

SERVICE MANUAL

MOBILE ELEVATING WORK PLATFORM
**S1530E, S1930E, S2032E, S2632E,
S2646E, S3246E, S4046E, S4550E**

EN - 9823/2400 - ISSUE 6 - 10/2021

This manual contains original instructions, verified by the manufacturer (or their authorized representative).

Copyright 2021 © JCB SERVICE
All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any other means, electronic, mechanical, photocopying or otherwise, without prior permission from JCB SERVICE.

www.jcb.com

Foreword

The Operator's Manual



You and others can be killed or seriously injured if you operate or maintain the machine without first studying the Operator's Manual. You must understand and follow the instructions in the Operator's Manual. If you do not understand anything, ask your employer or JCB dealer to explain it.

Do not operate the machine without an Operator's Manual, or if there is anything on the machine you do not understand.

Treat the Operator's Manual as part of the machine. Keep it clean and in good condition. Replace the Operator's Manual immediately if it is lost, damaged or becomes unreadable.

Contents

01 - Machine

06 - Body and Framework

24 - Brake System

25 - Steering System

27 - Driveline

30 - Hydraulic System

33 - Electrical System

72 - Fasteners and Fixings

75 - Consumable Products

78 - After Sales

[illegible]



SERVICE MANUAL
Volume 1

**S1530E, S1930E, S2032E, S2632E,
S2646E, S3246E, S4046E, S4550E**

EN 9823/2400



SERVICE MANUAL
Volume 2

**S1530E, S1930E, S2032E, S2632E,
S2646E, S3246E, S4046E, S4550E**

EN 9823/2400



SERVICE MANUAL
Volume 3

**S1530E, S1930E, S2032E, S2632E,
S2646E, S3246E, S4046E, S4550E**

EN 9823/2400



SERVICE MANUAL
Volume 4

**S1530E, S1930E, S2032E, S2632E,
S2646E, S3246E, S4046E, S4550E**

EN 9823/2400



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



01 - Machine

Contents	Page No.
Acronyms Glossary	01-2
01-03 Safety	
01-03-03 Safety - Yours and Others	01-3
01-03-06 Safety Warnings	01-4
01-03-09 General Safety	01-5
01-03-12 Maintenance Safety	01-6
01-03-18 Operating Safety	01-7
01-03-21 Worksite Safety	01-9
01-03-24 Risk Assessment	01-10
01-03-27 Maintenance Positions	01-11
01-06 About this Manual	
01-06-03 Model and Serial Number	01-15
01-06-06 Using the Manual	01-16
01-09 Description	
01-09-12 Main Component Locations	01-19
01-09-15 Service Point Locations	01-22
01-12 Operation	
01-12-00 General	01-29
01-27 Lifting	
01-27-00 General	01-53
01-33 Cleaning	
01-33-00 General	01-57
01-48 Specifications	
01-48-09 Static Dimensions	01-61
01-48-10 Weights	01-64
01-48-12 Lift Arm Dimensions and Performance	01-67



Acronyms Glossary

AC	Alternating Current
DC	Direct Current
ECU	Electronic Control Unit
LED	Light Emitting Diode
PIL	Parts Identification List
PPE	Personal Protective Equipment

03 - Safety

Contents	Page No.
01-03-03 Safety - Yours and Others	01-3
01-03-06 Safety Warnings	01-4
01-03-09 General Safety	01-5
01-03-12 Maintenance Safety	01-6
01-03-18 Operating Safety	01-7
01-03-21 Worksite Safety	01-9
01-03-24 Risk Assessment	01-10
01-03-27 Maintenance Positions	01-11



Notes:

03 - Safety - Yours and Others

Introduction

All machinery can be hazardous. When a machine is correctly operated and maintained, it is a safe machine to work with. When it is carelessly operated or poorly maintained it can become a danger to you (the operator) and others.

In this manual and on the machine you will find warning messages, you must read and understand them. They inform you of potential hazards and how to avoid them. If you do not fully understand the warning messages, ask your employer or JCB dealer to explain them.

Safety is not just a matter of responding to the warnings. All the time you are working on or with the machine you must be thinking of what hazards there might be and how to avoid them.

Do not work with the machine until you are sure that you can control it.

Do not start any work until you are sure that you and those around you will be safe.

If you are not sure of anything, about the machine or the work, ask someone who knows. Do not assume anything.

Remember:

- Be careful.
- Be alert.
- Be safe.

06 - Safety Warnings

Introduction

In this manual there are safety notices. Each notice starts with a signal word. The signal word meanings are given below.

The signal word 'DANGER' indicates a hazardous situation which, if not avoided, will result in death or serious injury.

The signal word 'WARNING' indicates a hazardous situation which, if not avoided, could result in death or serious injury.

The signal word 'CAUTION' indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The signal word 'Notice' indicates a hazardous situation which, if not avoided, could result in machine damage.

The safety alert system symbol (shown) also helps to identify important safety messages in this manual. When you see this symbol your safety is involved, carefully read the message that follows.

Figure 1. The safety alert system symbol



09 - General Safety

Introduction

Training

To operate the machine safely you must know the machine and have the skill to use it. You must abide by all relevant laws, health and safety regulations that apply to the country you are operating in. The operator's manual instructs you on the machine, its controls and its safe operation; it is not a training manual. Ensure that you receive the correct training before operating any machinery. Failing to do so will result in incorrect operation of the machine and you will be putting yourself and others at risk. In some markets, and for work on certain jobsites, you may be required to have been trained and assessed in accordance with an operator competence scheme. Make sure that you and your machine comply with relevant local laws and jobsite requirements – it is your responsibility.

Care and Alertness

All the time you are working with or on the machine, take care and stay alert. Always be careful. Always be alert for hazards.

Clothing

You can be injured if you do not wear the correct clothing. Loose clothing can get caught in the machinery. Keep cuffs fastened. Do not wear a necktie or scarf. Keep long hair restrained. Remove rings, watches and personal jewellery.

Alcohol and Drugs

It is extremely dangerous to operate machinery when under the influence of alcohol or drugs. Do not consume alcoholic drinks or take drugs before or while operating the machine or attachments. Be aware of medicines which can cause drowsiness.

Feeling Unwell

Do not attempt to operate the machine if you are feeling unwell. By doing so you could be a danger to yourself and those you work with.

Mobile Phones

Switch off your mobile phone before entering an area with a potentially explosive atmosphere. Sparks in such an area could cause an explosion or fire resulting in death or serious injury.

Lifting Equipment

You can be injured if you use incorrect or faulty lifting equipment. You must identify the weight of the item to be lifted then choose lifting equipment that is strong enough and suitable for the job. Make sure that lifting equipment is in good condition and complies with all local regulations.

Raised Machine

Never position yourself or any part of your body inside the raised scissor pack which is not correctly supported. If the machine moves unexpectedly you could become trapped and suffer serious injury or be killed.

Lightning

Lightning can kill you. Do not use the machine if there is lightning in your area.

Machine Modifications

This machine is manufactured in compliance with prevailing legislative requirements. It must not be altered in any way which could affect or invalidate its compliance. For advice consult your JCB dealer.

12 - Maintenance Safety

Introduction

Raised Machine

Never position yourself or any part of your body inside the raised scissor pack which is not correctly supported. If the machine moves unexpectedly you could become trapped and suffer serious injury or be killed.

Compressed Air

Compressed air is dangerous. Wear personal protective equipment. Never point a compressed air jet at yourself or others.

Springs

Always wear personal protective equipment when dismantling assemblies containing components under pressure from springs. This will protect against eye injury from components accidentally flying out.

Metal Splinters

You can be injured by flying metal splinters when driving metal pins in or out. Use a soft faced hammer or copper drift to remove and install metal pins. Always wear personal protective equipment.

Repairs

If your machine does not function correctly in any way, get it repaired straight away. Neglect of necessary repairs could result in an accident or affect your health. Do not try to do repairs or any other type of maintenance work you do not understand. To avoid injury and/or damage get the work done by a specialist engineer.

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before connecting or removing any hydraulic hose, residual hydraulic pressure trapped in the service hose line must be vented. Make sure the hose service line has been vented before connecting or removing hoses. Make sure the machine cannot be started while the hoses are open.

'O' rings, Seals and Gaskets

Badly installed, damaged or rotted 'O' rings, seals and gaskets can cause leakages and possible accidents. Renew whenever disturbed unless otherwise instructed. Do not use Trichloroethane or paint thinners near 'O' rings and seals.

Soft Ground

A machine can sink into soft ground. Never work under a machine on soft ground.

Working Under the Machine

Make the machine safe. Make sure the park brake is engaged and machine is fully isolated. Remove the machine key switch, disconnect the battery. Use blocks to prevent unintentional movement of the wheels.

Hydraulic Hoses

Never re-use hydraulic hose end crimps or use reusable hose end crimps.

Personal Protective Equipment

Use the appropriate personal protective equipment before performing maintenance on the machine, otherwise you could be injured.

Working at Height

Use appropriate access equipment such as ladders or a working platform if it is necessary to work at height to perform maintenance tasks on the machine. If you do not use suitable access equipment there is a risk of falling, resulting in personal injury or death.

18 - Operating Safety

Introduction

Training

Make sure that you have had adequate training and that you are confident in your ability to operate the machine safely before you use it. Practice using the machine and its attachments until you are completely familiar with the controls and what they do. Where applicable you may be required to show competency to a national certification scheme. Ensure you comply with local legislation and jobsite rules. With a careful, well trained and experienced operator, your machine is a safe and efficient machine. With an inexperienced or careless operator, it can be dangerous. Do not put your life, or the lives of others, at risk by using the machine irresponsibly. Before you start to work, tell your colleagues what you will be doing and where you will be working. On a busy site, use a signalman.

Before doing any job not covered in this manual, find out the correct procedure. Your local JCB distributor will be glad to advise you.

Machine Condition

A defective machine can injure you or others. Do not operate a machine which is defective or has missing parts. Make sure the maintenance procedures in this manual are completed before using the machine.

Machine Limits

Operating the machine beyond its design limits can damage the machine, it can also be dangerous. Do not operate the machine outside its limits. Do not try to upgrade the machine performance with unapproved modifications or additional equipment.

Communications

Bad communications can cause accidents. Keep people around you informed of what you will be doing. If you will be working with other people, make sure any hand signals that may be used are understood by everybody. Worksites can be noisy, do not rely on spoken commands.

You must stop the machine operation, isolate the controls and turn off the machine when persons are required to interact with it.

Parking

An incorrectly parked machine can move without an operator. Follow the instructions in the Operator's Manual to park the machine correctly.

Banks and Trenches

Banked material and trenches can collapse. Do not work or drive too close to banks and trenches where there is danger of collapse.

Safety Barriers

Unguarded machines in public places can be dangerous. In public places, or where your visibility is reduced, place barriers around the work area to keep people away.

Sparks

Explosions and fire can be caused by sparks from the electrical system. Do not use the machine in closed areas where there is flammable material, vapour or dust.

Regulations

Obey all laws, worksite and local regulations which affect you and your machine.

Electrical Power Cables

You could be electrocuted or badly burned if you get the machine or its attachments too close to electrical power cables.

You are strongly advised to make sure that the safety arrangements on site comply with the local laws and regulations concerning work near electric power lines.

Before you start using the machine, check with your electricity supplier if there are any buried power cables on the site.

There is a minimum clearance required for working beneath overhead power cables. You must obtain details from your local electricity supplier.

Machine Safety

Stop work at once if a fault develops. Abnormal sounds and smells can be signs of trouble. Examine and repair before resuming work.

Travelling at High Speeds

Travelling at high speeds can cause accidents. Always travel at a safe speed to suit working conditions.

Travelling at Height

If it is not part of the work task, lower the platform before travelling. Only travel at height if it is necessary and the travel area has been inspected.

Confined Areas

Pay extra attention to proximity hazards when operating in confined areas. Proximity hazards include buildings, traffic and bystanders.

Safe Working Loads

Overloading the machine can damage it and make it unstable. Study the specifications in the Operator's Manual before using the machine.

Lightning

If there is lightning, stay away from the machine and do not use the machine. If you are on the machine, exit the machine and get to safety. Do not attempt to mount or enter the machine.

If the machine is struck by lightning do not use the machine until it has been checked for damage and malfunction by trained personnel.

Tools and Objects

Do not cover the platform sides or carry objects with a large surface area when operating outdoors.

21 - Worksite Safety

Introduction

"Workplace Inspection" will help operators to determine whether the workplace is suitable for operation. Operators must inspect the workplace before they move machines there. It is the operator's responsibility to understand and keep in mind the hazards in the workplace. He/she shall pay attention and avoid these problems when move, install and operate the machine. Check for hazards such as but not limited to:

- Drop-offs, or potholes including those concealed by water mud, etc.
- Slopes.
- Bumps and floor obstructions.
- Debris.
- Over head obstructions and electrical conductors.
- Hazardous locations and atmospheres.
- Inadequate surface and support to withstand all load forces imposed by the platform in all operating configurations.
- Wind and weather conditions.
- Presence of unauthorized persons.
- Other possible unsafe conditions.
- Underground utilities and pipes.
- Overhanging objects, tree branches.

24 - Risk Assessment

Introduction

It is the responsibility of the competent people that plan the work and operate the machine to make a judgement about the safe use of the machine, they must take into account the specific application and conditions of use at the time.

It is essential that a risk assessment of the work to be done is completed and that the operator obeys any safety precautions that the assessment identifies.

If you are unsure of the suitability of the machine for a specific task, contact your JCB dealer who will advise you.

The following considerations are intended as suggestions of some of the factors to be taken into account when a risk assessment is made. Other factors may need to be considered.

A good risk assessment depends on the training and experience of the operator. Do not put your life or the lives of others at risk.

Personnel

- Are all persons who will take part in the operation sufficiently trained, experienced and competent? Are they fit and sufficiently rested? A sick or tired operator is a dangerous operator.
- Is supervision needed? Is the supervisor sufficiently trained and experienced?
- As well as the machine operator, are any assistants or lookouts needed?

The Machine

- Is it in good working order?
- Have any reported defects been corrected?
- Have the daily checks been carried out?
- Are the tyres in good condition?
- Is the battery sufficiently charged to complete the job?

Working Area

- Is it level?
- Is the ground solid? Will it support the weight of the machine when loaded?
- How rough is the ground? Are there any sharp projections which could cause damage, particularly to the tyres?
- Are there any obstacles or hazards in the area, for example, debris, excavations, manhole covers, power lines?
- Is the space sufficient for safe manoeuvring?

- Are any other machines or persons likely to be in or to enter the area while operations are in progress?

The Route to be Travelled

- How solid is the ground, will it provide sufficient traction and braking? Soft ground will affect the stability of the machine and this must be taken into account.
- How steep are any slopes, up/down/across? A cross slope is particularly hazardous, is it possible to detour to avoid them?

Weather

- How windy is it? High wind will adversely affect the stability of a loaded machine.
- Is it raining or is rain likely? The ground that was solid and smooth when dry will become uneven and slippery when wet, and it will not give the same conditions for traction, steering or braking.

Emergency Plan

Make sure that emergency rescue plan is in place and understood by those involved, it is important to make sure that those involved in the rescue plan are aware of the location of the lowering controls and how to operating the machine from platform controller at height.

27 - Maintenance Positions

Introduction

Make the machine safe before you start a maintenance procedure.

1. Park the machine on level, solid (slabbed/paved) ground.
2. Remove the machine key switch.
[Refer to: PIL 33-03.](#)
3. Disconnect the battery to prevent accidental operation.
4. Put wheel chocks on the front or rear side of all wheels.

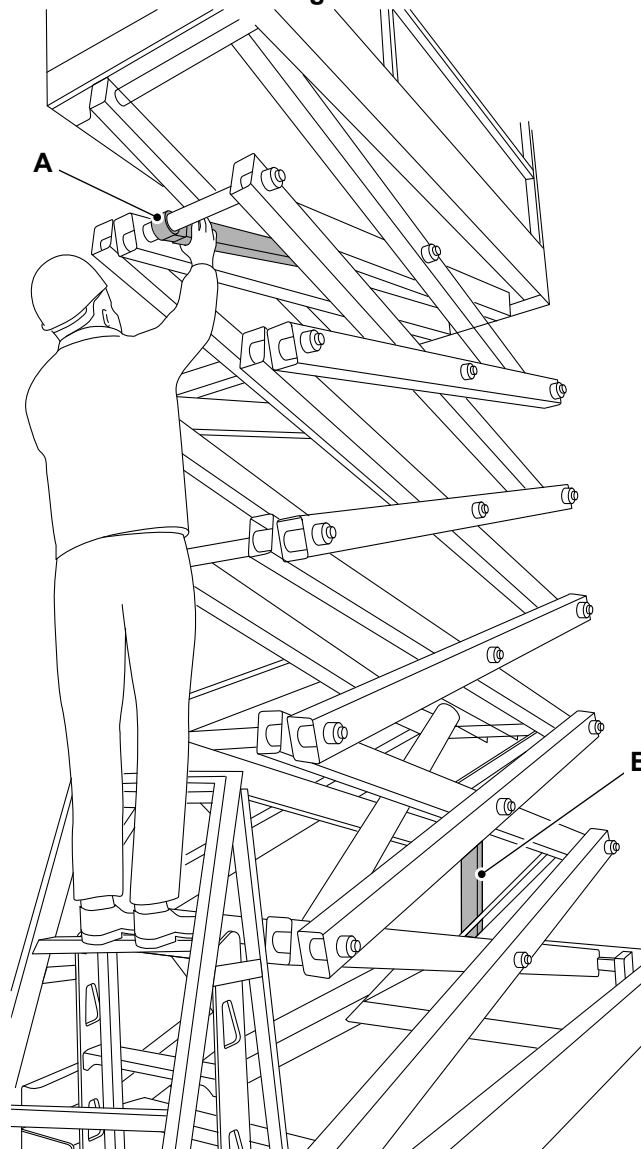
Maintenance Position- Platform Raised

▲ WARNING If a second person is involved with the operation ensure that the machine controls are not operated whilst they are in the working envelope of the machine and attachment, otherwise the other person could be killed or injured if a control is moved accidentally.

Make sure that the safety strut is installed before performing any maintenance task on a raised platform.

When installing the upper safety strut always maintain three points of contact with the ladder and scissor end bars. Use the scissor end bars as handrails.

Figure 2.



A Upper safety strut

B Lower safety strut

The minimum clearance height required to install the safety struts is shown. Refer to Table 1.

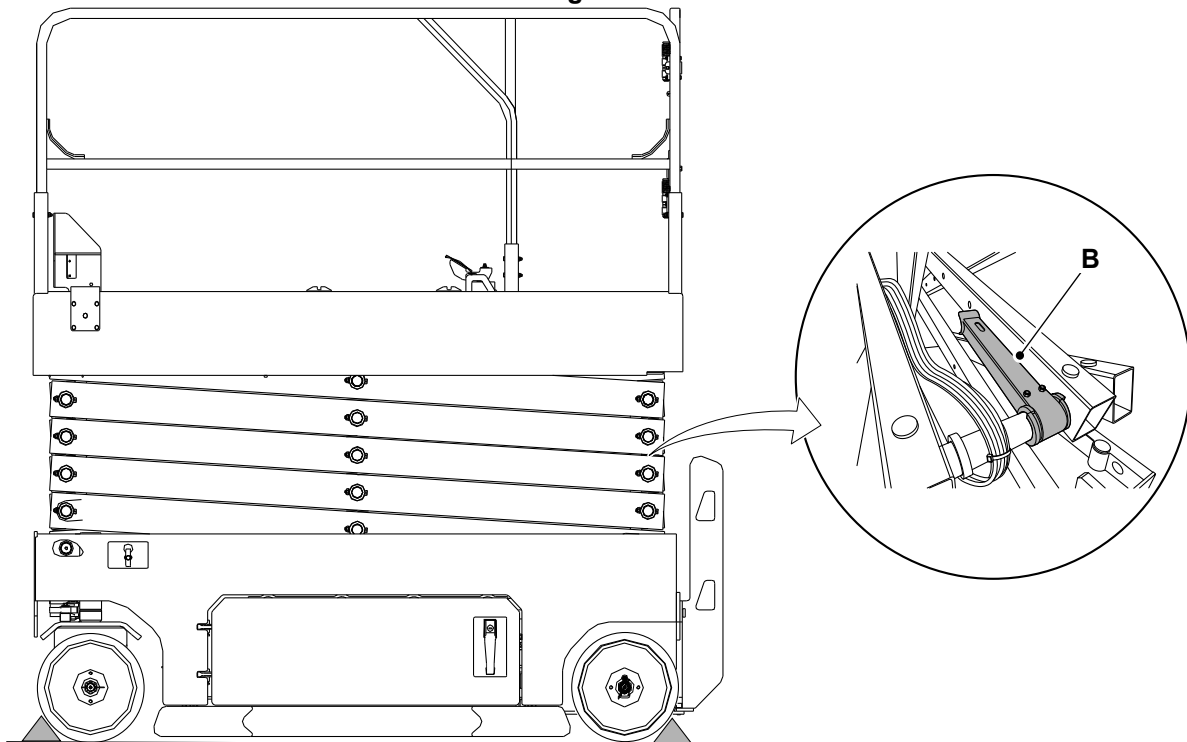
Table 1.

Machine	Length
S1530E	3.25m
S1930E	3.61m
S2032E	3.3m
S2632E	3.75m
S2646E	3.75m
S3246E	4.2m
S4046E	4.6m
S4550E	4.6m

Maintenance Position- Platform Lowered

Make sure that the safety strut is in stored position before lowering the platform.

Figure 3.



B Safety struts stowage position



06 - About this Manual

Contents	Page No.
01-06-03 Model and Serial Number	01-15
01-06-06 Using the Manual	01-16

03 - Model and Serial Number

Introduction

This manual provides information for the following model(s) in the JCB machine range:

Table 2.

Model	VIN Prefix. Refer to: PIL 06-63-03.
S1530E	RAJA0001
S1930E	RAJA0101
S2032E	RAJA0202
S2632E	RAJA0402
S2646E	RAJA0502
S3246E	RAJA0603
S4046E	RAJA0713
S4550E	RAJA0814

06 - Using the Manual

Introduction

Information in this manual conforms to a standard JCB service manual format. The format uses section headings taken from a PIL (Parts Identification

List). These headings are assigned numerical identification references.

Table 3.

Example	Section	Main Assembly / Heading	Component / Sub-heading
PIL reference	33	03	03
Heading	Electrical System	Battery	Isolator Switch

Information within each PIL reference is included under a set of standard headings such as Introduction, Health and Safety, Technical Data and Operation for example. Where additional relevant

information is contained within another PIL reference a cross reference is provided.

The main systems information is contained in the manual as follows.

Table 4.

System	PIL Reference	Heading
Hydraulic System	PIL 30-00-50	Schematic Circuit
Electrical System	PIL 33-03-03	Battery - Isolator Switch
	PIL 33-09-00	Power Distribution (including fuses and relays)
	PIL 33-00-50	Schematic Circuit
Electronic Diagnostic	PIL 33-57-00	Electronic Diagnostic (including Servicemaster)

Machine Variants

Where information is different depending on machine variant, the applicable information sets are included within the same PIL reference. Headings are included to identify which information is for which variant. Make sure you use the correct information.

Routine Maintenance

A dedicated section for routine maintenance procedures is not included. Instead, procedures are included in the relevant PIL headings. For example, procedures for the engine oil filter are given in Engine, Oil Filter (PIL 15-21).

Routine maintenance must be carried out in accordance with the applicable maintenance schedule. [Refer to: PIL 78-24.](#)

Diagnostics

Information in this manual can help you diagnose machine faults.

Before attempting to diagnose possible faults check the following.

- Make sure that the operator understands the machine controls, functions and use. Refer to the applicable Operator Manual.
- Check that the maintenance record complies with the applicable schedule for the operating environment.
- Check that the fluids in use comply with the standards specified.
- Make sure that the machine electronic set-up is applicable. Use the applicable Servicemaster vehicle set-up tool.
- Use the applicable Servicemaster diagnostics tools.

Remove and Install

Before removal of components or assemblies, clean the applicable parts of the machine. After removal cap open ports and hoses to prevent contamination. [Refer to: PIL 01-33-00.](#)

Use new sealing elements such as gaskets and O-rings.

Do not install defective components or assemblies. if necessary replace them with new ones.

Dismantle and Assemble

Before dismantling an assembly clean it.

After dismantling, clean the individual components and check them for wear and defects. If necessary replace them with new ones.

During assembly use new sealing elements such as gaskets and O-rings.

Torque Tightening

When you replace components, always tighten the applicable fixings to the correct torque value. Use the torque tightening values contained in the individual procedures (Remove and Install, Disassemble and Assemble etc.). If no torque values are specified, use the standard torque tightening values. For the torque setting to be effective, do the following before you install the fixings. [Refer to: PIL 72-00-00.](#)

- Make sure that all the applicable component assemblies are correct.
- Make sure that the applicable fixings are to the correct specification. If necessary discard the original fixings and replace them with new ones. The relevant procedures indicate when this is necessary.
- Make sure that the applicable fixings and threaded holes are free from contamination. This includes dirt, debris, old sealants and compounds, fluids and lubricants.

Consumable Products

Some procedures require the use of consumable products such as lubricants, sealants, adhesives and locking fluids. Use the correct products. Where products are available from JCB the applicable part numbers are given in the procedures. A complete list of consumable products available from JCB is given in this manual. [Refer to: PIL 75-00.](#)

After Sales

Some procedures require the use of equipment such as special tools and PPE (Personal Protective Equipment). Where special tools are available from JCB the applicable part numbers are given in the procedures. Full details about the applicable special tools are given in this manual. Refer to (PIL 78-00).

Use the correct PPE to comply with local and employer regulations.



Contents

01-09-12 Main Component Locations	01-19
01-09-15 Service Point Locations	01-22

12 - Main Component Locations

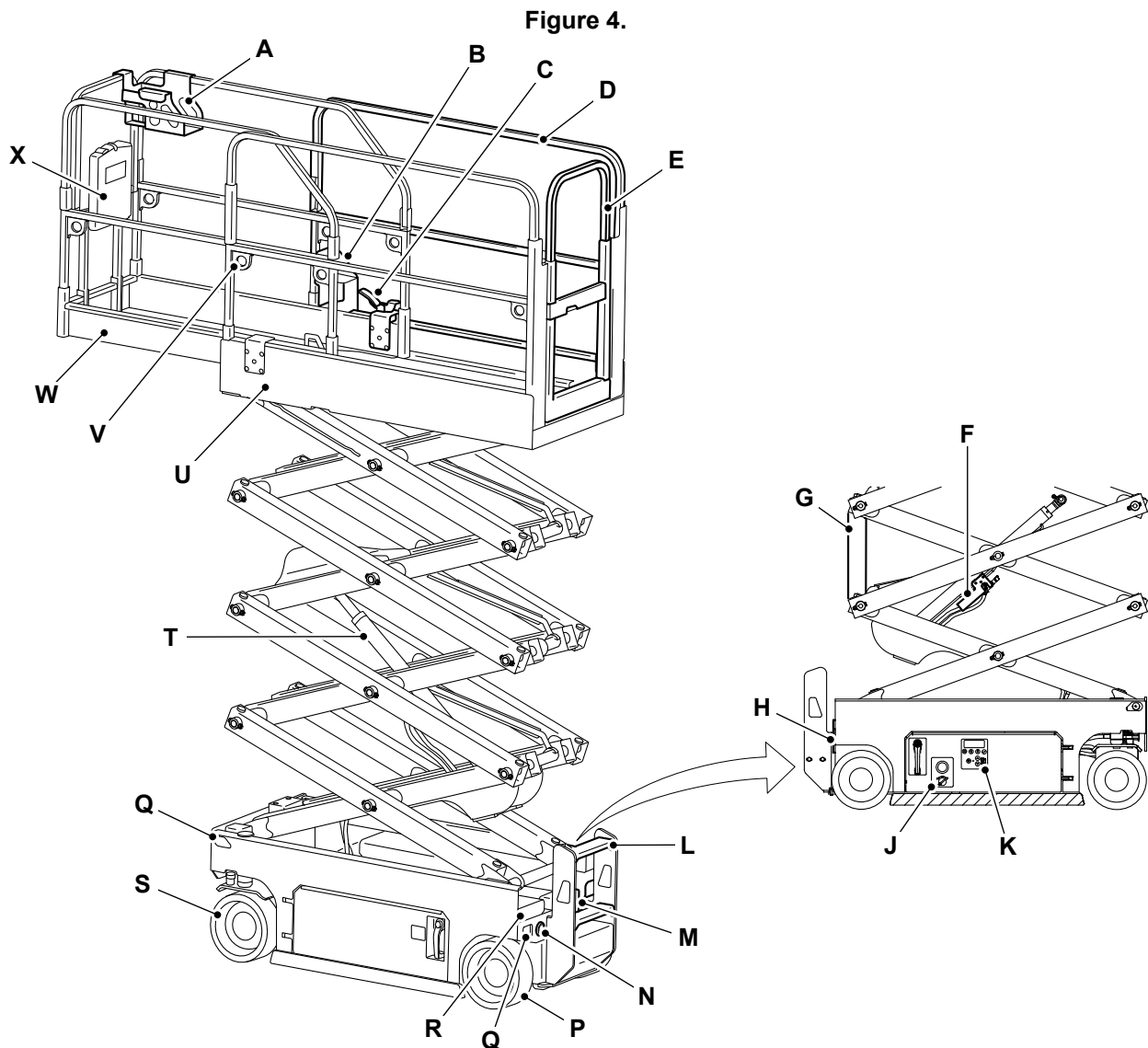
Introduction

For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ]
..... Page 01-19

For: S3246E [RAJ], S4046E [RAJ], S4550E [RAJ]
..... Page 01-20

(For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ])

The illustration shows the typical machine. Number of scissor packs on your machine may be different.



A Platform controller

B AC (Alternating Current) Power socket (option)

C Extension platform pedal
E Gate
G Safety strut
J Switch panel, key switch and emergency stop
L Ladder

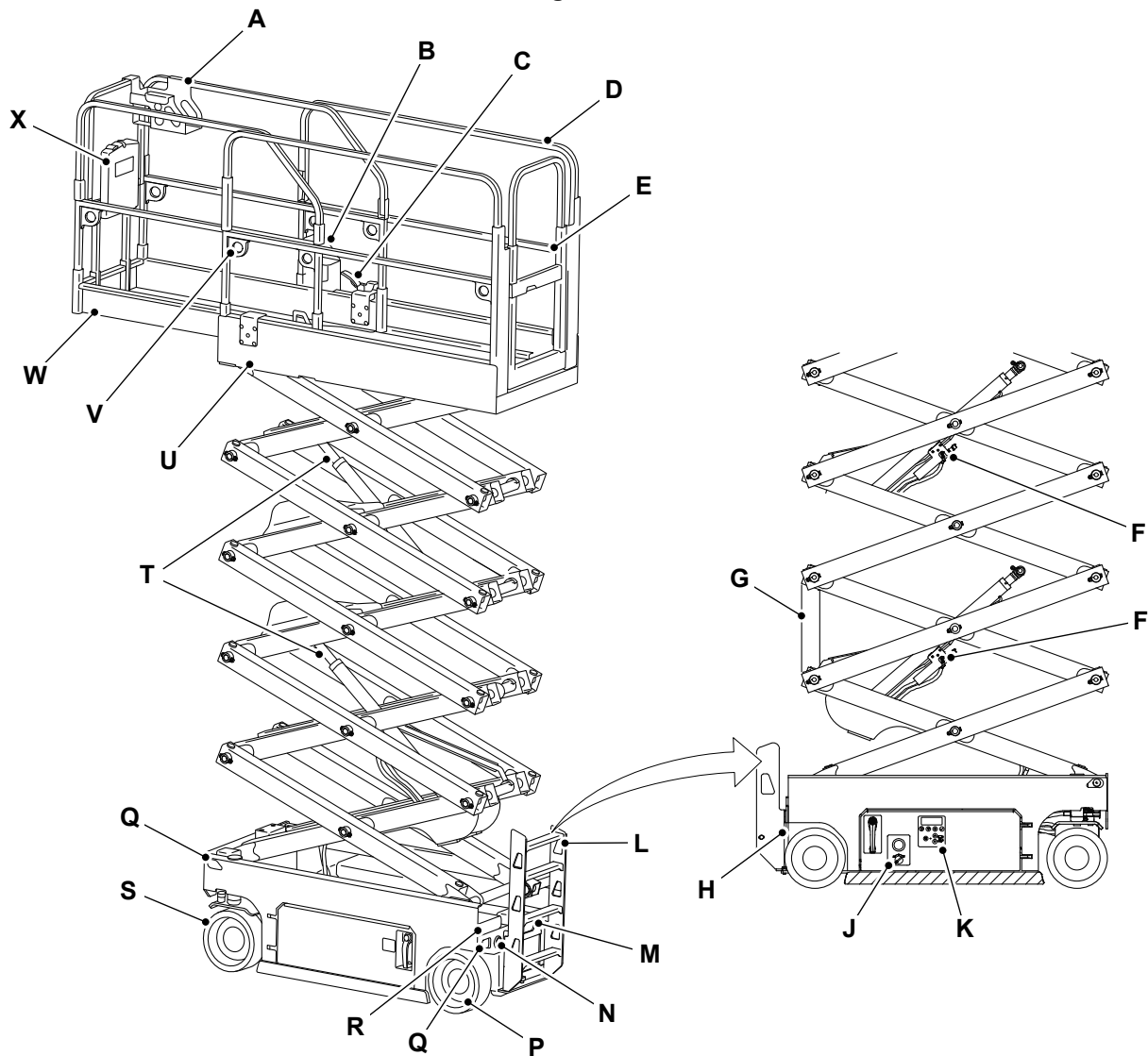
N Charging plug
Q Lifting/ tie-down point
S Front wheel (steering)
U Main platform
W Platform extension

D Guardrail
F Lift control valve
H Power to platform plug
K Ground controller
M Manual release valve and emergency lowering handle
P Rear wheel (braking)
R Forklift position
T Lift ram
V Safety harness fastening point
X Operator manual holder

(For: S3246E [RAJ], S4046E [RAJ], S4550E [RAJ])

The illustration shows the typical machine. Number of scissor packs on your machine may be different.

Figure 5.



A Platform controller
C Extension platform pedal

B AC Power socket (option)
D Guardrail



E Gate
G Safety strut
J Switch panel, key switch and emergency stop
L Ladder

N Charging plug
Q Lifting/ tie-down point
S Front wheel (steering)
U Main platform
W Platform extension

F Lift control valve
H Power to platform plug
K Ground controller
M Manual release valve and emergency lowering handle
P Rear wheel (braking)
R Forklift position
T Lift ram
V Safety harness fastening point
X Operator manual holder

15 - Service Point Locations

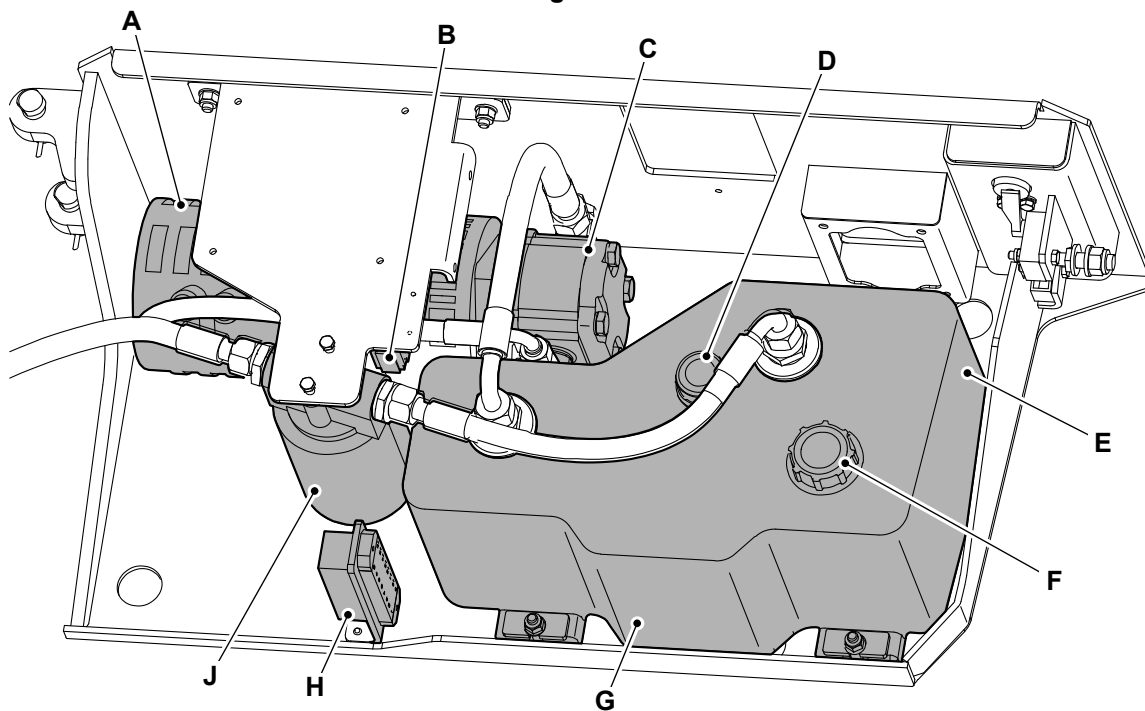
Introduction

For: S1530E [RAJ], S1930E [RAJ]
..... Page 01-22
For: S2032E [RAJ], S2632E [RAJ], S2646E
[RAJ], S3246E [RAJ], S4046E [RAJ]
..... Page 01-23
For: S4550E [RAJ] Page 01-26

(For: S1530E [RAJ], S1930E [RAJ])

Hydraulic Compartment

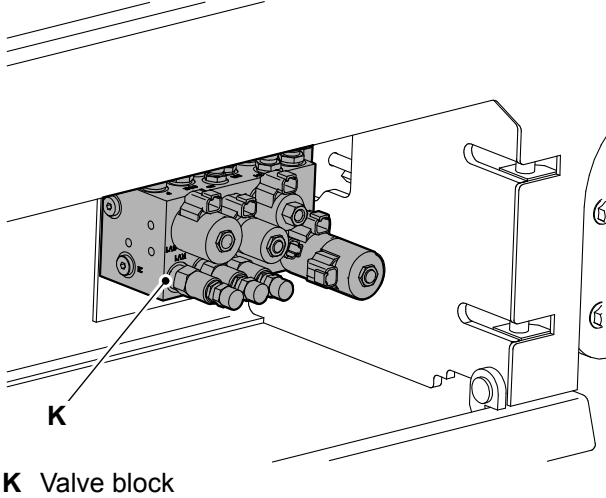
Figure 6.



- | | |
|-----------------------------------|-------------------------------|
| A Motor | B Relay |
| C Gear pump | D Hydraulic breather |
| E Hydraulic oil filler cap | F Hydraulic tank |
| G Fuse | H Hydraulic oil filter |

Hydraulic valve block is placed inside the chassis.
Refer to Figure 7.

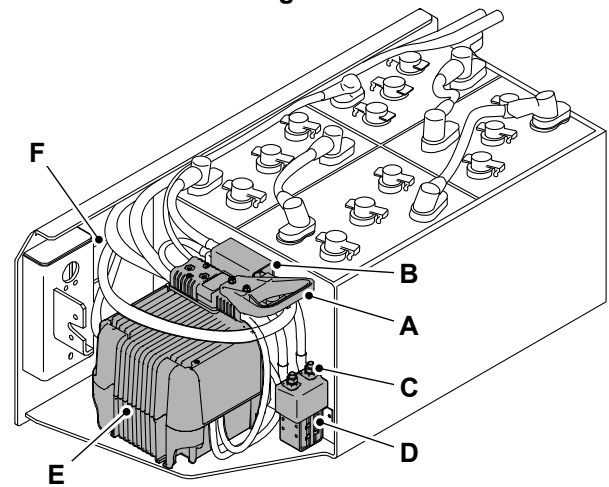
Figure 7.



K Valve block

Battery Compartment

Figure 8.

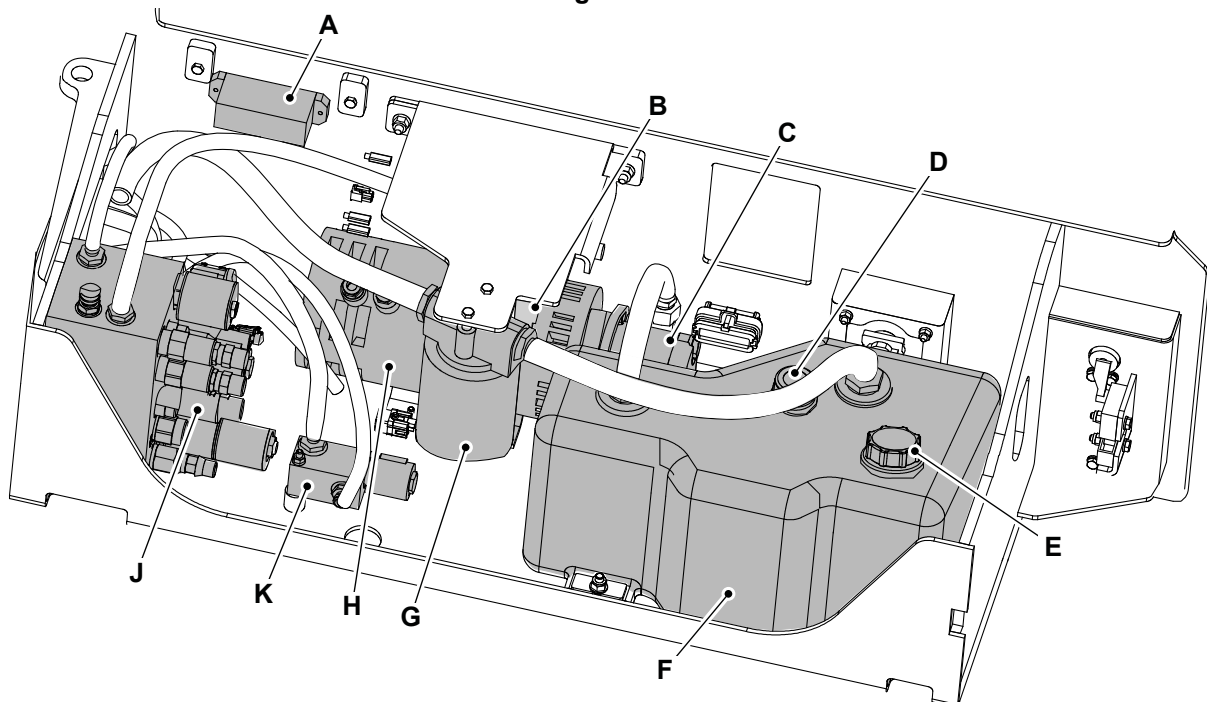


- A** Battery isolator
- B** Primary fuses (275A rating)
- C** DC contactor
- D** DC contactor resistor
- E** Battery charger
- F** Battery charger status sight hole

(For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ])

Hydraulic Compartment

Figure 9.



- A** Fuse
- C** Gear pump

- B** Relay
- D** Hydraulic breather

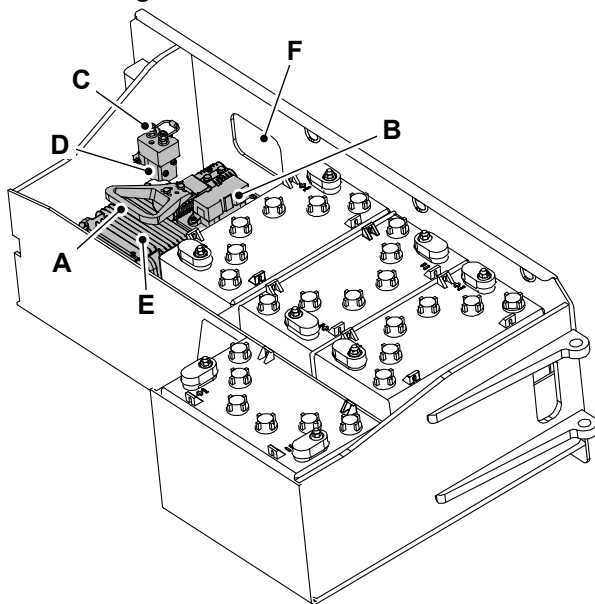


E Hydraulic oil filler cap
G Hydraulic oil filter
J Valve block

F Hydraulic tank
H Motor
K Dump valve

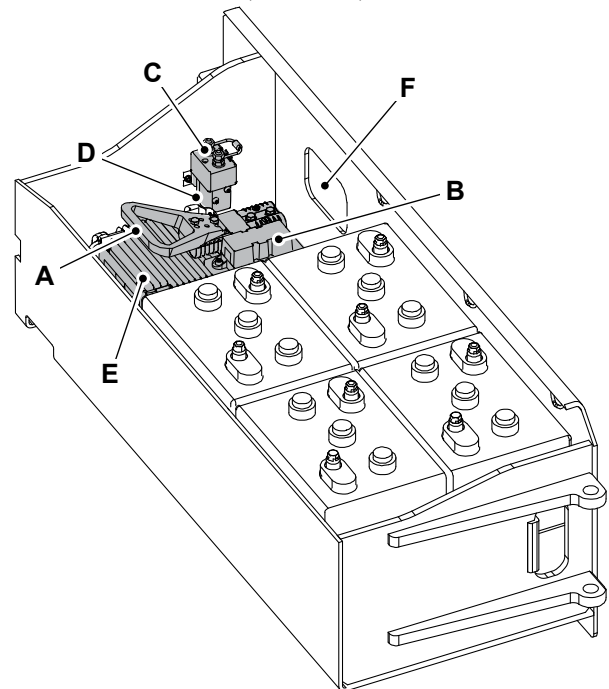
Battery Compartment

Figure 10. For Machine S4046E



- A** Battery isolator
- B** Primary fuses (200A rating)
- C** DC (Direct Current) contactor
- D** DC resistor
- E** Battery charger
- F** Battery charger status sight hole

Figure 11. For Machine S2032E, S2632E, S2646E, S3246E

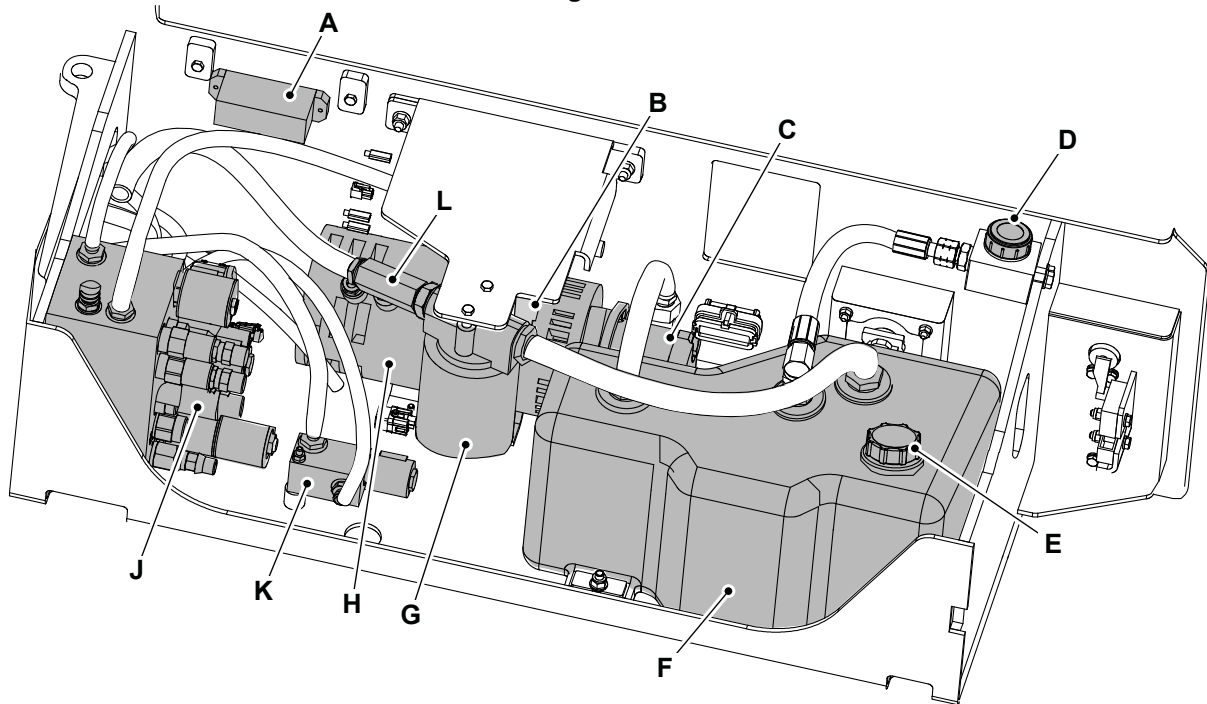


- A** Battery isolator
- B** Primary fuses (200A rating)
- C** DC contactor
- D** DC resistor
- E** Battery charger
- F** Battery charger status sight hole

(For: S4550E [RAJ])

Hydraulic Compartment

Figure 12.

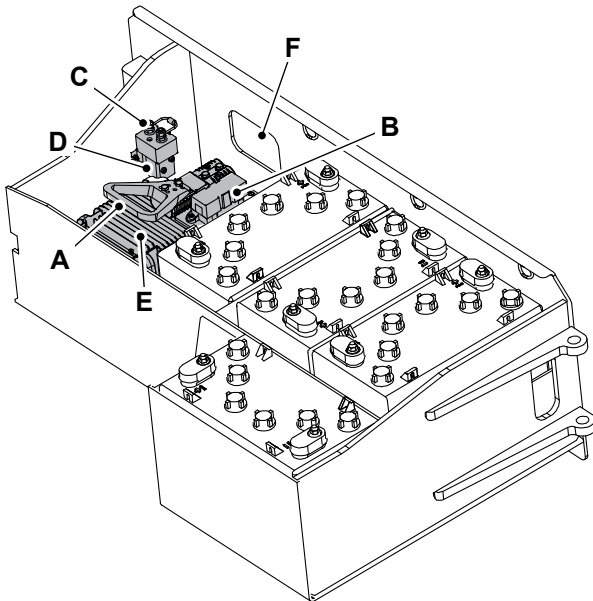


- A Fuse
- C Gear pump
- E Hydraulic oil filler cap
- G Hydraulic oil filter
- J Valve block
- L Check valve

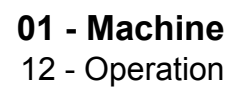
- B Relay
- D Remote breather
- F Hydraulic tank
- H Motor
- K Dump valve

Battery Compartment

Figure 13.



- A Battery isolator
- B Primary fuses (200A rating)
- C DC contactor
- D DC resistor
- E Battery charger
- F Battery charger status sight hole



Contents

01-12-00 General 01-29

00 - General

Health and Safety	01-29
Operation	01-34
Check (Operation)	01-36
Calibrate	01-39

Health and Safety

Trip and Fall Hazards

- Prior to operation, make sure that operator door and all guardrails are fastened and secured in their proper position.
- It is recommended that all persons in the platform wear full body harnesses with a short lanyard attached to an authorised lanyard anchor point while operating this machine. For further information refer to JCB dealer.
- No more than one person should be attached to each harness point.
- Keep both feet firmly on the platform floor at all times. Never position ladders, boxes, steps, planks or other similar items on unit to provide additional reach for any purpose.
- Never use the scissor arm assembly to gain accesses to or leave the platform.
- Keep your footwear and the platform floor clean of oil, mud and slippery substances.

Electrocution Hazards

- This machine is not insulated and does not provide protection from contact or proximity to electrical current.
- Maintain distance from electrical lines, apparatus, or any energized (exposed or insulated) parts according to the Minimum Approach Distance. Refer to Table 5.
- Allow for machine movement and electrical line swaying.
- Maintain a clearance of at least 3m between any part of the machine and its occupants, their tools, and their equipment from any electrical line or apparatus carrying up to 50,000V. One foot additional clearance is required for every additional 30,000V or less.
- The minimum approach distance may be reduced if insulating barriers are installed to prevent contact, and the barriers are rated for the voltage of the line being guarded. These barriers shall not be part of (or attached to) the machine. The minimum approach distance shall be reduced to a distance within the designed working dimensions of the insulating barrier. This determination shall be made by a qualified person in accordance with the employer, local, or governmental requirements for work practices near energized equipment.

Table 5. Minimum Approach Distance

Voltage Range	Minimum Approach Distance
0–50,000V	3m
50,000–200,000V	5m
200,000–350,000V	6m
350,000–500,000V	8m

Voltage Range	Minimum Approach Distance
500,000–750,000V	11m
750,000–1,000,000V	14m

Tipping Hazards

- Make sure that the ground conditions are adequate to support the maximum tyre load indicated on the tyre load decals located on the chassis adjacent to each wheel. Do not travel on unsupported surfaces.
- The user must be familiar with the driving surface before driving. Do not exceed the allowable sideslope and grade while driving.
- Do not raise the platform or drive with platform raised while on or near a sloping, uneven, or soft surface. Make sure that the machine is positioned on the level, solid (slabbed or paved) ground before elevating platform or driving with the platform in the elevated position.
- Before driving on floors, bridges, trucks, and other surfaces, check allowable capacity of the surfaces.
- Never exceed the maximum work load as specified on the platform. Keep all loads within the confines of the platform. Evenly distribute the load across the platform, or the machine could become unstable.
- Do not operate the machine when wind conditions exceed the limit.
- Never attempt to use the machine as a crane. Do not tie-off machine to any adjacent structure. Never attach wire, cable, or any similar item to platform.
- If the platform or scissor pack becomes stuck or snagged on an adjacent or overhead structure, do not try to free the machine until all personnel are removed from the platform.
- Do not push or pull from the platform against any adjacent or overhead structures.
- Do not cover platform sides or carry large surface area items in the platform when operating outdoors. The addition of such items increases the exposed wind area of the machine.
- Do not increase platform size with unauthorised deck extensions or attachments.
- Do not raise the platform with the access apertures open. Keep the access apertures closed whilst the platform is raised.

- Do not raise the platform with access apertures open and operator in the platform. Keep the access apertures closed whilst the platform is raised and operator in the platform.
- If the scissor arm or platform is caught so that one or more wheels are off the ground, all the persons and tools must be removed before attempting to free the machine. Use a crane, forklift truck, or other appropriate equipment to stabilise the machine and remove the personnel.

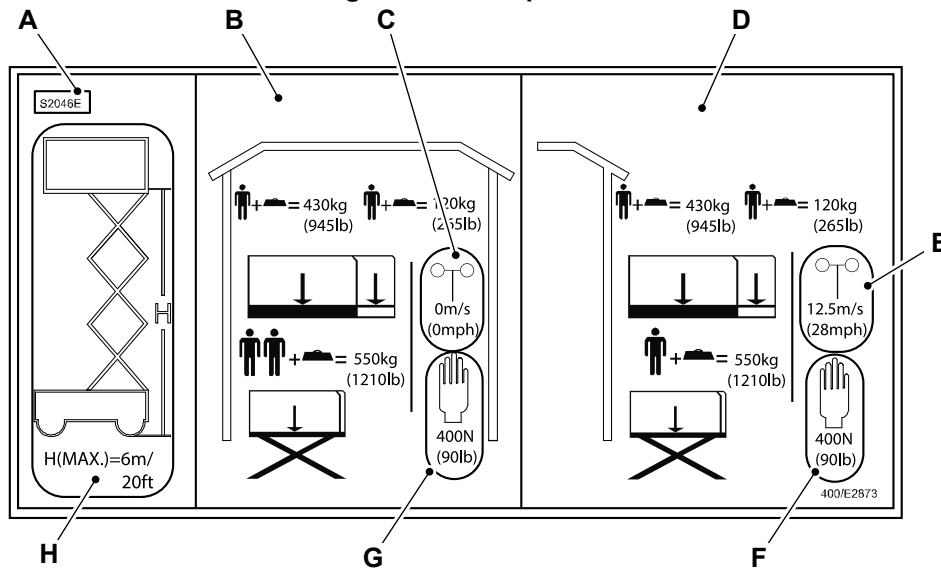
Crushing and Collision Hazards

- Approved head protection must be worn by all operating and ground personnel.
- Keep hand and limbs out of the scissor arm assembly during operation and when raised unless safety strut installed.
- Watch for obstructions around machine and overhead when driving. Check clearance above, to sides, at bottom of machine when lifting or lowering the platform.
- Always post a lookout when driving in areas where vision is obstructed.
- Keep non-operating personnel at least 1.8m away from machine during all operations.
- Under all travel conditions, the operator must limit travel speed according to conditions of ground surface, congestion, visibility, slope, location of personnel, and other factors.
- Be aware of stopping distances in all drive speeds.
- Exercise extreme caution at all times to prevent obstacles from striking or interfering with operating controls and persons in the platform.
- Ensure that operators of other overhead and floor level machines are aware of the aerial work platform's presence. Disconnect power to overhead cranes. Barricade floor area if necessary.
- Do not operate over ground personnel. Warn personnel not to work, stand, or walk under a raised platform. Position barricades on floor as necessary.

Platform Information Decals

The decals are located at the backboard of the platform.

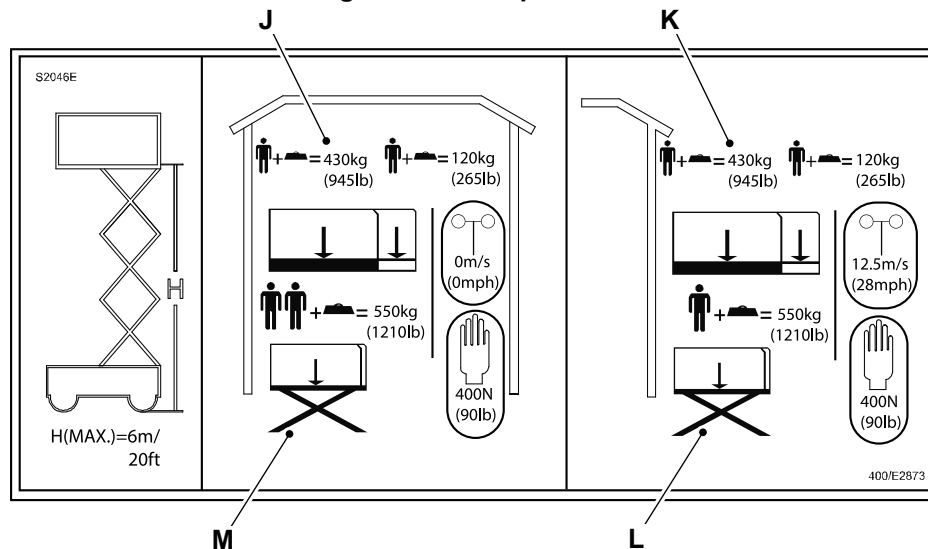
Figure 14. Example Decal



- A** Machine model
C Maximum wind speed
E Maximum wind speed
G Maximum manual force

- B** Indoor rating
D Outdoor rating
F Maximum manual force
H Maximum platform height

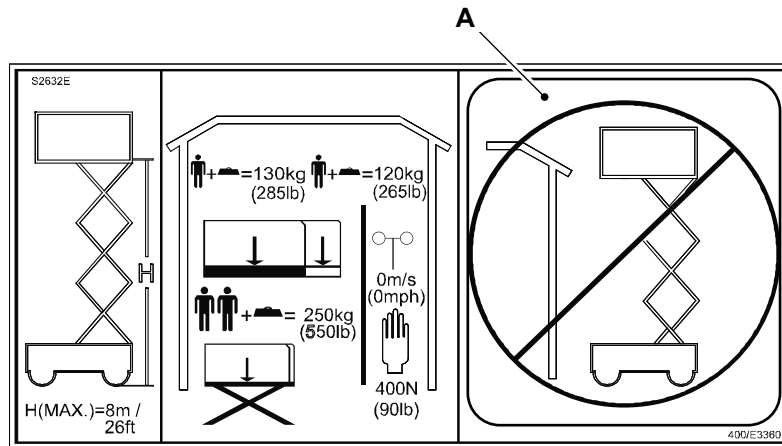
Figure 15. Example Decal



- J** Weight distribution on the extended platform
L Weight distribution on the retracted platform

- K** Weight distribution on the extended platform
M Weight distribution on the retracted platform

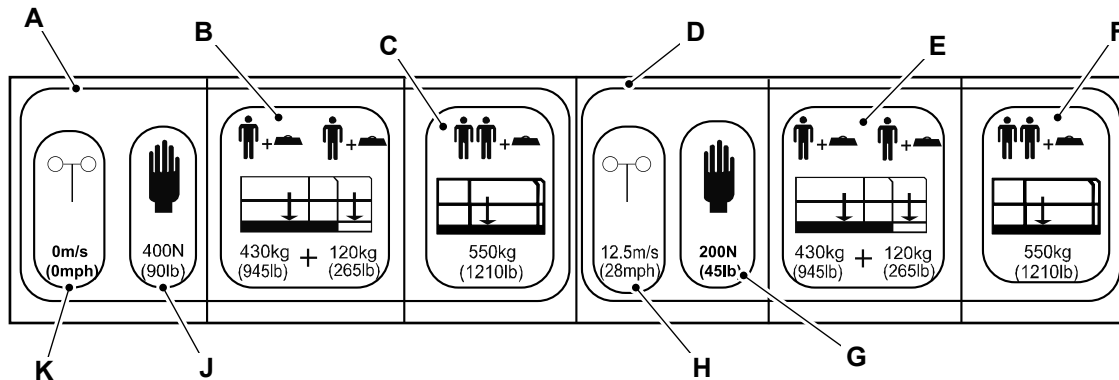
Figure 16. Example Decal



A Not suitable for outdoor use

The decals are located at the entry point of the platform. [Refer to: PIL 01-48-12.](#)

Figure 17. Example Decal



A Indoor rating (at 0m/s wind speed)

C Weight distribution on the retracted platform

E Weight distribution on the extended platform

G Maximum manual force

J Maximum manual force

B Weight distribution on the extended platform

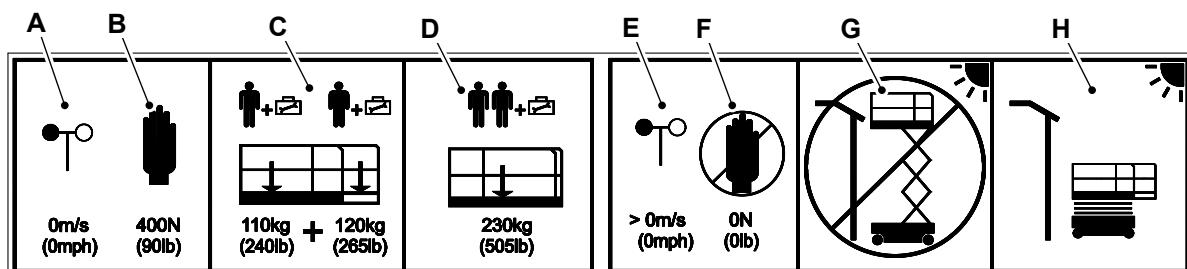
D Outdoor Rating (at 12.5m/s wind speed)

F Weight distribution on the retracted platform

H Wind speed

K Wind speed

Figure 18. Example Decal



- | | |
|--|---|
| A Wind speed | B Maximum manual force indoors (with 0m/s wind) |
| C Weight distribution on the extended platform | D Weight distribution on the retracted platform |
| E Wind speed | F Maximum manual force outdoors (with > 0m/s wind) |
| G Raised platform not suitable for outdoor use (with > 0m/s wind) | H Fully lowered platform only may be driven outside (with > 0m/s wind) |

Operation

⚠ DANGER Check the brake release valve is returned to its normal extruded position before leaving or operating the machine. Otherwise there is a risk that the machine will roll away.

WARNING Watch for obstructions around machine and overhead when driving. Check clearance above, to sides, at bottom of machine when lifting or lowering the platform.

WARNING Keep hands and arms out of the path of the scissor arms when lowering the platform.

WARNING Do not use the platform controller to release the platform when it is stuck, snagged or caught. In this case, use the ground controller only when there are no persons on the platform.

CAUTION Do not raise platform with the guardrails folded down. The guardrails must be in their upright positions and properly secured when raising the platform.

Battery Management System

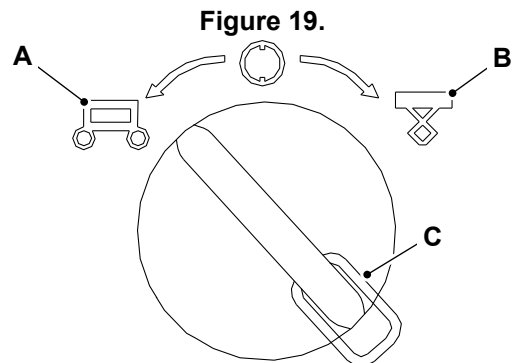
Machines equipped with lead acid batteries have a battery management system which will protect the batteries from damage due to adverse operating conditions. In the event of batteries being discharged to the safe limit the system will disconnect the battery output until the batteries are recharged. In this case, no machine movement will be possible until they are recharged. It is important that the battery charge level is checked on display during operation and the machine is put on to charge when the level reached two bars.

The electric motor will start to cut out when the voltage drops to a level requiring recharge. If the motor cuts out then when safe to do so lower the platform immediately and move the machine to a charging point.

Raising and Lowering the Platform

Operation from the Ground

1. Turn the key switch to chassis control. Refer to Figure 19.



- A** Chassis position
- B** Platform position
- C** Key switch

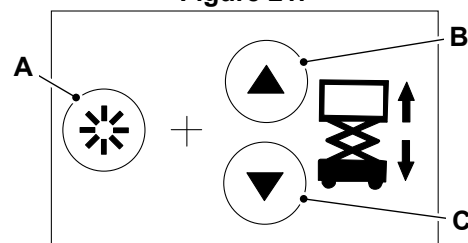
2. Once chassis control mode selected, the platform will blink "CH" on display. Refer to Figure 20.

Figure 20.



3. Make sure the ground and platform emergency stop buttons are pulled out.
4. Before trying to operate any controls, wait until the side lights on the chassis begins to flash. So that the machine can complete its start-up checks.
5. If there are any codes generated on the display. Refer to fault-finding table of this manual before trying to operate the machine.
6. Press and hold the enable and press the up button to raise the platform. Refer to Figure 21.
7. Press and hold the enable and press the down button to lower the platform. Refer to Figure 21.

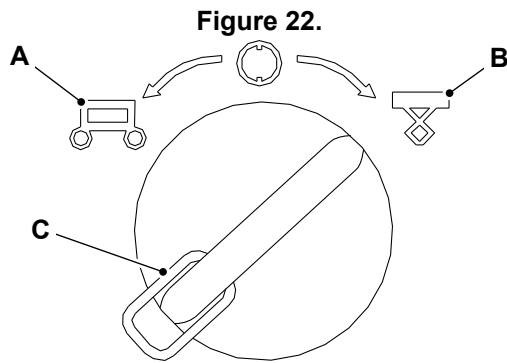
Figure 21.



- A** Enable button
- B** Up button
- C** Down button

Operation from the Platform

1. Turn the key switch to platform control.



- A** Chassis position
B Platform position
C Key switch

2. Make sure the ground and platform emergency stop buttons are pulled out.
3. Before trying to operate any controls, wait until the side lights on the chassis begins to flash. So that the machine can complete its start-up checks.
4. If there are any codes generated on the display. Refer to fault-finding table of this manual before trying to operate the machine.
5. Press the raise/lower mode button on the platform controller. The button should illuminate.
6. Press and hold the enable switch.
7. Move the joystick forwards or backwards. Check the arrow colours on the joystick with the operating direction. Move forwards to lower the platform. Move backwards to raise the platform.
8. When lowering the platform the platform will stop part way down for safety. Release the joystick and check there are no obstructions in the scissors. Move the joystick down again to fully lower the platform. There is an intentional delay periods after the stop and after the joystick is pressed during lowering. This is a standard feature on electric scissor lift machines. Some models may not have this feature as an option. For more details of this feature refer to 'Downward Safety Stop' section.
 - 8.1. Intentional delay periods after the stop.
Duration: 3s
 - 8.2. Intentional delay after the joystick is pressed during lowering.
Duration: 1.5s

Downward Safety Stop

When the platform is being lowered from above the safety stop height, the platform will automatically stop at the safety stop height, approximately 1.2m above

stowed position. Refer to Figure 23. An alarm will sound and lowering will be prevented. To continue lowering, the joystick/switch must be released, and re-activated. Refer to Figure 24. There will be a 3s delay, while the alarm continues, before the machine begins to lower. Continue to hold the joystick/switch during this delay. Refer to Figure 25.

When the platform is within the safety stop height (approximately 1.2m), the safety stop also applies. When the joystick/switch is pressed to lower the platform, there will be a 3s delay, while the alarm continues, before the machine begins to lower. Continue to hold the joystick/switch during this delay. Refer to Figure 25.

Figure 23.

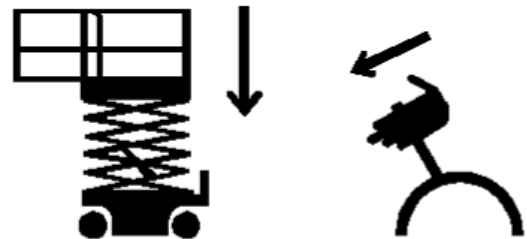


Figure 24. Release

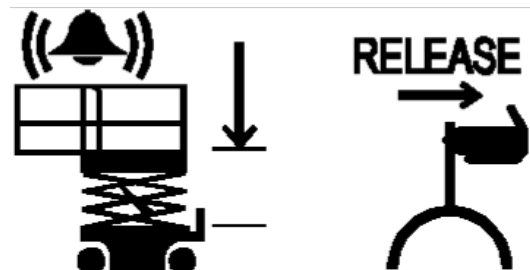
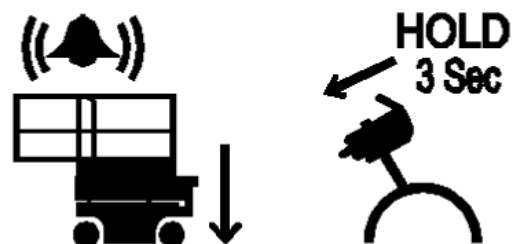


Figure 25. Hold



Operation in Raised Position

The automatic pothole protection system folds down and drive speed is reduced whenever the platform is raised.

Check (Operation)

You must check the machine and platform for correct operation at regular intervals. [Refer to: PIL 78-24-09.](#)

Raising and Lowering Platform

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Park the machine in a solid and even test area free from any obstructions.
3. Pull out the ground emergency stop button to the ON position.
4. Pull out the platform emergency stop button to the ON position.
5. Turn the ignition switch to ground control position.
6. Raise the platform to its maximum height.
7. Make a note of the duration required for raising the platform.
8. Make sure that the duration is within the specified limits.
[Refer to: PIL 01-48-12.](#)
9. Lower the platform to its stowed position.
10. Make a note of the duration required for lowering the platform.
11. Make sure that the duration is within the specified limits.
[Refer to: PIL 01-48-12.](#)

Driving

Make a note of the following.

- The correct drive function is necessary for safe machine operation.
- The drive function must respond quickly and smoothly to operator control.
- The drive performance must be free of hesitation, jerking and unusual noise over the entire proportionally controlled speed range.
- Do this procedure with the machine on a firm, level surface that is free of obstructions.

You must check the platform for correct operation in three different modes as follows.

At fast speed and platform in lowered position

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Put marks on the ground for start and finish lines. Make sure that the distance between the lines is as specified.
Distance: 10m
3. Turn the ignition switch to platform control position.
4. Pull out the ground emergency stop button to the ON position.
5. Pull out the platform emergency stop button to the ON position.
6. Make a note of the point on the machine (contact patch of a tyre) as a visual reference when you cross the test line.
7. Make sure that the low drive speed light is in OFF position.
 - 7.1. If the slow drive speed light is ON, press the drive speed select button to turn OFF the slow drive speed function.
8. Press the drive function button (if installed).
9. Press and hold the drive/steer function enable switch on the control handle.
10. Move the control lever in the forward direction.
11. Bring the machine to top drive speed before you reach the start line.
12. Start the timing when the selected reference point on the machine crosses the start line.
13. Continue at full speed and note the time when your reference point on the machine passes the finish line.
14. Make sure that the values are within the specified limits.
[Refer to: PIL 01-48-12.](#)

At slow speed and platform in lowered position

1. Make the machine safe with platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Put marks on the ground for start and finish lines. Make sure that the distance between the lines is as specified.
Distance: 10m

3. Turn the ignition switch to platform control position.
4. Pull out the ground emergency stop button to the ON position.
5. Pull out the platform emergency stop button to the ON position.
6. Make a note of the point on the machine (contact patch of a tyre) as a visual reference when you cross the test line.
7. Make sure that the low drive speed light is in ON position.
 - 7.1. If the slow drive speed light is OFF, press the drive speed select button to turn ON the slow drive speed function.
8. Press the drive function button (if installed).
9. Press and hold the drive/steer function enable switch on the control handle.
10. Move the control lever in the forward direction.
11. Bring the machine to top drive speed before you reach the start line.
12. Start the timing when the selected reference point on the machine crosses the start line.
13. Continue at full speed and note the time when your reference point on the machine passes the finish line.
14. Make sure that the values are within the specified limits.

[Refer to: PIL 01-48-12.](#)

At platform in raised position

When the platform is raised, the machine automatically goes to the slow speed mode.

1. Make the machine safe.

[Refer to: PIL 01-03-27.](#)
2. Put marks on the ground for start and finish lines. Make sure that the distance between the lines is as specified.

Distance: 10m
3. Turn the ignition switch to platform control position.
4. Pull out the ground emergency stop button to the ON position.
5. Pull out the platform emergency stop button to the ON position.

6. Raise the platform to the specified height above the ground.

Distance: 1.5m
7. Make sure that pothole protection system starts to work.
8. Make a note of the point on the machine (contact patch of a tyre) as a visual reference when you cross the test line.
9. Press the drive function button (if installed).
10. Press and hold the drive/steer function enable switch on the control handle.
11. Move the control lever in the forward direction.
12. Bring the machine to top drive speed before you reach the start line.
13. Start the timing when the selected reference point on the machine crosses the start line.
14. Continue at full speed and note the time when your reference point on the machine passes the finish line.
15. Calculate the speed of the machine.
16. Make sure that the speed is as specified limits.

[Refer to: PIL 01-48-12.](#)

Check Machine for Lateral Operation

1. Drive two side wheels up on to a suitable ramp so that the sideways chassis angle is as specified.

Angle: 1.5°
2. Raise the platform with the ground controller.
3. Make sure that the platform automatically stops when the limit switch is released.
4. If necessary, calibrate the tilt sensor.

[Refer to: PIL 33-84-60.](#)
5. Repeat this procedure for the other side.

Check Machine for Longitudinal Operation

1. Drive two front wheels up on a suitable ramp so that the lengthways chassis angle is as specified.

Angle: 3°
2. Raise the platform with the ground controller.
3. Make sure that the platform automatically stops when the limit switch is released.
4. If necessary, calibrate the tilt sensor.

[Refer to: PIL 33-84-60.](#)

5. Repeat this procedure for the rear side.

Calibrate

Special Tools

Description	Part No.	Qty.
Tilt sensor calibration lead	400/J2673	1

If any component or part is changed on this machine, it is recommended to calibrate full machine in the specified sequence only. Refer to Table 6.

Table 6. Machine Calibration Sequence

Sequence	Check	Description
1	Angle sensor mounting position	Check the angle sensor the value in ECU (Electronic Control Unit) display should change during platform raise or down
2	Tilt Sensor Calibration	As per procedure given below
2.1	Lateral Tilt Test	On 1.6° Ramp
2.2	Longitudinal Tilt Test	On 3° Ramp
3	Lower limit switch	Check the lower limit switch position it should stop for first descent height
3.1	Lower limit switch	Calibration of Lower limit switch in ECU
4	Higher limit switch	Check the higher limit switch position it the motor should stop on maximum limit height
4.1	Upper Limit Switch Check	As per Model specification with +/- 1 inch
5	No Load Calibration	As per procedure given below
5.1	Structural Check - No Load	Raise and lower the platform to full working height 5 cycles with no load in the platform. Visual check for no evidence of structural damage /weakness in the scissor pack and hydraulic cylinder
6	Full Load Calibration	As per SOP with 100% Rated Load
6.1	Full Load Calibration	105% overload test (overload alarm activation)
6.2	Full Load Calibration	95% overload test (overload alarm not activation)
6.3	Structural Check - Full Load	Raise and lower the platform to full working height 5 cycles with full rated load in the platform. Visual check for no evidence of structural damage /weakness in the scissor pack and hydraulic cylinder
6.4	Full Load Calibration_125%	
6.5	Full Load Calibration_110%	
7	Ascent / Descent Speeds	On Elevated with unladen Descent speed unladen Orifice/Restrictor change
8	Descent Delay Height	Check the first descent limit automatically stops the platform descent from height
9	Pot hole protection system	Check the pot hole protection system is deployed as the platform is raised both side
9.1	Pot hole protection system	Pot hole switch check securely mounted
10	Travel Speed	Check and record maximum travel speed in Tortoise, Hare and elevated condition (ex for S1930E above 2.1 mtr) it should be less than 0.8 KMPH [10m distance in not less than 45 seconds (+5 sec - 0 sec)]
10.1	Stopping Distance Test	Only on Hare mode
11	Gradeability Test	Check the machine can drive on 25% ramp

Sequence	Check	Description
11.1	Parking brake Test	Check the parking brake holds the machine on 25% ramp
12	Manual brake release	Check the manual brake release system is fully functional on level ground
13	Manual descent lever	Check the manual descent level is fully functional
14	Hydraulic Leak	Check for any hydraulic oil leaks
15	Clear fault history.	If necessary, delete all fault history.

Angle Sensor Check

Do the following steps to check angle sensor is working correctly.

If load sensing system is not calibrated, disable the overload alarm in ECU.

1. Make the machine safe in stowed position.
[Refer to: PIL 01-03-27.](#)
2. Turn on the machine.
3. Enter the Debug menu.
 - 3.1. Press the back button on ECU for specified duration.
Duration: 5s
4. Press the 'UP' or 'DOWN' button to read the data.
5. Make sure that the display shows some reading depending on the machine model.
6. Raise the platform. Make sure that the display shows the increasing value.
7. Lower the platform. Make sure that the display shows the decreasing value.
8. If the value changes as you lower or raise the platform, the angle sensors are installed and working correctly.

Tilt Sensor Check

Do the following steps to check tilt sensor is working correctly.

If load sensing system is not calibrated, disable the overload alarm in ECU.

1. Important: It is safety critical that the level of the ground is confirmed as flat during this calibration.
2. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
3. When the machine is on level ground (specified angle in each direction), do the following.
Angle: 0°

- 3.1. Connect the tilt sensor calibration lead to the specified power supply.

Voltage: 24V

[Special Tool: Tilt sensor calibration lead \(Qty.: 1\)](#)

- 3.2. Allow the lead to be connected with power supply for the specified duration.

Duration: 3–7s

- 3.3. This sets the zero position.

4. Disconnect the tilt sensor calibration lead from the power source.

- 4.1. The green colour LED (Light Emitting Diode) must blink.

Figure 26.



A Spare cable

Do the following steps to check tilt sensor is qualified on the X-axis.

1. Put the right side machine tyres on blocks so that the machine is at specified angle to the ground.
Angle: 1.6°
2. Put the machine to ground control mode.
3. Raise the platform.
 - 3.1. If the machine stops above the down limit height, the tilt sensor qualifies on X-axis.
4. Put the machine to platform control mode.
 - 4.1. Make sure that the error code 'LL' is displayed and alarm sounds.
5. Do the steps 1 to step 4.1 on the left side.

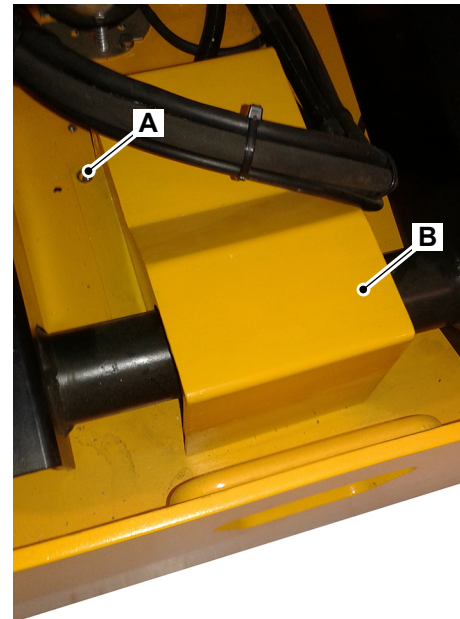
Do the following steps to check tilt sensor is qualified on the Y-axis.

1. Put the front machine tyres on blocks so that the machine is at specified angle to the ground.
Angle: 3.1°
2. Put the machine to ground control mode.
3. Raise the platform.
 - 3.1. If the machine stops above the down limit height, the tilt sensor qualifies on X-axis.
4. Put the machine to platform control mode.
 - 4.1. Make sure that the error code 'LL' is displayed and alarm sounds.
5. Do the steps 1 to step 4.1 on the rear side.

Platform Lower Limit Setting

1. Make the machine safe.
Refer to: [PIL 01-03-27](#).
2. Lower the platform to the stowed position.
3. Make sure that there is no load on the platform.
4. If the downward stop height is set by the angle sensor, reset the safety height to ground position.
5. Raise the platform to above the down limit switch.
6. Lower the platform until the platform stops automatically.
 - 6.1. This should identify the switching position of the down limit switch.
 - 6.2. Remove the screw 1 (x4).
 - 6.3. Remove the bracket to access the platform upper limit switch.

Figure 27.



- A** Screw 1 (x4)
B Bracket

7. Adjust the down limit switch up or down position according to the platform height.
8. Set the down limit switch position as follows.
 - 8.1. If the downward stop height is set by the angle sensor, reset the safety height to ground position.
 - 8.2. Raise the platform to above the switching position of the down limit switch.
 - 8.3. Make sure that the cam is no longer pressing on the switch.
 - 8.4. Lower the platform until the platform stops automatically. This should identify the switching position of the down limit switch.
 - 8.5. Adjust the cam position to increase or decrease the switching position of the down limit switch according to the platform height. Refer to Table 6.
 - 8.6. Reset the downward stop height.
 - 8.7. Do the steps 1 to step 8.5 until the correct lower limit is set.

Table 7. Down Limit Height

Machine Model	Down Limit Height ^(*)
S1530E	1.6–1.8m
S1930E	1.6–1.8m
S2032E	2–2.2m
S2632E	2.2–2.4m
S2646E	2.2–2.4m
S3246E	2.4–2.6m

Machine Model	Down Limit Height ⁽¹⁾
S4046E	2.5–2.7m
S4550E	2.5–2.7m

(1) Make a note that the heights are measured from the ground to the base of the platform.

Down Limit Height Calibration

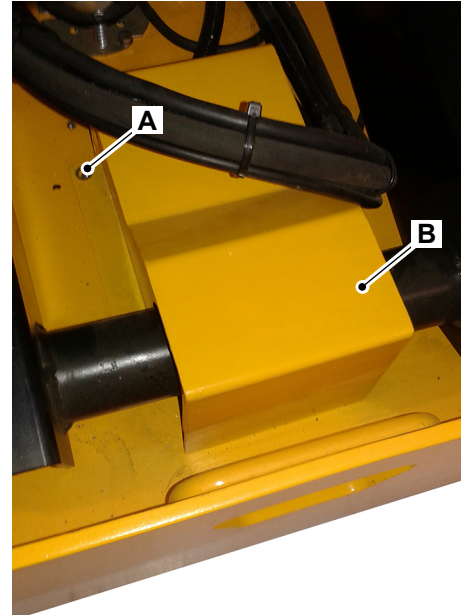
- Make the machine safe in the stowed position.
[Refer to: PIL 01-03-27.](#)
- Enter the Debug menu.
 - Press the back button on ECU for specified duration.
Duration: 5s
- Turn the key to chassis control position.
 - The LCD will display sub-menu of '1.Speed'.
- Press the 'UP' or 'DOWN' button to select 'machine mode'.
- Enter to 'Down Limit H'.
 - The 'O' and 'C' readings will show zero reading.
- Raise the platform with 'UP' button on ECU panel to go through 'Down limit Switch' position.
 - Raise until the down limit switch is no longer pressed by Cam screw. The reading of 'O' should change.
- Lower the platform with 'DOWN' button on ECU panel to go through 'Down limit Switch' position.
 - Lower until the down limit switch is fully released by Cam screw. The reading of 'C' should change.
- Press the back button on ECU for specified duration until the horn sounds to save the values.
Duration: 5s
- After the values are saved, display will be back to 'Machine Mode' menu.

Platform Upper Limit Setting

- Make the machine safe.
[Refer to: PIL 01-03-27.](#)
- Raise the platform to full extension of the lift cylinder or until the up limit switch stops the platform.
- Lower the platform by specified height.
Distance: 0.6m

- Remove the screw 1 (x4).
- Remove the bracket to access the platform upper limit switch.

Figure 28.



- A** Screw 1 (x4)
B Bracket

- Adjust the up limit switch in the direction required.
- Adjust the up limit switch up or down position according to the platform height. Refer to Table 8.
 - If the upper limit switch position is too low retract the Cam screw away from the limit switch.
 - If the down limit switch position is too high extend the Cam screw towards the limit switch.
- Do the steps 1 to step 7.2 until the correct lower limit is set.
- Lock the cam screw to the correct height.

During upper limit switch calibrated the 'LF' and '87' error is expected when platform reaches on full height, continue do the calibration process. If the platform stop by upper limit switch the lift motor should stop running.

Table 8. Up Limit Height

Machine Model	Up Limit Height ⁽¹⁾
S1530E	4m
S1930E	6m
S2032E	6m
S2632E	8m
S2646E	8m

Machine Model	Up Limit Height ⁽¹⁾
S3246E	10m
S4046E	12m
S4550E	14m

(1) Make a note that the heights are measured from the ground to the base of the platform.

No Load Calibration

The machine will be raised to full height during the calibration procedure. Make sure that there is sufficient clearance above the platform before starting the calibration. The calibration can be interrupted if there is a hazardous event by pressing an Emergency Stop.

Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

1. Take the machine to suitable testing area.
2. Lower the platform to the stowed position.
3. Make sure that there is no load on the platform.
4. Make sure that the both (ECU and PCU) emergency switches are in 'ON' Position.
5. Keep pressing the ENTER button on ECU for specified duration.
Duration: 5s
6. Turn the Key Switch to the ground control position.
7. The LCD will display 'Speed menu'.
8. Press the 'UP' or 'DOWN' button to find 'Calibration' function.
9. Press the 'ENTER' button.
10. The LCD will display 'Execute No Load Calibration'.
11. Press the 'ENTER' button on ECU for specified duration to start the automatic calibration.
Duration: 5s
12. Once the calibration is done, the LCD will display the result of calibration.
 - 12.1. Calibration data has changed
 - 12.2. No Load Calibration Complete!
13. Press the back button to go back to Calibration menu.
14. If the calibration result shows, 'Pressure Sensor Failure' or 'Angel Sensor Failure', check

condition of the sensors for correct working and do the calibration process again.

15. Raise and lower the platform to full working height for 5 cycles with no load in the platform.
16. Visually inspect the scissor pack, platform and hydraulic cylinders for structural damage or weakness.
17. Make sure that there are no hydraulic leaks.

Full Load Calibration

The machine will be raised to full height during the calibration procedure. Make sure that there is sufficient clearance above the platform before starting the calibration. The calibration can be interrupted if there is a hazardous event by pressing an Emergency Stop.

Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

1. Take the machine to suitable testing area.
2. Lower the platform to the stowed position.
3. Add 100% rated load on the platform. Refer to Table 9.
4. Keep pressing the ENTER button on ECU for specified duration.
Duration: 5s
5. Turn the Key Switch to the ground control position.
6. The LCD will display 'Speed menu'.
7. Press the 'UP' or 'DOWN' button to find 'Calibration' function.
8. Press the 'ENTER' button.
9. The LCD will display 'Execute No Load Calibration'.
10. Press the 'UP' or 'DOWN' button to find 'Execute Full Load Calibration' function.
11. Press the 'ENTER' button on ECU for specified duration to start the automatic calibration.
Duration: 5s
12. Once the calibration is done, the LCD will display the result of calibration.
 - 12.1. Calibration data has changed
 - 12.2. Full Load Calibration Complete!
13. Press the back button to go back to Calibration menu.

14. If the calibration result shows, 'Pressure Sensor Failure' or 'Angel Sensor Failure', check condition of the sensors for correct working and do the calibration process again.

