moderately Severe Level
234	190	0	Red	Engine Speed	Engine Speed High - Data Valid but Above Normal Operational Range - Most Severe Level
235	111	1	Red	Coolant Level	Coolant Level Low - Data Valid but Below Normal Operational Range - Most Severe Level
237	644	2	Amber	External Speed Input	External Speed Input (Multiple Unit Synchronization) - Data Erratic, Intermittent, or Incorrect
238	3511	4	Amber	System Diagnostic code # 1	Sensor Supply Voltage #3 Circuit – Voltage Below Normal, or Shorted to Low Source
239	3511	3	Amber	System Diagnostic code #2	Sensor Supply Voltage #3 Circuit - Voltage Above Normal, or Shorted to High Source
241	84	2	Amber	Wheel-based Vehicle Speed	Vehicle Speed Sensor Circuit - Data Erratic, Intermittent, or Incorrect
242	84	10	Amber	Wheel-based Vehicle Speed	Vehicle Speed Sensor Circuit tampering has been detected – Abnormal Rate of Change
244	623	4	Amber	Red Stop Lamp	Red Stop Lamp Driver Circuit - Voltage Below Normal, or Shorted to Low Source
245	647	4	Amber	Fan Clutch Output Device Driver	Fan Control Circuit - Voltage Below Normal, or Shorted to Low Source
249	171	3	Amber	Ambient Air Temperature	Ambient Air Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
256	171	4	Amber	Ambient Air Temperature	Ambient Air Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
261	174	16	Amber	Fuel Temperature	Engine Fuel Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level

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CANtrak System - Engine Fault Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	J1939 SPN Description	Cummins Description
263	174	3	Amber	Fuel Temperature	Engine Fuel Temperature Sensor 1 Circuit - Voltage Above Normal, or Shorted to High Source
265	174	4	Amber	Fuel Temperature	Engine Fuel Temperature Sensor 1 Circuit - Voltage Below Normal, or Shorted to Low Source
268	94	2	Amber	Fuel Delivery Pressure	Fuel Pressure Sensor Circuit - Data Erratic, Intermittent, or Incorrect
271	1347	4	Amber	Fuel Pump Pressurizing Assembly #1	High Fuel Pressure Solenoid Valve Circuit – Voltage Below Normal, or Shorted to Low Source
272	1347	3	Amber	Fuel Pump Pressurizing Assembly #1	High Fuel Pressure Solenoid Valve Circuit – Voltage Above Normal, or Shorted to High Source
281	1347	7	Amber	Fuel Pump Pressurizing Assembly #1	High Fuel Pressure Solenoid Valve #1 – Mechanical System Not Responding Properly or Out of Adjustment
284	1043	4	Amber	Internal Sensor Voltage Supply	Engine Speed/Position Sensor (Crankshaft) Supply Voltage Circuit - Voltage Below Normal, or Shorted to Low Source
285	639	9	Amber	SAE J1939 Datalink	SAE J1939 Multiplexing PGN Timeout Error - Abnormal Update Rate
286	639	13	Amber	SAE J1939 Datalink	SAE J1939 Multiplexing Configuration Error – Out of Calibration
287	91	19	Red	Accelerator Pedal Position	SAE J1939 Multiplexing Accelerator Pedal or Lever Sensor System Error - Received Network Data In Error
288	974	19	Red	Remote Accelerator	SAE J1939 Multiplexing Remote Accelerator Pedal or Lever Data Error - Received Network Data In Error
292	441	14	Red	Auxiliary Temperature 1	Auxiliary Temperature Sensor Input 1 - Special Instructions
293	441	3	Amber	OEM Temperature	Auxiliary Temperature Sensor Input # 1 Circuit - Voltage Above Normal, or Shorted to High Source
294	441	4	Amber	OEM Temperature	Auxiliary Temperature Sensor Input # 1 Circuit - Voltage Below Normal, or Shorted to Low Source
295	108	2	Amber	Barometric Pressure	Barometric Pressure Sensor Circuit - Data Erratic, Intermittent, or Incorrect
296	1388	14	Red	Auxiliary Pressure	Auxiliary Pressure Sensor Input 1 - Special Instructions
297	1388	3	Amber	Auxiliary Pressure	Auxiliary Pressure Sensor Input # 2 Circuit - Voltage Above Normal, or Shorted to High Source
298	1388	4	Amber	Auxiliary Pressure	Auxiliary Pressure Sensor Input # 2 Circuit - Voltage Below Normal, or Shorted to Low Source
319	251	2	Maint	Real Time Clock Power	Real Time Clock Power Interrupt - Data Erratic, Intermittent, or Incorrect
322	651	5	Amber	Injector Cylinder #01	Injector Solenoid Cylinder #1 Circuit – Current Below Normal, or Open Circuit
323	655	5	Amber	Injector Cylinder #05	Injector Solenoid Cylinder #5 Circuit – Current Below Normal, or Open Circuit
324	653	5	Amber	Injector Cylinder #03	Injector Solenoid Cylinder #3 Circuit – Current Below Normal, or Open Circuit
325	656	5	Amber	Injector Cylinder #06	Injector Solenoid Cylinder #6 Circuit – Current Below Normal, or Open Circuit
331	652	5	Amber	Injector Cylinder #02	Injector Solenoid Cylinder #2 Circuit – Current Below Normal, or Open Circuit
332	654	5	Amber	Injector Cylinder #04	Injector Solenoid Cylinder #4 Circuit – Current Below Normal, or Open Circuit
334	110	2	Amber	Engine Coolant Temperature	Coolant Temperature Sensor Circuit – Data Erratic, Intermittent, or Incorrect

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CANtrak System - Engine Fault Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	J1939 SPN Description	Cummins Description
338	1267	3	Amber	Vehicle Accessories Relay Driver	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage Above Normal, or Shorted to High Source
339	1267	4	Amber	Vehicle Accessories Relay Driver	Idle Shutdown Vehicle Accessories Relay Driver Circuit - Voltage Below Normal, or Shorted to Low Source
341	630	2	Amber	Calibration Memory	Engine Control Module data lost - Data Erratic, Intermittent, or Incorrect
342	630	13	Red	Calibration Memory	Electronic Calibration Code Incompatibility - Out of Calibration
343	629	12	Amber	Controller #1	Engine Control Module Warning internal hardware failure - Bad Intelligent Device or Component
349	191	16	Amber	Transmission Output Shaft Speed	Transmission Output Shaft Speed - Data Valid but Above Normal Operational Range - Moderately Severe Level
351	627	12	Amber	Controller #1	Injector Power Supply - Bad Intelligent Device or Component
352	3509	4	Amber	5 Volts DC Supply	Sensor Supply Voltage #1 Circuit – Voltage Below Normal, or Shorted to Low Source
386	3509	3	Amber	5 Volts DC Supply	Sensor Supply Voltage #1 Circuit – Voltage Above Normal, or Shorted to High Source
415	100	1	Red	Engine Oil Pressure	Oil Pressure Low – Data Valid but Below Normal Operational Range - Most Severe Level
418	97	15	Maint.	Water in Fuel Indicator	Water in Fuel Indicator High - Data Valid but Above Normal Operational Range – Least Severe Level
422	111	2	Amber	Coolant Level	Coolant Level - Data Erratic, Intermittent, or Incorrect
425	175	2	Amber	Oil Temperature	Engine Oil Temperature - Data Erratic, Intermittent, or Incorrect
428	97	3	Amber	Water in Fuel Indicator	Water in Fuel Sensor Circuit - Voltage Above Normal, or Shorted to High Source
429	97	4	Amber	Water in Fuel Indicator	Water in Fuel Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
431	558	2	Amber	Accelerator Pedal Low Idle Switch	Accelerator Pedal or Lever Idle Validation Circuit - Data Erratic, Intermittent, or Incorrect
432	558	13	Red	Accelerator Pedal Low Idle Switch	Accelerator Pedal or Lever Idle Validation Circuit - Out of Calibration
435	100	2	Amber	Engine Oil Pressure	Oil Pressure Sensor Circuit - Data Erratic, Intermittent, or Incorrect
441	168	18	Amber	Electrical Potential (Voltage)	Battery #1 Voltage Low - Data Valid but Below Normal Operational Range – Moderately Severe Level
442	168	16	Amber	Electrical Potential (Voltage)	Battery #1 Voltage High - Data Valid but Above Normal Operational Range – Moderately Severe Level
449	157	0	Red	Injector Metering Rail 1 Pressure	Fuel Pressure High - Data Valid but Above Normal Operational Range – Moderately Severe Level
451	157	3	Amber	Injector Metering Rail 1 Pressure	Injector Metering Rail #1 Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
452	157	4	Amber	Injector Metering Rail 1 Pressure	Injector Metering Rail #1 Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
488	105	16	Amber	Intake Manifold	Intake Manifold 1 Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level
489	191	18	Amber	Transmission Output Shaft Speed	Transmission Output Shaft Speed - Data Valid but Below Normal Operational Range - Moderately Severe Level

Continued over page

CANtrak System - Engine Fault Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	J1939 SPN Description	Cummins Description
497	1377	2	Amber	Switch Circuit	Multiple Unit Synchronization Switch Circuit - Data Erratic, Intermittent, or Incorrect
523	611	2	Amber	System Diagnostic code # 1	OEM Intermediate (PTO) Speed switch Validation - Data Erratic, Intermittent, or Incorrect
527	702	3	Amber	Circuit - Voltage	Auxiliary Input/Output 2 Circuit - Voltage Above Normal, or Shorted to High Source
528	93	2	Amber	Switch - Data	Auxiliary Alternate Torque Validation Switch - Data Erratic, Intermittent, or Incorrect
529	703	3	Amber	Circuit - Voltage	Auxiliary Input/Output 3 Circuit - Voltage Above Normal, or Shorted to High Source
546	94	3	Amber	Fuel Delivery Pressure	Fuel Delivery Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
547	94	4	Amber	Fuel Delivery Pressure	Fuel Delivery Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
551	558	4	Amber	Accelerator Pedal Low Idle Switch	Accelerator Pedal or Lever Idle Validation Circuit - Voltage Below Normal, or Shorted to Low Source
553	157	16	Amber	Injector Metering Rail 1 Pressure	Injector Metering Rail #1 Pressure High – Data Valid but Above Normal Operational Range - Moderately Severe Level
554	157	2	Amber	Injector Metering Rail 1 Pressure	Fuel Pressure Sensor Error - Data Erratic, Intermittent, or Incorrect
559	157	18	Amber	Injector Metering Rail 1 Pressure	Injector Metering Rail #1 Pressure Low – Data Valid but Below Normal Operational Range - Moderately Severe Level
584	677	3	Amber	Starter Solenoid Lockout Relay Driver Circuit	Starter Relay Circuit - Voltage Above Normal, or Shorted to High Source
585	677	4	Amber	Starter Solenoid Lockout Relay Driver Circuit	Starter Relay Circuit - Voltage Below Normal, or Shorted to Low Source
595	103	16	Amber	Turbocharger 1 Speed	Turbocharger #1 Speed High - Data Valid but Above Normal Operational Range – Moderately Severe Level
596	167	16	Amber	Alternate Potential (voltage)	Electrical Charging System Voltage High – Data Valid but Above Normal Operational Range - Moderately Severe Level
597	167	18	Amber	Alternate Potential (voltage)	Electrical Charging System Voltage Low – Data Valid but Below Normal Operational Range - Moderately Severe Level
598	167	1	Red	Alternate Potential (voltage)	Electrical Charging System Voltage Low – Data Valid but Below Normal Operational Range - Most Severe Level
599	640	14	Red	Engine External Protection Input	Auxiliary Commanded Dual Output Shutdown - Special Instructions
649	1378	31	Maint	Engine Oil Change Interval	Change Lubricating Oil and Filter – Condition Exists
687	103	18	Amber	Turbocharger 1 Speed	Turbocharger #1 Speed Low - Data Valid but Below Normal Operational Range – Moderately Severe Level
689	190	2	Amber	Engine Speed	Primary Engine Speed Sensor Error – Data Erratic, Intermittent, or Incorrect
691	1172	3	Amber	Turbocharger #1Compressor Inlet Temperature	Turbocharger #1 Compressor Inlet Temperature Sensor Circuit – Voltage Above Normal, or Shorted to High Source
692	1172	4	Amber	Turbocharger #1Compressor Inlet Temperature	Turbocharger #1 Compressor Inlet Temperature Sensor Circuit – Voltage Below Normal, or Shorted to Low Source
697	1136	3	Amber	Sensor Circuit - Voltage	ECM Internal Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
698	1136	4	Amber	Sensor Circuit - Voltage	ECM Internal Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source

Continued over page

CANtrak System - Engine Fault Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	J1939 SPN Description	Cummins Description
719	22	3	Amber	Crankcase Pressure	Extended Crankcase Blow-by Pressure Circuit - Voltage Above Normal, or Shorted to High Source
729	22	4	Amber	Crankcase Pressure	Extended Crankcase Blow-by Pressure Circuit - Voltage Below Normal, or Shorted to Low Source
731	723	7	Amber	Engine Speed Sensor #2	Engine Speed/Position #2 mechanical misalignment between camshaft and crankshaft sensors - Mechanical System Not Responding Properly or Out of Adjustment
~~753~~	~~723~~	~~3~~	~~Amber~~	~~Engine Speed Sensor #2~~	~~Engine Speed/Position #2 Camshaft sync error - Data Erratic, Intermittent, or Incorrect~~
757	2802	31	Amber	Electronic Control Module	Electronic Control Module data lost - Condition Exists
778	723	2	Amber	Engine Speed Sensor #2	Engine Speed Sensor (Camshaft) Error – Data Erratic, Intermittent, or Incorrect
779	703	11	Amber	Auxiliary Equipment Sensor Input	Warning Auxiliary Equipment Sensor Input # 3 (OEM Switch) - Root Cause Not Known
951	166	2	None	Cylinder Power	Cylinder Power Imbalance Between Cylinders - Data Erratic, Intermittent, or Incorrect
1117	627	2	None	Power Supply	Power Lost With Ignition On - Data Erratic, Intermittent, or Incorrect
1139	651	7	Amber	Injector Cylinder # 01	Injector Cylinder #1 - Mechanical System Not Responding Properly or Out of Adjustment
1141	652	7	Amber	Injector Cylinder # 02	Injector Cylinder #2 - Mechanical System Not Responding Properly or Out of Adjustment
1142	653	7	Amber	Injector Cylinder # 03	Injector Cylinder #3 - Mechanical System Not Responding Properly or Out of Adjustment
1143	654	7	Amber	Injector Cylinder # 04	Injector Cylinder #4 - Mechanical System Not Responding Properly or Out of Adjustment
1144	655	7	Amber	Injector Cylinder # 05	Injector Cylinder #5 - Mechanical System Not Responding Properly or Out of Adjustment
1145	656	7	Amber	Injector Cylinder # 06	Injector Cylinder #6 - Mechanical System Not Responding Properly or Out of Adjustment
1239	2623	3	Amber	Accelerator Pedal Position	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage Above Normal, or Shorted to High Source
1241	2623	4	Amber	Accelerator Pedal Position	Accelerator Pedal or Lever Position Sensor 2 Circuit - Voltage Below Normal, or Shorted to Low Source
1242	91	2	Red	Accelerator Pedal Position	Accelerator Pedal or Lever Position Sensor 1 and 2 - Data Erratic, Intermittent, or Incorrect
1256	1563	2	Amber	Control Module Identification Input State	Control Module Identification Input State Error - Data Erratic, Intermittent, or Incorrect
1257	1563	2	Red	Control Module Identification Input State	Control Module Identification Input State Error - Data Erratic, Intermittent, or Incorrect
1852	97	16	Amber	Water in Fuel Indicator	Water in Fuel Indicator - Data Valid but Above Normal Operational Range - Moderately Severe Level
1911	157	0	Amber	Injector Metering Rail	Injector Metering Rail 1 Pressure - Data Valid but Above Normal Operational Range - Most Severe Level
2111	52	3	Amber	Coolant Temperature	Coolant Temperature 2 Sensor Circuit - Voltage Above Normal, or Shorted to High Source
2112	52	4	Amber	Coolant Temperature	Coolant Temperature 2 Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
2113	52	16	Amber	Coolant Temperature	Coolant Temperature 2 - Data Valid but Above Normal Operational Range - Moderately Severe Level
2114	52	0	Red	Coolant Temperature	Coolant Temperature 2 - Data Valid but Above Normal Operational Range - Most Severe Level