Table 9. Load Calibration Weights

Machine Model	100% Rated Load
S1530E	280kg
S1930E	230kg
S2032E	380kg
S2632E	250kg
S2646E	450kg
S3246E	320kg
S4046E	320kg
S4550E	227kg

Overload Calibration - Upper Side

The machine will be raised to full height during the calibration procedure. Make sure that there is sufficient clearance above the platform before starting the calibration. The calibration can be interrupted if there is a hazardous event by pressing an Emergency Stop.

Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

1. Take the machine to suitable testing area.
2. Raise and lower the platform twice.
3. Lower the platform to the stowed position.
4. Add 105% rated load on the platform. Refer to Table 10.
5. Fully raise the platform.
6. Make sure that the platform should not raise to more 50% full height before the overload alarm sounds.
7. When the overload alarm occurs 'OL' error is displayed on the LCD.
8. Restart the machine. Wait for specified duration.
9. Make sure that the 'IOL' alarm sound again activates.

Table 10. Load Calibration Weights

Machine Model	105% Rated Load
S1530E	294kg
S1930E	242kg
S2032E	399kg
S2632E	263kg
S2646E	473kg
S3246E	336kg

Machine Model	105% Rated Load
S4046E	336kg
S4550E	240kg

Overload Calibration - Lower Side

The machine will be raised to full height during the calibration procedure. Make sure that there is sufficient clearance above the platform before starting the calibration. The calibration can be interrupted if there is a hazardous event by pressing an Emergency Stop.

Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

1. Take the machine to suitable testing area.
2. Raise and lower the platform twice.
3. Lower the platform to the stowed position.
4. Add 95% rated load on the platform. Refer to Table 11.
5. Fully raise and lower the platform.
6. Make sure that no overload alarm sounds during the test.
7. If overload alarm sounds, contact JCB Service.
8. Raise and lower the platform to full working height for 5 cycles with 95% load in the platform.
9. Visually inspect the scissor pack, platform and hydraulic cylinders for structural damage or weakness.
10. Make sure that there are no hydraulic leaks.

Table 11. Load Calibration Weights

Machine Model	95% Rated Load
S1530E	266kg
S1930E	219kg
S2032E	361kg
S2632E	238kg
S2646E	427.5kg
S3246E	304kg
S4046E	304kg
S4550E	215.65kg

Overload Calibration - at 125% Load

The machine will be raised to full height during the calibration procedure. Make sure that there is sufficient clearance above the platform before starting the calibration. The calibration can be interrupted if there is a hazardous event by pressing an Emergency Stop.

Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

1. Take the machine to suitable testing area.
2. Disable the overload alarm on the ECU.
3. Add 125% rated load on the platform. Refer to Table 12.
4. Raise the platform from fully stowed position to full height.
 - 4.1. Connect the Platform Controller to the chassis connector.
 - 4.2. Start in fully stowed position on flat, level ground.
 - 4.3. Raise the platform until it reaches full height.
5. Check drive and steer operation.
 - 5.1. Drive forwards to specified distance.
Distance: 5m
 - 5.2. Check the steering left and right as you drive forwards.
6. Do the steps 5.1 to 5.2 in reverse direction.
7. Lower the platform to fully stowed position.
 - 7.1. Start at full height on flat, level ground.
 - 7.2. Lower the platform until it reaches fully stowed position.

Table 12. Load Calibration Weights

Machine Model	125% Rated Load
S1530E	350kg
S1930E	288kg
S2032E	475kg
S2632E	313kg
S2646E	563kg
S3246E	400kg
S4046E	400kg
S4550E	290kg

Overload Calibration - at 110% Functional Load

The machine will be raised to full height during the calibration procedure. Make sure that there is sufficient clearance above the platform before starting the calibration. The calibration can be interrupted if there is a hazardous event by pressing an Emergency Stop.

Any button pressed outside of this time frame will nullify the sequence and require starting from the beginning.

1. Take the machine to suitable testing area.
2. Disable the overload alarm on the ECU.
3. Add 110% rated load on the platform. Refer to Table 13.
4. Raise the platform from fully stowed position to full height.
 - 4.1. Start in fully stowed position on flat, level ground.
 - 4.2. Raise the platform until it reaches full height.
 - 4.3. Record the time taken to raise the platform fully.
 - 4.4. Make sure that the raising speed is within the specified limits.
[Refer to: PIL 01-48-12.](#)
5. Lower the platform from full height to fully stowed position.
 - 5.1. Start at full height on flat, level ground.
 - 5.2. Lower the platform at full speed until it reaches to fully stowed position.
 - 5.3. Record the time taken to lower the platform fully.
 - 5.4. Make sure that the lowering speed is within the specified limits.
[Refer to: PIL 01-48-12.](#)
6. Check drive and steer operation.
 - 6.1. Drive forwards to specified distance.
Distance: 10m
 - 6.2. Select the drive mode and high speed mode.
 - 6.3. Record the time taken to travel specified distance in forward direction at full speed.
 - 6.4. Make sure that the driving speed is within the specified limits.
[Refer to: PIL 01-48-12.](#)
7. Do the steps 6.1 to 6.4 in reverse direction.
 - 7.1. Record the time taken to travel specified distance in reverse direction at full speed.
 - 7.2. Make sure that the driving speed is within the specified limits.
[Refer to: PIL 01-48-12.](#)

Table 13. Load Calibration Weights

Machine Model	110% Rated Load
S1530E	308kg
S1930E	253kg
S2032E	418kg
S2632E	275kg
S2646E	495kg
S3246E	352kg
S4046E	352kg
S4550E	250kg

Raising and Lowering Speed

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Park the machine in a solid and even test area free from any obstructions.
3. Pull out the ground emergency stop button to the ON position.
4. Pull out the platform emergency stop button to the ON position.
5. Turn the ignition switch to ground control position.
6. Raise the platform to its maximum height.
7. Make a note of the duration required for raising the platform.
8. Make sure that the duration is within the specified limits.

[Refer to: PIL 01-48-12.](#)

9. Lower the platform to its stowed position.
10. Make a note of the duration required for lowering the platform.
11. Make sure that the duration is within the specified limits.
[Refer to: PIL 01-48-12.](#)
12. If the platform raising and lowering speeds are not within the range, adjust the orifice. Refer to section below.

Orifice Change

Machines are factory set to achieve the desired lowering speed. Refer to Table 14. If required, you may change the orifice to achieve the specified speed.

1. Keep extending scissor until the lift valve easy to access for orifice fitment.
2. Install the safety strut.
3. Disconnect the battery.
4. Replace the orifice as required. Refer to Table 15.
 - 4.1. If the speed observed is less than specification, install the higher size orifice.
 - 4.2. If the speed observed is higher than specification, install the lower size orifice.
5. Check the lowering speed as per above procedure.
6. If the lowering speed does not change, contact the JCB Service.

Table 14. Orifice Settings (Factory Set)

Machine Model	Orifice Diameter	Lowering time @ 100% Load
S1530E	0.9mm	25–30s
S1930E	0.9mm	25–30s
S2032E	1.3mm	26–32s
S2632E	1.3mm	32–38s
S2646E	1.5mm	30–36s
S3246E	1.5mm	40–46s
S4046E	1.4mm	46–54s
S4550E	1.3mm	59–69s

Table 15. Orifice Settings Available Orifice

JCB Part Number	Orifice Diameter
443/E1220	0.9mm
443/E1221	1.5mm
443/E1222	1.8mm
443/E1223	1.3mm
443/E1224	1.6mm

JCB Part Number	Orifice Diameter
443/E1225	1.2mm
443/E1226	1.1mm
443/E1227	1mm
443/E1228	1.7mm
443/E1229	1.9mm

Decent Delay Height Setting

1. Press and hold the ENTER button on ECU for specified duration.
Duration: 5s
2. Turn the key switch to chassis control position.
3. The LCD will display 'Speed menu'.
4. Press the 'UP' or 'DOWN' button to find 'Descent Delay H' function.
5. Press the 'ENTER' button.
6. Lower or raise the platform to position with 'UP' or 'DOWN' button on ECU panel till the platform height reaches to specified height. Refer to Table 16.
- 6.1. It should be matched with parallel 2 scissor gap is 26 cm.
7. Press the 'ENTER' button on ECU for specified duration until the horn sounds to save the values.
Duration: 5s
8. After the values are saved, display will be back to 'Machine Mode' menu.
9. Restart the machine and check the descent delay height is correct in normal operation.

Table 16. Decent Height Limits

Machine Model	Descent Height Limits
S1530E	1.8 ± 0.1m
S1930E	2.1 ± 0.1m
S2032E	2.2 ± 0.1m
S2632E	2.4 ± 0.1m
S2646E	2.2 ± 0.1m
S3246E	2.6 ± 0.1m
S4046E	2.9 ± 0.1m
S4550E	3 ± 0.1m

Pothole Sensor Calibration

1. Make sure that the pothole protection system is deployed as the platform is raised.
2. Make sure that the pothole protection fault code is activated if the plates are prevented from deploying.
 - 2.1. Place a wooden wage under the pothole protection plate.
 - 2.2. Raise the platform.
 - 2.3. The error code '18' should appear and raise function should stop.

- 2.4. Do the steps 2.1 to step 2.3 for both side plates.

3. Make sure that the pothole sensors are correctly mounted and secured.

Machine Travel Speed Calibration

Make a note of the following.

- The correct drive function is necessary for safe machine operation.
- The drive function must respond quickly and smoothly to operator control.
- The drive performance must be free of hesitation, jerking and unusual noise over the entire proportionally controlled speed range.
- Do this procedure with the machine on a firm, level surface that is free of obstructions.

You must check the platform for correct operation in three different modes as follows.

At fast speed and platform in lowered position

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Put marks on the ground for start and finish lines. Make sure that the distance between the lines is as specified.

Distance: 10m

3. Turn the ignition switch to platform control position.
4. Pull out the ground emergency stop button to the ON position.
5. Pull out the platform emergency stop button to the ON position.
6. Make a note of the point on the machine (contact patch of a tyre) as a visual reference when you cross the test line.
7. Make sure that the low drive speed light is in OFF position.
 - 7.1. If the slow drive speed light is ON, press the drive speed select button to turn OFF the slow drive speed function.
8. Press the drive function button (if installed).
9. Press and hold the drive/steer function enable switch on the control handle.
10. Move the control lever in the forward direction.

11. Bring the machine to top drive speed before you reach the start line.
12. Start the timing when the selected reference point on the machine crosses the start line.
13. Continue at full speed and note the time when your reference point on the machine passes the finish line.
14. Make sure that the values are within the specified limits.

[Refer to: PIL 01-48-12.](#)

At slow speed and platform in lowered position

1. Make the machine safe with platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Put marks on the ground for start and finish lines. Make sure that the distance between the lines is as specified.
Distance: 10m
3. Turn the ignition switch to platform control position.
4. Pull out the ground emergency stop button to the ON position.
5. Pull out the platform emergency stop button to the ON position.
6. Make a note of the point on the machine (contact patch of a tyre) as a visual reference when you cross the test line.
7. Make sure that the low drive speed light is in ON position.
 - 7.1. If the slow drive speed light is OFF, press the drive speed select button to turn ON the slow drive speed function.
8. Press the drive function button (if installed).
9. Press and hold the drive/steer function enable switch on the control handle.
10. Move the control lever in the forward direction.
11. Bring the machine to top drive speed before you reach the start line.
12. Start the timing when the selected reference point on the machine crosses the start line.
13. Continue at full speed and note the time when your reference point on the machine passes the finish line.
14. Make sure that the values are within the specified limits.

[Refer to: PIL 01-48-12.](#)

At platform in raised position

When the platform is raised, the machine automatically goes to the slow speed mode.

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Put marks on the ground for start and finish lines. Make sure that the distance between the lines is as specified.
Distance: 10m
3. Turn the ignition switch to platform control position.
4. Pull out the ground emergency stop button to the ON position.
5. Pull out the platform emergency stop button to the ON position.
6. Raise the platform to the specified height above the ground.
Distance: 1.5m
7. Make sure that pothole protection system starts to work.
8. Make a note of the point on the machine (contact patch of a tyre) as a visual reference when you cross the test line.
9. Press the drive function button (if installed).
10. Press and hold the drive/steer function enable switch on the control handle.
11. Move the control lever in the forward direction.
12. Bring the machine to top drive speed before you reach the start line.
13. Start the timing when the selected reference point on the machine crosses the start line.
14. Continue at full speed and note the time when your reference point on the machine passes the finish line.
15. Calculate the speed of the machine.
16. Make sure that the speed is as specified limits.

[Refer to: PIL 01-48-12.](#)

Brake Test

The brakes must be able to hold the machine upto 25% slope. Refer to operators manual.

Make a note of the following.

- You must check the brakes for correct operation at regular intervals. Refer to Maintenance Schedules.
- The correct brake function is necessary for safe machine operation.
- The brake function must operate smoothly, free of hesitation, jerking and unusual noise.
- Do this procedure with the machine on a firm, level surface that is free of obstructions.

1. Make the machine safe with the platform lowered.

[Refer to: PIL 01-03-27.](#)

2. Make sure that the platform extension is in the fully retracted position.
3. Put a mark on the ground to use as a test line.
4. Turn the ignition switch to platform control.
5. Pull out the ground emergency stop button to the ON position.
6. Pull out the platform emergency stop button to the ON position.
7. Make a note of the point on the machine (contact patch of a tyre) as a visual reference when you cross the test line.
8. Press the drive function button (if installed).
9. Press and hold the drive/steer function enable switch on the control handle.
10. Move the control lever in the forward direction.
11. Bring the machine to top drive speed before you reach the test line.
12. Release the control lever when the selected reference point on the machine crosses the test line.
13. Measure the distance between the test line and the machine reference point.
14. Make sure that the braking distance is within the specified limits.

[Refer to: PIL 01-48-12.](#)

15. Raise the platform.

16. Do the steps 3 to 13 with the platform raised.

17. Make sure that the braking distance is within the specified limits.

[Refer to: PIL 01-48-12.](#)

Gradeability Test

Make a note that the machine will take on ramp with operator weight only in fully stowed position.

1. Start the machine on specified slope ramp from start point and slowly took upward side.

2. Hold/Park the machine on ramp for specified duration.

Duration: 5s

- 2.1. The Machine should stop on ramp.

3. Drive the machine on straight platform and slowly downward.

4. Hold/Park the machine on ramp for specified duration.

Duration: 5s

- 4.1. The Machine should stop on ramp.

Manual Brake Release Test

1. Make the machine safe.

[Refer to: PIL 01-03-27.](#)

2. If machine is on slope, then place the chocks to avoid the machine runaway.

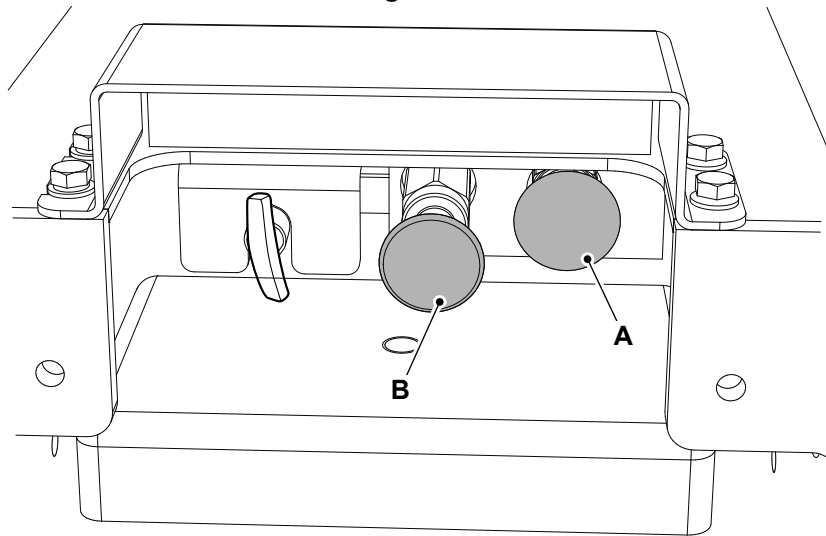
3. The release valve is at the back of the chassis.

4. Push in the brake release handle to close the brake valve and trap the brake pressure. Refer to Figure 29.

5. Firmly pump the brake release pump handle as required to release the brake. Refer to Figure 29.

6. Pull the brake release handle out after the machine is recovered to re-apply the brakes. Refer to Figure 29.

Figure 29.



A Brake release handle open and close

B Brake release pump handle

Manual Descent Lower Test

The lowering alarm does not sound while lowering but if the machine is switched on the fault alarm will sound due to lowering without electrical controls. Lowering may continue.

To lower the platform in emergency conditions:

1. Make the machine safe.

[Refer to: PIL 01-03-27.](#)

2. Raise the machine to full height.

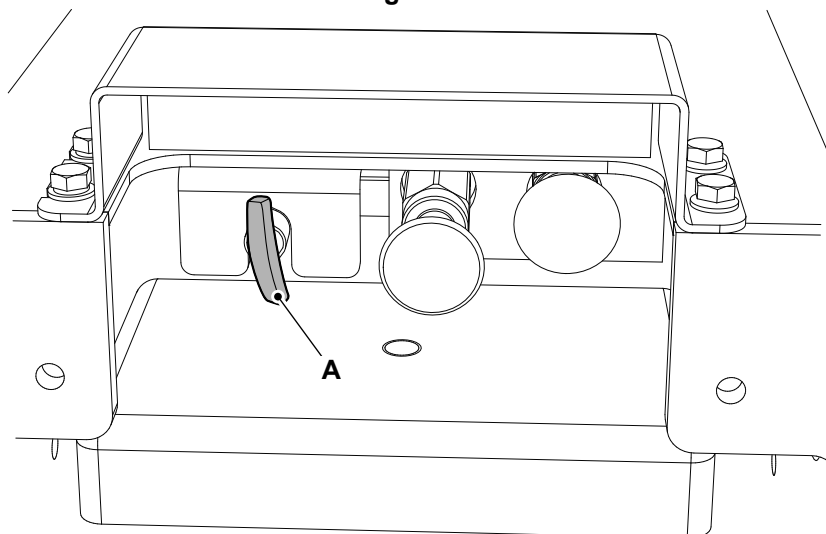
3. Pull out the emergency lowering lever. Refer to Figure 30.

4. Release the lever to stop the operation.

5. Measure the lowering speed. Make sure that it is within the specified limits.

[Refer to: PIL 01-48-12.](#)

Figure 30.



A Emergency lowering lever

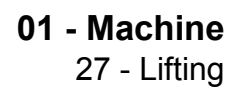
Hydraulic Leak Test

After the calibration and testing is completed, check the hydraulic system for leaks.

1. Check for signs of hydraulic oil leaks, dripping or residue on or around the following components.
 - 1.1. Hydraulic tank and filter.
 - 1.2. Gear pump and main control valve block.
 - 1.3. Cylinder rams and hydraulic hoses.
2. Replace the O-rings wherever there are leaks.
3. Replace any damaged hoses or components.
4. Tighten the hydraulic adaptors to required torque.

Clear Fault History (If required)

1. Enter the ECU display menu.
 - 1.1. Press and hold the 'Enter' button on the ECU.
 - 1.2. Switch the machine ON in the chassis control position.
 - 1.3. Release the 'Enter' button when the display changes to the menu.
2. Delete the fault history.
 - 2.1. Select and Enter the Fault History section in the display menu.
 - 2.2. When you view the Fault History, hold the 'Enter' button for specified duration until it displays 'Clear History Fault?'.
Duration: 5s
 - 2.3. Hold the 'Enter' button for another specified duration to delete the fault history.
Duration: 5s



Contents

01-27-00 General 01-53

00 - General

Introduction

Lifting by Forklift

▲ Notice: Do not lift the machine from the side. Lifting the machine from the side will cause damage to the pothole protection system.

1. Make the machine safe with the platform lowered.

[Refer to: PIL 01-03-27.](#)

2. Check the extension platform, controller and chassis parts are correctly secured.
3. Remove any loose items from the machine.
4. Keep the machine in the lowered position while lifting with the forklift.
5. Use the forklift slots at the ladder side at the end of the machine.

- 5.1. Align the forks with the forklift slots at the end of the machine.

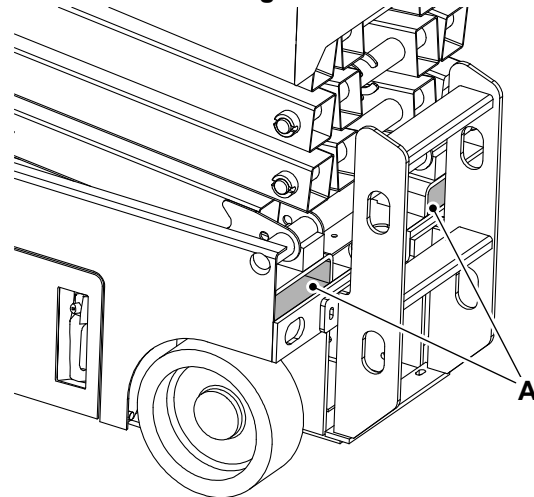
- 5.2. Drive the forklift forwards until the forks carriage almost touches the ladder

- 5.3. When lifting the machine rotate the forks back slightly to ensure the machine will not slide off the forks. Travel with the machine at the specified distance from the ground.

Length/Dimension/Distance: 0.4m

- 5.4. Level the forks before landing the machine.

Figure 31.



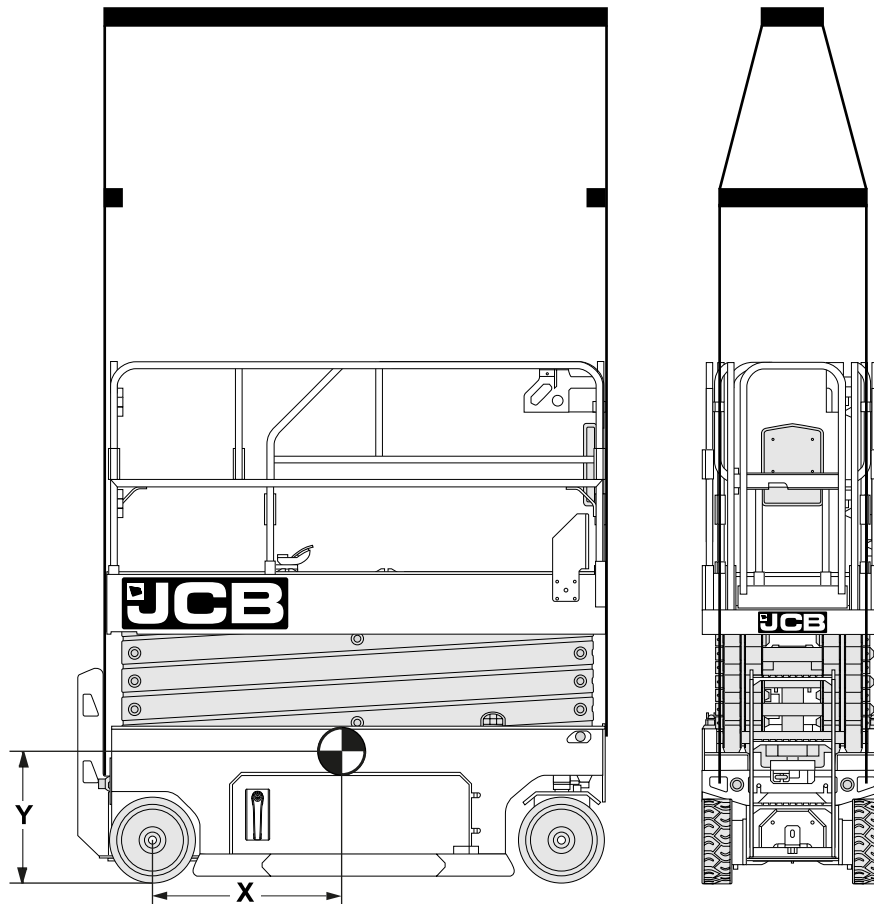
A Forklift slots

Lifting by Hoist

1. Make the machine safe with the platform lowered.

[Refer to: PIL 01-03-27.](#)

2. Check the extension platform, controller and chassis parts are correctly secured.
3. Remove any loose items from the machine.
4. Use the correct length of hoisting rope to prevent damage to the platform base and guardrail.
5. Make sure the hoist rigging is in the correct position. Adjust the hoist rigging to prevent machine damage and keep the machine in the level position.

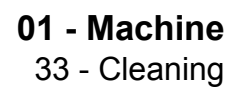
Figure 32.

X X axis distance

Y Y axis distance

5.1. You must consider the location of the centre of gravity on the machine, when you lift the machine. Refer to Table 17.

Table 17. Location of the Centre of Gravity

Machine Model	X axis	Y axis
S1530E	620mm	511mm
S1930E	582mm	515mm
S2032E	878mm	600mm
S2632E	927mm	664mm
S2646E	811mm	617mm
S3246E	841mm	689mm
S4046E	842mm	698mm
S4550E	1,067mm	791mm



Contents

Page No.

01 - 55



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction	01-57
Preparation	01-58

Introduction

▲ **WARNING** When using cleaning agents, solvents or other chemicals, you must adhere to the manufacturer's instructions and safety precautions.

CAUTION To avoid burning, wear personal protective equipment when handling hot components. To protect your eyes, wear goggles when using a brush to clean components.

Notice: Cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.

Notice: The efficiency of the rams will be affected if they are not kept free of solidified dirt. Clean dirt from around the rams regularly. When leaving or parking the machine, close all rams if possible to reduce the risk of weather corrosion.

Notice: Never use water or steam to clean inside the battery compartment. The use of water or steam could damage the machine electrics and render the machine inoperable. Remove dirt using a brush or damp cloth.

Clean the product with water and/or steam. Do not let mud, debris etc. to collect on the product.

Before you do any service procedures that require components to be removed:

- The cleaning must be done in the area of components to be removed, or in the case of major work, the surrounding product must be cleaned.
- When cleaning is complete, move the product away from the wash area or alternatively, remove the material washed from the product.

When you remove components, be aware of exposure to dirt and debris. Cover any open ports and remove the deposits before proceeding.

Detergents

Do not use a full strength detergent. Always dilute the detergents as per the manufacturer's recommendations, or damage to the paint finish can occur.

Always obey the local regulations regarding the disposal of debris created from cleaning the product.

Pressure Washing and Steam Cleaning

▲ **CAUTION** When using a steam cleaner, wear safety glasses or a face shield as well as protective clothing. Steam can cause personal injury.

The electrical components could be damaged by high pressure washing systems. Special precautions must be taken if the machine is to be washed using a high pressure system. Make sure that the electrical components are shielded and not directly cleaned by the high pressure cleaning system. Do not aim the water jet directly at internal surface of the machine.

Use a low pressure water jet and brush to remove dried mud or dirt.

Use a pressure washer to remove soft dirt and oil.

The product must always be greased (if appropriate) after pressure washing or steam cleaning.

Preparation

1. Make the machine safe. Stop the machine and let it cool for at least one hour. Do not try to clean any part of the machine while it is running.
2. Make sure that all of the electrical connectors are correctly coupled.
3. If the connectors are open, attach the correct caps or seal with waterproof tape.



48 - Specifications

Contents	Page No.
01-48-09 Static Dimensions	01-61
01-48-10 Weights	01-64
01-48-12 Lift Arm Dimensions and Performance	01-67



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

09 - Static Dimensions

Technical Data

For: S1530E [RAJ]	Page 01-61
For: S1930E [RAJ]	Page 01-61
For: S2032E [RAJ]	Page 01-62
For: S2632E [RAJ]	Page 01-62
For: S2646E [RAJ]	Page 01-62
For: S3246E [RAJ]	Page 01-63
For: S4046E [RAJ]	Page 01-63
For: S4550E [RAJ]	Page 01-63

(For: S1530E [RAJ])

Table 18.

Description	Dimension
Maximum platform height	4.54m (14ft-11in)
Maximum working height ⁽¹⁾	6.54m (20ft-11in)
Platform size (L x W x H)	1.64m (5ft-5in) x 0.77m (2ft-6.5in) x 1.1m (3ft-7in)
Ground clearance	0.07m (3in)
Wheelbase	1.33m (4ft-4in)
Extension outreach	0.9m (2ft-11in)
Overall length (stowed)	1.78m (5ft-10in)
Overall width (stowed)	0.77m (2ft-6.5in)
Overall height (stowed, guardrail folded)	1.82m (6ft)
Overall height (stowed, guardrail unfolded)	2.11m (6ft-11in)

(1) Maximum working height adds 2m to the metric platform height, and adds 6ft to the imperial platform height, based on regional norms.

(For: S1930E [RAJ])

Table 19.

Description	Dimension
Maximum platform height	5.71m (18ft-9in)
Maximum working height ⁽¹⁾	7.71m (24ft-9in)
Platform size (L x W x H)	1.64m (5ft-5in) x 0.77m (2ft-6.5in) x 1.1m (3ft-7in)
Ground clearance	0.07m (3in)
Wheelbase	1.33m (4ft 4in)
Extension outreach	0.9m (2ft-11in)
Overall length (stowed)	1.78m (5ft-10in)
Overall width (stowed)	0.77m (2ft-6.5in)
Overall height (stowed, guardrail folded)	1.85m (6ft-1in)
Overall height (stowed, guardrail unfolded)	2.12m (6ft-11in)

(1) Maximum working height adds 2m to the metric platform height, and adds 6ft to the imperial platform height, based on regional norms.

(For: S2032E [RAJ])

Table 20.

Description	Dimension
Maximum platform height	6.1m (20ft-1in)
Maximum working height ⁽¹⁾	8.1m (26ft-1in)
Platform size (L x W x H)	2.25m (7ft-5in) x 0.83m (2ft-8in) x 1.1m (3ft-7in)
Ground clearance	0.1m (4in)
Wheelbase	1.85m (6ft-1in)
Extension outreach	0.9m (2ft-11in)
Overall length (stowed)	2.39m (7ft-10in)
Overall width	0.83m (2ft-8.5in)
Overall height (stowed, guardrail folded)	1.83m (6ft-0in)
Overall height (stowed, guardrail unfolded)	2.22m (7ft-3in)

(1) Maximum working height adds 2m to the metric platform height, and adds 6ft to the imperial platform height, based on regional norms.

(For: S2632E [RAJ])

Table 21.

Description	Dimension
Maximum platform height	7.92m (26ft)
Maximum working height ⁽¹⁾	9.92m (32ft)
Platform size (L x W x H)	2.25m (7ft-5in) x 0.83m (2ft-8.5in) x 1.1m (3ft-7in)
Ground clearance	0.1m (3in)
Wheelbase	1.85m (6ft)
Extension outreach	0.9m (2ft-11in)
Overall length (stowed)	2.39m (7ft-10in)
Overall width	0.83m (2ft-8.5in)
Overall height (stowed, guardrail folded)	1.96m (6ft-5in)
Overall height (stowed, guardrail unfolded)	2.33m (7ft-8in)

(1) Maximum working height adds 2m to the metric platform height, and adds 6ft to the imperial platform height, based on regional norms.

(For: S2646E [RAJ])

Table 22.

Description	Dimension
Maximum platform height	7.9m (25ft-11in)
Maximum working height ⁽¹⁾	9.9m (31ft-11in)
Platform size (L x W x H)	2.25m (7ft-5in) x 1.15m (3ft-10in) x 1.1m (3ft-7in)
Ground clearance	0.1m (4in)
Wheelbase	1.85m (6ft-1in)
Extension outreach	0.9m (2ft-11in)
Overall length (stowed)	2.39m (7ft-10in)
Overall width	1.18m (3ft-10.5in)
Overall height (stowed, guardrail folded)	1.73m (5ft-9in)
Overall height (stowed, guardrail unfolded)	2.35m (7ft-8in)

(1) Maximum working height adds 2m to the metric platform height, and adds 6ft to the imperial platform height, based on regional norms.

(For: S3246E [RAJ])

Table 23.

Description	Dimension
Maximum platform height	9.68m (31ft-9in)
Maximum working height ⁽¹⁾	11.68m (37ft-9in)
Platform size (L x W x H)	2.25m (7ft-5in) x 1.17m (3ft-10in) x 1.1m (3ft-7in)
Ground clearance	0.1m (3in)
Wheelbase	1.85m (6ft-1in)
Extension outreach	0.9m (2ft-11in)
Overall length (stowed)	2.39m (7ft-10in)
Overall width (stowed)	1.18m (3ft-10.5in)
Overall height (stowed, guardrail folded)	1.86m (6ft-1in)
Overall height (stowed, guardrail unfolded)	2.48m (8ft-2in)

(1) Maximum working height adds 2m to the metric platform height, and adds 6ft to the imperial platform height, based on regional norms.

(For: S4046E [RAJ])

Table 24.

Description	Dimension
Maximum platform height	11.9m (39ft-0in)
Maximum working height ⁽¹⁾	13.9m (45ft-0in)
Platform size (L x W x H)	2.25m (7ft-5in) x 1.15m (3ft-10in) x 1.1m (3ft-7in)
Ground clearance	0.1m (4in)
Wheelbase	1.85m (6ft-1in)
Extension outreach	0.9m (2ft-11in)
Overall length (stowed)	2.39m (7ft-10in)
Overall width	1.15m (3ft-9in)
Overall height (stowed, guardrail folded)	1.98m (6ft-6in)
Overall height (stowed, guardrail unfolded)	2.60m (8ft-6in)

(1) Maximum working height adds 2m to the metric platform height, and adds 6ft to the imperial platform height, based on regional norms.

(For: S4550E [RAJ])

Table 25.

Description	Dimension
Maximum platform height	13.8m (45ft-3in)
Maximum working height ⁽¹⁾	15.8m (51ft-3in)
Platform size (L x W x H)	2.64m (8ft-7in) x 1.15m (3ft-9in) x 1.1m (3ft-7in)
Ground clearance	0.1m (0ft-4in)
Wheelbase	2.22m (7ft-3in)
Extension outreach	0.9m (2ft-11in)
Overall length (stowed)	2.76m (9ft-0in)
Overall width (stowed)	1.27m (4ft-2in)
Overall height (stowed, guardrail folded)	2.2m (7ft-2in)
Overall height (stowed, guardrail unfolded)	2.6m (8ft-6in)

(1) Maximum working height adds 2m to the metric platform height, and adds 6ft to the imperial platform height, based on regional norms.

10 - Weights

Technical Data

For: S1530E [RAJ]	Page 01-64
For: S1930E [RAJ]	Page 01-64
For: S2032E [RAJ]	Page 01-65
For: S2632E [RAJ]	Page 01-65
For: S2646E [RAJ]	Page 01-65
For: S3246E [RAJ]	Page 01-66
For: S4046E [RAJ]	Page 01-66
For: S4550E [RAJ]	Page 01-66

(For: S1530E [RAJ])

Table 26.

Description	Dimension
Overall weight	1,373kg
Load capacity	280kg
Maximum platform occupants (indoor)	2 persons
Maximum platform occupants (outdoor)	1 person
Maximum allowable side force (indoor)	400N
Maximum allowable side force (outdoor)	200N
Maximum wheel loads ^(1, 2)	565kg
Ground pressure per tyre ^(1, 2)	1062kN/m ²

(1) This assumes the typical wheel surface area in contact with the ground is approximately 15% wheel diameter x wheel width.

(2) Wheel loads and pressures are approximate and only cover standard manufacturer wheel configurations. These figures should only be used with adequate safety factors.

(For: S1930E [RAJ])

Table 27.

Description	Dimension
Overall weight	1,696kg
Load capacity	230kg
Maximum platform occupants (indoor)	2 persons
Maximum platform occupants (outdoor)	1 person
Maximum allowable side force (indoor)	400N
Maximum allowable side force (outdoor)	200N
Maximum wheel loads ^(1, 2)	603kg
Ground pressure per tyre ^(1, 2)	1135kN/m ²

(1) This assumes the typical wheel surface area in contact with the ground is approximately 15% wheel diameter x wheel width.

(2) Wheel loads and pressures are approximate and only cover standard manufacturer wheel configurations. These figures should only be used with adequate safety factors.

(For: S2032E [RAJ])

Table 28.

Description	Dimension
Overall weight	2,091kg
Load capacity	380kg
Maximum platform occupants (indoor)	2 persons
Maximum platform occupants (outdoor)	1 person
Maximum allowable side force (indoor)	400N
Maximum allowable side force (outdoor)	200N
Maximum wheel loads ^(1, 2)	1,094kg
Localized pressure per tyre ^(1, 2)	1415 kN/m ²

(1) This assumes the typical wheel surface area in contact with the ground is approximately 15% wheel diameter x wheel width.

(2) Wheel loads and pressures are approximate and only cover standard manufacturer wheel configurations. These figures should only be used with adequate safety factors.

(For: S2632E [RAJ])

Table 29.

Description	Dimension
Overall weight	2,180kg
Load capacity	250kg
Maximum platform occupants (indoor)	2 persons
Maximum platform occupants (outdoor)	N/A
Maximum allowable side force (indoor)	400N
Maximum allowable side force (outdoor)	N/A
Maximum wheel loads ^(1, 2)	1,135kg
Localized pressure per tyre ^(1, 2)	1469 kN/m ²

(1) This assumes the typical wheel surface area in contact with the ground is approximately 15% wheel diameter x wheel width.

(2) Wheel loads and pressures are approximate and only cover standard manufacturer wheel configurations. These figures should only be used with adequate safety factors.

(For: S2646E [RAJ])

Table 30.

Description	Dimension
Overall weight	2,663kg
Load capacity	450kg
Maximum platform occupants (indoor)	2 persons
Maximum platform occupants (outdoor)	2 persons
Maximum allowable side force (indoor)	400N
Maximum allowable side force (outdoor)	400N
Maximum wheel loads ^(1, 2)	1,453kg
Localized pressure per tyre ^(1, 2)	1880kN/m ²

(1) This assumes the typical wheel surface area in contact with the ground is approximately 15% wheel diameter x wheel width.

(2) Wheel loads and pressures are approximate and only cover standard manufacturer wheel configurations. These figures should only be used with adequate safety factors.

(For: S3246E [RAJ])

Table 31.

Description	Dimension
Overall weight	2,866kg
Load capacity	320kg
Maximum platform occupants (indoor)	2 persons
Maximum platform occupants (outdoor)	1 person
Maximum allowable side force (indoor)	400N
Maximum allowable side force (outdoor)	200N
Maximum wheel loads ^(1, 2)	1,268kg
Localized pressure per tyre ^(1, 2)	1640 kN/m ²

(1) This assumes the typical wheel surface area in contact with the ground is approximately 15% wheel diameter x wheel width.

(2) Wheel loads and pressures are approximate and only cover standard manufacturer wheel configurations. These figures should only be used with adequate safety factors.

(For: S4046E [RAJ])

Table 32.

Description	Dimension
Overall weight	3,070kg
Load capacity	320kg
Maximum platform occupants (indoor)	2 persons
Maximum platform occupants (outdoor)	N/A
Maximum allowable side force (indoor)	400N
Maximum allowable side force (outdoor)	N/A
Maximum wheel loads ^(1, 2)	1,206kg
Localized pressure per tyre ^(1, 2)	1561 kN/m ²

(1) This assumes the typical wheel surface area in contact with the ground is approximately 15% wheel diameter x wheel width.

(2) Wheel loads and pressures are approximate and only cover standard manufacturer wheel configurations. These figures should only be used with adequate safety factors.

(For: S4550E [RAJ])

Table 33.

Description	Dimension
Overall weight	3,593kg
Load capacity	230kg
Maximum platform occupants (indoor)	2 persons
Maximum platform occupants (outdoor)	N/A
Maximum allowable side force (indoor)	400N
Maximum allowable side force (outdoor)	N/A
Maximum wheel loads ^(1, 2)	1,212kg
Localized pressure per tyre ^(1, 2)	15.73bar (228.0psi)

(1) This assumes the typical wheel surface area in contact with the ground is approximately 15% wheel diameter x wheel width.

(2) Wheel loads and pressures are approximate and only cover standard manufacturer wheel configurations. These figures should only be used with adequate safety factors.

12 - Lift Arm Dimensions and Performance

Technical Data

For: S1530E [RAJ]	Page 01-67
For: S1930E [RAJ]	Page 01-67
For: S2032E [RAJ]	Page 01-68
For: S2632E [RAJ]	Page 01-68
For: S2646E [RAJ]	Page 01-69
For: S3246E [RAJ]	Page 01-69
For: S4046E [RAJ]	Page 01-69
For: S4550E [RAJ]	Page 01-70

(For: S1530E [RAJ])

Table 34.

Description	Dimension
Maximum allowable wind speed (outdoor)	12.5m/s (1 person only)
Maximum allowable slope (front/back)	3°
Maximum allowable slope (side/side)	1.5°
Turning radius (outside)	1.49m (4ft-9in)
Turning radius (inside)	0.04m (1in)
Gradeability	25%
Maximum driving speed - platform raised /time over 10m	0.8km/h (0.5mph) /45–49s
Hare speed /time over 10m	3km/h (1.9mph) /12–14s
Tortoise speed /time over 10m	1.8km/h (1.1mph) /19–23s
Rising speed (Full load)	20–25s
Lowering speed (Full load)	25–30s
Rising speed (No load)	15–20s
Lowering speed (No load)	30–35s
Drive and steer	2, front-wheel
Brake	2, rear-wheel
Brake distance (Level ground)	0.4 ± 0.1m

(For: S1930E [RAJ])

Table 35.

Description	Dimension
Maximum allowable wind speed (outdoor)	12.5m/s (1 person only)
Maximum allowable slope (front/back)	3°
Maximum allowable slope (side/side)	1.5°
Turning radius (outside)	1.49m (4ft-9in)
Turning radius (inside)	0.04m (1in)
Gradeability	25%
Maximum driving speed - platform raised /time over 10m	0.8km/h (0.5mph) /45–49s
Hare speed /time over 10m	3km/h (1.9mph) /12–14s
Tortoise speed /time over 10m	1.8km/h (1.1mph) /19–23s
Rising speed (Full load)	20–25s

Description	Dimension
Lowering speed (Full load)	25–30s
Rising speed (No load)	15–20s
Lowering speed (No load)	30–35s
Drive and steer	2, front-wheel
Brake	2, rear-wheel
Brake distance (Level ground)	0.4 ± 0.1m

(For: S2032E [RAJ])

Table 36.

Description	Dimension
Maximum allowable wind speed (outdoor)	12.5m/s
Maximum allowable slope (front/back)	3°
Maximum allowable slope (side/side)	1.5°
Turning radius (outside)	2.1m (6ft-11in)
Turning radius (inside)	0m (0ft-0in)
Gradeability	25%
Maximum driving speed - platform raised /time over 10m	0.8km/h (0.5mph) /45–49s
Hare speed /time over 10m	3.4km/h (2.1mph) /10–12s
Tortoise speed /time over 10m	1.8km/h (1.1mph) /19–23s
Rising speed (Full load)	26–32s
Lowering speed (Full load)	26–32s
Rising speed (No load)	22–28s
Lowering speed (No load)	33–39s
Drive and steer	2, front-wheel
Brake	2, rear-wheel
Brake distance (Level ground)	0.8 ± 0.1m

(For: S2632E [RAJ])

Table 37.

Description	Dimension
Maximum allowable wind speed (outdoor)	0m/s (Indoor only)
Maximum allowable slope (front/back)	3°
Maximum allowable slope (side/side)	1.5°
Turning radius (outside)	2.1m (6ft-10.68in)
Turning radius (inside)	0m (0ft-0in)
Gradeability	25%
Maximum driving speed - platform raised (Elevated speed)/time over 10m	0.8km/h (0.5mph) /45–49s
Hare speed /time over 10m	3.4km/h (2.1mph) /10–12s
Tortoise speed /time over 10m	1.8km/h (1.1mph) /19–23s
Rising speed (Full load)	28–34s
Lowering speed (Full load)	32–38s
Rising speed (No load)	25–31s
Lowering speed (No load)	38–44s
Drive and steer	2, front-wheel
Brake	2, rear-wheel
Brake distance (Level ground)	0.8 ± 0.1m

(For: S2646E [RAJ])

Table 38.

Description	Dimension
Maximum allowable wind speed (outdoor)	12.5m/s
Maximum allowable slope (front/back)	3°
Maximum allowable slope (side/side)	1.5°
Turning radius (outside)	0.1 (4in)
Turning radius (inside)	0m (0ft-0in)
Gradeability	25%
Maximum driving speed - platform raised /time over 10m	0.8km/h (0.5mph) /45–49s
Hare speed /time over 10m	3.4km/h (2.1mph) /10–14s
Tortoise speed /time over 10m	1.8km/h (1.1mph) /19–23s
Rising speed (Full load)	43–49s
Lowering speed (Full load)	30–36s
Rising speed (No load)	36–42s
Lowering speed (No load)	42–48s
Drive and steer	2, front-wheel
Brake	2, rear-wheel
Brake distance (Level ground)	0.8 ± 0.1m

(For: S3246E [RAJ])

Table 39.

Description	Dimension
Maximum allowable wind speed (outdoor)	12.5m/s (1 person only)
Maximum allowable slope (front/back)	3°
Maximum allowable slope (side/side)	1.5°
Turning radius (outside)	2.35m (7ft-8.5in)
Turning radius (inside)	0m (0ft-0in)
Gradeability	25%
Maximum driving speed - platform raised /time over 10m	0.8km/h (0.5mph) /45–49s
Hare speed /time over 10m	3.4km/h (2.1mph) /10–12s
Tortoise speed /time over 10m	1.8km/h (1.1mph) /19–23s
Rising speed (Full load)	49–54s
Lowering speed (Full load)	40–46s
Rising speed (No load)	44–50s
Lowering speed (No load)	47–53s
Drive and steer model	2, front-wheel
Brake	2, rear-wheel
Brake distance (Level ground)	0.8 ± 0.1m

(For: S4046E [RAJ])

Table 40.

Description	Dimension
Maximum allowable wind speed (outdoor)	0m/s, Indoor Only
Maximum allowable slope (front/back)	3°

Description	Dimension
Maximum allowable slope (side/side)	1.5°
Turning radius (outside)	0.1m (4in)
Turning radius (inside)	0m (0ft-0in)
Gradeability	25%
Maximum driving speed - platform raised /time over 10m	0.8km/h (0.5mph) /45–49s
Hare speed /time over 10m	3.2km/h (2.0mph) /11–13s
Tortoise speed /time over 10m	1.8km/h (1.1mph) /19–23s
Rising speed (Full load)	53–61s
Lowering speed (Full load)	46–54s
Rising speed (No load)	49–57s
Lowering speed (No load)	50–58s
Drive and steer	2, front-wheel
Brake	2, rear-wheel
Brake distance (Level ground)	0.8 ± 0.1m

(For: S4550E [RAJ])

Table 41.

Description	Dimension
Maximum allowable wind speed (outdoor)	0m/s (Indoor only)
Maximum allowable slope (front/back)	3°
Maximum allowable slope (side/side)	1.5°
Turning radius (outside)	2.56m (8ft-5in)
Turning radius (inside)	0m (0ft-0in)
Gradeability	25%
Maximum driving speed - platform raised /time over 10m	0.8km/h (0.5mph) /45–49s
Hare speed /time over 10m	3.4km/h (2.1mph) /10–12s
Tortoise speed /time over 10m	1.8km/h (1.1mph) /19–23s
Rising speed (Full load)	73–83s
Lowering speed (Full load)	61–67s
Rising speed (No load)	63–73s
Lowering speed (No load)	68–78s
Drive and steer model	2, front-wheel
Brake	2, rear-wheel
Brake distance (Level ground)	0.8 ± 0.1m

06 - Body and Framework

Contents	Page No.
Acronyms Glossary	06-2
06-00 Body and Framework	
06-00-00 General	06-3
06-06 Moveable Panel and Cover	
06-06-00 General	06-5
06-06-03 Battery Compartment	06-6
06-06-09 Hydraulic Compartment	06-7
06-14 Scissor Arm	
06-14-00 General	06-9
06-14-60 Slider Block	06-18
06-14-81 Bush	06-20
06-30 Pivot Pins	
06-30-00 General	06-23
06-45 Gas Strut	
06-45-45 Pothole Protection	06-27
06-47 Ladder	
06-47-00 General	06-29
06-57 Counterweight	
06-57-00 General	06-31
06-63 Identification Label	
06-63-00 General	06-37
06-63-03 Machine	06-38
06-66 Tools	
06-66-00 General	06-41
06-93 Emergency Lower System	
06-93-00 General	06-43
06-93-03 Cable	06-46
06-94 Pothole Protection System	
06-94-00 General	06-49
06-94-04 Actuator Rod	06-54
06-94-06 Plate	06-55
06-97 Platform	
06-97-00 General	06-57
06-97-03 Platform Extension	06-61
06-97-06 Guardrail	06-64
06-97-09 Gate	06-67
06-97-12 Gate Hinge	06-68
06-97-30 Extension Pedal	06-69
06-97-50 Wear Pads	06-71



Acronyms Glossary

AC	Alternating Current
ARV	Auxiliary Relief Valve
MRV	Main Relief Valve
PIN	Product Identification Number



00 - Body and Framework

Contents

Page No.

06-00-00 General	06-3
------------------------	------



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Check (Condition)

1. Make sure that all of the guards and protective devices are in position, secured by their locking devices and free from damage.
2. Inspect all of the steelwork for damage. Include the following:
 - 2.1. Examine all of the pivot point welds.
 - 2.2. Examine the condition of all the pivot pins.
 - 2.3. Check that the pivot pins are correctly in position and secured by their locking devices.
3. Check the steps and guardrails are undamaged and correctly attached.
4. Check that all of the safety and instructional labels are undamaged and in position. Install new labels where necessary.
5. Note any damaged paintwork for future repair.
6. Inspect the machine for broken or loose fasteners.
7. Raise the platform until pot hole protection is activated.
8. Check the condition of the pot hole protection bars and the pothole protection decal.



06 - Moveable Panel and Cover

Contents	Page No.
06-06-00 General	06-5
06-06-03 Battery Compartment	06-6
06-06-09 Hydraulic Compartment	06-7

00 - General

Introduction

Access panels provide easy access to the machine major components test and service points and other parts which require routine testing, servicing, adjusting, replacement or repair.

Before you operate the machine, make sure that all of the access panels are in their operation position and secure.

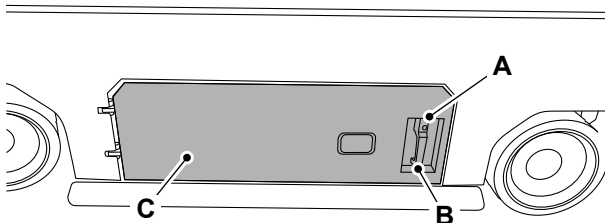
03 - Battery Compartment

Open and Close

Open

1. Make the machine safe.
2. Remove the key from the machine.
3. Use the key to unlock the cover.
4. Press the lock and pull the handle to open the cover. Refer to Figure 33.

Figure 33.



- A** Lock
B Handle
C Cover

Close

1. Close the cover.
2. Make sure the cover is closed correctly.
3. Use the key to lock the cover. Refer to Figure 33.

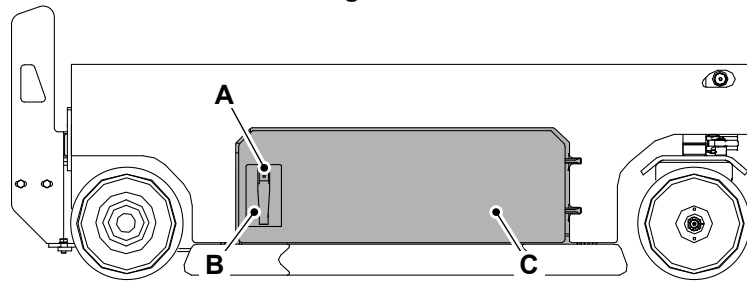
09 - Hydraulic Compartment

Open and Close

Open

1. Make the machine safe.
2. Remove the key from the machine.
3. Use the key to unlock the cover.
4. Press the lock and pull the handle to open the cover.

Figure 34.



A Lock
C Cover

B Handle

Close

1. Close the cover.
2. Make sure the cover is secured correctly.
3. Use the key to lock the cover.



14 - Scissor Arm

Contents	Page No.
06-14-00 General	06-9
06-14-60 Slider Block	06-18
06-14-81 Bush	06-20



00 - General

Introduction	06-9
Health and Safety	06-10
Component Identification	06-11
Operation	06-13
Check (Condition)	06-14
Remove and Install	06-14
Disassemble and Assemble	06-16

Introduction

The scissor lift mechanism is used to move the platform in a vertical direction. The mechanism to achieve this is the use of linked, folding supports in a criss-cross 'X' pattern, known as a scissor mechanism.

The upward motion is achieved by the application of hydraulic cylinders to propel the work platform.

Health and Safety

Raised Machine

Never position yourself or any part of your body inside the raised scissor pack which is not correctly supported. If the machine moves unexpectedly you could become trapped and suffer serious injury or be killed.

CAUTION! *The scissor arm is potentially dangerous, when pivoting about their centre they form a scissor point. Make sure that the scissor arm is securely blocked when working in the scissor arm area.*

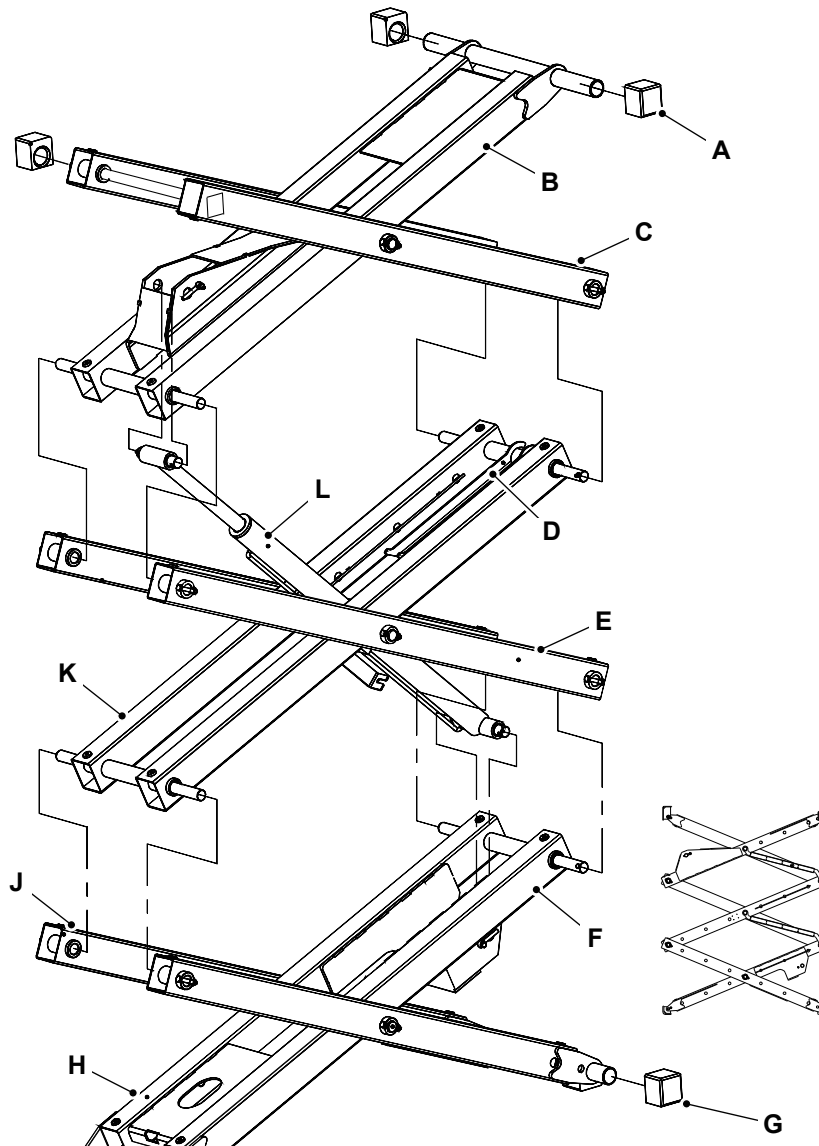
Component Identification

For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ] Page 06-11

For: S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ] Page 06-12

(For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ])

Figure 35.

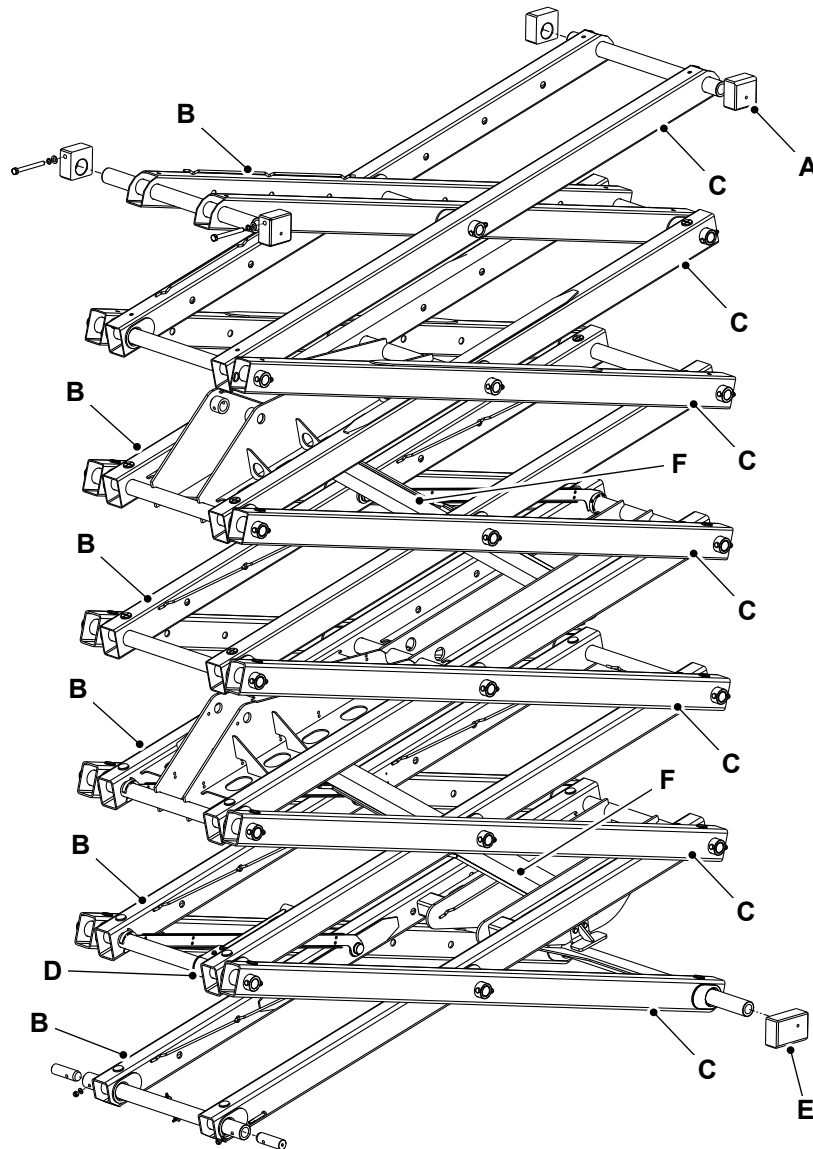


A Top slider block (x4)
C Outer arm 3
E Outer arm 2
G Bottom slider block (x2)
J Outer arm 1
L Lift cylinder

B Inner arm 3
D Safety strut
F Inner arm 1
H Inner arm 1
K Inner arm 2

(For: S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ])

Figure 36.



A Top slider block (x4)
C Outer arm
E Bottom slider block (x2)

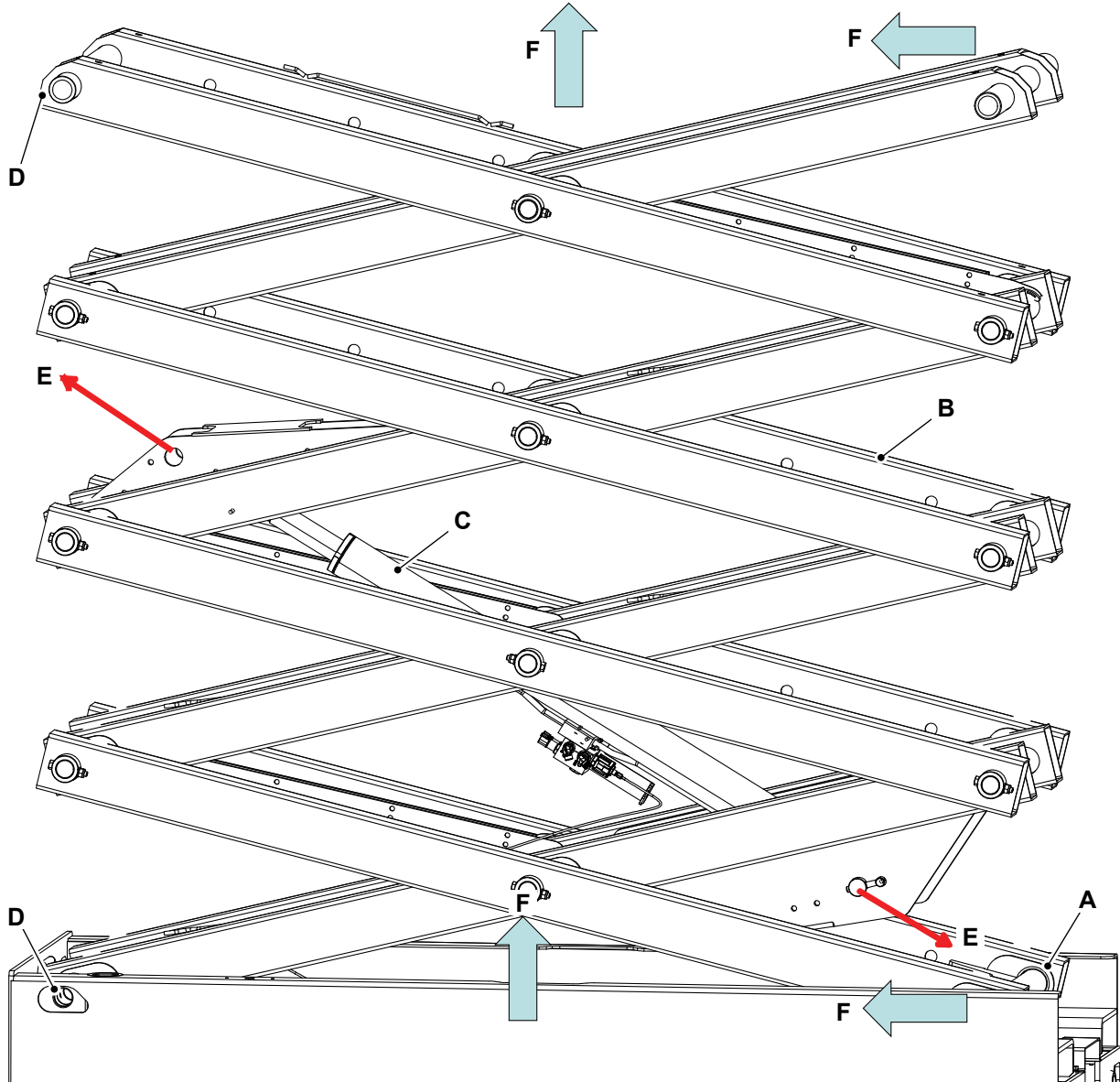
B Inner arm
D Safety strut
F Cylinder ram (x2)

Operation

When the hydraulic pressure is supplied to the cylinder ram, it extends. As the lift cylinder extends, the scissor arms are raised, and the sliding blocks

are moved inwards. The platform is raised by the scissors. Refer to Figure 37.

Figure 37.



- A Sliding block
- C Cylinder ram
- E Direction of force acting

- B Scissor arm
- D Fixed pivot
- F Direction of movement

Check (Condition)

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Make sure that the scissor arm assembly is free from cracks, damages and dents.
3. Make sure that all welds on the scissor arm are free from cracks and damage.
4. Make sure that all fasteners are correctly installed.
5. Make sure that all pivot pins are correctly secured.
6. Note any damaged paintwork for future repair.

Remove and Install

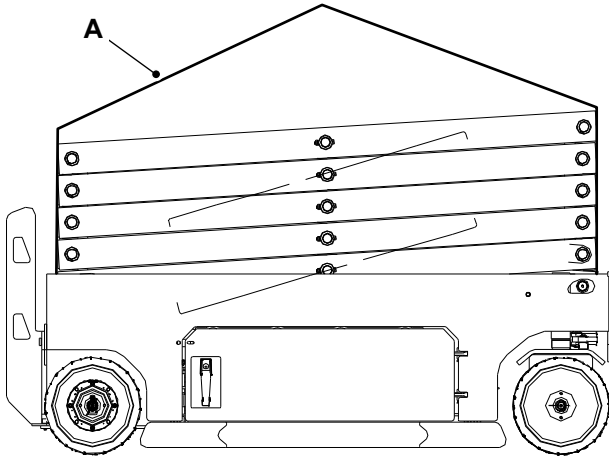
▲ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the platform control panel from the platform control connection.
3. Plug the platform control panel into the ground control connection.
4. Remove the ladder from the machine.
[Refer to: PIL 06-47-00.](#)
5. Use the platform control panel to raise the scissor arm.
6. Insert the maintenance strut.
[Refer to: PIL 01-03-27.](#)
7. Lower the scissor arm on to the maintenance strut.
8. Support the scissor arm with suitable lifting equipment. Put suitable wedges under the scissor arm.
9. Put a label on the electrical connectors and hydraulic hoses to help installation.
10. Disconnect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
11. Disconnect all the electrical connectors, remove the scissor arm harness.
[Refer to: PIL 33-95-75.](#)
12. Disconnect the hydraulic hoses from the scissor arm.
13. Put suitable container underneath the hydraulic connections to collect the hydraulic fluid.
14. Drain the hydraulic oil from the cylinder ram.
 - 14.1. Do not plug the open ports of ram at this stage to allow the extension and retraction of cylinder rams.
15. Remove the platform from the machine.
[Refer to: PIL 06-97-00.](#)
16. Remove the bolts from the stop pin.

17. Remove the stop pin with a suitable hammer and mandrel.
18. Dismount the scissor arm assembly from the chassis.
19. Remove the scissor arm assembly from the machine.
20. Plug all the open ports and hoses to prevent contamination.

Figure 38.



A Lifting sling

Install

1. The installation procedure is the opposite of the removal procedure.

Disassemble and Assemble

▲ CAUTION The scissor arm is potentially dangerous, when pivoting about their centre they form a scissor point. Make sure that the scissor arm is securely blocked when working in the scissor arm area.

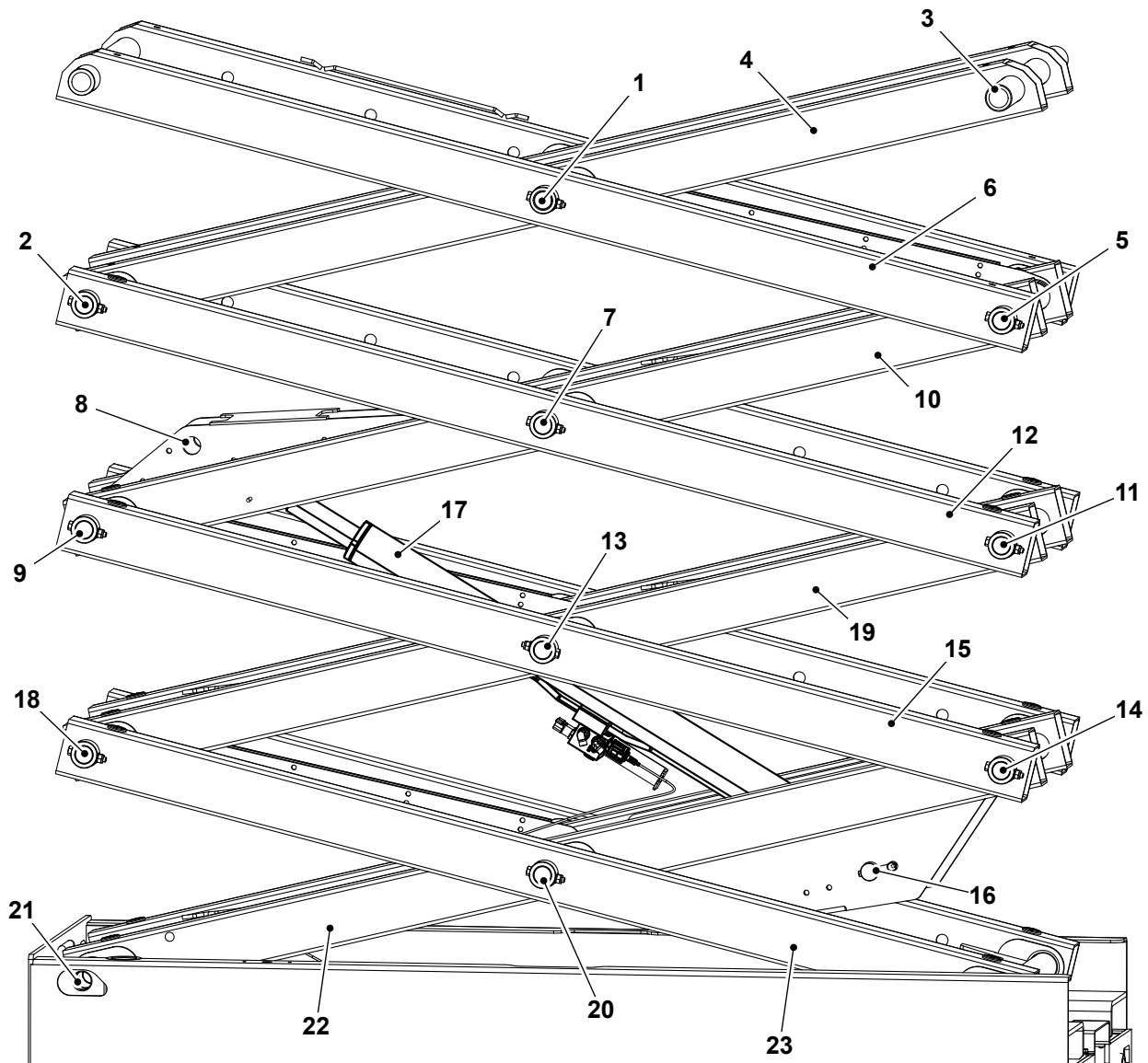
Disassemble

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Remove the platform.

[Refer to: PIL 06-97-00.](#)

3. Remove the scissor arm assembly.
[Refer to: PIL 06-14-00.](#)
4. Use the numerical sequence shown on the illustration as a guide to disassembly.
5. Remove the relevant pivot pin.
[Refer to: PIL 06-30-00.](#)
6. Remove the relevant section of the scissor arm.

Figure 39. Scissor Arm - Single Cylinder



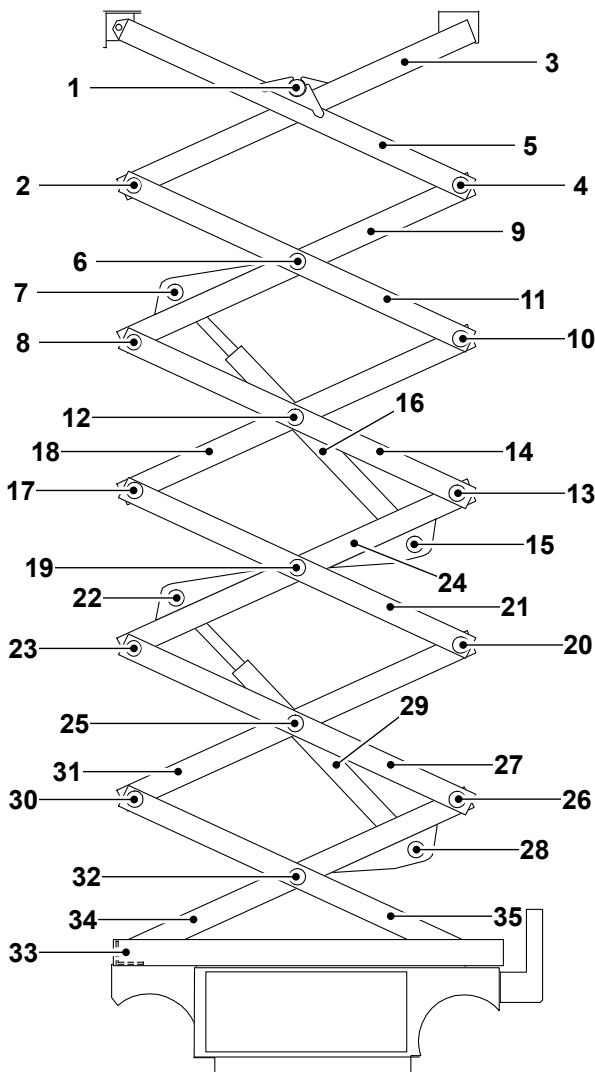
1 Pivot pin 11

2 Pivot pin 9

- 3 Pivot pin 12
- 5 Pivot pin 10
- 7 Pivot pin 8
- 9 Pivot pin 6
- 11 Pivot pin 7
- 13 Pivot pin 4
- 15 Outer arm 2
- 17 Lift cylinder
- 19 Inner arm 2
- 21 Pivot pin 1 (non-steer end)
- 23 Outer arm 1

- 4 Inner arm 4
- 6 Outer arm 4
- 8 Lift cylinder rod-end pivot pin
- 10 Inner arm 3
- 12 Outer arm 3
- 14 Pivot pin 3
- 16 Lift cylinder barrel-end pivot pin
- 18 Pivot pin 5
- 20 Pivot pin 2
- 22 Inner arm 1

Figure 40. Scissor Arm - Double Cylinder



- 8 Inner pivot pin 3 (x2)
- 9 Lower lift cylinder rod-end pivot pin
- 10 Pivot pin 3 (steer end)
- 11 Inner pivot pin 2 (x2)
- 12 Pivot pin 2 (steer end)
- 13 Inner pivot pin 1 (x2)
- 14 Inner arm 1
- 15 Pivot pin 1 (steer end) (x2)
- 16 Inner arm 5
- 17 Outer arm 5
- 18 Pivot pin 5 (non-steer end)
- 19 Inner arm 4
- 20 Outer arm 4
- 21 Pivot pin 4 (non-steer end)
- 22 Upper lift cylinder barrel-end pivot pin
- 23 Inner arm 3
- 24 Pivot pin 3 (non-steer end)
- 25 Inner arm 2
- 26 Outer arm 2
- 27 Pivot pin 2 (non-steer end)
- 28 Lower lift cylinder barrel-end pivot pin
- 29 Outer arm 1

Assembly

1. The assembly procedure is the opposite of the disassembly procedure.

- 1 Pivot pin 6
- 2 Inner pivot pin 5 (x2)
- 3 Upper lift cylinder rod-end pivot pin
- 4 Pivot pin 5 (steer end)
- 5 Inner pivot pin 4 (x2)
- 6 Pivot pin 4 (steer end)
- 7 Outer arm 3

60 - Slider Block

Check (Condition) 06-18

Remove and Install 06-19

Check (Condition)

Consumables

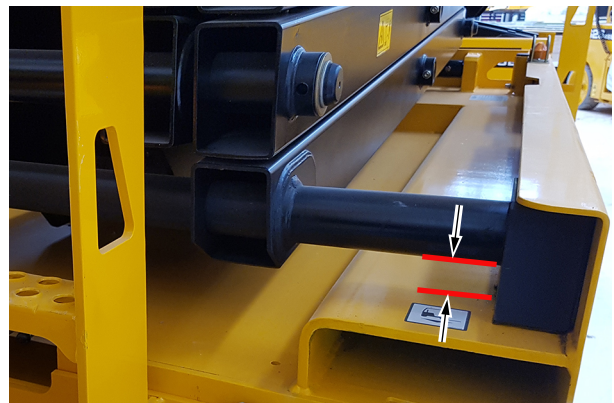
Description	Part No.	Size
Special HP Grease	4003/2020	0.5 kg
	4003/2017	0.4 kg
	4003/2006	12.5 kg
	4003/2005	50 kg

1. Make the machine safe with the platform lowered.

Refer to: PIL 01-03-27.

2. Check the distance from the shaft to the base of the slider block, for each side of the machine.

Figure 41.



3. Check the distance between the fixed end pivot and the bottom mounting plate.

Figure 42.



4. Compare the values obtained in step 2 and step 3.
5. If the difference between the values obtained in step 2 and step 3 is more than the specified, replace the slider block.

Dimension: 0.5mm

6. Apply specified grease to the scissor sliding area on the chassis and beneath the platform.

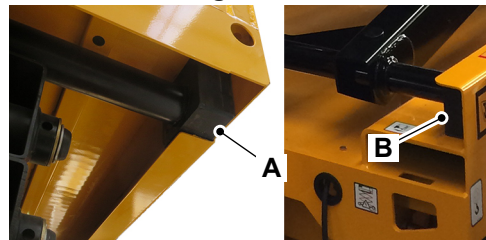
Consumable: Special HP Grease

Remove and Install

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Lower the platform to the stowed position.
3. Remove the platform.
[Refer to: PIL 06-97-00.](#)
4. Remove the slider block 1 from the scissor arm.
[Refer to Figure 43.](#)
5. Remove the scissor arm.
[Refer to: PIL 06-14-00.](#)
6. Remove the slider block 2 from the scissor arm.

Figure 43.



- A** Slider block 1 (x2)
B Slider block 2 (x2)

Install

1. The installation procedure is the opposite of the removal procedure.

81 - Bush

Check (Condition)

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Check the condition of the bush. If damaged, replace it.
3. Check the clearance between the shaft and the bush with a suitable thickness gauge.
4. Make sure that the clearance between the shaft and bush is within the specified limits.

Dimension: 0.1mm



30 - Pivot Pins

Contents	Page No.
06-30-00 General	06-23



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



00 - General

Introduction	06-23
Remove and Install	06-24

Introduction

The pivot pins are a short shaft or pin that supports something that turns. The pivot pins are installed in numerous positions on the machine.

The ram pivot points installed on these machines are maintenance free and do not required any lubrication.

Remove and Install

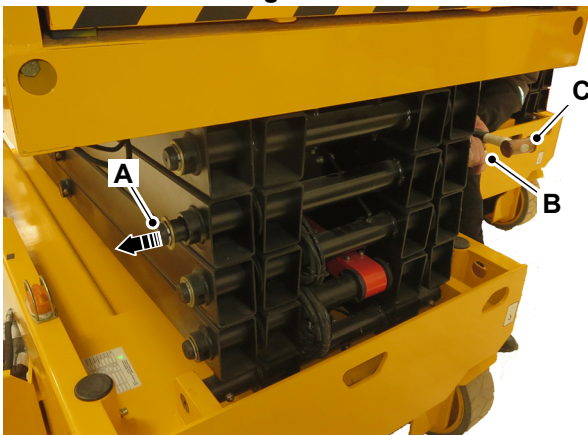
Remove

The illustration shows a typical pivot pin. The actual pivot pin installed on the machine may look different.

Outer Pivot Pin

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Prepare the outer pivot pin for removal.
 - 2.1. Remove the outer pivot pin retaining nuts and bolts.
3. Use a suitable hammer and drift to hit the outer pivot pin.
4. Do the step 3 until the outer pivot pin is released.

Figure 44.



- A Outer pivot pin
- B Drift
- C Hammer

Inner Pivot Pin

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Prepare the inner pivot pin for removal.
3. Use a suitable lifting device to support the scissor arm.
4. Remove the inner pivot pin retaining nuts and bolts.
5. Use a suitable hammer and drift to hit the inner pivot pin.
6. Do the step 5 until the inner pivot pin is released.

Figure 45.



- A Inner pivot pin

Install

1. The installation procedure is the opposite of the removal procedure.



45 - Gas Strut

Contents

Page No.

06-45-45 Pothole Protection	06-27
-----------------------------------	-------



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

45 - Pothole Protection

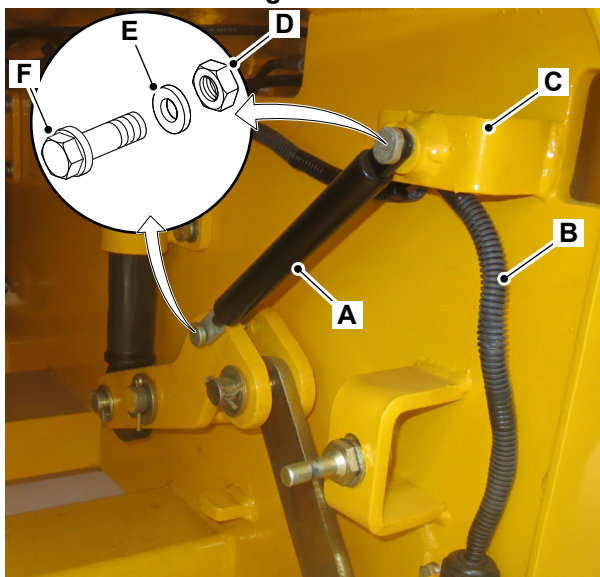
Remove and Install

Take care when you remove the gas strut it is under load.

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Remove the limit switch harness from the bracket.
4. Remove the nut (x2), washer (x2) and bolt (x2).
5. Remove the gas strut.

Figure 46.



- A** Gas strut
- B** Limit switch harness
- C** Bracket
- D** Nut
- E** Washer
- F** Bolt

Install

1. The installation procedure is the opposite of the removal procedure.
2. Do not overtighten the nuts.



47 - Ladder

Contents

Page No.

06-47-00 General	06-29
------------------------	-------

00 - General

Remove and Install

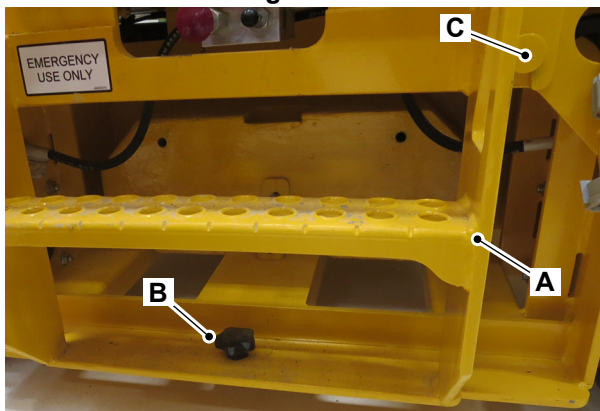
For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ] Page 06-29
For: S1530E [RAJ], S1930E [RAJ] Page 06-29

(For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ])

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Remove the quick release handle.
3. Lift the ladder upwards to release from the fixing points (x2).
4. Remove the ladder.

Figure 47.



- A Ladder
- B Quick release handle
- C Fixing points

Install

1. The installation procedure is the opposite of the removal procedure.

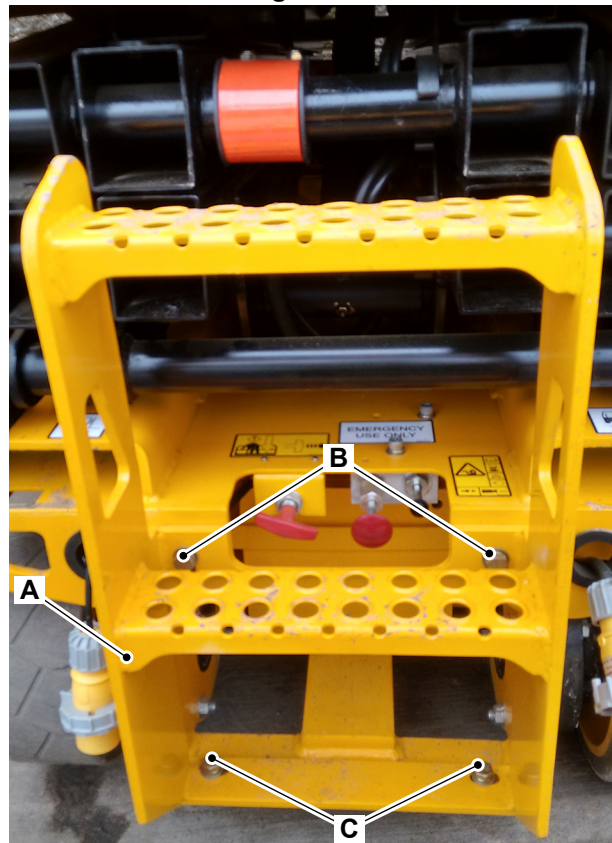
(For: S1530E [RAJ], S1930E [RAJ])

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)

2. Support the ladder with a suitable lifting equipment.
3. Remove the bolt 1 (x2).
4. Remove the bolt 2 (x2).
5. Remove the ladder away from the machine.

Figure 48.



- A Ladder
- B Bolt 1
- C Bolt 2

Install

1. The installation procedure is the opposite of the removal procedure.



57 - Counterweight

Contents

Page No.

06-57-00 General	06-31
------------------------	-------



00 - General

Introduction	06-31
Technical Data	06-32
Remove and Install	06-32

Introduction

The counterweights are heavy metal blocks installed in the ladder. The purpose of the counterweights is to provide stability to the machine while in operation.

Technical Data

Table 42.

Machine Model	Counterweight
S1530E	57.8kg
S1930E	322.8kg
S2032E	220kg
S2632E	141kg
S2646E	415kg
S3264E	338kg
S4046E	355kg
S4550E	194kg

Remove and Install

For: S1530E [RAJ], S1930E [RAJ]

..... Page 06-32

For: S2032E [RAJ], S2632E [RAJ], S3246E [RAJ], S4550E [RAJ] Page 06-33

For: S2646E [RAJ], S4550E [RAJ] Page 06-34

(For: S1530E [RAJ], S1930E [RAJ])

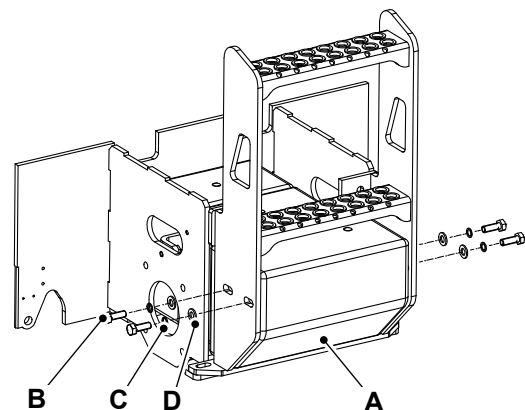
▲ WARNING Do not use the machine with the counterweights removed. The counterweights are critical to the stability of machine.

CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Remove the bolt 1 (x4), spring washer 1 (x4) and washer 1 (x4).
3. Remove the ladder.
[Refer to: PIL 06-47-00.](#)
4. Remove the counterweight 1 carefully.
 - 4.1. Make a note of the positions of the counterweights to help installation.

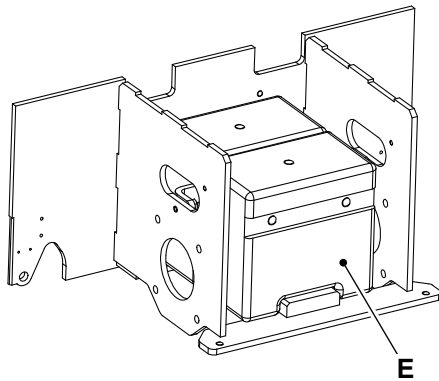
Figure 49.



- A Counterweight 1
- B Bolt 1
- C Spring washer 1
- D Washer 1

5. Remove the counterweight 2 carefully.

Figure 50.



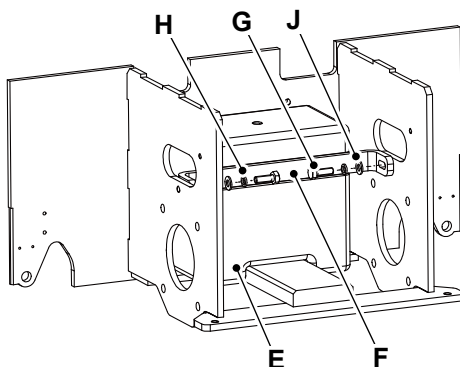
E Counterweight 2

6. Remove the bolt 2 (x2), spring washer 2 (x2) and washer 2 (x2).

6.1. Remove the bracket.

6.2. Remove the counterweight 3 carefully.

Figure 51.



E Counterweight 3
F Bracket
G Bolt 2
H Spring washer 2
J Washer 2

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Make a note that the weights of the counterweights are different, you must not interchange them.

(For: S2032E [RAJ], S2632E [RAJ], S3246E [RAJ], S4550E [RAJ])

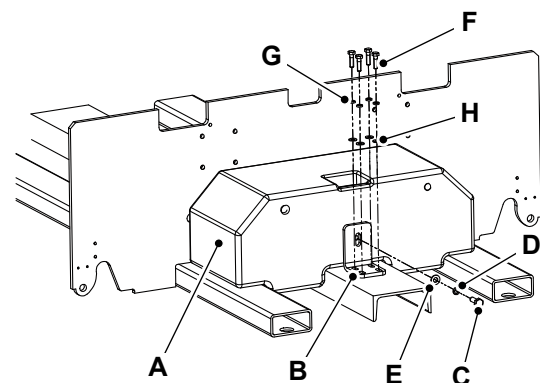
⚠ WARNING Do not use the machine with the counterweights removed. The counterweights are critical to the stability of machine.

CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Remove the bolt 1 (x1), Spring washer 1 (x1) and washer 1 (x1).
3. Remove the bolt 2 (x4), Spring washer 2 (x4) and washer 2 (x4).
4. Remove the bracket from counterweight and chassis.
5. Remove the counterweight from chassis.

Figure 52.



A Counterweight
B Bracket
C Bolt 1
D Spring washer 1
E Washer 1
F Bolt 2
G Spring washer 2
H Washer 2

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Make a note that the weights of the counterweights are different, you must not interchange them.

(For: S2646E [RAJ], S4550E [RAJ])

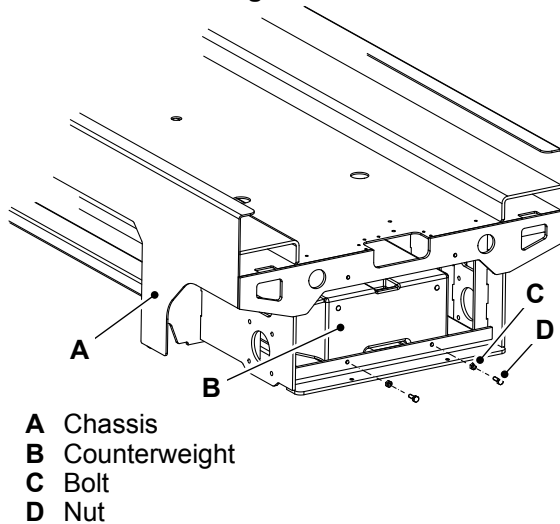
⚠ WARNING Do not use the machine with the counterweights removed. The counterweights are critical to the stability of machine.

CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Get access to the counterweight.
3. Support the counterweight with suitable lifting equipment.
4. Remove the bolt (x2) and nut (x2).
5. Lift the counterweight away from the machine.
Make sure that the counterweight does not swing or snag on any other components.

Figure 53.



Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Make a note that the weights of the counterweights are different, you must not interchange them.



63 - Identification Label

Contents	Page No.
06-63-00 General	06-37
06-63-03 Machine	06-38



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

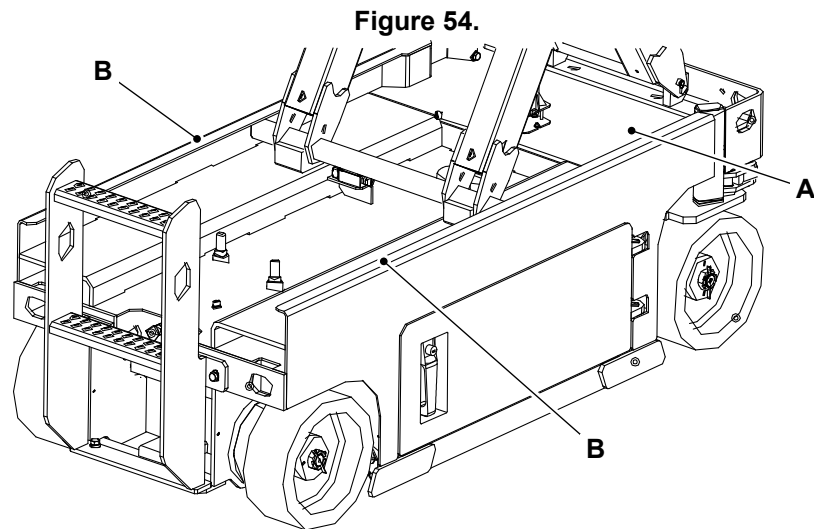
Introduction

The machine has identification plates that contain important information relating to the specific machine details, for example VIN or PIN number. These serial numbers can help you identify exactly what equipment has been installed on the machine.

03 - Machine

Introduction

Your machine has an identification plate as shown.
Refer to Figure 54.



A Machine identification plate location

B VIN Stamping location

Explanation of Machine Identification Plate

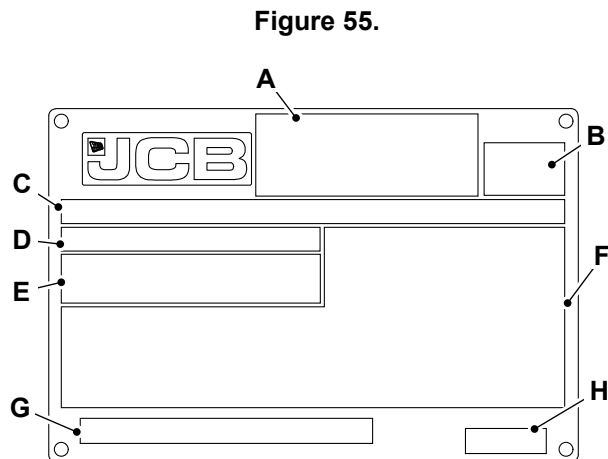


Table 43.

A	Manufacturers address
B	Regional certification mark (if applicable) ⁽¹⁾
C	PIN (Product Identification Number) ISO10261
D	Model
E	Model and manufacture year ⁽²⁾
F	Model data



G	Product description and relevant design standards
H	Part number

(1) This only applies to markets requiring a certification mark. example a CE mark.

(2) This only applies to markets requiring a model and manufacture year.



66 - Tools

Contents

Page No.

06-66-00 General	06-41
------------------------	-------

00 - General

Introduction

When you carry tools onto the machine, you must keep three points of contact with the machine at all times. If necessary, lift the tools on to the machine in intervals. Put the tools down before you adjust your grips on the machine. Do not try to adjust your grips on the machine while holding tools.



93 - Emergency Lower System

Contents	Page No.
06-93-00 General	06-43
06-93-03 Cable	06-46

00 - General

Introduction	06-43
Operation	06-44
Check (Operation)	06-45

Introduction

The emergency lower system allows the user to lower the platform from the ground in the event of a primary power failure.

Pull the emergency lower handle to lower the platform in an emergency. Before you lower the platform with the emergency lower lever, do the following.

- Make sure that the lowering of the platform is not hindered by obstructions under the scissor arm.
- It may be necessary to retract the extension platform.
- Refer to the applicable Operator's Manual for correct procedure of using emergency lower lever.

Operation

For: Double Cylinder Page 06-44

For: Single Cylinder Page 06-44

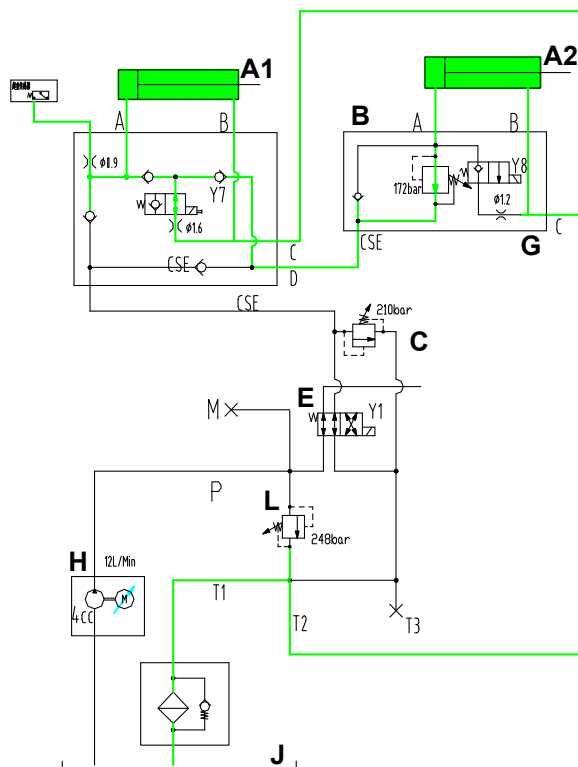
(For: Double Cylinder)

When you pull the emergency lower handle, the lower solenoid valve on the cylinder valve is pulled to the position shown. Then the oil in the head port of the lower scissor arm cylinder ram flows into the oil tank through this valve under the action of gravity and some oil flows into the rod port.

With the retraction of the lower scissor arm cylinder ram, the pressure of the head port for the upper lift arm cylinder ram increases. This increased pressure opens the scissor lower valve and the oil returns back to the oil tank along with the lower scissor arm cylinder ram.

During the lowering operation, oil flows through a restrictor, which controls the lowering speed.

Figure 56.



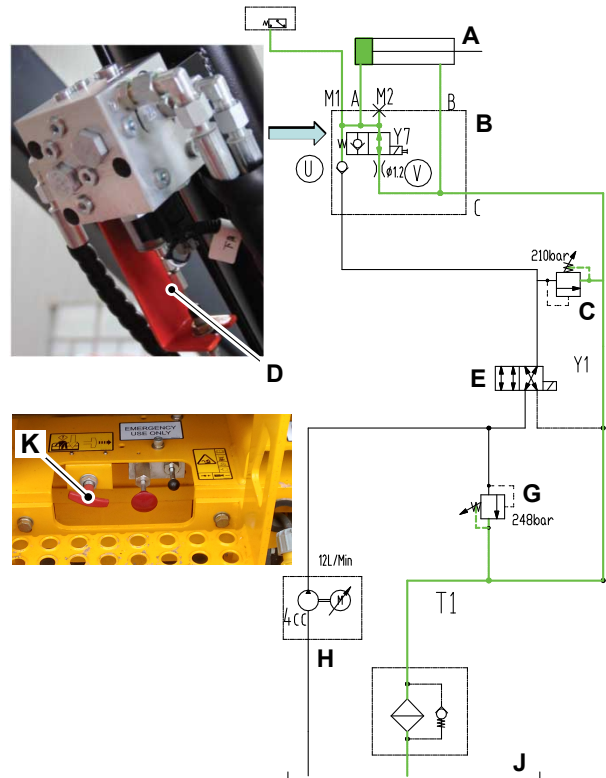
- A** Lower lift cylinder
- B** Lower lift cylinder valve block
- C** Lift ARV (Auxiliary Relief Valve)
- G** Upper lift cylinder valve block
- H** Gear pump
- J** Hydraulic tank
- K** Emergency lower handle
- L** Scissor lower valve

(For: Single Cylinder)

When you pull the emergency lower handle, the lower solenoid valve on the cylinder valve is pulled to the position shown. Then the oil in the head port of the scissor arm cylinder ram flows into the oil tank through this valve under the action of gravity and some oil flows into the rod port.

During the lowering operation, oil flows through a restrictor, which controls the lowering speed.

Figure 57.



- A** Lift cylinder
- B** Lift cylinder valve block
- C** Lift ARV
- D** Solenoid valve (Lower)
- G** MRV (Main Relief Valve)
- H** Gear pump
- J** Hydraulic tank
- K** Emergency lower handle

Check (Operation)

⚠ WARNING Keep hands and arms out of the path of the scissor arms when lowering the platform.

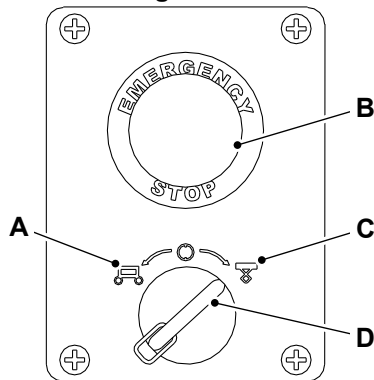
The lowering alarm does not sound while lowering but if the machine is switched ON the fault alarm will sound due to lowering without electrical controls. Lowering may continue.

1. Make the machine safe with the platform lowered.

[Refer to: PIL 01-03-27.](#)

2. Make sure that the platform extension is in the fully retracted position.
3. Turn the key switch to the ground control position.

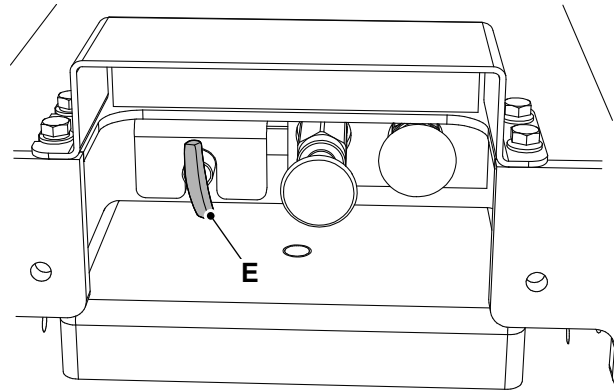
Figure 58.



- A** Ground control position
- B** Emergency stop switch
- C** Platform control position
- D** Key switch

4. On the ground controller press the raise/up button to raise the platform.
5. Make sure that the platform is raised to its full height.
6. Pull the emergency lowering lever.

Figure 59.



E Emergency lowering lever

7. Make sure that the platform is lowered.

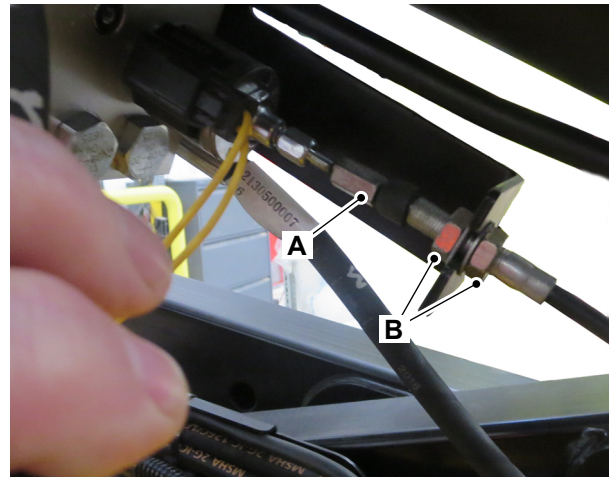
03 - Cable

Adjust	06-46
Remove and Install	06-47

Adjust

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Loosen the locknut (x2).
5. Adjust the cable length as required so that the emergency lower function operates correctly.

Figure 60.



- A** Cable
- B** Locknut (x2)

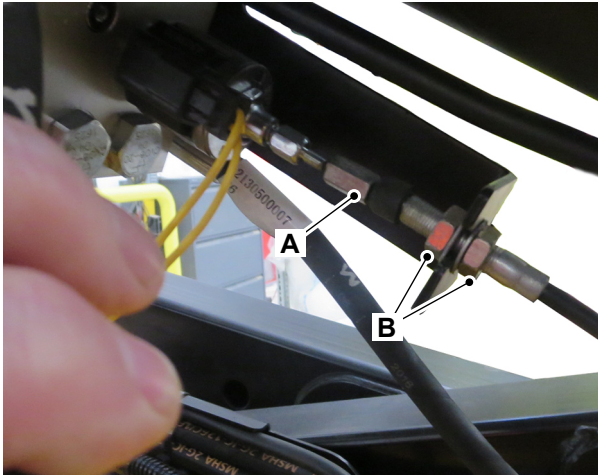
6. Check the operation of the emergency lower system.
[Refer to: PIL 06-93-00.](#)
7. If necessary, do the step 1 to 5 again.
8. Tighten the locknut (x2) to lock the position of the cable.
9. Install the maintenance strut.
[Refer to: PIL 01-03-27.](#)
10. Connect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)

Remove and Install

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Loosen the nut 1 (x2). Refer to Figure 61.
5. Pull out the inside fitting to release the cable at the top.

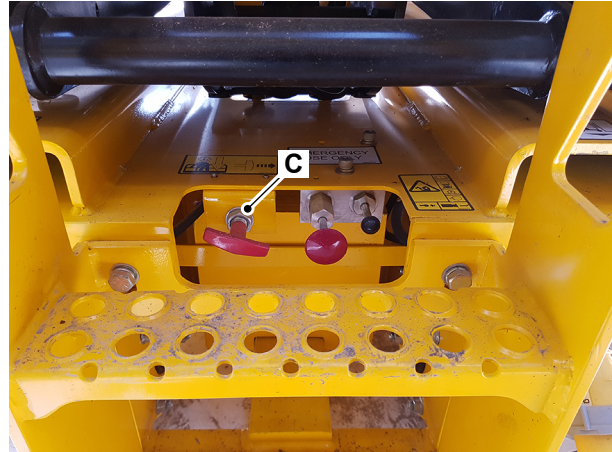
Figure 61.



- A** Cable
- B** Nut 1 (x2)

6. Remove the cable ties that secure the cable to the scissor arm.
7. Remove the nut 2 (x2). Refer to Figure 62.
8. Remove the cable slowly through the release handle aperture.

Figure 62.



- C** Nut 2 (x2)

Install

1. The installation procedure is the opposite of the removal procedure.
2. Adjust the cable.
[Refer to: PIL 06-93-03.](#)



94 - Pothole Protection System

Contents	Page No.
06-94-00 General	06-49
06-94-04 Actuator Rod	06-54
06-94-06 Plate	06-55

00 - General

Introduction	06-49
Component Identification	06-50
Operation	06-52
Check (Operation)	06-53

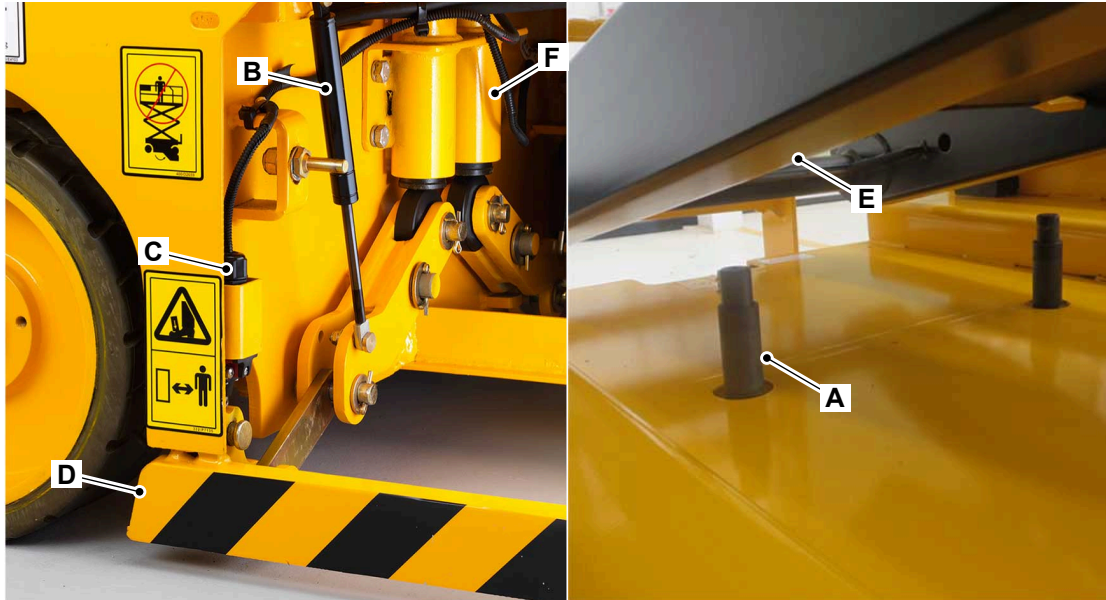
Introduction

The pothole protection system on these machines helps to prevent the machine from tipping over when one wheel drives off a depression, such as a pothole.

A typical pothole protection system consists of a protection plate, actuator and supporting linkages. The protection plates are extended when the platform is raised, and the protection plates are retracted when the platform is lowered to allow the machine to drive over ramps or obstacles.

Component Identification

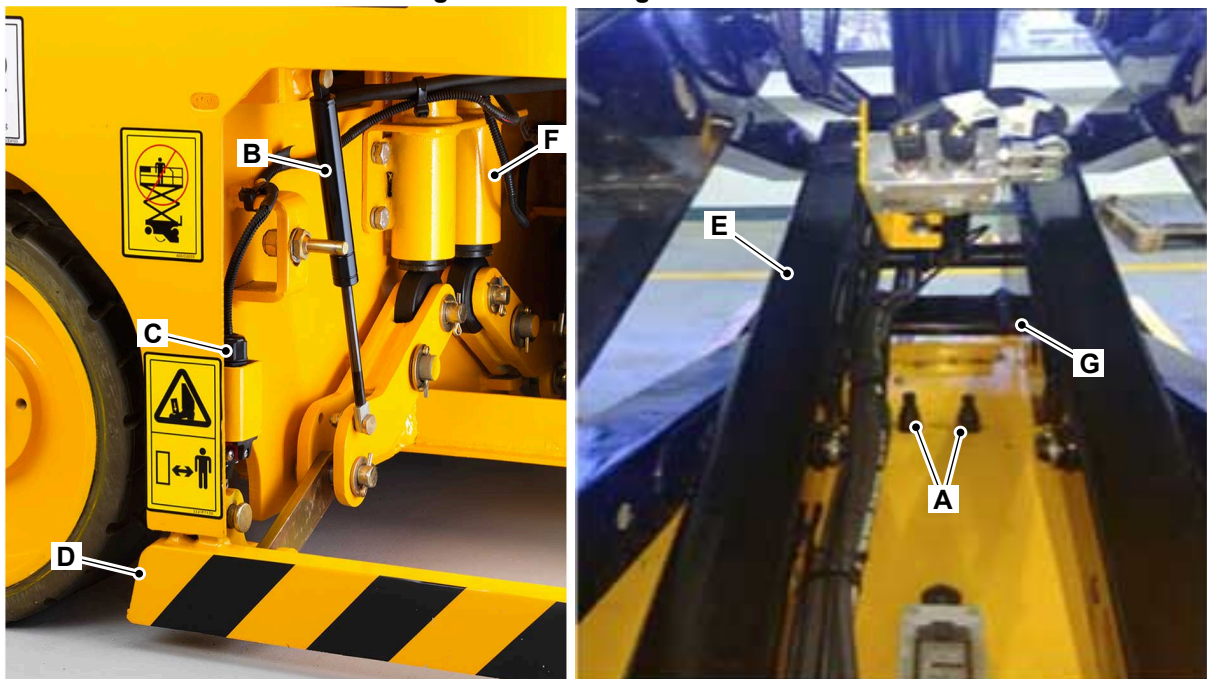
Figure 63. For Smaller Machines



- A Actuator rods
- C Protection sensor
- E Scissor arm

- B Gas strut
- D Protection plate
- F Actuator case

Figure 64. For Larger Machines



- A Actuator rods

- B Gas strut



C Protection sensor
E Scissor arm
G Bracket

D Protection plate
F Actuator case

Operation

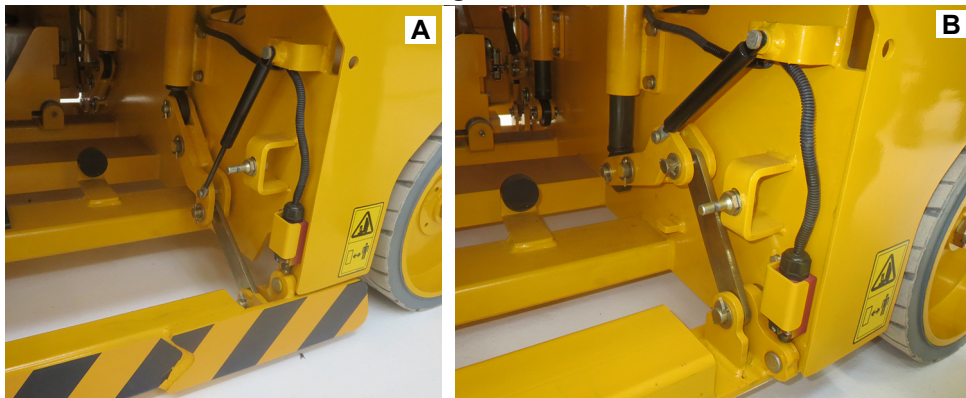
The pothole protection system consists of sensors (x2) and actuator rods (x2).

When the platform rises, the protection plate will open under the action of the weight of the plates and the force of the gas strut. When the platform lowers, the lower scissor arm will press the actuator,

the actuator rod will move downwards, and the protection plate will retract automatically.

You must check the operation of the pothole protection daily to confirm whether the protection plate retracts and extends normally.

Figure 65.



A Protection plate in extended position (Platform raised)

B Protection plate in retracted position (Platform lowered)

Check (Operation)

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Lower the platform to the stowed position.
3. Place a block under the pothole plate on one side.
4. Use the ground controls to raise the platform.
 - 4.1. The pothole protection alarm should trigger when the scissor is raised off the down limit switch.
5. Check the machine operation.
 - 5.1. All functions except lowering should be disabled.

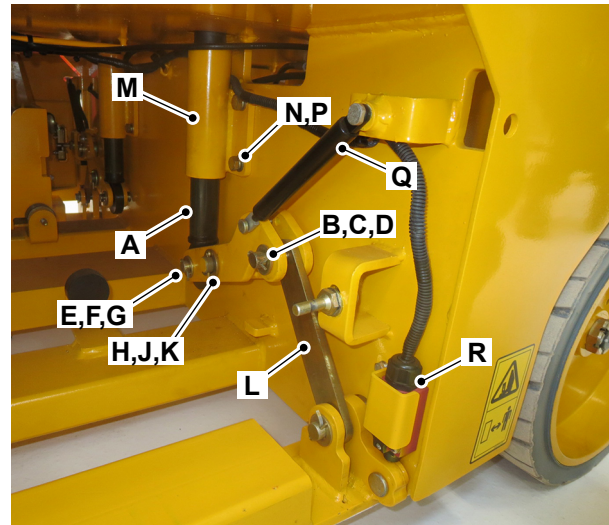
04 - Actuator Rod

Remove and Install

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. If necessary, remove the pothole protection switch.
[Refer to: PIL 33-84-82.](#)
4. Remove the gas strut.
[Refer to: PIL 06-45-45.](#)
5. Remove the split pin 1 (x2) and washer 1 (x2).
6. Lever out the pivot pin 1 (x2).
7. Disconnect the lever link arm (x2) from the pivot link arm.
8. Remove the split pin 2 (x2) and washer 2 (x3).
9. Support the actuator rod suitably.
10. Lever out the pivot pin 2 (x2).
11. Slowly remove the actuator rod (x2) from the guide sleeve (x2).
12. If necessary, remove the pivot link arm as follows.
 - 12.1. Remove the split pin 3 (x2) and washer 3 (x3).
 - 12.2. Remove the pivot link arm from the machine.
 - 12.3. Lever out the pivot pin 3 (x2).
13. If necessary, remove the guide sleeve as follows.
 - 13.1. Remove the bolt (x4), washer 4 (x8)
 - 13.2. Remove the guide sleeve (x2) from the machine.

Figure 66.



- A** Actuator rod
- B** Split pin 1 (x2)
- C** Washer 1 (x2)
- D** Pivot pin 1 (x2)
- E** Split pin 2 (x2)
- F** Washer 2 (x2)
- G** Pivot pin 2 (x2)
- H** Split pin 3 (x2)
- J** Washer 3 (x2)
- K** Pivot pin 3 (x2)
- L** Lever link arm
- M** Guide sleeve
- N** Bolts (x4)
- P** Washers 4 (x8)
- Q** Gas strut
- R** Pothole protection switch (x2)

Install

1. The installation procedure is the opposite of the removal procedure.
2. Apply grease to the pivot pins in accordance with the Maintenance Schedules.
[Refer to: PIL 78-24-06.](#)

06 - Plate

Remove and Install

Remove

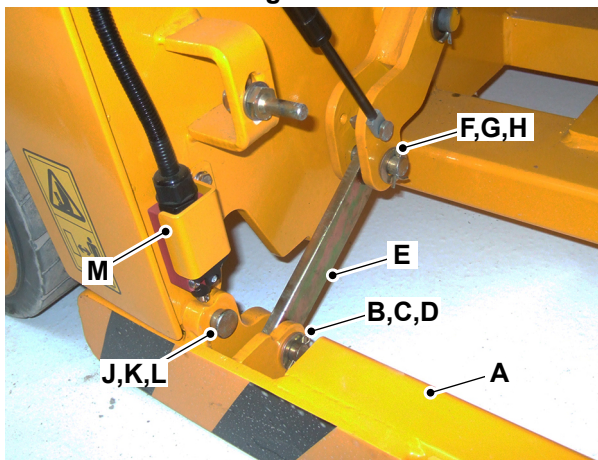
1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. If necessary, remove the pothole protection switch.
[Refer to: PIL 33-84-82.](#)
4. Remove the split pin 1 (x2) and washer 1 (x2).
5. Lever out the pivot pin 1 (x2).
6. Disconnect the lever link (x2) from the pothole protection plate.
7. If necessary, remove the lever links as follows.
 - 7.1. Remove the split pin 2 (x2) and washer 2 (x2).
 - 7.2. Lever out the pivot pin 2 (x2).
 - 7.3. Remove the lever link (x2).
8. Remove the split pin 3 (x2) and washer 3 (x3).
9. Lever out the pivot pin 3 (x2).
10. Remove the pothole protection plate from the machine.

- F** Split pin 2 (x2)
G Washer 2 (x2)
H Pivot pin 2 (x2)
J Split pin 3 (x2)
K Washer 3 (x2)
L Pivot pin 3 (x2)
M Pothole protection switch (x2)

Install

1. The installation procedure is the opposite of the removal procedure.
2. Apply specified grease to the pivot pins in accordance with the Maintenance Schedules.
[Refer to: PIL 75-00-00.](#)

Figure 67.



- A** Pothole protection plate
B Split pin 1 (x2)
C Washer 1 (x2)
D Pivot pin 1 (x2)
E Lever link

97 - Platform

Contents**Page No.**

06-97-00 General	06-57
06-97-03 Platform Extension	06-61
06-97-06 Guardrail	06-64
06-97-09 Gate	06-67
06-97-12 Gate Hinge	06-68
06-97-30 Extension Pedal	06-69
06-97-50 Wear Pads	06-71



00 - General

Introduction	06-57
Health and Safety	06-58
Check (Condition)	06-59
Remove and Install	06-60

Introduction

The platform is mounted on top of the lift or scissor arm. The platform consists of the following parts:

- Gate.
- Guardrail.
- Main platform.
- Platform extension.

Health and Safety

▲ **WARNING** Control lever/switch action may vary on machines, instructional labels near the levers/switches show by symbols, which levers/switches cause what actions. Before operating control levers/switches check the instructional label to make sure you select the desired action.

WARNING To operate the machine safely you must know the machine and have the skill to use it. You must abide by all relevant laws, health and safety regulations that apply to the country you are operating in. The operator's manual instructs you on the machine, its controls and its safe operation; it is not a training manual. Ensure that you receive the correct training before operating any machinery. Failing to do so will result in incorrect operation of the machine and you will be putting yourself and others at risk. In some markets, and for work on certain jobsites, you may be required to have been trained and assessed in accordance with an operator competence scheme. Make sure that you and your machine comply with relevant local laws and jobsite requirements – it is your responsibility.

WARNING Make sure it is clear overhead before raising the platform. Keep an adequate safe distance from all electrical power lines. Contact your local power company for safety procedures.

WARNING Notice boards or panels must not be installed on the platform because they will increase wind resistance.

WARNING Do not use the platform as a crane.

WARNING Do not extend the reach or height of the platform by the use of ladders or other equipment.

WARNING Do not use the platform when the wind speed exceeds the rated limit, stated in the operators manual.

WARNING Do not allow the machine to come in to contact with fixed objects, buildings etc.

WARNING Do not allow the machine to come in to contact with moving objects, vehicles, cranes etc.

WARNING Do not exceed the maximum rated load stated on the platform.

WARNING All operators must be adequately trained and authorised to use the machine.

WARNING All operators must make sure there is a restricted area under or around the platform to safeguard against falling objects injuring bystanders or colleagues.

WARNING All operators must use the correct safety harnesses when operating from the platform. Hard hats with chin straps must also be worn.

WARNING Do not operate the machine from the base controls with personnel in the platform, except when you need to lower the platform in an emergency using the procedure in the operators manual.

If the platform cannot be lowered by the use of the emergency controls, personnel must be removed using other means.

You must not work on the machine whilst personnel are in the platform.

Check (Condition)

▲ WARNING If one or more of these faults are found, make sure the machine is not used until the fault has been correctly repaired or the component replaced.

Notice: These checks do not replace inspections that are necessary to obey local or national regulations applicable in your area.

Remote Mode Pre- Operation Checks

Prior to commencing work from the platform, the following functions must be checked (refer to the Operators Manual):

1. Machine isolation from the operator station.
2. Machine isolation from the platform.
3. Emergency Lowering.

Checking For Damage

1. These checks are not a substitute for inspections to meet the prevailing regulations in your territory.
 - 1.1. Platforms should be inspected daily prior to use to ensure structural soundness and correct operation.

Check the Platform Structure

1. Inspect all steelwork for damage. Pay particular attention to the following:
 - 1.1. Inspect all lifting point welds.
 - 1.2. Inspect all pivot point welds.
 - 1.3. Inspect all lanyard anchor points.
 - 1.4. Inspect the condition of all pivot pins.
 - 1.5. Check pivot pins are correctly in place and secured by their locking devices.
2. Check handrails and toeplates are undamaged and secure.
3. Check gates are undamaged and secure.
4. Check all safety and instructional labels are in place and undamaged. Install new labels where necessary.
5. Note damaged paintwork for future repair.

Check the Electrical Circuits

1. Inspect the electrical circuits regularly for:
 - 1.1. Damaged connectors.
 - 1.2. Loose connections.

1.3. Chafing on wiring harnesses.

1.4. Corrosion.

1.5. Missing insulation.

1.6. Incorrect routing of harness.

2. Do not use the machine if one or more of these faults are found. You must make sure that the electrical circuit is repaired immediately.
3. Perform the daily checks as stated in the machine operator's manual.

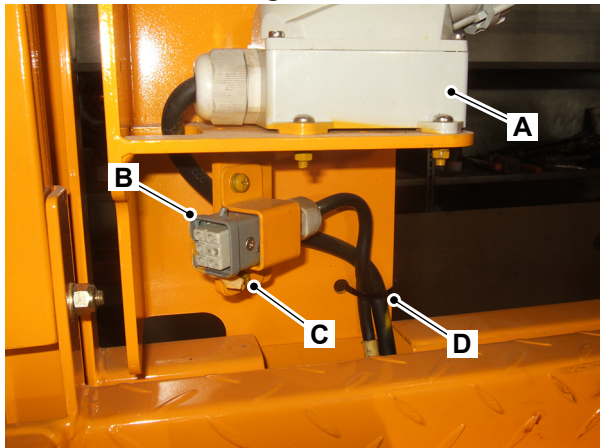
Remove and Install

⚠ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the external power supply, and set the emergency stop switches of the platform and ground control panels at the OFF position.
3. Find the cable connected to the bottom of the platform control box assembly.
4. Remove the cable ties.
5. Disconnect the cable from the bottom of the control box.
6. Remove the screws, remove the platform control box assembly and mounting brackets, and remove the control cable away from the working platform.
7. (If installed) Remove the screws, remove the AC (Alternating Current) power socket away from the mounting bracket.

Figure 68.



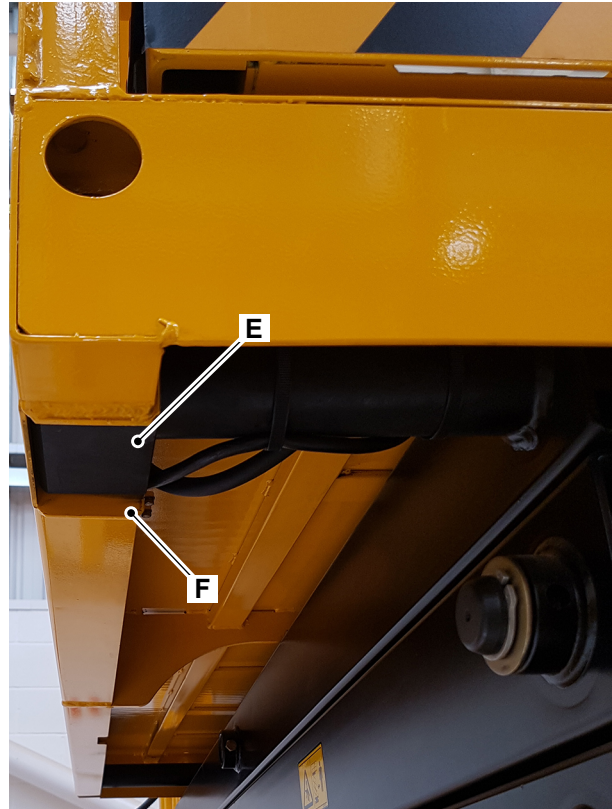
- A** AC power socket
- B** Platform controller power socket
- C** Screws (x2)
- D** Cable Tie

8. Disassemble the AC and platform power socket. Disconnect the harnesses and feed through the aperture in the base of the platform.

[Refer to: PIL 33-95-75.](#)

9. Use a suitable lifting hoist with straps positioned under the platform base to carefully raise the platform slightly.
10. Raise and push the platform forwards to allow the slider block to clear the gap at the rear of the platform base.
11. Remove the platform away from the machine.

Figure 69.



- E** Rear slider
- F** Gap at rear of platform base

Install

1. The installation procedure is the opposite of the removal procedure.

03 - Platform Extension

Introduction	06-61
Open and Close	06-62
Remove and Install	06-63

Introduction

The platform extension allows the operator to laterally increase the walking area on the platform.

Due to space restrictions, the machine cannot be parked immediately adjacent to the work at ground level, but at some height above the ground this restriction is no longer an issue. At such instances you may use the platform extension to get better access to the work place.

Press the platform extension pedal and push the platform extension forwards as required to extend the platform extension.

Open and Close

▲ WARNING Do not exceed the maximum rated load stated on the platform.

WARNING Do not stand on the extension platform while it is moving or not fixed.

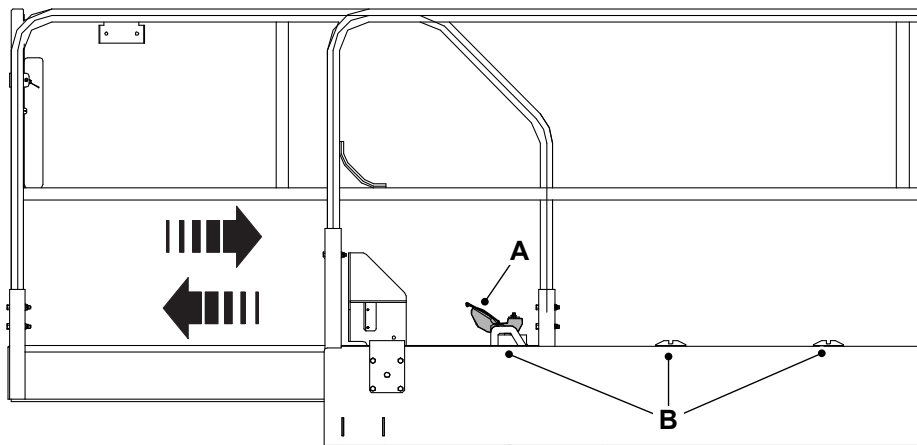
CAUTION Do not lower the platform without completely retracting the platform extension.

Make sure that platform door is latched correctly before extending or retracting the platform.

There are three fixing positions for the extending platform

1. Press the pedal.
2. Hold and push the extension platform guard rail.
3. Release the pedal when the rail is in one of the three fixing positions. Make sure that it is engaged correctly.

Figure 70.



A Pedal

B Fixing positions

4. Press the pedal and pull the extended guardrail to retract the platform.

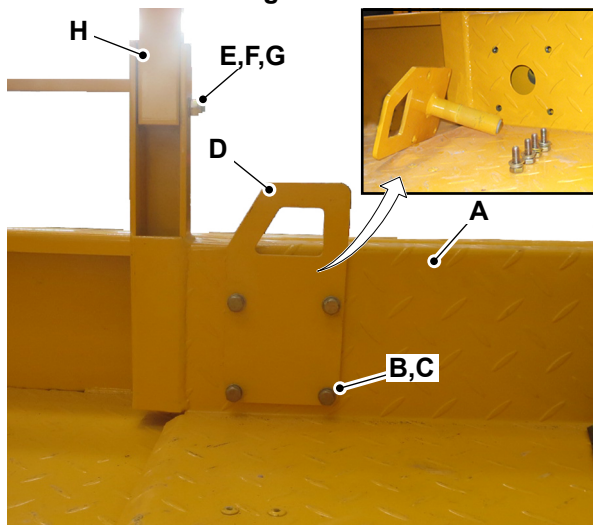
Remove and Install

⚠ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Remove the AC (Alternating Current) connector and the mounting bracket from the platform.
[Refer to: PIL 33-95-75.](#)
4. Remove the platform control cradle from the platform position.
5. Remove the platform extension pedal.
[Refer to: PIL 06-97-30.](#)
6. Remove the bolts 1 (x4) and washers 1 (x8) from the lock plate.

Figure 71.



- A Platform extension
- B Bolts 1 (x4)
- C Washers 1 (x8)
- D Lock plate
- E Bolts 2
- F Washers 2
- G Nuts 1
- H Guardrails

7. Support the platform extension with suitable lifting equipment.
8. Carefully slide out the platform extension forwards.

Figure 72.



- A Platform extension
- J Platform

9. Remove the platform extension from the platform.
10. If necessary, remove the guardrails.
 - 10.1. Remove the bolts 2, washers 2 and nuts 1.
 - 10.2. Remove the guardrails from the platform extension.

Install

1. The installation procedure is the opposite of the removal procedure.

06 - Guardrail

Open and Close	06-64
Remove and Install	06-66

Open and Close

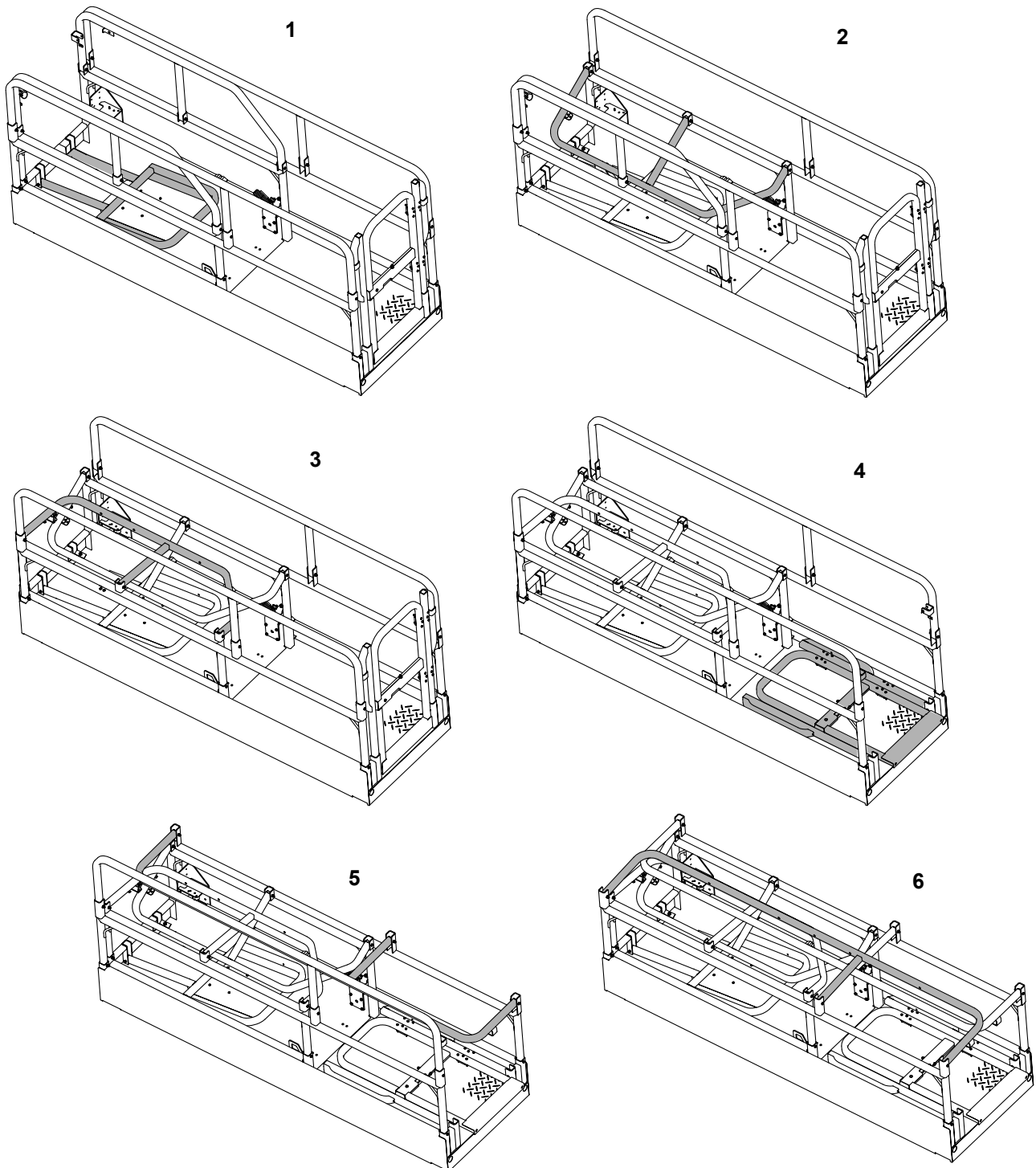
▲ CAUTION If the guardrails have been folded down, use extreme caution when entering and leaving the operator station. Do not operate the controls from the platform when the guard rails are folded.

Fold the guardrails in order as shown. Refer to Figure 73.

1. To fold down each of guardrail, remove the lock pin for that guardrail.
2. Take a firm hold on the top of the guardrail, carefully lower it until it is fully folded. Follow the sequence of folding order

For unfolding the guardrails, follow the reverse sequence of folding order. Make sure that each lock pin is installed when guardrails are unfolded.

Figure 73.



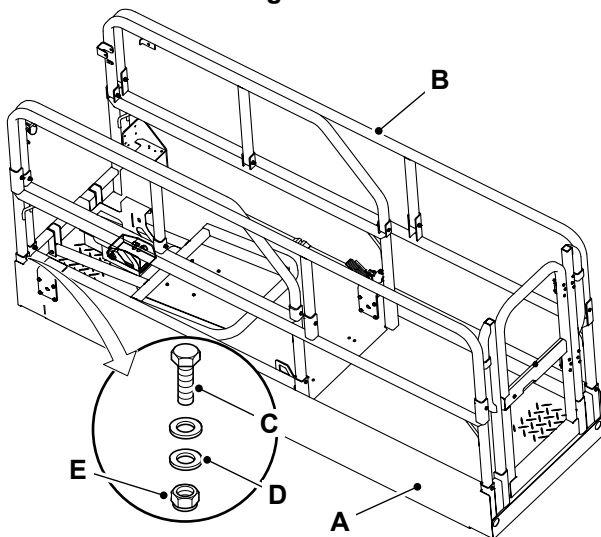
Remove and Install

⚠ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Remove the platform control cradle from the platform position.
4. Support the guardrails with suitable lifting equipment.
5. Remove the bolts, nuts and washers from the relevant guardrails.

Figure 74.



- A Platform
- B Guardrail
- C Bolts
- D Washers
- E Nuts

6. Remove the locking pins.
7. Slowly remove the each guardrail.

Figure 75.



F Locking pin

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the nuts to the correct torque value.
3. Check the operation of folding guardrails.

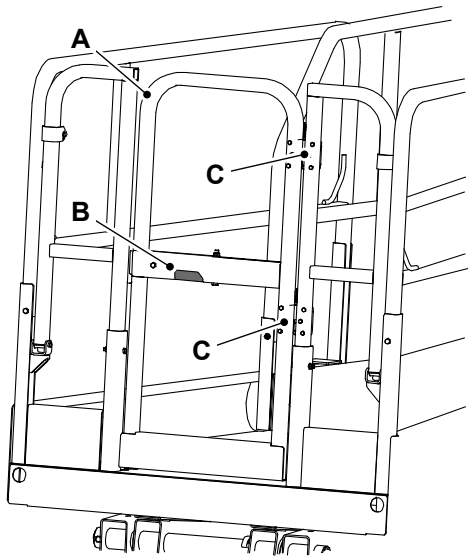
09 - Gate

Remove and Install

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Close the platform gate and make sure it latches correctly.
3. Remove the gate hinges.
[Refer to: PIL 06-97-12.](#)
4. Depress the lever.
5. Remove the gate from the machine.

Figure 76.



- A** Gate
B Lever
C Hinge

Install

1. The installation procedure is the opposite of the removal procedure.

12 - Gate Hinge

Remove and Install

The following procedure is for the removal of one gate hinge, the procedure for the other gate hinge is similar.

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Remove the bolts (x6), nuts (x6) and washers.
3. Support the gate.
4. Remove the gate hinge.

Figure 77.



- A** Gate hinge
- B** Bolts (x6)
- C** Nuts (x6)
- D** Gate

Install

1. The installation procedure is the opposite of the removal procedure.
2. Tighten the bolts to the correct torque value.

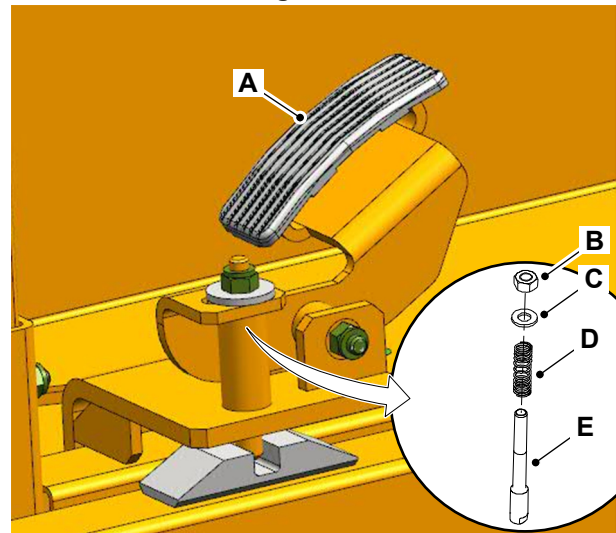
30 - Extension Pedal

Lubricate	06-69
Remove and Install	06-70

Lubricate

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Press and hold the extension pedal.
3. Apply grease on the pin.
4. If necessary, do the following.
 - 4.1. Remove the nut, washer, spring and pin.
 - 4.2. Apply grease to the pin.
 - 4.3. Install the pin, spring washer and nut.

Figure 78.



- A Pedal
- B Nut
- C Washer
- D Spring
- E Pin

Remove and Install

Remove

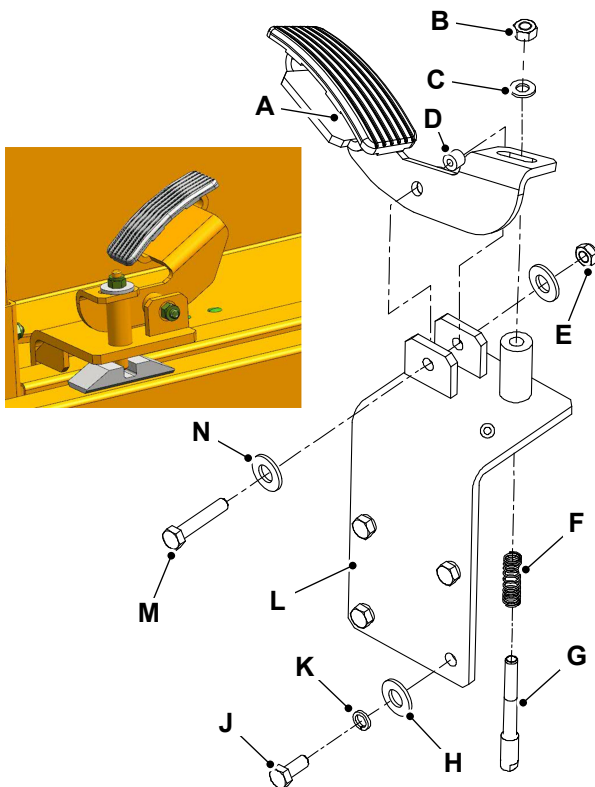
1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Remove the nut 1 and washer 1.
3. Remove the nut 2, washer 3 (x2) and bolt 2.
4. Remove the pedal from the machine.
5. Collect the boss.
6. Remove the bolt 1 (x4), spring washer (x4) and washer 2 (4).
7. Remove the bracket from the machine.
8. Collect the spring and pin.

- L** Bracket
M Bolt 2
N Washer 3 (x2)

Install

1. The installation procedure is the opposite of the removal procedure.

Figure 79.



- A** Pedal
B Nut 1
C Washer 1
D Boss
E Nut 2
F Spring
G Pin
H Washer 2 (x4)
J Bolt 1 (x4)
K Spring washer (x4)

50 - Wear Pads

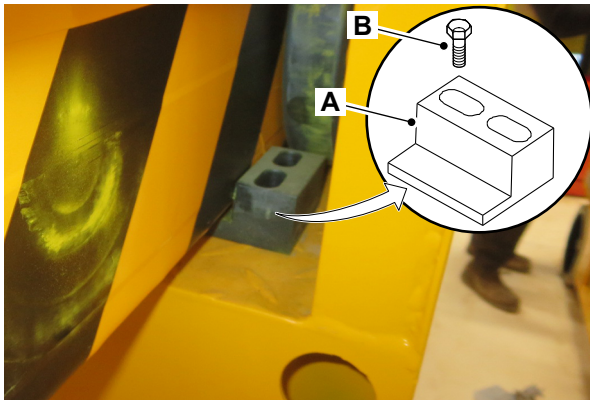
Remove and Install

It is recommended that the wear pads are replaced in complete sets.

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Remove the front wear pads.
 - 2.1. Remove the setscrews (x4) from the front wear pads (x2).

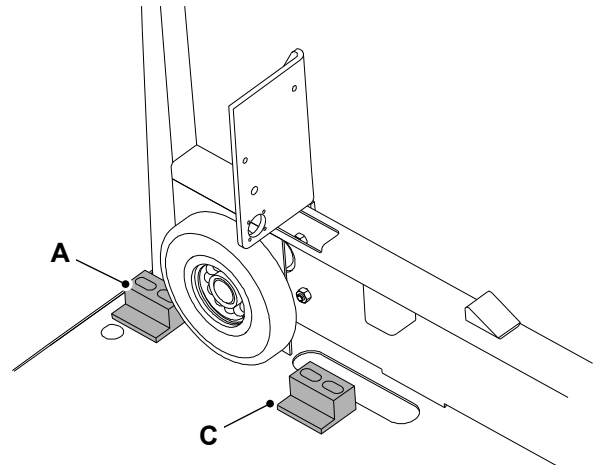
Figure 80.



A Front wear pads
B Bolts

3. Remove the rear wear pads.
 - 3.1. Remove the platform extension from the platform.
[Refer to: PIL 06-97-03.](#)
 - 3.2. Remove the setscrews (x4) from the rear wear pads (x2).

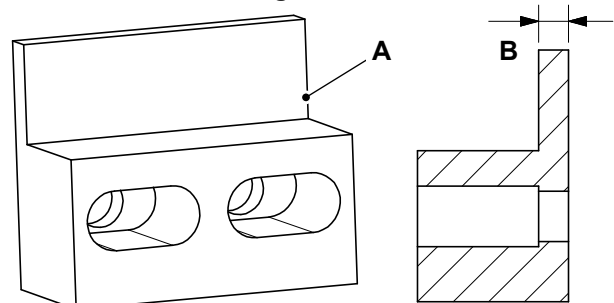
Figure 81.



A Front wear pads
C Rear wear pads

4. Examine the pads for wear, cracks or damage. Replace as necessary.
5. Make sure that wear is within the specified limits. Dimension: 3mm
 - 5.1. The original dimensions (as of new) are shown. Refer to Figure 82.

Figure 82.



A Wear pad
B Thickness (6mm)

Install

1. The installation procedure is the opposite of the removal procedure.



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



24 - Brake System

Contents	Page No.
Acronyms Glossary	24-2
24-00 Brake System	
24-00-00 General	24-3
24-00-06 Dump Valve	24-8



Acronyms Glossary

SAHR Spring Applied Hydraulic Release



00 - Brake System

Contents	Page No.
24-00-00 General	24-3
24-00-06 Dump Valve	24-8



Notes:

00 - General

Introduction	24-3
Health and Safety	24-4
Operation	24-4
Check (Operation)	24-5
Remove and Install	24-6
Disassemble and Assemble	24-7

Introduction

This machine has brakes installed on the rear wheels only. The brakes installed on this machine are park brake only, there are no dynamic brakes installed.

The brake will release automatically during travel, the brake will not release during lifting.

The brakes installed on this machine are SAHR (Spring Applied Hydraulic Release) type.

Health and Safety

Working Under the Machine

Make the machine safe. Make sure the park brake is engaged and machine is fully isolated. Remove the machine key switch, disconnect the battery. Use blocks to prevent unintentional movement of the wheels.

Springs

Always wear personal protective equipment when dismantling assemblies containing components under pressure from springs. This will protect against eye injury from components accidentally flying out.

WARNING! Before working on the brake system, make sure that the machine is on solid level ground. Put blocks on all wheels to prevent the machine rolling.

WARNING! Before testing the park brake make sure the area around the machine is clear of people.

WARNING! Do not use a machine with a faulty park brake.

WARNING! Do not use the machine with any part of its brake system disconnected or inoperative. When the test has been completed, make sure all brake system components are installed and the system is operating correctly.

Operation

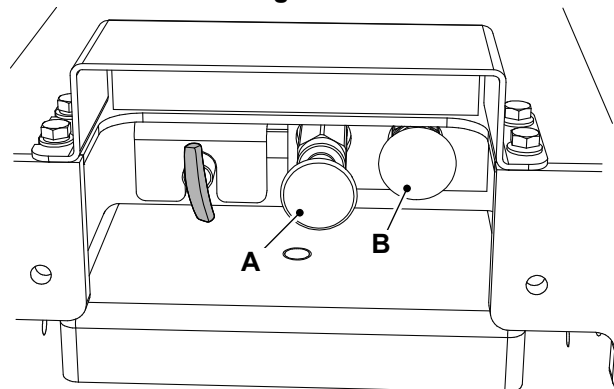
Manual Release of Brake

When the machine is without power and it is required to move the machine to a repair position, use the manual brake release valve.

To release the brakes:

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Put wheel chocks at the front and rear of all four wheels. Make sure they are securely in place.
3. On the rear side of the chassis, push the brake release handle to close the brake valve and trap the brake pressure.
4. Firmly pump the brake release pump handle as required to release the brake.
5. Pull the brake release handle out after the machine is recovered to re-apply the brakes.

Figure 83.



- A Brake release pump lever
- B Brake release valve lever

Check (Operation)

The brakes must be able to hold the machine on any slope it is able to climb. Refer to operators manual.

Make a note of the following.

- You must check the brakes for correct operation at regular intervals. Refer to Maintenance Schedules.
- The correct brake function is necessary for safe machine operation.
- The brake function must operate smoothly, free of hesitation, jerking and unusual noise.
- Do this procedure with the machine on a firm, level surface that is free of obstructions.

1. Make the machine safe with the platform lowered.

[Refer to: PIL 01-03-27.](#)

2. Make sure that the platform extension is in the fully retracted position.
3. Put a mark on the ground to use as a test line.
4. Turn the ignition switch to platform control.
5. Pull out the ground emergency stop button to the ON position.
6. Pull out the platform emergency stop button to the ON position.
7. Make a note of the point on the machine (contact patch of a tyre) as a visual reference when you cross the test line.
8. Press the drive function button.
9. Press and hold the drive/steer function enable switch on the control handle.
10. Move the control lever in the forward direction.
11. Bring the machine to top drive speed before you reach the test line.
12. Release the control lever when the selected reference point on the machine crosses the test line.
13. Measure the distance between the test line and the machine reference point.
14. Make sure that the braking distance is within the specified limits.
[Refer to: PIL 01-48-12.](#)
15. Raise the platform.
16. Do the steps 3 to 13 with the platform raised.

17. Make sure that the braking distance is within the specified limits.

[Refer to: PIL 01-48-12.](#)

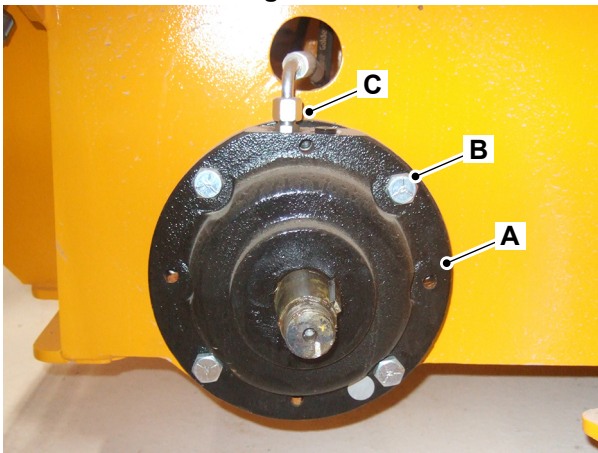
Remove and Install

⚠ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Remove the relevant rear wheel.
[Refer to: PIL 27-29-00.](#)
4. Disconnect the hydraulic hoses to the brake.
5. Plug all the open ports and hoses to prevent contamination.
6. Remove the bolts (x4) and nuts (x4).
7. Remove the brake assembly.

Figure 84.

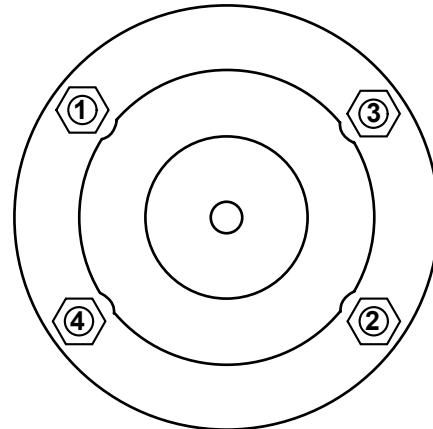


- A** Brake assembly
- B** Bolts (x4)
- C** Hydraulic hose

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the bolts to the correct torque value.
 - 2.1. Make sure that you follow the symmetrical pattern for the tightening sequence. Refer to Figure 85.

Figure 85.



3. Check the hydraulic oil level and top up to the correct level.

[Refer to: PIL 30-00-00.](#)

Table 44. Torque Values

Item	Nm
B	104
C	24–26

Disassemble and Assemble

This is a non-serviceable part, replace the complete assembly.

06 - Dump Valve

Introduction	24-8
Operation	24-9
Remove and Install	24-10

Introduction

(For: S2032E [RAJ], S2632E [RAJ],
S2646E [RAJ], S3246E [RAJ], S4046E
[RAJ])

The brake dump valve is located in the hydraulic compartment. It is a solenoid operated valve that dumps the return flow from brakes faster to tank, so that brakes engage faster.

Operation

(For: S2032E [RAJ], S2632E [RAJ],
S2646E [RAJ], S3246E [RAJ], S4046E
[RAJ])

You must read the following description with reference to the hydraulic schematic circuit diagram.
[Refer to: PIL 30-00-50.](#)

When the drive spool 'SV3' is energised for forward or reverse direction travel mode, same time the dump valve is energised to pass the oil from main control valve 'BR' port to 'P' port of dump valve which allows oil to flow from port 'P' of dump valve to 'BRB' port of dump valve into both left and right brake hubs through the manual brake release valve port 'B1', which will keep both the brakes disengaged to propel the machine in required directions. When the 'SV3' spool is de-energised, same time the dump valve is de-energised and allows to dump all the oil from brake hubs through 'BRB' port to tank which will give effective braking on flat ground and on slope as well.

Remove and Install

(For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ])

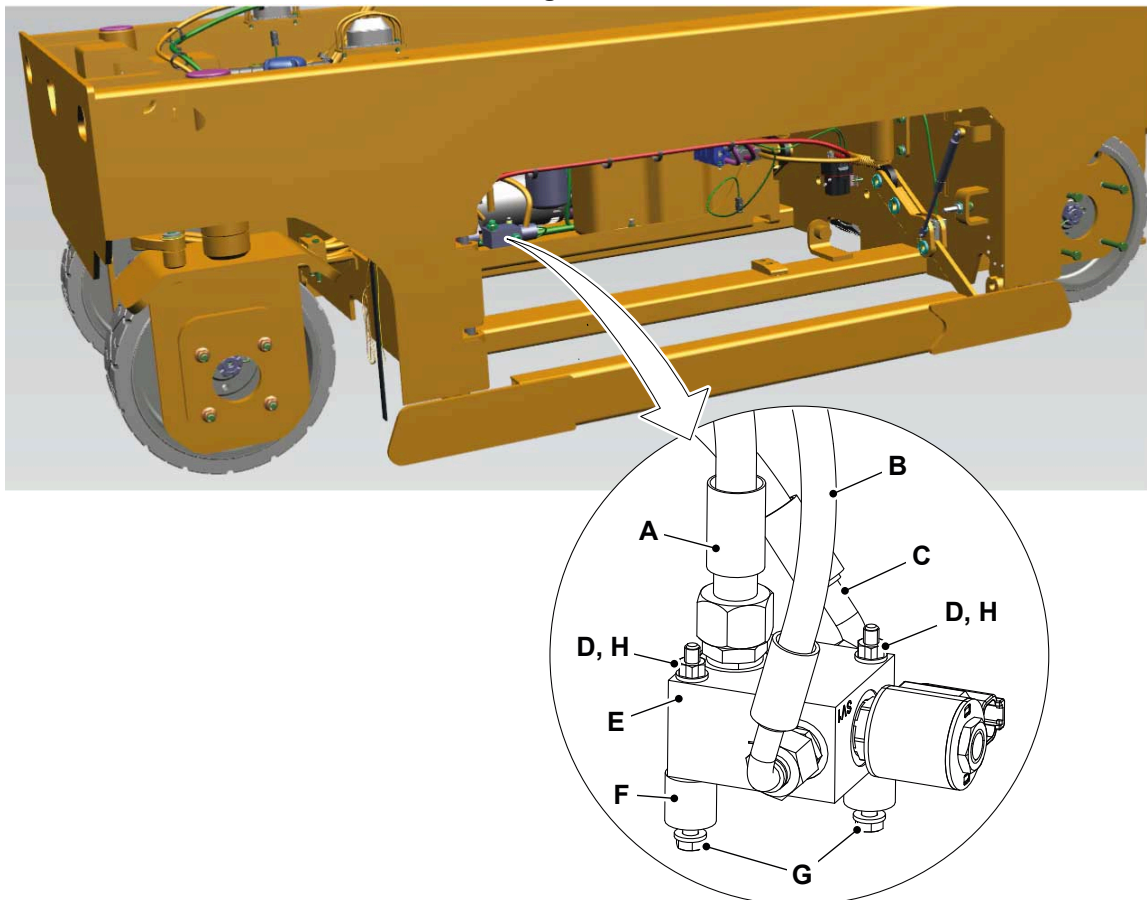
Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Discharge the hydraulic system.
[Refer to: PIL 30-00-00.](#)
4. Open the battery compartment door.
[Refer to: PIL 06-06-03.](#)
5. Remove the battery.

[Refer to: PIL 33-03-00.](#)

6. Put a label on the hoses and electrical connections to help installation.
7. Disconnect the electrical connector from the dump valve.
8. Disconnect the hydraulic hoses from the dump valve.
9. Plug all the open ports and hoses to prevent contamination.
10. Remove the nut (x2) and washer (x2).
11. Remove the bolt (x2) that attaches the dump valve to the ground panel.
12. Remove the dump valve.
13. Remove the spacer (x2).

Figure 86.



A Hose 1
C Hose 3

B Hose 2
D Nut (x2)

E Dump valve**G** Bolt (x2)**F** Spacer (x2)**H** Washer (x2)**Install**

1. The installation procedure is the opposite of the removal procedure.



Notes:



25 - Steering System

Contents	Page No.
25-00 Steering System	
25-00-00 General	25-3



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



00 - Steering System

Contents

Page No.

25-00-00 General	25-3
------------------------	------



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



00 - General

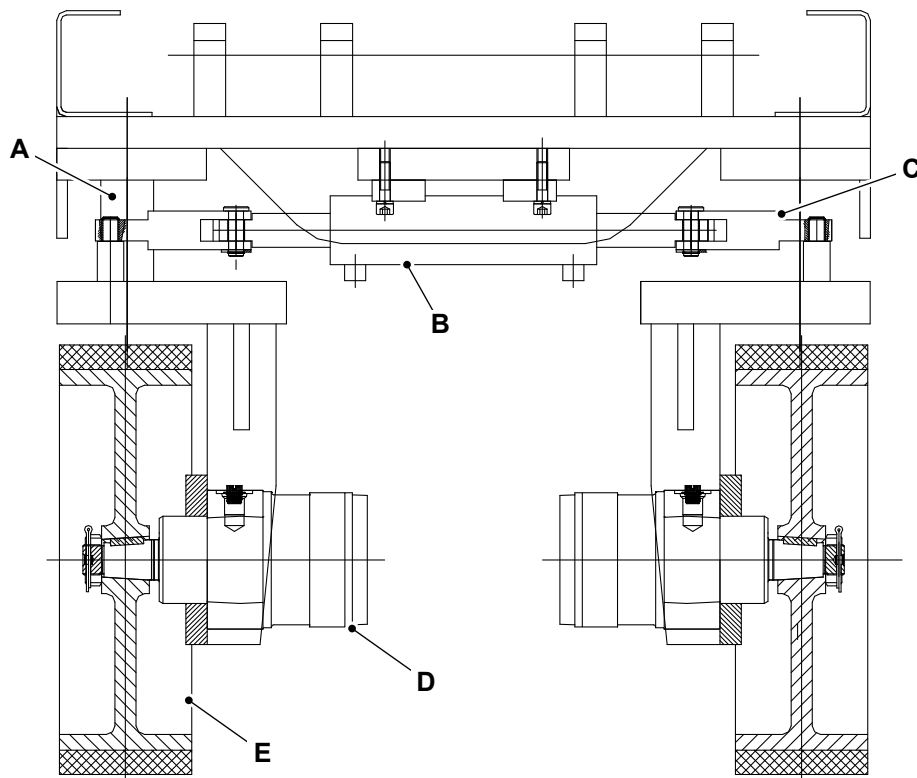
Introduction	25-3
Component Identification	25-4
Operation	25-5
Lubricate	25-6

Introduction

The steering is controlled by the hydraulic system and the main hydraulic pump through the control valve block. There is a double acting double end steering ram. The ram drives the action of a connecting rod and the spindle rotates to achieve the steering action.

Component Identification

Figure 87.



- A Wheel carrier
- C Connecting rod
- E Wheel

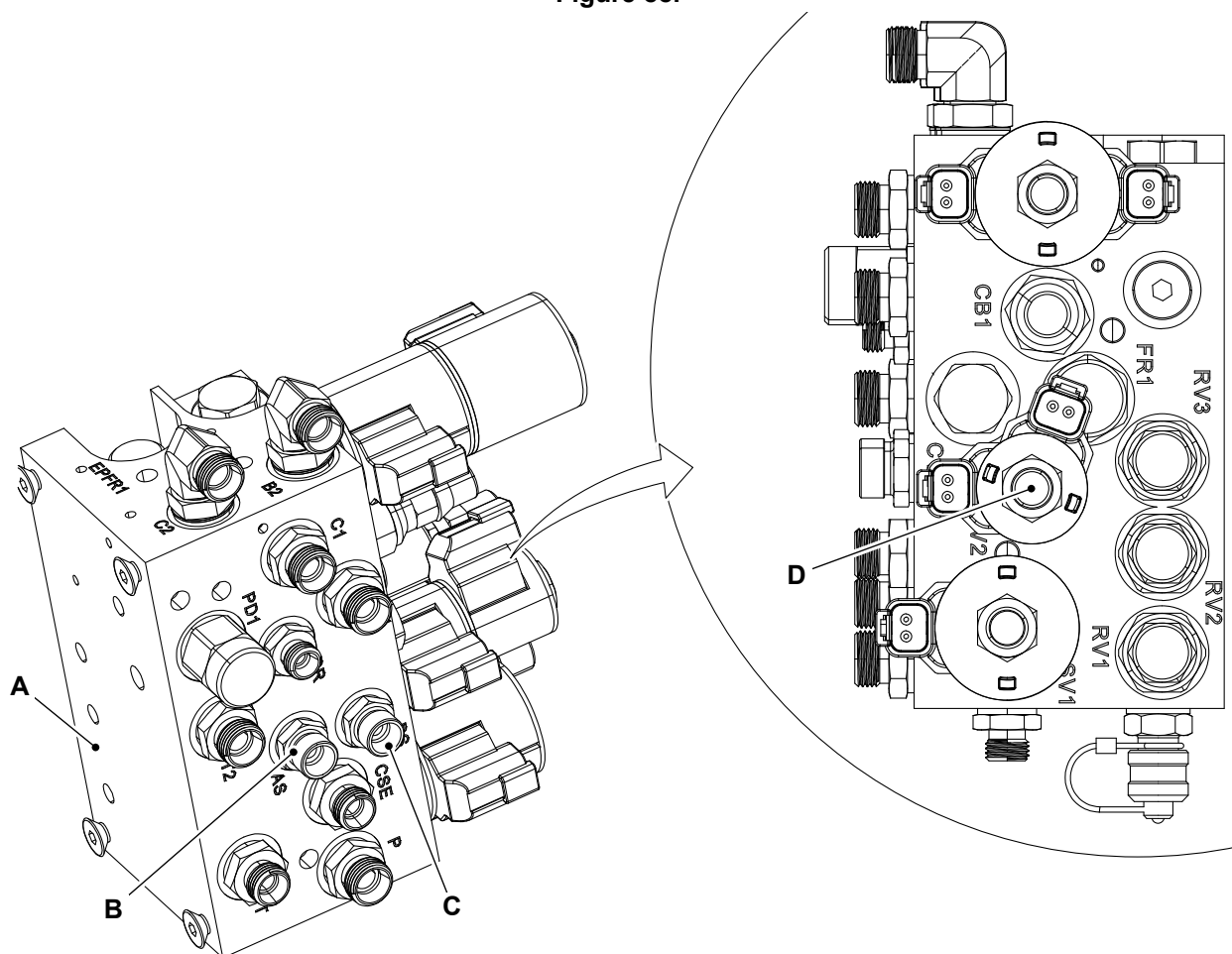
- B Steering cylinder ram
- D Wheel drive motor

Operation

When you operate right steering button, the pressurised oil flows into the left cavity of the steering

cylinder ram and the oil in the right cavity of steering cylinder flows into the travel solenoid valve.

Figure 88.



- A Control valve
- C Port - steer to left

- B Port - steer to right
- D Steering solenoid

You must read the following description with reference to the hydraulic schematic circuit diagram.
[Refer to: PIL 30-00-50.](#)

When you operate right steering button with travel mode operation, the pressurised oil flows through flow divider into the left cavity (port 'AS') of the steering cylinder ram and the oil in the right cavity of steering cylinder flows into the travel solenoid valve through the check valve.

When you operate left steering button with travel mode operation, the pressurised oil flows through flow divider into the right cavity (port 'BS') of the steering cylinder ram and the oil in the left cavity of

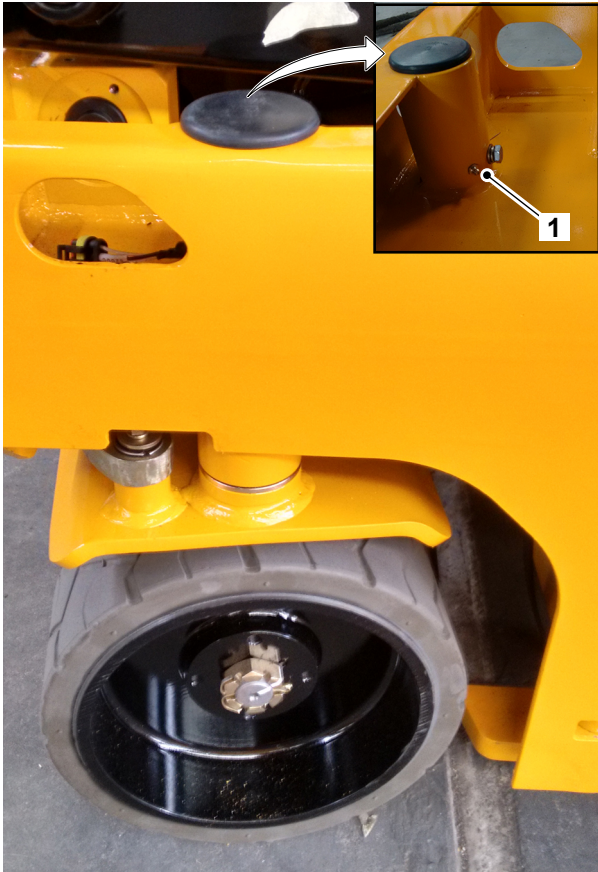
steering cylinder flows into the travel solenoid valve through the check valve.

When you operate only steering either left or right direction without travel mode then oil flows through 'EP1' valve to tank.

Lubricate

There is one grease point for each wheel pivot. Refer to Figure 89.

Figure 89.



27 - Driveline

Contents	Page No.
27-00 Driveline	
27-00-00 General	27-3
27-29 Wheel	
27-29-00 General	27-7
27-32 Wheel Drive Motor	
27-32-00 General	27-13
27-33 Tyre	
27-33-00 General	27-21



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



00 - Driveline

Contents

Page No.

27-00-00 General	27-3
------------------------	------



Notes:

00 - General

Introduction	27-3
Operation	27-4

Introduction

The driveline system installed on this machine is an electrically operated and a hydraulically driven system. It consists of the following components:

- Wheel drive motor. [Refer to: PIL 27-32-00.](#)
- Wheel. [Refer to: PIL 27-29-00.](#)
- Tyre. [Refer to: PIL 27-33-00.](#)

Operation

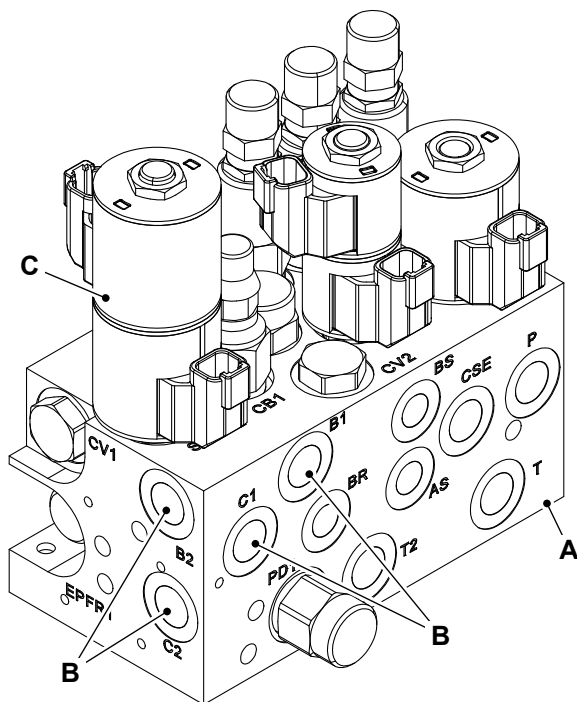
For: S1530E [RAJ], S1930E [RAJ]
 Page 27-4

For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ] Page 27-4

(For: S1530E [RAJ], S1930E [RAJ])

The pressurised oil goes through the travel direction control solenoid valve. The travel direction control solenoid valve opens after energization.

Figure 90.



- A** Control valve block
- B** Port - travel motor
- C** Travel direction control solenoid valve

(For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ])

The pressurised oil goes through the travel direction control solenoid valve. The travel direction control solenoid valve opens after energization.

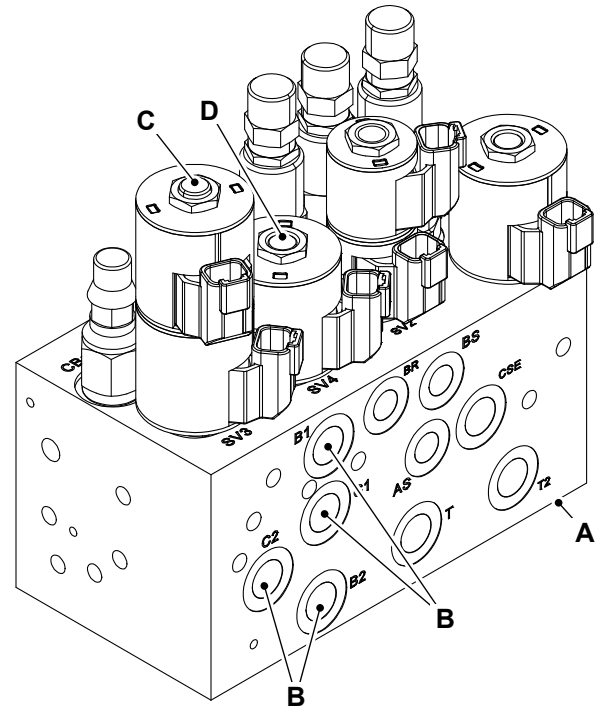
If the high and low speed solenoid valve is de-energized, the left and right motors will be connected in series under a high speed (high speed low torque) state.

If the high and low travel speed solenoid valve is energized, the left and right motors will be connected

in parallel under a low speed (low speed high torque) state.

The non-energized state is high speed. It can be manually switched to low speed by means of a switch on the platform controller.

Figure 91.



- A** Control valve block
- B** Port - travel motor
- C** Travel direction control solenoid valve
- D** High/Low switch

You must read the following description with reference to the hydraulic schematic circuit diagram.
[Refer to: PIL 30-00-50.](#)

Hare mode travel

When the drive spool 'SV3' energised for forward direction travel mode, oil flows in series from port 'C1' to port 'B1' of a wheel motor through de-energised 'SV4' spool and then oil passes through second wheel motor from port 'B2' to return port 'C2' through 'SV3' spool through counterbalance valve to tank.

When the drive spool 'SV3' energised for reverse direction travel mode, oil flows in series from port 'C2' to port 'B2' of a wheel motor through de-energised 'SV4' spool and then oil passes through second wheel motor from port 'B1' to return port 'C1' through 'SV3' spool through counterbalance valve to tank.

Tortoise mode travel

When drive spool 'SV3' energised for forward direction travel mode, oil flows parallel to port 'C1' and port 'B2' through energised 'SV4' spool and then oil returns back to tank, through ports 'B1' and port 'C2' which then pass through SV3 spool through counterbalance valve to tank.

When drive spool 'SV3' energised for reverse direction travel mode, oil flows parallel to port 'C2' and port 'B1' through energised 'SV4' spool and then oil returns back to tank, through ports 'B2' and port 'C1' which then pass through 'SV3' spool through counterbalance valve to tank.

Gradient travel

The machine should operate only in tortoise mode while it is on slope, when machine travel down the slope the return oil passes through the counterbalance valve which creates a back pressure and allows continuous oil supply to the brake hubs to built required pressure to release the brakes. This provides the better controllability of the machine without juddering.



29 - Wheel

Contents

Page No.

27-29-00 General	27-7
------------------------	------

00 - General

Introduction	27-7
Health and Safety	27-8
Technical Data	27-8
Check (Condition)	27-9
Remove and Install	27-9

Introduction

The machine uses solid tyres, which do not need inflating. The wheel and tyre assemblies are complete units, if damaged they must be replaced as a complete assembly. [Refer to: PIL 27-29-00.](#)

Make sure that the tyres are kept in good condition.
[Refer to: PIL 27-29-00.](#)

Health and Safety

⚠ **WARNING** Do not install pneumatic tyres on a wheel made for a solid tyre. Do not install a solid tyre on a wheel made for a pneumatic tyre. If you are unsure of the correct specification for your machine, contact your local JCB dealer or a trained specialist.

WARNING Wheels and tyres are heavy. Take care when lifting or moving them. Store with care to ensure that they cannot fall and cause injury. Use suitable lifting equipment if necessary.

Technical Data

Table 45.

Wheel Nut Torque	380–460N·m
------------------	------------

Check (Condition)

Always drive with consideration for the condition of the tyres. Check the tyres daily for the signs of damage and wear. For example:

- Signs of distortion
- Cuts
- Embedded objects (nails, etc.)
- Continuous tread
- Edge damage
- Uneven wear
- Compare wear between tyres

Never modify tyres or install tyres which are not intended for use on this machine. Contact you local JCB dealer to replace the parts.

Remove and Install

Special Tools

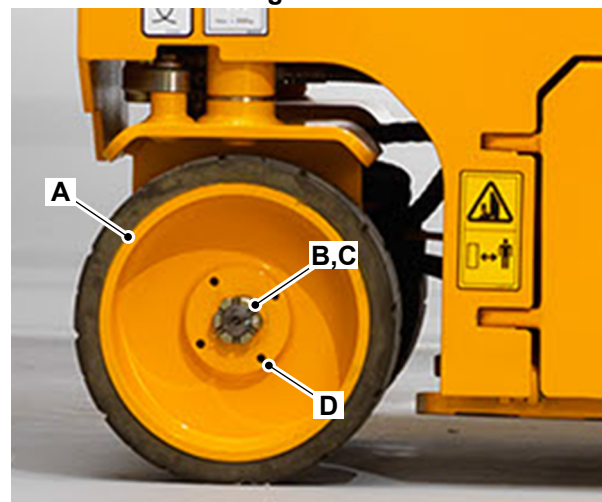
Description	Part No.	Qty.
Wheel Chock - JC/405217		6
Forklift Jack	334/F1285	1
Puller Tool	400/K4721	1

⚠ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Chock all wheels except the one to be removed.
[Special Tool: Wheel Chock - JC/405217 \(Qty.: 6\)](#)
4. Remove and discard the locking pin.
5. Loosen the wheel nut.
6. Use a suitable Jack to raise the machine at the end of the required wheel.
[Special Tool: Forklift Jack \(Qty.: 1\)](#)
7. Remove the wheel nut.

Figure 92.

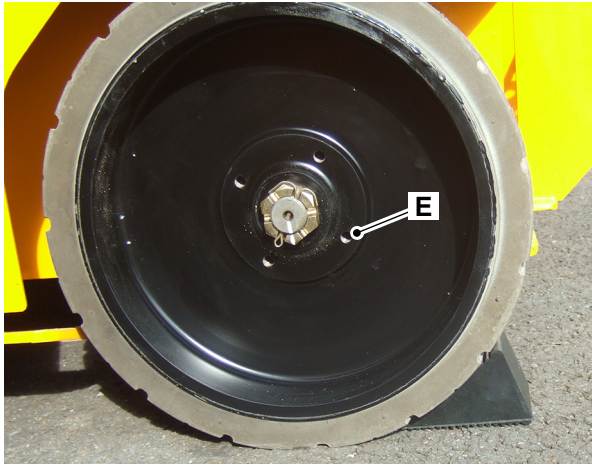


- A** Wheel
- B** Locking pin
- C** Wheel nut
- D** Slots (For side screws of special puller tool)

8. Install the specified special puller tool as shown.
[Special Tool: Puller Tool \(Qty.: 1\)](#)

- 8.1. Make sure that the side screws are inserted in the correct slots provided.

Figure 93.



E Slot for side screws

9. Tighten the central screw to apply pressure to pull out the wheel from the tapered shaft.
 - 9.1. If necessary, apply a slight shock force to separate the wheel from the tapered shaft.
10. Support the wheel with suitable lifting equipment.
11. Remove the wheel from the tapered shaft.
 - 11.1. Collect the key from the tapered shaft. Keep it safely.

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Make a note that the special puller tool is not required for the installation of the wheel.
3. Tighten the nut as follows.
 - 3.1. Tighten the nuts to the specified torque value.
Torque: 420N·m
 - 3.2. If the slots on the nut are not aligned to the pin hole, tighten the but further by specified value.
Torque: 30N·m
 - 3.3. If required repeat the step 3.2.
 - 3.4. Make sure that you do not tighten the nut to more than maximum specified value.
Torque: 500N·m
4. Install the new locking pin.