Continued over page

CANtrak System - Engine Fault Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	J1939 SPN Description	Cummins Description
2115	2981	3	Amber	Coolant Pressure	Coolant Pressure 2 Circuit - Voltage Above Normal, or Shorted to High Source
2116	2981	4	Amber	Coolant Pressure	Coolant Pressure 2 Circuit - Voltage Below Normal, or Shorted to Low Source
2117	2981	18	Amber	Coolant Pressure	Coolant Pressure 2 - Data Valid but Below Normal Operational Range - Moderately Severe Level
2182	1072	3	Amber	Engine Brake Output # 1	Engine Brake Actuator Driver 1 Circuit - Voltage Above Normal, or Shorted to High Source
2183	1072	4	Amber	Engine Brake Output # 1	Engine Brake Actuator Driver 1 Circuit - Voltage Below Normal, or Shorted to Low Source
2185	3512	3	Amber	System Diagnostic code # 1	Sensor Supply Voltage #4 Circuit – Voltage Above Normal, or Shorted to High Source
2186	3512	4	Amber	System Diagnostic code # 1	Sensor Supply Voltage #4 Circuit – Voltage Below Normal, or Shorted to Low Source
2195	703	14	Red	Auxiliary Equipment Sensor	Auxiliary Equipment Sensor Input 3 Engine Protection Critical - Special Instructions
2215	94	18	Amber	Fuel Delivery Pressure	Fuel Pump Delivery Pressure - Data Valid but Below Normal Operational Range - Moderately Severe Level
2216	94	1	Amber	Fuel Delivery Pressure	Fuel Pump Delivery Pressure - Data Valid but Above Normal Operational Range – Moderately Severe Level
2217	630	31	Amber	Calibration Memory	ECM Program Memory (RAM) Corruption - Condition Exists
2249	157	1	Amber	Injector Metering Rail 1 Pressure	Injector Metering Rail 1 Pressure - Data Valid but Below Normal Operational Range - Most Severe Level
2261	94	15	Maint	Fuel Delivery Pressure	Fuel Pump Delivery Pressure - Data Valid but Above Normal Operational Range - Least Severe Level
2262	94	17	Maint	Fuel Delivery Pressure	Fuel Pump Delivery Pressure - Data Valid but Below Normal Operational Range - Least Severe Level
2263	1800	16	Amber	Battery Temperature	Battery Temperature - Data Valid but Above Normal Operational Range - Moderately Severe Level
2264	1800	18	Amber	Battery Temperature	Battery Temperature - Data Valid but Below Normal Operational Range - Moderately Severe Level
2265	1075	3	Amber	Electric Lift Pump for Engine Fuel	Fuel Priming Pump Control Signal Circuit – Voltage Above Normal, or Shorted to High Source
2266	1075	4	Amber	Electric Lift Pump for Engine Fuel	Fuel Priming Pump Control Signal Circuit – Voltage Below Normal, or Shorted to Low Source
2292	611	16	Amber	Fuel Inlet Meter Device	Fuel Inlet Meter Device - Data Valid but Above Normal Operational Range - Moderately Severe Level
2293	611	18	Amber	Fuel Inlet Meter Device	Fuel Inlet Meter Device flow demand lower than expected - Data Valid but Below Normal Operational Range - Moderately Severe Level
2311	633	31	Amber	Fuel Control Valve #1	Fueling Actuator #1 Circuit Error – Condition Exists
2321	190	2	None	Engine Speed	Engine Speed / Position Sensor #1 - Data Erratic, Intermittent, or Incorrect
2322	723	2	None	Engine Speed Sensor #2	Engine Speed / Position Sensor #2 - Data Erratic, Intermittent, or Incorrect
2345	103	10	Amber	Turbocharger 1 Speed	Turbocharger speed invalid rate of change detected - Abnormal Rate of Change
2346	2789	15	None	System Diagnostic Code #1	Turbocharger Turbine Inlet Temperature (Calculated) - Data Valid but Above Normal Operational Range – Least Severe Level

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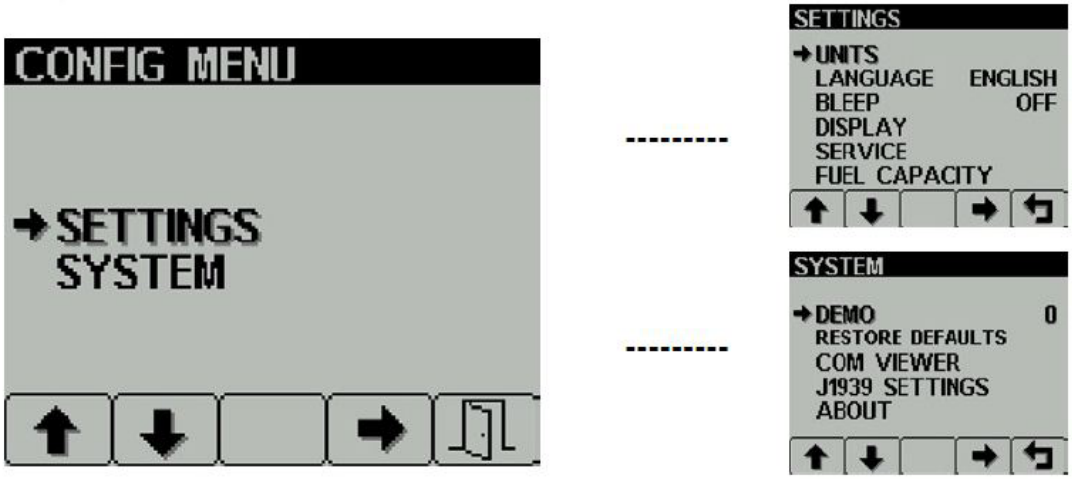
CANtrak System - Engine Fault Codes

Fault Code	J1939 SPN	J1939 FMI	Lamp Colour	J1939 SPN Description	Cummins Description
2347	2790	15	None	System Diagnostic Code #1	Turbocharger Compressor Outlet Temperature (Calculated) - Data Valid but Above Normal Operational Range – Least Severe Level
2363	1073	4	Amber	Engine Compression Brake Output # 2	Engine Brake Actuator Circuit #2 – Voltage Below Normal, or Shorted to Low Source
2365	1112	4	Amber	Engine Brake Output # 3	Engine Brake Actuator Driver Output 3 Circuit - Voltage Below Normal, or Shorted to Low Source
2367	1073	3	Amber	Engine Compression Brake Output # 2	Engine Brake Actuator Circuit #2 – Voltage Above Normal, or Shorted to High Source
2368	1112	3	Amber	Engine Brake Output # 3	Engine Brake Actuator Driver 3 Circuit - Voltage Above Normal, or Shorted to High Source
2372	95	16	Amber	Engine Fuel Filter Differential Pressure	Fuel Filter Differential Pressure - Data Valid but Above Normal Operational Range - Moderately Severe Level
2373	1209	3	Amber	Exhaust Gas Pressure	Exhaust Gas Pressure Sensor Circuit - Voltage Above Normal, or Shorted to High Source
2374	1209	4	Amber	Exhaust Gas Pressure	Exhaust Gas Pressure Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
2375	412	3	Amber	Exhaust Gas Recirculation Temperature	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage Above Normal, or Shorted to High Source
2376	412	4	Amber	Exhaust Gas Recirculation Temperature	Exhaust Gas Recirculation Temperature Sensor Circuit - Voltage Below Normal, or Shorted to Low Source
2377	647	3	Amber	Fan Clutch Output Device Driver	Fan Control Circuit - Voltage Above Normal, or Shorted to High Source
2425	730	4		Intake Air Heater # 2	Intake Air Heater 2 Circuit - Voltage Below Normal, or Shorted to Low Source
2426	730	3		Intake Air Heater # 2	Intake Air Heater 2 Circuit - Voltage Above Normal, or Shorted to High Source
2555	729	3	Amber	Inlet Air Heater Driver #1	Intake Air Heater #1 Circuit - Voltage Above Normal, or Shorted to High Source
2556	729	4	Amber	Inlet Air Heater Driver #1	Intake Air Heater #1 Circuit - Voltage Below Normal, or Shorted to Low Source
2557	697	3	Amber	Auxiliary PWM Driver #1	Auxiliary PWM Driver #1 - Voltage Above Normal, or Shorted to High Source
2558	697	4	Amber	Auxiliary PWM Driver #1	Auxiliary PWM Driver #1 - Voltage Below Normal, or Shorted to Low Source
2963	110	15	None	Engine Coolant Temperature	Engine Coolant Temperature High - Data Valid but Above Normal Operational Range - Least Severe Level
2973	102	2	Amber	Boost Pressure	Intake Manifold Pressure Sensor Circuit - Data Erratic, Intermittent, or Incorrect

CANtrak System - Configuration

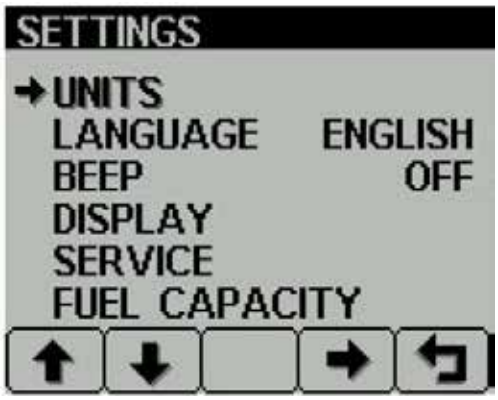
Configuration Menu

This mode allows users to set various GEM operating parameters such as imperial or metric units, scale limits for the speedometer, engine service interval, etc. The configuration menu is entered by pressing and holding key 5 (the right hand key) for at least 3 seconds while GEM is in normal operating mode. The top-level configuration menu will be displayed as shown. Keys 1 and 2 then allow you to choose either SETTINGS or SYSTEM sub-menus (the chosen item is highlighted in bold with an arrow pointing to it). Pressing key 4 enters the selected/ highlighted sub-menu. SETTINGS allows GEM to be configured according to user preferences. SYSTEM accesses maintenance and low-level system configuration settings. These sub-menus are described overleaf. Key 5 exits the current menu/sub menu. Settings are automatically stored on exit.



The top-level Configuration menu and it's two choices of SETTINGS and SYSTEM sub-menus. Pressing Key 4 enters the menu highlighted. The right hand button (Key 5 'exit door') returns you to the previous menu..

Settings Sub-Menu (2nd Level Configuration Menu)



The settings menu allows the user to enter sub-level screens to configure:

- UNITS: speed, distance, pressure, volume, etc.
- LANGUAGE: choose from various language options
- BEEP: keys "beep" when pressed (toggles on or off); note that an audible beep still sounds if an alarm occurs
- DISPLAY: select ranges for max. RPM, max. speed, and graph X axis
- SERVICE: set service interval in hours, and reset interval counter
- FUEL CAPACITY: adjust tank capacity and reset tank level to full

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CANtrak System - Configuration

System Sub-Menu (2nd Level Configuration Menu)

The system menu allows the user to configure or view: DEMO: Switches between GEM's demonstration mode and the normal mode of displaying live engine/ transmission data. Demo allows GEM to operate without live data and provides 3 levels of simulated data: 1 = Speed On; 2 = Speed Off; 3 = Alarms On. Demo is automatically set to OFF if live data is received. DEMO mode can be selected, allowing you to evaluate GEM without connecting an engine/ transmission (it is accessed via the Configuration menu described above). If the unit is in DEMO mode and live data from the engine/ transmission becomes active, DEMO mode will automatically be switched off.

RESTORE DEFAULTS:

Allows you to reset all configuration information to default metric or imperial values. Default settings:

Setting	Metric	Imperial
Language	ENGLISH	
Max. RPM	4000	
Max. speed	110 KM/H	70 MPH
Graph range	2 minutes	
Speed	KM/H	MPH
Distance	KM	MILES
Pressure	kPa	PSI
Volume	L	Gallon (US)
Temperature	°C	°F

COM VIEWER: Displays last messages received on J1939 (CAN) and NMEA 0183 (GPS - derived speed over ground data) ports. You can also view GEM's database (DB) which stores all data transmitted from the engine/transmission.

NOTE: this is a diagnostic feature that may be helpful for OEMs/users diagnosing faults.

J1939 SETTINGS: J1939 configuration screen for engine and transmission source: 1 = engine 1 (port), 2 = engine 2 (Starboard); alarm filter (GLB (Global) = all alarm sources, SRC = selected engine/ transmission only); SPN version (4 is default but older engines will need to be set to 1, 2 or 3 as appropriate). Note. Consult your engine or vehicle supplier to establish which SPN version is appropriate if you have problems reading alarm data.

ABOUT: Displays the following product information:

- ID NO: Unique number of the display
- EEPROM: Number of write cycles
- PART No: Software part number
- VERS: Software version number
- CHK: Flash memory checksum
- SOURCE: The source of received data
- LIB1: Low level system library version
- LIB2: Low-level graphical display interface library version (if used).

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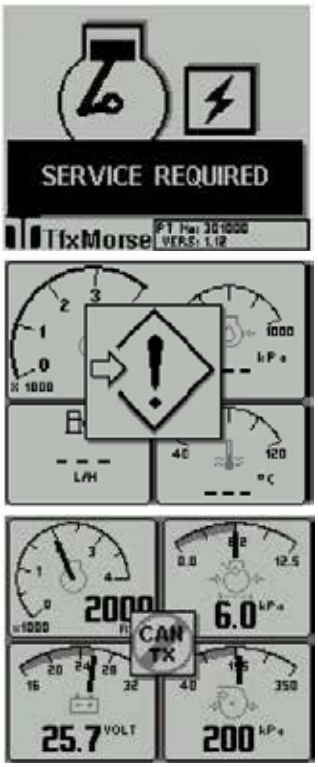
CANtrak System - Configuration

Pop Up Messages and Warnings

- Engine service warning. In the Configuration menu, users can set the engine service interval in hours. When GEM determines an engine service is due, it displays SERVICE REQUIRED on the splash screen that appears at power-up.
- Data communications failure. If GEM cannot detect engine/ transmission data broadcasts , a pop-up window with a data communications failure warning icon will appear and flash. Once engine/transmission data is detected the warning disappears and normal data display resumes.
- CAN TX disable. If CAN TX (transmission) is disabled, then the status will be displayed, with a pop-up window flashing with a period of approximately 1 second on, 10 seconds off. Note that this function is a requirement of the J1939 specification and is not normally of importance for GEM applications.
- Data not supported. If the required data parameter is not available, the gauge will display " - - - " near the units and parameter icon (see centre picture for example)



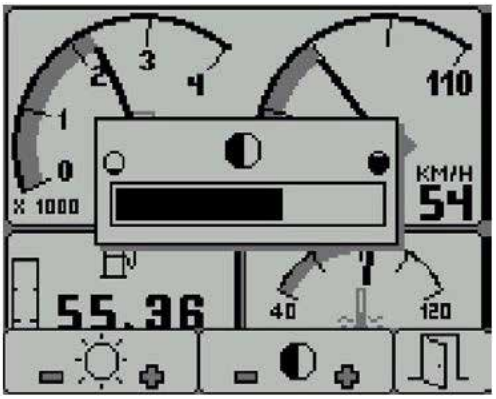
From top to bottom: Pop up warnings - Engine service required, a data communications failure and CANTX is disabled.

Setting LCD Lighting and Contrast

Pressing key 5 (the right-hand key) when the menu icons are not being displayed brings up the lighting and contrast menu. The LCD has a number of back-lighting levels that allow the display to be read in the dark. The appropriate level is selected by pressing keys 1 or 2 to decrease or increase illumination. Contrast is adjusted in the same manner, using keys 3 and 4 (Figure 12.1). Note that GEM monitors the temperature of the LCD and automatically adjusts display contrast as required, therefore it is not likely that a user will need to make a manual contrast adjustment unless extreme climate changes occur. The menu is exited by pressing key 5. The lighting and contrast settings are retained after the unit is switched off.

NOTE: resetting contrast. If the contrast has been adjusted poorly, you may restore the factory setting (a central value) by pressing keys 1 to 4 simultaneously. This action does not change other user-configured settings.

NOTE: The backlight can be set to Auto or ON.



The lighting and adjust screen, showing a contrast level adjustment in progress.

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CANtrak System - Configuration

Preferred Screen Storage

GEM automatically stores the current screen as a user's preferred page, after a delay of approximately 15 seconds (if no buttons are pushed). On next power-up the display will start with the splash screen, and then go to the last stored screen.

NOTE: selecting Restore Defaults on the Systems sub-menu of Configuration will set the main engine screen as the default display.

Key Pad Lock

GEM's five keys can be locked, such that an operator cannot change any settings or access any other display mode - in a similar manner to the key lock functions on a mobile phone. This is achieved by pressing and holding keys 1 and 5 simultaneously for four seconds. Repeating this operation resets GEM/ CANtrak back to normal operation.

Maintenance and Troubleshooting

No regular maintenance is required, except for cleaning the GEM lens as required using a soft, damp cloth. Do not use abrasive materials or solvents. Should any further attention be necessary, please contact your supplier.

If you are experiencing problems with GEM, check these diagnostics:

Problem	Possible solution
Unit does not power up	Ensure connections to unit are correct. Ensure power source is present.
Display is blank or black	Adjust/ reset lighting and contrast settings. Ensure temperature is within operating range of the unit.
Unit fails self-test	Perform Restore Factory Defaults procedure.
Unit fails to display any data	Ensure connections to unit are correct. Ensure data source supports J1939 message protocol.
Unit fails to display certain parameter(s)/unable to select certain parameter(s)	Ensure GEM supports required parameter(s). Ensure data source provides required parameter(s).
Active alarm messages are not displayed	Ensure data source provides alarm message data in the following format: J1939 Active Diagnostic Trouble Codes- Diagnostic Message 1 (DM1).
Stored alarm messages are not displayed	Ensure data source provides alarm message data in the following format: J1939 Active Diagnostic Trouble Codes- Diagnostic Message 2 (DM2).

Glossary

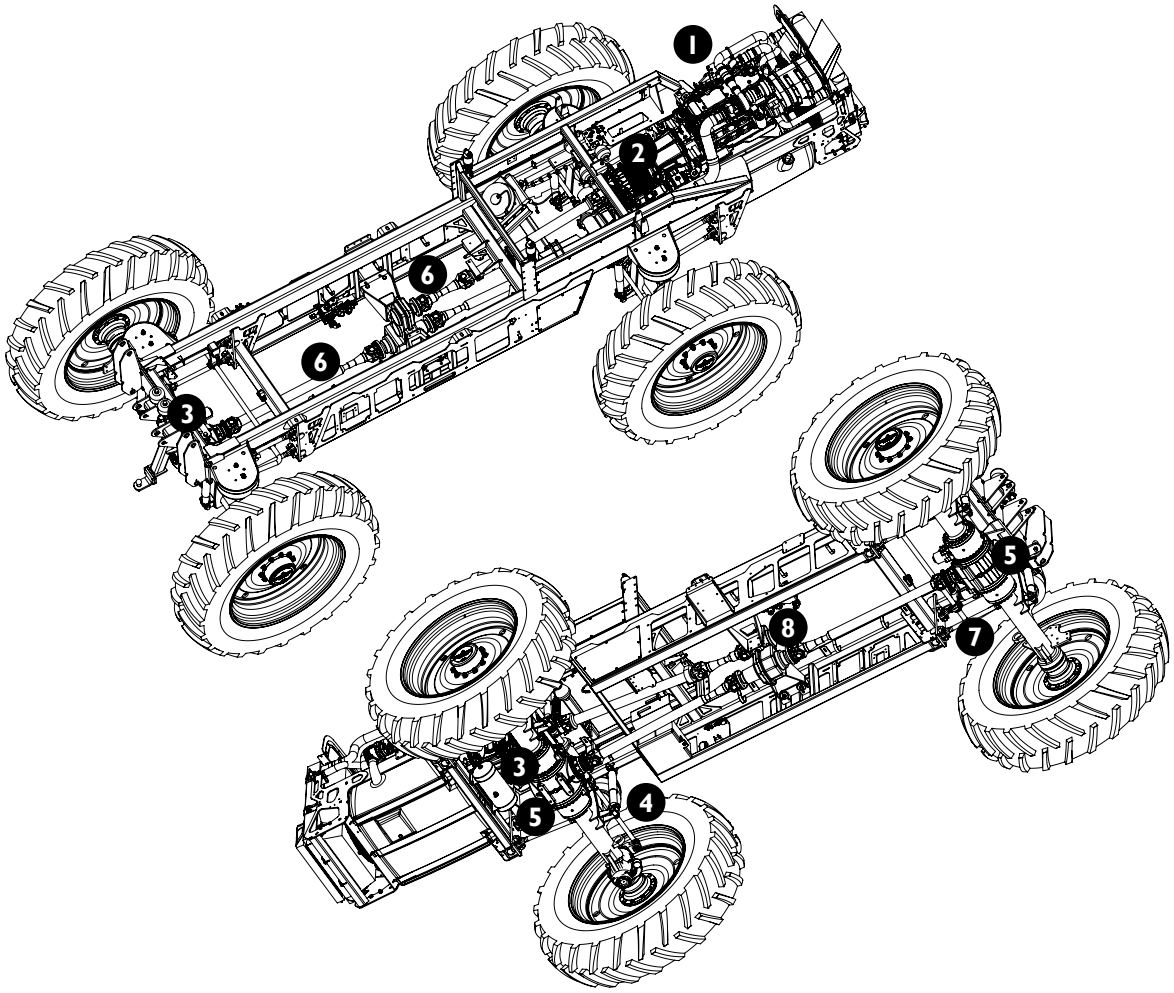
- CAN: Controller Area Network (also referred to as CANbus); serial communications protocol for automotive use
- CANtrak: Intelligent CAN-compatible LCD display module
- GEM: Generic Engine Monitor
- GPS: Global Positioning System
- HMI: Human-Machine Interface
- ISO: International Standard Organisation
- J1939: SAE engine data protocol using CAN 2.0B
- LCD: Liquid Crystal Display
- NMEA: National Marine Electronics Association; serial communications protocol for marine use
- PID: Parameter Identifier
- RS-232: Standard electrical interface for serial communications
- RS-485: Standard differential electrical interface for serial communications
- SAE: Society of Automotive Engineers Inc.
- SID: Subsystem Identifier
- Soft keys: Push-button keys whose function changes according to use
- SPN: Suspect Parameter Number: J1939-specific fault code ID number

NOTE: The messages, icons, error codes etc displayed by GEM conform to J1939 standards wherever possible.

Chapter 5

DRIVETRAIN

Key Features

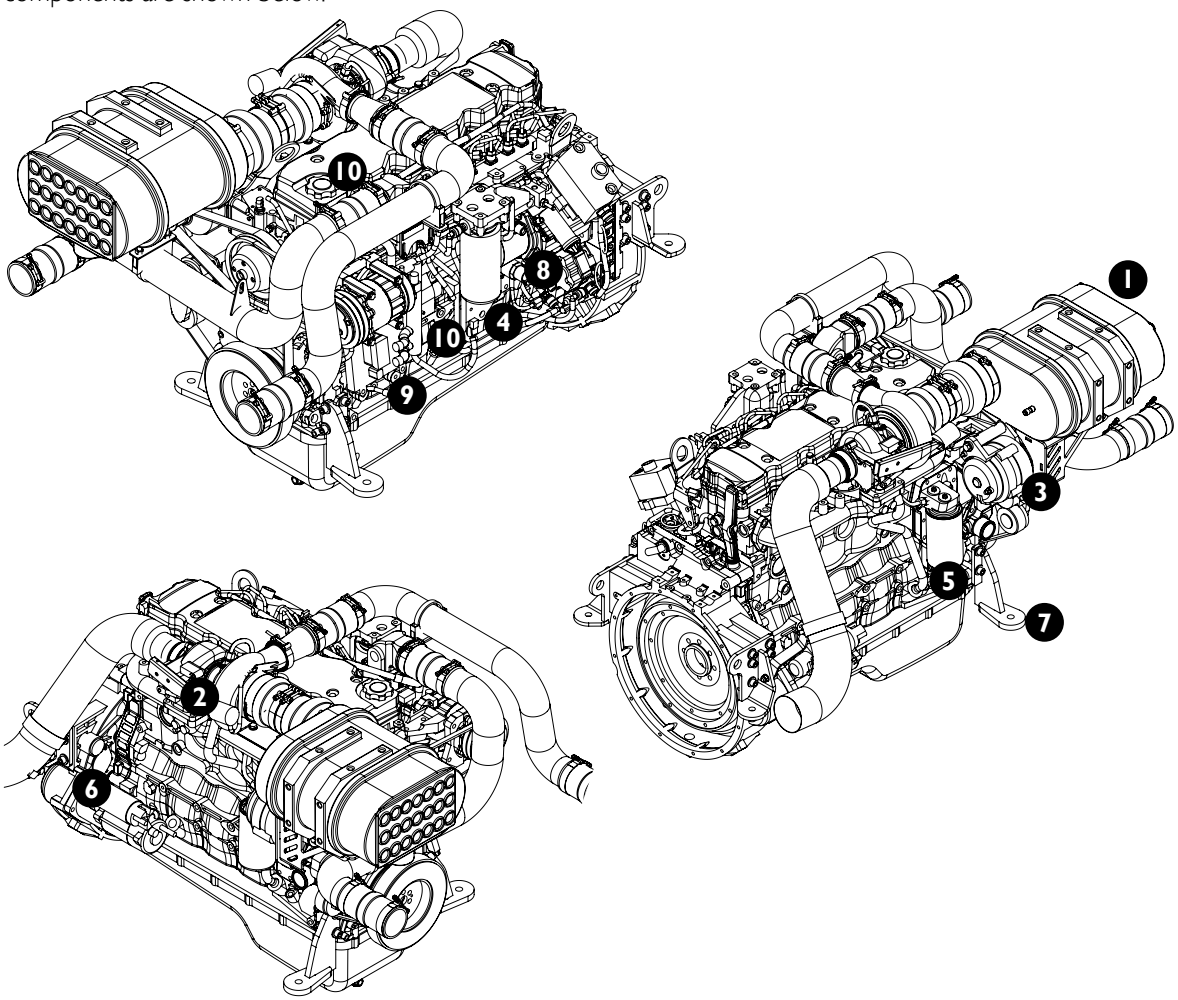


NO.	FEATURE
1.	Engine
2.	Transmission
3.	Axle
4.	Steering
5.	Differential
6.	Drive Shafts
7.	Suspension
8.	Transfer Case

Engine

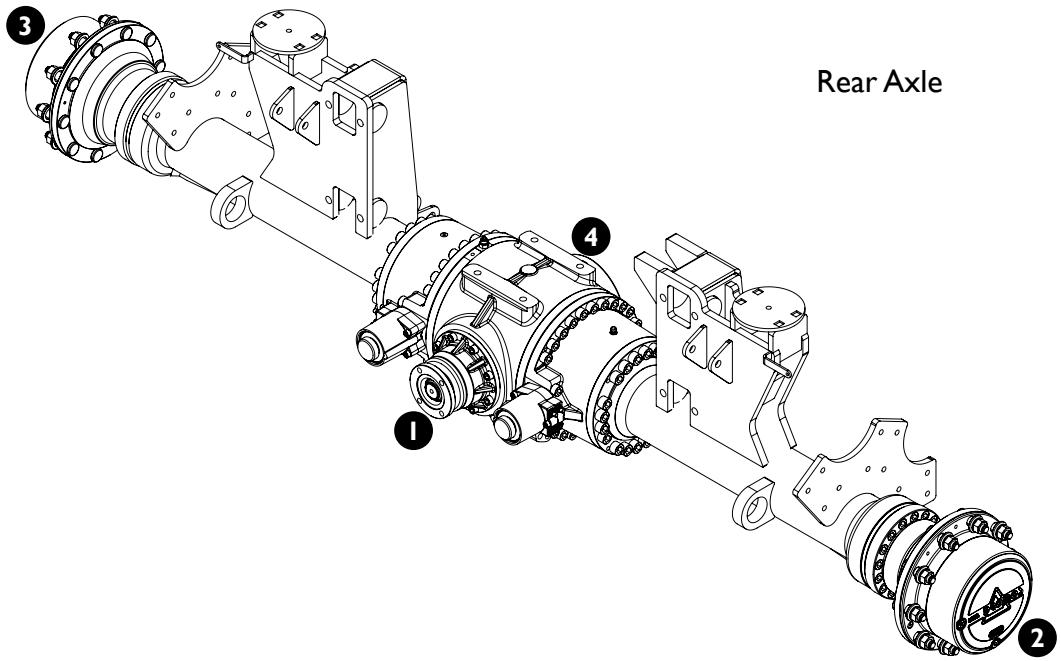
The Super Cruiser is fitted with a 193kw (260 hp) QSB 6.7 litre Cummins engine, some of its components are shown below.

Note: More information can be found in Chapter 10 'Lubrication & Maintenance'.



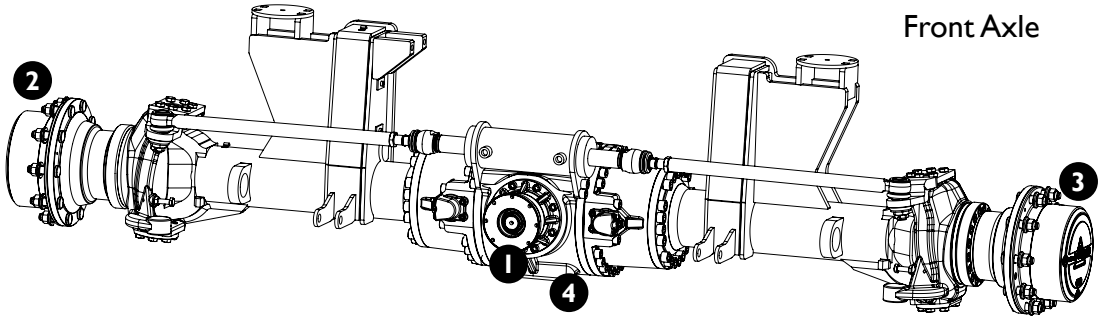
NO.	FEATURE
1.	Air cleaner
2.	Turbo
3.	Alternator
4.	Fuel Filter (secondary)
5.	Oil Filter
6.	Starter Motor
7.	Engine Mounts
8.	Hydraulic Pump - Fan & Brakes
9.	Dip Stick
10.	Oil Filler Point

Axles



Rear Axle

NO.	FEATURE
1.	Input Flange
2.	Planet Hub - Left
3.	Planet Hub - Right
4.	Differential



Front Axle

The axles are driven by a spiral bevel gear and pinion located in the centre of the axle. Inside the rear differential centre is a slide ring for locking the centre and driving torque to both drive shafts out to the planetary wheel hubs, giving direct drive through the axles.

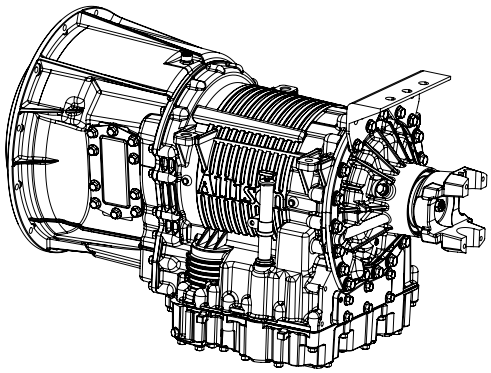
The rear differential locking engagement is pneumatic driven and equipped with a switch that detects the engagement and disengagement position of the slide ring. When engaged, the switch in the cabin will light up and when disengaged the light will turn off. To help with engagement and disengagement, it may be necessary to rock the Super Cruiser forward or backward to help the slide ring engage or disengage.

The front axle is an open centre and drive is transmitted through the steering knuckles and into the outer planetary hubs. The steering ram is a 50.mm shaft with adjustable rod ends to adjust toe in. Camber is factory set.