32 - Wheel Drive Motor

Contents	Page No.
27-32-00 General	27-13



Notes:



00 - General

Introduction	27-13
Technical Data	27-14
Component Identification	27-15
Remove and Install	27-16
Disassemble and Assemble	27-17

Introduction

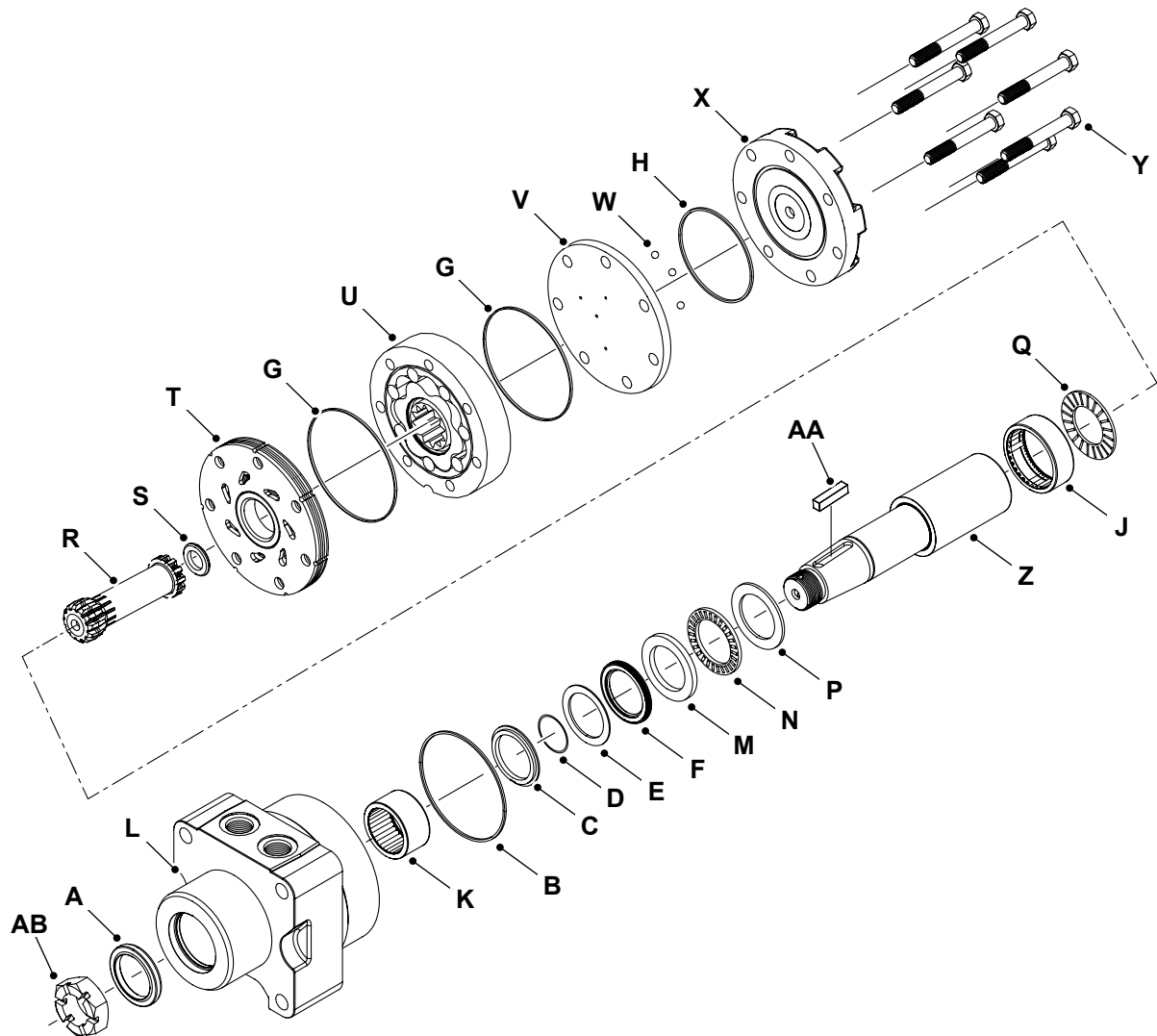
The wheel drive motor installed on these machines is the Gerotor orbital motor with commutator valve.

Technical Data

Refer to Hydraulic System - Technical Data. [Refer to:](#)
[PIL 30-00-00.](#)

Component Identification

Figure 94.



- | | |
|-------------------------------|------------------------------|
| A Dust seal | B Case seal |
| C Back-up ring | D Back-up shim |
| E Back-up seal | F Shaft seal |
| G Body seals (x2) | H End cover seal |
| J Rear case bearing | K Front case bearing |
| L Case | M Front thrust washer |
| N Front thrust bearing | P Rear thrust washer |
| Q Rear thrust bearing | R Drive link |
| S Drive link spacer | T Manifold |
| U Rotor assembly | V Balance plate |
| W Steel balls (x3) | X End cover |
| Y Bolts (x7) | Z Shaft |
| AA Shaft key | AB Shaft nut |

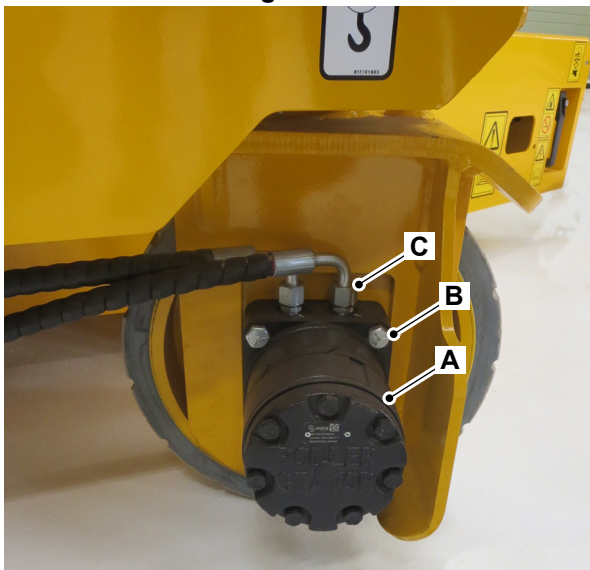
Remove and Install

⚠ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Remove the relevant front wheel.
[Refer to: PIL 27-29-00.](#)
4. Put a suitable container under the hydraulic hoses.
5. Disconnect the hydraulic hoses.
6. Put a label on the hoses to help installation.
7. Plug all the open ports and hoses to prevent contamination.
8. Remove the bolts (x4).
9. Remove the wheel drive motor.
10. Check the condition of the dust seal. If damaged, replace it.

Figure 95.

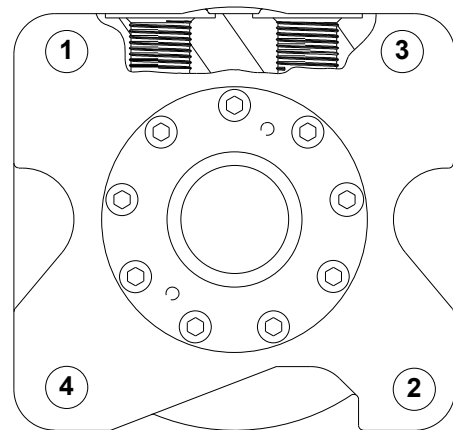


- A** Wheel drive motor
- B** Bolts (x4)
- C** Hoses

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the bolts to the correct torque value.
 - 2.1. Make sure that you follow the symmetrical pattern for the tightening sequence. Refer to Figure 96.

Figure 96.



3. Tighten the hoses to the correct torque value.
4. Check the hydraulic fluid level and refill if necessary.

[Refer to: PIL 30-00-00.](#)

Table 46. Torque Values

Item	Nm
B	110
C	47–53

Disassemble and Assemble

Disassemble

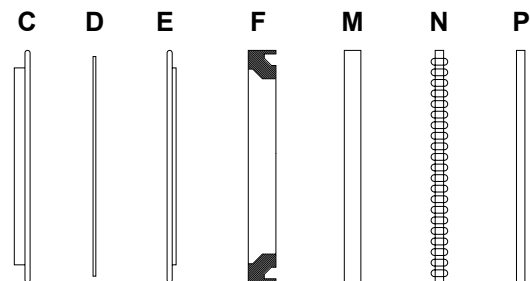
1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Remove the wheel drive motor from the machine.
[Refer to: PIL 27-32-00.](#)
3. This procedure requires service parts. Make sure that you have obtained the correct service parts before you start.
4. Remove all the shaft related components from the shaft.
 - 4.1. Remove the shaft nut.
 - 4.2. Remove and discard the dust seal.
 - 4.3. Remove the shaft key.
5. Put a V-shaped mark from the end cover to the case with suitable marker to help assembly.
6. Hold the motor in a suitable vice.
 - 6.1. Make sure that the shaft faces downwards.
7. Remove the bolts (x7).
8. Remove the end cover.
9. Remove and discard the end cover seal.
10. Remove the balance plate.
 - 10.1. Make sure that you do not drop the steel balls (x3) located in the balance plate holes.
11. Remove the rotor assembly, manifold and the drive link spacer (if installed).
12. Remove the drive link and the rear thrust bearing.
13. Remove and discard the body seals (x2) from the rotor assembly.
14. Remove and discard the case seal from the case.
15. Gently tap the shaft upwards from the case.
16. Remove the shaft through the rear of case.
17. Remove the case from the vice and turn over.
18. Pry out and discard the dust seal from the case.
19. Remove the rear case bearing with a suitable bearing puller.

20. Remove the rear thrust washer, front thrust bearing, front thrust washer, shaft seal, back-up seal, back-up shim and the back-up ring.
21. Discard all the seals and shims.

Assemble

1. Clean all the parts with an oil-base solvent and compressed air.
2. Apply a thin layer of clean hydraulic oil to all new seals.
[Refer to: PIL 75-00-00.](#)
3. Place the shaft on a clean flat surface with output end facing upwards.
4. Install the rear thrust washer, front thrust bearing, front thrust washer sequentially on the shaft.
5. Apply a thin layer of clean oil to seal area of the shaft.
6. Install the shaft seal onto the shaft until it contacts the front thrust washer.
 - 6.1. Make sure that the lip of the shaft seal faces downwards.
 - 6.2. Make sure that all the seals are in the correct orientation. Refer to Figure 97.

Figure 97.

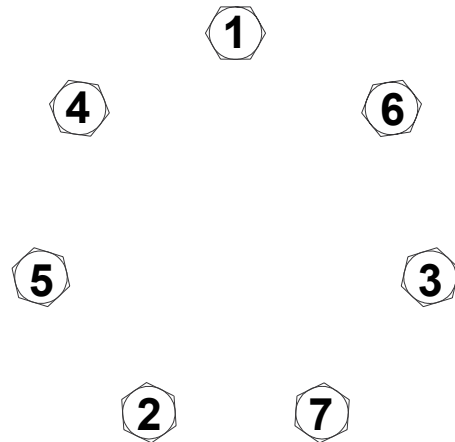


- C** Back-up ring
- D** Back-up shim
- E** Back-up seal
- F** Shaft seal
- M** Front thrust washer
- N** Front thrust bearing
- P** Rear thrust washer

7. Carefully install the back-up seal on the shaft with the flat side upwards.
 - 7.1. Make sure that lip of the back-up seal faces the shaft seal.
8. Install the metal back-up shim on the shaft.
9. Install the back-up ring on the shaft with the flat side against the back-up shim.

10. Install the case on the shaft assembly.
11. Hold the motor assembly in a suitable vice.
 - 11.1. Make sure that the shaft faces downwards.
12. Install the rear case bearing into the rear of the case until it contacts the stop in the case.
 - 12.1. Make sure that the flat side of the rear case bearing faces upward away from the case.
13. Install the drive link in the shaft end.
 - 13.1. Make a note that the crowned splines goes into the shaft end.
14. Install the rear thrust bearing over the drive link.
 - 14.1. If the shaft assembly is correctly seated in the case, the rear thrust bearing will flush or countersunk with rear surface of the case.
15. Install the case seal into the case groove.
16. Install the manifold on the case.
17. Install the body seals in the grooves on both sides of the rotor.
18. Install the rotor on the manifold.
 - 18.1. Make sure that the side of the rotor with chamfer in splines faces the manifold.
19. Install the drive link spacer on top of the drive link (if installed).
20. Install the balance plate onto the rotor.
 - 20.1. Make sure that the holes for the steel balls faces upwards.
21. Install the steel balls (x3) in the balance plate holes.
22. Install the end cover seal into the end cover groove.
23. Install the end cover on the balance plate.
24. Install the bolts (x7).
 - 24.1. Tighten the bolts the correct pre-torque value.
 - 24.2. Make sure that you tighten the bolts in the correct sequence only. Refer to Figure 98.

Figure 98.



25. Tighten the bolts the correct final-torque value.
 - 25.1. Make sure that you tighten the bolts in the correct sequence only. Refer to Figure 98.
26. Remove the motor from the vice.
27. Place the motor on the work surface with shaft facing upwards. Make sure that the lip on the dust seal faces upwards.
28. Place the dust seal over the shaft.
29. Carefully drive the dust seal into position with suitable hammer and sleeve.
30. Install the wheel drive motor to the machine.

[Refer to: PIL 27-32-00.](#)

Table 47. Torque Values

Item	Description	Nm
Y	Pre-torque	10
Y	Final-torque	50



33 - Tyre

Contents	Page No.
27-33-00 General	27-21



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction

The wheel and tyre assemblies are a complete unit.

Refer to: [PIL 27-29-00](#).



Notes:

30 - Hydraulic System

Contents	Page No.
Acronyms Glossary	30-2
30-00 General	
30-00-00 General	30-3
30-00-49 Schematic Symbols	30-13
30-00-50 Schematic Circuit	30-17
30-03 Tank	
30-03-00 General	30-43
30-03-24 Breather	30-45
30-04 Filter	
30-04-00 General	30-49
30-04-09 Return Line	30-50
30-11 Gear Pump	
30-11-00 General	30-53
30-15 Cylinder / Ram	
30-15-00 General	30-57
30-15-34 Steering	30-60
30-15-75 Scissor Arm	30-61
30-56 Main Control Valve Block	
30-56-00 General	30-63
30-60 Directional Control Valve	
30-60-03 Brake	30-73
30-60-51 Lift Cylinder	30-75
30-93 Hose	
30-93-00 General	30-81
30-97 Connectors	
30-97-00 General	30-85



Acronyms Glossary

ARV	Auxiliary Relief Valve
MRV	Main Relief Valve
QRC	Quick Release Coupling
RPM	Revolutions Per Minute



00 - General

Contents	Page No.
30-00-00 General	30-3
30-00-49 Schematic Symbols	30-13
30-00-50 Schematic Circuit	30-17



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction	30-3
Health and Safety	30-4
Technical Data	30-4
Operation	30-7
Discharge and Pressurise	30-8
Drain and Fill	30-8
Clean	30-9
Check (Leaks)	30-10
Check (Level)	30-10
Check (Operation)	30-11
Check (Pressure)	30-11

Introduction

The hydraulic system is a power transmission system that uses the force of flowing liquids to transmit power to specific components in a machine.

To help you trace specific hydraulic problems to a faulty unit (valve, actuator, ram etc.), refer to Fault finding. Once you have traced the faulty unit, refer to the relevant section for removal, disassembly and checking instructions.

To help identify circuits, valves, rams etc. mentioned in the fault finding procedures. [Refer to: PIL 30-00-50.](#)

- Before you begin fault finding, read the Health and Safety Information. [Refer to: PIL 30-00-00.](#)
- Make simple checks before you remove or disassemble a major component.
- Make sure that the hydraulic fluid is at the correct working temperature 20°C (68.0°F)
- Whatever the fault, check the condition of the hydraulic fluid. Drain and replace if necessary. Refer to Hydraulic fluid quality in this procedure and Hydraulic System - Clean. [Refer to: PIL 30-00-00.](#)
- Make sure you remove ALL contamination and if possible identify its origin. It may be part of a component from elsewhere in the circuit.

Hydraulic Contamination

Once inside the system, hydraulic circuit contaminants greatly affect the performance and life of hydraulic equipment. For example, contaminants in a hydraulic pump develop internal wear to cause internal leakage and hence lower discharges. Wear particles generated will circulate with the hydraulic fluid to cause further deterioration in the performance of this and other equipment. Contaminants also enter principal sliding sections of the equipment causing temporary malfunction, scuffing, sticking and leakage and can lead to major problems. The main contaminants can be classified as follows:

1. Solid Particles - Sand, fibres, metallic particles, welding scale, sealing materials and wear particles etc.
2. Liquid - Usually water and incompatible oils and greases.
3. Gases - Air, sulphur dioxide etc. which can create corrosive compounds if dissolved in the fluid.

These contaminants can appear during manufacture, assembly and operation.

Health and Safety

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before connecting or removing any hydraulic hose, residual hydraulic pressure trapped in the service hose line must be vented. Make sure the hose service line has been vented before connecting or removing hoses. Make sure the machine cannot be started while the hoses are open.

WARNING! Fine jets of fluid at high pressure can penetrate the skin. Keep face and hands well clear of pressurised fluid and wear protective glasses. If fluid penetrates your skin, get medical help immediately.

WARNING! Take care when disconnecting hydraulic hoses and fittings as the oil will be hot.

WARNING! Damaged hoses can cause fatal accidents. Examine the hoses regularly. Do not use the machine if a hose or hose fixture is damaged.

Notice: Using incorrect fluid could damage the system. See Fluids, Capacities and Lubricants for the correct fluid. The fluid can harm your skin. Wear rubber gloves. Cover cuts or grazes.

Notice: Do not allow dirt to enter the system. Before disconnecting any part of the system, thoroughly clean around the connection. When a component has been disconnected, always install protective caps and plugs to prevent dirt ingress. Failure to follow these instructions will lead to dirt entering the system. Dirt in the system will seriously damage the systems components and could be expensive to repair.

CAUTION! The temperature of the hydraulic oil will be high soon after stopping the machine. Wait until it cools before beginning maintenance.

Notice: Using incorrect fluid could damage the system. See Fluids, Capacities and Lubricants for the correct fluid. The fluid can harm your skin. Wear rubber gloves. Cover cuts or grazes.

Technical Data

For: S1530E [RAJ]	Page 30-4
For: S1930E [RAJ]	Page 30-4
For: S2032E [RAJ]	Page 30-5
For: S2632E [RAJ]	Page 30-5
For: S2646E [RAJ]	Page 30-5
For: S3246E [RAJ]	Page 30-6
For: S4046E [RAJ]	Page 30-6
For: S4550E [RAJ]	Page 30-6

(For: S1530E [RAJ])

Table 48.

Description	Data
Hydraulic oil	
Grade	ISO 32 or ISO 46 (As per requirement)
Operating temperature	For ISO 32: -20–30°C (-4.0–86.0°F)
	For ISO 46: -12–51°C (10.4–123.7°F)
Hydraulic pump	
Type	Gear, constant displacement
Flow rate at 3000 RPM (Revolutions Per Minute)	12L/min
Maximum driving pressure	248bar (3,594.2psi)
Driving motor	
Type	Orbital motor
Displacement	300cc
Main control valve block	
MRV (Main Relief Valve) pressure	248bar (3,594.2psi)
Lift ARV (Auxiliary Relief Valve)	150bar (2,173.9psi)
Steering ARV	100bar (1,449.3psi)
Brake operating pressure	28bar (405.8psi)
Lowering restrictor size	0.9mm
Oil return filter	
Type	10 Micron
Bypass pressure	1.7bar (24.6psi)

(For: S1930E [RAJ])

Table 49.

Description	Data
Hydraulic oil	
Grade	ISO 32 or ISO 46 (As per requirement)

Description	Data
Operating temperature	For ISO 32: -20–30°C (-4.0–86.0°F) For ISO 46: -12–51°C (10.4–123.7°F)
Hydraulic pump	
Type	Gear, constant displacement
Flow rate at 3000 RPM	12L/min
Maximum driving pressure	248bar (3,594.2psi)
Driving motor	
Type	Orbital motor
Displacement	300cc
Main control valve block	
MRV pressure	248bar (3,594.2psi)
Lift ARV	200bar (2,898.5psi)
Steering ARV	100bar (1,449.3psi)
Brake operating pressure	28bar (405.8psi)
Lowering restrictor size	0.9mm
Oil return filter	
Type	10 Micron
Bypass pressure	1.7bar (24.6psi)

(For: S2032E [RAJ])

Table 50.

Description	Data
Hydraulic oil	
Grade	ISO 32 or ISO 46 (As per requirement)
Operating temperature	For ISO 32: -20–30°C (-4.0–86.0°F) For ISO 46: -12–51°C (10.4–123.7°F)
Hydraulic pump	
Type	Gear, constant displacement
Flow rate at 3000 RPM	12L/min
Maximum driving pressure	248bar (3,594.2psi)
Driving motor	
Type	Orbital motor
Displacement	300cc
Main control valve block	
MRV pressure	248bar (3,594.2psi)
Lift ARV	145bar (2,101.4psi)
Steering ARV	120bar (1,739.1psi)
Brake operating pressure	28bar (405.8psi)
Lowering restrictor size	1.6mm
Oil return filter	

Description	Data
Type	10 Micron
Bypass pressure	1.7bar (24.6psi)

(For: S2632E [RAJ])

Table 51.

Description	Data
Hydraulic oil	
Grade	ISO 32 or ISO 46 (As per requirement)
Operating temperature	For ISO 32: -20–30°C (-4.0–86.0°F) For ISO 46: -12–51°C (10.4–123.7°F)
Hydraulic pump	
Type	Gear, constant displacement
Flow rate at 3000 RPM	12L/min
Maximum driving pressure	248bar (3,594.2psi)
Driving motor	
Type	Orbital motor
Displacement	300cc
Main control valve block	
MRV pressure	248bar (3,594.2psi)
Lift ARV	185bar (2,681.1psi)
Steering ARV	120bar (1,739.1psi)
Brake operating pressure	28bar (405.8psi)
Lowering restrictor size	1.3mm
Oil return filter	
Type	10 Micron
Bypass pressure	1.7bar (24.6psi)

(For: S2646E [RAJ])

Table 52.

Description	Data
Hydraulic oil	
Grade	ISO 32 or ISO 46 (As per requirement)
Operating temperature	For ISO 32: -20–30°C (-4.0–86.0°F) For ISO 46: -12–51°C (10.4–123.7°F)
Hydraulic pump	
Type	Gear, constant displacement
Flow rate at 3000 RPM	12L/min
Maximum driving pressure	248bar (3,594.2psi)
Driving motor	

Description	Data
Type	Orbital motor
Displacement	300cc
Main control valve block	
MRV pressure	248bar (3,594.2psi)
Lift ARV	175bar (2,536.2psi)
Steering ARV	120bar (1,739.1psi)
Brake operating pressure	28bar (405.8psi)
Lowering restrictor size	1.6mm
Oil return filter	
Type	10 Micron
Bypass pressure	1.7bar (24.6psi)

(For: S3246E [RAJ])

Table 53.

Description	Data
Hydraulic oil	
Grade	ISO 32 or ISO 46 (As per requirement)
Operating temperature	For ISO 32: -20–30°C (-4.0–86.0°F) For ISO 46: -12–51°C (10.4–123.7°F)
Hydraulic pump	
Type	Gear, constant displacement
Flow rate at 3000 RPM	12L/min
Maximum driving pressure	248bar (3,594.2psi)
Driving motor	
Type	Orbital motor
Displacement	300cc
Main control valve block	
MRV pressure	248bar (3,594.2psi)
Lift ARV	145bar (2,101.4psi)
Steering ARV	120bar (1,739.1psi)
Brake operating pressure	28bar (405.8psi)
Lowering restrictor size	1mm
Oil return filter	
Type	10 Micron
Bypass pressure	1.7bar (24.6psi)

(For: S4046E [RAJ])

Table 54.

Description	Data
Hydraulic oil	
Grade	ISO 32 or ISO 46 (As per requirement)

Description	Data
Operating temperature	For ISO 32: -20–30°C (-4.0–86.0°F) For ISO 46: -12–51°C (10.4–123.7°F)
Hydraulic pump	
Type	Gear, constant displacement
Flow rate at 3000 RPM	12L/min
Maximum driving pressure	248bar (3,594.2psi)
Driving motor	
Type	Orbital motor
Displacement	350cc
Main control valve block	
MRV pressure	248bar (3,594.2psi)
Lift ARV	150bar (2,173.9psi)
Steering ARV	120bar (1,739.1psi)
Brake operating pressure	28bar (405.8psi)
Lowering restrictor size	0.9mm
Oil return filter	
Type	10 Micron
Bypass pressure	1.7bar (24.6psi)

(For: S4550E [RAJ])

Table 55.

Description	Data
Hydraulic oil	
Grade	ISO 32 or ISO 46 (As per requirement)
Operating temperature	For ISO 32: -20–30°C (-4.0–86.0°F) For ISO 46: -12–51°C (10.4–123.7°F)
Hydraulic pump	
Type	Gear, constant displacement
Flow rate at 3000 RPM	11L/min
Maximum driving pressure	248bar (3,594.2psi)
Driving motor	
Type	Orbital motor
Displacement	375 cc
Main control valve block	
MRV pressure	248bar (3,594.2psi)
Lift ARV	180bar (2,608.7psi)
Steering ARV	120bar (1,739.1psi)
Brake operating pressure	28bar (405.8psi)
Lowering restrictor size	1.3mm
Oil return filter	

Description	Data
Type	10 Micron
Bypass pressure	1.7bar (24.6psi)

Operation

The main components of the hydraulic system are:

- Main valve block. [Refer to: PIL 30-56-00.](#)
- Gear pump. [Refer to: PIL 30-11-00.](#)
- Cylinder rams. [Refer to: PIL 30-15-00.](#)
- Wheel drive motor. [Refer to: PIL 27-32-00.](#)
- Brake hub. [Refer to: PIL 24-00-00.](#)
- Manual brake release valve. [Refer to: PIL 30-60-03.](#)
- Hydraulic filter. [Refer to: PIL 30-04-00.](#)
- Hydraulic tank. [Refer to: PIL 30-03-00.](#)
- Lift cylinder valves. [Refer to: PIL 30-60-51.](#)

The hydraulic system performs all the functions of the machine. The hydraulic system is divided into two parts.

1. For steer and travel operations.
2. For platform raise and lower operations.

The gear pump is driven by the control motor to supply pressurised oil to the hydraulic system. The pressurised hydraulic oil is supplied to the main control valve block, which directs this oil to different cylinder rams and wheel drive motors as per the inputs from the controller through the solenoid valves.

Relief valves in the system prevent undue pressure increases.

Discharge and Pressurise

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the speed control signal on the motor controller.
3. Operate the controls to remove the hydraulic pressure from the service hose lines.
4. Turn the machine key to position 0.
5. Remove the machine key.

Drain and Fill

Drain

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Discharge the hydraulic system.
[Refer to: PIL 30-00-00.](#)
3. Remove the hydraulic tank.
[Refer to: PIL 30-03-00.](#)
4. Drain the hydraulic oil into a suitable container.

Fill

1. Install the hydraulic tank.
[Refer to: PIL 30-03-00.](#)
2. Fill the tank with the correct quantity and grade of hydraulic oil.
[Refer to: PIL 75-00-00.](#)
3. Check the hydraulic oil level.
[Refer to: PIL 30-00-00.](#)

Clean

Special Tools

Description	Part No.	Qty.
Hydraulic Flushing Rig	892/01255	1

Cleaning Operation

The purpose of cleaning oil is to remove contaminants of all types and sludge by filtering hydraulic fluid through a cleaning unit. Follow the instructions in the Hydraulic flushing rig instruction manual.

- Red Blood Cell = 8 microns (0.008 mm, 0.000315 in)
- Human Hair = 70 microns (0.07 mm, 0.00275 in)
- Grain of Salt = 100 microns (0.1 mm, 0.00394 in)

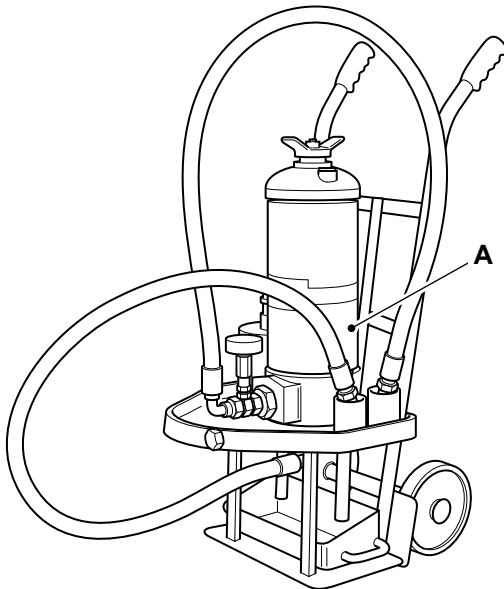
The smallest particle visible to the naked eye is 40 microns (0.00157) approximately. Standards will often be quoted to ISO (International Standards Organisation) for which literature can be obtained.

Procedure

1. Connect the Hydraulic flushing rig in place of the hydraulic filter.
2. Run the system for sufficient time to pump all the hydraulic fluid through the unit.
3. Disconnect the cleaning unit and reconnect the filter.
4. Top up the system with clean hydraulic fluid as required.

Special Tool: Hydraulic Flushing Rig (Qty.: 1)

Figure 99.



A Hydraulic flushing rig

Contaminant Standards

Dirt that damages your system is in many cases too small to be seen with the eye. The particle size is measured in microns (1 micron = 0.001 mm (0.0000394 in)).

Listed below are a few typical comparisons:

Check (Leaks)

▲ WARNING Fine jets of fluid at high pressure can penetrate the skin. Keep face and hands well clear of fluid under pressure and wear personal protective equipment. Hold a piece of cardboard close to suspected leaks and then examine the cardboard for signs of fluid. If fluid penetrates your skin, get medical help immediately.

Notice: If the fluid is cloudy, then water or air has contaminated the system. This could damage the hydraulic pump. Contact your JCB dealer immediately.

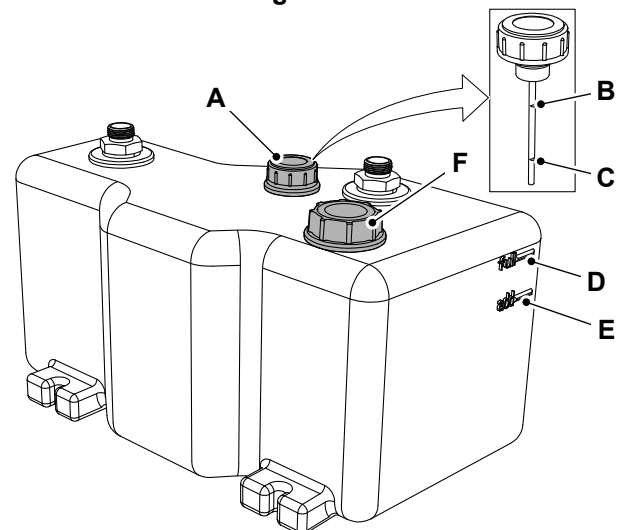
1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
3. Check for signs of hydraulic oil leaks, dripping or residue on or around the following components.
 - 3.1. Hydraulic tank and filter.
 - 3.2. Gear pump and main control valve block.
 - 3.3. Cylinder rams and hydraulic hoses.
4. Replace the O-rings wherever there are leaks.
5. Replace any damaged hoses or components.
6. Tighten the hydraulic adaptors as required.

Check (Level)

▲ Notice: If the fluid is cloudy, then water or air has contaminated the system. This could damage the hydraulic pump. Contact your JCB dealer immediately.

1. Make the machine safe with the platform stowed.
2. Get access to the hydraulic compartment.
3. Check the oil level.
 - 3.1. Look at the Add/Full mark on the hydraulic oil tank. The hydraulic oil level must be between the marks. Refer to Figure 100.
 - 3.2. Alternatively, remove the breather cap. Check that the hydraulic oil level is between the two marks on the dipstick. Refer to Figure 100.
4. If necessary, add the recommended hydraulic fluid.
 - 4.1. Open the hydraulic oil filler cap.
 - 4.2. Use a suitable container to add the hydraulic fluid through the filler port.
 - 4.3. Check the level of hydraulic fluid.
 - 4.4. Close the filler cap.

Figure 100.



- A** Hydraulic breather
- B** Upper mark - maximum
- C** Lower mark - minimum
- D** Oil Full mark
- E** Oil Add mark
- F** Hydraulic oil filler cap

Check (Operation)

Check the operation of all the hydraulic services.
Check for:

- Speed of operation
- Strength of operation
- Juddering
- Abnormal noises.

Do not use the machine if one or more of these faults are found. You must make sure that the hydraulic service is repaired immediately.

Check (Pressure)

Special Tools

Description	Part No.	Qty.
Digital Pressure Gauge 0-400 bar	892/01268	1
Hose for Pressure Gauge	892/01271	1
Digital Hydraulic Pressure Test Kit	998/11051	1

1. Make the machine safe with the platform lowered.

Refer to: PIL 01-03-27.

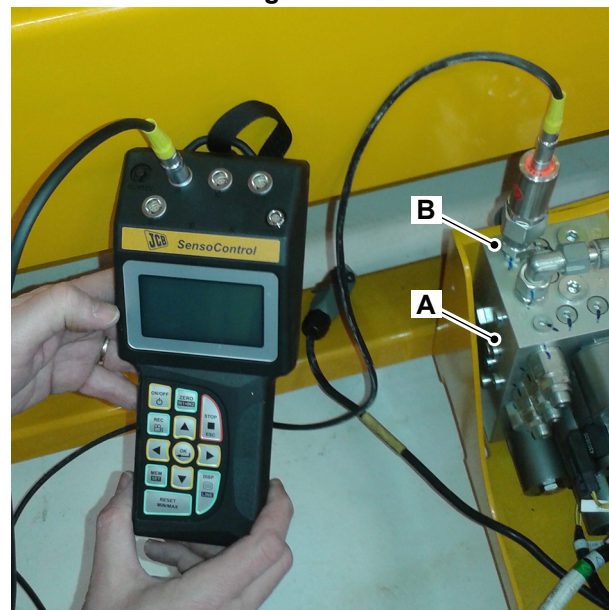
2. Open the hydraulic compartment cover.

Refer to: PIL 06-06-09.

3. Connect the specified digital hydraulic pressure test kit to the pressure port on the main control valve block. Refer to Figure 101.

Special Tool: Digital Hydraulic Pressure Test Kit (Qty.: 1)

Figure 101.



A Main control valve block

B Pressure port

- 3.1. If the digital hydraulic pressure test kit is not available, you can use the specified analogue pressure gauge and test hose.

Special Tool: Digital Pressure Gauge 0-400 bar (Qty.: 1)

Special Tool: Hose for Pressure Gauge (Qty.: 1)

4. Check the machine drive pressure as follows.

- 4.1. Use suitable chocks on the front wheels to prevent the machine moving.
- 4.2. Try to drive the machine and observe the pressure readings.
- 4.3. Make sure that the pressure readings are within the specified limits.
[Refer to: PIL 30-00-00.](#)
5. Check the machine lift operating pressure as follows.
 - 5.1. Lower the platform.
 - 5.2. Put the rated load on the platform.
[Refer to: PIL 01-48-10.](#)
 - 5.3. It is recommended to partially close the hydraulic compartment cover for stability issues. You may route the hoses through the hole to close the hydraulic compartment cover fully.
 - 5.4. Raise the platform to approximately specified height.
Distance: 3m
 - 5.5. Observe the pressure gauge reading while raising the platform.
 - 5.6. Make sure that the pressure readings are within the specified limits.
[Refer to: PIL 30-00-00.](#)
6. Check the machine lift ARV (Auxiliary Relief Valve) pressure as follows.
 - 6.1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
 - 6.2. Disconnect the hydraulic hose from the CSE port.
 - 6.3. Plug the open hose to prevent contamination.
 - 6.4. Put a suitable blanking plug on the CSE port. Make a note that high pressure will be acting on the blanking plug.
 - 6.5. Operate the platform raise button. Make a note that the platform will not raise.
 - 6.6. Observe the pressure gauge reading.
 - 6.7. Make sure that the pressure readings are within the specified limits.
[Refer to: PIL 30-00-00.](#)
7. Check the machine steer operating pressure as follows.
 - 7.1. Remove the wooden blocks from the front wheels.
 - 7.2. Steer the machine to left and right alternatively to full lock position.
 - 7.3. Observe the pressure gauge reading when the steering is on full lock.
 - 7.4. Make sure that the pressure readings are within the specified limits.
[Refer to: PIL 30-00-00.](#)
8. Check the machine steer ARV pressure as follows.
 - 8.1. Disconnect the hydraulic hose from the AS and BS port of the main control valve block. Alternatively, you can disconnect the hoses from steer ram.
[Refer to: PIL 30-56-00.](#)
 - 8.2. Plug the open hoses and ports to prevent contamination. Alternatively, you can use a suitable T-adaptor.
 - 8.3. Connect the specified pressure gauge to both the ports on the main control valve block or to both hoses (if you disconnect the hoses from steer ram).
 - 8.4. Operate the platform control unit left and right alternately.
 - 8.5. Observe the pressure gauge reading.
 - 8.6. Make sure that the pressure readings are within the specified limits.
[Refer to: PIL 30-00-00.](#)

49 - Schematic Symbols

Introduction	30-13
Diagram	30-14

Introduction

Complex hydraulic components and circuits can be described to the engineer by using graphical symbols. The tables illustrate and give a brief description for some of the more common symbols used.

There are many symbols in use and it would be impossible to include them all here. However it should be noted that most are only variations or refinements on the basic principles explained here. If more detailed information is required you are recommended to obtain a copy of BS2917 or ISO1219.

Once familiar with the symbols, the engineer can use hydraulic circuit diagrams as an aid to fault finding. It will be possible to see the complete hydraulic circuit and decipher the relationship between hydraulic components.

Diagram

Table 56. General

Symbol	Description
	Spring
	Flow restriction affected by viscosity
	Direction of flow
	Indication of rotation
	Indication of direction and paths of flow
	Variable control

Table 57. Cylinder Rams

Symbol	Description
	Single acting
	Double acting
	Double ended
	Double acting with damping at rod area end

Table 58. Pumps and Motors

Symbol	Description
	Variable capacity pump two directions of flow
	Fixed capacity motor one direction of flow
	Fixed capacity motor two directions of flow
	Variable capacity motor one direction of flow
	Variable capacity motor two directions of flow

Table 59. Directional control valves

Symbol	Description
	Used to enclose several valves indicating they are supplied as one unit
	3-Position, 4-port spring centered pilot operated valve
	3-position, 6-port spring centered manually operated valve
	3-Position, 4-port spring centered solenoid & pilot pressure operated valve
	3-Position, 4-port spring centered detent hand operated valve
	Non-return valve
	Non-return valve with back pressure spring
	Pilot operated non-return valve
	One way restrictor
	High pressure selector (shuttle valve)
	Throttling orifice - normally closed
	Throttling orifice - normally open
	Relief valve
	Variable restrictor

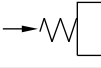
Table 60. Energy Transmissions and Conditioning

Symbol	Description
	Working line, return or feed
	Pilot control
	Drain lines
	Flexible pipe
	Line junction
	Crossing lines
	Air bleed
	Line plugged, also pressure test point
	Line plugged with take-off line
	QRC (Quick Release Coupling) - connected
	QRC - disconnected
	Tank - return line above fluid level
	Tank - return line below fluid level
	Header tank
	Pressure sealed tank
	Accumulator

Symbol	Description
	Filter or strainer
	Water trap
	Cooler - with no indication of coolant flow
	Cooler - indicating direction of coolant flow
	Heater

Table 61. Control Mechanisms

Symbol	Description
	Rotating shaft - one direction
	Rotating shaft - two directions
	Detent
	Locking device
	Over centre device
	Simple linkage
	General control
	Push button operated
	Lever operated
	Pedal operated
	Stem operated
	Spring operated
	Roller operated
	Roller trip operated (one directional)
	Solenoid one winding
	Solenoid two windings

Symbol	Description
	Electric motor operated
	Internal pressure pilot operated
	External pressure pilot operated
	Pressure operated spring release
	Pilot operated by solenoid pilot valve
	Pilot operated by a solenoid or separate pilot valve
	Pressure gauge
	Pressure switch

50 - Schematic Circuit

Introduction	30-17
Diagram	30-18

Introduction

A schematic diagram is a simplified pictorial representation of the machine's hydraulic circuit. It shows the components of the circuit as simplified hydraulic symbols, and the connections between the different components. The schematic diagram is used to troubleshoot problems and to make sure that all the connections have been made and that everything is present. Detailed schematics for individual systems are given in the relevant PIL section.

Diagram

For: S1530E [RAJ], S1930E [RAJ]
..... Page 30-18

For: S2032E [RAJ], S2632E [RAJ], S2646E
[RAJ] Page 30-23

For: S3246E [RAJ], S4046E [RAJ]
..... Page 30-29

For: S4550E [RAJ] Page 30-35

(For: S1530E [RAJ], S1930E [RAJ], BLAISE_PDF)

[Figure 102. 401/L7336-2 \(Sheet 1 of 1\)](#).....[Page 30-19](#)

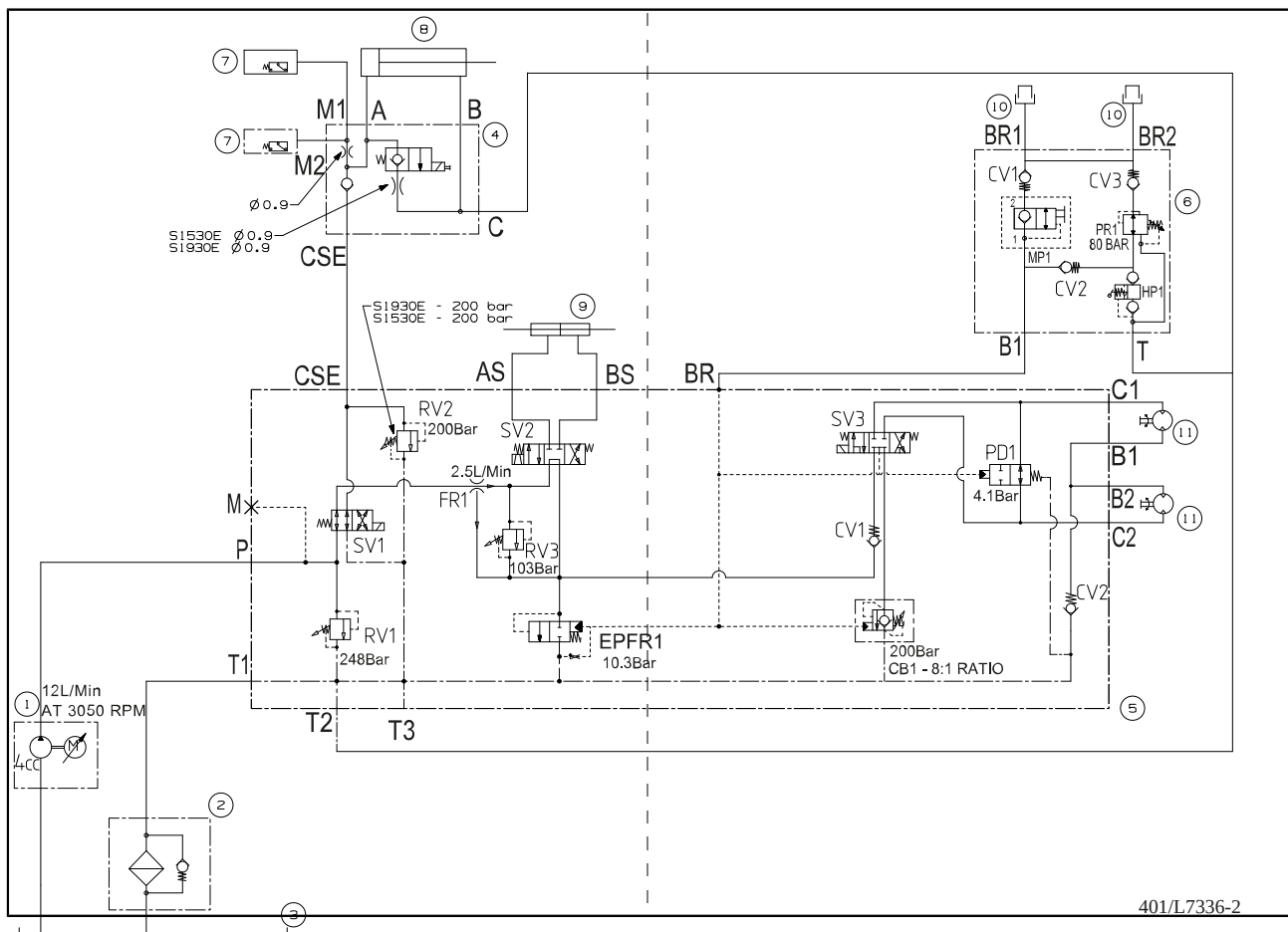


Figure 102. (Part 1 of 2)

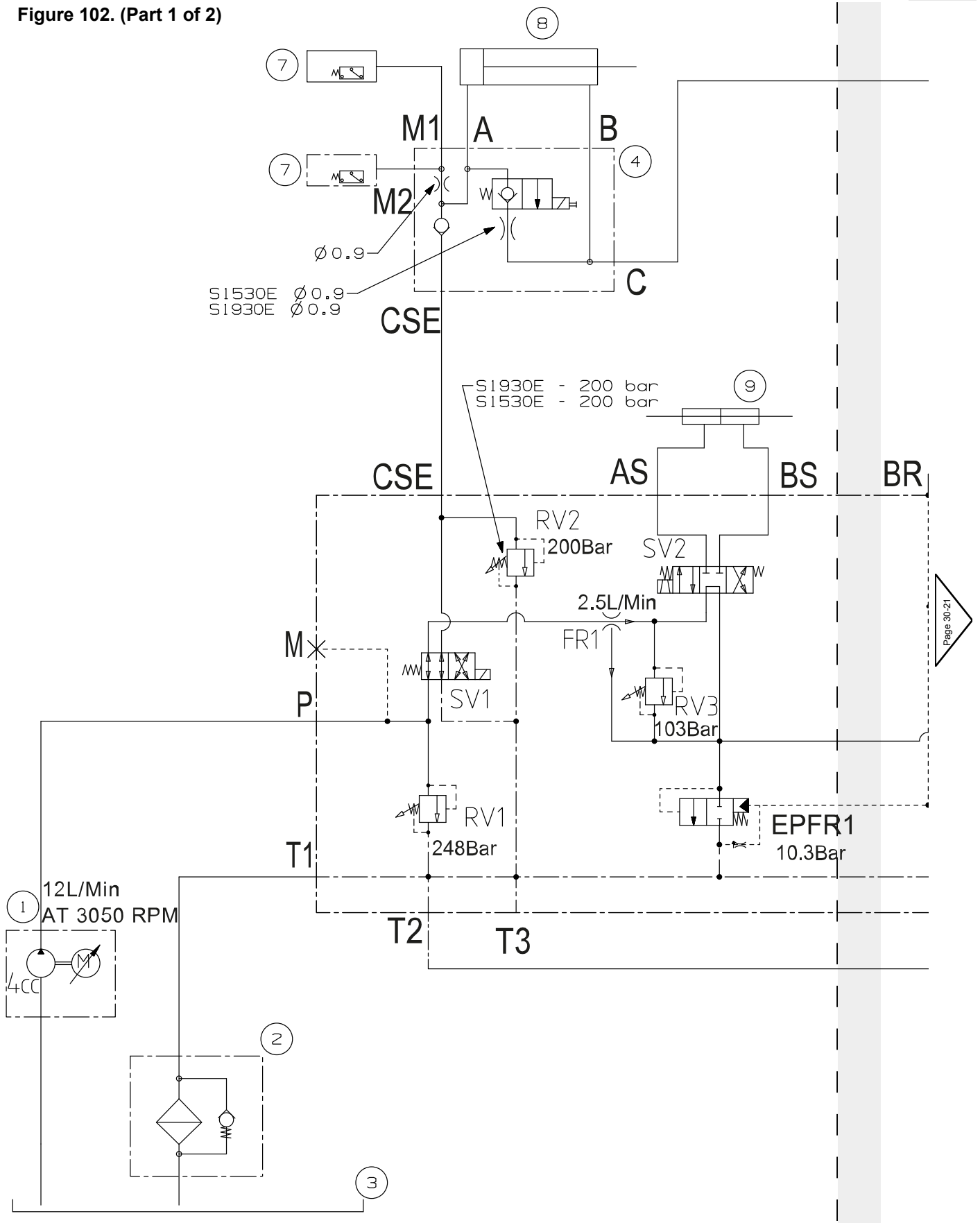
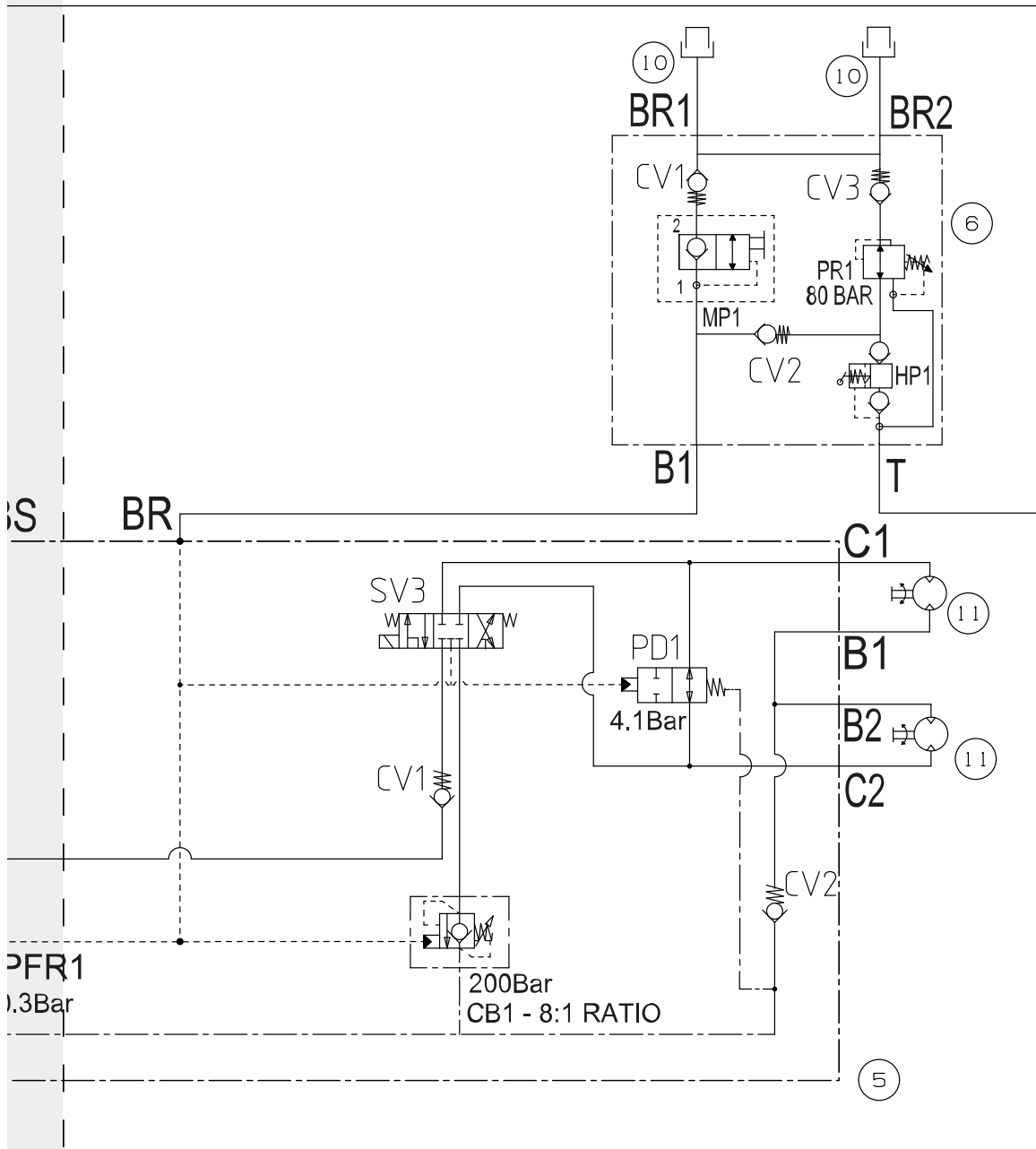


Figure 102. (Part 2 of 2)



401/L7336-2

Table 62.

1	Gear pump
2	Return filter
3	Hydraulic tank
4	Lower lift cylinder valve block
5	Main control valve
6	Manual brake release valve
7	Pressure sensor
8	Lower lift cylinder
9	Steering cylinder
10	Brake
11	Wheel motor



(For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], BLAISE_PDF)

Figure 103. Hydraulic Schematic - 401/L7374-3 (Sheet 1 of 1).....Page 30-25



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

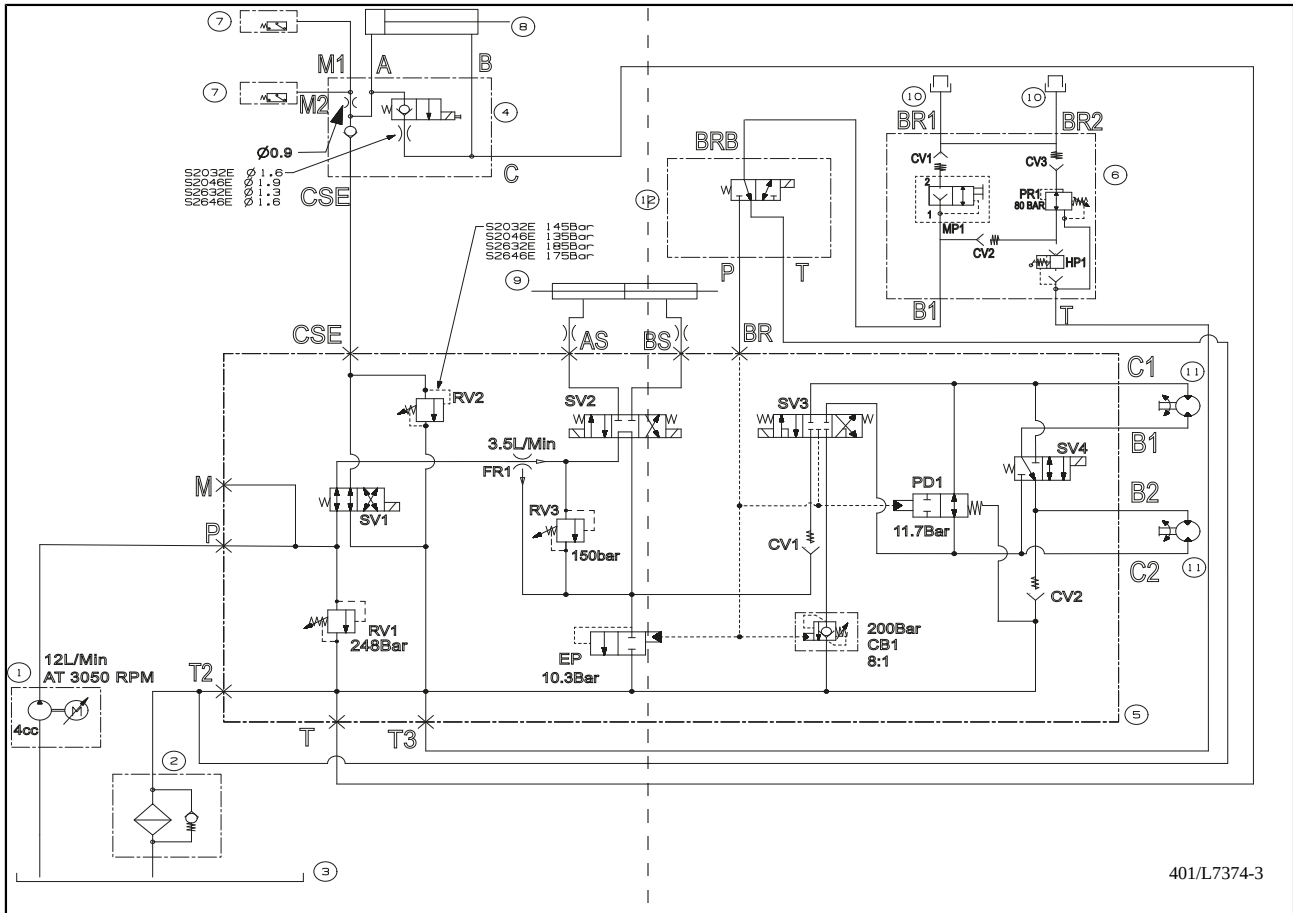


Figure 103. (Part 1 of 2)

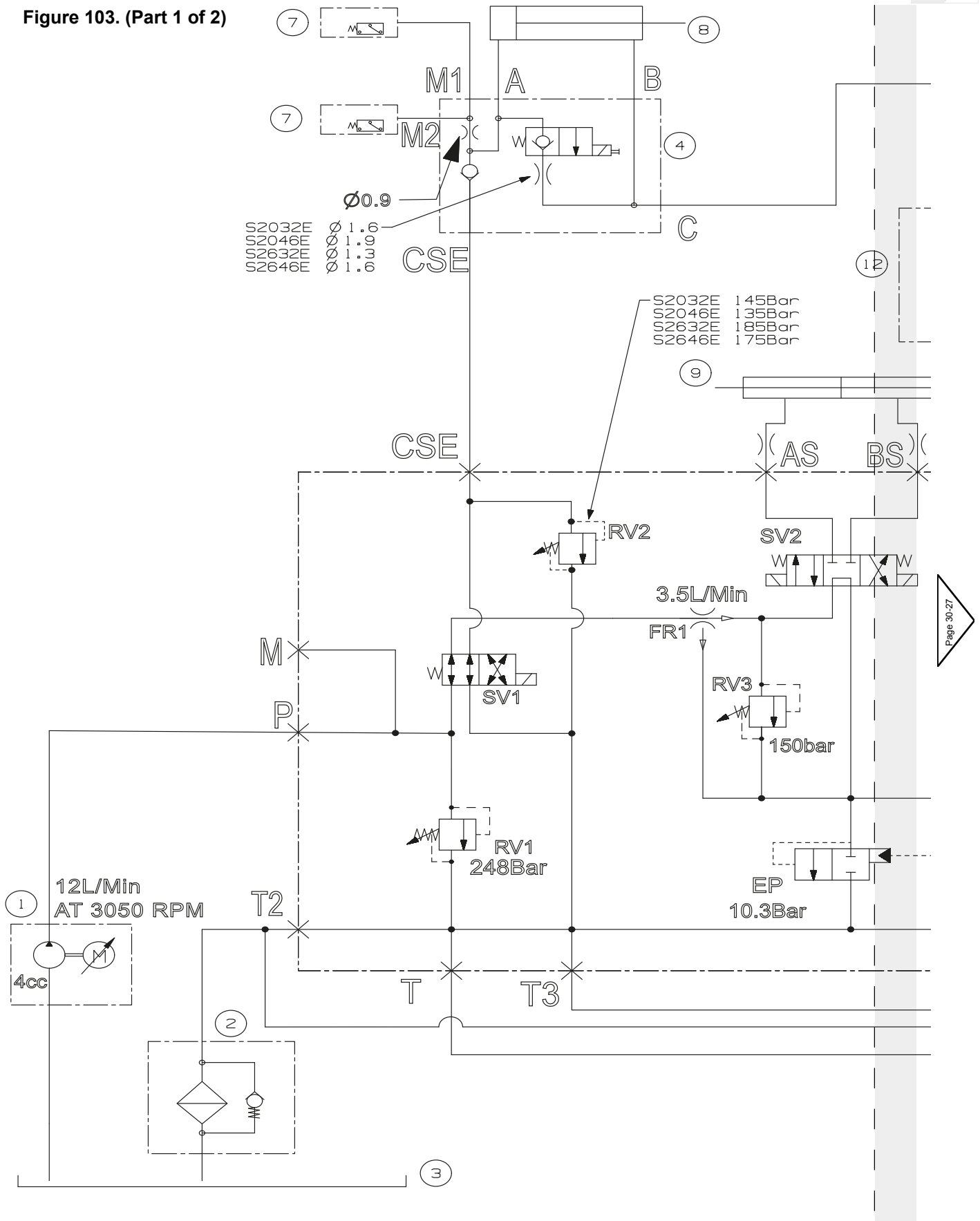
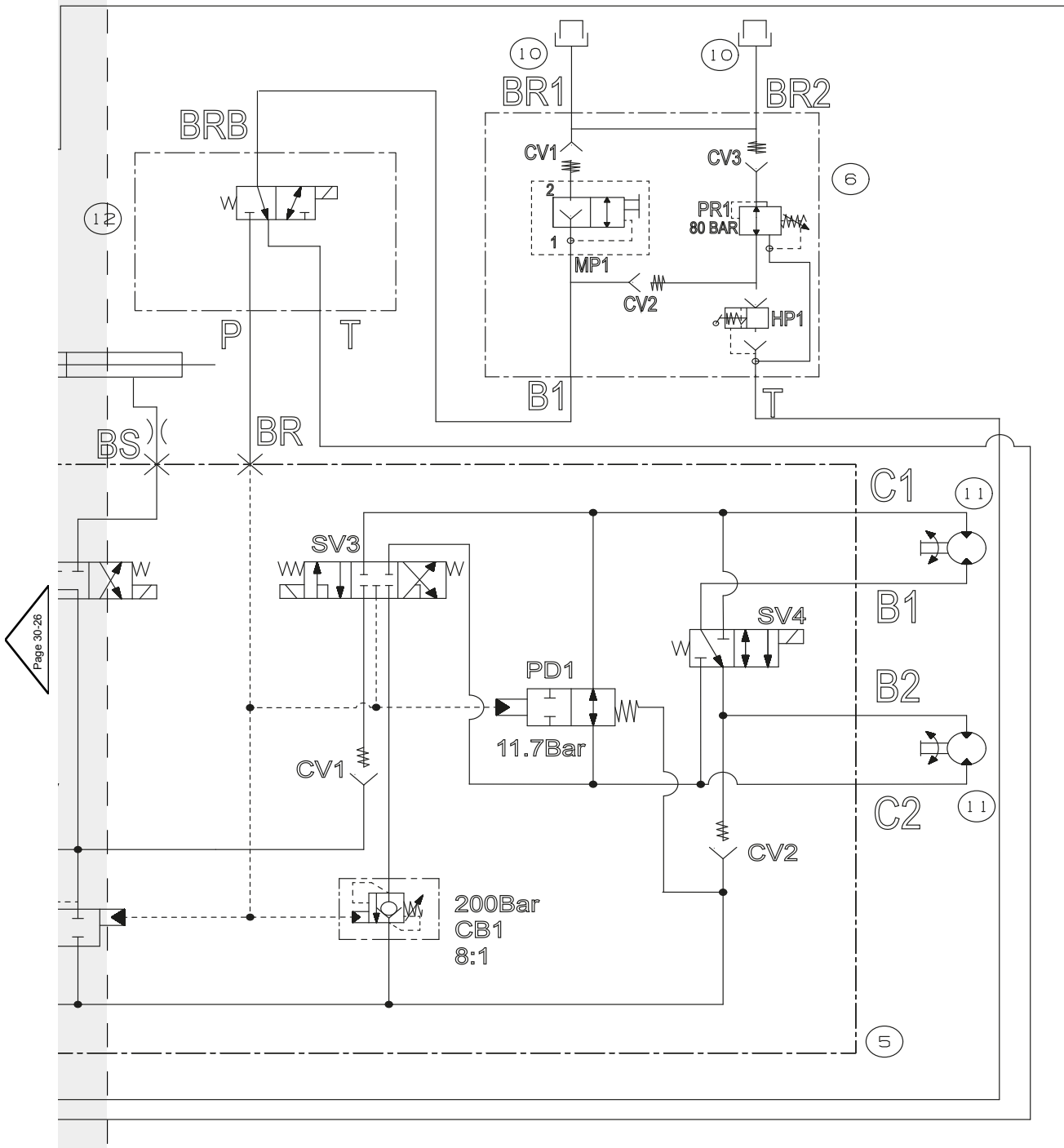


Figure 103. (Part 2 of 2)



401/L7374-3

Table 63.

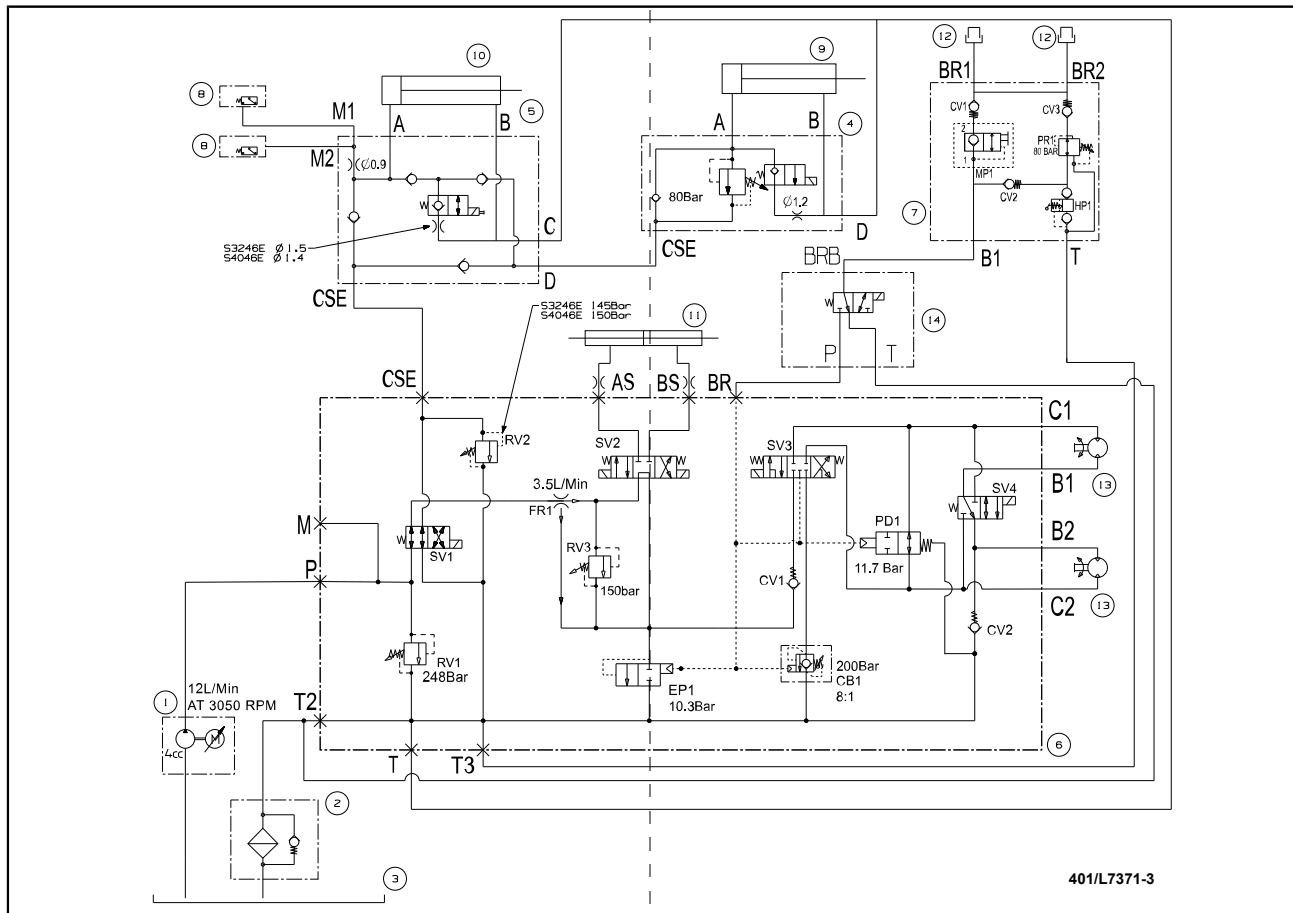
1	Gear pump
2	Return filter
3	Hydraulic tank
4	Lower lift cylinder valve block
5	Main control valve
6	Manual brake release valve
7	Pressure sensor
8	Lower lift cylinder
9	Steering cylinder
10	Brake
11	Wheel motor
12	Dump valve



(For: S3246E [RAJ], S4046E [RAJ], BLAISE_PDF)

Figure 104. 401/L7371-3 (Sheet 1 of 1).....Page 30-31

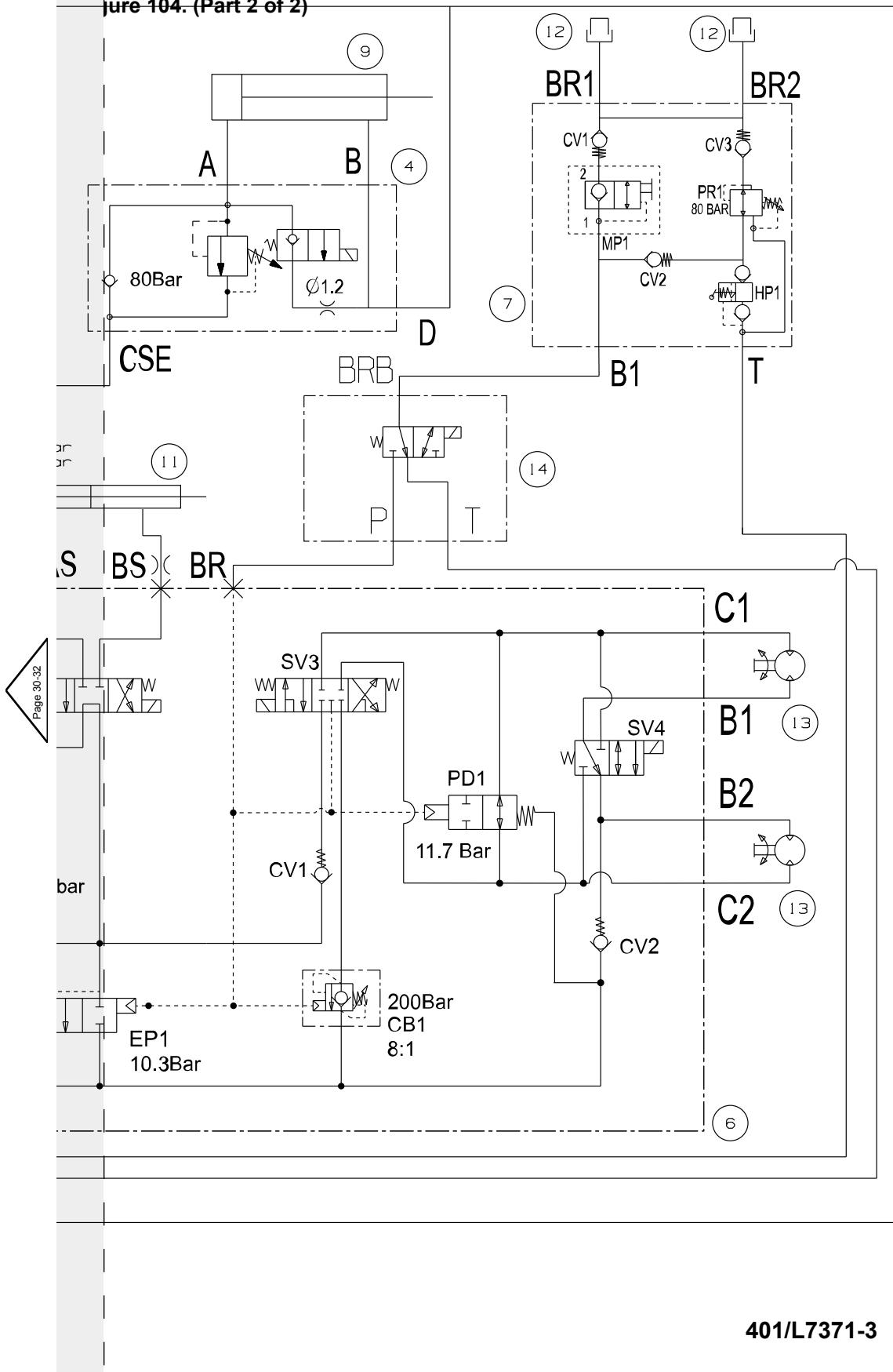
[illegible]



of 2)

Hydraulic schematic diagram of a test rig for a 4-way valve. The diagram shows a pump (1) with a flow rate of 12L/Min at 3050 RPM, connected to a 4-way valve (2) via a line with a pressure drop of 0.9. The valve has four ports: A, B, C, and D. Port A is connected to a cylinder (10) via a line with a pressure drop of 0.9. Port B is connected to a cylinder (5) via a line with a pressure drop of 0.9. Port C is connected to a cylinder (1) via a line with a pressure drop of 0.9. Port D is connected to a cylinder (1) via a line with a pressure drop of 0.9. The diagram also shows a 3.5L/Min flow rate, a 150bar pressure, and a 10.3 pressure. Various components like valves (RV1, RV2, RV3), solenoid valves (SV1, SV2), and a pressure sensor (EP1) are shown. The diagram is labeled with 8, 10, 5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Figure 104. (Part 2 of 2)



401/L7371-3

Table 64.

1	Gear pump
2	Return filter
3	Hydraulic tank
4	Upper lift cylinder valve block
5	Lower lift cylinder valve block
6	Main control valve
7	Manual brake release valve
8	Pressure sensor
9	Upper lift cylinder
10	Lower lift cylinder
11	Steering cylinder
12	Brake
13	Wheel motor
14	Dump valve



(For: S4550E [RAJ], BLAISE_PDF)

Figure 105. 401/L7387-2 (Sheet 1 of 1).....Page 30-37



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

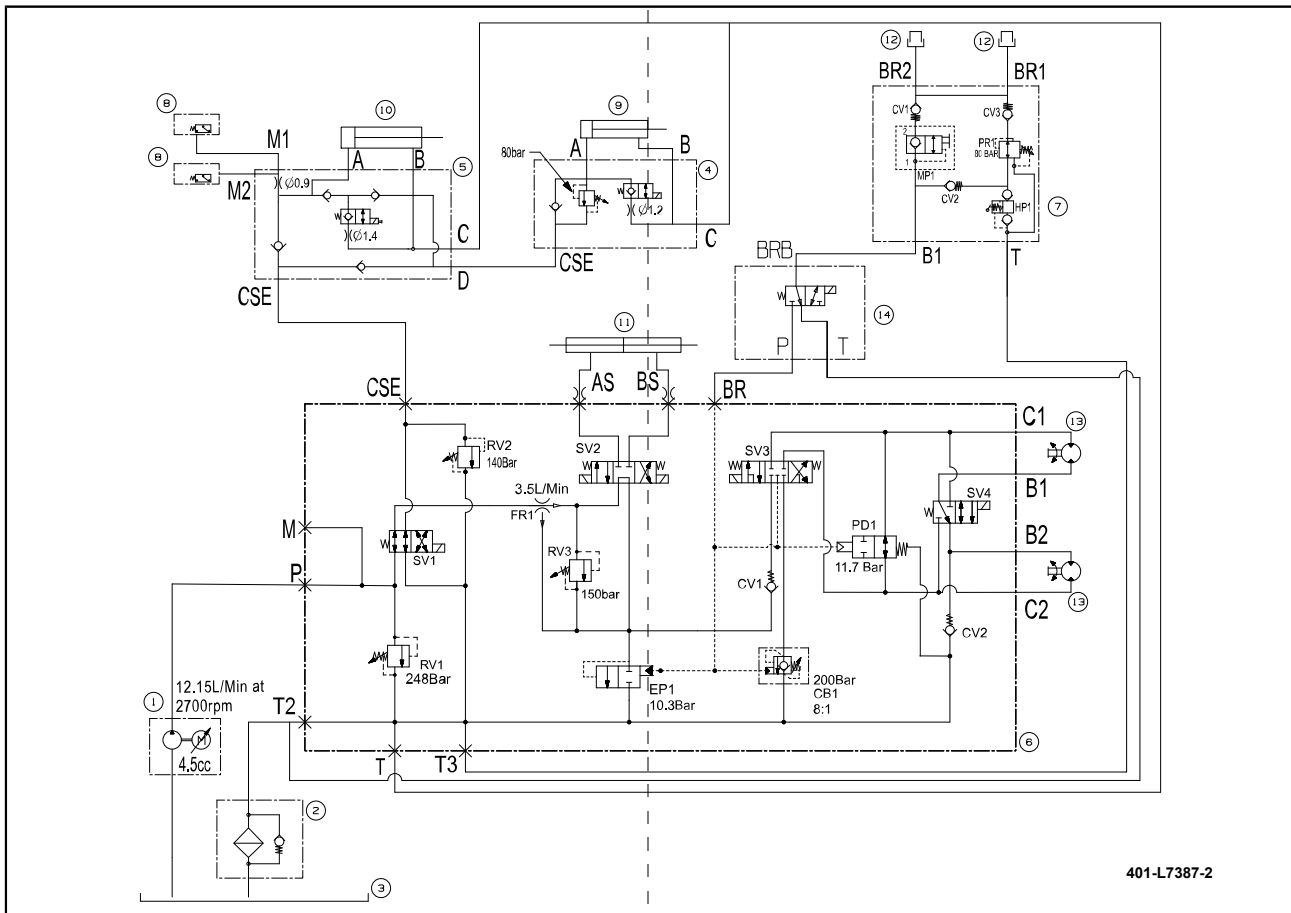
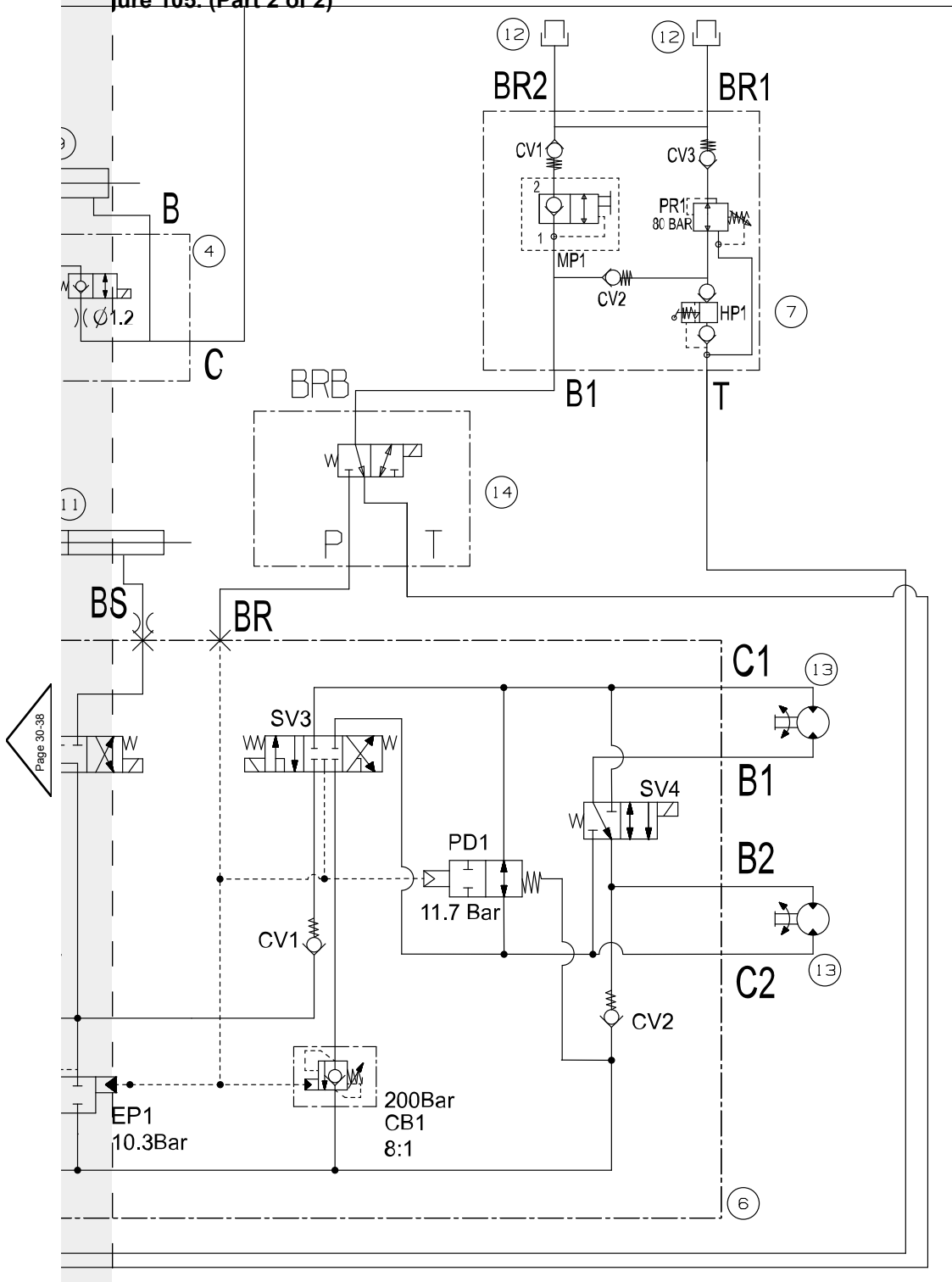


Figure 105. (Part 2 of 2)



401-L7387-2

Table 65.

1	Gear pump
2	Return filter
3	Hydraulic tank
4	Upper cylinder valve block
5	Lower cylinder valve block
6	Main control valve
7	Manual brake release valve
8	Pressure sensor
9	Upper lift cylinder
10	Lower lift cylinder
11	Steering cylinder
12	Brake
13	Wheel motor
14	Dump valve



03 - Tank

Contents	Page No.
30-03-00 General	30-43
30-03-24 Breather	30-45



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction	30-43
Remove and Install	30-44

Introduction

The hydraulic tank holds excess hydraulic oil to accommodate volume changes due to the following.

- Cylinder ram extension and contraction.
- Temperature driven expansion and contraction.
- Hydraulic oil leaks.

The tank is also designed to aid in the separation of air from the fluid and it also acts as a heat accumulator to cover losses in the system when peak power is used.

The tank also houses filters or strainers that help to separate dirt and other particulates from the oil.

The cleanliness of this component is critical. [Refer to: PIL 30-00-00.](#)

Remove and Install

Remove

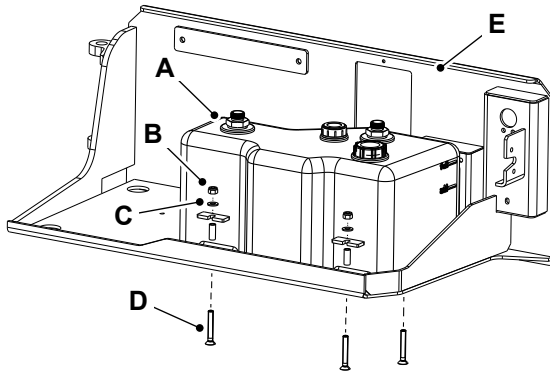
1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Open the hydraulic compartment door.
[Refer to: PIL 06-06-09.](#)
4. Remove the ground control panel (if required).
[Refer to: PIL 33-24-04.](#)
5. Disconnect the hydraulic hose connections.
6. Put a label on the hoses to help installation.
7. Plug all the open ports and hoses to prevent contamination.
8. Remove the bolts (x3), washers (x3) and nuts (x3).
9. Carefully lift and remove the hydraulic tank.

3.1. It is recommended to change the oil filter if oil is changed.

4. Check the hydraulic oil level.

[Refer to: PIL 30-00-00.](#)

Figure 106.



- A** Hydraulic tank
- B** Nuts (x3)
- C** Washers (x3)
- D** Bolts (x3)
- E** Hydraulic compartment cover

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the bolts to the correct torque value.
3. Add the recommended grade of hydraulic oil.
[Refer to: PIL 75-00-00.](#)

24 - Breather

Introduction	30-45
Remove and Install	30-46

Introduction

The hydraulic tank breather allows air in and out of the tank. This smooths out the pressure fluctuations in the hydraulic tank as hydraulic fluid is rapidly drawn out from, or returned to the tank.

The breather also prevents contaminants like moisture and particles from entering the tank when air is drawn in. Contaminates can easily corrode, wear out or otherwise reduce the fluid performance of a hydraulic system.

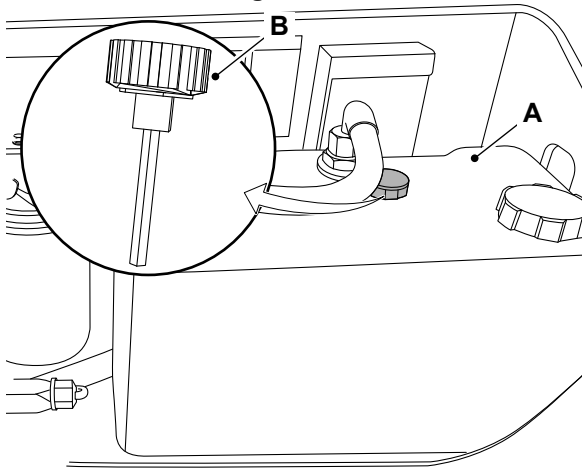
When air is expelled from the tank the breather prevents hydraulic fluid spillage.

Remove and Install

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Open the hydraulic compartment door.
[Refer to: PIL 06-06-09.](#)
3. Remove the breather cap.

Figure 107.



- A** Hydraulic tank
B Breather cap

Install

1. The installation procedure is the opposite of the removal procedure.



04 - Filter

Contents	Page No.
30-04-00 General	30-49
30-04-09 Return Line	30-50



Notes:

00 - General

Introduction

Hydraulic filters are an important part of the machines hydraulic system. Metal particles are continually produced by mechanical components and need to be removed along with other contaminants.

The hydraulic filter assemblies are designed to filter all the contamination that is generated through use to the required level of cleanliness.

Filters are positioned in many different locations. Refer to the relevant hydraulic filter for the location and removal procedure.

The filters must be serviced to the requirements of the machine maintenance schedules. To ensure optimum performance and reliability it is important that the machine's hydraulic system is serviced periodically in accordance with the manufacturers requirements.



09 - Return Line

Introduction	30-50
Remove and Install	30-51

Introduction

The return line hydraulic filter is the main hydraulic filter installed on the return line close to the hydraulic tank.

The filter incorporates a bypass valve. If the filter becomes blocked, the bypass valve opens and allows fluid to bypass the filter. This prevents excessive back pressure which can damage the hydraulic system. The filter is not effective when the bypass valve is open.

Remove and Install

Refer to: PIL 30-00-00.

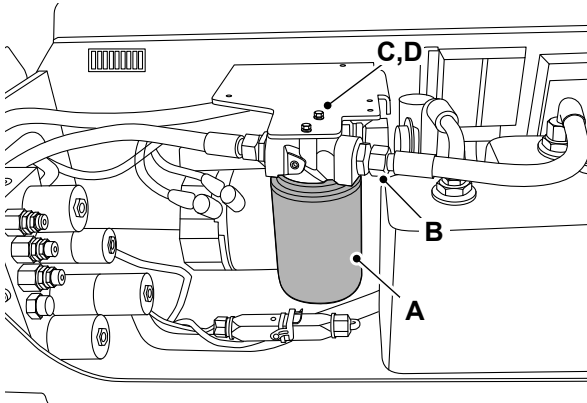
Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
3. Put a suitable oil absorbent cloth under the hydraulic filter to collect any residual oil.
4. Remove the hydraulic filter. If necessary, use a suitable strap wrench.
5. Discard the filter element.
6. Remove and discard the O-ring.

Table 66. Torque Values

Item	Description	Nm
B	Hydraulic hoses	25–35
C	Bolt	7–12
E	Hydraulic adaptors on the filter	120

Figure 108.



- A** Hydraulic filter
- B** Hydraulic hoses
- C** Bolt (x2)
- D** Washer (x2)

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Apply a thin layer of clean hydraulic oil to the O-ring before installation.
[Refer to: PIL 75-00-00.](#)
3. Tighten the filter as follows.
 - 3.1. Install the filter by hand. Make sure that the filter forms the sealing contact.
 - 3.2. Further tighten the filter to one full turn by hand.
4. Check the hydraulic oil level and top up to the correct level.



11 - Gear Pump

Contents

Page No.

30-11-00 General	30-53
------------------------	-------

00 - General

Introduction	30-53
Technical Data	30-54
Component Identification	30-54
Remove and Install	30-55

Introduction

The gear pump consists of an end cover, a body, housing a matched gear pair, bushes and a mounting flange fixed together with bolts. The gear journals are supported in plain bearings within pressure balanced bushes to give high volumetric and mechanical efficiencies.

The direction of rotation of the pump is indicated by an arrow on the body near to the driveshaft.