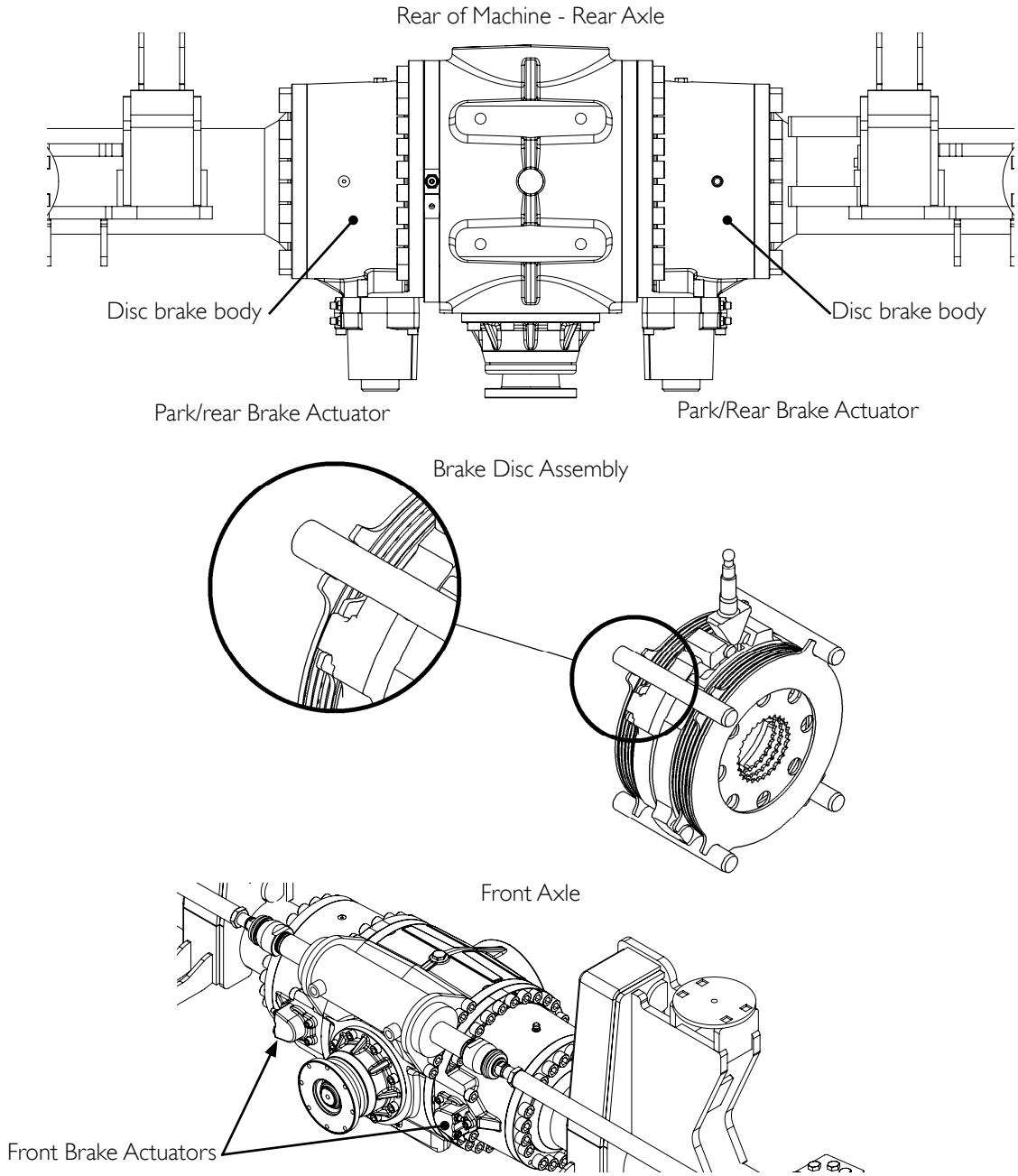
Transmission

Refer to the Allison Transmission operation and codes manual (supplied) for any information on operation or trouble shooting the Allison transmission.

You can also refer to the Operation chapter of this manual for information on using the Allison transmission.



Braking System



The braking system for the Super Cruiser is hydraulically driven. The hydraulic pump mounted on the engine supplies oil to the braking circuit and gives priority to the brakes once the accumulators are fully charged. Hydraulic pressure goes from the accumulators to the foot pedal and then to the wet brake system in the front and rear axles.

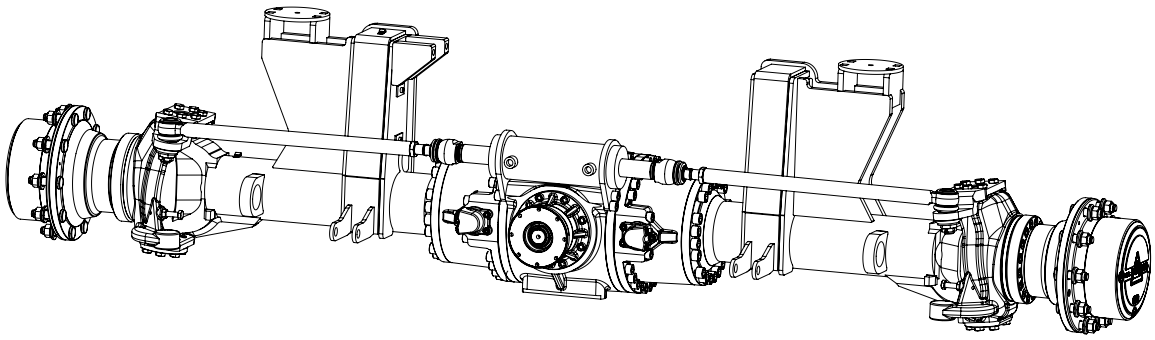
If one accumulator fails, a check valve will prevent the other accumulator from losing pressure and keep enough pressure to operate the braking system.

The Park Brake in the axle, is also hydraulically driven and is actuated by a solenoid valve, with a manual override. The park brake also uses an accumulator and then a pressure reducing valve to keep the pressure from going over 35 bar.

Note: The Park Brake will apply at any time if there is no hydraulic pressure going into the park brake control cylinder.

Note: More information can be found in the Maintenance chapter.

Steering System

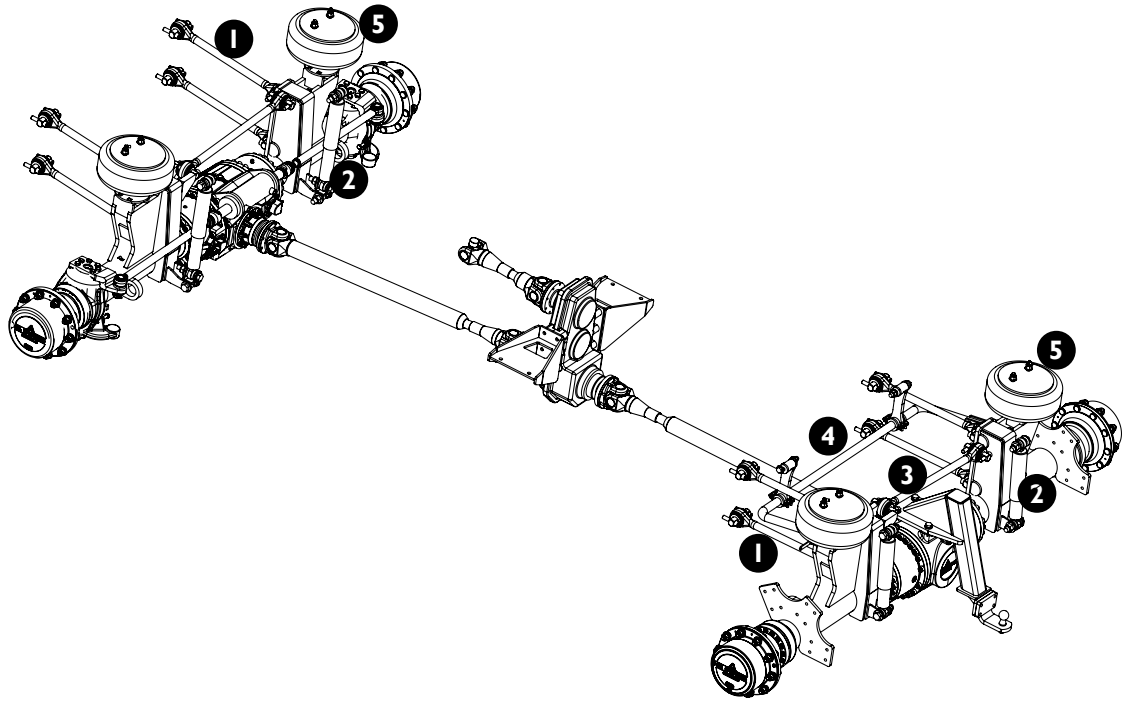


Camber - The wheel camber is a factory set parameter. At the time of manufacture the wheel camber is set to +0.5°

Steering Toe In - The wheels of the sprayer should toe in 0-5mm.

Note: Information on checking Camber and Toe can be found in the Maintenance chapter.

Suspension System



NO.	FEATURE
1.	Parallel Link
2.	Shock Absorber
3.	Panhard Rod
4.	Sway Bar (Rear only)
5.	Air Bag

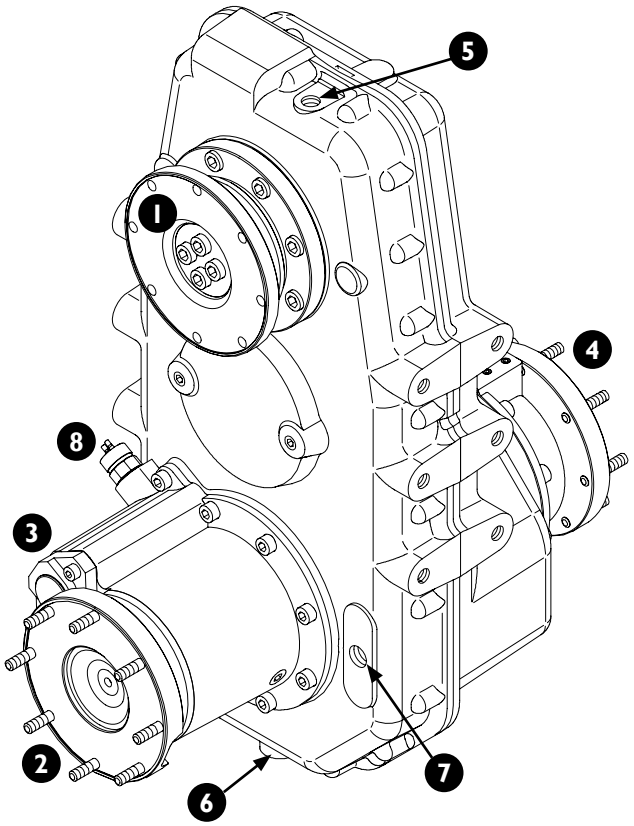
The Five Point Suspension system used on the Super Cruiser Sprayer consists of four parallel links, one panhard rod and 2 air bags on each axle. The rear axle of the machine is also fitted with an anti roll sway bar.

Parallelogram links hold the axle in place on the chassis. Panhard rods hold the axle centred in the chassis. The parallelogram arms allow the axle to distort or twist forward and backwards when the wheels come in contact with an obstruction such as a pot hole, log or embankment. This oscillation is absorbed by polyurethane bushes in each end of the links. The life time of these bushes is subject to the conditions the sprayer operates in and the style of operation that it receives. The polyurethane bushes should be checked at regular service intervals as stated in this manual.

Air Bags mounted on to each side of the axle allow the axle to oscillate and dampen the ride.

Note: More information can be found in the Maintenance chapter.

Transfer Case



NO.	FEATURE
1.	Input Flange - from transmission
2.	Output Flange - to front diff
3.	Drive split 50/50 - Engage/Disengage - Shift cylinder air line 6 mm
4.	Output Flange - to rear diff
5.	Oil fill plug
6.	Oil drain plug
7.	Oil level plug
8.	Lock Ring Signal plug

The transfer case, is constant 4WD. It is a single speed transfer case that directs drive from the transmission, to the front and rear axles. The transfer case has a centre diff lock that will split the drive 50/50 front to rear.

The diff lock is engaged from a switch, located in the arm rest console, in the cab. The switch activates a solenoid which sends air through a 6mm line, to the transfer case shift cylinder (see #3 above). The shift cylinder is pushed in by the air and the diff lock is engaged. A light will illuminate on the diff lock switch when it is actually engaged.

When centre diff lock is turned off, air is released from the 6mm line and a spring pushes the shift cylinder in the transfer case back out.

The air solenoid that switches the centre diff lock on and off is located on the chassis rail on the right hand side of the machine.

For more information on the transfer case and solenoid, see Chapter 10 'Lubrication & Maintenance'.

Chapter 6

CALIBRATION

Not Applicable

Chapter 7

PRE-OPERATION

Preparing the Machine for Use

WARNING

If work is to be done at night, ensure that adequate lighting is available around the machine and the work area.

- The amount of lighting around the machine needs to be sufficient for all labels and warnings on the machine to be clearly visible to the operator.
- The amount of lighting in the work area needs to be sufficient for obstacles in the path of the machine to be clearly visible to the operator.

Before Starting the Machine in Cold Conditions

- If the machine has been in a cold environment, always check components to make sure that they have not been damaged and that there is no ice in the system.
- Inspect the machine to ensure there is no damage or wear which could lead to injury, further damage or reduced performance.
- Check all hoses and fittings for leaks or damage. Check the machine to ensure frosts and/or vermin have not damaged the machine, and that the tyres are correctly inflated.
- Check the engine oil, water and fuel.
- Check that all of the lights are working correctly.
- Check all bolts and nuts to make sure they are tight and secure.
- Complete the scheduled lubrication.

Note: Proper grease is essential for the machine to operate with maximum effectiveness and life-expectancy. It is important to keep the lubricant and lubricant applicator clean. Wipe all dirt from the fittings before use.

Goldacres recommends that multi-purpose grease should be used for all lubrications. Make sure all open-end bearings are lubricated their full length by forcing lubricant into them until it begins to appear at the sides. Protect all surfaces with corrision inhibitor G15.

- Be sure to adequately clean and flush all chemical handling equipment.
- Arrange communication with someone who can come to your aid if need be.

Machine in Transit

The Super Cruiser is approximately 4.3m in height and with aerials on the roof can be much higher. Check the regulations in your state for maximum vehicle height restrictions. When driving the Super Cruiser on roads it may be necessary to remove aerials to meet the required height restrictions.

Aerials on the roof may also need to be removed to meet clearance requirements for over head power lines, while on the road and also in some paddocks.

Overhead Power Lines

Check any areas to be sprayed for overhead power lines. If there are any in the area, contact the relevant energy provider for information on safe use of machinery near live lines.

Danger

Check the work area for overhead power lines. Contact between the machine and powerlines can result in serious injury or death.

Do NOT walk on machine platform when near power lines.

Maintenance

Correct servicing and maintenance of the Goldacres Super Cruiser will ensure the efficient safe operation of the machine. Servicing and maintenance should be carried out according to the schedule in Chapter 10 'Lubrication & Maintenance'.

DURING THE FIRST 8 HOURS OF OPERATION

Torque Settings

- Check the torque on retaining nuts frequently.
- The wheel nuts should be checked to ensure that 350 ft/lb is maintained.

Engine

- If the engine has been running, take extra care around hot engine parts such as the exhaust.
- Check the engine oil level frequently. Due to the "bedding in" of the engine components and additional friction between connecting parts, expect the oil usage to be higher than normal.
- Avoid excess engine idling.
- Inspect the air intake system and check for leaks.

Lubricating And Hydraulic Fluids

- Maintain correct hydraulic oil levels and monitor the oil temperature on a regular basis.

Check the transmission oil level and ensure that grease points are lubricated effectively. Crush Hazard Warning (Refer to Chapter 2, Safety)

- Inspect for leaks in the hydraulic system

Suspension Bolts

- There are numerous suspension bolts located at each end of the parallel links and at each end of the pan hard rods and sway bars. These bolts should be checked to ensure that they have not become loose.

Lights

- Check each light around the vehicle for correct operation.

Starting

Before operating the Super Cruiser, all fluid levels must be checked in accordance to this manual.

The isolator switch must be engaged to provide power to the machine systems.

To start the engine, the transmission must be in neutral.

Insert the ignition key and turn clockwise. The ignition key is located on the rear right console.

The key has 4 positions - however only 3 are utilised on this machine

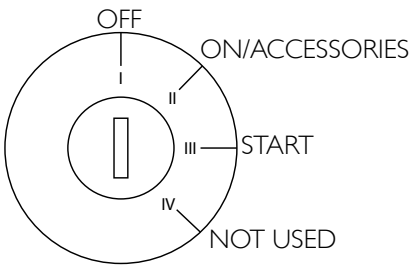
I Off - vertical

II On/accessories - in this position all cabin components will be energised.

III Start - this is a momentary position which can only be achieved by holding the key hard in this position, the engine will be cranking if the transmission is in neutral. Once released the key will return to the 'ON' position.

IV Not Used

To shut down the engine rotate the ignition key counter clockwise until in the vertical 'OFF' position.



Chapter 8

OPERATION

Arm Rest Controls

CRUISE CONTROL Press the switch labeled 'Cruise control / RPM Raise' forward to turn Cruise Control function ON. Press this switch forward again to turn the function OFF.

To set cruising speed, set Cruise control function to ON as described above. While driving at the desired speed press the switch labeled 'Cruise Set / -' back.

This set speed may be varied up by pressing 'Cruise Resume / +' in the forward direction. The set speed may be varied down by pressing 'Cruise Set / -' in the backward direction.