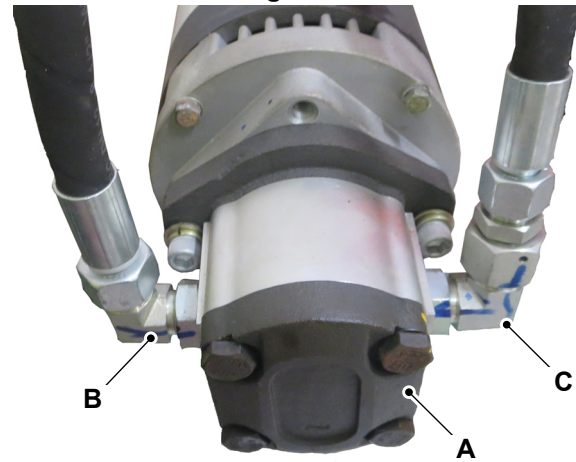
Technical Data

Refer to Hydraulic System- General, Technical Data.

Refer to: [PIL 30-00-00](#).

Component Identification

Figure 109.



- A** Gear pump
- B** Inlet port
- C** Outlet port

Remove and Install

The Gear Pump remove and install procedure is given in the Pump Motor remove and install procedure. [Refer to: PIL 33-10-00.](#)



15 - Cylinder / Ram

Contents	Page No.
30-15-00 General	30-57
30-15-34 Steering	30-60
30-15-75 Scissor Arm	30-61

00 - General

Introduction	30-57
Health and Safety	30-58
Check (Condition)	30-59

Introduction

A hydraulic cylinder ram is a hydraulic actuator that is used to give a single directional force through a single action stroke. It is used in many applications, the cylinder gets the power from pressurised hydraulic oil. The hydraulic cylinder consists of a cylinder barrel, in which a piston connected to a piston rod moves back and forth.

The barrel is closed on one end by the cylinder cap and the other end by the cylinder head where the piston rod comes out of the cylinder. The piston has sliding rings and seals. The piston divides the inside of the cylinder into two chambers, the bottom chamber (cap end) and the piston rod side chamber (rod end / head end).

Health and Safety

Hydraulic Pressure

Hydraulic fluid at system pressure can injure you. Before connecting or removing any hydraulic hose, residual hydraulic pressure trapped in the service hose line must be vented. Make sure the hose service line has been vented before connecting or removing hoses. Make sure the machine cannot be started while the hoses are open.

Lifting Equipment

You can be injured if you use incorrect or faulty lifting equipment. You must identify the weight of the item to be lifted then choose lifting equipment that is strong enough and suitable for the job. Make sure that lifting equipment is in good condition and complies with all local regulations.

WARNING! *A raised and badly supported machine can fall on you. Position the machine on a firm, level surface before raising one end. Ensure the other end is securely chocked. Do not rely solely on the machine hydraulics or jacks to support the machine when working under it. Disconnect the battery, to prevent the machine being started while you are beneath it.*

Precautions for Installation

1. Precautions when installing the ram on the machine.
 - 1.1. When installing and removing from the machine, suspend the ram safely.
 - 1.2. Suspending the ram by the piping is not only dangerous, but can also cause damage to the cylinder.
 - 1.3. Secure the piston rod with a band. It is very dangerous if the rod extends unexpectedly. Also, the rod can be damaged and become unusable.
2. Welding after installing the ram may result in damage.
 - 2.1. If electric welding is done even at a point away from the ram, there may be sparking inside the ram and it will become necessary to replace the ram with a new one.
3. When painting the machine, mask the ram. If paint adheres to the rod surface or to the wiper ring and the ram is operated, the wiper ring will not function properly and foreign matter and paint can easily enter the ram. This will cause damage to the seals, drastically shortening the life of the ram.
4. Install the ram only when it is clean.

Caution During Use

1. Use only under designated conditions.
 - 1.1. If hydraulic oil other than the designated oil is used, the seals quickly degenerate and become damaged. If the relief valve is set at a value higher than specified, it may cause ram damage and is dangerous.
 - 1.2. In high or low temperature environments, seals quickly become damaged. Special seal materials are necessary so check to see if the ram that you are using is suitable or not.
 - 1.3. The number one cause of ram oil leakage is rod damage. Be careful not to damage the rod.
2. Warm up sufficiently before beginning work.
 - 2.1. In cold conditions the rod seals may be frozen, so if the ram is operated at maximum pressure and maximum speed, the seals will be damaged.
 - 2.2. There is a large amount of air in a new ram or one which has been left for a long time, so the ram will not operate smoothly. Also, if pressure is applied suddenly without bleeding the air, high temperatures will be generated due to adiabatic compression and the seals may burn.
 - 2.3. Before beginning work, always move the ram at full stroke with no load and expel air from the cylinder.
3. When stopping or storing, do it at a safe and fixed position.
 - 3.1. The installed ram cannot maintain the same position for a long period of time, because the oil inside the ram may leak and the hydraulic oil volume decreases as it cools. Stop or store the machine in a safe and fixed position.

Maintenance, Inspection Points

1. Carry out daily maintenance and inspection.
 - 1.1. The key point for correct long-term ram function is daily maintenance and inspection. Carry out maintenance and inspection so that the ram functions fully at all times. Always remove any mud, water, dust or oil film adhering to the rod and keep it in normal condition. However, when cleaning the wiper ring and seals, do not get them wet with water but wipe clean with a rag. To prevent rust forming during storage, the amount of exposed ram piston rod should be kept to a minimum. If leaving for

more than one week, apply a light coating of suitable grease or petroleum jelly to the exposed part of the ram piston rod.

2. Use genuine JCB parts when replacing parts.
 - 2.1. If parts other than genuine JCB parts are used, the desired results may not be obtained. Use only genuine JCB parts.
3. Caution during dismantling and reassembly.
 - 3.1. Dismantling the ram while it is still installed on the machine can be dangerous as unexpected movements of the machine can occur. Remove the ram from the machine and then dismantle.
 - 3.2. If reassembled with dirty hands, foreign matter can enter the ram causing a shorter life span and also the other hydraulic equipment may be damaged. Reassemble in a clean state.
 - 3.3. Follow the instructions in the diagrams regarding torque tightening for screwed parts. If the torque is too high or too low, it can cause damage.

Check (Condition)

Consumables

Description	Part No.	Size
Surface Cleaning Fluid	4103/1204	1 L

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Extend each ram fully.
3. Clean the piston, gland, piston rod and tube with cleaning solvent.
[Consumable: Surface Cleaning Fluid](#)
4. Visually examine each ram for score marks, dents, leaks or similar defects.
5. Check the condition of the tube as follows.
 - 5.1. Illuminate the inside of the tube.
 - 5.2. Inspect the inside of the tube for deep grooves and other damage. If damaged, replace the tube.
 - 5.3. Remove small scratches on the inside of the tube with a medium grain emery cloth. Use the emery cloth with a rotary motion.
 - 5.4. Inspect the gland end of the tube for sharp edges that will cut the gland O-ring.
 - 5.5. Remove the sharp edges from the tube as required.
6. Check the condition of the piston rod as follows.
 - 6.1. Make sure that the piston rod is straight.
 - 6.2. If the piston rod is not straight, install a new piston rod.
 - 6.3. Inspect the piston for damage and wear.
 - 6.4. If the piston is damaged or worn, replace it.
7. Check the condition of the gland as follows.
 - 7.1. Inspect the gland for rust.
 - 7.2. Remove rust and clean as required.

34 - Steering

Remove and Install

Working Under the Machine

Make the machine safe. Make sure the park brake is engaged and machine is fully isolated. Remove the machine key switch, disconnect the battery. Use blocks to prevent unintentional movement of the wheels.

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Discharge the hydraulic pressure.
[Refer to: PIL 30-00-00.](#)
3. Remove and discard the split pins from both ends of the ram.
4. Put a label on the hoses to help installation.
5. Disconnect the hydraulic hoses from the steering cylinder ram.
6. Plug all the open ports and hoses to prevent contamination.
7. Support the steering cylinder ram.
8. Use a suitable hammer and drift to remove the pivot pins.
[Refer to: PIL 06-30-00.](#)
9. Remove the bolts (x4).
10. Remove the steering cylinder from the machine.

2. Apply grease to the pivot pins in accordance with the Maintenance Schedules.

[Refer to: PIL 75-00-00.](#)

3. Check the hydraulic oil level and top up to the correct level.

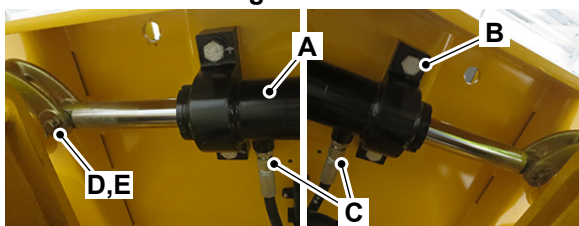
[Refer to: PIL 30-00-00.](#)

4. Tighten the bolts to the correct torque value.

Table 67. Torque Values

Item	Nm
B	260

Figure 110.



- A Steering cylinder ram
- B Bolts (x4)
- C Hoses (x2)
- D Split pins (x2)
- E Pivot pins (x2)

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.

75 - Scissor Arm

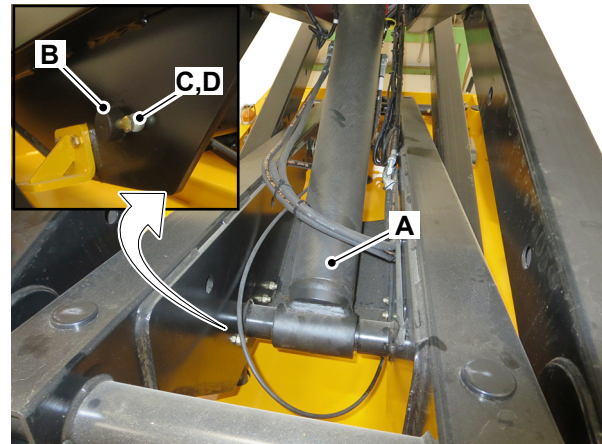
Remove and Install

⚠ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Discharge the hydraulic pressure.
[Refer to: PIL 30-00-00.](#)
3. Support the platform with suitable lifting equipment. The scissor arm ram will not be supporting the weight of the scissor arm during this procedure. Therefore the maintenance strut will not work. You could get killed or injured if you do not support the scissor arm fully.
4. Put a label on the hoses to help installation.
5. Disconnect the hydraulic hoses from the scissor arm cylinder ram.
6. Plug all the open ports and hoses to prevent contamination.
7. Remove the guide sleeve from the piston rod with a suitable tool.
8. Support the scissor arm cylinder ram.
9. Remove the nut 1 and bolt 1 from the pivot pin 1.
10. Use a suitable hammer and drift to remove the pivot pin 1.
[Refer to: PIL 06-30-00.](#)

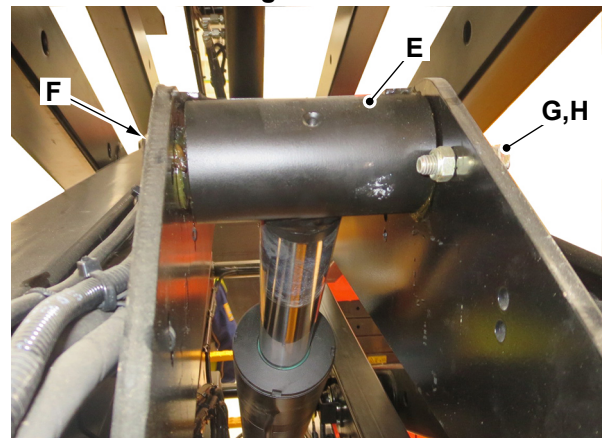
Figure 111.



- A Head side - Scissor arm cylinder ram
- B Pivot pin 1
- C Bolt 1
- D Nut 1

11. Remove the nut 2 and bolt 2 from the pivot pin 2.
12. Use a suitable hammer and drift to remove the pivot pin 2.
[Refer to: PIL 06-30-00.](#)

Figure 112.



- E Rod side - Scissor arm cylinder ram
- F Pivot pin 2
- G Bolt 2
- H Nut 2

13. Remove the scissor arm cylinder ram.

Install

1. The installation procedure is the opposite of the removal procedure.
2. Check the hydraulic fluid level and refill if necessary.
[Refer to: PIL 30-00-00.](#)



56 - Main Control Valve Block

Contents

Page No.

30-56-00 General	30-63
------------------------	-------



00 - General

Introduction	30-63
Component Identification	30-64
Operation	30-68
Remove and Install	30-69

Introduction

The main control valve block controls all hydraulic functional elements of the machine.

Component Identification

For: S1530E [RAJ], S1930E [RAJ]
..... Page 30-64

For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ] Page 30-66

(For: S1530E [RAJ], S1930E [RAJ])

Figure 113.

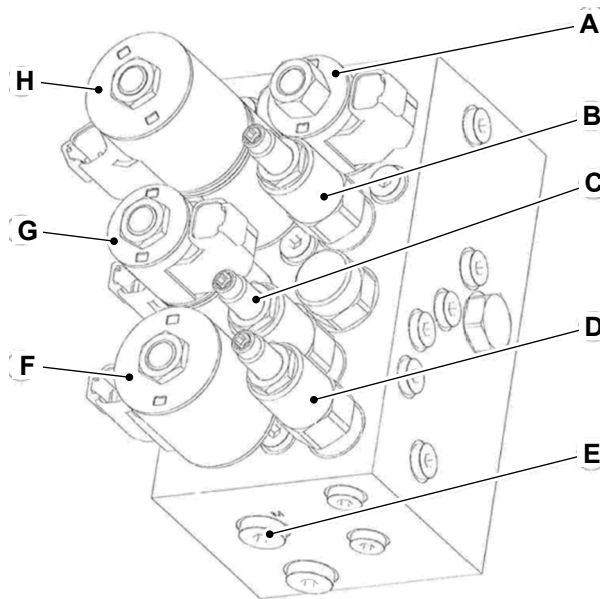


Table 68.

Item	Description	Remarks
A	2-position 4-way solenoid DCV (Direction Control valve)	Brake release
B	ARV (Auxiliary Relief Valve)	Steering pressure control
C	ARV	Lifting pressure control
D	MRV (Main Relief Valve)	System pressure control
E	Test port	Test port
F	2-position 4-way solenoid DCV	Platform lifting
G	3-position 4-way solenoid DCV	Steer
H	3-position 4-way solenoid DCV	Drive

Figure 114.

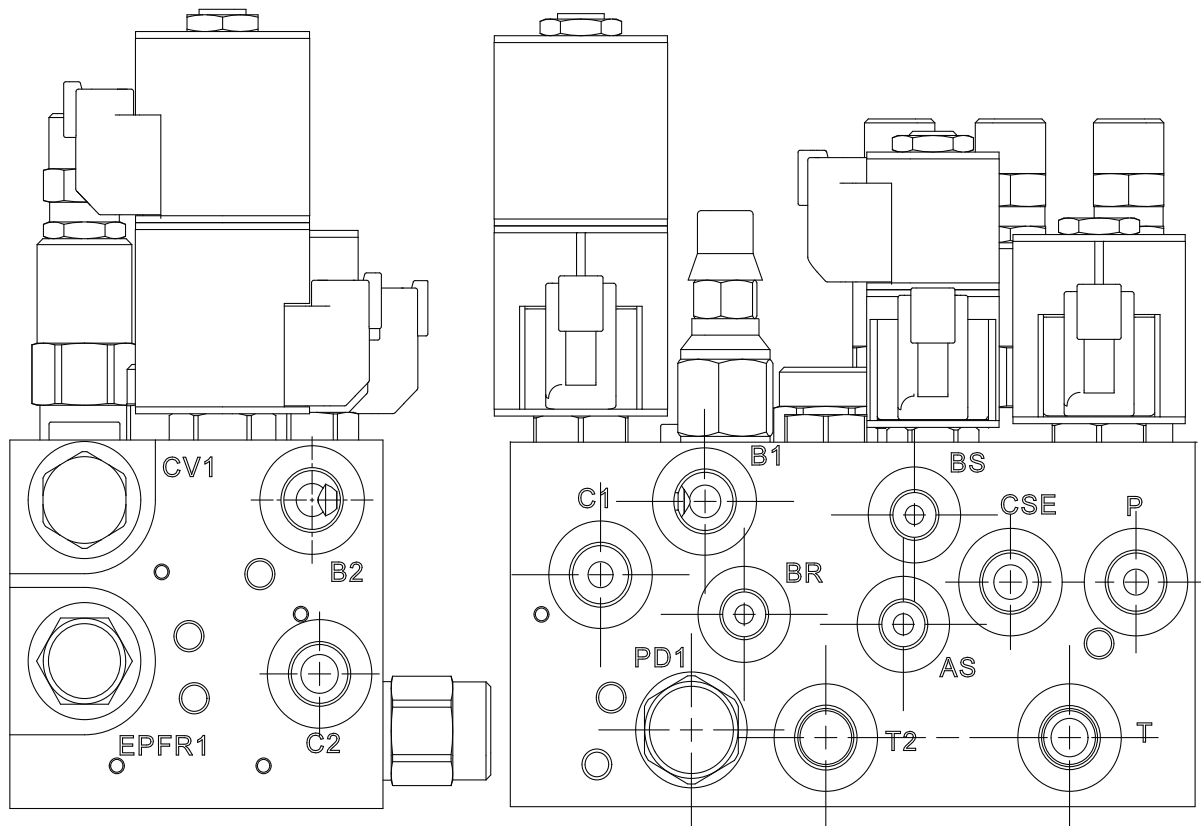


Table 69.

Item	Description
AS	Steer outlet port
B1	Wheel motor outlet port
B2	Wheel motor outlet port
BR	Brake release outlet port
BS	Steer outlet port
C2	Wheel motor outlet port
CSE	Lift outlet port
P	Pump inlet port
T	Lift Outlet Port
T2	Filter Inlet Port
CSE	Lift Inlet Port
EPFR	Pressure Compensated directional valve
CV1	Check Valve - 1
C1	Wheel motor outlet port
PD1	Piloted Directional Valve

(For: S2032E [RAJ], S2632E [RAJ],
S2646E [RAJ], S3246E [RAJ], S4046E
[RAJ], S4550E [RAJ])

Figure 115.

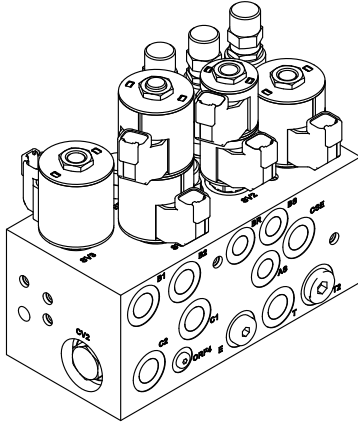
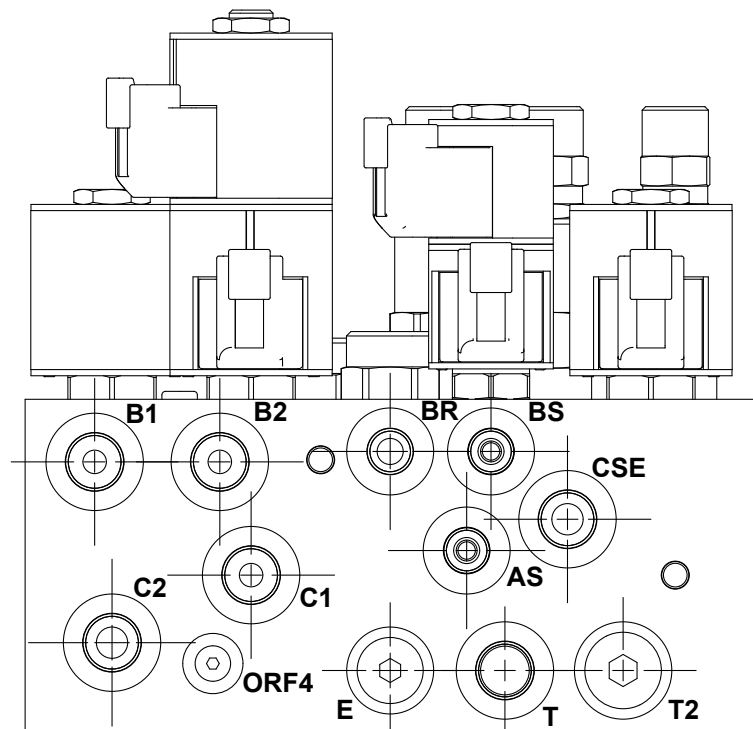
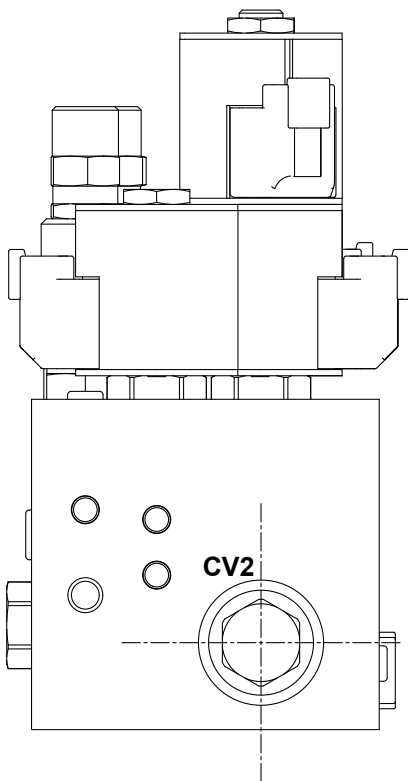
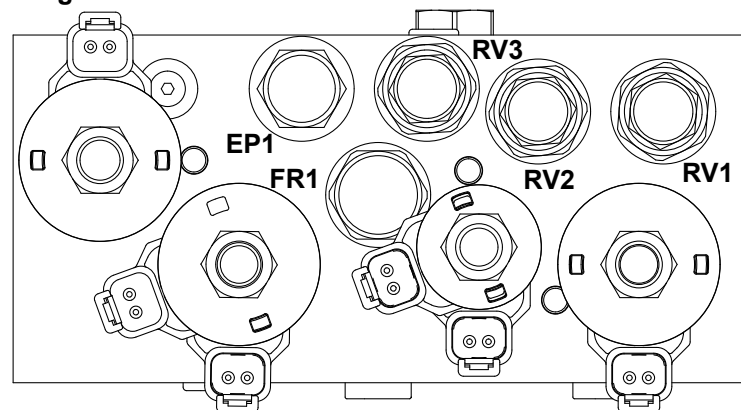


Figure 116.



EP1 10.3bar (149.3psi)
RV2 Relief valve (175bar (2,536.2psi))
FR1 Fan relay (3.5L/min)
ORF4 2.5mm
T Lift Outlet Port
AS Left steer port
BR Brake release supply
B1 Left hydraulic motor port B
B2 Right hydraulic motor port B

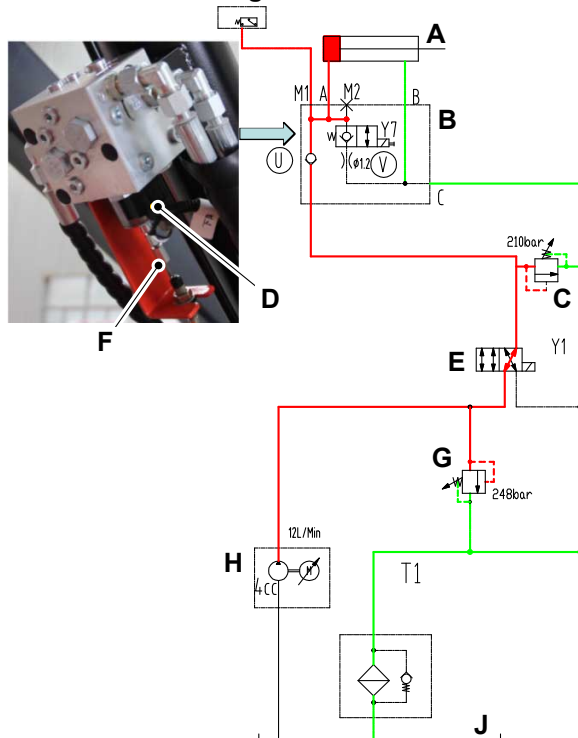
RV1 Relief valve (248bar (3,594.2psi))
RV3 Relief valve (150bar (2,173.9psi))
CSE Lift Inlet Port
CV2 Check valve (0.5bar (7.2psi))
BS Right steer port
T2 Lift cylinder return port
C1 Left hydraulic motor port A
C2 Right hydraulic motor port A

Operation

Raising Platform

When platform raise is operated, the pressurised oil generated from the gear pump flows into the main control valve block. The raise solenoid valve changes position after energization and the pressurised oil flows into the head port of the lift cylinder through the check valve. As the lift cylinder extends, the platform raises and the oil in the rod port returns back to the oil tank through the return line.

Figure 117.

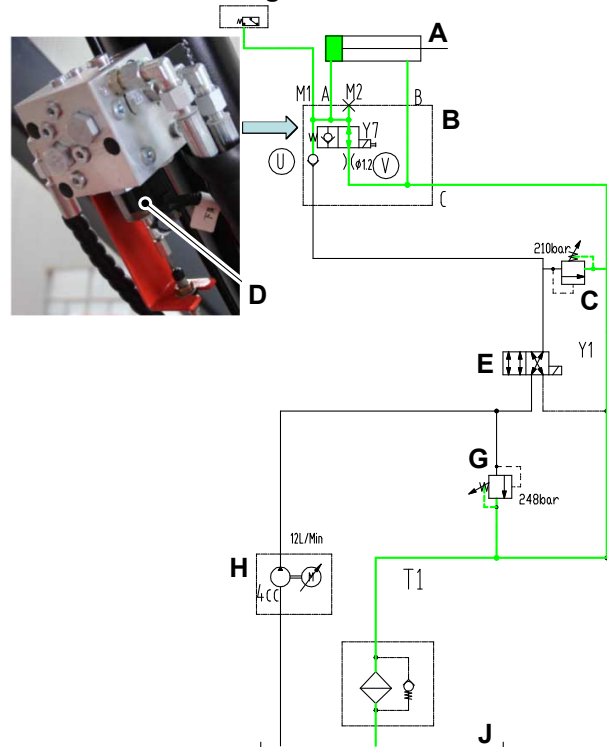


- A Scissor arm cylinder ram
- B Scissor arm cylinder control valve
- C Safety valve
- D Solenoid valve (Lower)
- E Main control valve block
- F Emergency lower cable
- G Lower lift cylinder control valve
- H Gear pump
- J Hydraulic tank

For two-cylinder systems, both cylinders have lower solenoid valves. The oil flows from the upper cylinder to the lower cylinder, then to tank.

If platform lower is operated by the manual lowering lever, the cable from the lever pulls the lower valve of the lower cylinder open, allowing the lower cylinder to retract under the action of the platform load. The upper cylinder also retracts as oil from the cylinder then flows through the ARV (Auxiliary Relief Valve) at the upper cylinder valve block, since the pressure difference increases above the setting pressure.

Figure 118.



- A Scissor arm cylinder ram
- B Scissor arm cylinder valve
- C Safety valve
- D Solenoid valve (Lower)
- E Main control valve block
- F Emergency lower cable
- G Lift cylinder lower control valve
- H Gear pump
- J Hydraulic tank

Lowering Platform

When platform lower is operated, the lower solenoid valve at the cylinder valve block is energized. The oil in the head port of the lift cylinder flows back to the oil tank through this valve under the action of the platform load. Some of the oil will flow back into the rod port. During the lowering operation, the oil flows through a restrictor, which controls the lowering speed. (Refer to table for restrictor sizes for each model.)

Remove and Install

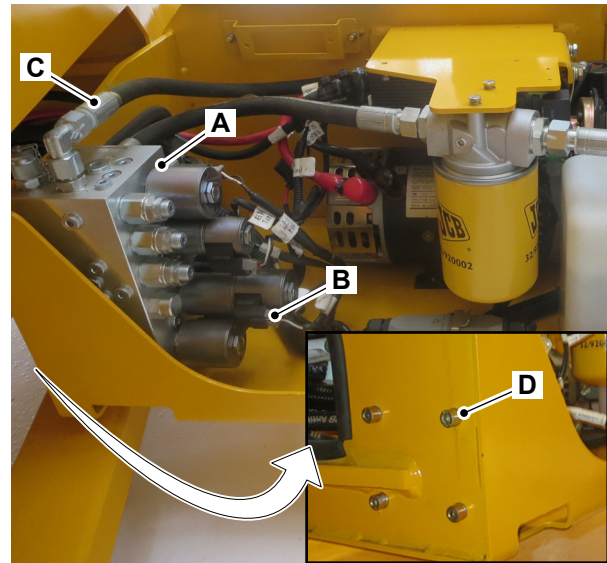
For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ] Page 30-69
 For: S1530E [RAJ], S1930E [RAJ] Page 30-69

(For: S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ], S4046E [RAJ], S4550E [RAJ])

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Discharge the hydraulic pressure.
[Refer to: PIL 30-00-00.](#)
3. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
4. Put a label on the hoses and electrical connections to help installation.
5. Disconnect the hydraulic hoses from the scissor arm control valve block.
6. Plug all the open ports and hoses to prevent contamination.
7. Disconnect the electrical connections from the solenoids.
8. Support the main control valve block.
9. Remove the capscrews (x4).
10. Remove the main control valve block.

Figure 119.



- A** Main control valve block
- B** Electrical connections
- C** Hydraulic hoses
- D** Capscrews (x4)

Install

1. The installation procedure is the opposite of the removal procedure.
2. Check the hydraulic oil level and top up to the correct level.
[Refer to: PIL 30-00-00.](#)

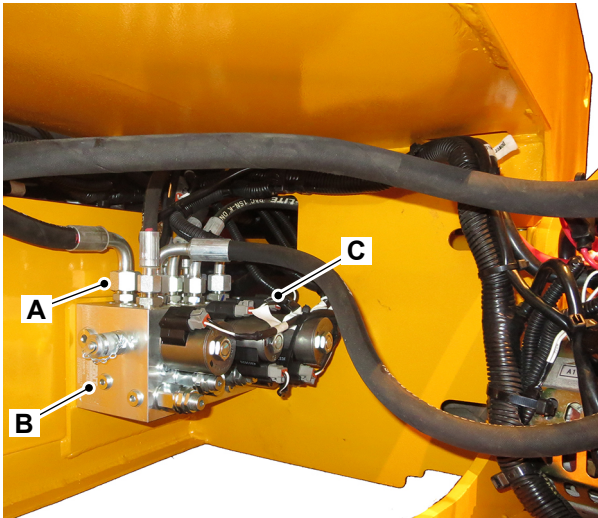
(For: S1530E [RAJ], S1930E [RAJ])

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Discharge the hydraulic pressure.
[Refer to: PIL 30-00-00.](#)
3. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
4. Put a label on the hoses and electrical connections to help installation.
5. Disconnect the hydraulic hoses from the main control valve block.
6. Plug all the open ports and hoses to prevent contamination.
7. Disconnect the electrical connections from the solenoids.

8. Open the battery compartment cover.
[Refer to: PIL 06-06-03.](#)
- 8.1. Make a note that the access to the mounting fasteners of the main control valve block is from the battery compartment.
9. Support the main control valve block.
10. Remove the capscrews (x4) and washers (x4).
11. Remove the main control valve block.

Figure 120.



- A** Hydraulic hoses
B Main control valve block
C Electrical connections

Install

1. The installation procedure is the opposite of the removal procedure.
2. Tighten the hydraulic hoses to the correct torque value.
3. Check the hydraulic oil level and top up to the correct level.

[Refer to: PIL 30-00-00.](#)



60 - Directional Control Valve

Contents	Page No.
30-60-03 Brake	30-73
30-60-51 Lift Cylinder	30-75



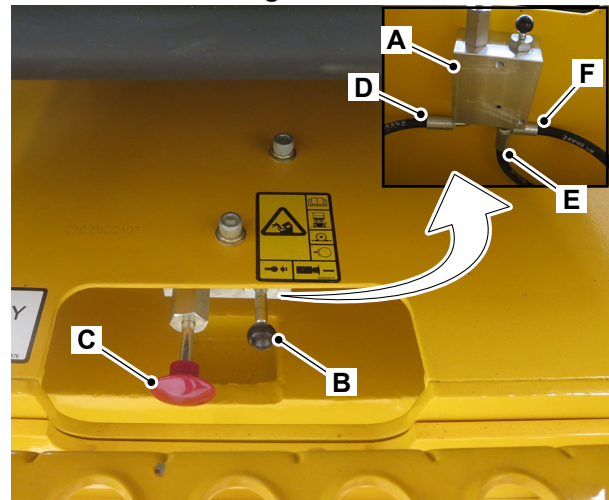
This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

03 - Brake

Component Identification	30-73
Remove and Install	30-74

Component Identification

Figure 121.



- A** Manual brake release valve
- B** Brake release valve lever (Black)
- C** Brake pump lever (Red)
- D** Hose - To left hand side brake
- E** Hose - To the scissor control valve block
- F** Hose - To right hand side brake

Remove and Install

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Discharge the hydraulic pressure.
[Refer to: PIL 30-00-00.](#)
3. Pull the black handle to release the brake pressure.
4. Remove the capscrews (x2) and washers (x4).
5. Put a label on the hose connections to help installation.
6. Support the manual brake release valve.
7. Disconnect the hydraulic hoses from the manual brake release valve.
8. Plug all the open ports and hoses to prevent contamination.
9. Remove the manual brake release valve.

[Refer to: PIL 72-06-00.](#)

3. Check the hydraulic oil level and top up as required.

[Refer to: PIL 30-00-00.](#)

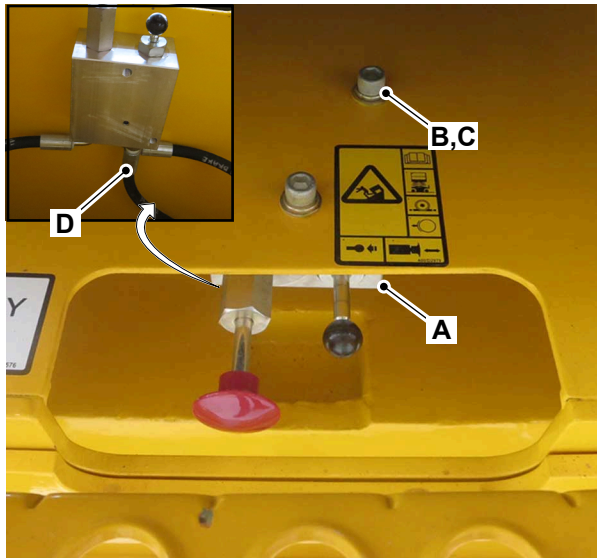
4. Check the brake system for correct operation.

[Refer to: PIL 24-00-00.](#)

Table 70. Torque Values

Item	Nm
D	20 ± 2

Figure 122.



- A** Manual brake release valve
- B** Capscrews (x2)
- C** Washers (x4)
- D** Hoses

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the screws to the correct torque value.

51 - Lift Cylinder

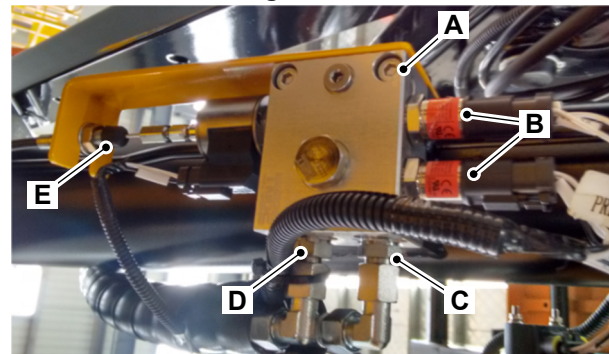
Component Identification	30-75
Remove and Install	30-76

Component Identification

For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], Single Cylinder Page 30-75
For: S3246E [RAJ], S4046E [RAJ], S4550E [RAJ], Double Cylinder Page 30-75

(For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], Single Cylinder)

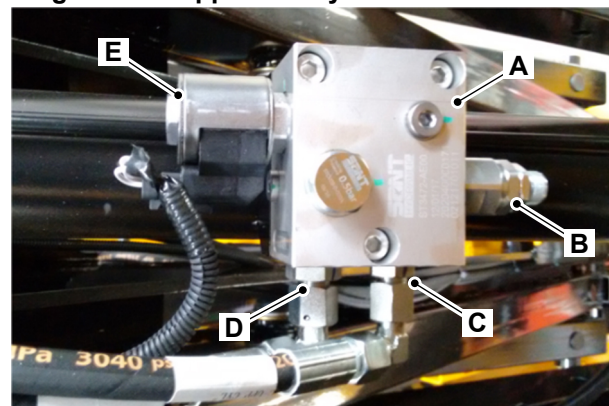
Figure 123.



- A** Lift cylinder control valve
- B** Pressure sensors
- C** Hydraulic return line to tank
- D** Hydraulic pressure line from pump
- E** Lowering solenoid with emergency lower cable

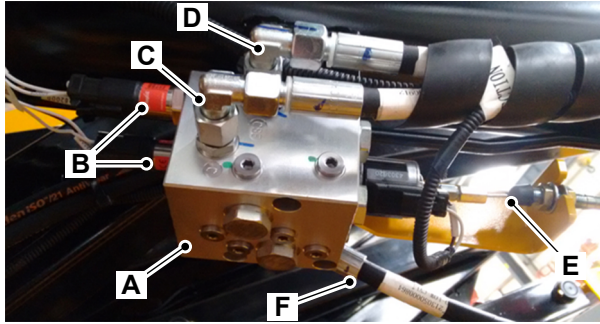
(For: S3246E [RAJ], S4046E [RAJ], S4550E [RAJ], Double Cylinder)

Figure 124. Upper Lift Cylinder Control Valve



- A** Lift cylinder control valve
- B** Upper cylinder relief valve
- C** Hydraulic return line to tank
- D** Hydraulic pressure line from pump
- E** Lowering solenoid

Figure 125. Lower Lift Cylinder Control Valve



- A** Lift cylinder control valve
- B** Pressure sensors
- C** Hydraulic return line to tank
- D** Hydraulic pressure line from pump
- E** Lowering solenoid with emergency lower cable
- F** Upper cylinder supply line

Remove and Install

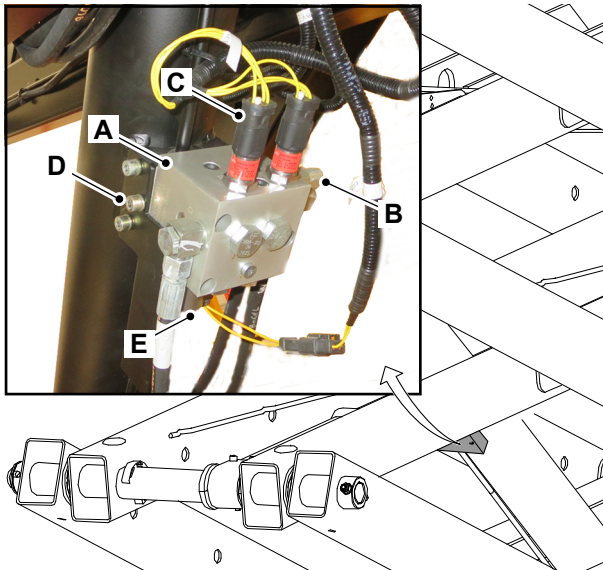
Lower Lift Cylinder Control Valve

The single cylinder ram machines are installed with the lower lift cylinder control valve only.

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Discharge the hydraulic pressure.
[Refer to: PIL 30-00-00.](#)
3. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
4. Put a label on the hoses and harness connections to help installation.
5. Disconnect the electrical connections to the sensors.
6. Disconnect the hydraulic hoses from the main control valve.
7. Plug all the open ports and hoses to prevent contamination.
8. Remove the emergency lower cable.
[Refer to: PIL 06-93-03.](#)
9. Support the valve.
10. Remove the capscrews (x3).
 - 10.1. Carefully remove the capscrews to release any trapped pressure. Take care to avoid any risk of contact with high pressure hydraulic fluid.
11. Remove the lift cylinder control valve.

Figure 126.

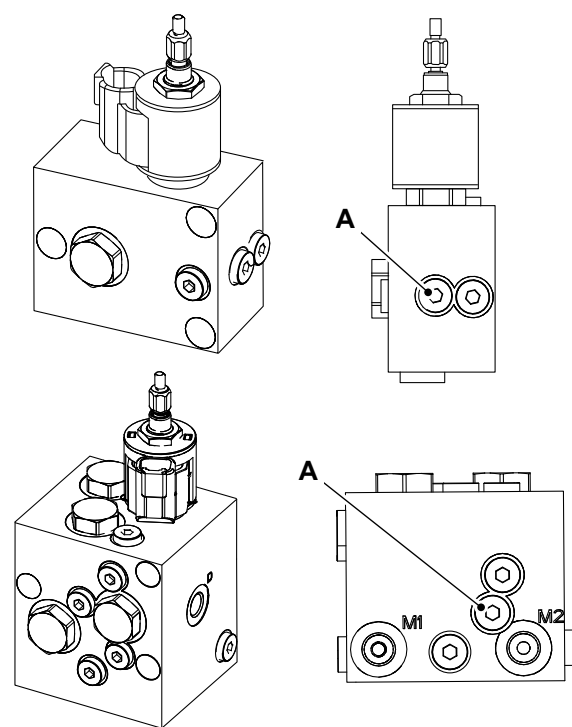


- A** Lift cylinder control valve (Lower)
- B** Hydraulic hoses
- C** Electrical connections
- D** Capscrews (x3)
- E** Emergency lower cable

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Make sure that the contact surfaces are clean.
3. Lightly lubricate all the O-rings. Make sure that all O-rings are correctly seated when assembling.
4. Tighten the screws to the correct torque value.
5. Check the hydraulic fluid level and refill if necessary.
[Refer to: PIL 30-00-00.](#)
6. Replace the lowering restrictor as follows.
 - 6.1. Put the valve on a clean workbench.
 - 6.2. Use an Allen key to remove the port cap to get access to the restrictor.
 - 6.3. Use an Allen key to remove the restrictor.
 - 6.4. Replace the restrictor with the correct size.
[Refer to: PIL 30-00-00.](#)
 - 6.5. Install the port cap.
 - 6.6. Tighten the port cap.

Figure 127.



- A** Restrictor

Upper Lift Cylinder Control Valve

The double cylinder ram machines are installed with the upper lift cylinder control valve in addition to the lower lift cylinder control valve.

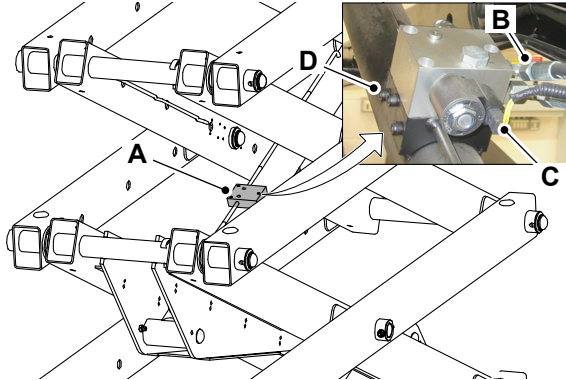
Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Discharge the hydraulic pressure.
[Refer to: PIL 30-00-00.](#)
3. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
4. Put a label on the hoses and harness connections to help installation.
5. Disconnect the hydraulic hoses from the main control valve.
6. Disconnect the electrical connections to the sensors.
7. Plug all the open ports and hoses to prevent contamination.
8. Support the valve.
9. Remove the capscrews (x3).

9.1. Carefully remove the capscrews to release any trapped pressure. Take care to avoid any risk of contact with high pressure hydraulic fluid.

10. Remove the lift cylinder control valve.

Figure 128.



- A** Lift cylinder control valve (Upper)
- B** Hydraulic hoses
- C** Electrical connections
- D** Capscrews (x3)

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Make sure that the contact surfaces are clean.
3. Lightly lubricate all the O-rings. Make sure that all O-rings are correctly seated when assembling.
4. Tighten the screws to the correct torque value.
5. Check the hydraulic fluid level and refill if necessary.

[Refer to: PIL 30-00-00.](#)

Table 71. Torque Values

Item	Nm
D	35 ± 3



93 - Hose

Contents	Page No.
30-93-00 General	30-81

[illegible]



00 - General

Introduction	30-81
Disconnect and Connect	30-82
Check (Condition)	30-83

Introduction

Hydraulic hoses are used to connect different components in the hydraulic circuit. The hoses are graded by pressure, temperature, and fluid compatibility. Hoses are built up with rubber and steel layers. A rubber interior is surrounded by multiple layers of woven wire and rubber. The exterior is designed for abrasion resistance. The bend radius of a hydraulic hose is carefully designed for the machine, since hose failures can be deadly, and violating the hose's minimum bend radius will cause failure. Hydraulic hoses generally have steel fittings swaged on the ends.

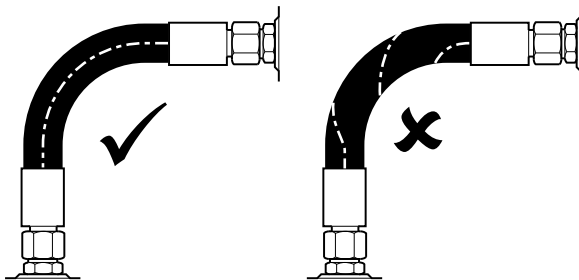
Disconnect and Connect

Some attachments are hydraulically powered. The following procedures show how to connect and disconnect the hydraulic hoses safely.

Connecting the Hydraulic Hoses

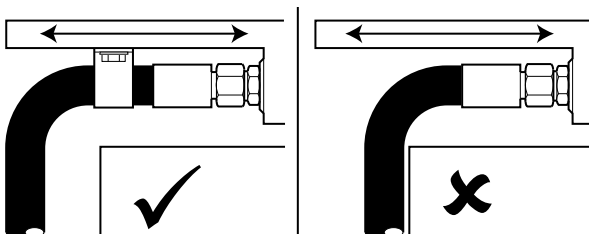
1. Make the machine safe.
[Refer to: PIL 01-03.](#)
2. Discharge the hydraulic system pressure.
[Refer to: PIL 30-00-00.](#)
3. Check the hoses and adaptors for damage.
4. Connect the hoses:
 - 4.1. Make sure that the hose is not twisted. Pressure applied to a twisted hose can cause the hose to fail or the connections to loosen.

Figure 129.



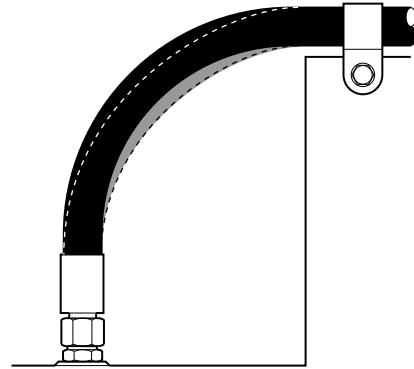
- 4.2. Make sure that the hose does not touch hot parts. High ambient temperatures can cause the hose to fail.
- 4.3. Make sure that the hose does not touch parts which can rub or cause abrasion.
- 4.4. Use the hose clamps (where possible) to support long hose runs and keep the hoses away from moving parts, etc.

Figure 130.



- 4.5. To allow for length changes when the hose is pressurised, do not clamp at the bend. The curve absorbs the change.

Figure 131.



5. Check for leaks:
 - 5.1. Start the machine.
 - 5.2. Operate the related controls to increase the pressure in the hydraulic system.
 - 5.3. Stop the machine then remove the key.
 - 5.4. Check for indications of leakage at the hose connections. Correct, as necessary.

Disconnecting the Hydraulic Hoses

1. Make the machine safe.
[Refer to: PIL 01-03.](#)
2. Discharge the hydraulic system pressure.
[Refer to: PIL 30-00-00.](#)
3. Disconnect the hoses.
4. Check the hoses and adaptors for damage.
5. If necessary, install the blanking caps.
6. Check for leaks:
 - 6.1. Start the machine.
 - 6.2. Operate the related controls to increase the pressure in the hydraulic system.
 - 6.3. Stop the machine then remove the key.
 - 6.4. Check for indications of leakage at the hose connections. Correct, as necessary.

Check (Condition)

Hydraulic Hoses

▲ **WARNING** Damaged hoses can cause fatal accidents. Examine the hoses regularly. Do not use the machine if a hose or hose fixture is damaged.

WARNING Fine jets of fluid at high pressure can penetrate the skin. Keep face and hands well clear of fluid under pressure and wear personal protective equipment. Hold a piece of cardboard close to suspected leaks and then examine the cardboard for signs of fluid. If fluid penetrates your skin, get medical help immediately.

Examine the hoses for:

- Damaged hose ends
- Worn or cracked outer covers
- Ballooned outer covers
- Kinked or crushed hoses
- Exposed armouring in the outer covers
- Displaced hose end fittings.
- Worn cover sheathing or hose burst protection covering

Replace a damaged hose before you use the machine again.

The replacement hoses must be of the same size, standard and pressure rating. If necessary, for more information contact your JCB dealer.



97 - Connectors

Contents	Page No.
30-97-00 General	30-85

00 - General

Technical Data

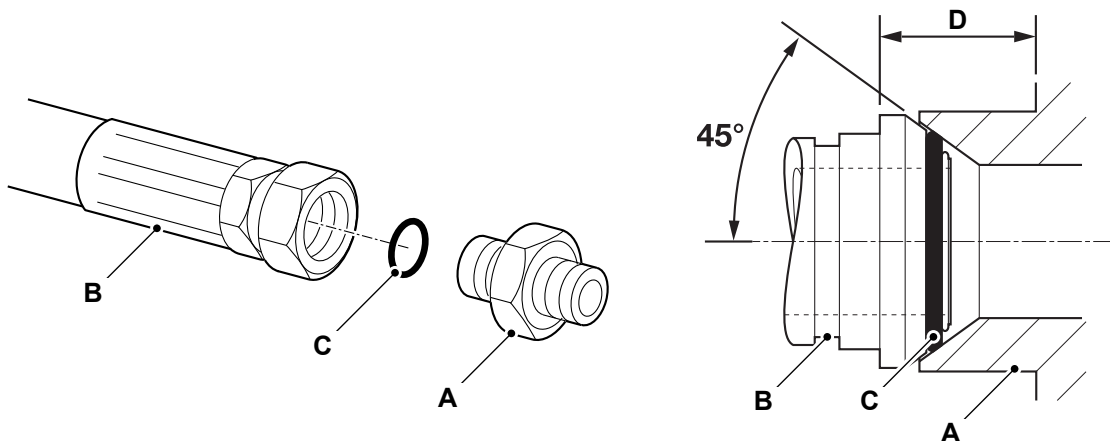
Adaptors Connected into Valve Blocks

Table 72. Torque Settings - BSP Adaptors

BSP Adaptor Size	BSP Adaptor Size	Hexagon (A/F)	Torque Value
Inch	mm	mm	N·m
1/4	6.35	19mm	18N·m
3/8	9.525	22mm	31N·m
1/2	12.7	27mm	49N·m
5/8	15.875	30mm	60N·m
3/4	19.05	32mm	81N·m
1	25.4	38mm	129N·m
1 1/4	31.75	50mm	206N·m

Hoses installed into Adaptors

Figure 132.



A Adaptor
C O-ring

B Hose
D Dimension will vary depending upon the torque applied.

Hoses installed into adaptors seal onto an O-ring which is compressed into a 45° seat machined into the face of the adaptor port.

Table 73. Torque Settings - Metric Adaptors

Adaptor specification	Torque
M10	13–17N·m
M12	22–28N·m
M14	31–39N·m
M16	36–44N·m



Adaptor specification	Torque
M18	40–50N·m
M22	54–66N·m

33 - Electrical System

Contents	Page No.
Acronyms Glossary	33-3
33-00 Electrical System	
33-00-00 General	33-3
33-00-50 Schematic Circuit	33-10
33-03 Battery	
33-03-00 General	33-115
33-04 Battery Charger	
33-04-00 General	33-131
33-05 Battery Quick Disconnect	
33-05-00 General	33-141
33-07 DC Contactor	
33-07-00 General	33-145
33-09 Power Distribution	
33-09-00 General	33-149
33-09-03 Fuse	33-151
33-09-06 Relay	33-153
33-10 Motor	
33-10-00 General	33-155
33-12 Harness	
33-12-00 General	33-161
33-15 Alarm	
33-15-00 General	33-173
33-24 Instruments	
33-24-04 Control Panel	33-175
33-24-05 Platform Controller	33-187
33-36 Horn	
33-36-00 General	33-193
33-42 Exterior Light	
33-42-39 Hazard Warning Light	33-197
33-45 Control Module	
33-45-03 Machine Control	33-201
33-45-66 Motor Controller	33-207
33-57 Electronic Diagnostic	
33-57-03 Servicemaster	33-213
33-57-90 Error Codes	33-224
33-84 Sensor	
33-84-00 General	33-229
33-84-07 Hydraulic Pressure	33-231
33-84-60 Tilt	33-233
33-84-63 Angle	33-236
33-84-82 Pothole Protection System	33-239
33-84-84 Platform Upper Limit	33-242
33-84-85 Platform Down Limit	33-245



33-86 Solenoid	
33-86-00 General	33-251
33-95 AC Circuit	
33-95-09 Residual Current Circuit Breaker with Overcurrent protection (RCBO)	33-255
33-95-75 AC Connector	33-258

Acronyms Glossary

AC	Alternating Current
CAN	Controller Area Network
DC	Direct Current
DLA	Data Link Adaptor
ECM	Engine Control Module
ECU	Electronic Control Unit
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MECU	Machine Electronic Control Unit
RCBO	Residual current Circuit Breaker with Over current protection
RPM	Revolutions Per Minute
SPP	Service Parts Pro
USB	Universal Serial Bus



Notes:



00 - Electrical System

Contents	Page No.
33-00-00 General	33-3
33-00-50 Schematic Circuit	33-10



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction	33-3
Health and Safety	33-4
Technical Data	33-4
Operation	33-6
Diagram	33-7
Fault-Finding	33-8
Check (Condition)	33-9
Check (Operation)	33-9

Introduction

It is important that the electrical system on the machine is in a sound state of repair.

Make sure that all the health and safety warnings in this section are followed. The machine must be safe with the battery isolated before you attempt to disconnect any electrical connections.

Health and Safety

▲ WARNING Do not connect the charger when the batteries are not connected. Doing so could result in danger of live terminals from the charger.

Do not carry out maintenance on a machine whilst the charger is connected to an external power supply (i.e. do not work on a live machine). Cables from the charger to the batteries may remain live even if the batteries are disconnected/removed from the machine. There is a risk of serious electrical shock.

Always disconnect all external power supplies to the machine before carrying out maintenance.

CAUTION Understand the electrical circuit before connecting or disconnecting an electrical component. A wrong connection can cause injury and/or damage.

Technical Data

For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ]

..... Page 33-4

For: S3246E [RAJ] Page 33-5

For: S4046E [RAJ], S4550E [RAJ]

..... Page 33-5

(For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ])

Table 74.

Description	Data
Battery	
Make	Trojan Battery Company
Model	T-105
Quantity	4
Voltage	6V each
Operating temperature	-20–45°C (-4.0–112.9°F) ⁽¹⁾
Capacity Rating ⁽⁴⁾	5h - 185 Ah 10h - 207 Ah 20h - 225 Ah 100h - 250 Ah
Weight ⁽⁵⁾	28kg
Battery Charge Voltage ^(2, 3)	
Bulk Charge	7.4V
Float Charge	6.7V
Equalize Charge	8.1V

(1) At temperatures below 0°C (32.0°F) maintain a state of charge greater than 60%.

(2) Add 0.005V per cell for every 1°C (33.8°F) below 25°C (77.0°F).

(3) Subtract 0.005V per cell for every 1°C (33.8°F) above 25°C (77.0°F).

(4) The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 27°C (80.6°F) and maintain a voltage above 1.7V per cell. Capacities are based on peak performance.

(5) If you replace the batteries, make sure that new batteries are of same weight to avoid stability issues.

Table 75. Control Motor

Description	Data
Type	Series wound, DC (Direct Current) electric motor
Rated power	3.3kW
Input voltage	24V
Rated current	180A
Rated speed	3050 RPM (Revolutions Per Minute)
Maximum speed	5600 RPM

(For: S3246E [RAJ])

Table 76.

Description	Data
Battery	
Make	Trojan Battery Company
Model	T-125
Quantity	4
Voltage	6V each
Operating temperature	-20–45°C (-4.0–112.9°F) ⁽¹⁾
Capacity Rating ⁽⁴⁾	5h - 195 Ah 10h - 221 Ah 20h - 240 Ah 100h - 266 Ah
Weight ⁽⁵⁾	30kg
Battery Charge Voltage ^(2, 3)	
Bulk Charge	7.4V
Float Charge	6.7V
Equalize Charge	8.1V

(1) At temperatures below 0°C (32.0°F) maintain a state of charge greater than 60%.

(2) Add 0.005V per cell for every 1°C (33.8°F) below 25°C (77.0°F).

(3) Subtract 0.005V per cell for every 1°C (33.8°F) above 25°C (77.0°F).

(4) The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 27°C (80.6°F) and maintain a voltage above 1.7V per cell. Capacities are based on peak performance.

(5) If you replace the batteries, make sure that new batteries are of same weight to avoid stability issues.

Table 77. Control Motor

Description	Data
Type	Series wound, DC electric motor
Rated power	3.3kW
Input voltage	24V
Rated current	180A
Rated speed	3050 RPM
Maximum speed	5600 RPM

(For: S4046E [RAJ], S4550E [RAJ])

Table 78.

Description	Data
Battery	
Make	Trojan Battery Company
Model	T-1275
Quantity	4
Voltage	12V each

Description	Data
Operating temperature	-20–45°C (-4.0–112.9°F) ⁽¹⁾
Capacity Rating ⁽⁴⁾	5h - 120 Ah 10h - 134 Ah 20h - 150 Ah 100h - 166 Ah
Weight ⁽⁵⁾	39kg
Battery Charge Voltage ^(2, 3)	
Bulk Charge	14.8V
Float Charge	13.5V
Equalize Charge	16.2V

(1) At temperatures below 0°C (32.0°F) maintain a state of charge greater than 60%.

(2) Add 0.005V per cell for every 1°C (33.8°F) below 25°C (77.0°F).

(3) Subtract 0.005V per cell for every 1°C (33.8°F) above 25°C (77.0°F).

(4) The amount of amp-hours (AH) a battery can deliver when discharged at a constant rate at 27°C (80.6°F) and maintain a voltage above 1.7V per cell. Capacities are based on peak performance.

(5) If you replace the batteries, make sure that new batteries are of same weight to avoid stability issues.

Table 79. Control Motor

Description	Data
Type	Series wound, DC electric motor
Rated power	4.5kW
Input voltage	24V
Rated current	239A
Rated speed	2700 RPM
Maximum speed	5600 RPM

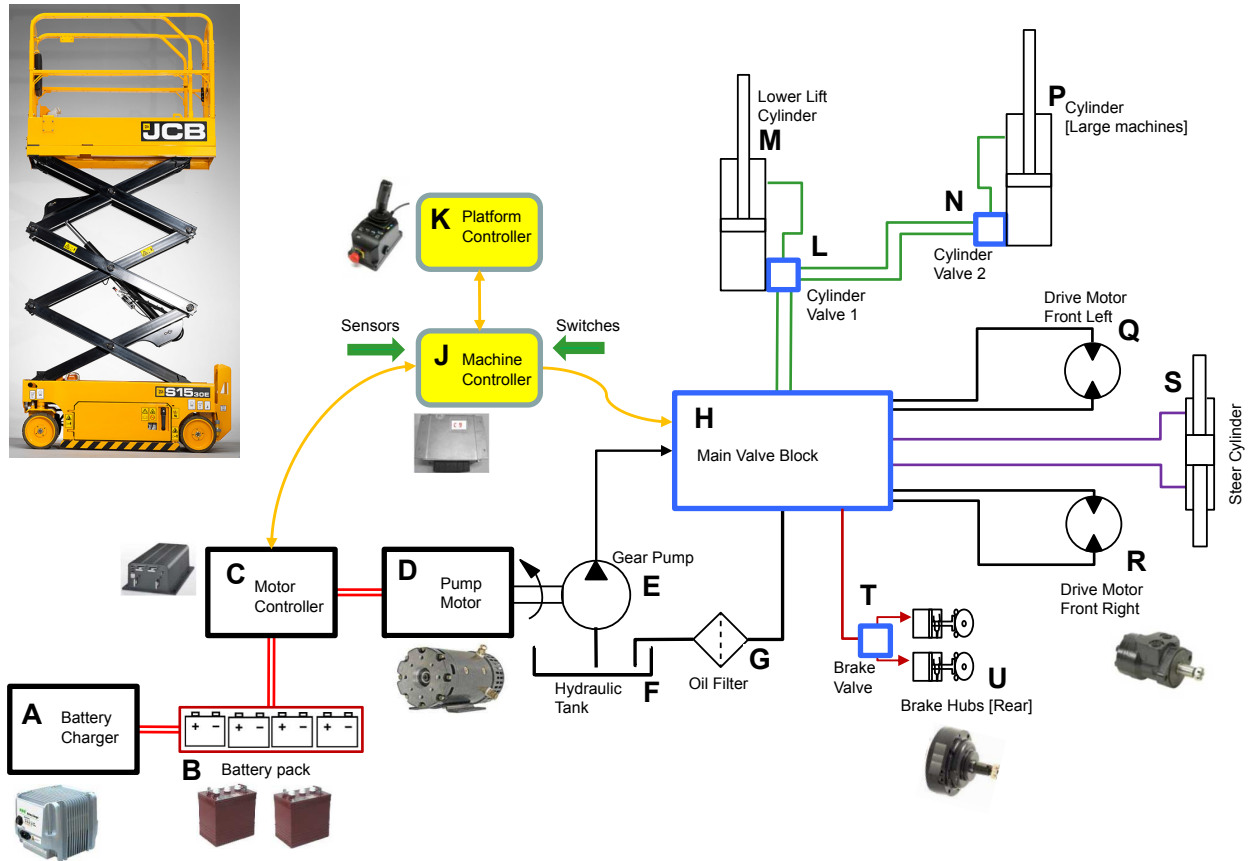
Operation

The main components of the electrical system are:

- Motor. [Refer to: PIL 33-10-00.](#)
- Motor controller ECU (Electronic Control Unit). [Refer to: PIL 33-45-66.](#)
- MECU (Machine Electronic Control Unit). [Refer to: PIL 33-45-03.](#)
- Batteries. [Refer to: PIL 33-03-00.](#)
- Battery charger. [Refer to: PIL 33-04-00.](#)
- Sensors. [Refer to: PIL 33-84-00.](#)
- Ground control panel. [Refer to: PIL 33-24-04.](#)
- Platform control panel. [Refer to: PIL 33-24-05.](#)

The batteries drive the electrical pump motor, which drives the gear pump to provide necessary hydraulic power. The electrical power required to operate the controls and other electrical components is also taken from the batteries.

Diagram

Figure 133. Typical Machine


- A** Battery charger
- C** Motor controller ECU (Electronic Control Unit)
- E** Gear pump
- G** Oil filter
- J** MECU (Machine Electronic Control Unit)
- L** Lower lift cylinder flow control valve
- N** Upper lift cylinder flow control valve (For large machines only)
- Q** Left side drive motor (On front wheels only)
- S** Steer cylinder ram
- U** Park brake unit (On rear wheels only)

- B** Battery pack
- D** Pump motor
- F** Hydraulic tank
- H** Main control valve block
- K** Platform ECU
- M** Lower scissor arm ram
- P** Upper scissor arm ram (For large machines only)
- R** Right side drive motor (On front wheels only)
- T** Brake valve

Fault-Finding

Fault

Battery fault

General Relay Fault

Electrical Wiring

Table 80.

Table 81.

Table 82.

Page 33-8

Page 33-8

Page 33-8

Table 80. Battery fault

Cause	Remedy
Battery Voltage	Switch on the ignition key and check the battery voltage with a multimeter. If the battery voltage is below specified value, charge the batteries. Refer to: PIL 33-03-00.
Battery connection fault	Check the condition of the electrical wires to the battery. Check for signs of corrosion or contamination on the battery terminals. Clean the battery terminals. Repair as necessary.
Battery charge circuit fault	Make sure that the AC (Alternating Current) supply to the battery charger is ON. Check the connections to the battery charger. Make sure that the correct charger profile is loaded into the charger. Refer to: PIL 33-04-00. If no fault is found raise a Techweb Helpdesk call.

Table 81. General Relay Fault

Cause	Remedy
Relay supply voltage fault	Check the condition of the primary and secondary fuses. If relay supply voltage is found fault, proceed to 'Relay connection faulty'. If relay supply voltage is OK, raise Techweb Helpdesk Call.
Relay connection faulty	Check the condition of relay to harness connection. Repair/replace as necessary.

Table 82. Electrical Wiring

Cause	Remedy
Wiring fault	Check the harness continuity and electrical insulation, repair or replace as necessary.

Check (Condition)

Examine the electrical circuits regularly for:

- Damaged connectors.
- Loose connections.
- Chafing on the wiring harnesses.
- Corrosion.
- Missing insulation.
- Incorrect routing of the wiring harnesses.

Do not use the machine if one or more of these faults are found. You must make sure that the electrical circuit is repaired immediately.

Check (Operation)

Make sure that all the electrical equipment listed below operate correctly.

- Switches (Limit switch and Tilt switch).
- Warning lights.
- Alarm.
- Horn.
- Hourmeter.
- Battery.
- Lights.
- Sensors (Angle sensor and Pressure sensor).
- Controllers.
- Pothole protection system.

All defective equipment must be repaired before the machine is used.

Use the correct diagnostic tool to check the proper operation of the sensors.

50 - Schematic Circuit

Introduction	33-10
Diagram	33-13

Introduction

A schematic wiring diagram is a simplified pictorial representation of the machines electrical circuit. It shows the components of the circuit as simplified electrical symbols, and the power and signal connections between the devices. The wiring diagram is used to troubleshoot problems and to make sure that all the connections have been made and that everything is present.

Use the schematics together with the correct electrical harness drawings to reference the connector pin details.

This section may contain more than one set of electrical schematics for different machine variants.

Understanding Electrical Schematics

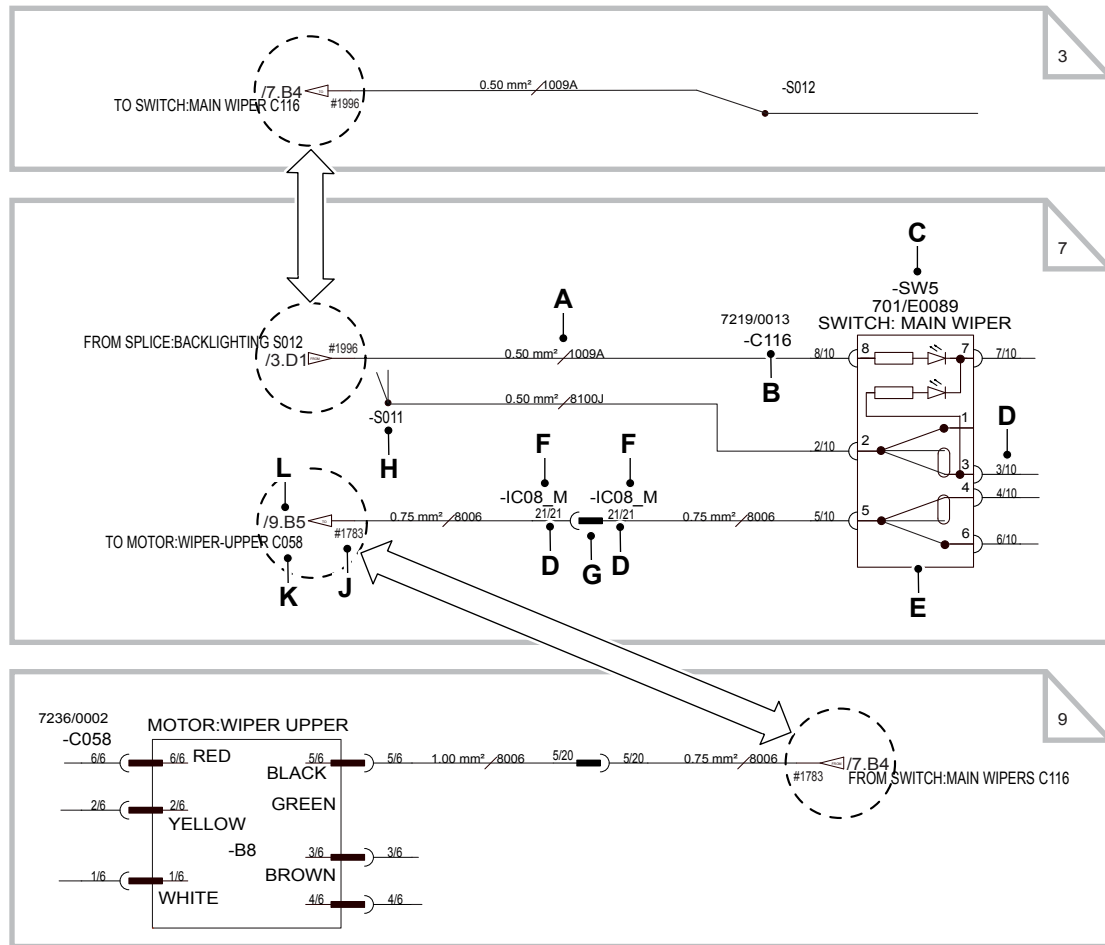
Use the applicable schematic set to trace wires and connections between electrical devices. In most cases it will be necessary to trace wires across more than one schematic sheet.

The example identifies the information contained on the diagrams. It also shows how to follow wires from one diagram sheet to another.

The harness inter-connector codes and device harness connector codes are the same as used on the applicable harness drawings.

Splices are not normally accessible. Splices are inside the harness sheath and not visible on the outside. Wires are welded together at a splice, there are no individual connector components.

Figure 134.



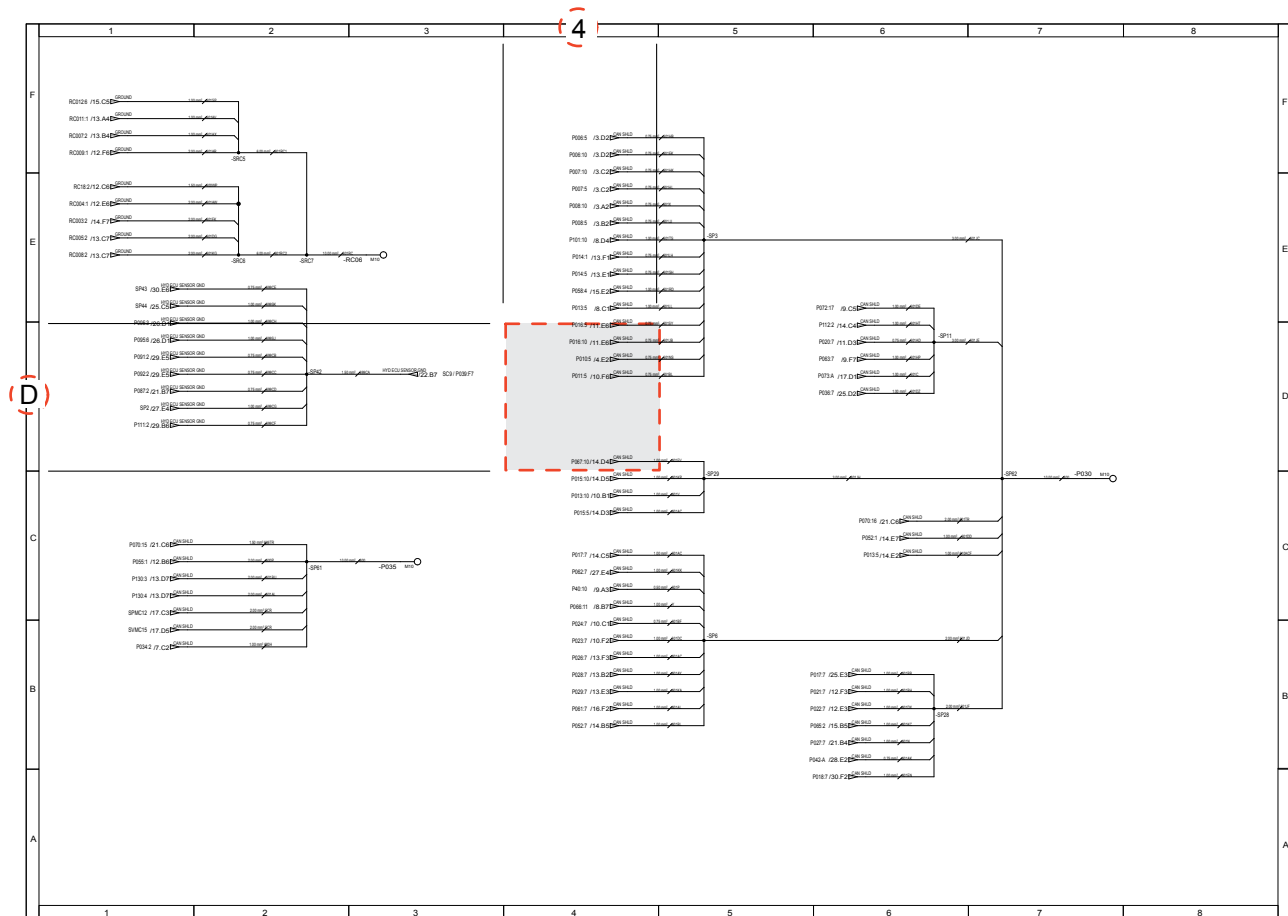
- A** Wire size (area) and number
- C** Device description
- E** Device internal schematic
- G** Harness inter-connector symbol
- J** Destination reference number
- L** Destination (diagram sheet and grid)

- B** Device harness connector code
- D** Connector pin number (wire location / total)
- F** Harness inter-connector codes
- H** Splice code and symbol
- K** Destination (harness connector code)

To help locate a wire destination from other diagram sheets use the grid reference. This identifies the applicable location zone on the sheet in a similar way to a map reference.

Due to space limitations, the grid is sometimes omitted.

Figure 135. Grid reference example (D4)



Diagram

For: S1530E [RAJ], S1930E [RAJ]	
.....	Page 33-13
For: S2032E [RAJ], S2632E [RAJ]	
.....	Page 33-34
For: S3246E [RAJ]	Page 33-54
For: S2646E [RAJ]	Page 33-74
For: S4046E [RAJ], S4550E [RAJ]	
.....	Page 33-94

(For: S1530E [RAJ], S1930E [RAJ], BLAISE_PDF)

Figure 136. 401/C3250-4 (Sheet 1 of 5) - Battery Charger, MECU, Platform Control ECU.....	Page 33-15
Figure 137. 401/C3250-4 (Sheet 2 of 5) - MECU, Motor Controller ECU.....	Page 33-19
Figure 138. 401/C3250-4 (Sheet 3 of 5) - LiveLink ECU.....	Page 33-23
Figure 139. 401/C3250-4 (Sheet 4 of 5) - AC Extension Lead.....	Page 33-27
Figure 140. 401/C3250-4 (Sheet 5 of 5) - AC Extension Lead.....	Page 33-31



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

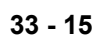
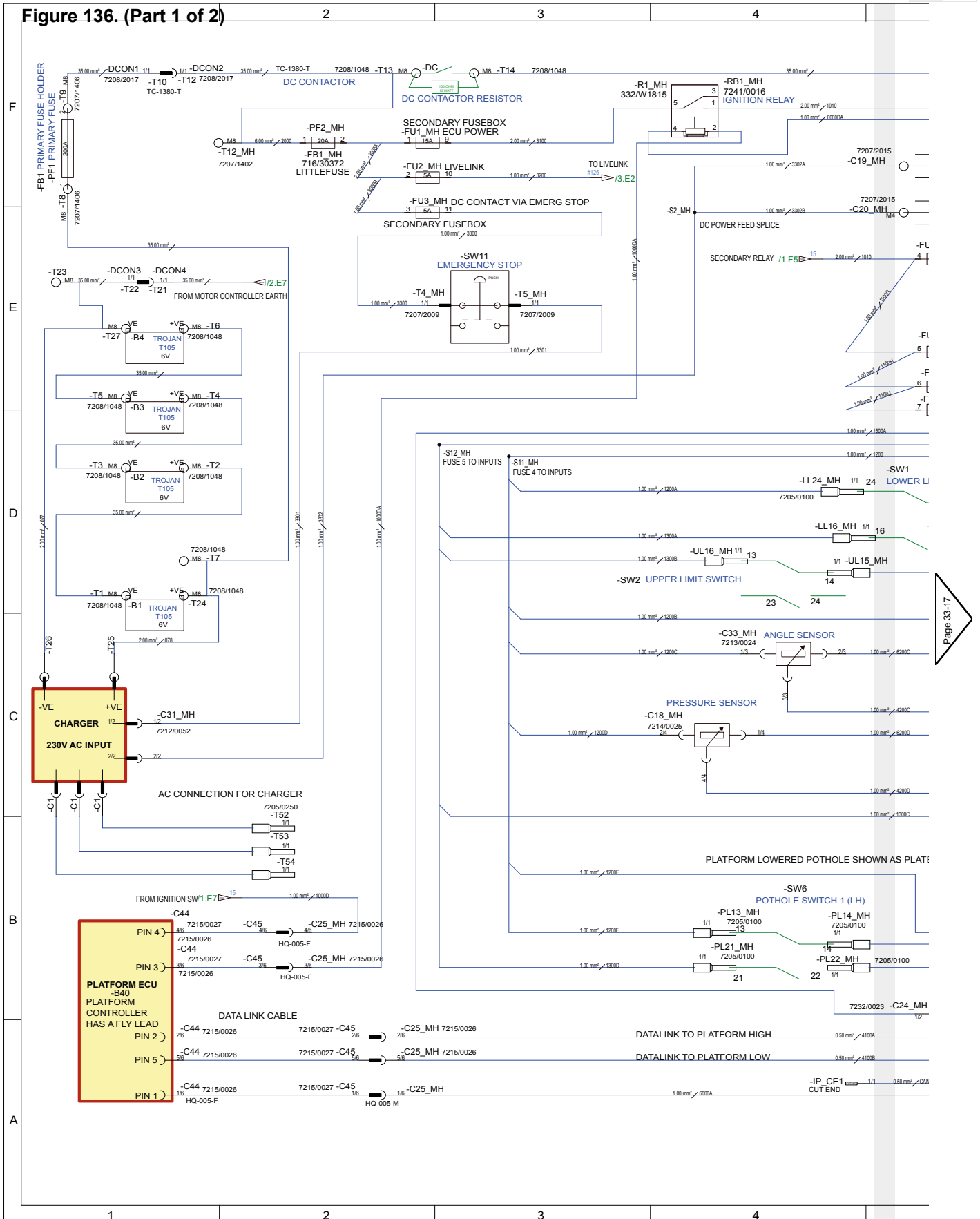
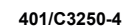


Figure 136. (Part 1 of 2)



8





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-20

Figure 137. 401/C3250-4 (Sheet 2 of 5) - MECU, Motor Controller ECU

Page 33-21

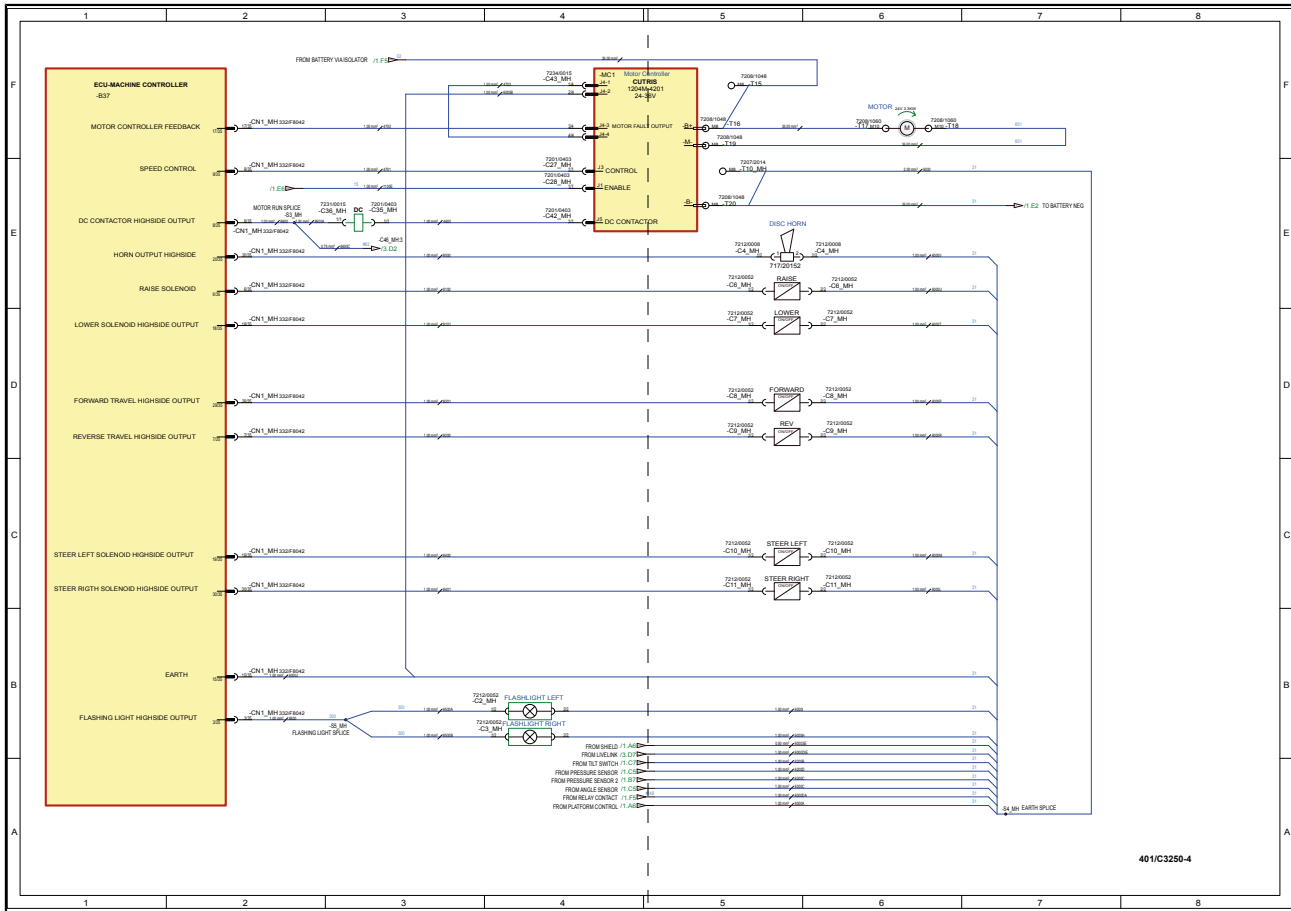


Figure 137. (Part 1 of 2)

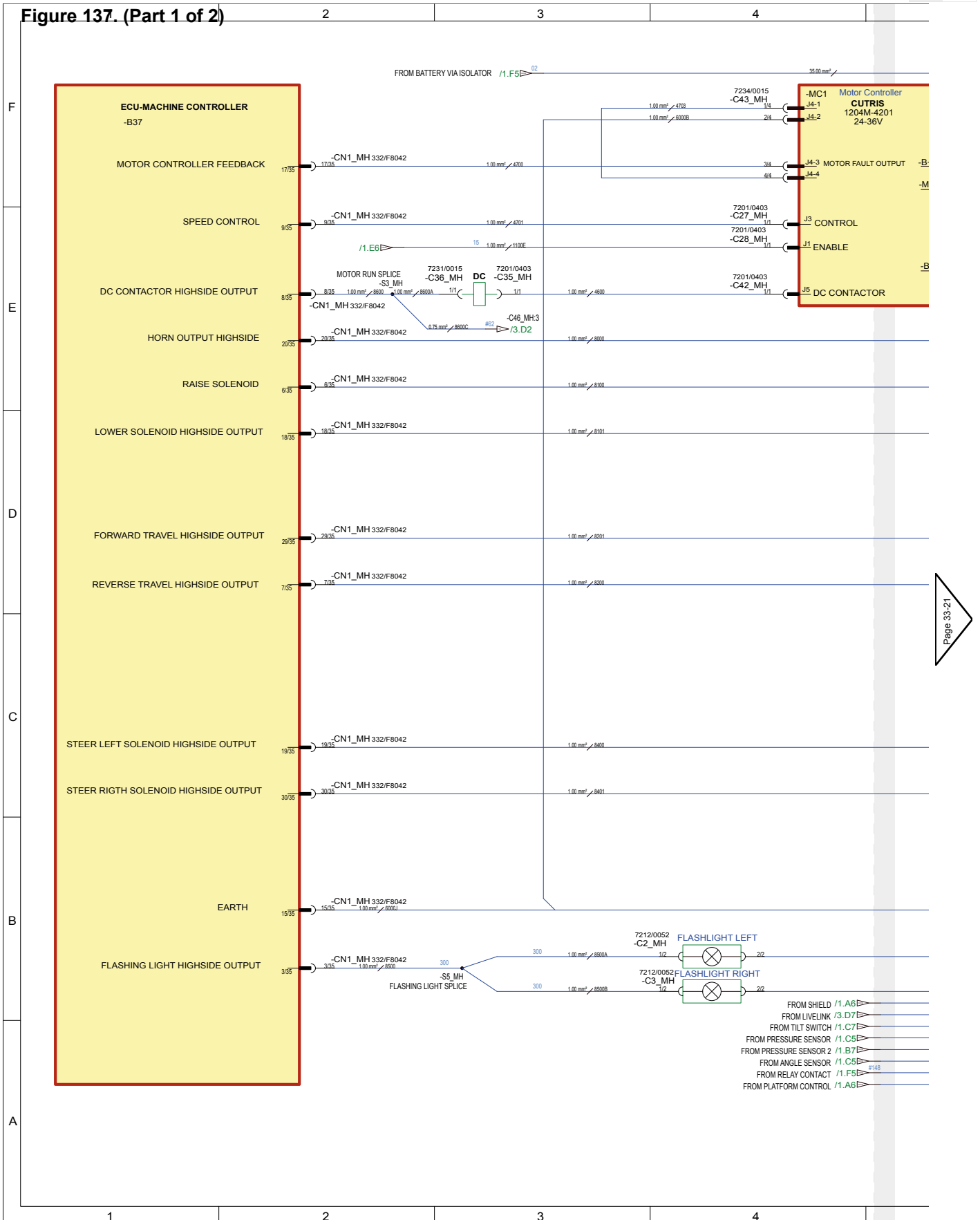
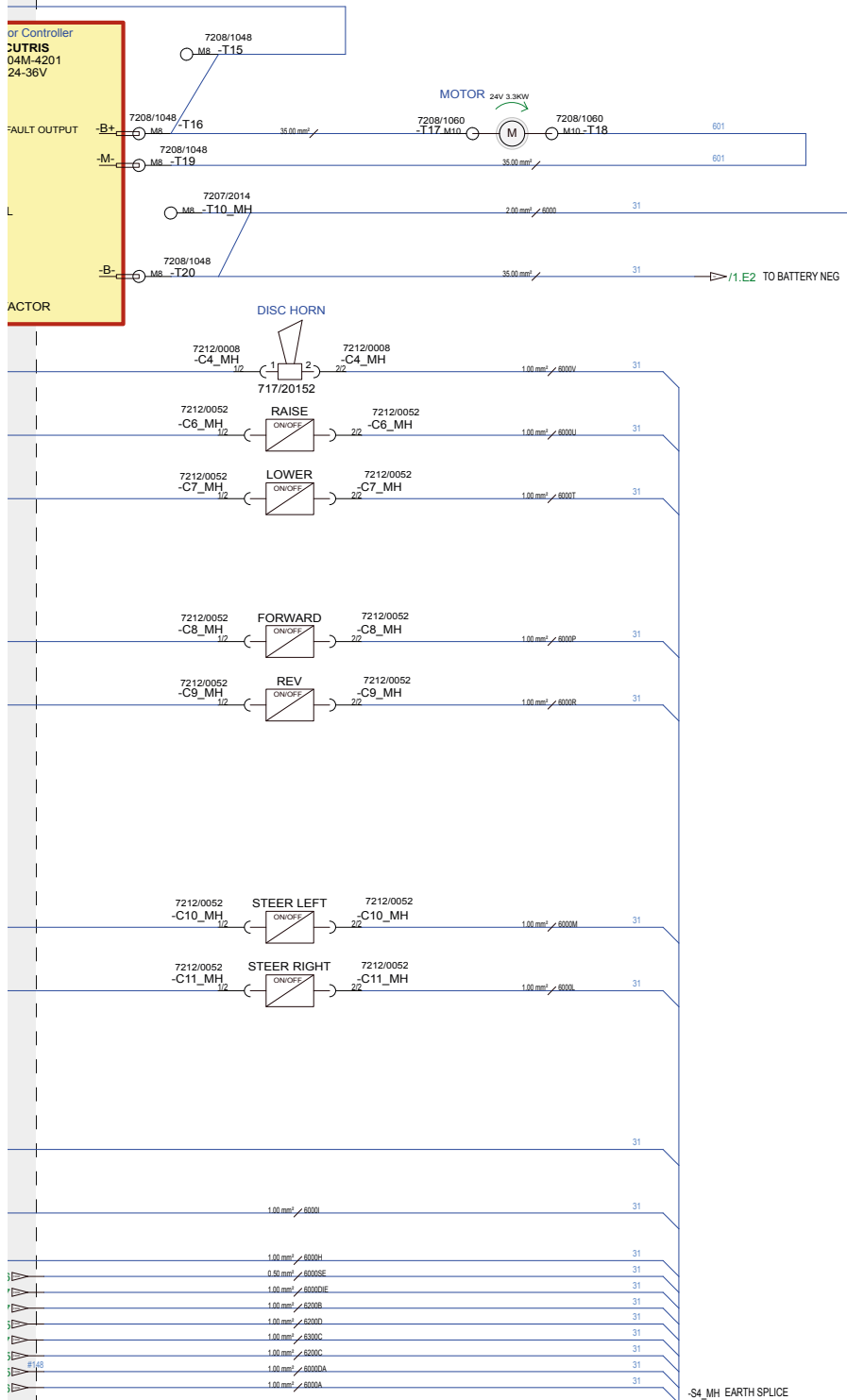


Figure 137.5 (Part 2 of 2)



401/C3250-4



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit



Figure 138. (Part 1 of 2)

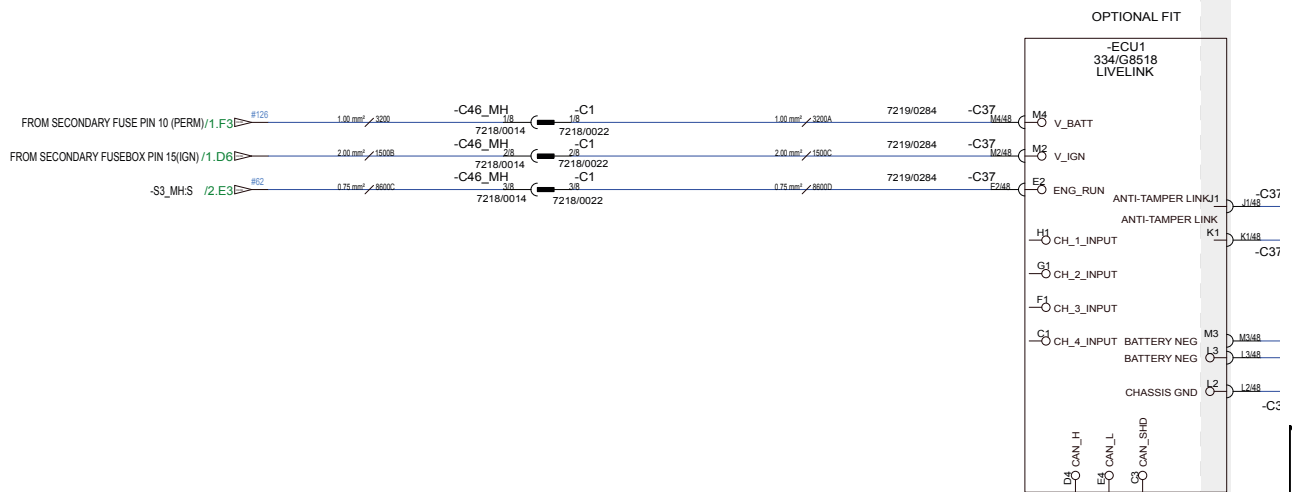
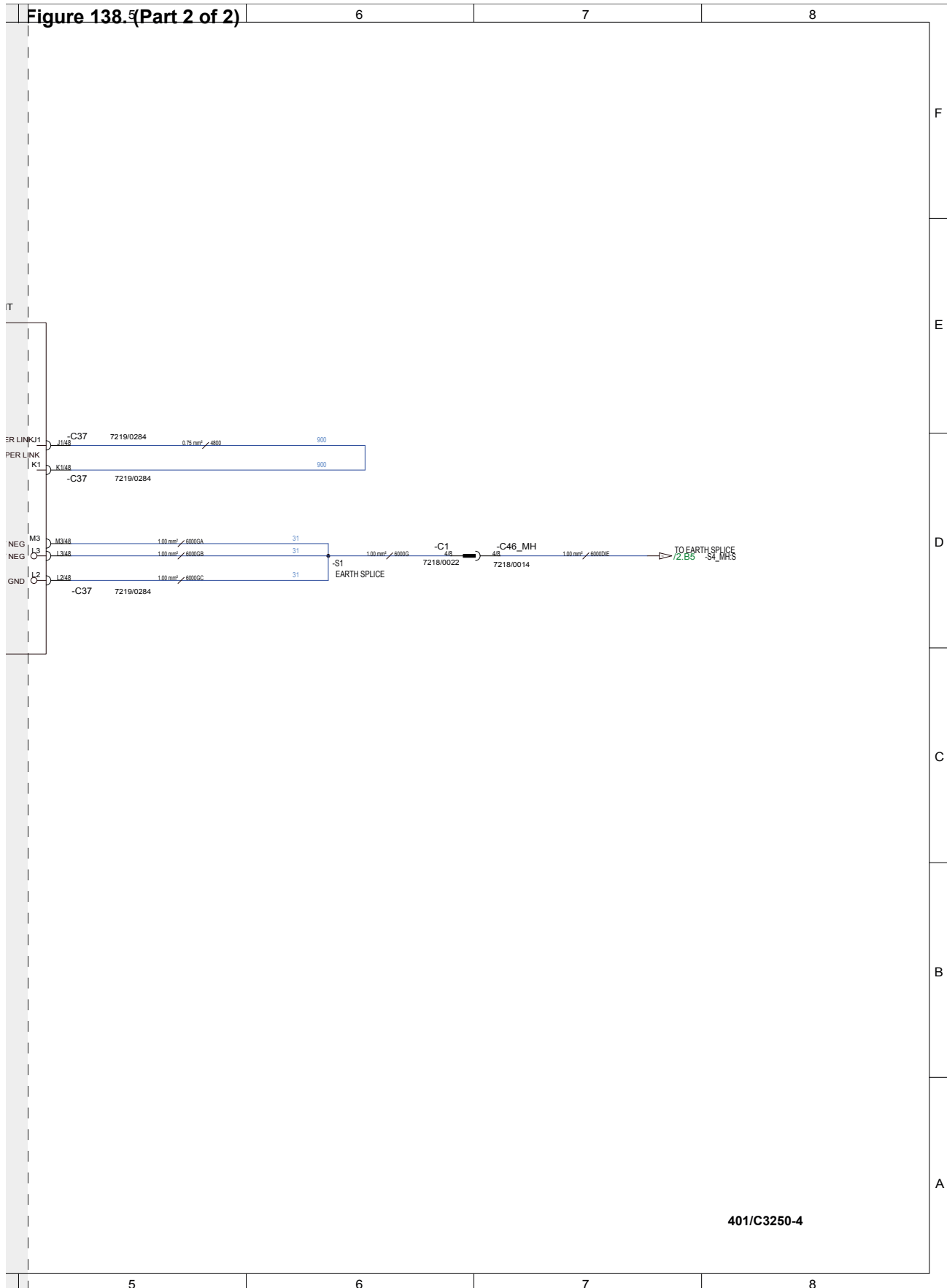


Figure 138.5 (Part 2 of 2)





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

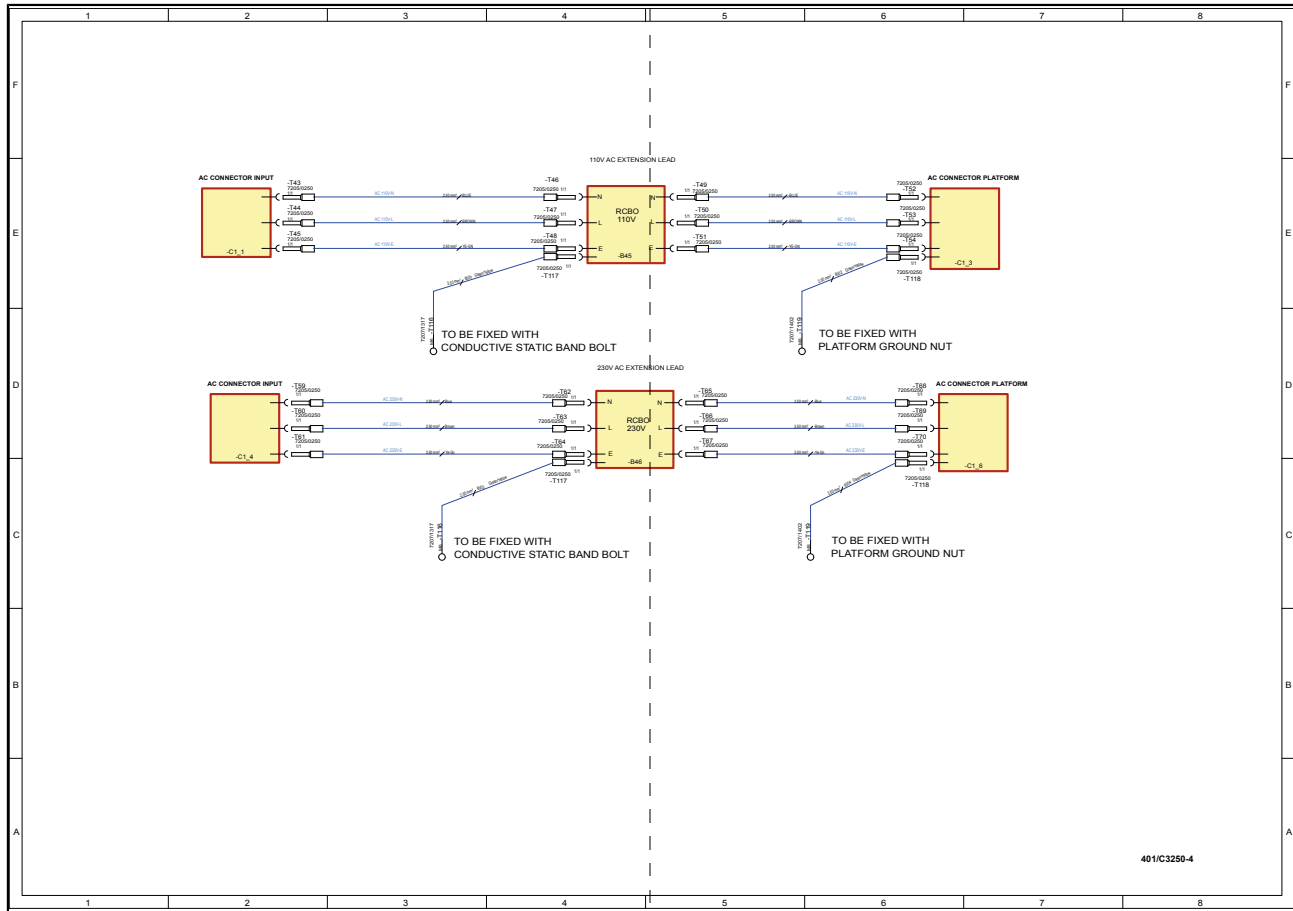


Figure 139. (Part 1 of 2)

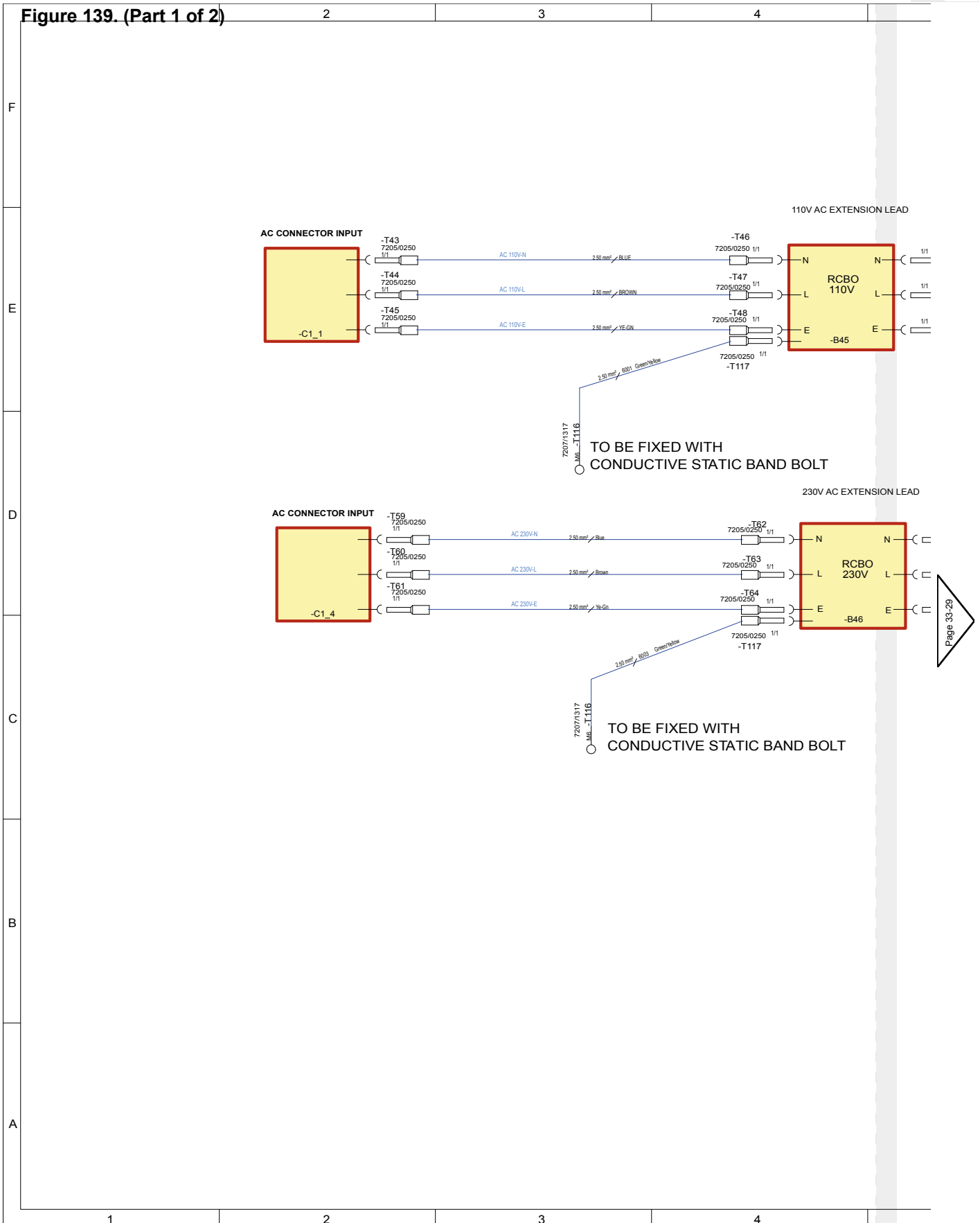
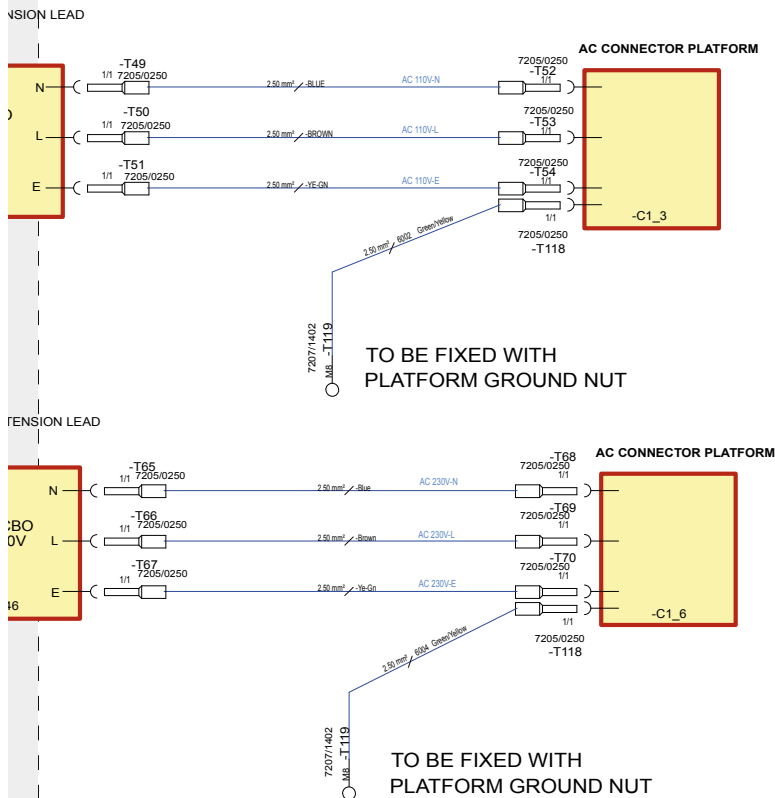


Figure 139.5 (Part 2 of 2)



401/C3250-4



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-32

Figure 140. 401/C3250-4 (Sheet 5 of 5) - AC Extension Lead

Page 33-33

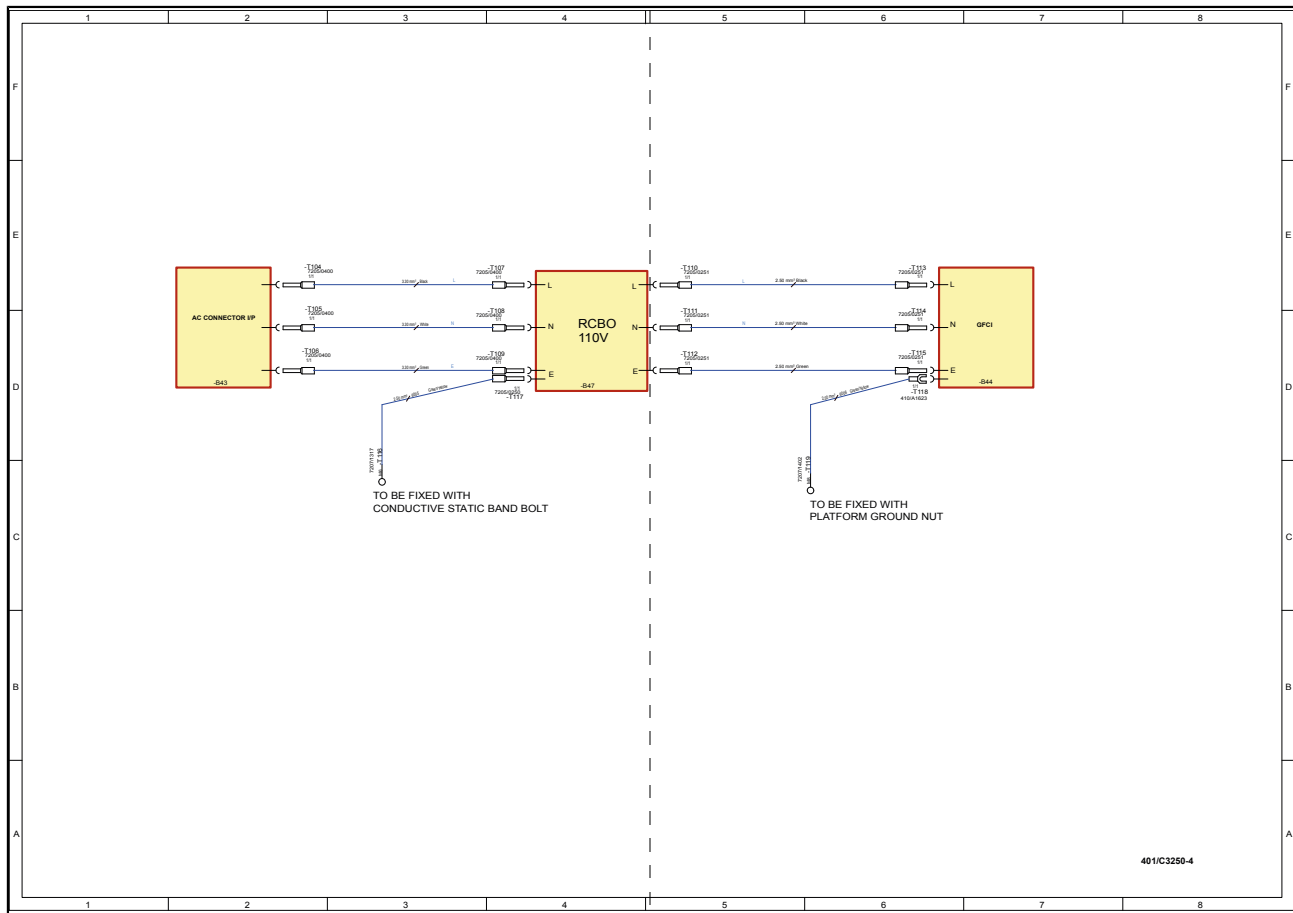


Figure 140. (Part 1 of 2)

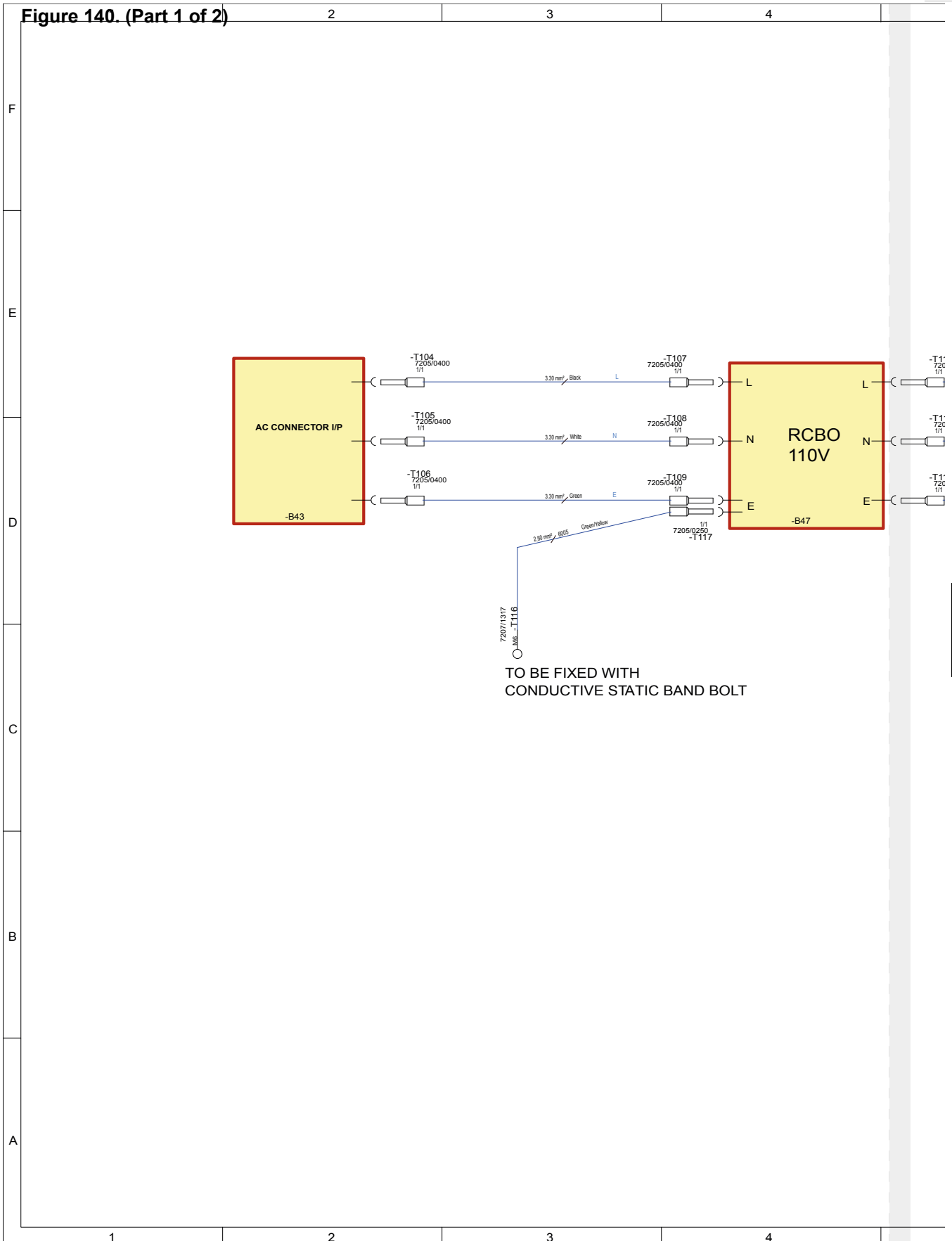
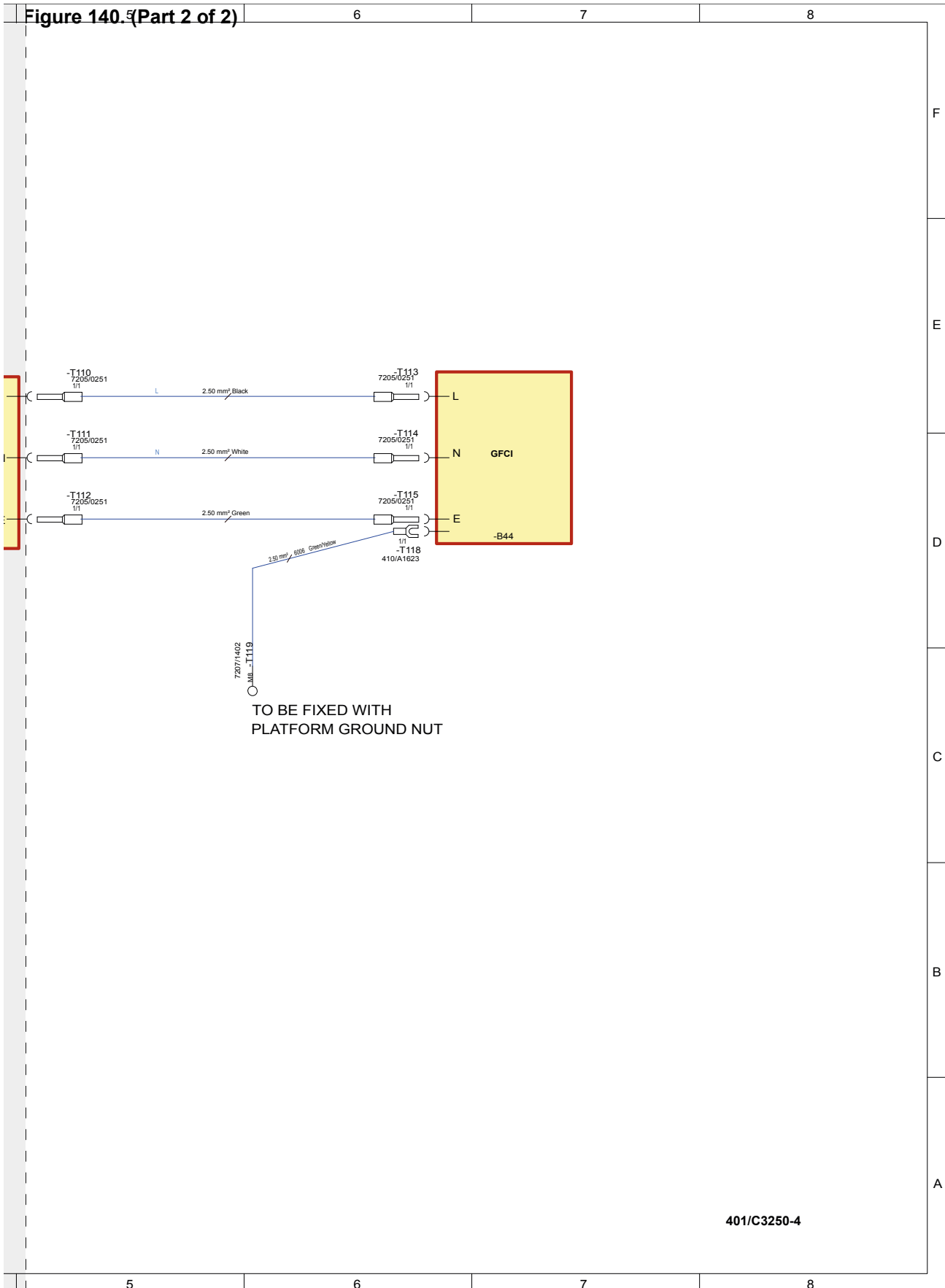


Figure 140.5 (Part 2 of 2)



(For: S2032E [RAJ], S2632E [RAJ], BLAISE_PDF)

Figure 141. 401/D4166-4 (Sheet 1 of 5) - Battery charger, MECU, platform control ECU.....	Page 33-35
Figure 142. 401/D4166-4 (Sheet 2 of 5) - MECU, motor controller ECU.....	Page 33-39
Figure 143. 401/D4166-4 (Sheet 3 of 5) - LiveLink ECU.....	Page 33-43
Figure 144. 401/D4166-4 (Sheet 4 of 5) - AC extension lead (For: UK and Europe).....	Page 33-47
Figure 145. 401/D4166-4 (Sheet 5 of 5) - AC extension lead (For: USA).....	Page 33-51



Figure 141¹. (Part 1 of 2)

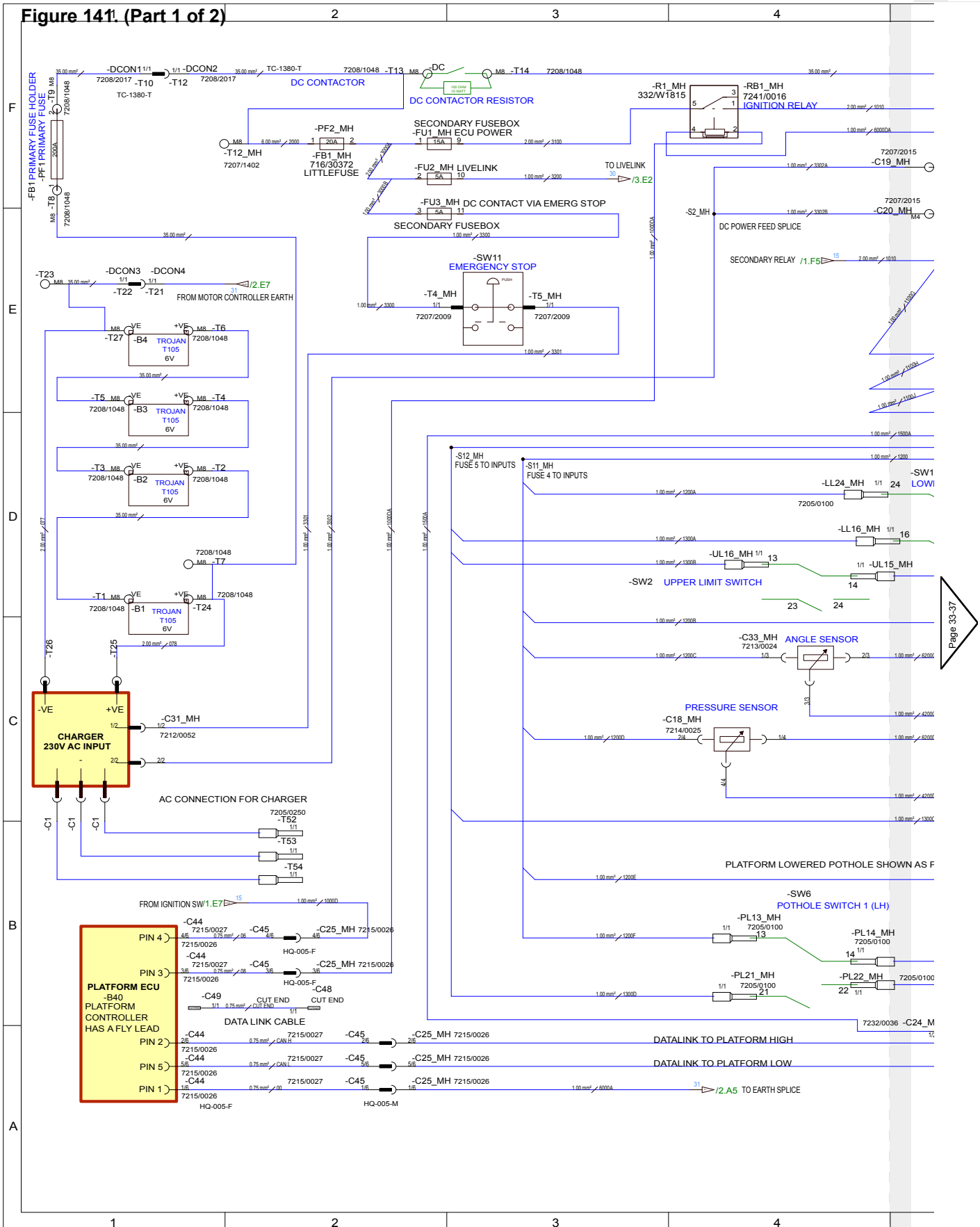
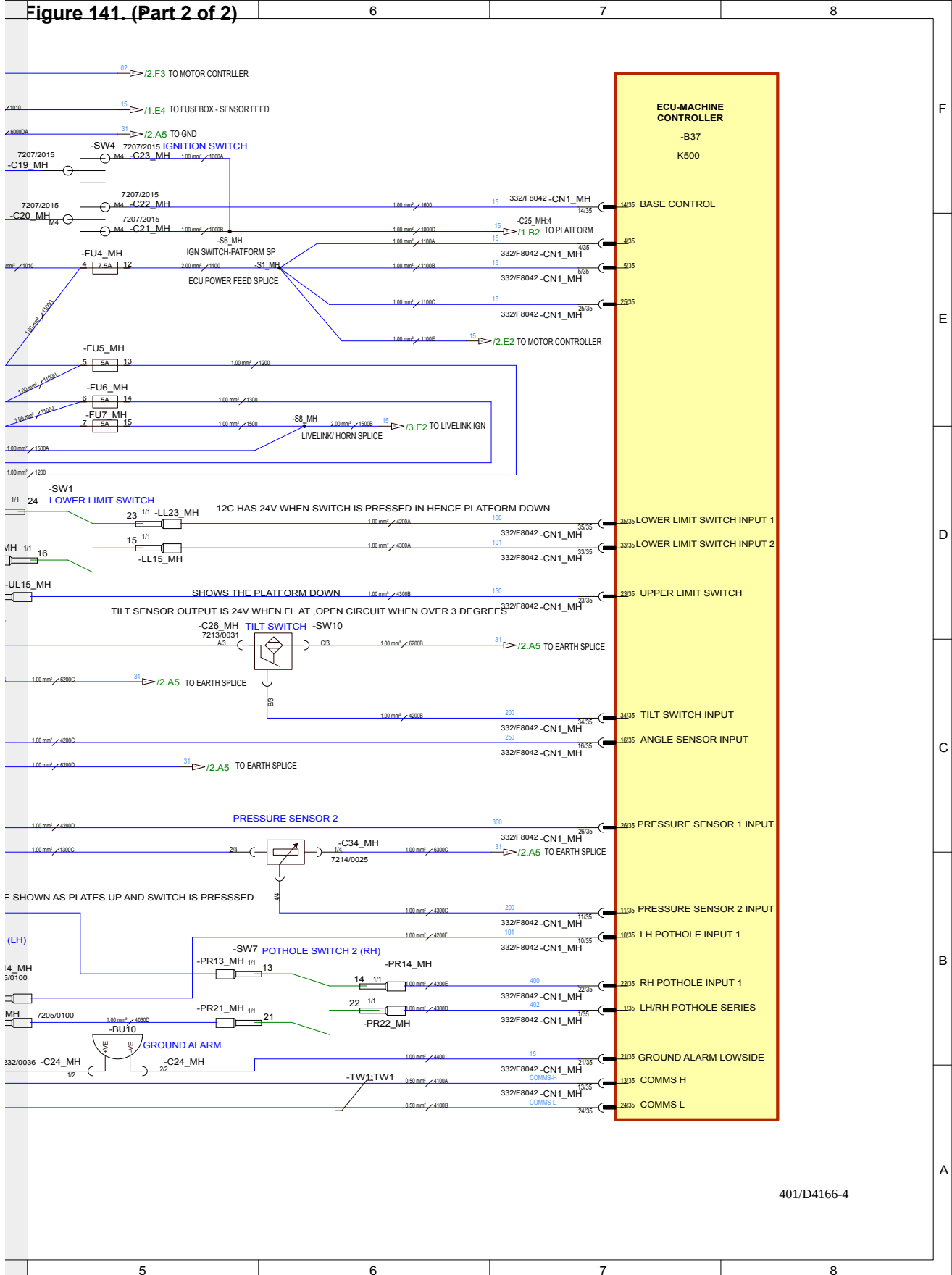


Figure 141. (Part 2 of 2)



401/D4166-4



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-40

Figure 142. 401/D4166-4 (Sheet 2 of 5) - MECU, motor controller ECU

Page 33-41

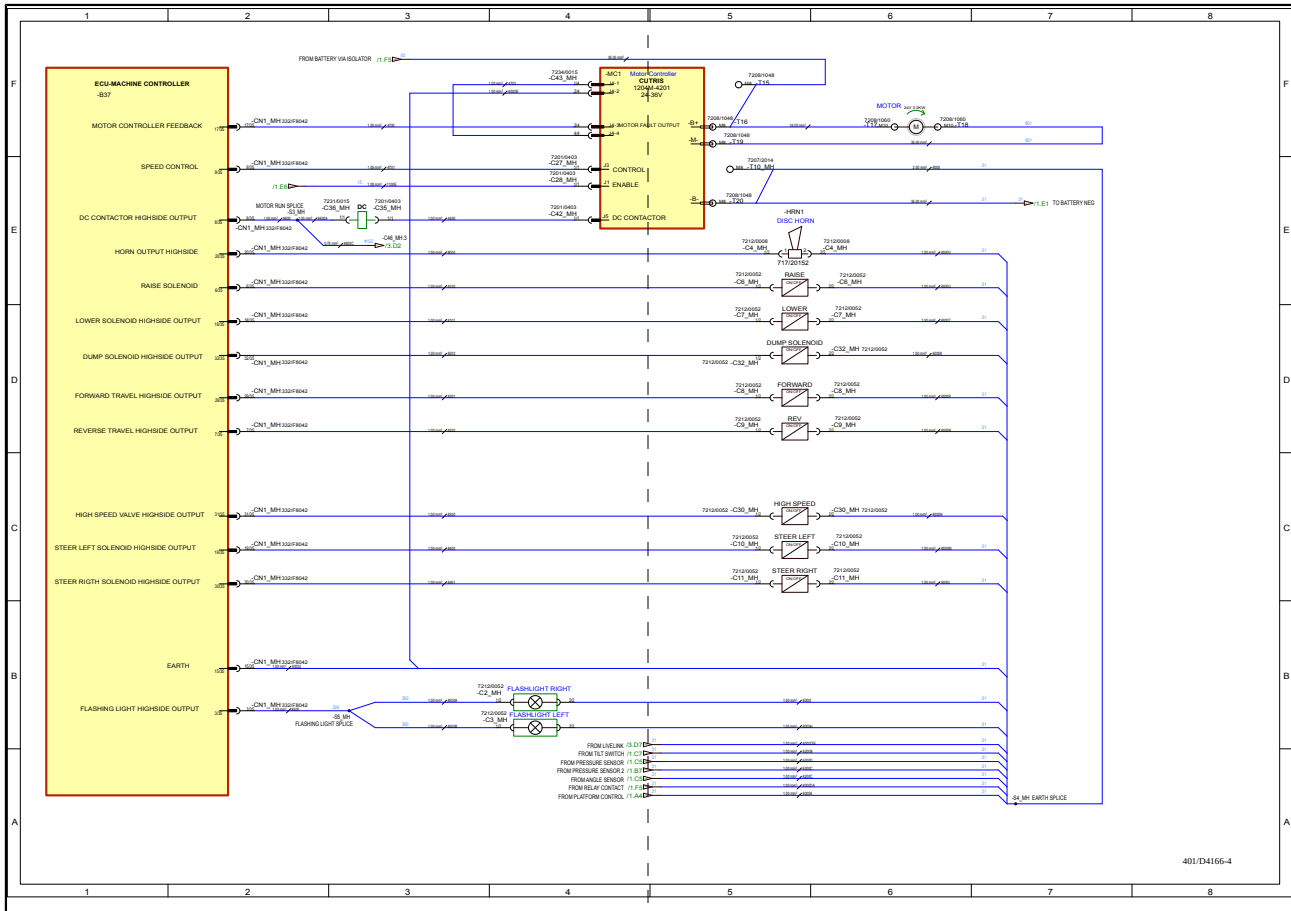
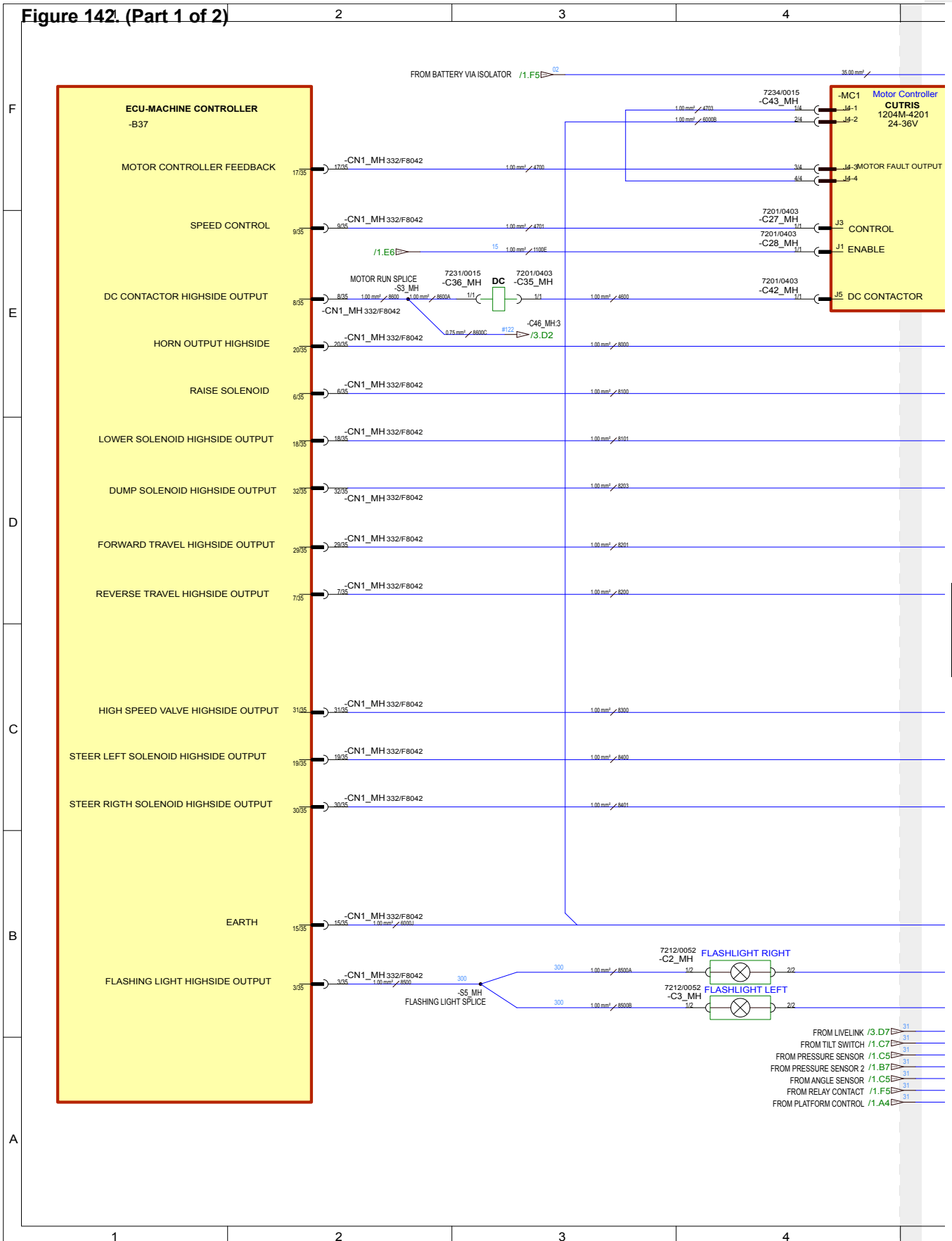


Figure 142. (Part 1 of 2)



8



33 - 41



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-44

Figure 143. 401/D4166-4
(Sheet 3 of 5) - LiveLink ECU

Page 33-45

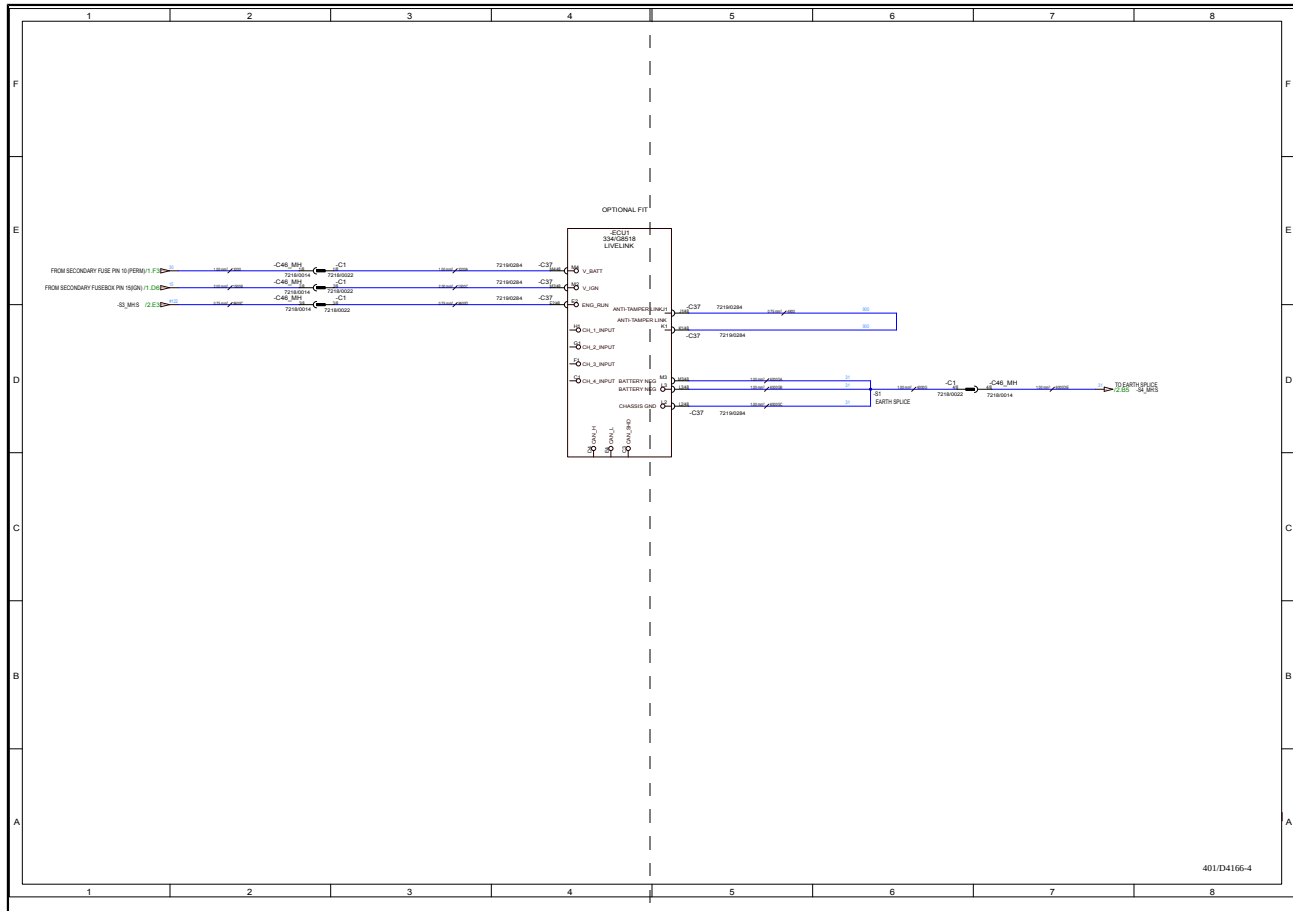
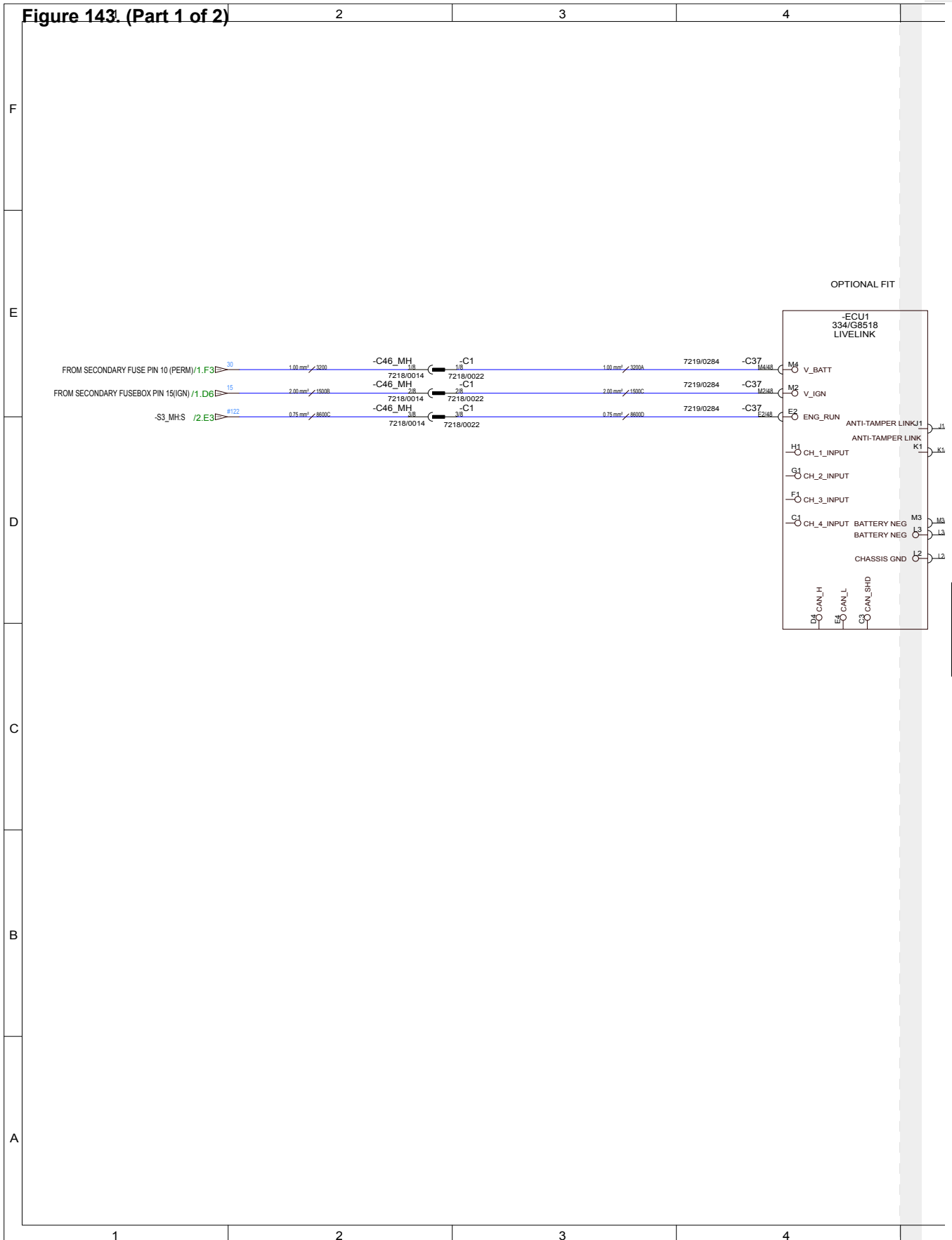


Figure 143. (Part 1 of 2)





33 - Electrical System

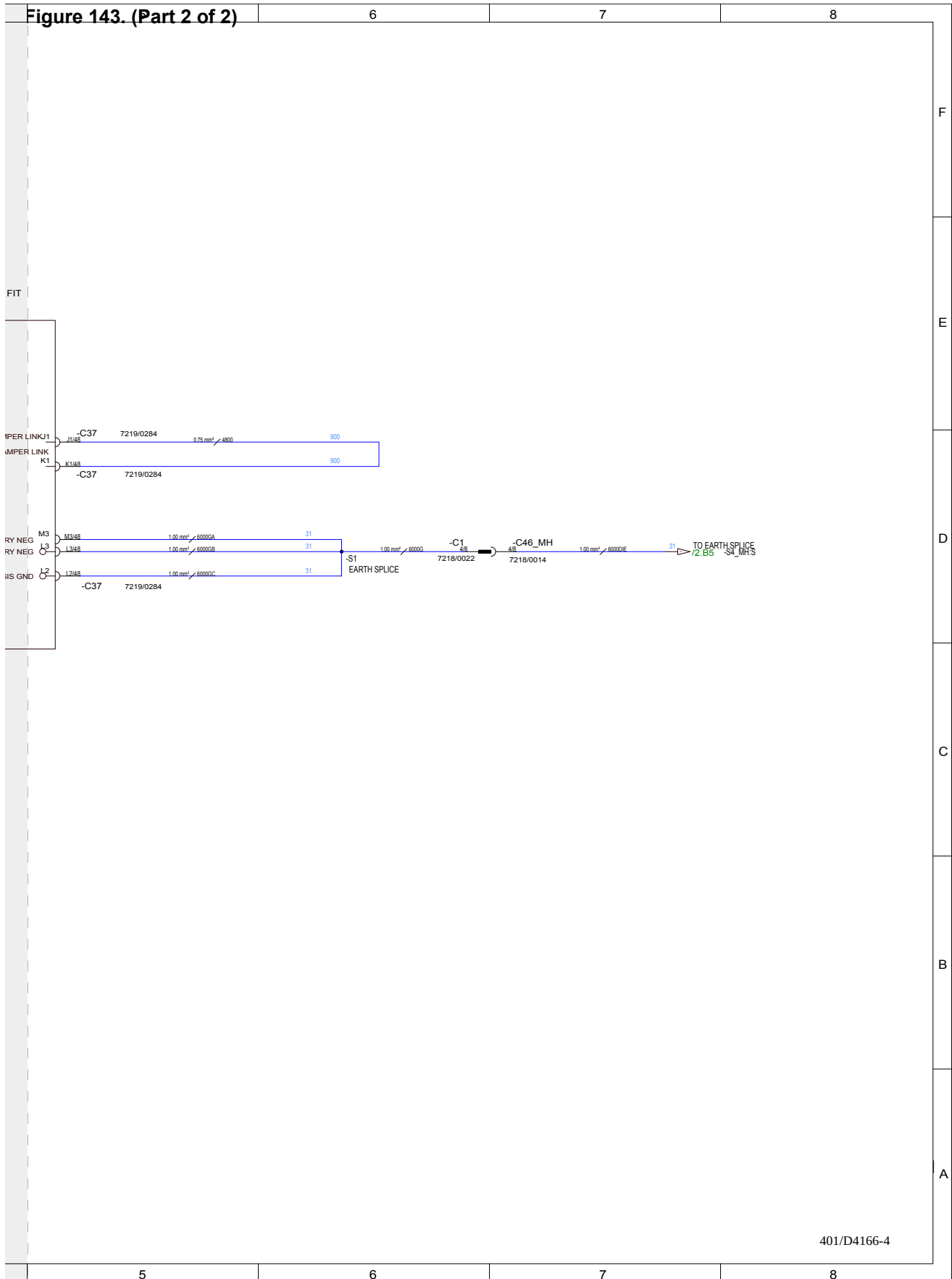
00 - Electrical System

50 - Schematic Circuit

Page
33-44

Page
33-45

Figure 143. (Part 2 of 2)





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-48

Figure 144. 401/D4166-4 (Sheet 4 of 5) - AC extension lead (For: UK and Europe)

Page 33-49

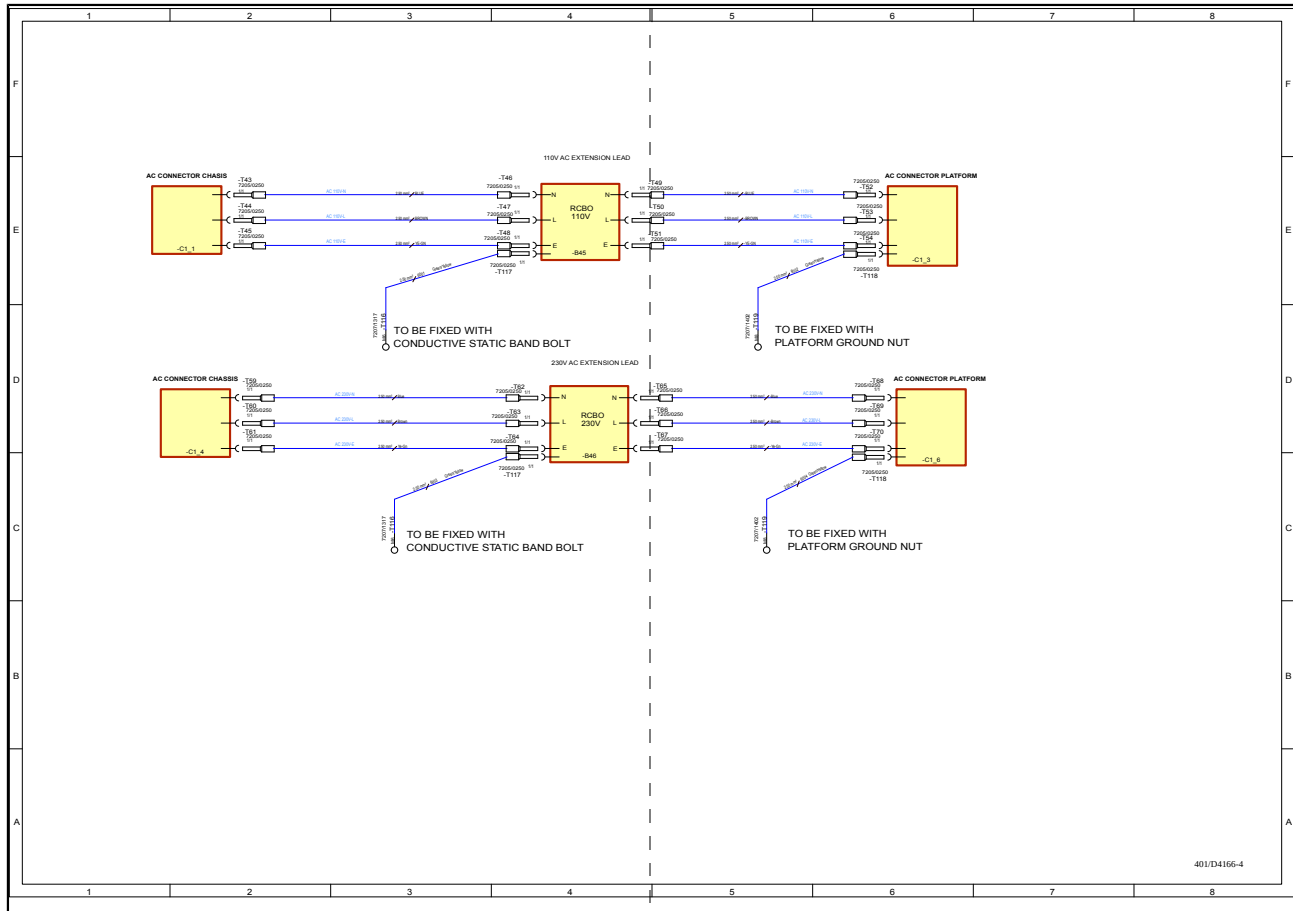


Figure 144. (Part 1 of 2)

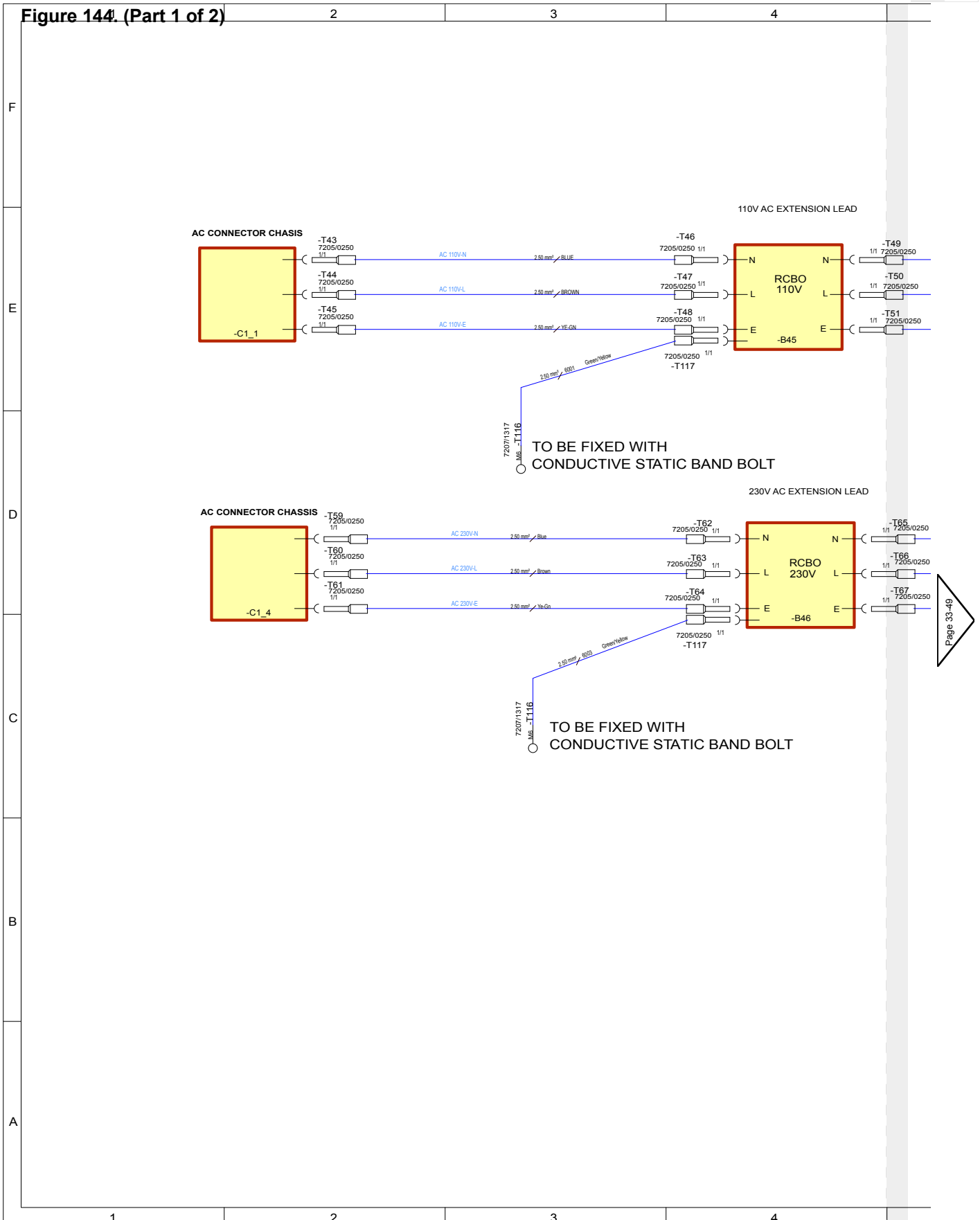
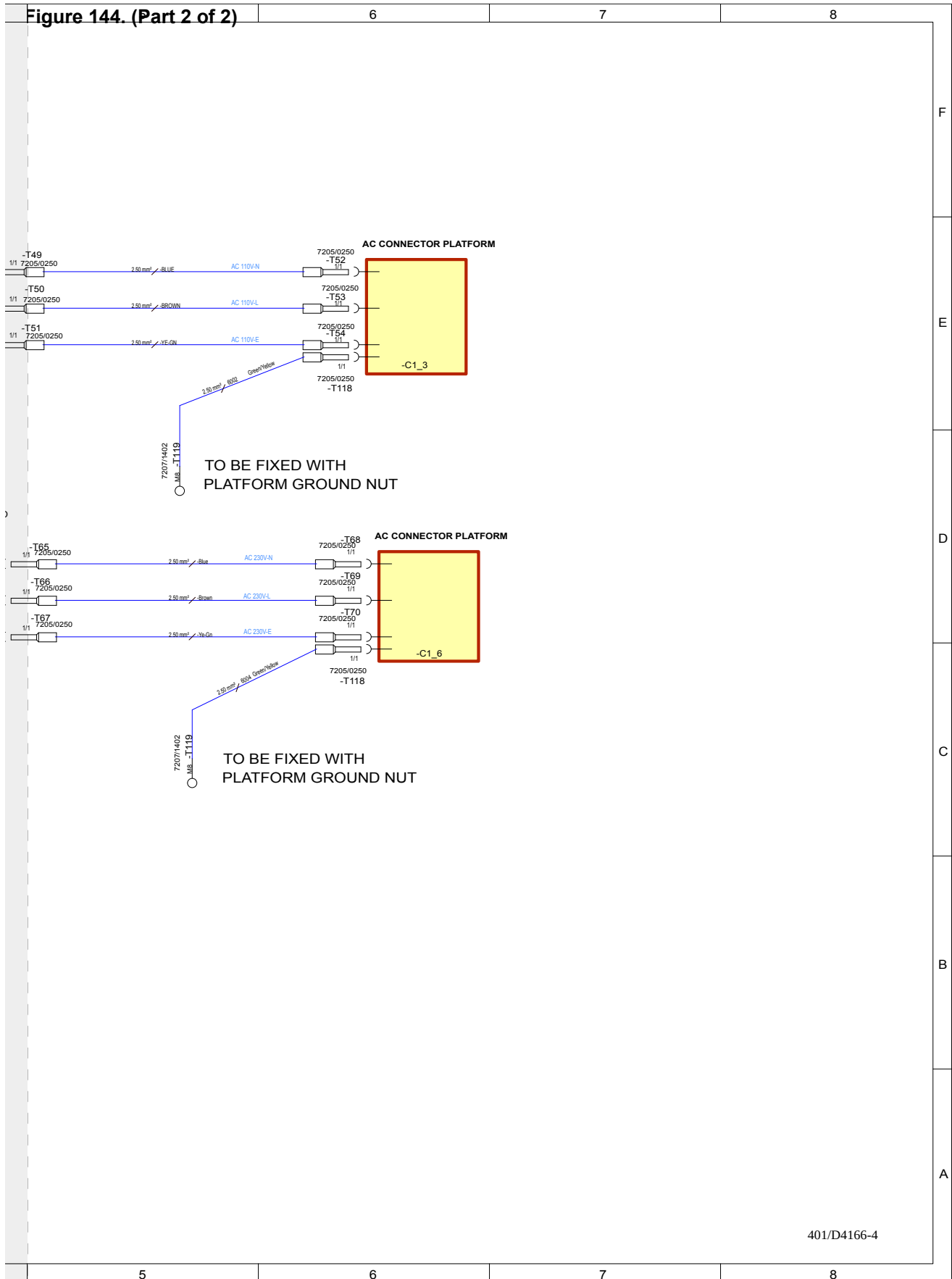


Figure 144. (Part 2 of 2)





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

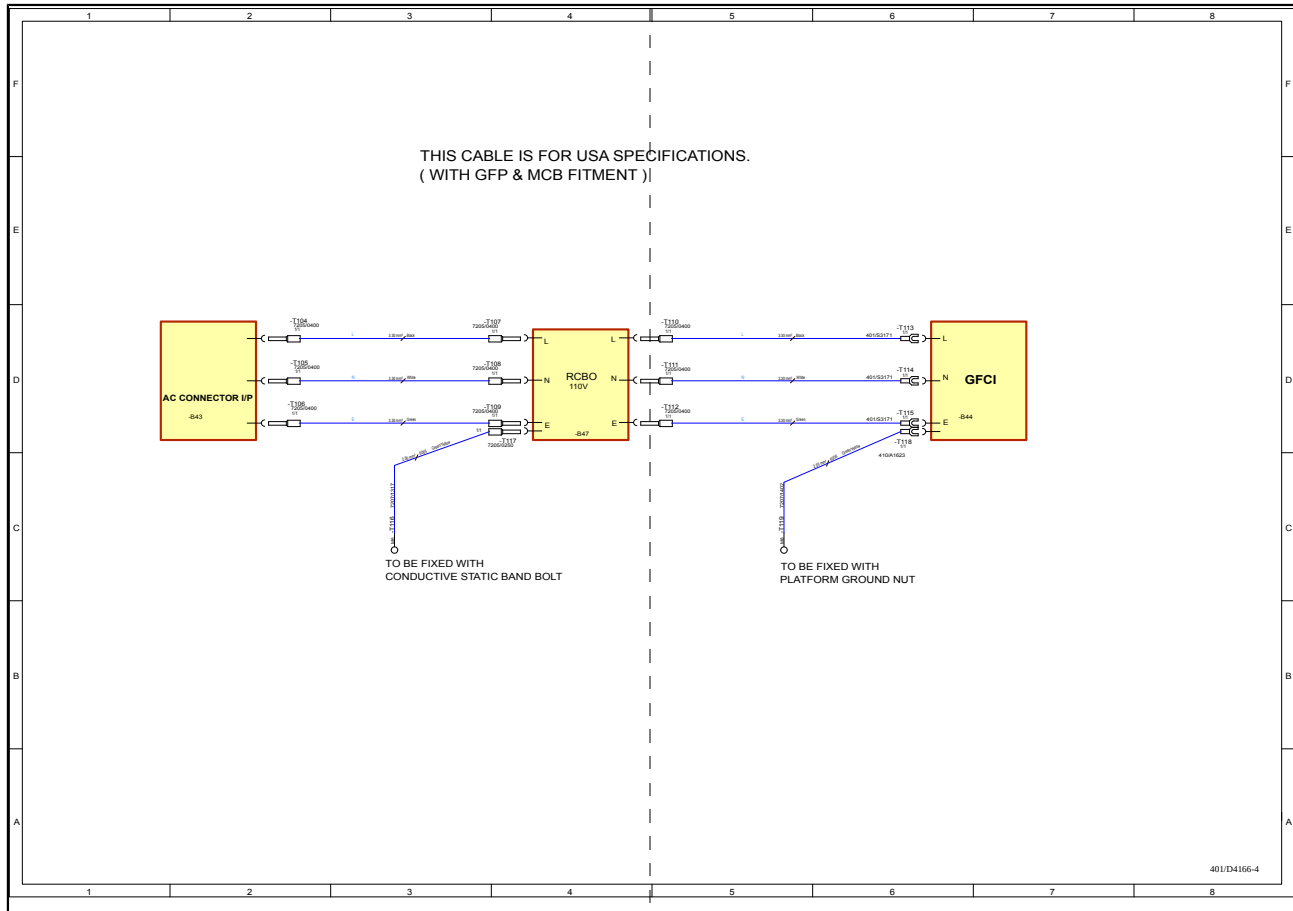
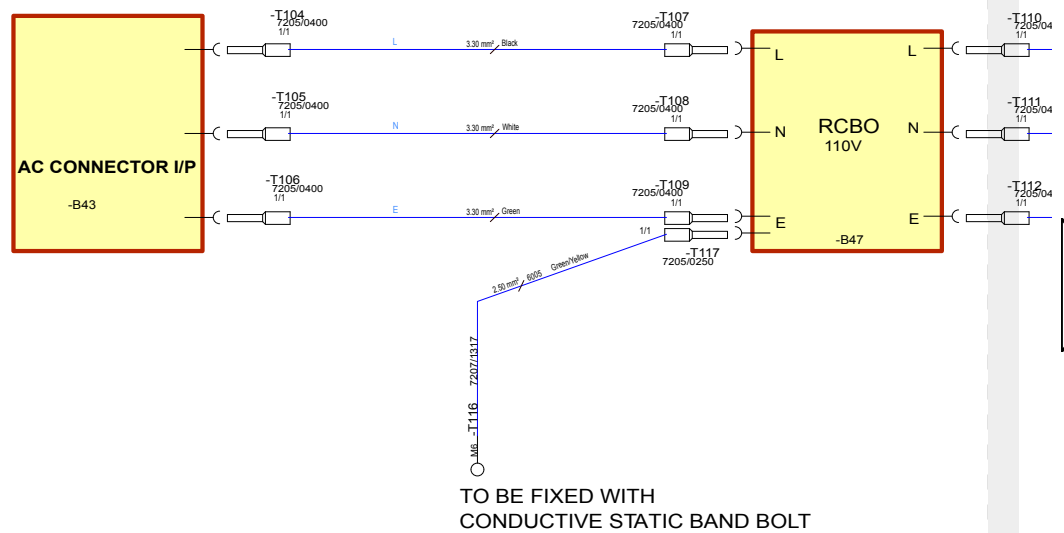


Figure 145. (Part 1 of 2)

THIS CABLE IS FOR USA SPECIFIC
(WITH GFP & MCB FITMENT)

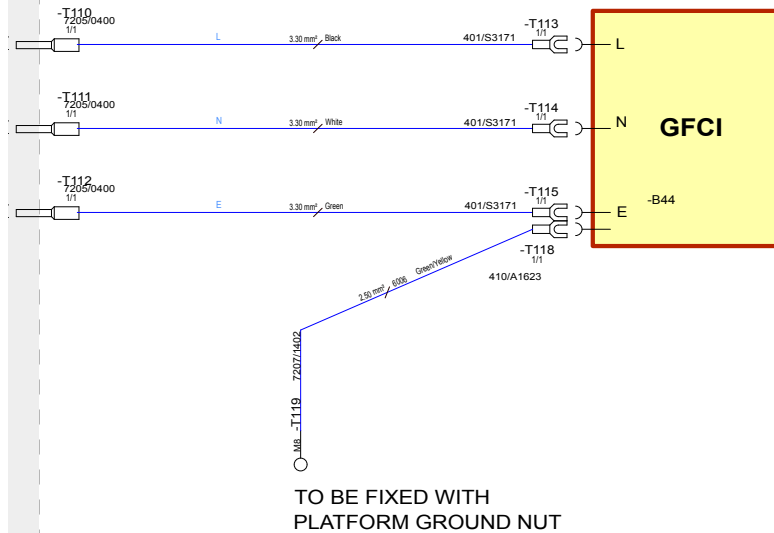


Page 33-53

Figure 145. (Part 2 of 2)

ECIFICATIONS.

)



401/D4166-4

(For: S3246E [RAJ], BLAISE_PDF)

Figure 146. 401/D6941-3 (Sheet 1 of 5) - Battery Charger, MECU, Platform Control ECU.....	Page 33-55
Figure 147. 401/D6941-3 (Sheet 2 of 5) - MECU, Motor Controller ECU.....	Page 33-59
Figure 148. 401/D6941-3 (Sheet 3 of 5) - LiveLink ECU.....	Page 33-63
Figure 149. 401/D6941-3 (Sheet 4 of 5) - AC Extension Lead.....	Page 33-67
Figure 150. 401/D6941-3 (Sheet 5 of 5) - AC Extension Lead.....	Page 33-71

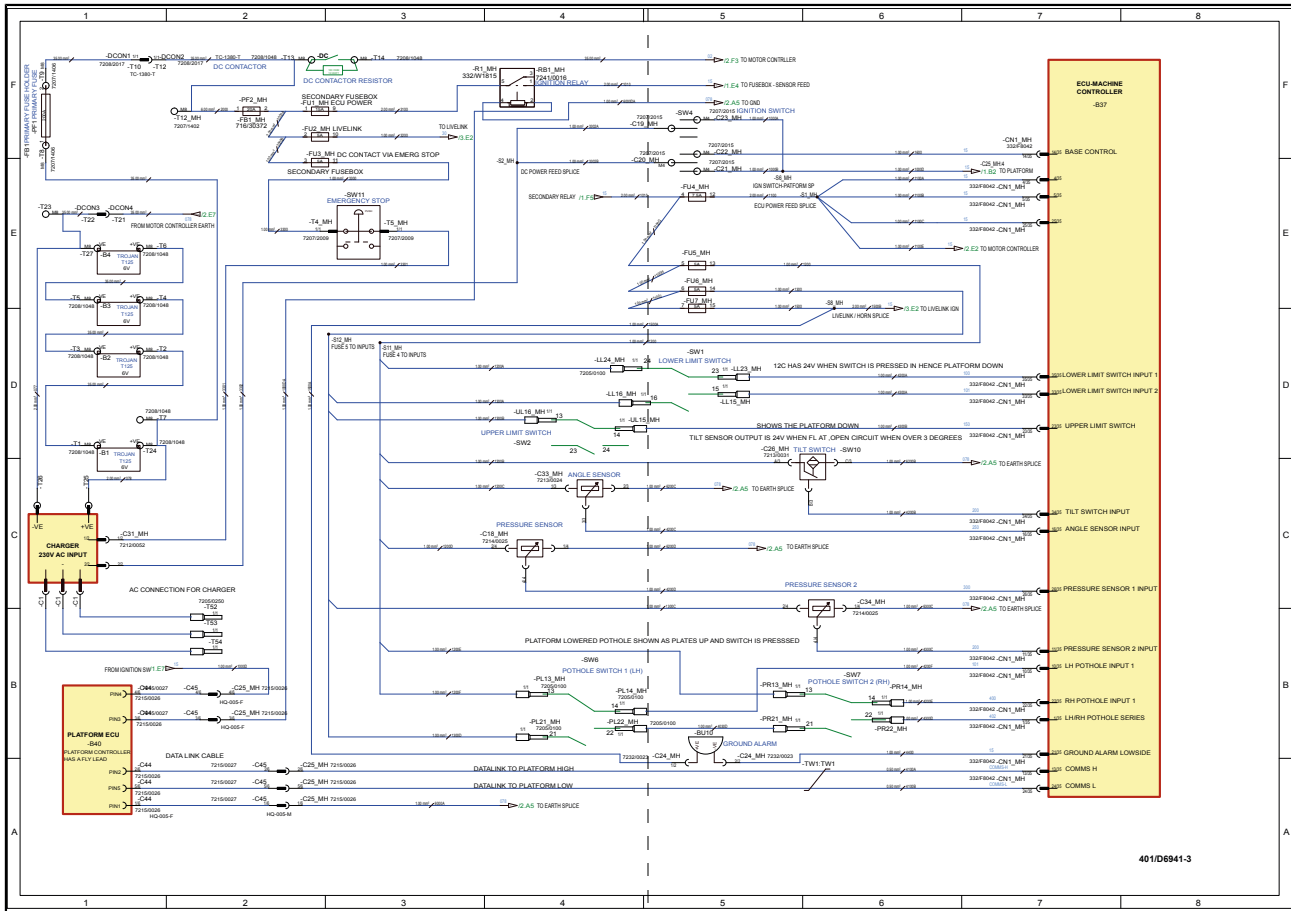


Figure 146. (Part 1 of 2)

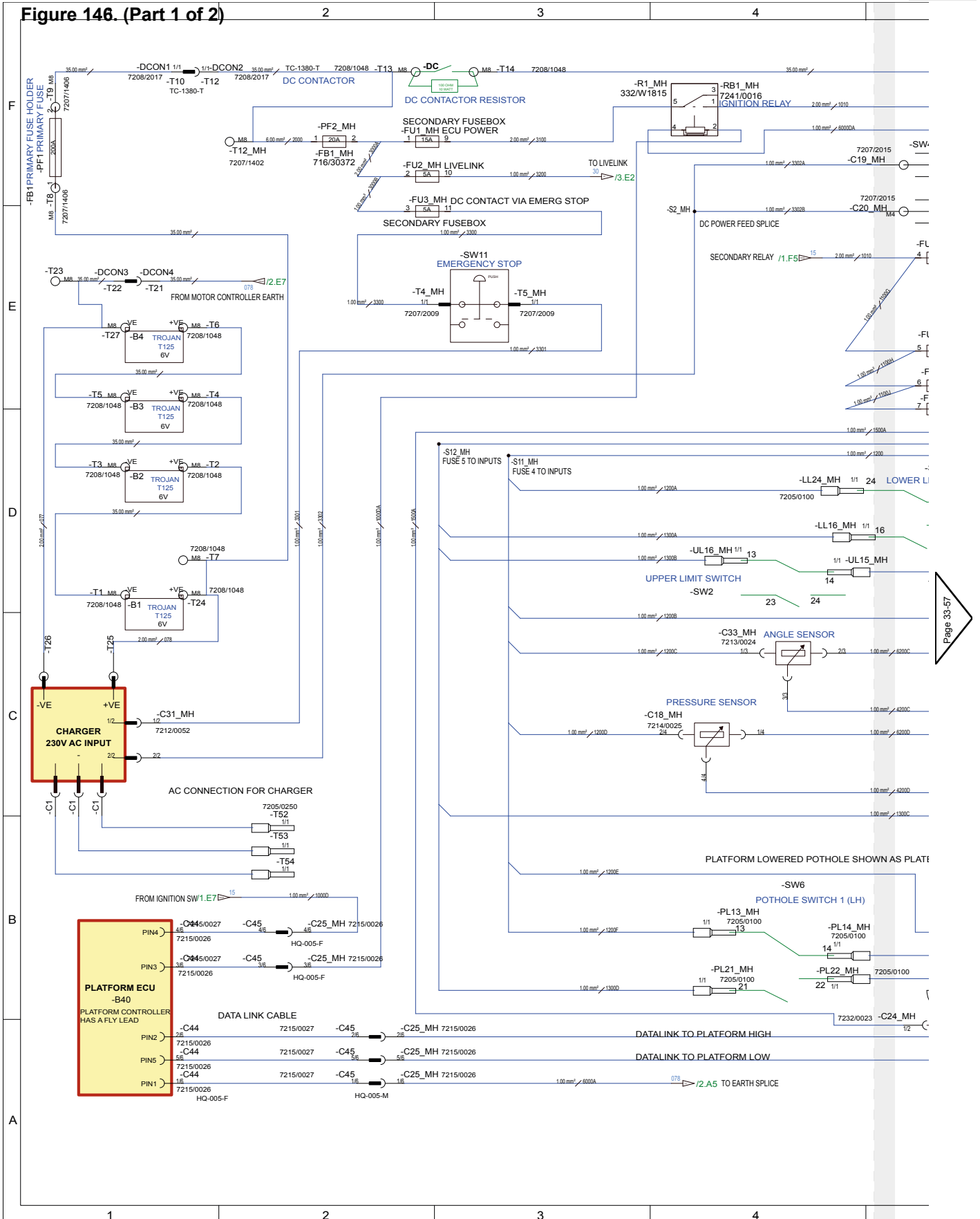
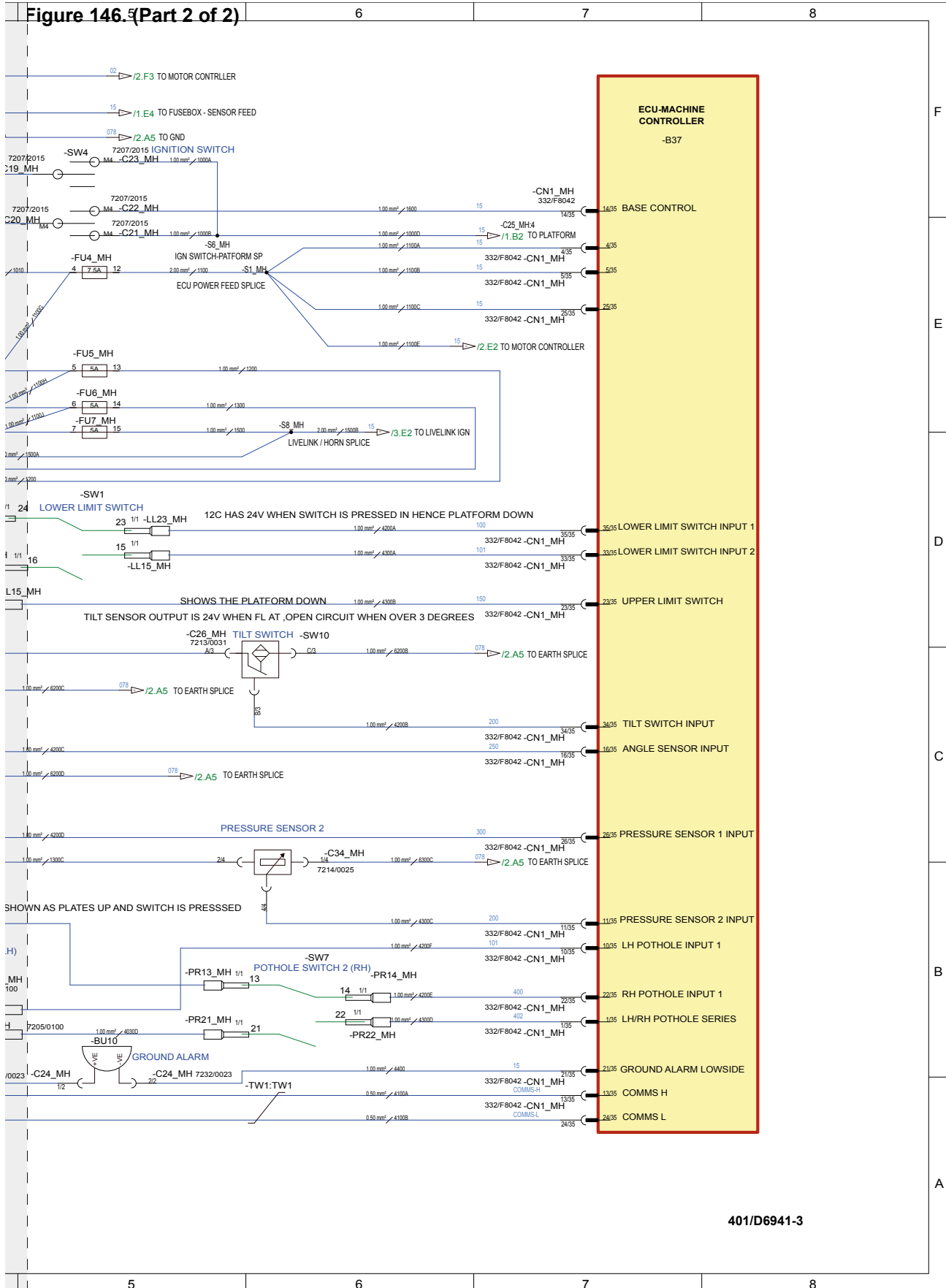


Figure 146.5 (Part 2 of 2)



401/D6941-3



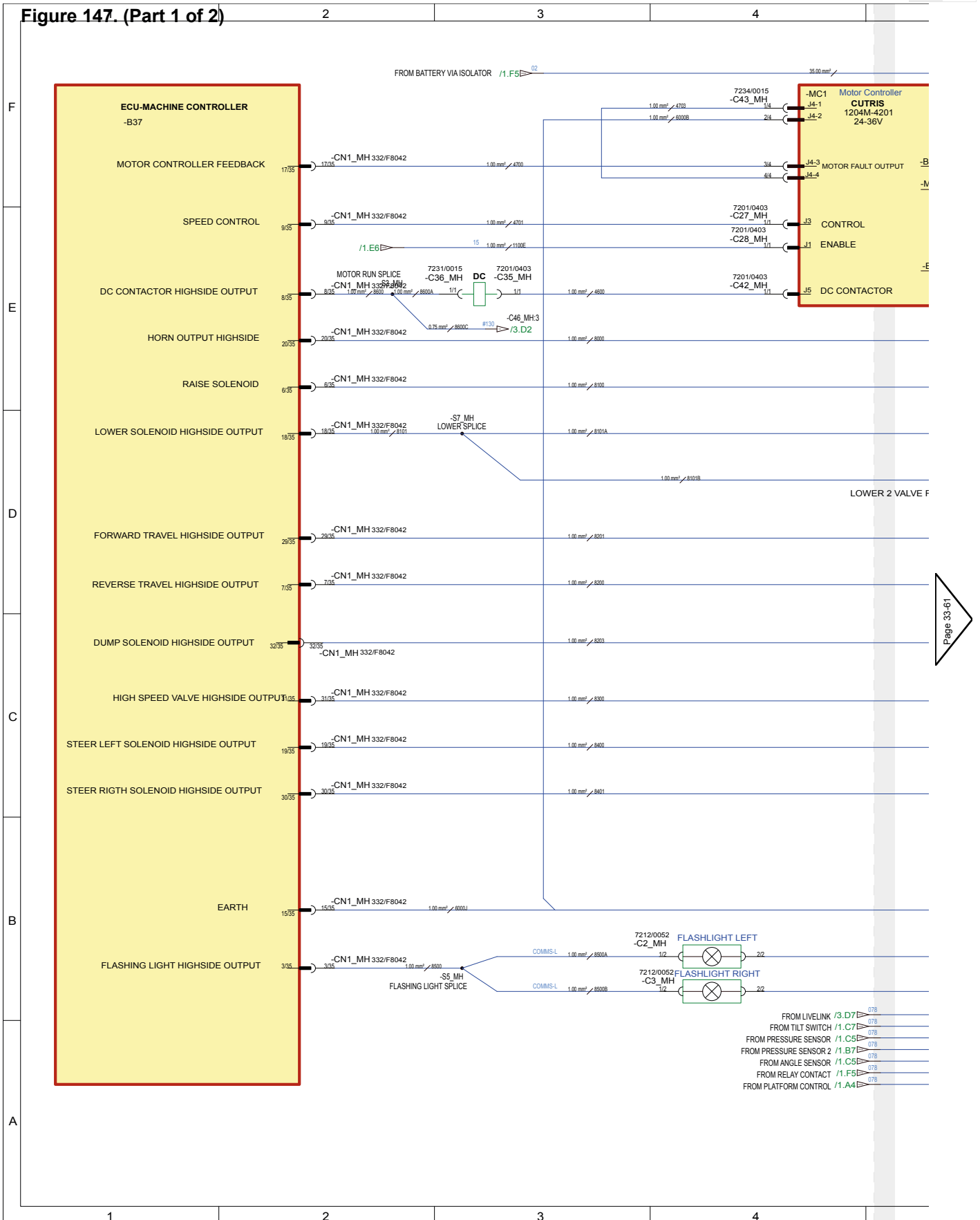
33 - Electrical System

00 - Electrical System

50 - Schematic Circuit



Figure 147. (Part 1 of 2)