To deactivate cruise control while driving either tap the foot brake or press the switch labeled 'Cruise control / RPM Raise' forward to turn Cruise Control function OFF.

Deactivating cruise control via the footbrake only, allows the driver to resume the previously set speed more quickly. To do this, press the switch labeled 'Cruise Resume / +' in the forward direction.

To resume set speed after deactivation via the switch labeled 'Cruise control / RPM Raise', it will need to be cycled back ON by pressing it forward. Then pressing the switch labeled 'Cruise Resume / +' in the forward direction will resume previously set speed.

Note: If the engine ignition has been cycled a new cruise speed will have to be set.

Continued over page

Arm Rest Controls

RPM RAISE Press the switch labeled 'Cruise control / RPM Raise' back to turn RPM Raise function ON. The engine speed will increase to 1500 RPM. Press the switch back again to turn this function OFF.

The engine speed can also be set above or below the default RPM raise function setting of 1500 RPM.

With RPM raise function set to ON, press the Cruise Resume + / Set - button forward (+) to raise engine speed or back (-) to lower engine speed.

GPS by pressing switch down the GPS resume wires are activated. If a GPS steering unit is fitted 12 volts will be supplied to the GPS auxiliary connector port "C" each time this momentary switch is triggered down. This switch returns immediately to the centre OFF position once the operator releases it.

CENTRE DIFF LOCK ON/OFF This switch will engage the diff lock in the transfer case and split the drive 50/50 to the front & rear wheels. When the diff lock is fully engaged, the light in the switch will illuminate.

DIFF LOCK REAR ON/OFF This switch will engage the diff lock in the rear differential & give full drive to both the rear wheels. When engaged, the light will illuminate.

PARK BRAKE ON/OFF This switch must be in the ON (forward) position before starting the engine. If not, pull the orange slide lock and then press forward to turn the function "ON". Once the engine has started and the foot service brake has been applied, pull the orange slide lock and press the bottom of the switch to disengage the park brake. A gear will now be able to be selected. When stopping the machine, the foot service brake needs to be applied to bring the machine to a stop, and then the transmission needs to be in "N" before the park brake switch can be placed in the "ON" position.

Note: Cruise control should not be engaged when RPM Raise is switched on.

Note: The transmission will not engage any gear if the engine is over 1000 RPM.

Transmission

The operator must wear the "Operator Safety Belt" at all times when seated in the cabin or when the machine is in motion. To engage a gear, first apply the foot service brake located to the right of the column, then release the park brake, press the "D" button on the gear selector to drive forward.

SELECT DISPLAY:

This LED Character shows which gear has been selected by the operator. It will display D, R, or N or a number reflecting the specific gear.

MONITOR DISPLAY:

This LED character shows which transmission gear is currently engaged. This includes P, R, N, and numerical values for forward gears. This side typically does not display D for Drive – it allows the operator to glance down and see the specific gear they are currently using.

R — Reverse

N — Neutral, the gear selector must be in this position for ignition.

D — Drive, in this position 1st - 6th gears are available and will be selected by the ECM when required. Overdrive gears 5th & 6th will only be engaged when in ROAD MODE.

↑ — This button is the manual gear UP selector.

When the transmission is in "D", depressing the ↑ will manually upshift the transmission one gear at a time until 6th gear is selected. The SELECT display will show which gear range has been selected, and the MONITOR display will show which transmission gear is currently engaged.

NOTE: The transmission will not shift above the gear range selected. When DRIVE "D" is selected the full range automatic shift capability is restored

↓ — This button is the manual gear DOWN selector. When the transmission is in "D", depressing the ↓ will manually downshift the transmission one gear at a time until 1st gear is selected.

The SELECT display will show which gear range has been selected, and this will limit the transmission from shifting into a gear above this value, and the MONITOR display will show which transmission gear is currently engaged.

NOTE: The transmission will not shift above the gear range selected. When DRIVE "D" is selected the full range automatic shift capability is restored

Mode — When the engine is started, the transmission starts in ROAD mode. When the MODE button is selected, the transmission will go into "SPRAY" mode and "2 MODE" will be displayed in the Monitor Display. With this switch in SPRAY MODE, the transmission will only go to 4th gear for spraying speed. Press the button again, it will go into ROAD MODE, 5th & 6th gear are selectable for speeds upto 50Km/h

Continued over page

Transmission

Wrench Icon,

If the Wrench (spanner) icon is displayed or flashing after startup, there is a fault in the Shift By Wire system. A qualified technician should inspect the system as soon as possible.
WARNING: Operation with the Wrench icon flashing may indicate a loss of safety back up systems, and the operator should use extra caution when shifting to ensure that the transmission is performing properly.

When in 1st gear, reduced torque is applied until 11Km/h and then all the engine torque is applied.

Once the desired gear is selected release the foot service brake.

If the gear "D" is pressed while the park brake is still engaged, no gear will be engaged by the transmission. An audible alarm will sound. The gear "N" needs to be selected, then the park brake released and then a gear can be selected.

NOTE: The transmission must be in neutral before pressing RPM raise and Cruise Control must be off.

NOTE: The transmission will not engage any gear if the engine is over 900 RPM.

Troubleshooting

J1939 - Loss of the J1939 to/from the shifter is indicated on the Display as **-\--\-** for the 6 Speed Transmission.
The SELECT display works as normal except that Drive will only display **-\--\-** on screen**.** Upshift and Downshift commands are sent on the J1939 link and will not function in this mode. The vehicle transmission will not be able to hold any of the forward gears unless
the loss of J1939 occurred while a lower range was currently selected – in this case the selected range will be the max range. Press D during this condition to enable shifting to all 6 gears, and consult a qualified technician.

Range Inhibit Indicator - Certain conditions may cause the Allison Transmission Control Module to restrict shifting. The Range Inhibit Indicator alerts the operator that such a condition exists when the SELECT display (the left digit) begins flashing, and the MONITOR Display
(the right digit) remains constant.

Filter Life Monitor - The Filter Life Monitor will display REPLACE FILTERS when it detects that the flow through the transmission is being restricted.

Towing and Transporting the Sprayer

- A disabled sprayer is best transported on a drop deck trailer. Use chains to secure the sprayer via the tie down attachment point located under the front and rear axles.
- The machine must not be towed unless the engine is running (as the steering and brakes require engine power to operate). Before towing, the front tail shaft should be disconnected, due to the risk of damage to the transmission. While towing do not travel at a speed greater than 10 km/h.
- An operator must steer and brake the sprayer under tow.

End of Day

At the end of the working day:

1. Find a suitable area to clean the machine and any fitted options of any remaining material (an area where chemical can not run off into above-ground or sub-surface water courses).
2. Clean all filters.
3. Wash down unit.

End of Program

If the machine is to be stored for a long period of time without use, there are several tasks that need to be performed.

- Clean the machine thoroughly as described under 'End of Day' tasks.
- Carry out a thorough observation to determine if there is any damage to the machine.
- Park the machine in a position where it will not be affected by frosts, and preferably out of direct sunlight.
- Ensure machine bins and/or other fitted options are empty.

If necessary, remove consoles from cabin and store in a safe and secure location. Protect hydraulic hoses and electrical connections.

NOTE: Store the machine in a suitable location to prevent freezing.

Chapter 9

BOOM

Not Applicable

Chapter 10

LUBRICATION & MAINTENANCE

Recommended Lubricants

- For differing weather conditions consult your Cummins operator's manual to choose the suitable oil grade.
- Ensure that lubricants are stored in a place where the lubricants are protected from contamination (such as dirt and moisture). Always use clean containers when handling lubricants.
- Do not mix lubricants. Proper lubrication may be affected by differences in chemical composition.
- Seek advice from your petroleum dealer on the correct use of lubricants and additives.

SERVICE ITEM	SERVICE SPECIFICATION	CAPACITY (L)
Engine Oil	SAE 15W-40 Heavy Duty Engine Oil that meets Cummins standard CES20078 API1 & C14	15L
Hydraulic Oil	46W Dedicated hydraulic oil eg:Total Equivis ZS 46	90L
Transmission 3000 Series 6 Speed	Castrol Allison Transynd	35L approx (dry)
Transfer Gearbox	Synthetic FE 75W-90	5.2L approx.
Differential Rear Axle	80W90 EP Gear Oil	24L (fill to level hole)
Differential Front Axle	80W90 EP Gear Oil	17L (fill to level hole)
Planetary Hubs - Front	80W90 EP Gear Oil	1.9L (fill to level hole)
General Grease Points	Multi-Purpose Grease	-
Steering Pivot Points	Molybdenum Based Grease	-
Coolant	TEC PG XL Cummins	39L approx
Diaphram Spray Pump	SAE 15W40	2.79L for Zeta 300
Air Conditioning	Oil, Sanden SP20	571ml dry
	Gas R134a	2kg

Goldacres are applying G15 anti corrosion spray to all fasteners (bolts, washers and nuts) and zinc plated components at the time of manufacture.
G15 should also be applied to the machine pre and post season.

As a guide, application to following areas is recommended but not limited to; Pump mounting bolts, Boom rests, Left hand POD, Mudguard mounting bolts, Induction Hopper bolts & latches, Hydraulic manifold, Boom hinge bolts, Airbag hose fittings and Hydraulic hose crimp fittings etc.

Filters

SERVICE ITEM	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Hydraulic Return Filter	GA5069056	-
A/C Carbon Filter	GA5066740	P277
Air Cleaner Primary Element	GA5069031	P608666
Air Cleaner Safety Element	GA5069032	P601560
Engine Oil Filters	GA5051755	LF3970
Transmission Oil Filters	GA3500140	Series 3000 = 29548988 kit
Fuel filter (primary)	GA5051760	FS1242
Fuel filter on engine	GA5051765	FF5612 , FF5421
Fuel Filter inline	GA5069895	W2153 3/8" tails

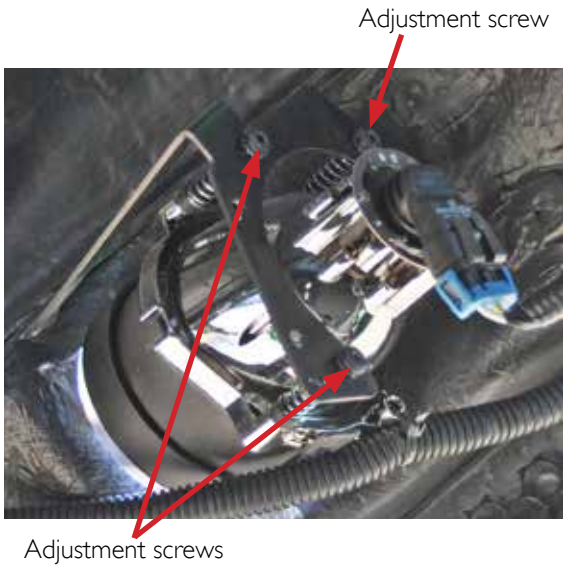
Replacement Globes

SERVICE ITEM	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Headlight - Low Beam	GA3000082	HB3 12V 60w
Headlight - High Beam	GA3000082	HB3 12V 60w

Headlight Adjustment

The headlights on the Super Cruiser have a HB3 globe for replacement. To replace the globe, the bonnet will need to be unclipped on both sides and rolled forward, do not let the bonnet roll forward under it's own weight, lean over the cold engine and unclip the loom from the globe and then unclip the globe from the headlight housing and remove. Replace with new globe and follow the instruction in reverse. Ensure bonnet has been re-clipped before driving.

Headlight alignment can be made by adjusting the 3 screws located around the headlight body. Make a change and then check to see the movement was in the correct direction.



Wheels

Tyre Changing

- Only an experienced person working with the correct equipment should change the wheels
- When changing a wheel ensure that the sprayer is on hard, level ground and the wheels at the opposite end are chocked
- Remove the isolator and the key from the ignition
- Before raising the machine off the ground ensure that the boom is at its fully closed position
- Where possible empty the spray tank before lifting the machine
- Place the jack securely under the jacking point and gently raise the machine until the weight has been removed from the wheel
- Do not support the sprayer using materials that may crumble
- Do not work under the machine when supported solely by a jack

NOTE: When the tank is fully loaded each wheel supports a weight up to approx 4 tonnes. Always ensure that the jack is designed to operate under this pressure.

Tyre Maintenance

- Maintain the correct tyre pressure at all times. Inflation above the recommended pressures may cause damage to the tyres
- Extreme caution is required during the inflation of tyres. If tyres are inflated at a rapid rate then the tyre rim combination may explode. This can result in serious or fatal injuries
- When inflating a tyre regularly check the tyre pressure with an inflation gauge
- Do not weld, heat or modify the rim, as this is likely to weaken the rim

Be proactive and regularly check the condition of your tyres.

Tyre Pressures

The tyres on the Super Cruiser operate under harsh conditions, high road speeds and high loads can cause tyres to wear prematurely. It is very important that tyres are maintained and operated correctly. Tyre pressures are the most integral item to maintaining correct load rating of the tyre.

It is advisable to protect the tyres as much as possible to reduce deterioration.

Chemical sprays and insecticides are harmful to the rubber in the tyres and should be washed off after use.

Tyre Pressures must be checked daily to maintain a satisfactory working life.

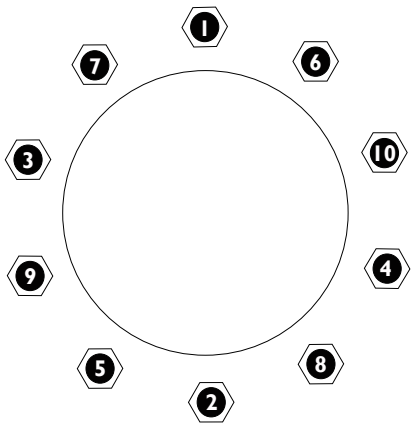
Also see chart in chapter 'General Information & Specs'.

Wheel Nut Tension

Wheel nuts must be tensioned daily when the machine is new or when the wheel nuts have been removed and refitted.

Once the wheel nuts hold their tension inspection can be lengthened to approximately 50 hrs. Wheel nut tension on the Super Cruiser front and rear wheels is 350 ft/lb.

Follow the sequence below to ensure an even torque distribution of the wheel nuts @ 350ft/lb.



Suspension

The Five Point Suspension system used on the Super Cruiser Sprayer consists of four parallel links, one panhard rod and 2 air bags on each axle. The rear axle of the machine is also fitted with an anti roll sway bar.

Parallelogram links hold the axle in place on the chassis. Pan hard rods hold the axle centred in the chassis. The parallelogram arms allow the axle to distort or twist forward and backwards when the wheels come in contact with an obstruction such as a pot hole, log or embankment. This oscillation is absorbed by polyurethane bushes in each end of the links. The life time of these bushes is subject to the conditions the machine operates in and the style of operation that it receives. The polyurethane bushes should be checked at regular service intervals as stated in this manual.

Air Bags mounted on to each side of the axle allow the axle to oscillate.

Polyurethane Bushes

There are two sized polyurethane bushes used in the suspension system on this machine. The first bushes are located in the Para Link and Pan Hard Rods. There are 20 of these bushes used in the machine and they can be purchased from your Goldacres dealer.

The second bushes are located on the sway bar.

Polyurethane bushes wear gradually over time and should be checked for movement during servicing. If there is any play in these bushes they should be replaced.

Parallel Link

Each end of the parallel link is attached to the chassis and differential with polyurethane bushes and 3/4 inch high tensile bolts. These links hold the axle in place while the bushes allow deflection when the wheels come in contact with an impact such as wash out or embankment. The bolts and bushes should be checked each time that the vehicle is serviced. If the axle is tending to twist or rock the bushes must be replaced.

Shock Absorbers

There are four shock absorbers fitted to the machine, one fitted to each side of the front and rear axle. The shockers dampen the movement of the air bags to prevent recoil. These should be check for damaged rubbers or oil leaks.

Panhard Rods

The pan hard rods fitted to the Goldacres Super Cruiser are designed to prevent any sideways movement of the axles and hold the axles central to the chassis. These rods are attached to the top of the axle and bottom of the chassis with two polyurethane bushes and 3/4" high tensile bolts. These bolts and bushes should be checked each time that the vehicle is serviced. If the axle is tending to twist or rock the bushes must be replaced.

Sway Bar

The sway bar is attached to the chassis and top of the rear axle with polyurethane bushes. This bar is designed to prevent excessive roll in the vehicle. The bushes should be checked each time that the vehicle is serviced.

Air Bags

The four air bags use compressed air to inflate them. They have ride height valves attached to the chassis and axle. As a load is exerted on the chassis the air bags will compress lowering the ride height valve arm. The ride height valve will then let air into the air bag causing it to inflate. As load is lessened on the axle the air bags will expand raising the arm of the ride height valve. The ride height valve will exhaust letting air flow out of the air bag causing it to deflate until the ride height arm becomes level again.

The air bags have internal rubber bumps that prevent the air bag bottoming out and jarring when the axle contacts large obstacles.

The rear axle has two ride height valves which level the sprayer, the front axle has one ride height valve in the middle of the axle which maintains the required height and allows it to pivot freely.

Airbag Height Settings

The distance for setting the Air Bag should be between 290mm and 280mm with both sides being the same. If this distance is not maintained the angle of the drive shaft changes causing a vibration and possible damage to the drive train.

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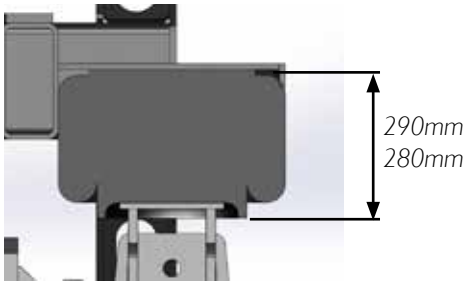
Suspension



The front & rear air bag is measured from the inside of the top mount to the bottom of the plastic skirt of the air bag.

Procedure to Evacuate Air Bags when Transporting on Trailers:

Loosen the drain tap on the air tank and drain the air. Loosen the fitting on the top of the Air Bag mount and release the air in the Air Bags. The Air Bags will lower on to the bump stops. Once the machine is on the bump stops tighten up the air tank valves and the fittings to the Air Bags. Don't alter or change the Height Control Valve linkages to release the air.

Ride Height Valve Adjustment

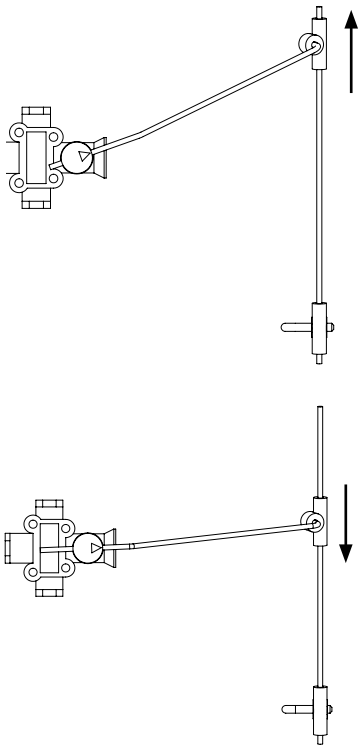
The ride height valves are used to adjust the air pressure within the air bags to maintain the correct ride height. There are two ride height valves located on each side of the rear axle and one located in the centre of the front axle.

The ride height can be adjusted by loosening the hose clamp attached to the vertical rod on the end of the ride height valve and then moving the valve arm in the required direction.

When the sprayer has been unused for a period of time, the air bags may deflate, this is normal. They will refill when the machine is started.

To raise the machine this arm should be moved up the vertical rod.

To lower the machine, move the arm down the vertical rod.

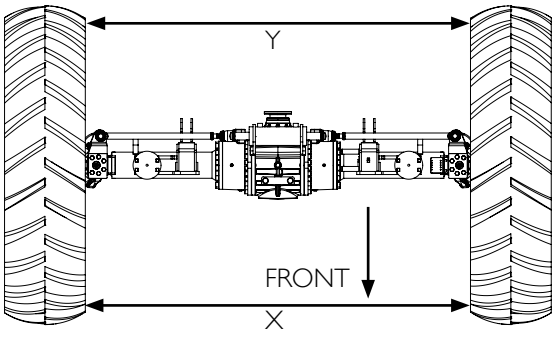


Steering

Steering Toe In

The steering wheels of the sprayer should "toe in" 0-5mm to check this measurement follow these steps.

1. Park the machine on a flat level surface.
2. Apply the parking brake and remove the keys from the ignition.
3. Measure up from the ground 900mm on the front of the steer tyre and mark.
4. Repeat for the rear of the steer tyre.
5. Measure between the front of the left and right steer tyres at the mark previously made and record.
6. Measure between the rear of the left and right steer tyres at the mark and record.
7. The front measurement must be 0-5mm less than the rear measurement.
8. If it is not the tie rod lengths must be varied.
9. Loosen the tie rod lock nuts and loosen or tighten until the "toe in" measurement is correct.



Measurement X should be 0-5mm less than measurement Y.

Camber

The wheel camber is a factory set parameter and cannot be adjusted. At the time of manufacture the wheel camber is set to + 0.5°.

Steering Swivel Housing

The front axle has a steering swivel on both side and on the top and bottom of these is a grease point, these should be greased every 100 Hrs.

Inside the swivel, there is a universal joint and this also needs grease at the same intervals as the steering swivel.

Pneumatic System

The pneumatic system on this machine is used to operate the air bags, control the cabin access ladder, and engage and disengage diff locks.

Air Tank

The air system fitted to this machine incorporates a single air tank located under the transmission on the chassis cross member.

Due to condensation in the tank, it must be drained daily. To drain fluid from this tank, a drain tap has been placed into the bottom of this tank. The tank must be drained on a 10 hour or daily basis.

To drain the air, turn the manual drain tap on tank and allow the condensation and air to escape from the tank.

CAUTION: Beware of high-speed particles leaving the tank. Also be aware that due to the expansion of the air the valve may become cold.

Compressor

The compressor used on this system is attached to the timing gear case on the rear of the engine. The output of the compressor is connected to the input port on the tank. To regulate the amount of air being generated by the compressor a governor is attached to the side of the compressor. This governor is connected with a sense line back to the tank.

The governor enables the compressor to continue pumping until the required tank pressure is achieved. Once this pressure is reached the governor stops the compressor pumping air. The governor is set to stop the compressor when a pressure of 120 psi is reached.

Pressure Relief Valve

To prevent the pressure within the air system exceeding acceptable limits, the tank has a pressure relief valve built onto the top of the tank. This valve is set to operate when a pressure of 150 psi is reached and vents the air to atmosphere.

Pneumatic Cylinder

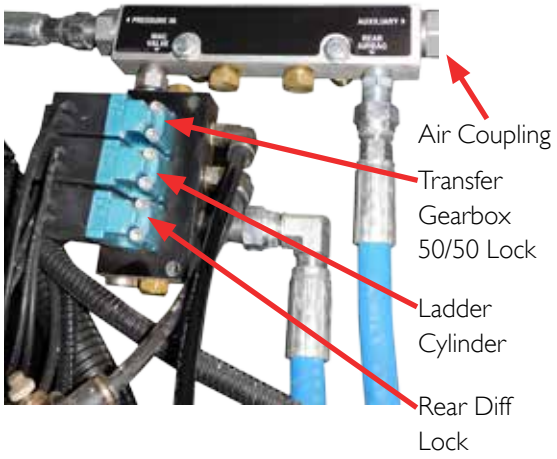
There is a pneumatic cylinder used on the cabin access ladder. This cylinder gets air flow from the pneumatic block. There is a flow control needle valve, on the inlet of the cylinder, to control the speed of the ladder when raising and falling.

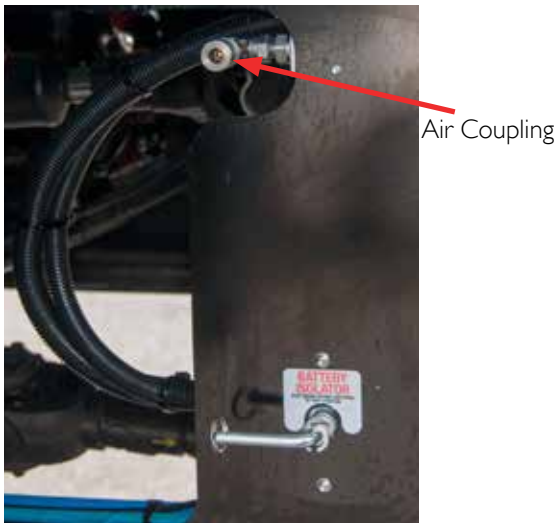
To increase or decrease the speed of the ladder going down, the needle valve on the flow control can be screwed in to decrease the speed and screwed out to increase the speed.

NOTE: The speed of the ladder is set at the factory and if adjustments need to be made, ensure the safety precautions are followed.

Quick Release Air Coupling

Air supply is available out of the air tank to blow out filters and nozzles etc. A Ryco 290 series, super-hi-flow airline coupling has been placed in the system. This coupling is located in the pneumatic block. Located on the right hand side, inside the chassis rail as shown in the image.



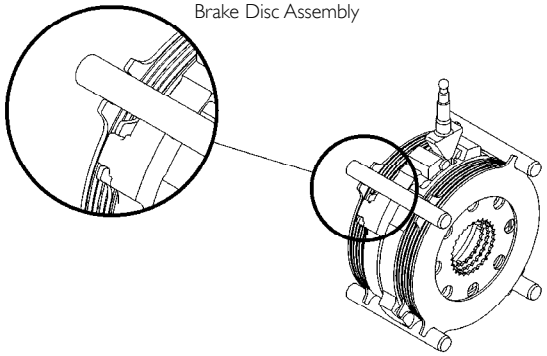


Braking System

The braking system for the Super Cruiser is hydraulically driven. The hydraulic pump mounted on the engine supplies oil to the braking circuit and gives priority to the brakes once the accumulators are fully charged. Hydraulic pressure goes from the accumulators to the foot pedal and then to the wet brake system in the front and rear axles.

The hydraulic pressure drives a wedge into the disk body and clutch disks, and on the rear axle when there is no pressure, it acts as a park brake.

Brake Disc Assembly



There is two brake control cylinders on each axle. On the rear, the brake control cylinders also operate the park brake. The park brake will always be applied when there is no hydraulic pressure going to the park brake chamber in the brake control cylinder.

There is no adjustment for the service brake function, if the braking performance deteriorates and it take more pressure to stop, the clutch disks may need replacing.

Bleeding the Brakes

The braking system is a hydraulic configuration. The front and rear brakes are operated from the main hydraulic pressure system.

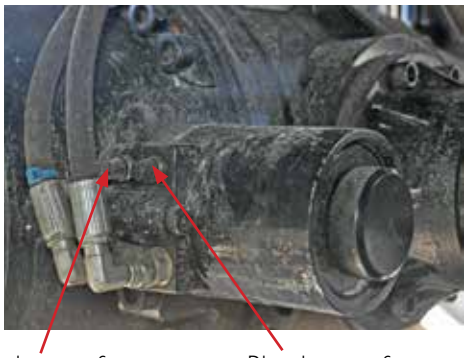
To bleed the brakes, ensure that the wheels are chocked front and rear.

Each brake control cylinder and function must then be bled separately.

The method used to bleed the service brakes manually is to:

1. Connect a clear plastic tube to the bleed screw and place the opposite end of the tube into a container.

Rear brake control cylinders



Bleed screw for Service brakes

Bleed screw for Park Brake

NOTE: The system should be bled until no more air bubbles appear in the bleed line.

NOTE: It is recommended that during this process the person bleeding the brakes wear suitable eye protection.

2. With an assistant in the cabin, start the engine (ensure no person is under the machine and the transmission is in neutral).
3. In the cabin, depress the brake pedal and hold.
4. Loosen the bleed screw and when there is no air and only a continuous stream of fluid in the clear hose, re-tighten the bleed screw before allowing the pedal to return to its released position.

3. Repeat this procedure for each of the other brake control cylinder assemblies.

Front brake control cylinders

Bleed screw for Service brakes

Continued over page

Braking System

Park Brake

The park brakes are only on the rear axle. The method to bleed the park brake is similar:

1. Connect a clear plastic tube to the bleed screw and place the opposite end of the tube into a container.

NOTE: The system should be bled until no more air bubbles appear in the bleed line.

CAUTION: It is recommended that during this process the person bleeding the brakes wear suitable eye protection.

2. With an assistant in the cabin, start the engine (ensure no person is under the machine and the transmission is in neutral).
3. In the cabin, depress the brake pedal and hold.
4. In the cabin, on the side console, switch the park brake "off".
5. Loosen the bleed screw and when there is no air and only a continuous stream of fluid in the clear hose, re-tighten the bleed screw before allowing the park brake to be applied.

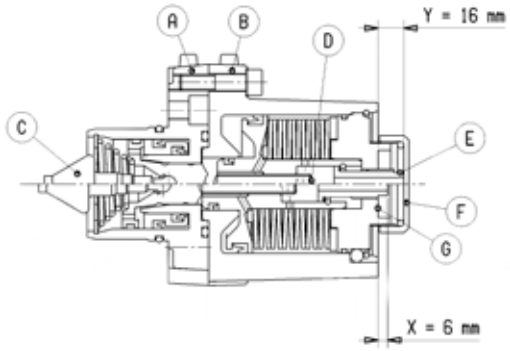
Bleed screw for Park Brake

Rear brake control cylinder

6. Repeat this procedure for the other park brake control cylinder assembly.

Park Brake Adjustments

1. With the engine stopped, and the machine on a flat level surface. The wheels chocked.
2. Remove the cover from the brake control cylinder.
3. With a 13 mm spanner, loosen the lock nut until the 16 mm measurement is obtained.
4. With a 6 mm hex key, insert into the bore and wind down until there is strong resistance.
5. Now wind out 2 1/4 turns.
6. Now, wind down the lock nut until the 6 mm measurement is obtained.
7. Replace the cover on the brake control cylinder.



Park Brake Disengage

1. With the engine stopped, and the machine on a flat level surface. The wheels chocked.
2. Remove the cover from the brake control cylinder.
3. With a 13 mm spanner, loosen the lock nut until the 16 mm measurement is obtained.
4. Replace the cover on the brake control cylinder.

This will disengage the park brake for towing the machine, but also leave the machine with no form of braking when the engine is not running.

So the wheels will need to be chocked at all times when the engine is off and the machine is stationary.

Transmission

The Allison 6 speed automatic transmission oil level can be checked by using the dipstick located in left hand side of the transmission, under the cabin.

The oil level must be checked with the engine running. If the oil is cold (less than 70 degrees) the oil level must be in the lower range.

If the oil temperature is warm (above 70 degrees) the oil level must be in the upper range.

The 2 internal oil filters needs to be changed as per the maintenance schedules and the Lubricants and Filters charts for servicing requirements.

Transmission Oil Cooler

The transmission oil cooler is integrated into the radiator.

Refer to the maintenance schedules and the Lubricants and Filters charts for servicing requirements.

Refer to the Allison Transmission operation and codes manual (supplied) for any information on operation or trouble shooting the Allison transmission.

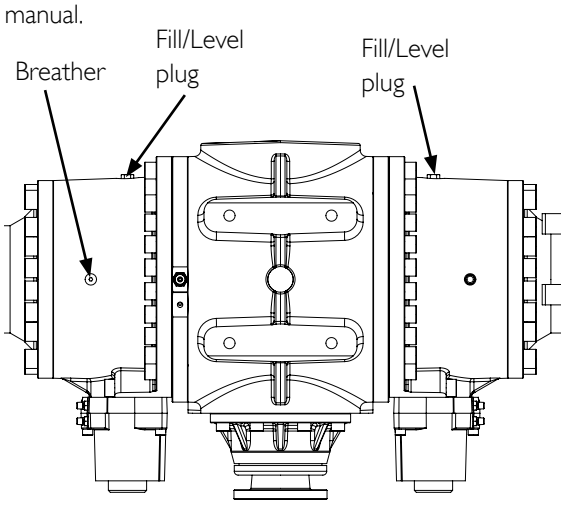
Driveline

Fixed drive lines are used to transmit drive between the transmission, transfer gearbox and the differential. These drive lines have greasable universal joints at each end. All the shafts have a telescopic spline which also requires greasing. These drive lines should be inspected for wear and greased at regular service intervals

Differential

The front and rear differential runs in an oil bath sump. The oil level can be checked by removing the level plug on the rear of the differential housing. The oil should be replaced at the first service to remove manufacturing contamination. Every 500 hrs the oil must be replaced.

NOTE: The lubricant specification can be found in the 'Recommended Lubricants' section of this manual.



There is a breather located on the top of the differential. This allows the oil to expand and contract without creating a vacuum or pressurising the differential housing. Ensure the cap moves freely.

Front axle needs to be greased as per the 'Recommended Lubricants' section of this manual. The front swivel, top and bottom needs to be greased, and the drive shaft yoke in the centre of the swivel also needs to be greased. The machine may need to be moved or the wheel lifted of the ground and rotated to access the grease nipples.