8



33 - 61



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit



Figure 148. (Part 1 of 2)

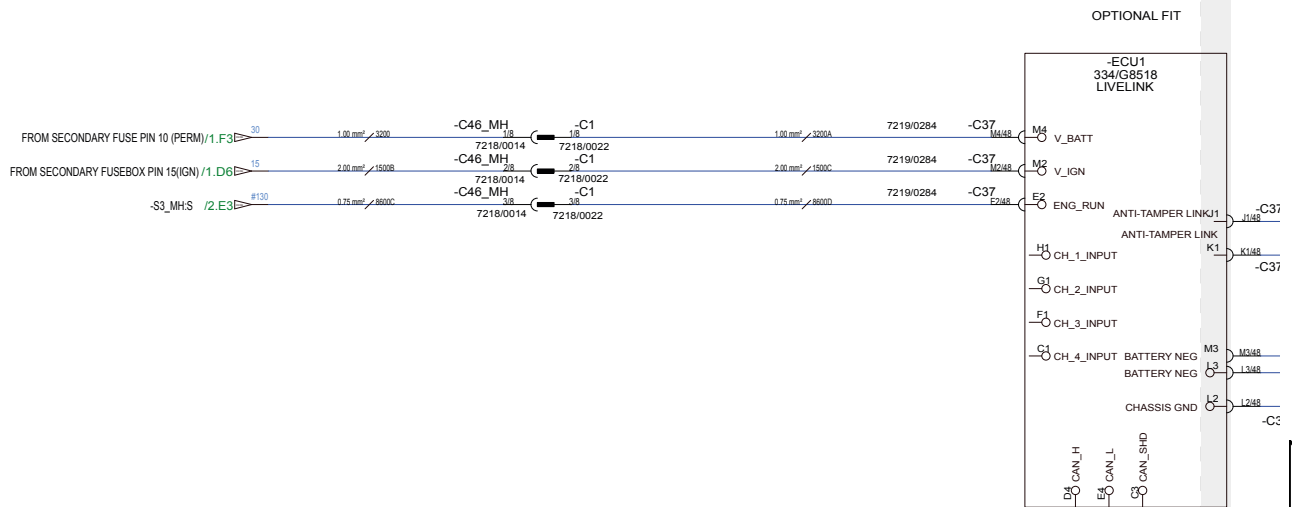
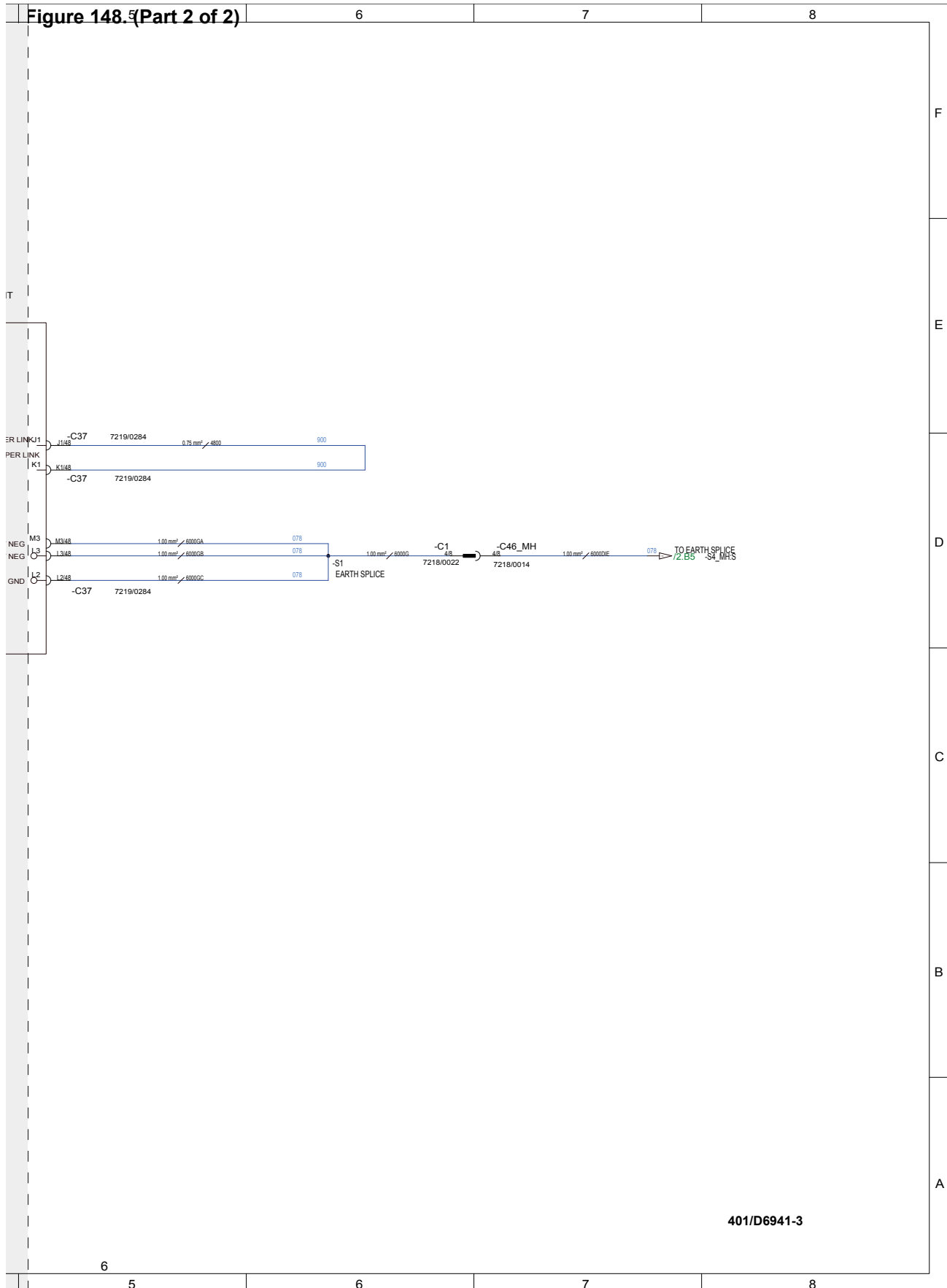


Figure 148.5 (Part 2 of 2)





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-68

Figure 149. 401/D6941-3 (Sheet 4 of 5) - AC Extension Lead

Page 33-69

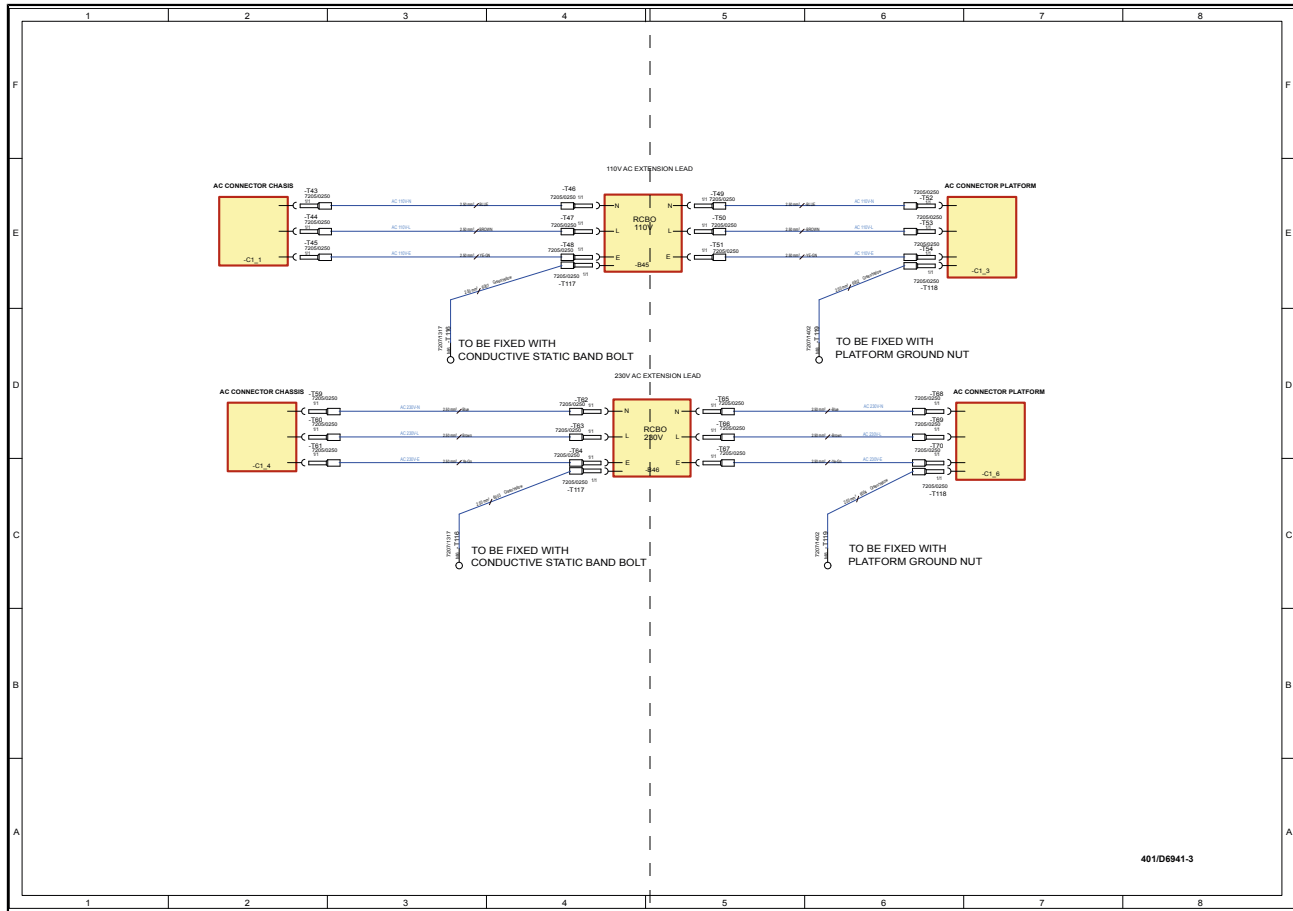
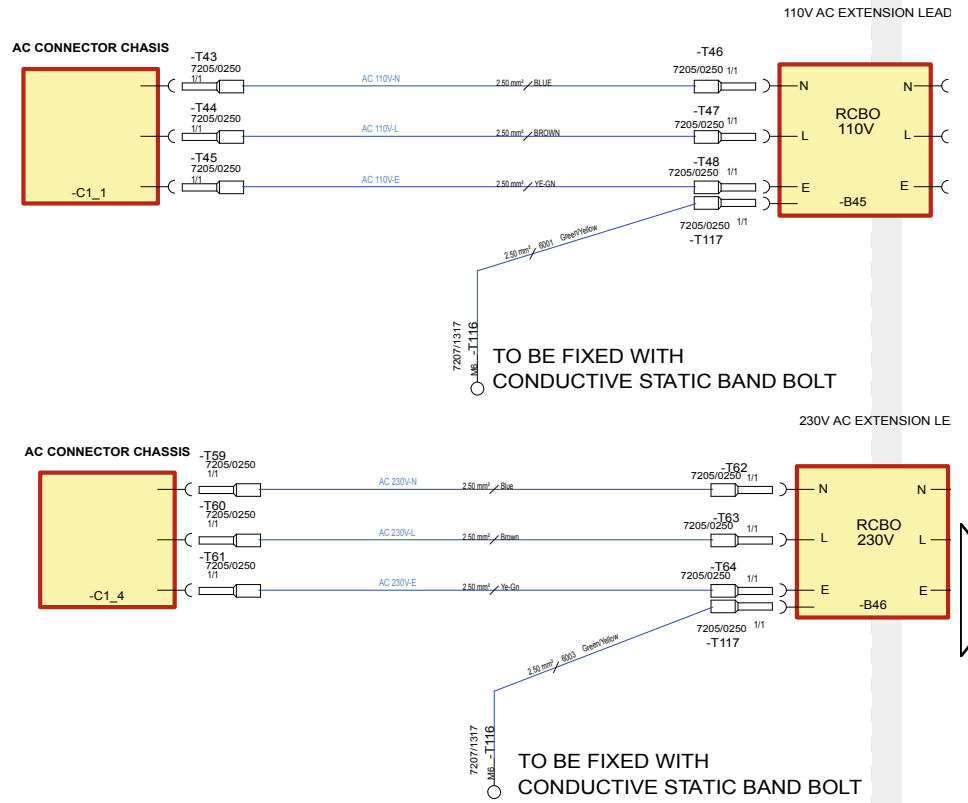


Figure 149. (Part 1 of 2)



8





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-72

Figure 150. 401/D6941-3 (Sheet 5 of 5) - AC Extension Lead

Page 33-73

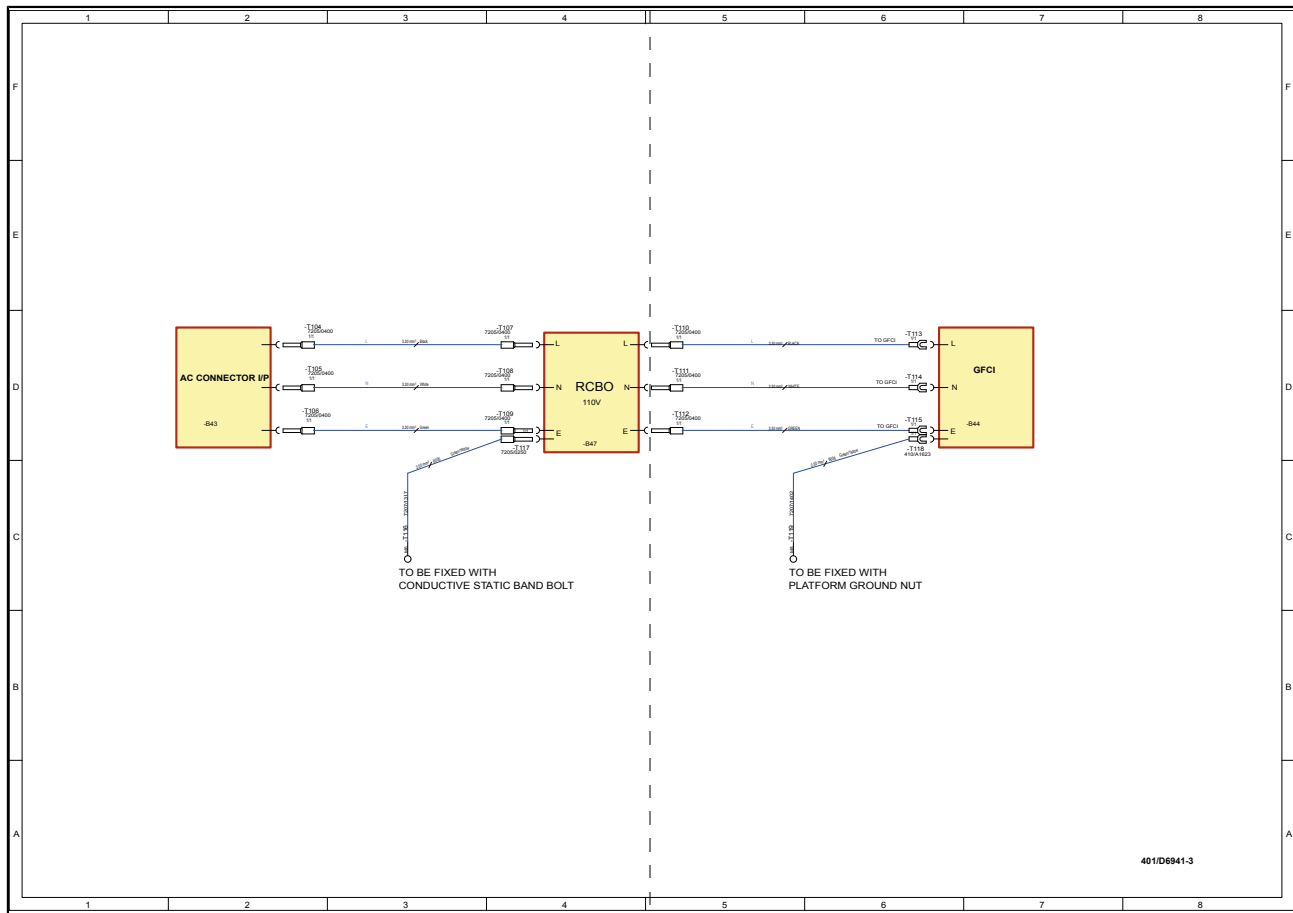


Figure 150. (Part 1 of 2)

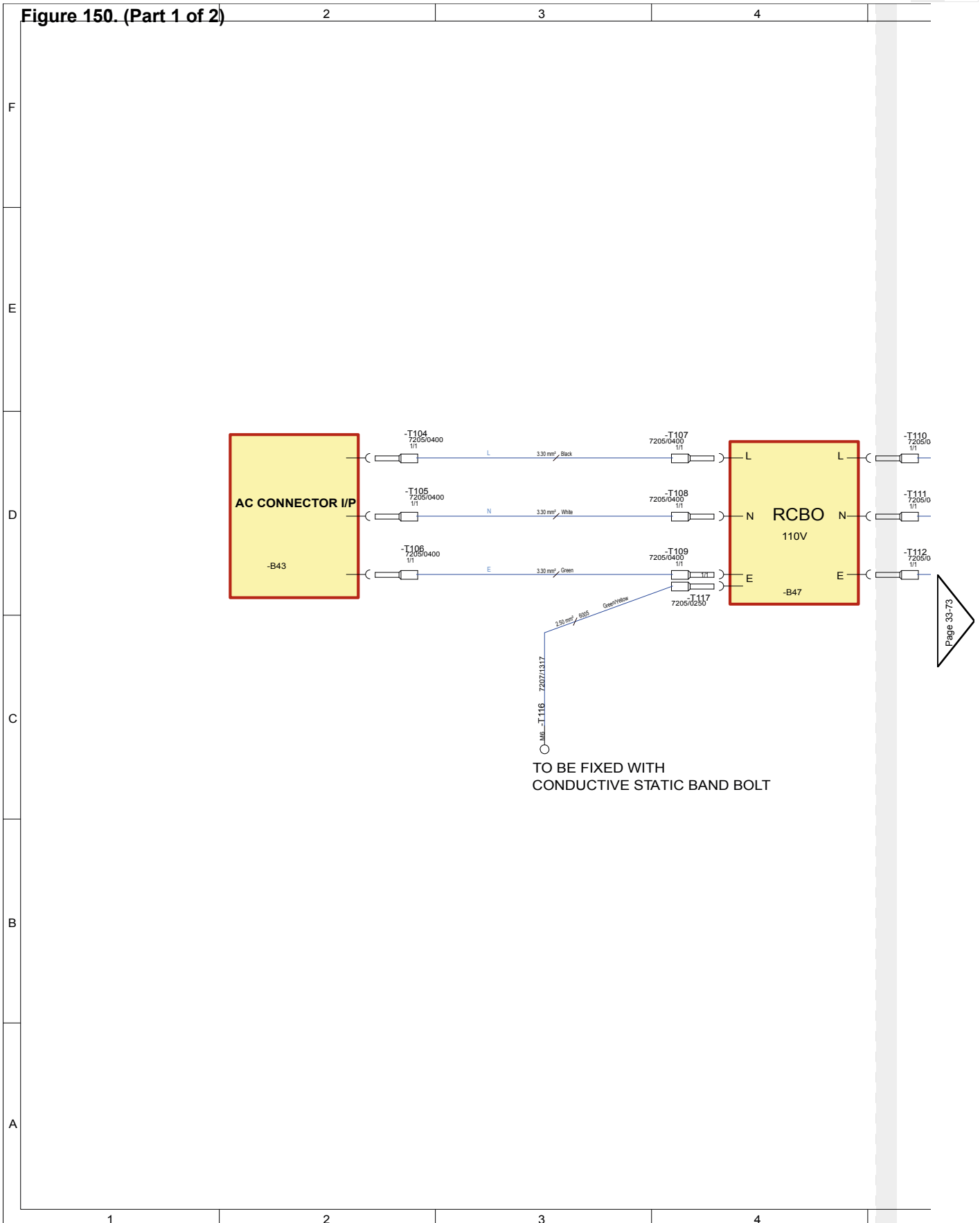


Figure 150.5 (Part 2 of 2)

6

7

8

F

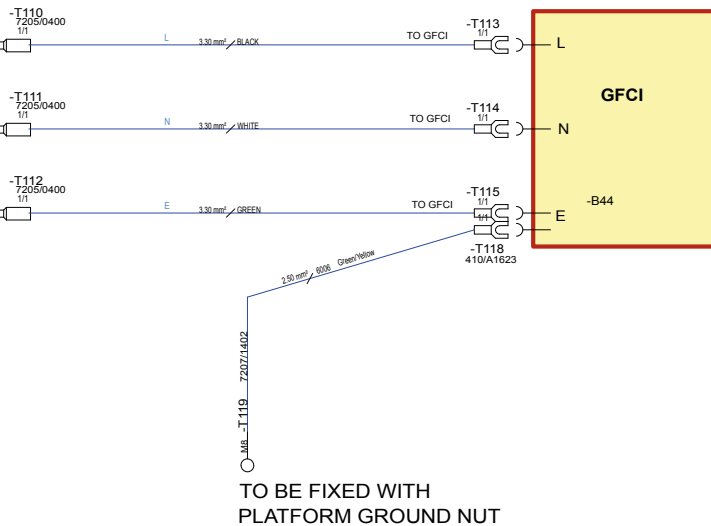
E

D

C

B

A



401/D6941-3

(For: S2646E [RAJ], BLAISE_PDF)

Figure 151. 401/F0705-2 (Sheet 1 of 5) - Battery charger, MECU, platform control ECU.....	Page 33-75
Figure 152. 401/F0705-2 (Sheet 2 of 5) - MECU, motor controller ECU.....	Page 33-79
Figure 153. 401/F0705-2 (Sheet 3 of 5) - LiveLink ECU.....	Page 33-83
Figure 154. 401/F0705-2 (Sheet 4 of 5) - AC extension lead.....	Page 33-87
Figure 155. 401/F0705-2 (Sheet 5 of 5) - AC extension lead.....	Page 33-91

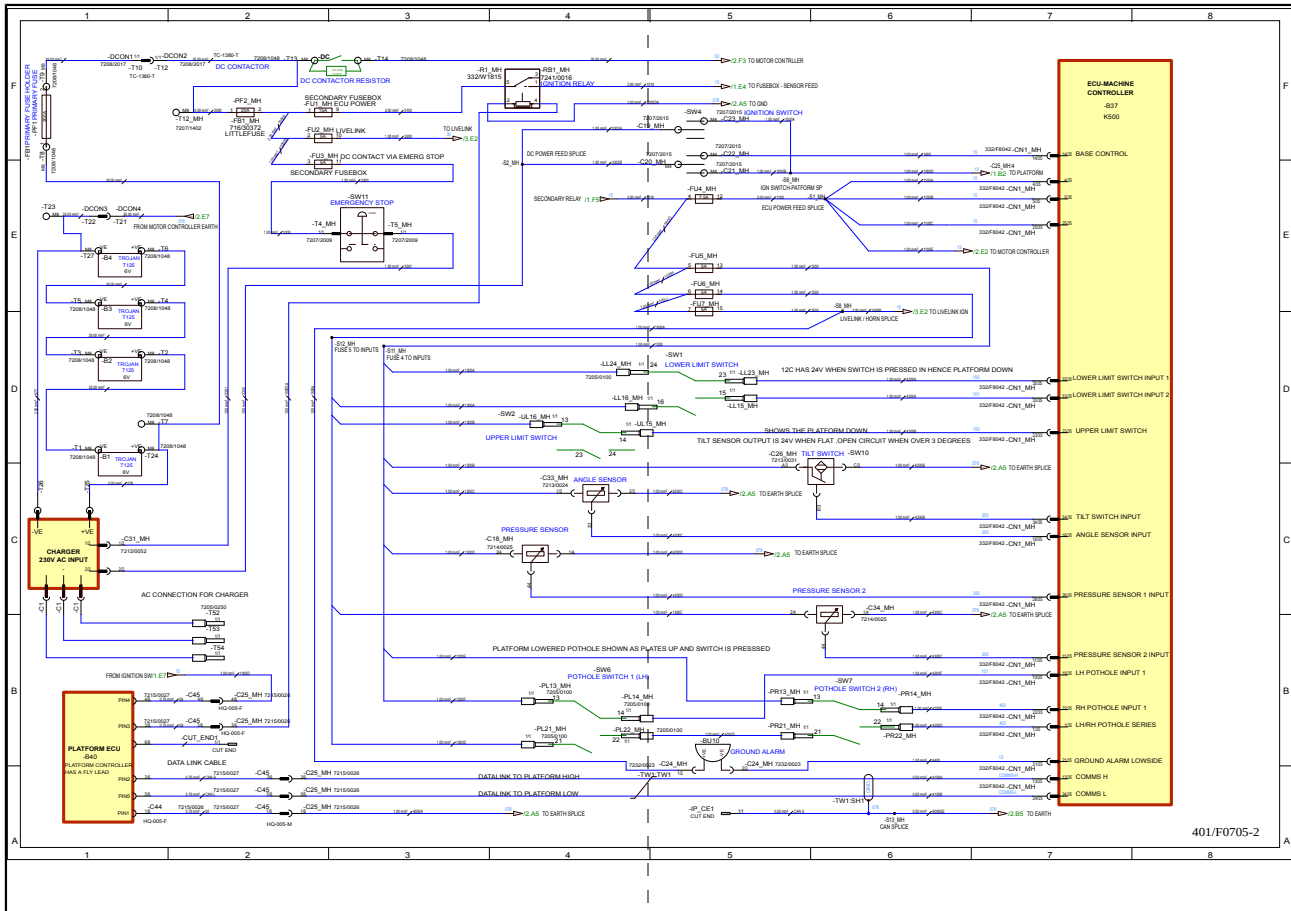
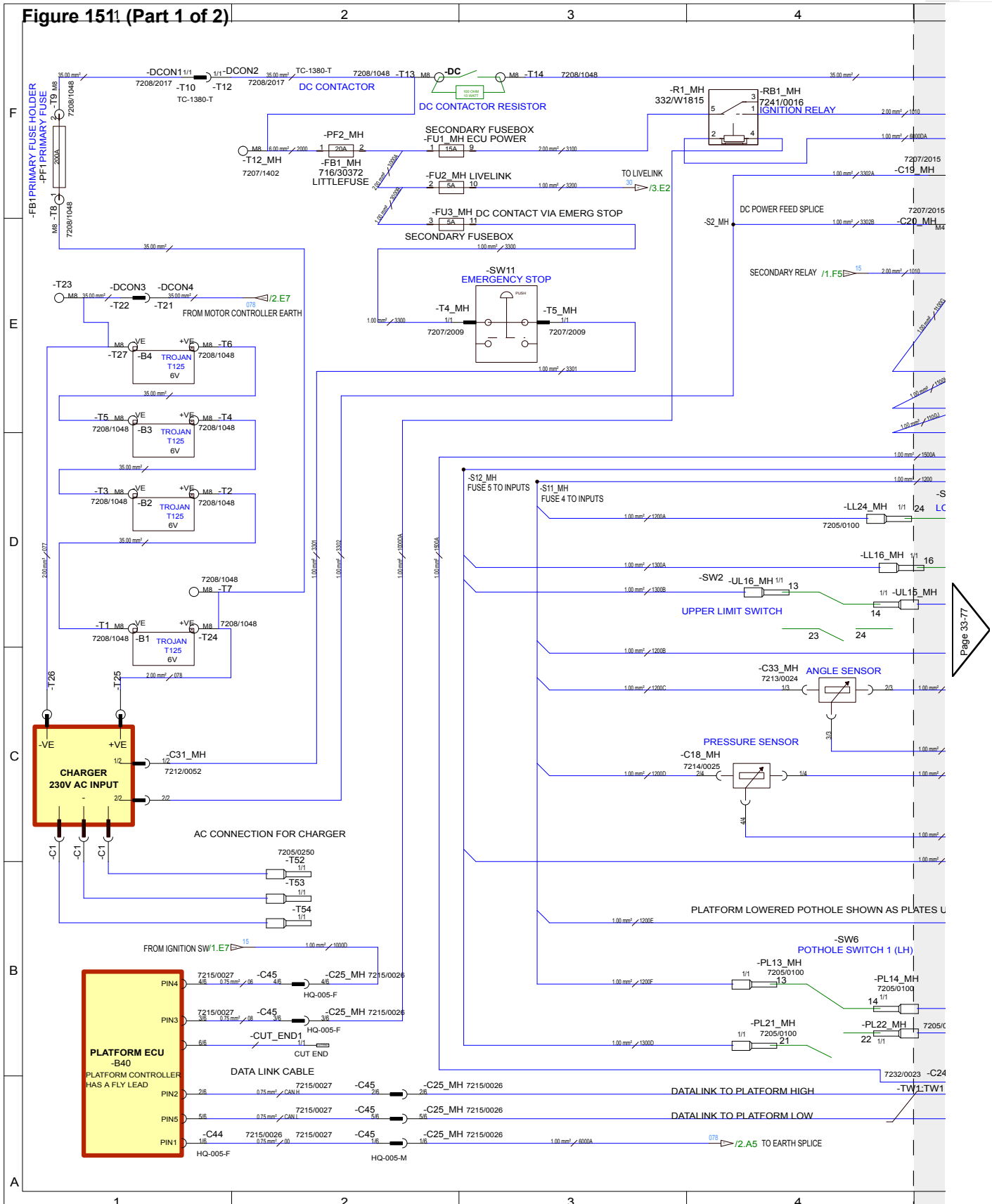
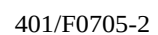


Figure 1511. (Part 1 of 2)



8





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

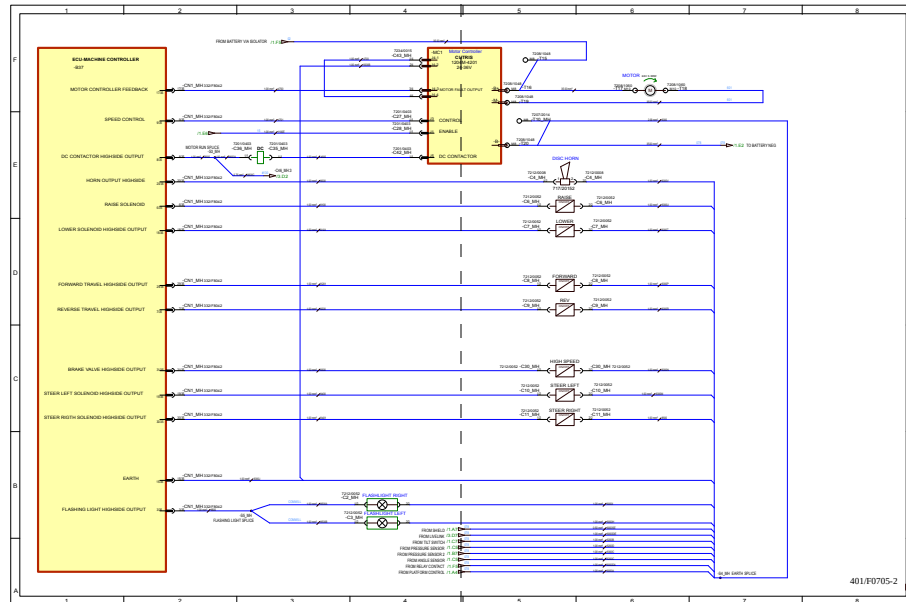
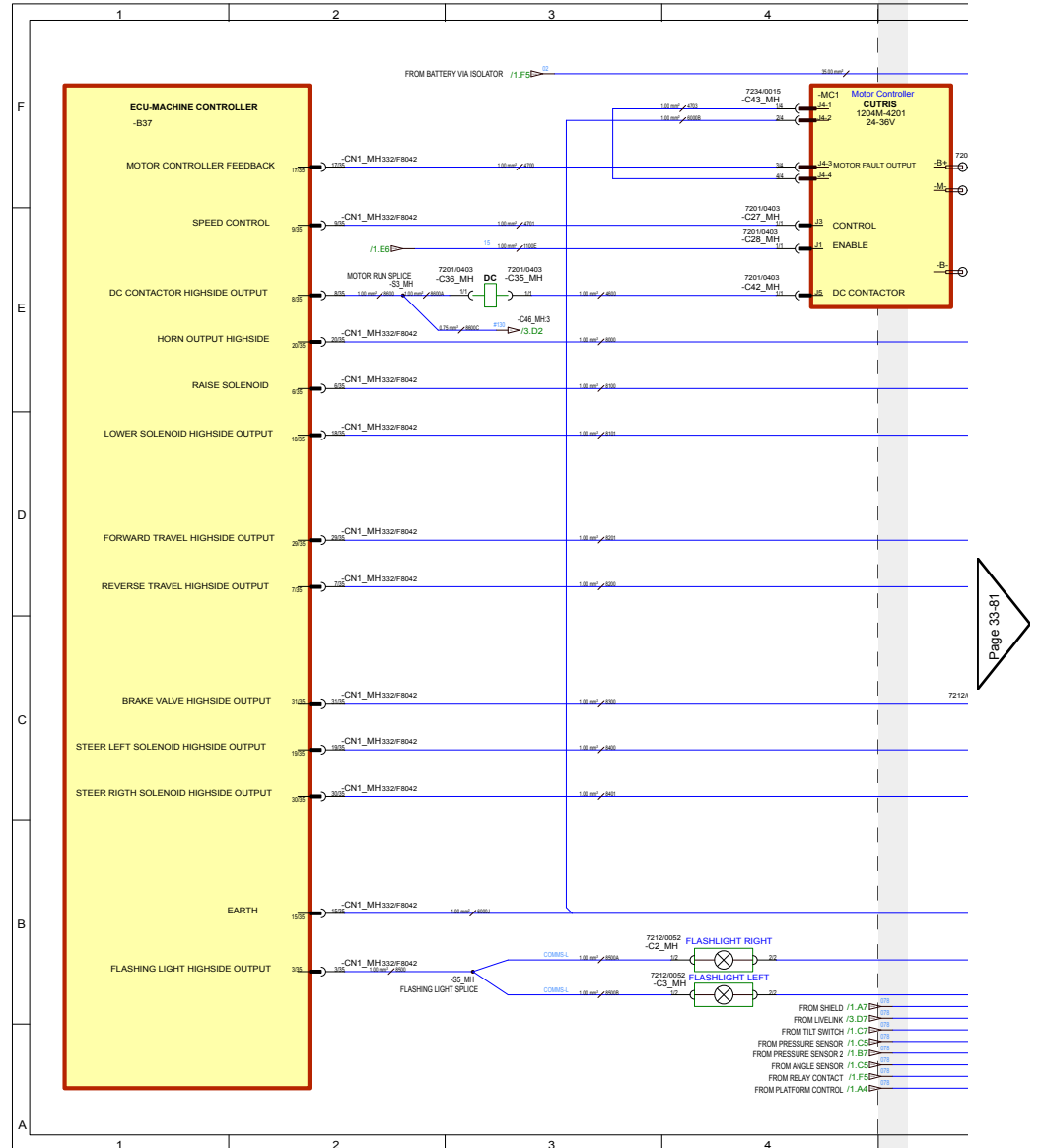


Figure 152. (Part 1 of 2)



Page 33-81

Page 33-80





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-84

Figure 153. 401/F0705-2
(Sheet 3 of 5) - LiveLink ECU

Page 33-85

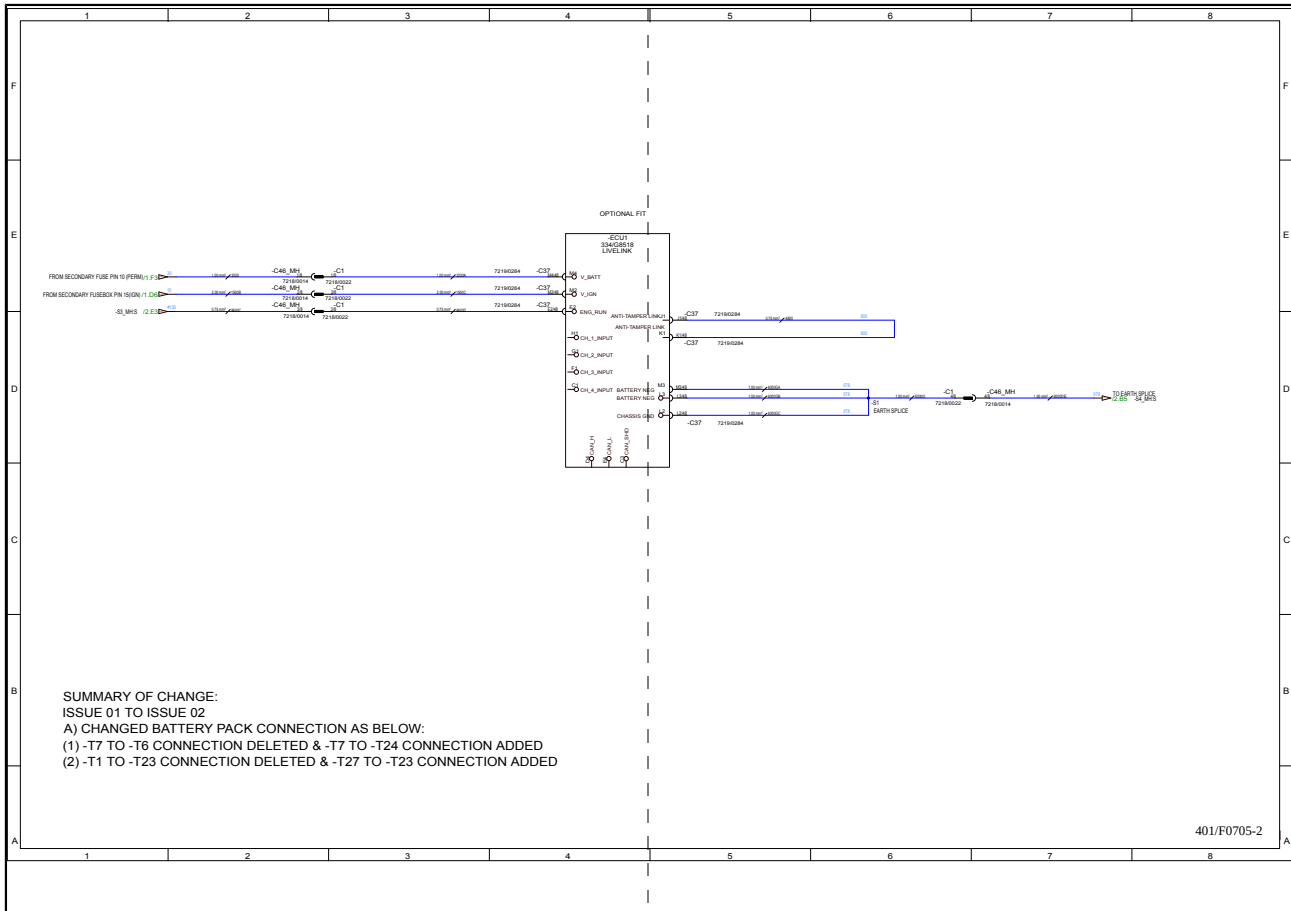
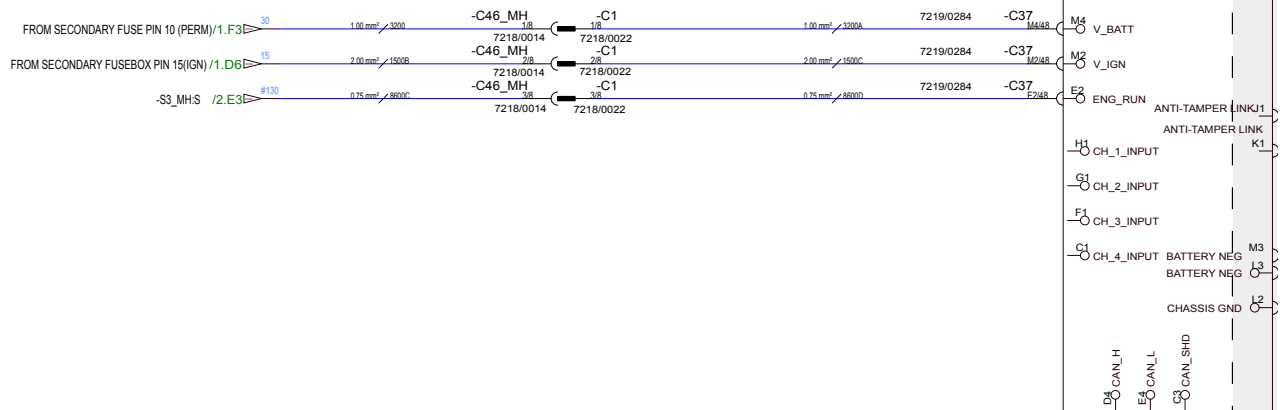


Figure 1531 (Part 1 of 2)



SUMMARY OF CHANGE:

ISSUE 01 TO ISSUE 02

A) CHANGED BATTERY PACK CONNECTION AS BELOW:

- (1) -T7 TO -T6 CONNECTION DELETED & -T7 TO -T24 CONNECTION ADDED
- (2) -T1 TO -T23 CONNECTION DELETED & -T27 TO -T23 CONNECTION ADDED



33 - Electrical System

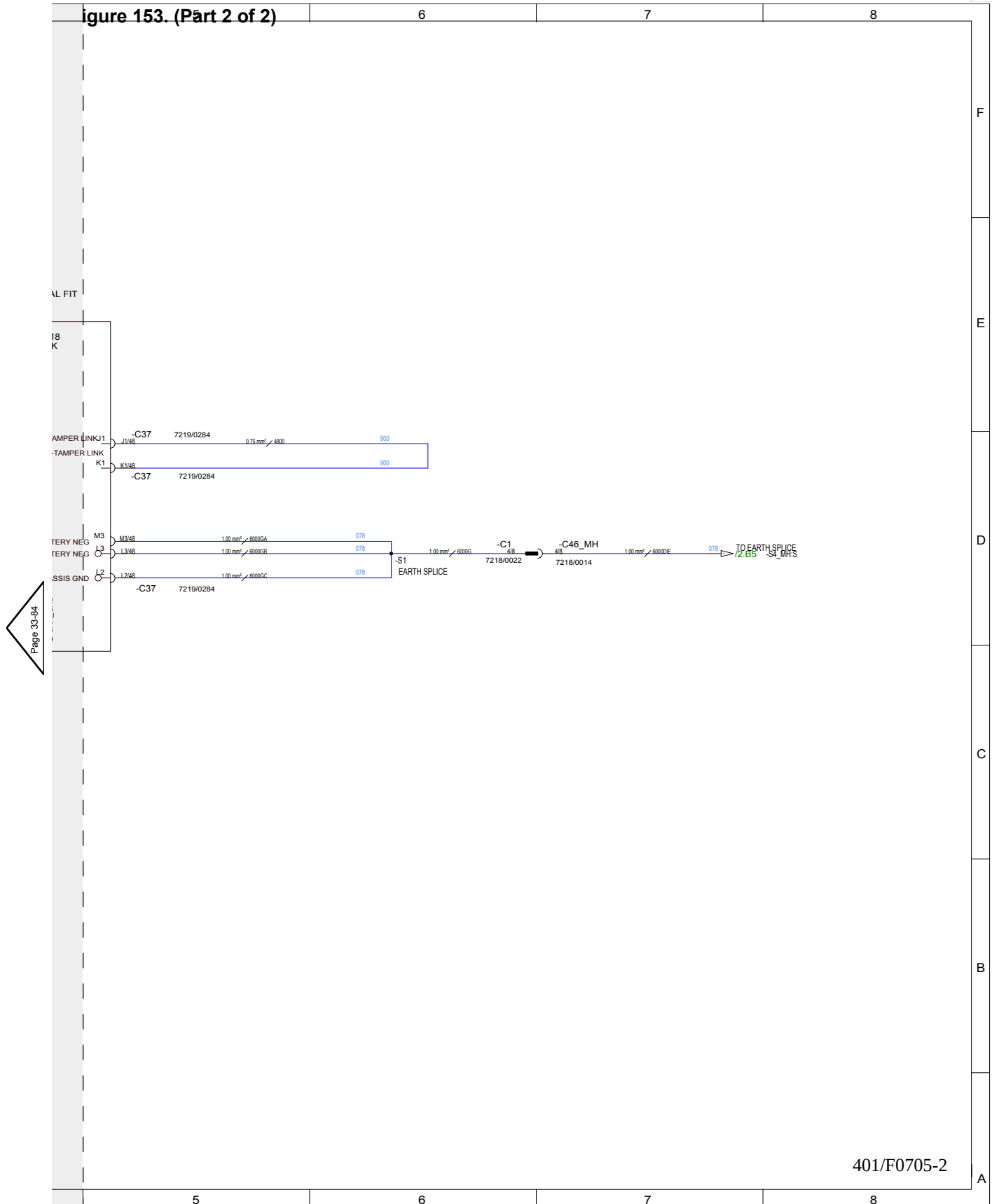
00 - Electrical System

50 - Schematic Circuit

Page
33-84

Page
33-85

Figure 153. (Part 2 of 2)



401/F0705-2



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

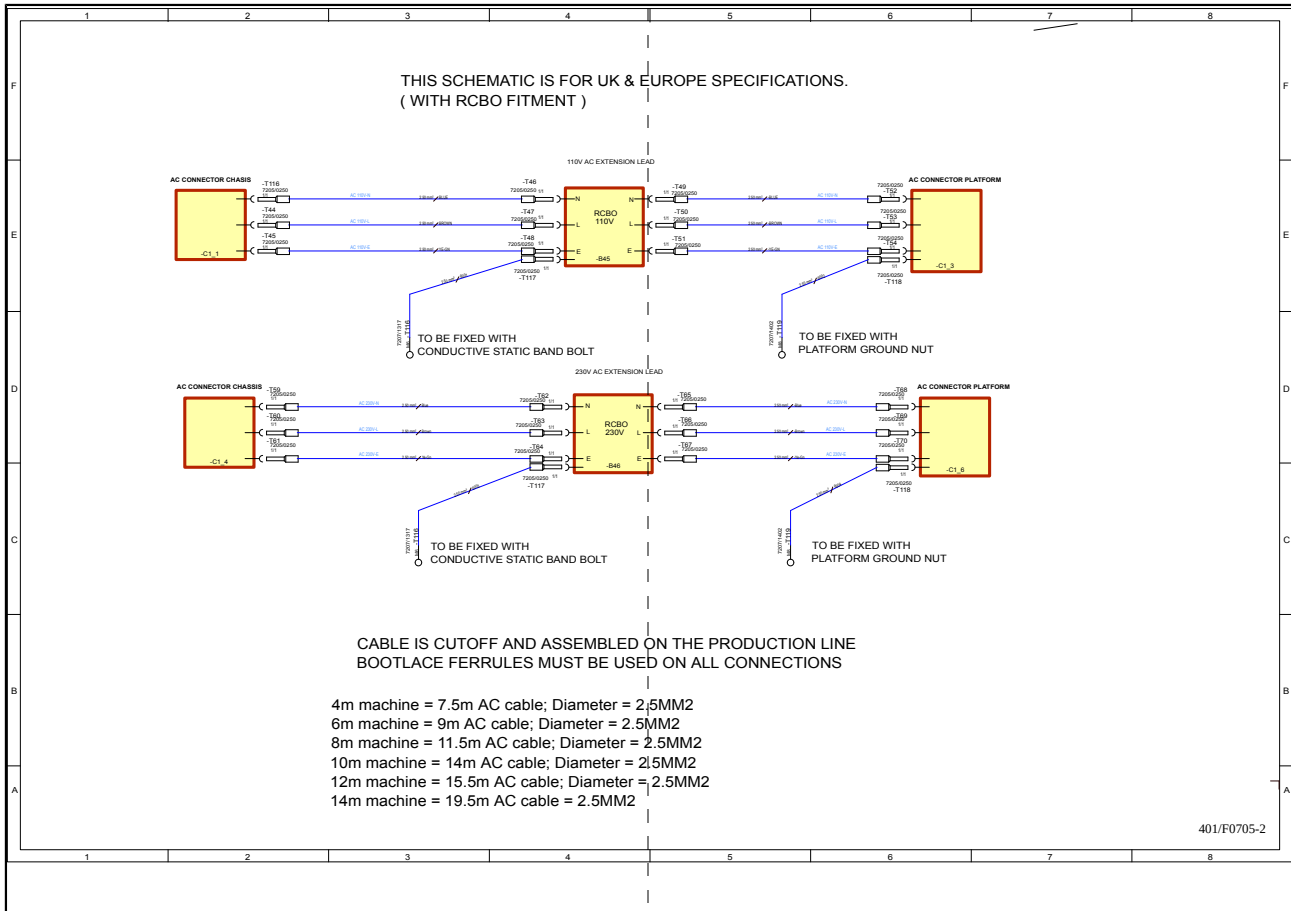
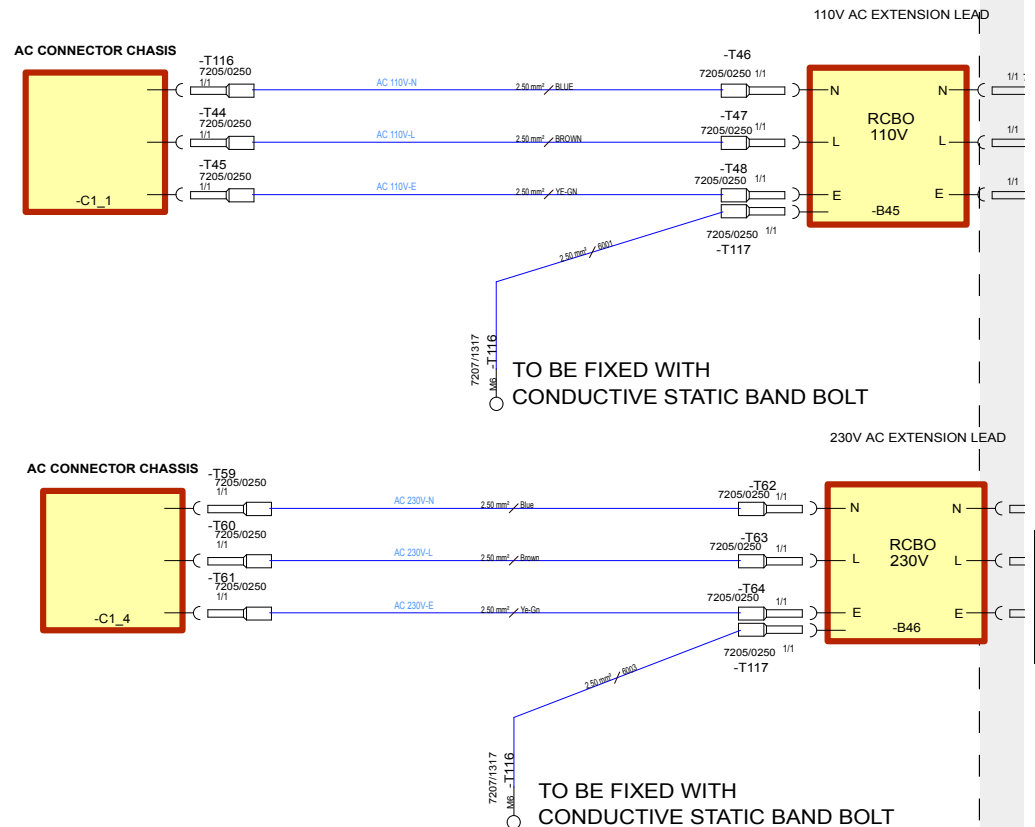


Figure 154 (Part 1 of 2)

THIS SCHEMATIC IS FOR UK & EUR
(WITH RCBO FITMENT)

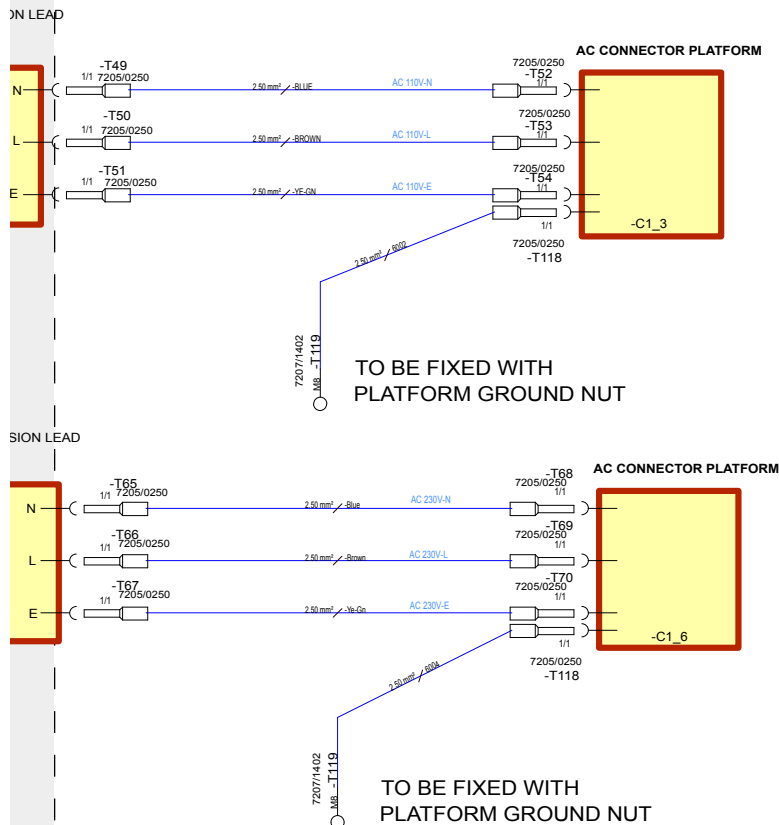


CABLE IS CUTOFF AND ASSEMBLED ON
BOOTLACE FERRULES MUST BE USED C

4m machine = 7.5m AC cable; Diameter = 2.5MM
6m machine = 9m AC cable; Diameter = 2.5MM
8m machine = 11.5m AC cable; Diameter = 2.5MM
10m machine = 14m AC cable; Diameter = 2.5MM
12m machine = 15.5m AC cable; Diameter = 2.5MM
14m machine = 19.5m AC cable = 2.5MM2

Figure 154. (Part 2 of 2)

& EUROPE SPECIFICATIONS.



D ON THE PRODUCTION LINE
SED ON ALL CONNECTIONS

= 2.5MM2
2.5MM2
= 2.5MM2
= 2.5MM2
r = 2.5MM2
2

401/F0705-2



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-92

Figure 155. 401/F0705-2 (Sheet 5 of 5) - AC extension lead

Page 33-93

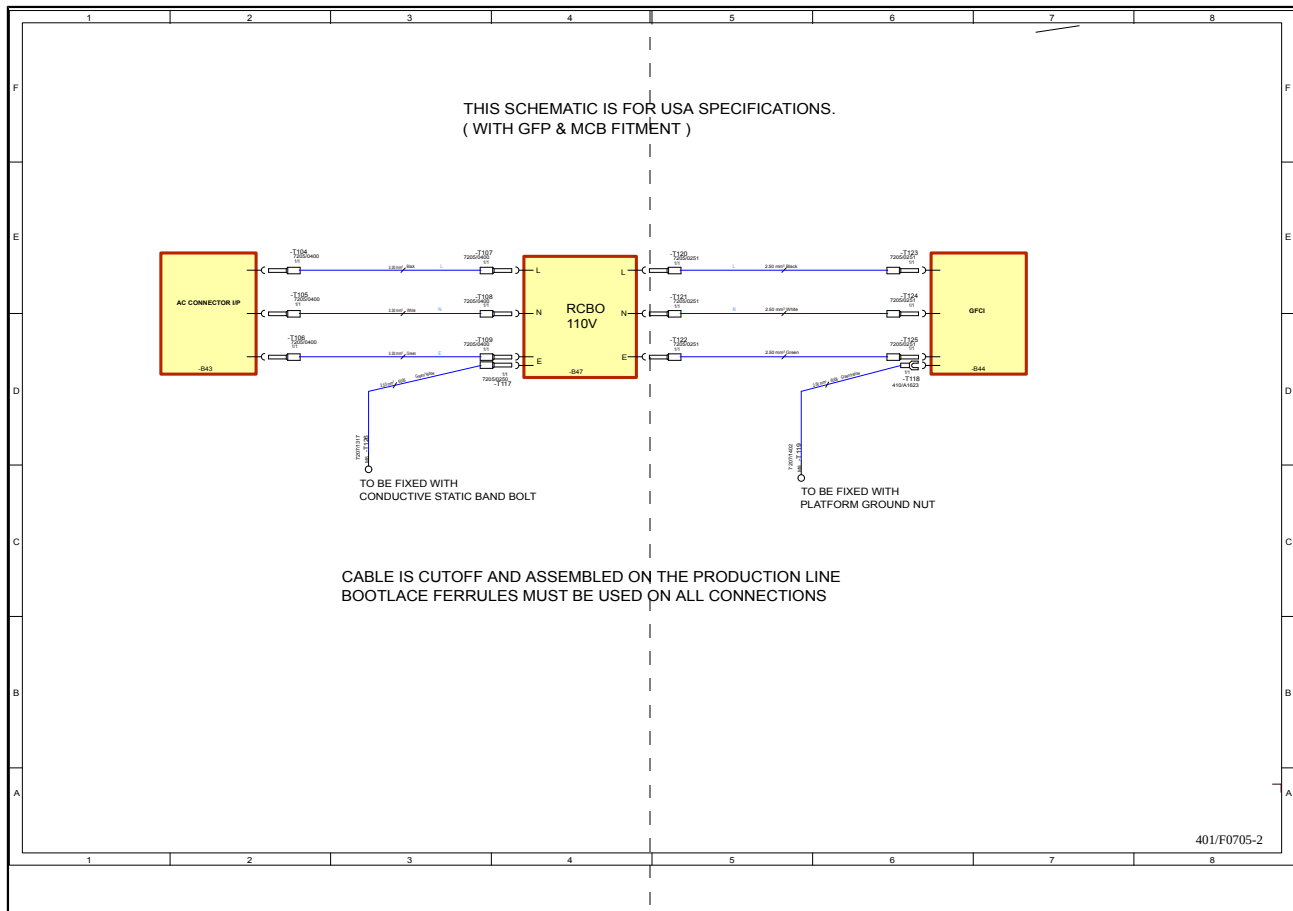


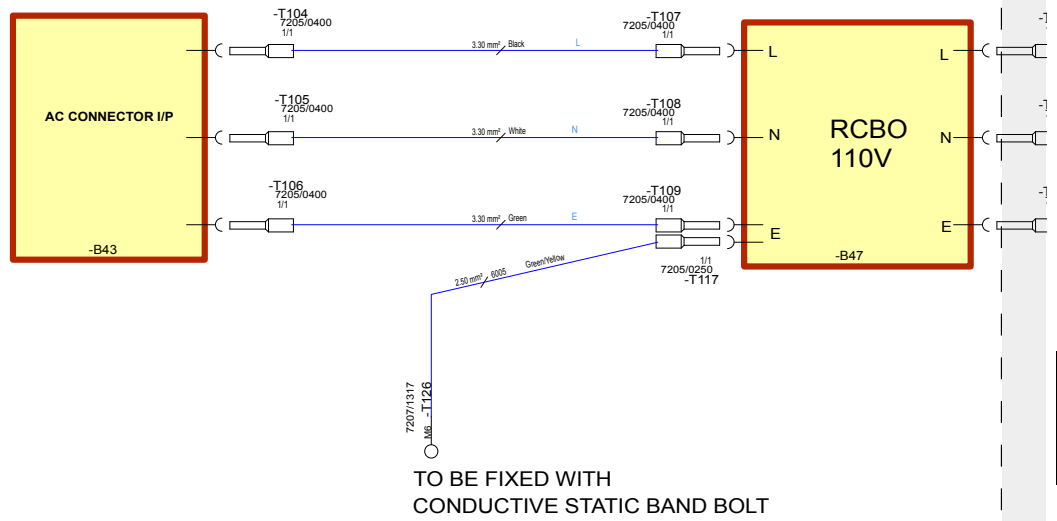
Figure 1551 (Part 1 of 2)

2

3

4

THIS SCHEMATIC IS FOR USE WITH
(WITH GFP & MCB FITMENT)

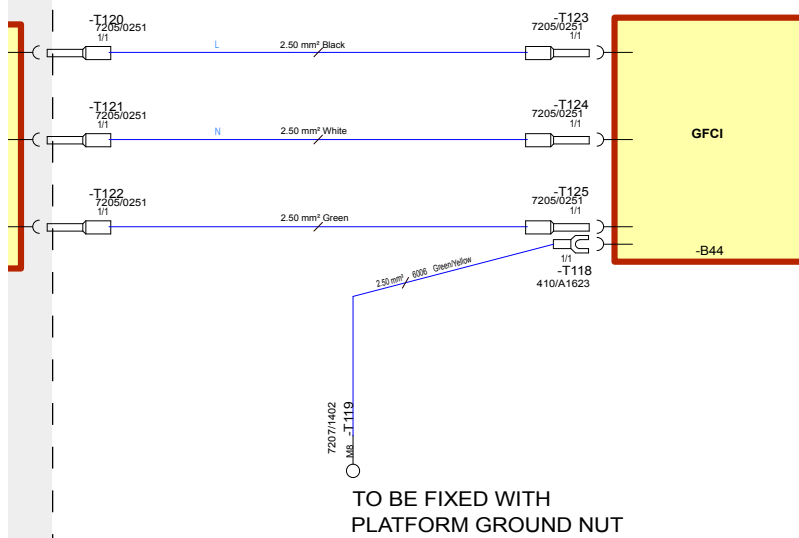


CABLE IS CUTOFF AND ASSEMBLED ON THE
BOOTLACE FERRULES MUST BE USED ON

Page 33-93

Figure 155. (Part 2 of 2)

FOR USA SPECIFICATIONS.
(MENT)



ON THE PRODUCTION LINE
D ON ALL CONNECTIONS

401/F0705-2

(For: S4046E [RAJ], S4550E [RAJ], BLAISE_PDF)

Figure 156. 401/F0709-3 (Sheet 1 of 5) - Battery charger, MECU, platform control ECU.....	Page 33-95
Figure 157. 401/F0709-3 (Sheet 2 of 5) - MECU, motor controller ECU.....	Page 33-99
Figure 158. 401/F0709-3 (Sheet 3 of 5) - LiveLink ECU.....	Page 33-103
Figure 159. 401/F0709-3 (Sheet 4 of 5) - AC extension lead.....	Page 33-107
Figure 160. 401/F0709-3 (Sheet 5 of 5) - AC extension lead.....	Page 33-111



4

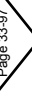
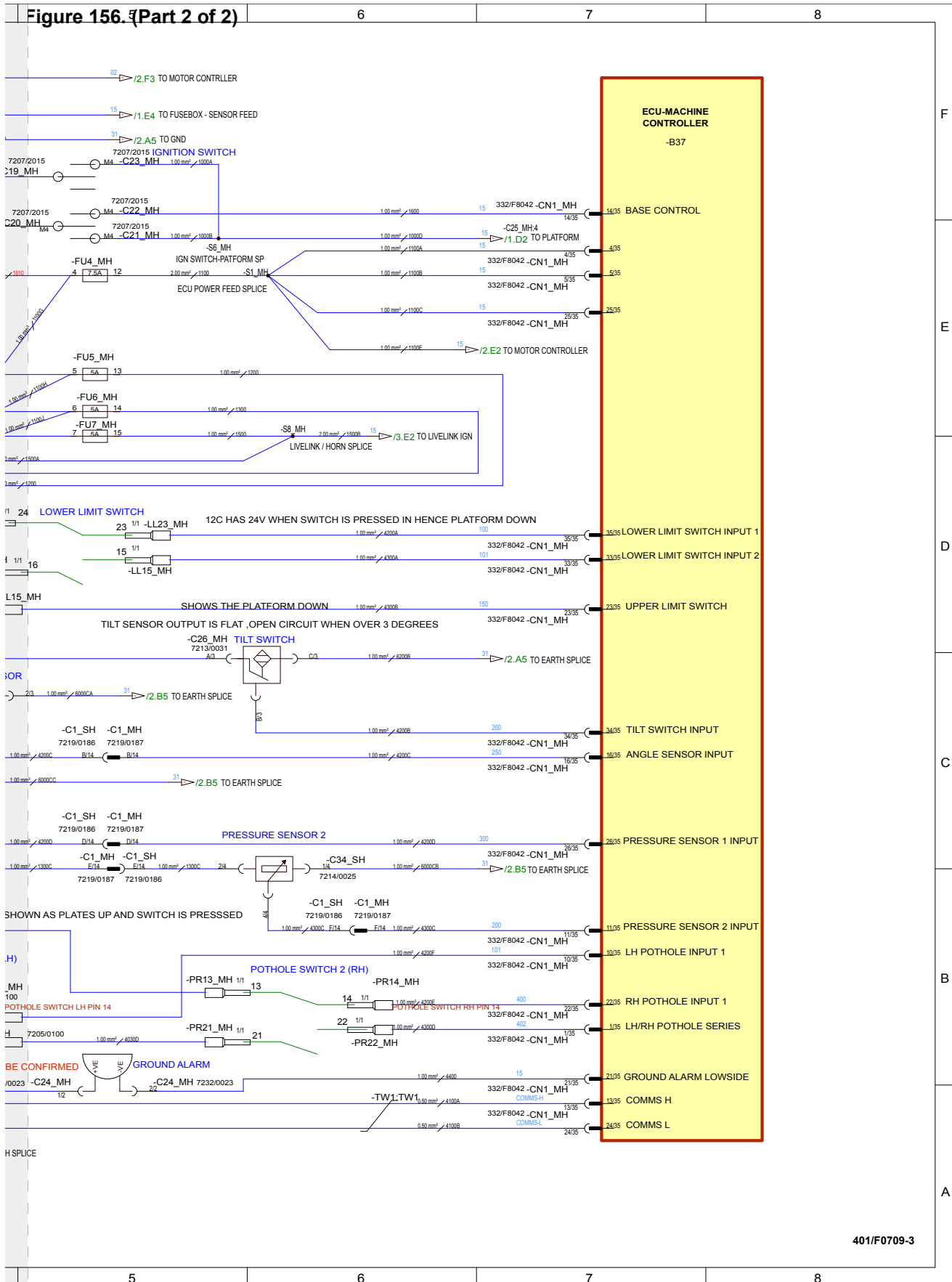


Figure 156. (Part 2 of 2)





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

Page 33-100

Figure 157. 401/F0709-3 (Sheet 2 of 5) - MECU, motor controller ECU

Page 33-101

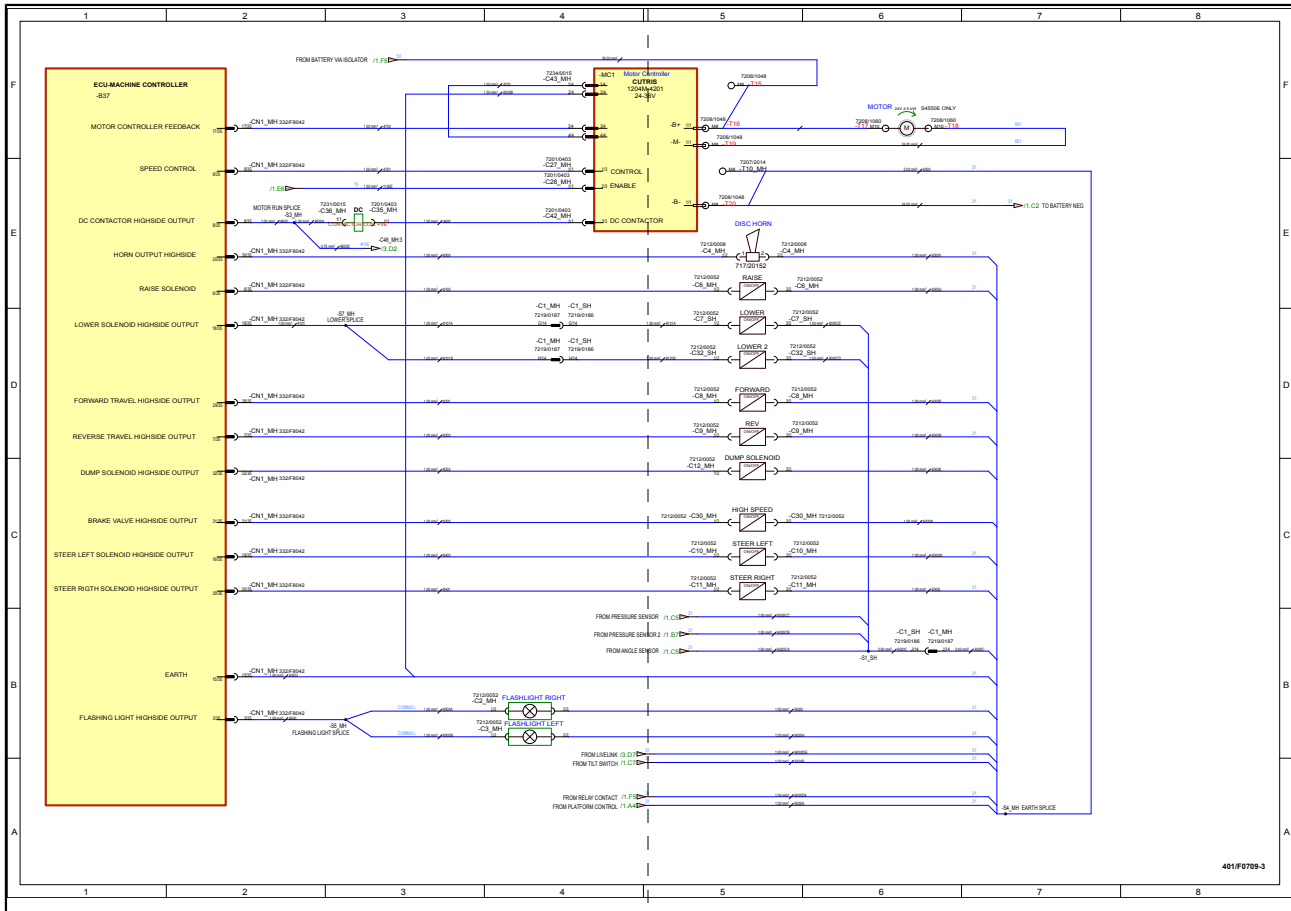
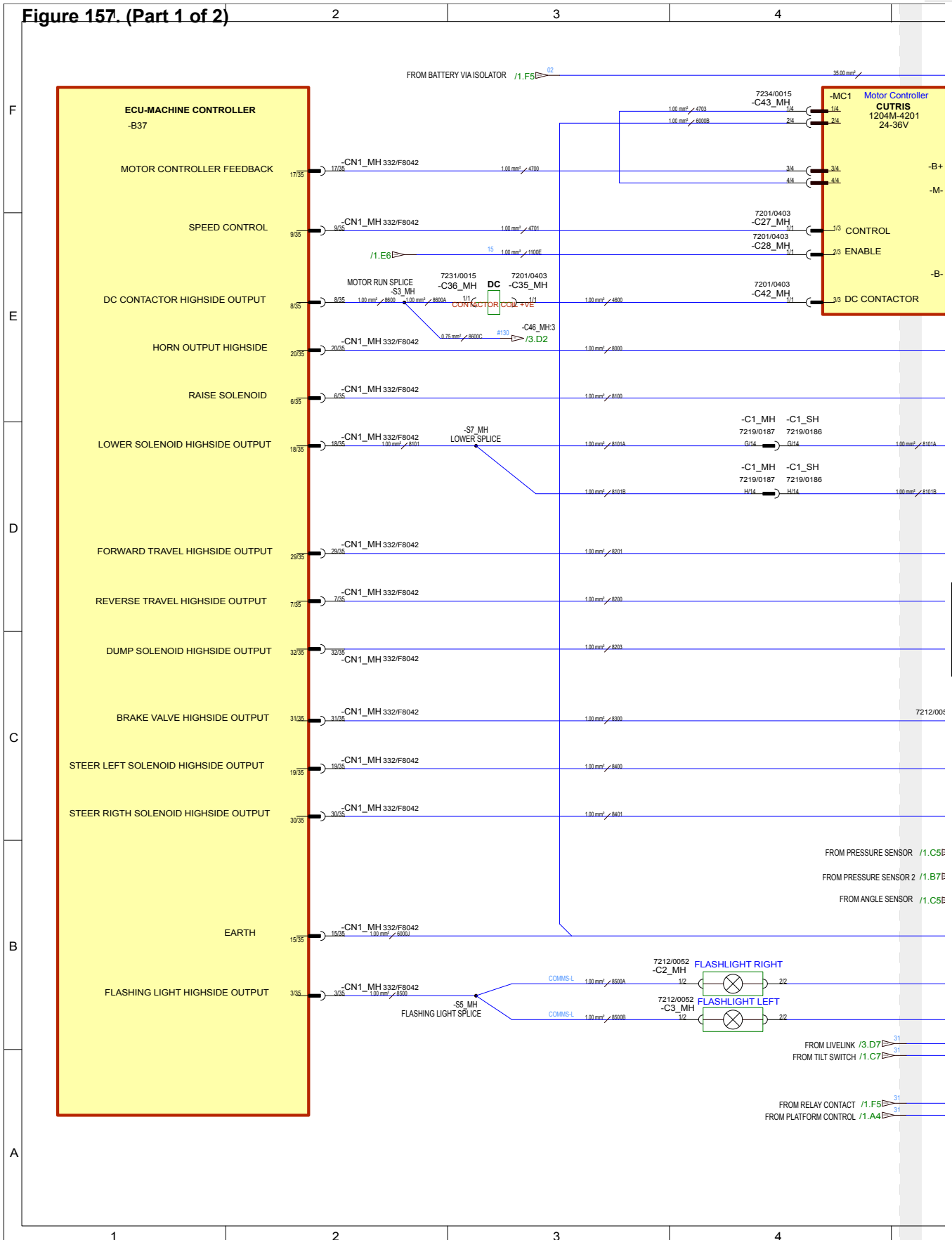


Figure 157. (Part 1 of 2)



8





33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

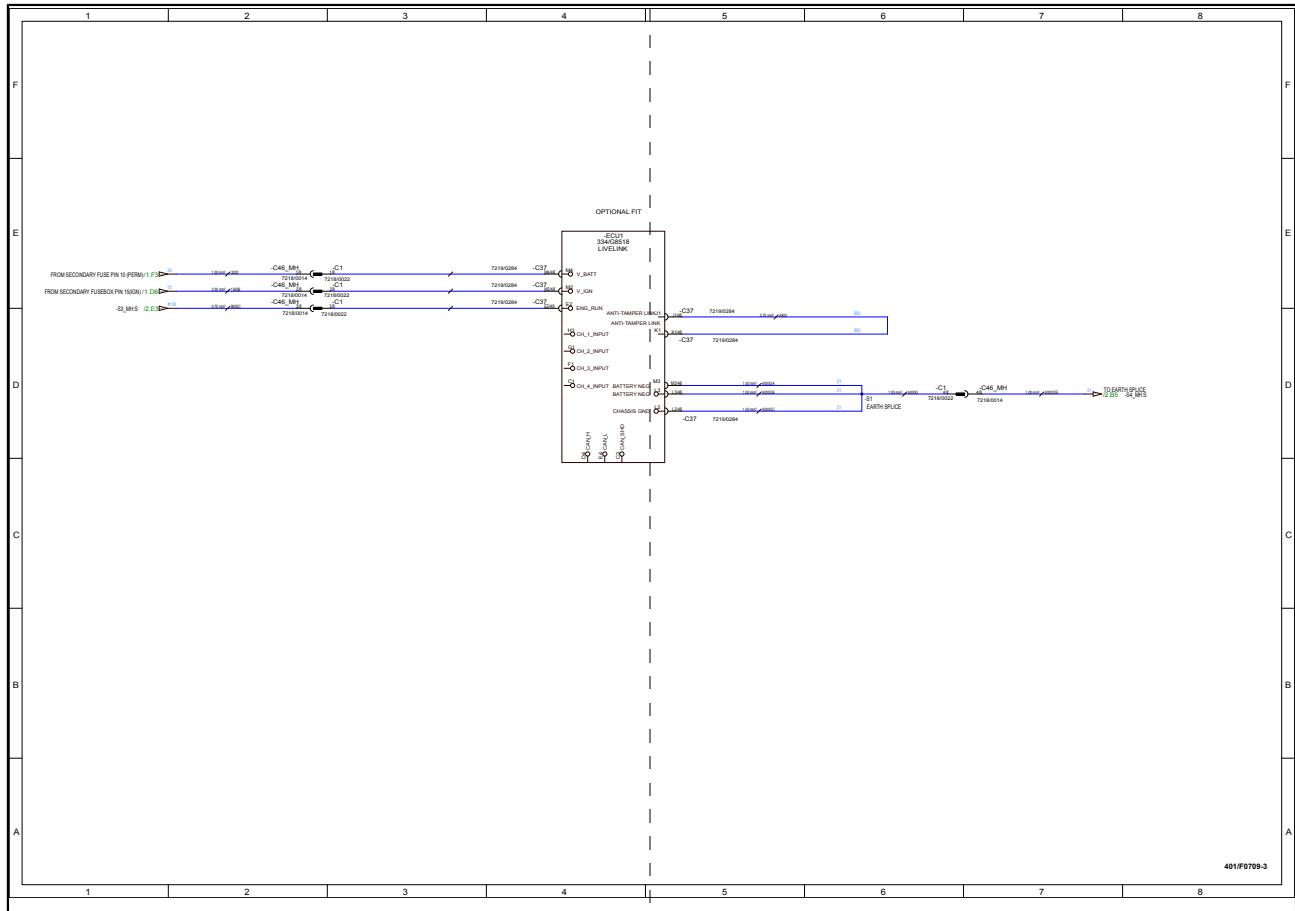
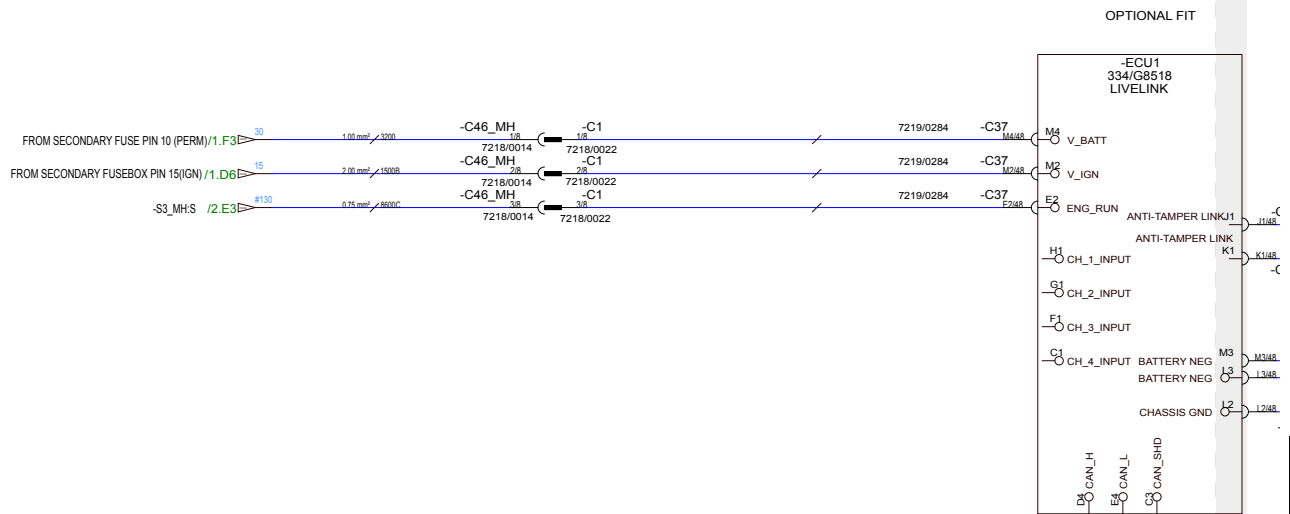


Figure 158. (Part 1 of 2)





33 - Electrical System

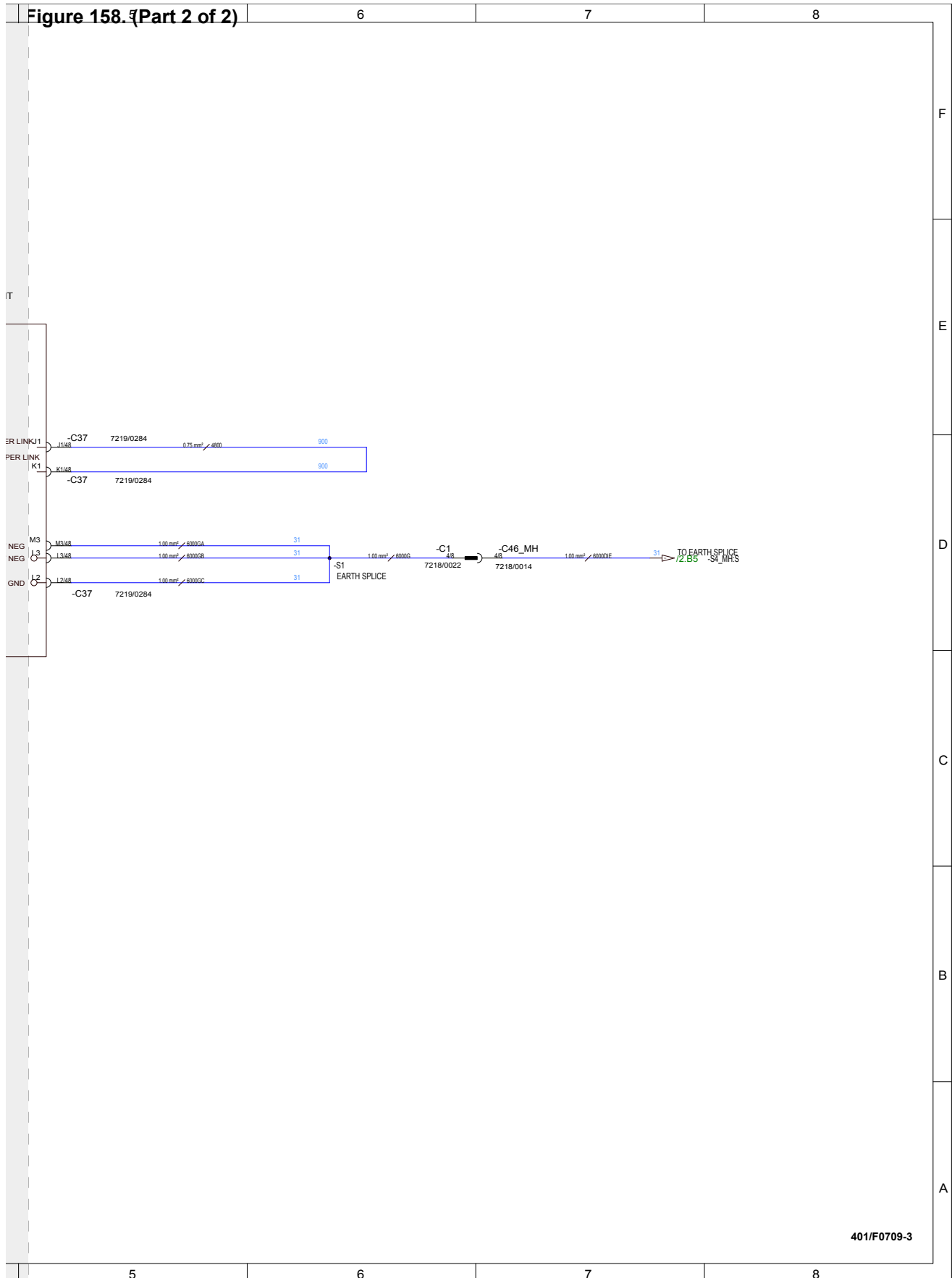
00 - Electrical System

50 - Schematic Circuit

Page
33-104

Page
33-105

Figure 158. (Part 2 of 2)