See next page for images of the greasing points.

Continued over page

Driveline

Planetary Hubs

The planetary hubs in the rear axle are open and part of the rear axle, and get their oil supply when the differential is filled with oil. The oil level can still be checked at each hub, independent to the differential oil level plugs.

When draining the oil from the rear axle, rotate the rear wheels so the drain plugs of the planet hubs are at the bottom, remove the plugs from the centre differential housing and the drain plugs from the planetary hubs. Replace the plugs when all the oil has drained

Fill the rear differential to the level plugs in the differential housing and the planet hubs.

The front planet hubs need to be filled individually as they are separate from the centre differential. To check the oil in the front planet hubs, the front wheel needs to be rotated so the oil level plug is in the level position.

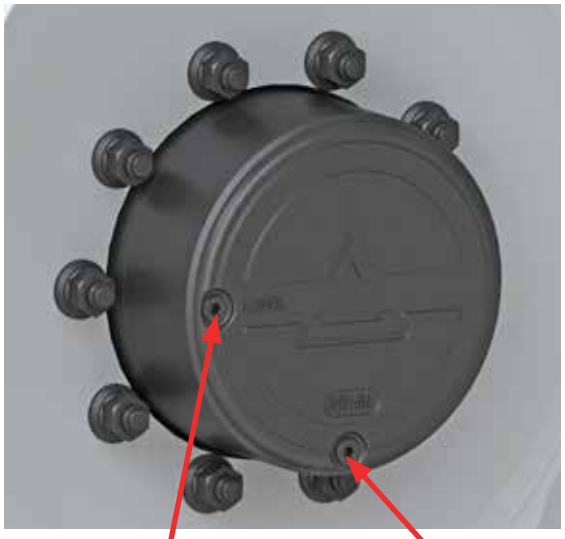
Remove the plug and see if the oil is level with the plug or just below, if no oil can be seen, more oil needs to be added to bring it back up to level.

To drain the front axle, remove the drain plugs from the centre differential housing. Replace when all the oil has drained.

Fill the front differential to the level plugs in the differential housing.

To drain the front planetary hub, rotate the front wheel so the drain plug is at the bottom. Remove the level plug to help the oil drain from the hub. Replace the plugs when all the oil has drained.

Fill the front planet hubs to the level plugs.



Transfer Case

The transfer case directs drive from the transmission to the front and rear axles. 4WD lock should only be engaged when the machine is stationary.

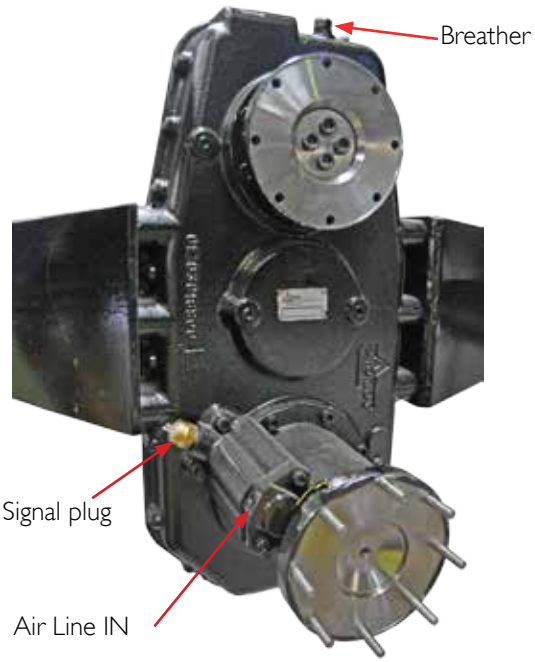
The transfer case runs in an oil bath sump. The oil level can be checked by removing the oil level plug located on the side of the transfer case.

The oil should be replaced at the first service to remove any manufacturing contamination.

When draining the oil, the machine should be driven for a short time before hand to warm up the oil. This allows it to drain easier. Remove both the drain and fill plugs when draining the oil.

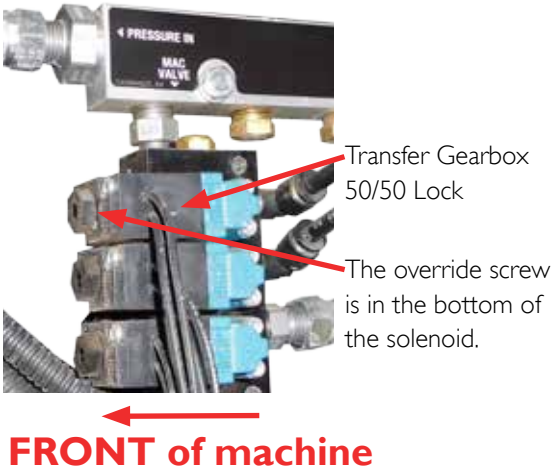
When filling the transfer case, the machine should be parked on level ground. Fill up to the oil level plug. Clean the oil level plug before refitting. See the 'Recommended Lubricants' section of this manal for information on which oil to use.

An air solenoid is located on the right hand side chassis side wall near the flush tank. When 4WD lock is switched on in the cab, the solenoid is activated. This then sends air from the solenoid, down to the shift cylinder on the transfer case. The cylinder is pushed in by the air and 4WD lock is selected.



This solenoid can be manually overridden if required. Locate the solenoid. The override screw is on the bottom. Using a flat head screw driver, push into the screw and turn a 1/4 turn in either direction. Air should now be flowing through the solenoid and 4WD lock should be engaged.

To disengage, turn the screw a 1/4 turn in the opposite direction to when it was overridden.



Hydraulics

The Super Cruiser is fitted with two hydraulic systems.

The first is used to operate the steering, hydraulic cylinders.

The second system is used to operate the cooling fan and the brakes.

These systems operate from a common hydraulic reservoir. The reservoir has a sight tube mounted on the side. The oil level must always be visible in top third of the tube. The oil temperature will normally run at 60-80 degrees Celsius.

NOTE: The lubricant specification can be found in the 'Recommended Lubricants' section of this manual.

Main Hydraulic Systems

The first pump is a 60cc variable displacement piston pump. This pressure line gives priority to the steering circuit first. All functions require an unloader to stroke up the pump to max pressure and flow.

The second pump is driven from the air compressor drive. This pump operates the cooling fan and the braking system. This system will give priority to the brakes which also includes the accumulators, and when up to pressure and charge, the cooling fan will receive full pressure. Max cooling fan pressure is set to 175 Bar.

The braking accumulators are charged at 90 Bar, if one of the accumulators fail, a check valve will prevent the other accumulator from losing pressure. The pressure goes from the accumulators to the foot pedal, and then to the brakes in the axles.

The park brake hydraulics goes through a pressure reducing valve to ensure the pressure does not exceed 35 Bar. The park brake is actuated (released) with a solenoid valve after the cabin park brake switch is released.

Return Filter

The hydraulic filter is located in the tank in front of the cabin. This filter should be replaced after the first 50 hours of use and then every 500 hours after that. The return filter filters all of the return oil to the reservoir. There is a red indicator located on the top of the filter. If the indicator pops out then the filter must be replaced because it is blocked and causing back pressure through the system. This filter should be checked once the oil has reached operating temperature as cold oil can cause a false reading on the indicator.

Oil Cooler

The oil cooler is located under the rear of the cabin mounted on the chassis. This cooler uses an electric fan and a thermo switch to keep the oil at the optimum temperature. The cooler will switch on when the oil flowing through reaches 55°C. Ensure that the fins on the cooler are kept clear of debris.

Continued over page

Hydraulics

Hydraulic Pumps

The 60cc single hydraulic pump is attached directly on the side of the transmission to the transmission PTO. This pump is a variable displacement type pump and is powered off the transmission.

The pump is used to supply fluid for the steering and hydraulic cylinders.

After fluid leaves the hydraulic pump it travels through a priority valve. This valve gives priority to the steering system to ensure that the steering orbital (attached to the CF connection) always receives sufficient oil flow. When the steering system has received sufficient flow, the priority valve begins to enable fluid to travel to the rear hydraulic circuit. This flow is determined by the load sense line from the steering orbital.

P – Pressure supply

CF – Supply to steering orbital

EF – Supply to solenoid bank

LS – Feedback from steering orbital

The 22cc single hydraulic gear pump is attached directly to the engine air compressor. This pump is a positive displacement type pump and is powered off the engine timing gears.

The pump is used to supply fluid for the fan pump and the brake system.

After fluid leaves the hydraulic pump it travels through an accumulator charging manifold. It charges the brake accumulators, then the excess oil is supplied to the fan on the radiator.

Steering Orbital

The steering orbital is located under the front of the cabin. This supplies oil flow to the steering cylinder when directed by the steering wheel.

P	Pressure supply
R & L	Supply and return to steering cylinders
LS	Load sense to priority valve
T	Return to reservoir

Engine

Opening the Bonnet

The bonnet is fastened down by 2 latches.

Once open, the bonnet is supported by over centre weight.

CAUTION: If the engine has been running, take extra care around hot engine parts such as the exhaust.

CAUTION: When the bonnet is closed, ensure that the latches are tight before driving machine.

Fuel Filters

There are three fuel filters mounted on the left hand side of the engine.

The first filter is an inline filter that is located behind the fuel tank near the parallel link arms on the left hand side.

The water separator or primary filter is mounted on the front of the left hand chassis rail. This filter is the second point from the fuel tank, it separates any water from the fuel and also filters contaminants.

This filter has a sensor in the base of it which will alarm when excessive amounts of water is detected in the fuel.

This filter should be replaced with in the first 50 hours of use and then every 250 hours of engine operation.

The water trap at the base of the cylinder should be drained daily.

The Secondary filter is mounted on the left hand side of the engine. This filter is finer than the primary filter.

NOTE: Filter specifications can be found in the 'Replacement Filter' section of this manual.

Engine Oil and Filter

Check the engine oil level daily. The engine oil must be checked with the engine stopped. The engine oil dipstick must be removed from the engine tube, cleaned and then re-dipped to verify the correct engine oil level. The oil level must be between the 'ADD' and 'FULL' marks on the dipstick. If the oil level is below the 'ADD' mark top up the engine with the appropriate fluid. The lubricant specification can be found in the 'Recommended Lubricants' section of this manual.

The engine oil must be drained within the first 50 hours of engine use and then as per the maintenance schedule after that. To drain the engine oil place a container, at least 30 litre capacity, under the remote drain plug, located on the left hand side on the front cross rail in front off the fuel tank, and then remove the plug. The engine oil filler cap can be loosened to allow the oil to drain easier.

Once drained refit the oil drain plug and fill though the rocker cover on the top of the engine or the filler located near the dipstick. The oil can be checked via the dipstick on the left of the engine.

When the engine oil is changed the engine oil filter must be replaced. The engine oil filter is located on the right side of the engine. The filter is a spin on element.

NOTE: Filter specifications can be found in the 'Replacement Filter' section of this manual.

Continued over page

Engine

Coolant

Super Cruiser radiators are fitted with a header tank. This allows for expansion of the coolant when the engine warms up. The radiator cap allows excess fluid to drain out of the over flow if the coolant expands too much. The coolant level must be visible from the lid of the header tank. The level will be 50mm below the lid when the engine is cool.

Coolant level must be checked DAILY.

CAUTION: Never remove the radiator cap when the engine is hot.

The header tank is fitted with a level sensor. If the coolant drops below this sensor the engine controller will send an alarm through to the CanTrak console and shut the engine down.

Coolant must be checked at regular service intervals. Refer to maintenance schedule. Test kits are available from Cummins to check this.

The coolant must be replaced every 2000 hours. Quantity and type can be found in the 'Recommended Lubricant' section of this manual.

There are ball valves located on the heater hoses at the rear of the engine and also at the header tank. These ball valves can be isolated during hotter periods to allow the air conditioning system to operate more efficiently. When replacing the entire coolant system these ball valves must be opened so that all the air is bled from the coolant lines.

Engine Drive Belt

The engine drive belt is a serpentine belt that has a self tensioner on it. The belt requires inspection at regular service intervals. If the belt begins to slip the belt may require replacement as it can become laminated or slippery. If the tensioner looses its tension it can also cause the belt to slip and must be replaced. The belt should be replaced every 1000 hours.

To replace the engine drive belt insert a ½" drive into the tensioner arm and pull upwards.

Pull the belt off the pulleys and off the fan.

Fit the new belt in reverse, ensure all pulleys are aligned correctly with the belt before releasing the tensioner.

Air Conditioner Belt

The air conditioner compressor belt has a manual adjuster. To tension the belt the compressor mounting bolt and adjuster bolt must be loosened. To tighten the belt, use the lock nuts on the adjuster to pivot the compressor and pull the belt tight. When the belt is correctly tensioned tighten the retaining hardware.

There should be no more than 12mm deflection in the belt when it is tensioned correctly. The compressor belt should be replaced every 1000 hours.

Engine Air Cleaner

The air cleaner is mounted to the top of the engine on the front right hand side. Mounted on the right hand side of the hydraulic oil tank frame is a vacuum gauge (this can be seen from the cabin). This is used to detect a blocked air filter. The gauge will operate in the middle range when in normal working conditions, and in the 'RED' zone when blocked. This indicates it is time to remove the primary filter and replace it.

Continued over page

Engine

It is recommended to inspect the filters when the machine is new. Inspection of the primary filter should be carried out at service intervals or when the vacuum gauge indicates. NEVER clean the secondary filter, this filter should be replaced if it is contaminated or damaged.

NOTE: Filter specifications can be found in the 'Replacement Filter' section of this manual.

Cabin Air Cleaner

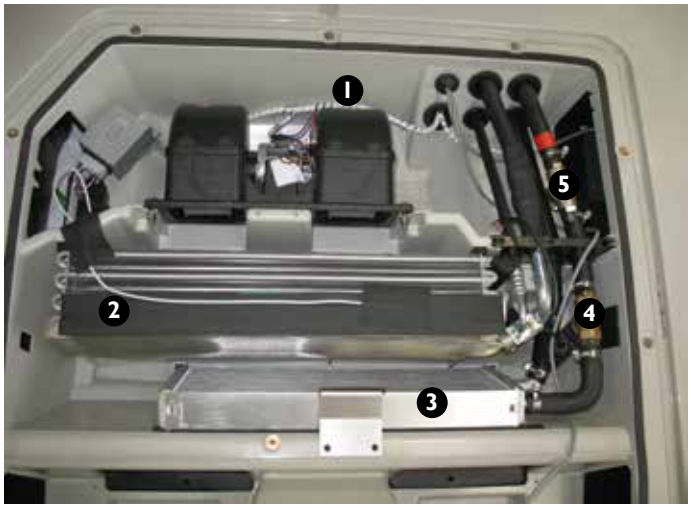
A carbon air cleaner is fitted to the right hand side of the cabin. This filter cleans the impurities from the air being drawn into the cabin. The air is drawn in through the carbon filter by a fan and pressurises the cabin to prevent impure air entering the cab from any holes or seal leaks. The filter elements has a pre-cleaner foam covering it, this foam element can be removed and washed in water. The element must be totally dried before refitting. Carbon balls inside the filter capture any impurities in the air that is drawn through it. An indicator on the end of the filter identifies when the carbon balls need to be recharged so that its cleaning qualities remain. By removing the element from the housing and inspecting the colour of the carbon balls the service life can be witnessed. When the indicator shows the filter needs to be recharged it must be replaced with a new carbon filter or recharged by a certified agent.

Purple - Active
Brownish Orange- Active
Brownish Red - Requires recharging or replacing

NOTE: Filter specifications can be found in the 'Replacement Filter' section of this manual.

Clamp thread

Air Conditioning System



NO.	COMPONENT
1.	Fan
2.	AC Evaporator
3.	Heater Core
4.	Heater Control Valve
5.	Heater Water Filter

HVAC Operation

(Heater, Ventilation, Air Conditioning)

The air conditioning circuit operates by the pressuriser fan drawing clean air into the cabin through the carbon filter. This fan pressurises the cabin with clean air and forces air out any holes or leaking seals in the cabin ensuring no impurities can be drawn into the operator's clean environment.

The blower fan then pulls air through the air conditioning evaporator and heating evaporator and pushes it to the demist and roof vents. If the air conditioning compressor is engaged the air conditioner evaporator will cool the air as it is drawn though it. If the heater thermostat is turned to heat, the air will warm again as it passes through. If the heater is off, the cool air passes through to the vents.

Compressor

The air conditioning compressor is located on the front side of the engine. This compressor is connected to the engine by a "V" belt. The compressor is engaged when ever the cabin blower fan switch is energised. The thermostat will cycle the air compressor if the evaporator gets to cold.

Condensor

The air conditioning system condenser is located in front of the engine radiator. The condenser is cooled by air being drawn through from the engine fan. The condenser requires regular cleaning of dust and any debris.

NOTE: Take care not to damage the condenser coils or fins when the condenser is cleaned.

Receiver Dryer

The air conditioning receiver dryer is fitted to the right hand chassis rail under the cabin. This component captures any moisture that is circulating in the air condition system. Moisture in the air conditioning system freezes and causes blockages. The component must be replaced any time the air conditioning system is opened or serviced.

Heating System

The heating core is warmed with hot water from the engine. The volume of the water travelling through the system (and therefore the heat supplied) may be adjusted by setting the temperature on the AC head unit. To enable the heating core to be isolated from the engine two taps have been installed. The first tap is located on the right hand side of the engine behind the radiator. The second tap is located at the header tank.

NOTE: If the heating is not working ensure that the isolating taps are on.

Electrical System

Batteries

The electrical system operates on 12 volts. To provide a 12V supply with sufficient current two 12 volt batteries have been used in parallel. This means that the like polarity terminals have been joined.

- Before carrying out any repairs to the electrical system turn the battery isolator switch to the 'off' position. The battery isolator is located on the right hand side panel in front of the rinse tank.
- When welding connect the ground terminal directly to the part being welded and ensure that the batteries are disconnected. Disconnect any electronic controls such as the engine controller, transmission controller and the spray controller.
- When welding on the sprayer ensure, If fitted, that all weed seeker controllers are totally removed from the sprayer.

Battery Isolator

The battery isolator switches power flow from the batteries to the sprayer. The switch is a 250 amp switch. The isolator switch cut all power to the sprayer except for the radio back up power. The isolator switch must be isolated when the sprayer is not in use to prevent battery leakage or power faults. The battery isolator is located on the right hand side panel in front of the rinse tank.

NOTE: The battery isolator is not an Emergency stop. The isolator key should only be removed after more than 30 seconds from stopping the engine, so data can be written and saved to the ECU.

Battery Jumper

If the batteries need jumping, the cables need to be connected directly to the batteries. They are located on the inside chassis rail on the right hand side. When charging the batteries or jump starting another vehicle:

- Switch the engine off.
- Switch off the battery isolator switch.
- Connect the positive jumper lead to the positive battery jumper point.
- Connect the negative jumper lead to the negative battery jumper point.

Electrical Components

The Electrical control panel is located in the side console on the right of the operator's seat. These panels contain fuses and relays to activate the sprayer circuitry. To gain access to the panels the console lining must be removed by releasing the latches on top of the cover and pulling it forwards.

These boxes control various relays, diodes and fuses to operate a number of electrical circuits through out the sprayer. The layout of the fuse boxes can be seen in the 'Cabin' chapter.

When a fault occurs, the fuses will blow and disconnect the circuit. If a fuse has been blown identify the corresponding device and investigate the cause before reconnecting the new fuse.

The fuses have been placed in the system to protect the system against electrical faults. When a fuse is replaced it is important that the fuse is replaced with another fuse of the same rating.

Maintenance Schedules

See end of this chapter for a list of items that need to be replaced for the first service.

After the first service, replace or inspect the items at the intervals indicated.

Engine

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Engine oil level	Inspect	Inspect	Replace	Replace	Replace	Replace
Engine oil filter	Inspect	Inspect	Replace	Replace	Replace	Replace
Fuel filter - engine	Inspect	Inspect	Replace	Replace	Replace	Replace
Fuel filter - (separator filter)	Drain	Drain	Replace	Replace	Replace	Replace
Fuel Filter - (in line)	Inspect	Inspect	Replace	Replace	Replace	Replace
Fuel level	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Antifreeze/Coolant	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Fan	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Drive belt	Inspect	Inspect	Inspect	Inspect	Inspect	Replace
Cooling system	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Mounting bolts and vibromounts	-	Inspect	Inspect	Inspect	Inspect	Inspect
Hoses, lines and clamps	-	Inspect	Inspect	Inspect	Inspect	Inspect
Exhaust system	-	Inspect	Inspect	Inspect	Inspect	Inspect
Air cleaner (primary filter)	-	Inspect	Inspect	Inspect	Inspect	Replace
Air cleaner (safety filter)	-	Inspect	-	Inspect	Inspect	Replace
Air cleaner fittings	-	Inspect	Inspect Tension	Inspect Tension	Inspect Tension	Inspect Tension
Intake system	-	Inspect	Inspect Tension	Inspect Tension	Replace Tension	Replace Tension
Belt tensioner bearing	-	Inspect	Inspect	Inspect	Inspect	Replace
Belt tension	-	Inspect	Inspect	Inspect	Inspect	Inspect
Turbocharger	-	Inspect	Inspect	Inspect	Inspect	Inspect
Air compressor	-	Inspect	Inspect	Inspect	Inspect	Inspect
Harmonic balancer	-	Inspect	Inspect	Inspect	Inspect	Inspect

Note: Engine coolant to be replaced at 2000 hours.

Continued over page

Maintenance Schedules

Transmission

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Oil Level	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Internal Main Filter	Replace on rebuild					
Internal Fluid Filters	-	Inspect	Inspect	Replace	Inspect	Replace
Bolts	-	Inspect	Inspect Tension	Inspect Tension	Inspect Tension	Inspect Tension
Oil Lines	-	Inspect	Inspect	Inspect	Inspect	Inspect
Electrical Harnesses	-	Inspect	Inspect	Inspect	Inspect	Inspect
Cooling System	-	Inspect	Inspect	Inspect	Inspect	Inspect

Drive Shafts

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Transmission and Axle Input	-	Inspect	Inspect	Inspect	Inspect	Inspect
Universal Joints	-	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect
Slip Splines	-	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect

Axles

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Differential Oil Level	-	Inspect	Inspect	Replace	Inspect	Replace
Steering Swivel	-	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Inspect Replace
Tie Rod Ends and Ball Joints	-	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect
Front Axle Universal Joints	-	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect	Lubricate Inspect
Front Planetary hubs - Oil Level	-	Inspect	Inspect	Inspect	Inspect	Inspect
Breather	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Toe In (1-5mm)	-	-	Measure	Measure	Measure	Measure

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Maintenance Schedules

Transfer Gearbox

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Oil Level	Inspect	Replace	Inspect	Replace	Inspect	Replace
Input Output Seals	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Breather	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect

Hydraulic System

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Hydraulic oil	-	Inspect	Sample	Sample	Sample	Replace
Hydraulic oil return filter	-	Inspect	Inspect	Replace	Inspect	Replace
Hydraulic lines and hoses	-	Inspect	Inspect	Inspect	Inspect	Inspect
Hydraulic cylinders	-	Inspect	Inspect	Inspect	Inspect	Inspect
Hydraulic pumps	-	Inspect	Inspect	Inspect	Inspect	Inspect
Hydraulic pump mountings	-	Inspect	Inspect	Inspect	Inspect	Inspect
Hydraulic valves	-	Inspect	Inspect	Inspect	Inspect	Inspect
Hydraulic relief pressures	-	Inspect	Adjust	Adjust	Adjust	Adjust

Pneumatic System

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Air tank	Drain	Drain	Drain	Drain	Drain	Drain
Air lines and fittings	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect

Braking System

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Foot Brake Housing	-	Inspect	Inspect	Inspect	Inspect	Inspect
Hydraulic brake lines/hoses	-	Inspect	Inspect	Inspect	Inspect	Inspect
Seals	-	Inspect	Inspect	Inspect	Inspect	Inspect
Brake operation	Inspect	Inspect	Test & Inspect	Test & Inspect	Test & Inspect	Test & Inspect
Parking brake	-	Inspect	Inspect	Inspect	Inspect	Inspect
Parking brake operation	Inspect	Inspect	Test & Adjust	Test & Adjust	Test & Adjust	Test & Adjust
Parking brake switch	-	Inspect	Inspect	Inspect	Inspect	Inspect

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Maintenance Schedules

Suspension System

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Polyurethane bushes	-	Inspect	Inspect	Inspect	Inspect	Inspect
Bolts and nuts *	-	Inspect	Tension	Tension	Tension	Tension
Shock absorbers	-	Inspect	Inspect	Inspect	Inspect	Inspect
Ride height valve	-	Inspect	Inspect	Inspect	Inspect	Inspect
Sway Bar Bushes	-	Inspect	Inspect	Inspect	Inspect	Inspect
Torque Rod - Welds	-	Inspect	Inspect	Inspect	Inspect	Inspect

Polyurethane bushes, Shock absorbers, Sway bar bushes need to be replaced at 2000 hrs.
*** Note:** Parallel link bolts are to be torqued to 350 ft/lb.

Wheels & Tyres

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Rims	-	-	Inspect	Inspect	Inspect	Inspect
Wheel nuts - 350 ft/lb	Tension	Tension	Tension	Tension	Tension	Tension
Tyre pressure	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Tyres	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect

Air Conditioning System

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Condensor	Clean	Inspect	Inspect	Inspect	Inspect	Inspect
Air conditioner lines	-	-	Inspect	Inspect	Inspect	Inspect
Refrigerant and dryer	-	-	Inspect	Inspect	Inspect	Replace
HVAC box	-	-	Inspect	Inspect	Inspect	Inspect
Carbon filter	-	Inspect	Inspect	Replace	Inspect	Replace
Carbon filter inlet	-	Inspect	Inspect	Inspect	Inspect	Inspect
Compressor drive belt	-	Inspect	Inspect	Adjust	Adjust	Adjust

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Maintenance Schedules

Chassis

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Ladder Switch	-	-	Inspect	Inspect	Inspect	Inspect
Ladder Folding Mechanism	-	Lubricate	Lubricate	Lubricate	Lubricate	Lubricate
Ladder Mounting Bolts	-	Tighten	Tighten	Tighten	Tighten	Tighten
Pump Mounting Bolts	Tighten	Tighten	Tighten	Tighten	Tighten	Tighten
Cab mount bolts and bushes	Tighten	Tighten Inspect	Tighten Inspect	Tighten Inspect	Tighten Inspect	Tighten Inspect
Cabin Seals	-	-	Inspect	Inspect	Inspect	Inspect
Cabin Interior	Clean	Clean	Clean	Clean	Clean	Clean
Chassis Frame	-	-	Inspect	Inspect	Inspect	Inspect
Machine Exterior	-	Clean	Clean	Clean	Clean	Clean
Windscreen Wiper Fluid	-	Inspect	Inspect	Inspect	Inspect	Inspect

Electrical System

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Battery electrolyte level	-	Inspect	Inspect	Inspect	Inspect	Inspect
Lights	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Leads and wires	-	-	Inspect	Inspect	Inspect	Inspect
Earth leads	-	-	Inspect	Inspect	Inspect	Inspect
Wires near moving parts	-	-	Inspect	Inspect	Inspect	Inspect
Neutral start switch	-	-	Inspect	Inspect	Inspect	Inspect
Battery terminal	-	-	Clean & Protect	Clean & Protect	Clean & Protect	Clean & Protect

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Maintenance Schedules

Spraying Equipment

SERVICE ITEM	DAILY (10Hrs)	WEEKLY (50Hrs)	250Hrs/ 3 Months	500Hrs/ 6 Months	750Hrs/ 9 Months	1000Hrs/ 1 Year
Nuts and bolts	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Hinge bushes	Lubricate	Lubricate	Lubricate	Lubricate	Lubricate	Lubricate
Tilt bushes	Lubricate	Lubricate	Lubricate	Lubricate	Lubricate	Lubricate
Filters (suction filter, pressure filter, flush filter, compressor air filter)	Inspect	Inspect	Inspect or replace	Inspect or replace	Inspect or replace	Inspect or replace
Nozzles	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Pump (pre-spray test)	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect
Pump oil condition and level	Inspect	Inspect	Replace	Replace	Replace	Replace
Pump diaphragms	-	-	-	Replace	-	Replace
Pump seals	-	-	-	Replace	-	Replace
Pump valve O-rings	-	-	-	Replace	-	Replace
Pump valve springs and cages	-	-	-	Replace	-	Replace
Hoses and fittings	Inspect	Inspect	Inspect	Inspect	Inspect	Inspect

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Maintenance Schedules

First Service @ 50 Hrs

Engine

SERVICE ITEM	TYPE OF SERVICE REQUIRED	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Engine oil	Drain and Replace	GA5017913	-
Engine oil filter	Replace	GA5051755	LF3970
Fuel filter - engine	Replace	GA5051765	FF5612, FF5421
Fuel filter - (Primary)	Replace	GA5051760	FS1242
Fuel Filter - (in line)	Replace	GA5069895	W2153 3/8 tails

Transmission

SERVICE ITEM	TYPE OF SERVICE REQUIRED	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Oil	Drain and Replace	GA5006959	-
Internal Filters	Replace	GA3500140	29548988 kit

Transfer Case

SERVICE ITEM	TYPE OF SERVICE REQUIRED	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Oil	Drain and Replace	GA5072325	-

Rear Axle

SERVICE ITEM	TYPE OF SERVICE REQUIRED	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Differential Oil	Drain and Replace	GA5047310	-
Planetary Hub Oil	Drain and Replace	GA5047310	-

Front Axle

SERVICE ITEM	TYPE OF SERVICE REQUIRED	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Differential Oil	Drain and Replace	GA5047310	-
Planetary Hub Oil	Drain and Replace	GA5047310	-
Toe In (1-5mm)	Measure	-	-

Hydraulic Oil Tank

SERVICE ITEM	TYPE OF SERVICE REQUIRED	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Hydraulic oil return filter	Replace	GA5069056	-
Hydraulic oil	-	GA5017199	-

Air-conditioning

SERVICE ITEM	TYPE OF SERVICE REQUIRED	PART NUMBER - GOLDACRES	PART NUMBER - GENERIC
Compressor drive belt	Check and re-tension	GA5071435	-

Chapter 11

TROUBLESHOOTING

General

The following troubleshooting information is provided as a reference when your sprayer is not functioning correctly.

To ensure that you receive the best possible service, it is recommended that you exhaust all applicable troubleshooting solutions shown in this chapter prior to calling your dealer, or Goldacres for service advice.

Parts information and schematics can be found in the parts manual supplied.

Brakes

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Brakes are not responding	Leak in brake lines	Inspect all hydraulic lines & repair if necessary
Sprayer is stopping inconsistently	Low hydraulic pressure	Check the level of main hydraulic tank
		Check main hydraulic pressure to ensure there is enough flow
Brakes are squealing	High oil heat in differential	Cool the differential
Park brake not holding	Brake disc wear	Adjust park brake as per 'lubrication & Maintenance' chapter
	Pressure in brake line	Inspect switch and ensure that the hydraulic spool is operating correctly

Hydraulic & Pneumatic

PROBLEM	COMMON CAUSES	COMMON SOLUTION
No hydraulic pressure	Low hydraulic oil level	Check the oil level in the hydraulic reservoir and top up if necessary
	Load Sense	Check hydraulic fittings and ensure flow through the system
		Check that standby pressure is at least 15bar
The air bags are not inflating	Low system pressure	The bags will not inflate until the pressure in the system is above 75 PSI, check system pressure
	Compressor not working properly	Check that the compressor is working correctly
Vehicle sits unevenly	Incorrectly adjusted ride height valves	Adjust the ride height valves as per the instructions in the Lubrication and Maintenance chapter

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Air Conditioning

PROBLEM	COMMON CAUSES	COMMON SOLUTION
Air conditioning not cooling effectively	Condenser Blocked	Check the condenser for a build up of dirt and plant matter, clean if required.
	Compressor belt loose	Inspect the belt to see if it is tensioned correctly. If belt is showing signs of wear, replace.
	A/C system needs re-gassing	If this is the case, only allow a qualified air conditioning technician to work on the system. R134a refrigerant must not be allowed to escape to the atmosphere.
	Evaporator blocked	Build up of dirt and plant matter, clean if required. Be careful not to damage any of the components.

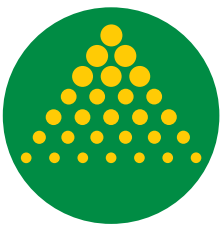
Chapter 12

OPTIONAL ACCESSORIES

General Information

The following pages provide information on Goldacres optional accessories available on this equipment.

NOTE: These options may not be fitted to your equipment unless ordered.



GOLDACRES

www.goldacres.com.au