Page 33-104



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

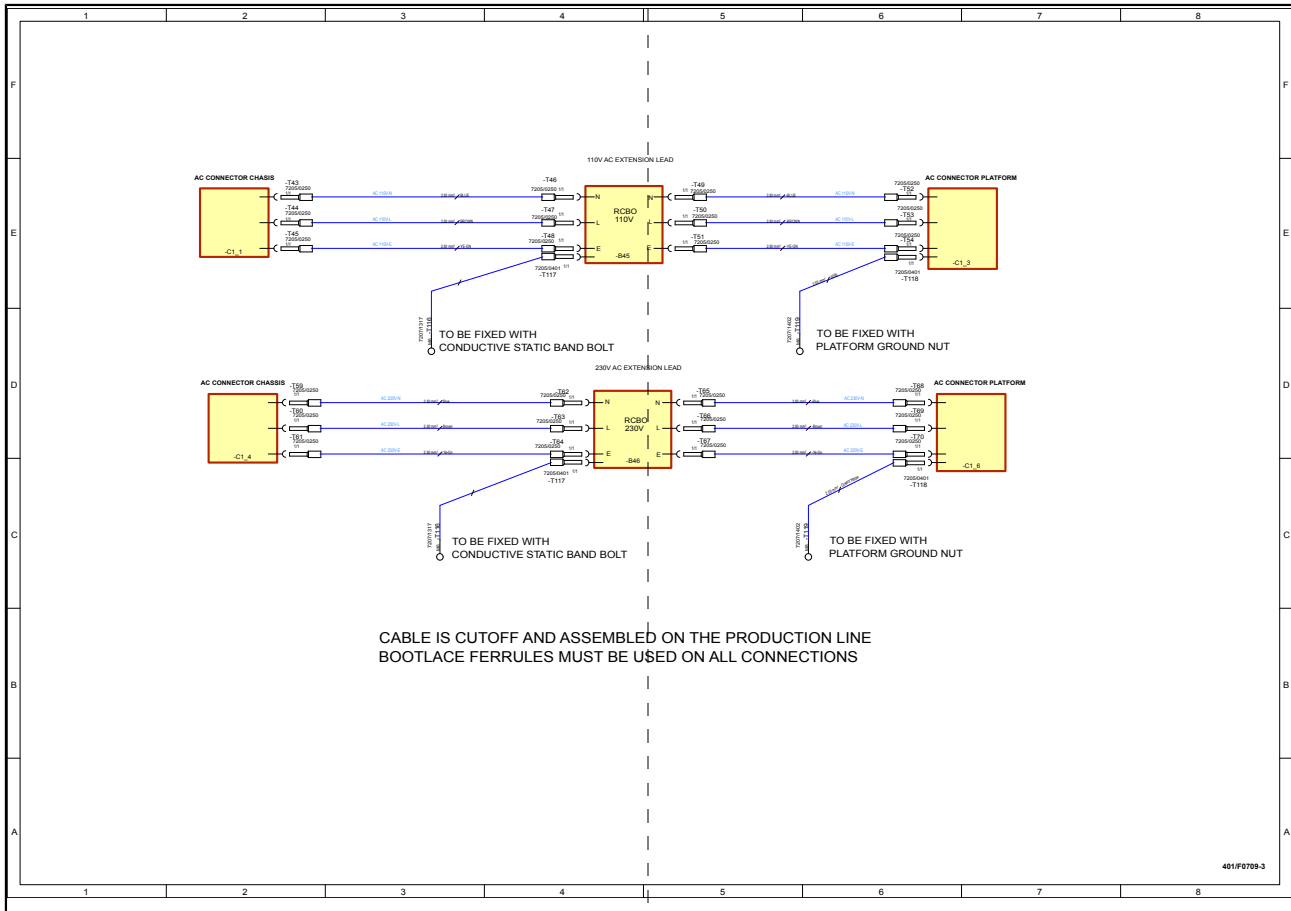
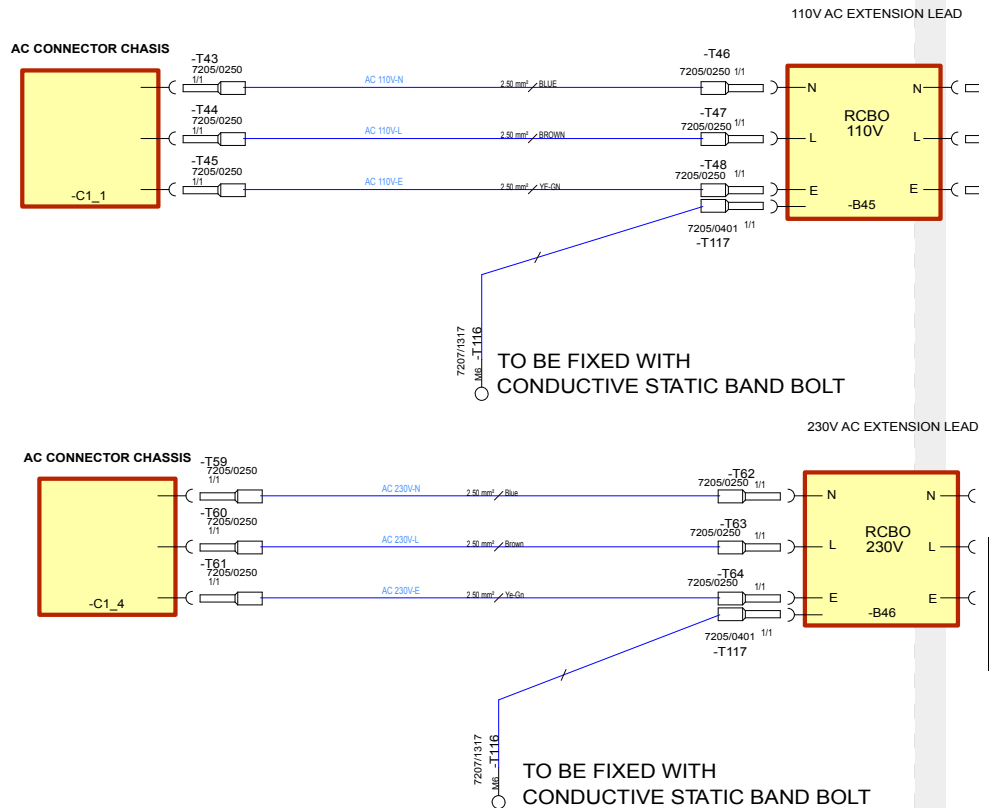
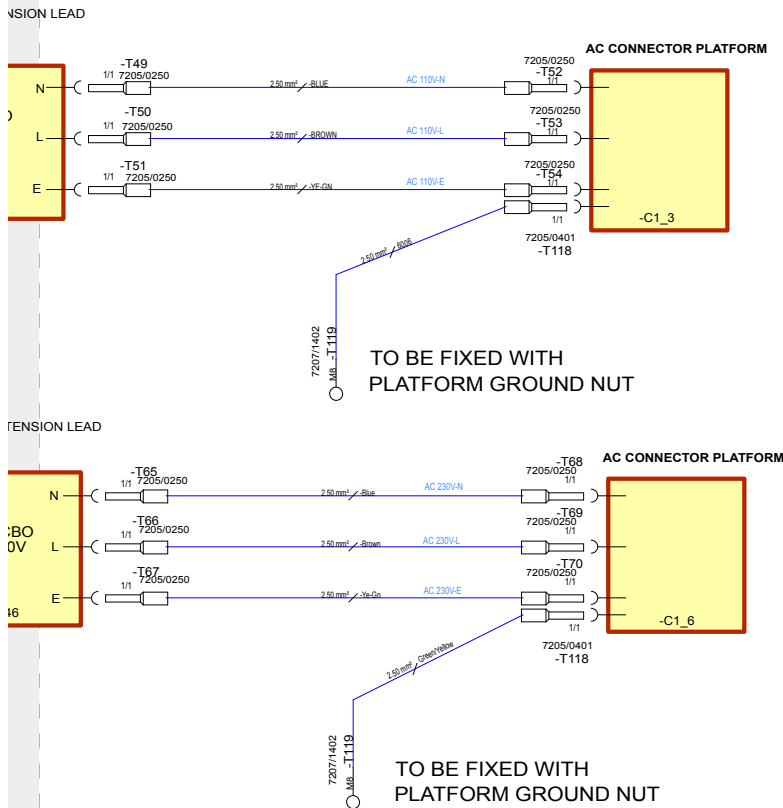


Figure 159. (Part 1 of 2)



CABLE IS CUTOFF AND ASSEMBLED ON
BOOTLACE FERRULES MUST BE USED

Figure 159. (Part 2 of 2)



USED ON THE PRODUCTION LINE
USED ON ALL CONNECTIONS

401/F0709-3



33 - Electrical System

00 - Electrical System

50 - Schematic Circuit

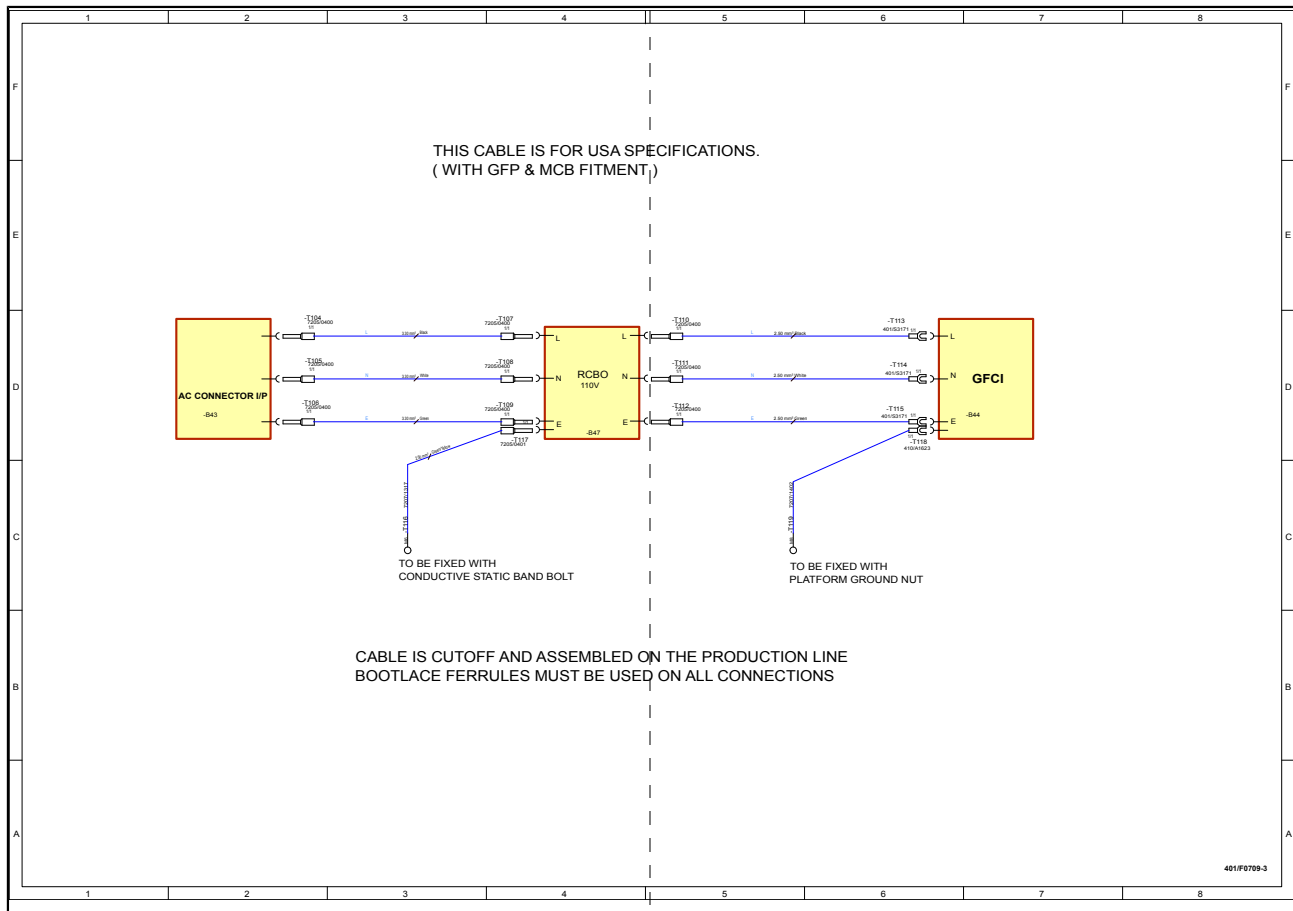


Figure 160. (Part 1 of 2)

2

3

4

F

E

D

C

B

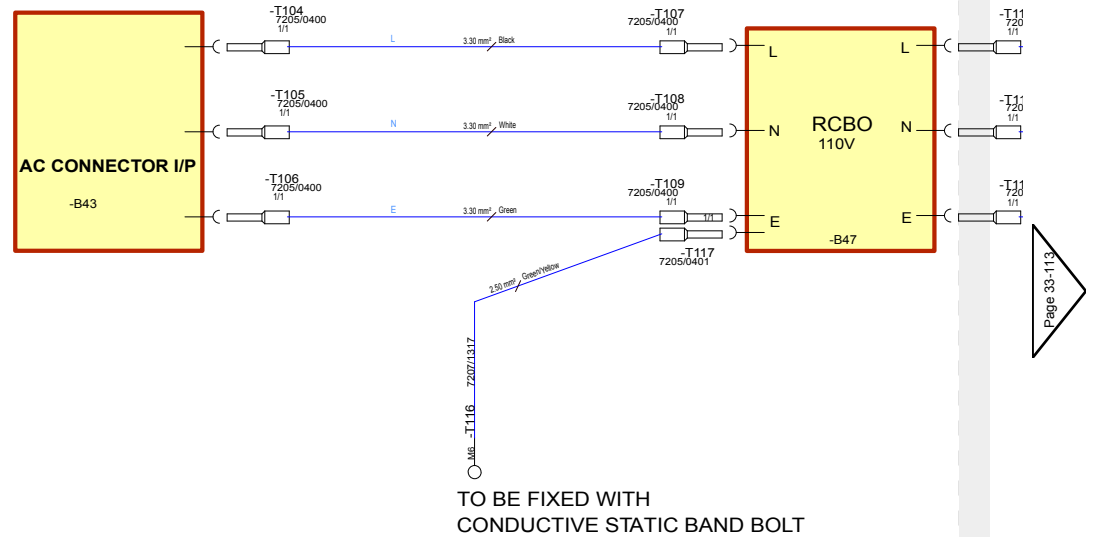
A

1

2

3

4

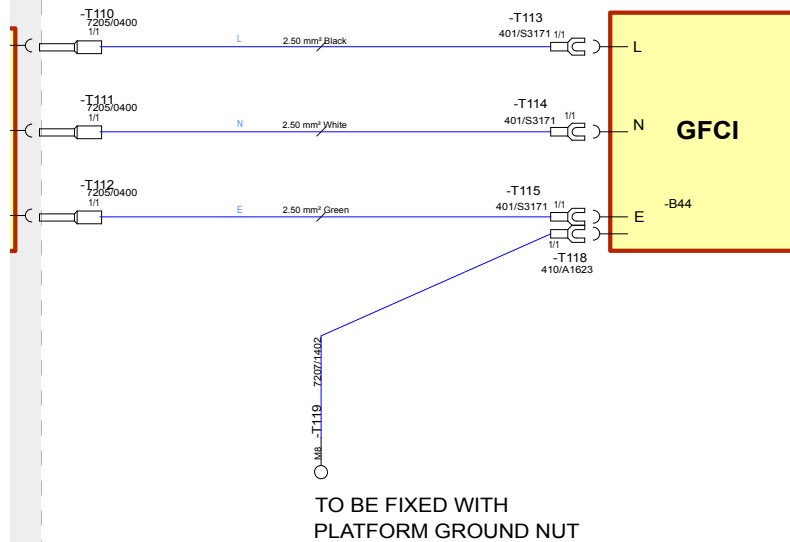


Page 33-113

CABLE IS CUTOFF AND ASSEMBLED ON TH-
BOOTLACE FERRULES MUST BE USED ON

Figure 160. (Part 2 of 2)

PECIFICATIONS.
(T)



ON THE PRODUCTION LINE
ED ON ALL CONNECTIONS

401/F0709-3



03 - Battery

Contents

Page No.

33-03-00 General	33-115
------------------------	--------

00 - General

Introduction	33-115
Health and Safety	33-116
Component Identification	33-116
Disconnect and Connect	33-117
Drain and Fill	33-119
Clean	33-120
Check (Condition)	33-121
Check (Level)	33-123
Remove and Install	33-128
Store and Recommission	33-128

Introduction

For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ] Page 33-115
For: S4046E [RAJ], S4550E [RAJ] Page 33-115

(For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ])

The machine has four separate 6V batteries connected in series to give out 24V.

The batteries installed on these machines are deep-cycle flooded batteries (wet). In the flooded type batteries, the electrolyte is a solution of sulphuric acid and water than can spill out if the battery is tipped over.

The batteries are used to drive the electric motor and the control unit which drives the hydraulic pump to provide the required hydraulic power for machine operation.

The batteries are charged with a battery charger installed on the machine through an external power supply.

The battery technical data is given in the Electrical System, Technical Data. [Refer to: PIL 33-00-00.](#)

(For: S4046E [RAJ], S4550E [RAJ])

The machine has four separate 12V connected in series/parallel to give out 24V.

The batteries installed on these machines are deep-cycle flooded batteries (wet). In the flooded type batteries, the electrolyte is a solution of sulphuric acid and water than can spill out if the battery is tipped over.

The batteries are used to drive the electric motor and the control unit which drives the hydraulic pump to provide the required hydraulic power for machine operation.

The batteries are charged with a battery charger installed on the machine through an external power supply.

The battery technical data is given in the Electrical System, Technical Data. [Refer to: PIL 33-00-00.](#)

Health and Safety

⚠ DANGER Batteries give off an explosive gas. Do not smoke when handling or working on the battery. Keep the battery away from sparks and flames.

Battery electrolyte contains sulphuric acid. It can burn you if it touches your skin or eyes. Wear goggles. Handle the battery carefully to prevent spillage. Keep metallic items (watches, rings, zips etc) away from the battery terminals. Such items could short the terminals and burn you.

Set all switches to off before disconnecting and connecting the battery. When disconnecting the battery, take off the earth (-) lead first.

When reconnecting, attach the positive (+) lead first.

WARNING Battery electrolyte is toxic and corrosive. Do not breathe the gases given off by the battery. Keep the electrolyte away from your clothes, skin, mouth and eyes. Wear safety glasses.

WARNING Do not top the battery up with acid. The electrolyte could boil out and burn you.

CAUTION Understand the electrical circuit before connecting or disconnecting an electrical component. A wrong connection can cause injury and/or damage.

Notice: Do not disconnect the battery while the platform is in operation, otherwise the electrical circuits may be damaged.

DANGER If you try to charge a frozen battery, the battery could explode. Do not use a battery if its electrolyte is frozen. To prevent the battery electrolyte from freezing, keep the battery at full charge.

CAUTION Damaged or spent batteries and any residue from fires or spillage must be put in a suitable closed receptacle and must be disposed of in accordance with local environmental waste regulations.

Notice: Before carrying out arc welding on the machine, disconnect the battery to protect the circuits and components. The battery must still be disconnected even if a battery isolator is installed.

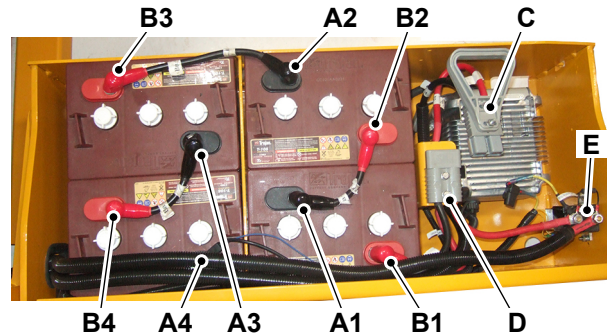
WARNING The batteries remain live even when the isolator key is removed.

WARNING You could get killed or injured if you touch the Battery positive and Battery negative terminals of the motor controller. The controller is installed with energy storing devices (capacitors). You must discharge the controller before you remove or install.

Component Identification

Make a note that the illustration shows a typical 6V battery layout for reference. The 12V battery layout will look different.

Figure 161.



- A1** Negative cable - Battery 1
- A2** Negative cable - Battery 2
- A3** Negative cable - Battery 3
- A4** Negative cable - Battery 4
- B1** Positive cable - Battery 1
- B2** Positive cable - Battery 2
- B3** Positive cable - Battery 3
- B4** Positive cable - Battery 4
- C** Battery quick disconnect handle
- D** Battery quick disconnect coupling
- E** DC (Direct Current) contactor

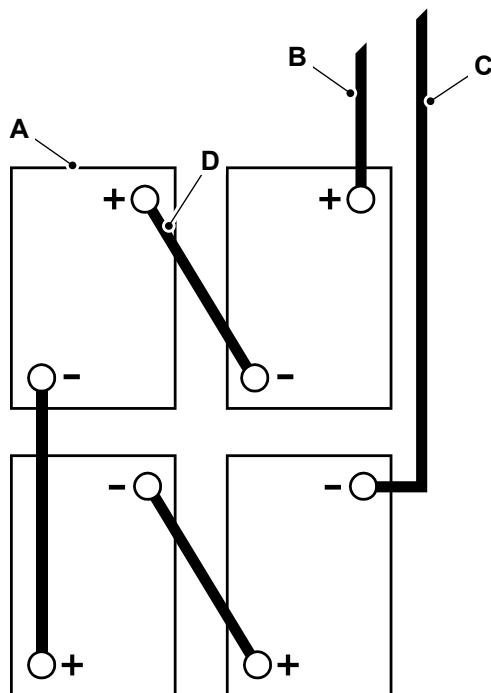
Disconnect and Connect

Make sure you connect the batteries correctly for your machine.

Disconnect

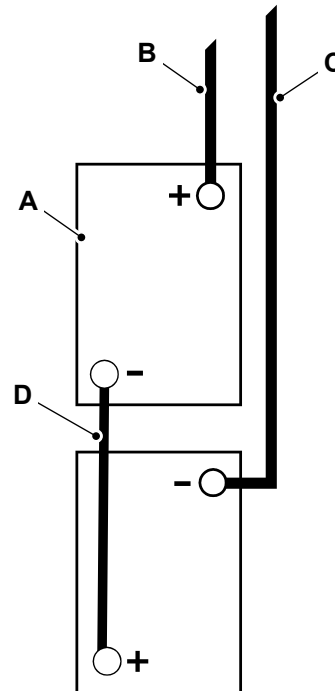
1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Open the battery compartment cover.
[Refer to: PIL 06-06-03.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Disconnect the battery negative lead first.
5. Disconnect the battery positive lead and store away from the batteries.
6. Disconnect and remove the battery link leads.

Figure 162. Typical Battery Series Connection (Four batteries)



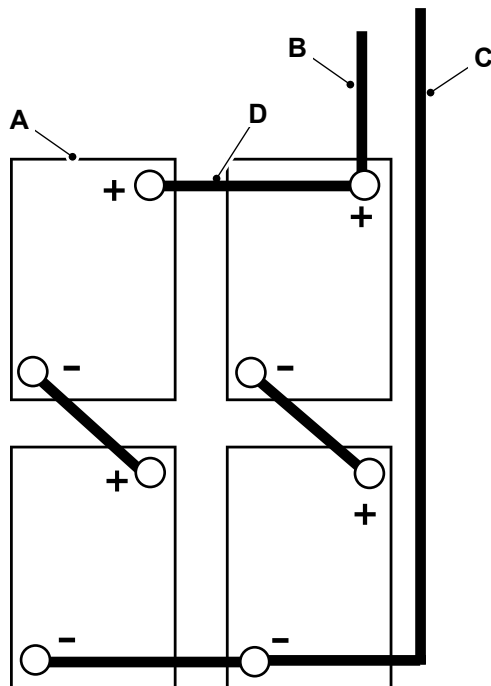
- A Battery (x4)
B Battery negative lead
C Battery positive lead
D Battery link leads (x3)

Figure 163. Typical Battery Series Connection (Two batteries)



- A Battery (x4)
B Battery negative lead
C Battery positive lead
D Battery link leads (x3)

Figure 164. Typical Battery Series-Parallel Connection

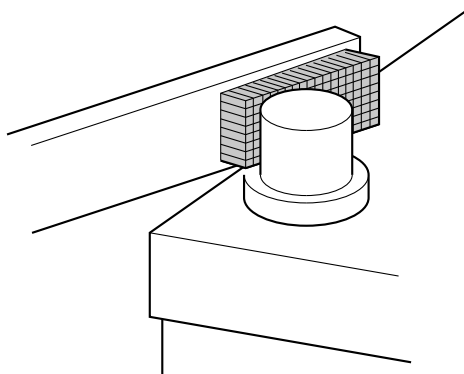


- A Battery (x4)
- B Battery negative lead
- C Battery positive lead
- D Battery link leads (x3)

Connect

1. Check the battery as follows:
 - 1.1. If any terminals are dirty, clean them.
 - 1.2. If the terminal is corroded and has white powder, wash the terminal with hot water. Make sure the water does not enter the battery cells.
 - 1.3. If considerable corrosion is found, then clean with a wire brush or abrasive paper. Make sure you use eye and hand protection. Refer to Figure 165.

Figure 165.



- 1.4. After cleaning, apply a thin coat of petroleum jelly to the terminals.

2. If necessary, fill the distilled water.
3. Connect the leads.
 - 3.1. First connect the link leads.
 - 3.2. Connect the positive battery lead.
 - 3.3. Finally connect the negative battery lead.
4. Tighten the battery terminal nuts to the correct torque value.
5. Connect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
6. Close the battery compartment cover.
[Refer to: PIL 06-06-03.](#)

Table 83. Torque Values

Item	Description	Nm
E	Battery terminal nut	35 ± 3

Drain and Fill

Important: It is not recommended to drain batteries installed on these machines.

Make a note of the following.

- Only flooded type batteries need water.
- You must add distilled water at the right time and in the right amount. If you do not do this, it will affect the performance and life of the battery.
- You must add distilled water only after the battery is fully charged.
- There should be enough water to cover the plates, before you charge the battery. If the battery is discharged (partially or fully), the water level should also be above the plates.
- It is recommended that the batteries must be checked daily.
- Do not allow the plates to get exposed to air. This will damage (corrode) the plates.
- Do not fill the water level in the filling well to the cap. This will cause the battery to overflow acid.
- Do not use water with a high mineral content. Use distilled or deionized water only.

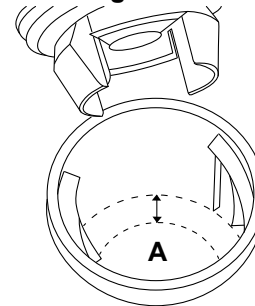
Adding Liquid

Obey all battery health and safety information. [Refer to: PIL 33-03-00.](#)

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Open the battery compartment cover.
[Refer to: PIL 06-06-03.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Remove the vent caps.
5. Check the electrolyte level.
 - 5.1. The minimum level is at the top of the plates.
 - 5.2. If necessary, add just enough distilled water to cover the plates at this time.
6. Install the vent caps.
7. Top up the batteries before you put them for charging.
8. Remove the vent caps.
9. Add water until the electrolyte level is below the bottom of the fill well by the specified value.
Distance: 3.175mm

- 9.1. If necessary, use a piece of rubber as a dipstick to determine this level.

Figure 166.



A Electrolyte level (3.175mm)

10. Clean the vent caps.
11. Install the vent caps.

Clean

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Open the battery compartment cover.
[Refer to: PIL 06-06-03.](#)
3. If installed, make sure that all vent caps are tightly installed.
4. Make sure that you do not touch both battery terminals at the same time.
5. Clean the battery top with a cloth or brush. Use a solution of baking soda and water as required for wiping only.
6. Do not allow any cleaning solution or other foreign matter to get inside the battery.
7. Wipe the battery with damp cloth.
8. Dry the battery with a clean cloth.
9. Disconnect the battery terminals.
10. Clean the battery terminals.
11. Clean the inside of the cable clamps with a post and clamp cleaner.
12. Clean the terminal to have a bright metallic shine.
13. Connect the clamps to the terminals.
14. Apply a thin layer of an anti-corrosive spray or petroleum gel to the battery terminals.
15. Keep the area around batteries clean and dry.
16. Close the battery compartment cover.
[Refer to: PIL 06-06-03.](#)

Check (Condition)

Special Tools

Description	Part No.	Qty.
Meter (hydrometer)	333/H5664	1

Visual Inspection

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Open the battery compartment cover.
[Refer to: PIL 06-06-03.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Check the condition of the outside appearance of the battery.
 - 4.1. Look for cracks in the battery shell and the battery cover.
 - 4.2. Make sure that the top of the battery, battery posts and connections are clean, free of dirt, fluids and corrosion.
 - 4.3. Repair or replace any damaged batteries as required.
5. Make a note that any fluids on or around the battery is an indication that electrolyte is spilling, leaching or leaking out. Replace or repair the leaking batteries as required.
6. Check the condition of all battery cables and their connections.
 - 6.1. Look closely for loose or damaged parts.
 - 6.2. Make sure that all battery cables are intact. Make a note that broken or damaged cables are extremely hazardous.
 - 6.3. Replace any cable that is damaged.
7. Tighten all the wiring connections to the correct torque values.
 - 7.1. Make sure that there is a good contact with the terminals.

Specific Gravity Test

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Open the battery compartment cover.
[Refer to: PIL 06-06-03.](#)

3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Remove the battery vent caps.
5. Do not add water at this time.
6. Fill and drain the hydrometer 2 to 4 times before you pull out a sample.
[Special Tool: Meter \(hydrometer\) \(Qty.: 1\)](#)
7. Make sure that there is enough sample electrolyte in the hydrometer to completely support the float.
8. Make a note of the reading on the Hydrometer. Return the electrolyte back to the cell.
9. Do the step 6 to step 8 for each cell of the battery.
10. Install the battery vent caps. Wipe off any spilled electrolyte.
11. Correct the readings to ambient temperature. Refer to Table 84.
12. Check the state of charge with reference to the table. Refer to Table 84.
 - 12.1. Make sure that the specific gravity reading is as specified. 1.277 +/- 0.007
13. If any specific gravity reading is low, do the following.
 - 13.1. Check and record voltage levels.
 - 13.2. Put the battery on a complete charge.
[Refer to: PIL 33-03-00.](#)
 - 13.3. Take specific gravity readings again.
14. If any specific gravity reading is low, do the battery equalizing procedure.

Open Circuit Voltage Test

For accurate voltage readings, batteries must remain idle (no charging, no discharging) for at least 6h, preferably 24h.

1. Disconnect all loads from the batteries.
2. Measure the voltage with a DC voltmeter.
3. Check the state of charge. Refer to Table 84.
4. Charge the battery if it reads 0% to 70% charged.

Table 84. State of Charge at 20 degrees C

Percentage of Charge	Specific Gravity (Corrected) ^(1, 2)	Open Circuit Voltage	
		6V battery	12V battery
100	1.277	6.37V	12.73V
90	1.258	6.31V	12.62V
80	1.238	6.25V	12.5V
70	1.217	6.19V	12.37V
60	1.195	6.12V	12.27V
50	1.172	6.02V	12.1V
40	1.148	5.98V	11.89V
30	1.124	5.91V	11.81V
20	1.098	5.83V	11.66V
10	1.073	5.75V	11.51V

(1) Add 0.004 to readings for every 5.6°C (42.1°F) above charge temperature.

(2) Subtract 0.004 from readings for every 5.6°C (42.1°F) below charge temperature.

Check (Level)

▲ WARNING Do not connect the charger when the batteries are not connected. Doing so could result in danger of live terminals from the charger.

Do not carry out maintenance on a machine whilst the charger is connected to an external power supply (i.e. do not work on a live machine). Cables from the charger to the batteries may remain live even if the batteries are disconnected/removed from the machine. There is a risk of serious electrical shock.

Always disconnect all external power supplies to the machine before carrying out maintenance.

Electrolyte checks must be done to check state of the battery.

To check the battery state of charge:

1. Disconnect the isolator.

2. Ensure the charger is not connected to an external power supply.

3. Measure the voltage across the battery terminals.

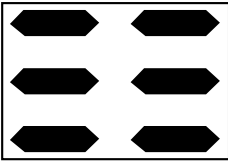
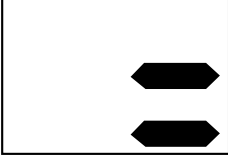
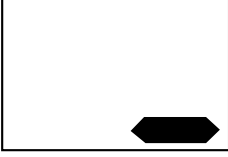
The battery state of charge can also be read from the charger display when the machine is on charge. Refer to Figure 168.

An approximate charge level of the battery is shown on the platform controller. Refer to Table 85.

When the charge level of the batteries is about 20%, the battery must be charged. Never let the battery fully discharge before charging.

When the battery voltage is low, select tortoise speed mode and drive at slowly/half throttle to a charge location.

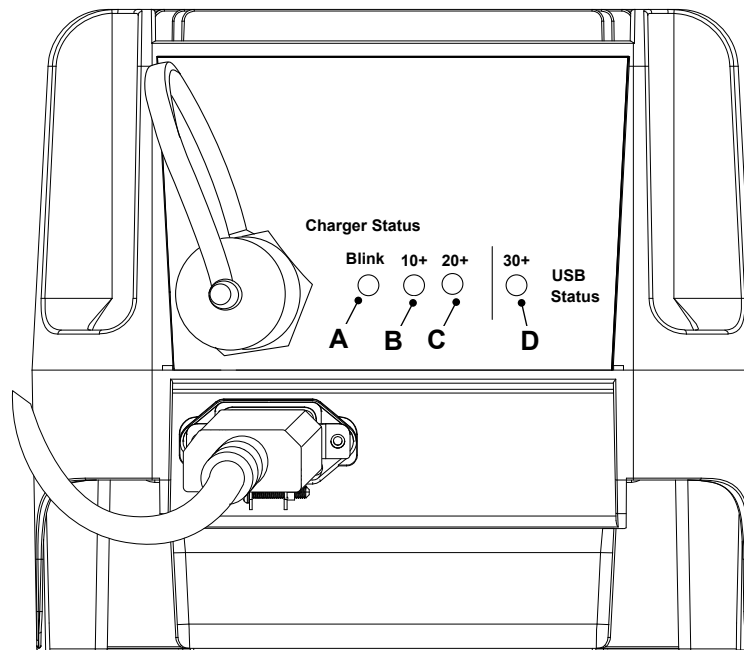
Table 85. Platform Control Display

	Fully charged
	50%
	Battery low - Suggest battery charge.
	Battery too low - charge battery immediately.

Charge the Battery

When charging the batteries, refer to the battery charger display to view the charge status of the batteries. Refer to Figure 167.

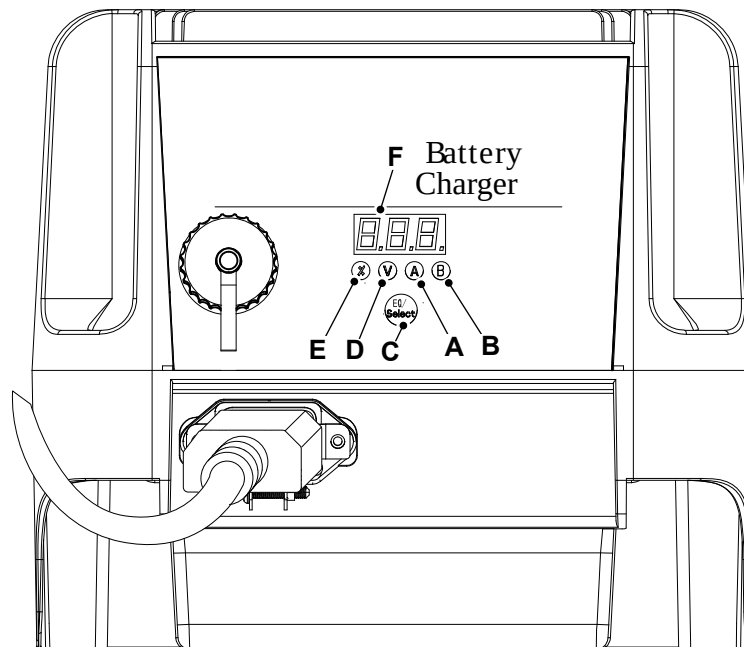
Figure 167. Variant 1



A 50%
C 100%

B 70%
D USB (Universal Serial Bus) status

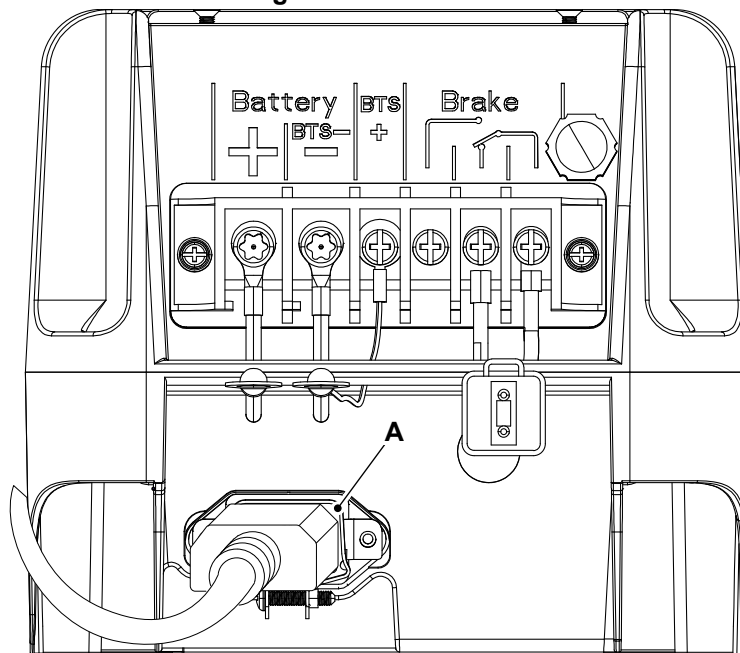
Figure 168. Variant 2



A Charging Current Indicator
C EQ / Select Button
E Capacity Percentage Indicator

B Battery Voltage Indicator
D Charging Voltage Indicator
F Digital Display

Figure 169. Variant 3



A AC (Alternating Current) input socket

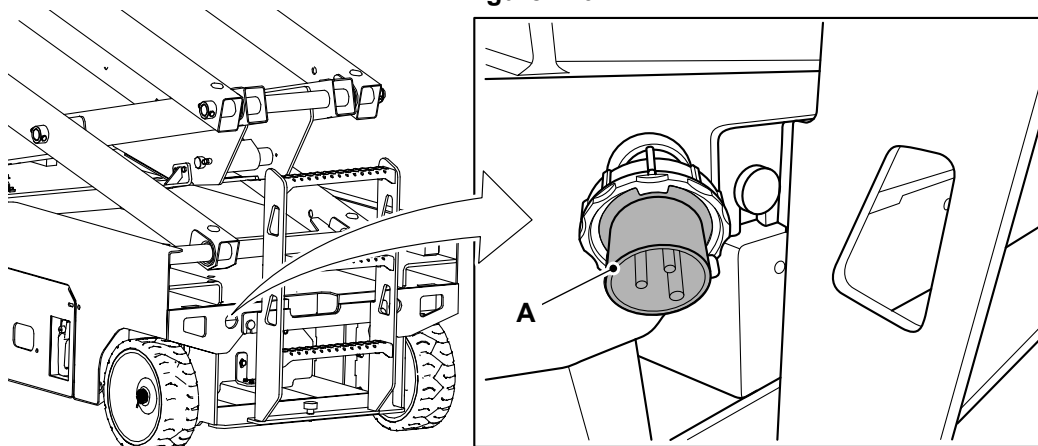
Make a note that the variant 2 charger has the AC input socket located on front side under the USB port, for variant 3 chargers the AC input socket is located on rear side of the charger.

Only use the original charger installed to the machine with the original batteries. Charge the battery in a well ventilated place. Use an appropriate grounded industrial power supply with the correct AC input voltage to charge.

1. Make sure the battery is properly connected before charging. Check the terminal connections are tight.

2. Remove the ventilation cap and check the electrolyte level is above the polar plate. Replenish with distilled water if required. Do not overfill. Install the ventilation cap.
3. Connect the charger to the AC supply. Refer to Figure 170.
4. When disconnecting the charger make sure that the cable is not pulled or damaged. Hold both the ends of connector when removing.

Figure 170.



A Battery charging socket

Battery and power to platform connectors may be mounted rigidly in the mounting holes or hung loose with their cables according to configuration.

According to the territories different types of plugs are used on the machine. Refer to Table 86.

Table 86.

Region	Voltage	Color of Plug	Plug Specification	Plug Image
Europe/India	230V	Blue	230 IEC Industrial Plug	
USA	110V	Yellow	110 NEMA5 15P Plug	
UK	110V	Yellow	110 IEC Industrial Plug	

Fault Indicator

For variant 1 charger, when a fault occurs, all three battery charge indicator LED (Light Emitting Diode)s will blink at the same time. Refer to Table 87.

For variant 2 and 3 charger, when a fault occurs, an error code will be displayed on LED screen. Refer to Table 88.

Table 87. (For variant 1)

Blinking Frequency	Cause	Remedy
1	The battery is not connected or the battery voltage is too low	No charging at the time or the individual battery voltage is less than 4V. Remove the battery and charge with 6V battery charger.
2	Abnormal AC Power Input (Voltage)	Check AC input cord is connected between charger and AC outlet. Make sure AC plug is tightly secured into the AC outlet and connected to charger correctly.
3	Charger High Temperature Protection	Charger shuts down and goes into protection mode due to charger / environmental temperature too high for charger to function properly. Place the charger into an area with ambient air flow or to a cooler place. Disconnect the charger and wait for 15–20min before reconnecting it for charging.

Blinking Frequency	Cause	Remedy
4	Battery High Temperature Protection	Charger will reduce or even stop charging when the battery temperature exceeds 50°C (121.9°F). This is to protect the battery from overheating. Disconnect the charger and wait for 15–20min before reconnecting it for charging.
5	Output Current is too large	Contact JCB dealer for repair.
6	Battery Voltage is too high (>28.5V)	Contact JCB dealer.
7	Battery Voltage is too low (<17.5V)	Check and make sure that the correct output battery voltage is connected. (The charger keeps charging normally even though the battery voltage is more than 4V.)

Table 88. (For variant 2 and 3)

Error code	Cause	Remedy
E01 bAt	The battery is not connected or the battery voltage is too low	No charging at the time or the individual battery voltage is less than 4V. Remove the battery and charge with 6V battery charger.
E02 AC	Abnormal AC Power Input (Voltage)	Check AC input cord is connected between charger and AC outlet. Make sure AC plug is tightly secured into the AC outlet and connected to charger correctly.
E03 Hot	Charger High Temperature Protection	Charger shuts down and goes into protection mode due to charger / environmental temperature too high for charger to function properly. Place the charger into an area with ambient air flow or to a cooler place. Disconnect the charger and wait for 15–20min before reconnecting it for charging.
E04 bAt	Battery High Temperature Protection	Charger will reduce or even stop charging when the battery temperature exceeds 50°C (121.9°F). This is to protect the battery from overheating. Disconnect the charger and wait for 15–20min before reconnecting it for charging.
E06 bAt	Battery Voltage is too high (>28.5V)	Contact JCB dealer.

Remove and Install

Special Tools

Description	Part No.	Qty.
6V Battery Lifting Tool	400/J3606	1
12V Battery Lifting Tool	400/K9854	2

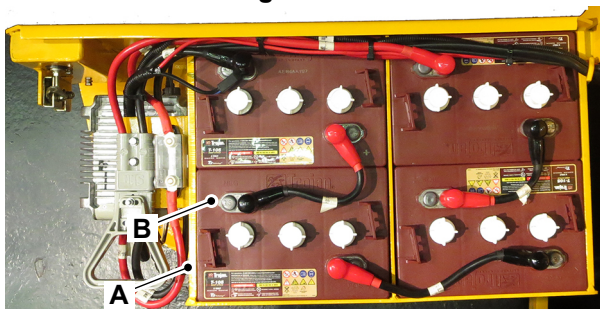
⚠ CAUTION This component is heavy. It must only be removed or handled using a suitable lifting method and device.

Observe all the battery health and safety information.
[Refer to: PIL 33-03-00.](#)

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Open the battery compartment cover.
[Refer to: PIL 06-06-03.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Disconnect the batteries.
[Refer to: PIL 33-03-00.](#)
5. Move the battery cables out of the way to allow access to remove the relevant battery.
6. Use the battery lifting tool to carefully remove the battery from the machine.
[Special Tool: 6V Battery Lifting Tool \(Qty.: 1\)](#)
[Special Tool: 12V Battery Lifting Tool \(Qty.: 2\)](#)
 - 6.1. Make a note that two persons are required to lift the battery.

Figure 171.



- A** Battery compartment
B Battery (x4)

Install

1. The installation procedure is the opposite of the removal procedure.

Store and Recommission

Do not keep a lead acid battery inactive for a long period of time.

Make sure that the lead acid battery stays healthy and is ready for use at the time of storage.

It is fine if you charge, store, or operate the lead acid battery on a concrete base.

Things to Avoid

Freezing

Avoid the storage of a lead acid battery, where freezing temperatures are expected.

Put a battery at a high state of charge to prevent freezing. Freezing results in damage to a battery's plates and container.

Heat

Avoid direct exposure to heat sources, such as radiators or space heaters.

Temperatures above 26.6°C (79.8°F) accelerate the battery's self-discharge characteristics.

Step by Step Storage

1. Charge the battery fully before storage.
2. Store the battery in a cool, dry location, protected from the elements.
3. At the time of storage monitor the specific gravity (flooded) or voltage.
4. Batteries in storage should be given a boost charge when they show a 70% charge or less.
5. Fully charge the battery before use.
6. For optimum performance, equalize the batteries (flooded) before you put them back into service.



04 - Battery Charger

Contents	Page No.
33-04-00 General	33-131



Notes:

00 - General

Introduction	33-131
Technical Data	33-132
Component Identification	33-132
Check (Operation)	33-134
Calibrate	33-136
Charge	33-138
Remove and Install	33-138

Introduction

The battery charger is a device used to force the current through the battery to charge it.

The battery charger installed on this machine is a high efficient (up to 94%) unit and has several built in protection systems as follows.

- High AC (Alternating Current) voltage input.
- Low voltage.
- Short circuit.
- Over current.
- Temperature.
- Reverse connection.
- Charging lock.

This battery charger also has a data logger function. It maintains the data that follows. This data can be transferred to and from a USB (Universal Serial Bus) stick.

- Dates and times.
- Input voltage.
- Start and end voltage.
- Battery temperature.

Equalization

The battery charger will automatically equalize the batteries every 30 days. During this mode, the batteries will be charged at a higher voltage for a longer period than usual. A higher level of gas is expected to be emitted compared to the normal charge cycle. This is normal and non-configurable. This helps to maintain optimum battery condition.

Technical Data

Table 89.

Description	Data
DC (Direct Current) Output	
Nominal voltage	24V
Maximum voltage	34V
Maximum power	750W
Maximum current	30A
AC (Alternating Current) Input	
Nominal voltage	110–240V
Input frequency	50–60Hz
Maximum current	8.5A at 110V
Operating temperature	-20–50°C (-4.0–121.9°F)
Storage temperature	-40–70°C (-39.9–157.9°F)

Component Identification

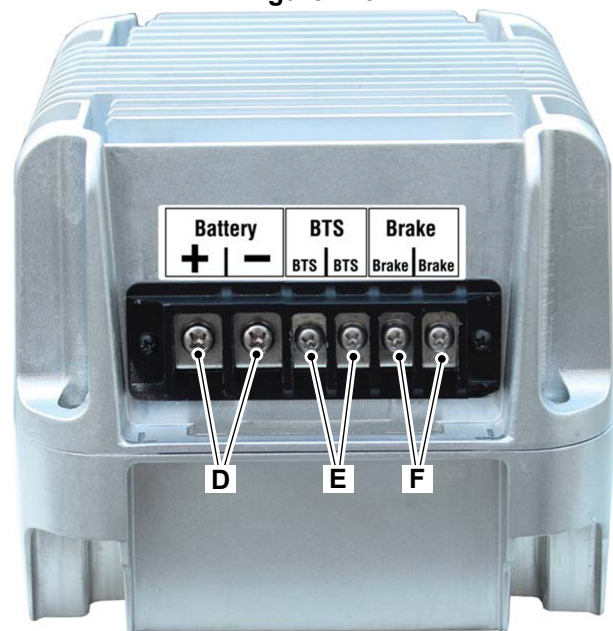
Variant 1

Figure 172.



- A USB (Universal Serial Bus) port
- B LED (Light Emitting Diode) display
- C AC (Alternating Current) input

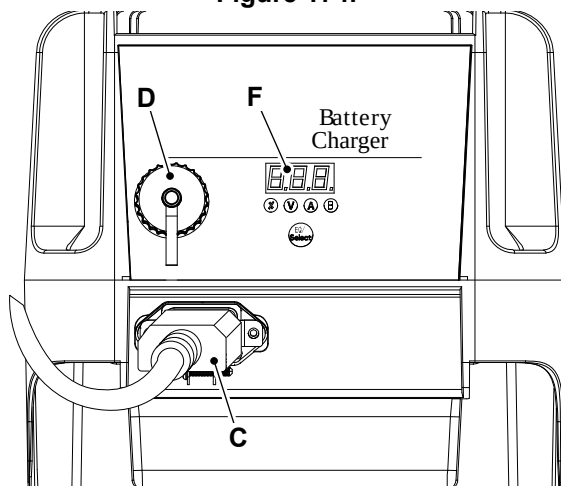
Figure 173.



- D Battery connection
- E BTS (Battery Temperature Sensor) connection
- F Brake cable connection

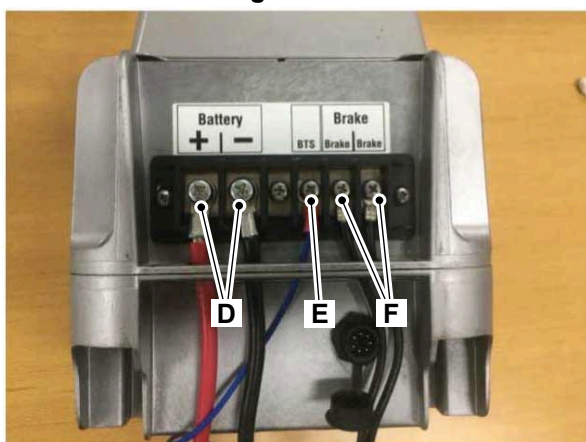
Variant 2

Figure 174.



- C AC input
- D USB port
- F LED display

Figure 175.



- D Battery connection
- E BTS (Battery Temperature Sensor) connection
- F Brake cable connection

Variant 3

Figure 176.



- A USB port (Under the cap)
- B LED display

Figure 177.



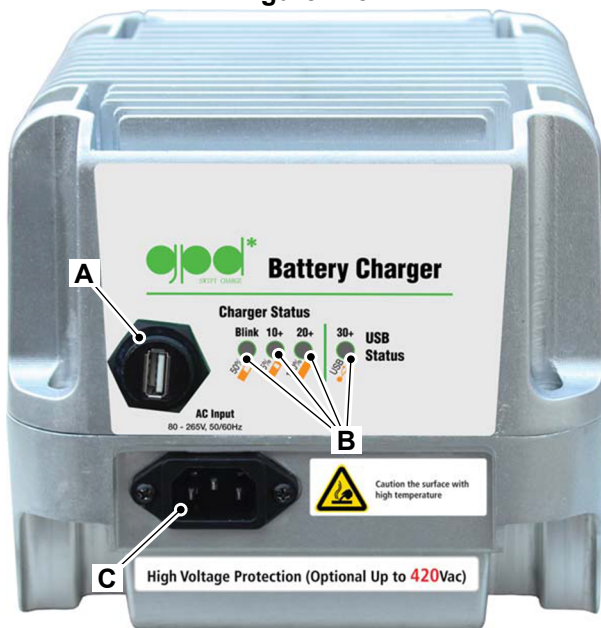
- C AC input

Check (Operation)

1. Do not expose the charger to oil, dirt, mud or direct heavy water spray when cleaning the machine.
2. Check the condition of the input and output wires. If necessary, replace them.
3. Do the following steps when you start charging.
 - 3.1. Connect the charger to battery.
 - 3.2. Connect the charger to AC (Alternating Current) input. The charger will go into charging mode.
4. The charger will show the battery charging status.

For Variant 1

Figure 178.



- A** USB (Universal Serial Bus) port
B LED (Light Emitting Diode) display
C AC input

Table 90.

LED 4 (50%)	LED 3 (75%)	LED 2 (100%)	LED 1 (USB)
Number of blinks	10–19%	20–29%	30–49%

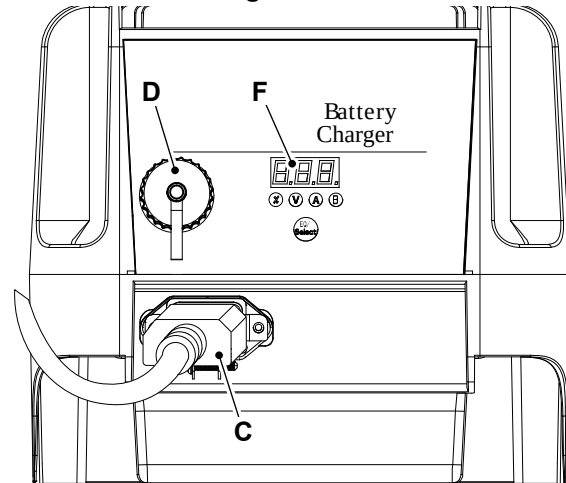
When the charging status is 35% the LED 1 will represent 30% and LED 4 will blink five times to represent 5%. LED 2 and LED 3 will remain OFF.

When the charging status is 18% LED 3 will represent 10% and LED 4 will blink eight times to represent 8%. LED 1 and LED 2 will remain OFF.

For Variant 2

This charger shows the charging status in numerical format on the LED display.

Figure 179.



- C** AC input
D USB port (Under the cap)
F LED display

For Variant 3

This charger shows the charging status in numerical format on the LED display.

Figure 180.



- A** USB port (Under the cap)
B LED display

Figure 181.



Calibrate

Charge Curves and History

The below procedure is the process to extract historic data from the charger and upload new charge curve data to the charger. This allows you to see the charge history through ServiceMaster, and change the charge parameters to control the battery charger. These should only need to be updated if charger is replaced or battery type or size is changed.

To extract data from charger

1. Format the USB (Universal Serial Bus) stick (capacity does not exceed 8GB) to be FAT32.
2. Insert the USB stick to the charger.
3. Wait until the USB status LED (Light Emitting Diode) of charger stops flashing.
 - 3.1. This will download to two files to the USB stick. One file will be saved under a serial number of the charger and other will be PYLODATA.PYL document.
4. If the USB status LED of charger flashes each for specified frequency or specified time, the update work has not completed.

Frequency: 1Hz
Duration: 1s

 - 4.1. The following are the potential reasons.
 - 4.2. Poor contact between the USB and USB port of the charger.
 - 4.3. The USB stick has not been formatted to FAT32.
 - 4.4. The USB stick capacity exceeds 8GB.
5. Take out the USB stick from the charger.
6. Access the charger profile data.
 - 6.1. Open the serial number file in Servicemaster battery history tool. This will tell you the code loaded into the PYLODATA.PYL to the dates they were uploaded.
 - 6.2. Check the excel sheet for correct curves to battery type.

To update the charger profile

1. Format the USB (capacity does not exceed 8GB) to be FAT32.
2. Upload the new PYLODATA.PYL document into root of USB. Refer to Table 91.

3. Insert the USB stick to the charger.
4. Wait until the USB status LED of charger stops flashing.
 - 4.1. This will update the battery charger profile.

Table 91. Battery category and program code contrast

Code	Battery type
1	Trojan Flooded
2	TROJAN T105
3	No
4	Discover AGM
5	US Battery Flooded
6	Trojan 30XHS
7	Trojan T125
8	Trojan J305
9	NO
10	Trojan T145
11	Trojan T1275
12	Discover DGC6A-220D AGM
13	Trojan T605
14	No
15	No
16	Generic 250-335Ah AGM
17	No
18	Trojan T875 flooded
19	US 2000 flooded
20	US 2200 flooded
21	US 250hc flooded
22	No
23	No
24	No
25	Fullriver DC224-6 AGM
26	No
27	No
28	Generic 250-335Ah AGM
29	US. 8VGCXC2 Flooded
30	US. 12VXC2 Flooded
31	US 305XC Flooded
32	US 125 XC2 FLA
33	US 145 XC2 FLA
34	Crown CR - 235 FLA
35	Crown CR - 245 FLA
36	
37	
38	User-defined

Table 92. Charger Profile Applicability

Model/ Option	Charger Profile	Batteries
S1530E	T105 - profile 02	T105
S1930E	T105 - profile 02	T105
S2032E	T105- Profile 02	T105
S2632E	T105 - profile 02	T105
S2646E	T125 - profile B07	T125
S3246E	T125 - profile B07	T125
S4046E	T1275- Profile 11	T1275
S4550E	T1275- Profile B11	T1275

Charge

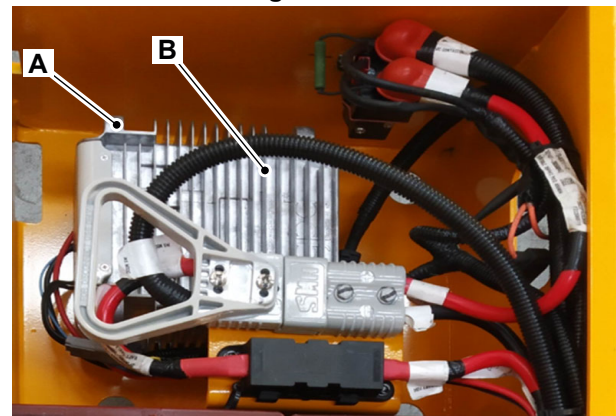
The battery charging procedure is given in the Electrical System, Battery. Refer to [Refer to: PIL 33-03-00](#).

Remove and Install

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27](#).
2. Open the battery compartment cover.
[Refer to: PIL 06-06-03](#).
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00](#).
4. Disconnect the batteries.
[Refer to: PIL 33-03-00](#).
5. Disconnect the charge cable and temperature probe wire from the batteries.
6. Remove the electrical connections from the charger.
7. Remove the screw (x4).
8. Remove the charger from the machine.

Figure 182.



- A** Screw (x4)
- B** Charger

Install

1. The installation procedure is the opposite of the removal procedure.



05 - Battery Quick Disconnect

Contents

Page No.

33-05-00 General	33-141
------------------------	--------



Notes:

00 - General

Introduction	33-141
Disconnect and Connect	33-142

Introduction

The battery quick disconnect connector allows the operator to connect/disconnect the batteries easily and quickly.

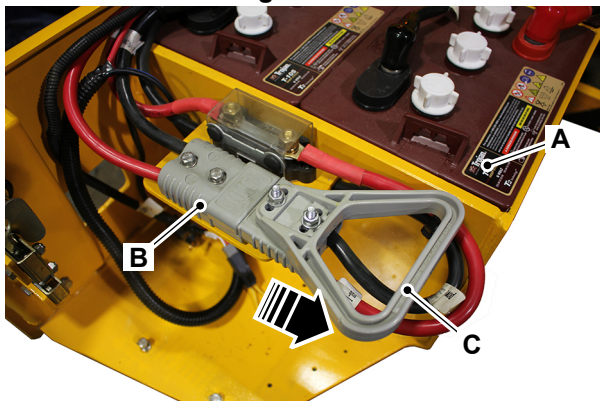
It is a mechanical keyed housing that prevents the accidental mating of the components operating at different voltage levels. It has a flat wiping contact system that allows minimum contact resistance at high current. The wiping action of these connectors also cleans the contact surface during disconnection.

Disconnect and Connect

Disconnect

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Open the battery compartment cover.
[Refer to: PIL 06-06-03.](#)
3. Make sure that all the electrical components are switched off.
4. Pull the battery quick disconnect handle in the direction shown. Refer to Figure 183.
 - 4.1. If necessary, hold the other end of the quick disconnect handle.
 - 4.2. Make sure that the connection/disconnection force is within specified limits.
Force: 150N
5. Remove the primary fuse from the high power fuse box, otherwise the disconnecter will still be live.
6. Remove the nuts and bolts from the fixed end of the battery quick disconnect.
7. Press the tab within the end of the disconnecter to pull the cable out the opposite side.

Figure 183.



- A Battery
- B Battery quick disconnect
- C Handle

Connect

1. The connection procedure is the opposite of the disconnection procedure.



07 - DC Contactor

Contents	Page No.
33-07-00 General	33-145



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction	33-145
Component Identification	33-146
Remove and Install	33-146

Introduction

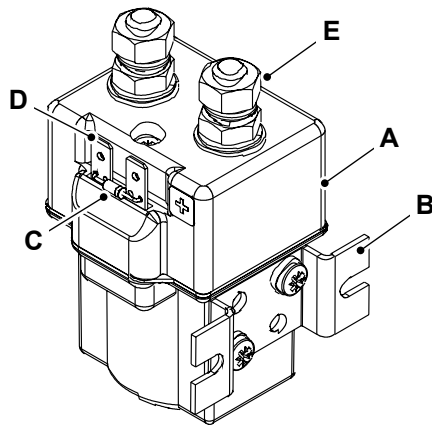
The DC (Direct Current) contactor is part of the safety functions. It works like a large relay. It cuts high power to the pump motor ECU (Electronic Control Unit) when a function is not demanded.

It is controlled by the MECU (Machine Electronic Control Unit) and the motor controller ECU.

If there are any faults, it will not allow the motor to power up so there will be no movement.

Component Identification

Figure 184.



- A DC (Direct Current) contactor
- B Mounting bracket
- C Diode
- D Coil terminals
- E Power connections for battery terminals

Remove and Install

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Open the battery compartment door.
[Refer to: PIL 06-06-03.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Remove the electrical terminal wires from the wiring harness on the DC (Direct Current) contactor.
 - 4.1. Put a label on the coil terminal wires to help installation. It is very important to connect the coil terminal wires to the correct terminal or it may cause damage to the electrical system.
5. Pull back the red caps to remove the nuts on the DC contactor.
 - 5.1. Make sure that you support the DC contactor. Otherwise you may damage the bracket or DC contactor.
 - 5.2. Remove the bolt (x2), nut (x2) and washers.
 - 5.3. This will release the resistor and the battery leads to the top of the DC contactor.
6. Remove the resistor.

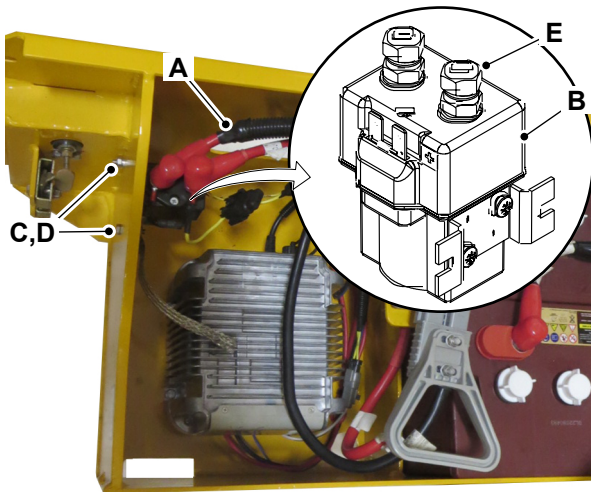
Figure 185.



- F Resistor

7. Disconnect the coil terminal wires.
8. Remove the DC contactor from the machine.

Figure 186.



- A Terminal wires
- B DC contactor
- C Bolt (x2)
- D Nut (x2)
- E Terminal nut

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Tighten the nuts to the correct torque value.
3. Make sure that you correctly connect the coil terminal wires. If the coil terminal wires are connected wrongly, it may cause damage to the electrical system.

Table 93. Torque Values

Item	Nm
E	8–9.5



09 - Power Distribution

Contents	Page No.
33-09-00 General	33-149
33-09-03 Fuse	33-151
33-09-06 Relay	33-153

00 - General

Introduction	33-149
Health and Safety	33-150

Introduction

The electrical circuits are protected by fuses. If a fuse blows, find out why and rectify the fault before installing a new one.

Health and Safety

⚠ **Notice:** Always replace fuses with ones of correct ampere rating to avoid electrical system damage.

Notice: When installing auxiliary electrical components always ensure that the additional load rating is suitable for that particular circuit. It is unacceptable to simply increase the fuse rating as this can cause overloading and consequential failure of wiring, along with failure of integral circuit components, which the fuse is protecting.

03 - Fuse

Component Identification

Component Identification 33-151

Remove and Install 33-152

Primary Fuses

Table 94.

Fuse	Rating
Primary fuse (high rating)	200A
Primary fuse- single inline (low rating)	20A

Secondary Fuses

Figure 187.

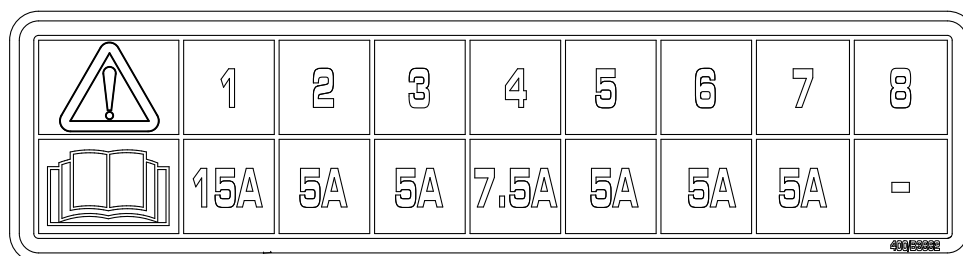


Table 95.

Fuse	Circuit	Rating
1	Permanent feed - ignition relay contact	15A
2	Permanent Feed - livelink permanent (Option)	5A
3	Permanent feed - emergency stop, charger switch, ignition key, Up/Down switch, platform controller	5A
4	Ignition feed - main ECU controller, hour meter feed, motor controller	7.5A
5	Ignition Feed - lower limit, Tilt switch, angle sensor, pressure sensor 1, pot-hole switch 2 (right hand) separate input	5A
6	Lower limit switch input 2, upper limit switch, pressure sensor 2, left hand/ right hand pothole series connection	5A
7	Livelink ignition feed (option), ground alarm	5A
8	Spare	-

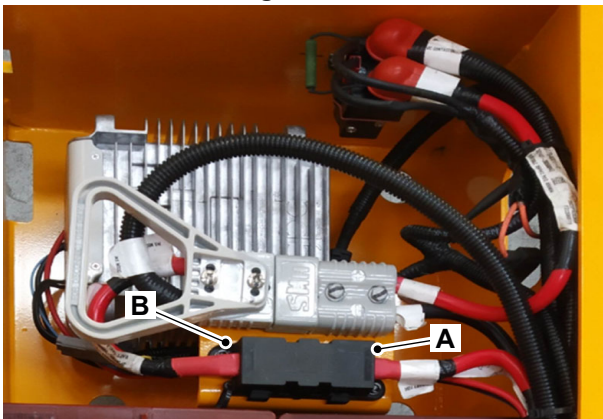
Remove and Install

Primary Fusebox

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Isolate the battery.
[Refer to: PIL 33-05-00.](#)
3. Open the battery compartment door.
[Refer to: PIL 06-06-03.](#)
4. Remove the primary fusebox cover.
5. Remove the nuts from the DC (Direct Current) contactor.
6. Release the battery positive terminal wire and fuse.
 - 6.1. Be careful when you release the fuse, as other end of the battery is still connected and is live.
7. Remove the screws (x2) from fusebox base.
8. Remove the primary fusebox.

Figure 188.



- A** Primary fusebox
- B** Nut

Install

1. The installation procedure is the opposite of the removal procedure.

Secondary Fusebox

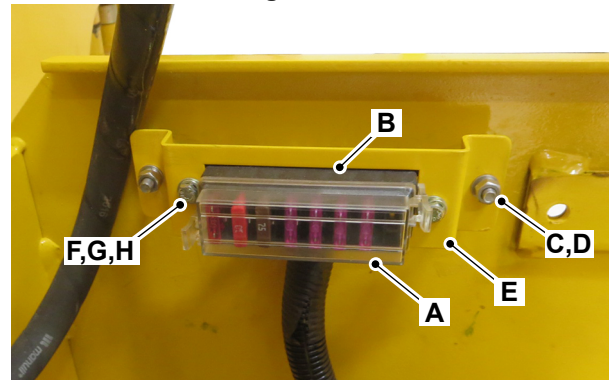
Remove

1. Make the machine safe with the platform lowered.

[Refer to: PIL 01-03-27.](#)

2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
4. Remove the cover.
5. If necessary, remove the fuses from the fusebox.
6. Remove the bolt 2 (x2), washer 2 (x2) and nut 2 (x2).
7. Remove the bracket.
 - 7.1. Remove the nut 1 (x2) and washer 1 (x2).
 - 7.2. Remove the bracket from the machine.
8. Remove the fusebox from the machine.
9. Disconnect the wires from the fusebox.

Figure 189.



- A** Cover
- B** Fusebox
- C** Nut 1 (x2)
- D** Washer 1 (x2)
- E** Bracket
- F** Bolt 2 (x2)
- G** Washer 2 (x2)
- H** Nut 2 (x2)

Install

1. The installation procedure is the opposite of the removal procedure.

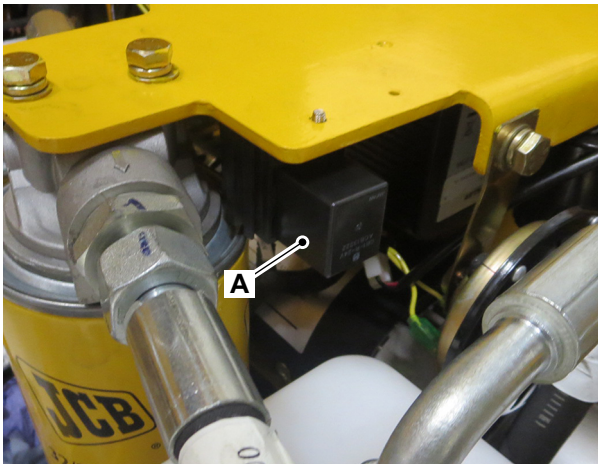
06 - Relay

Remove and Install

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Open the hydraulic compartment door.
[Refer to: PIL 06-06-09.](#)
4. Remove the main control relay.
5. Remove the screw.
6. Disconnect the terminal wires.

Figure 190.



A Main control relay

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Before you connect the wires check the condition of the crimped terminals of the wires. If damaged, crimp the wire terminals.

[Refer to: PIL 33-12-00.](#)



10 - Motor

Contents	Page No.
33-10-00 General	33-155

00 - General

Introduction	33-155
Technical Data	33-156
Component Identification	33-157
Remove and Install	33-158

Introduction

The pump motor installed on this machine is a DC (Direct Current) motor with a series excited permanent magnet.

The resistance between the motor enclosure and any of the binding points is infinite or more than 1 mega ohm.

The pump motor rotates in an anticlockwise direction (viewed from commutator end).

Technical Data

For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ] Page 33-156

For: S4046E [RAJ], S4550E [RAJ] Page 33-156

(For: S1530E [RAJ], S1930E [RAJ], S2032E [RAJ], S2632E [RAJ], S2646E [RAJ], S3246E [RAJ])

Table 96.

Description	Data
Rated power	3.3kW
Rated speed	3050 RPM (Revolutions Per Minute)
Input voltage	24V
Rated current	180A
Maximum speed	5600 RPM

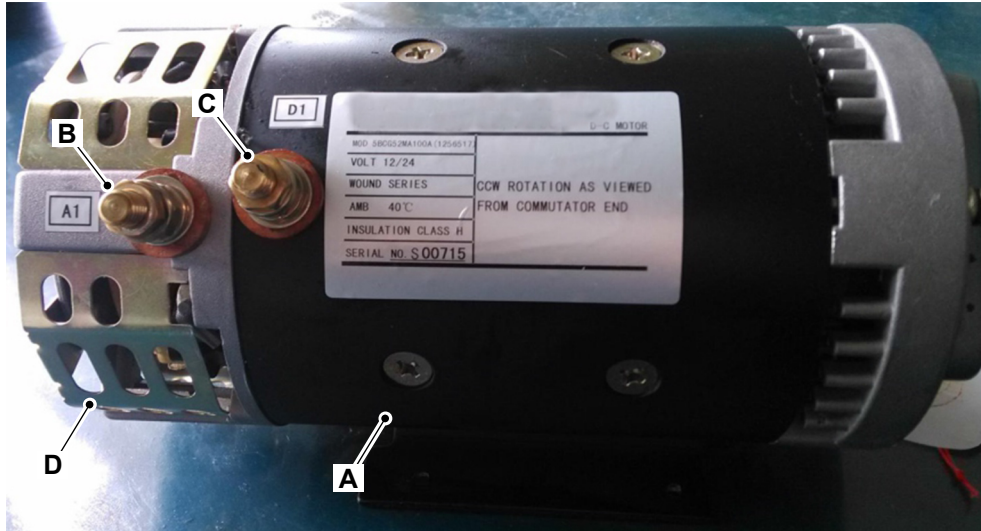
(For: S4046E [RAJ], S4550E [RAJ])

Table 97.

Description	Data
Rated power	4.5kW
Rated speed	2700 RPM
Input voltage	24V
Rated current	239A
Maximum speed	5600 RPM

Component Identification

Figure 191.



A Pump motor

C D1 terminal (Positive binding)

B A1 terminal (Negative binding)

D Commutator end

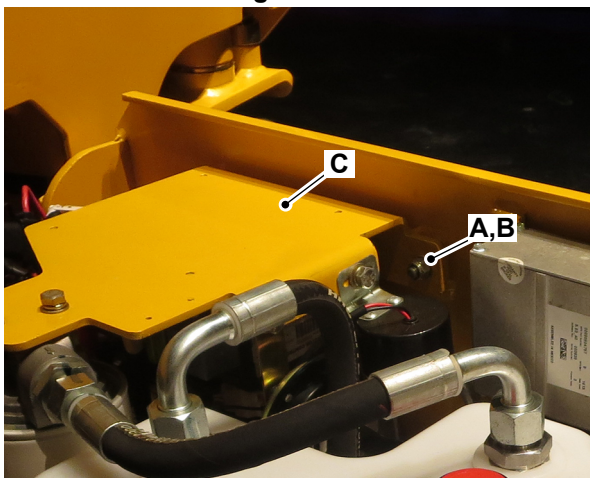
Remove and Install

⚠ WARNING You could get killed or injured if you touch the Battery positive and Battery negative terminals of the motor controller. The controller is installed with energy storing devices (capacitors). You must discharge the controller before you remove or install.

Remove

1. Obey all electrical system health and safety information.
[Refer to: PIL 33-00-00.](#)
2. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Disconnect the batteries.
[Refer to: PIL 33-03-00.](#)
5. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
6. Support the mounting bracket.
7. Remove the hydraulic tank.
[Refer to: PIL 30-03-00.](#)
8. Remove the locknut (x2) and bolts 1 (x2).
9. Carefully move the mounting bracket assembly to reveal the pump motor harnesses.

Figure 192.

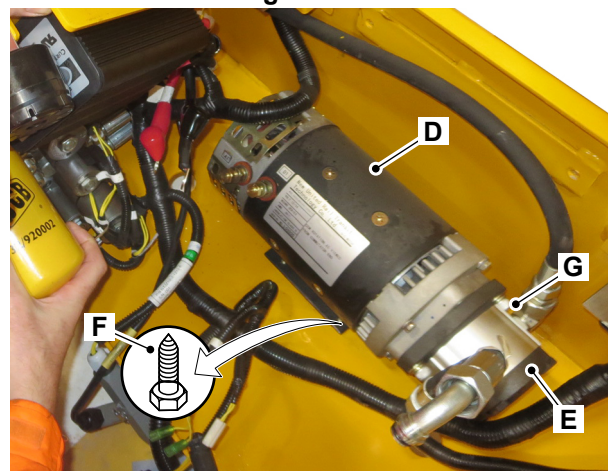


- A** Locknut (x2)
- B** Bolts 1 (x2)
- C** Mounting bracket

10. Put a label on the hoses and electrical harnesses to help installation.

11. Disconnect the hydraulic hoses and electrical harnesses from the pump motor.
12. Plug all the open ports and hoses to prevent contamination.
13. Remove the bolts 2 (x4) from the underside of the hydraulic compartment.
14. Lift and remove the pump motor assembly clear of the machine.
15. Remove the bolts 3 (x2).
16. Remove the gear pump from the pump motor.

Figure 193.



- D** Pump motor
- E** Gear pump
- F** Bolts 2 (x4)
- G** Bolts 3 (x2)

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the fasteners to the correct torque value.
3. Check the hydraulic oil level and top up to the correct level.

[Refer to: PIL 30-00-00.](#)



12 - Harness

Contents	Page No.
33-12-00 General	33-161



This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction	33-161
Health and Safety	33-162
Component Identification	33-163
Diagram	33-165
Repair	33-165
Check (Condition)	33-168

Introduction**Harness Drawings**

Drawings are reproduced from production electrical harness drawings. Each harness drawing includes tables showing wire connections and destinations for all the connectors on the harness. To identify the correct harness drawing for a particular machine refer to the relevant Harness Interconnection page for the machine serial number range.

Health and Safety

▲ **Notice:** When installing auxiliary electrical components always ensure that the additional load rating is suitable for that particular circuit. It is unacceptable to simply increase the fuse rating as this can cause overloading and consequential failure of wiring, along with failure of integral circuit components, which the fuse is protecting.

Harness Repair (Butane Heater)

▲ **WARNING** In addition to the warnings incorporated into this procedure, extreme care should be taken when handling the gas heating tool to ensure that the flame does not damage or set fire to any items in the vicinity of the repair, i.e. other wires, floor panels, floor mats, sound proofing, paintwork, etc. This tool should not be used in any restricted location prohibiting the use of "Naked Flames" or where risk of explosive gas or similar safety parameters apply. No other heat source should be used to attempt a sealed joint.

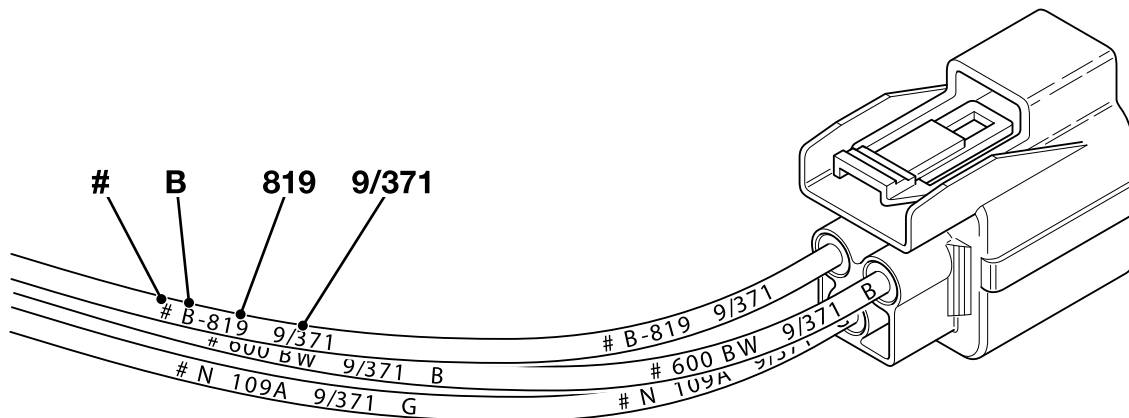
CAUTION When the heater is in use, the reflector and the air coming out are extremely hot. Keep away to avoid accidental burns. Do not touch the reflector until it has had time to cool down after switching off. If flame reappears at the reflector when the heater is in use, the catalytic element is damaged or used up. Stop work immediately and replace the heater.

Component Identification

Wire and Harness Number Identification

This section details the allocation of wire numbers and the identification of wires in the wiring harness.

Figure 194.



The illustration shows a typical connector and wires. Each wire has an individual identification number permanently marked on it, at regular intervals along its length. The number stamped on the wire identifies the following:

Table 98. Wire and Harness Number Identification

Identification Number	Description
#	The # indicates the start of the identification number. It is always printed to the left of the identification number.
B	If applicable - The colour of the flying lead that the harness wire should mate with. For instance, if wire 819 from harness 719/37100 mated with a flying lead coloured black (colour code B) then the number printed on the wire would be B-819 9/371.

Identification Number	Description
819	The wire's unique identification number. The wire functions and numbers allocated to them are consistent through out the JCB range of products. Refer to Wire Numbers and Functions.
9/371	If applicable - The part number of the harness that the wire originates from. If the harness part number is 719/37100, the number printed on the harness wires will be 9/371 (71 and 00 are common numbers and therefore deleted).

Wire Numbers and Functions

Table 99. Wires 000-199, 1000-1999 (These numbers are reserved for ignition feeds, heater start circuits and start circuits)

Wire Number	Description
Wires 000 - 099	Unfused ignition feeds
Wires 100 - 199 and 1000 -1999	Fused ignition feeds (feeds via ignition relays are also classed as ignition feeds). Power supplies output by a control module.

Table 100. Wires 200-399, 2000-3999 (These numbers are reserved for battery feeds)

Wire Number	Description
Wires 200-299 and 2000-2999	Unfused battery feeds. Power supplies output by a control module.
Wires 300-399 and 3000-3999	Fused battery feeds. Power supplies output by a control module.

Table 101. Wires 400-599, 4000-5999

Wire Number	Description
Wires 400-599 and 4000-5999	These numbers are reserved for instruments, sensors and variable input/output signal wires used in electronic systems. CAN wires also use numbers in this series.

Table 102. Wires 600-799, 6000-7999

Wire Number	Description
Wires 600-799 and 6000-7999	These numbers are used for earth wires. When the number is printed on to a wire it is prefixed by the Earth symbol. This symbol is printed onto the wire, it may however be omitted from harness drawings. Where a load is switched negative, the wire number from the load to the switch shall be different to that of the wire from the switch to the earth.

Figure 195.

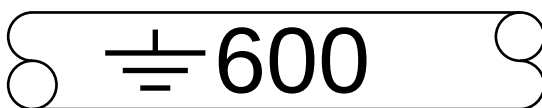


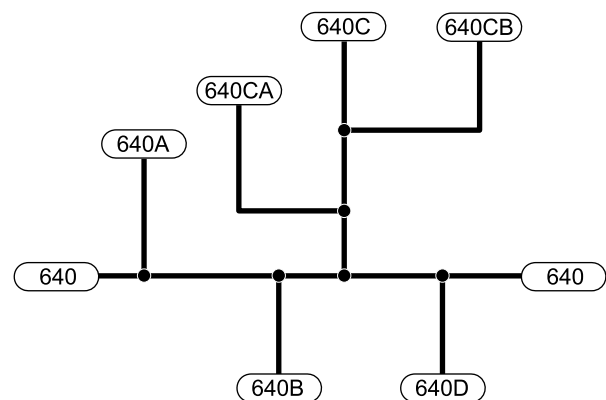
Table 103. Wires 800-999, 8000-9999

Wire Number	Description
Wires 800-999 and 8000-9999	These numbers are reserved for switched supplies to electrical loads, i.e. to lights, etc. Power supplies output by a control module.

Table 104. Wires In Splices

Wire Number	Description
Various	The main input wire is allocated with a wire number and a suitable description, i.e. Wire 640 earth splice to earth. The additional wires in the splice are allocated the same wire number and a postfix, i.e. 640A, 640B, etc.

Figure 196.



General Points

1. Wires continue to have the same number even after passing through a connector block to another harness.
2. The descriptions are applicable to JCB specification wiring harnesses. The machine may be installed with some wiring that does not conform to the JCB specifications, typically when it is part of equipment supplied by other manufacturers.

Diagram

A full set of harness drawings are available. Refer to: servicepro.jcb.com.

Repair

Special Tools

Description	Part No.	Qty.
Wiring Crimp Tool	892/00349	1
Butane Heater	892/00350	1

Consumables

Description	Part No.	Size
Wiring Splice (0.5-1.5mm Red, contains 50 off)	892/00351	-
Wiring Splice (1.5-2.5mm Blue, contains 50 off)	892/00352	-
Wiring Splice (3-6mm Yellow, contains 50 off)	892/00353	-
Wiring Splice-Bootlace (1mm Red)	7205/0100	-
Wiring Splice-Bootlace (2.5mm Grey)	7205/0250	-

Instances occur where it is necessary to incorporate auxiliary electrical components into existing electrical circuits and although unlikely with present wiring harnesses, repair or replace specific individual wires within a harness. This will also apply to other machines in addition to those of manufacture.

To make sure that either the inclusion of an auxiliary electrical component or a repair within a harness is completed to an acceptable standard it is strongly recommended that the following tools, equipment and procedures are always used.

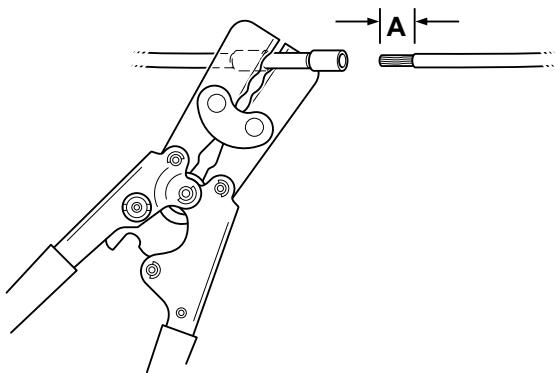
The sheath covering of the recommended splice is heat shrunk onto the original wire insulation. This results in a seal and corresponding joint to IP 67 specifications.

Procedure 1

1. Cut the wire and remove the protective insulation for a suitable distance dependent upon the size of wire and splice to be used.

[Special Tool: Wiring Crimp Tool \(Qty.: 1\)](#)

Figure 197.



A Distance for splice (check size)

2. Using the correct sized splice, attach the new section of wire required or auxiliary flying lead to the existing harness and secure using the crimp tool. Note that each of the splices detailed is colour-coded to make size and range readily visible. They are secured using the corresponding size and matching colour-coded jaws of the crimp tool to ensure joint security. This tool also incorporates a ratchet closing mechanism which will not release until the splice is fully closed to the correct compression size.

Consumable: Wiring Splice (0.5-1.5mm Red, contains 50 off)

Consumable: Wiring Splice (1.5-2.5mm Blue, contains 50 off)

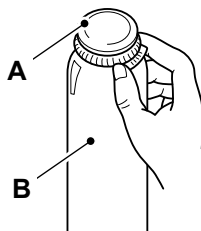
Consumable: Wiring Splice (3-6mm Yellow, contains 50 off)

3. With the Butane heater assembly, seal the connection.

Special Tool: Butane Heater (Qty.: 1)

- 3.1. Remove the cap from the end of the disposable gas cartridge.

Figure 198.

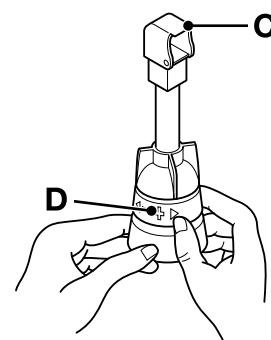


A Cap

B Gas cartridge

- 3.2. Before assembling the gas cartridge to the reflector element, turn the red ring to the left, (in the direction of the minus sign marked on the ring).

Figure 199.

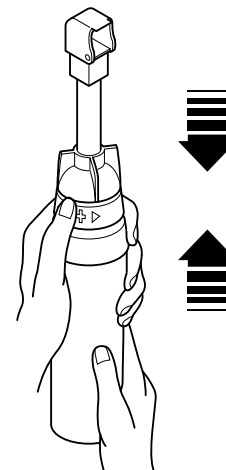


C Reflector element

D Red ring

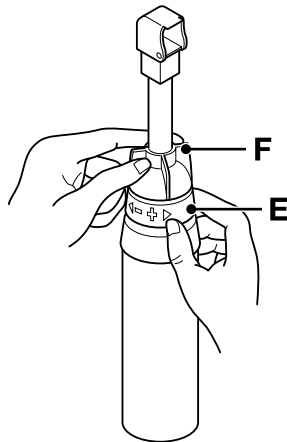
- 3.3. Position the tube hanging down from inside the reflector assembly into the hole at the top of the gas cartridge. Then press the gas cartridge up into the reflector assembly as far as possible until the two elements are clapsed firmly together. An audible click will be heard.

Figure 200.



- 3.4. Turn the small ring so that the air holes are completely closed.

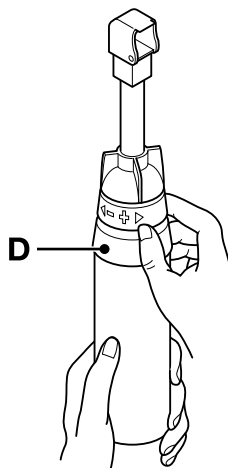
Figure 201.



E Small ring
F Air holes

- 3.5. Turn the red ring to the right (in the direction of the plus sign) in order to turn on the gas. Important: Before turning the heater on, make sure that the cartridge is not hotter than the reflector element. This may occur if the cartridge is held in the hand for a long time. The temperature difference between the cartridge and the reflector element may cause long yellow flames to appear on ignition.

Figure 202.

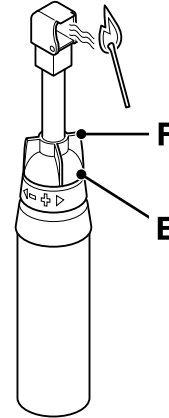


D Red ring

- 3.6. Hold the heater vertically and, using a match or cigarette lighter, light the gas as shown. Hold the heater vertically for 1 to 2 minutes until the catalytic reaction occurs. This is indicated when the blue flame fades and the ceramic element glows red. Then turn the small ring until the air holes at are completely open. The tool is ready for use. Note: The fact that the sound of liquid cannot be heard when the cartridge is

shaken does not mean it is empty. No sound will be heard even when the cartridge is full.

Figure 203.



E Small ring
F Air holes

- 3.7. The heater can be used in two modes:
3.8. Side wings down, reflector head completely open. In this mode the infra-red heat waves are dominant (recommended for the light coloured plastic splices).

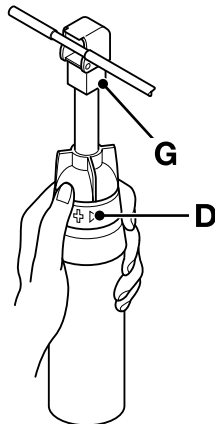
Figure 204.



G Side wings

- 3.9. Side wings up, reflector head opening reduced. In this mode the heating is done only by the hot gas (use for dark coloured plastic splices).

Figure 205.



- D Red ring
- G Side wings

Procedure 2

1. Cut the wire and remove the protective insulation for a suitable distance.
2. Install the suitable bootlace ferrule on the wires.
[Consumable: Wiring Splice-Bootlace \(1mm Red\)](#)
[Consumable: Wiring Splice-Bootlace \(2.5mm Grey\)](#)
3. Use a suitable bootlace ferrule tool to crimp the terminals. Refer to Figure 206.

Figure 206.



Check (Condition)

This section describes how to use electrical measuring devices that are used in electrical fault finding.

Use of Multimeters

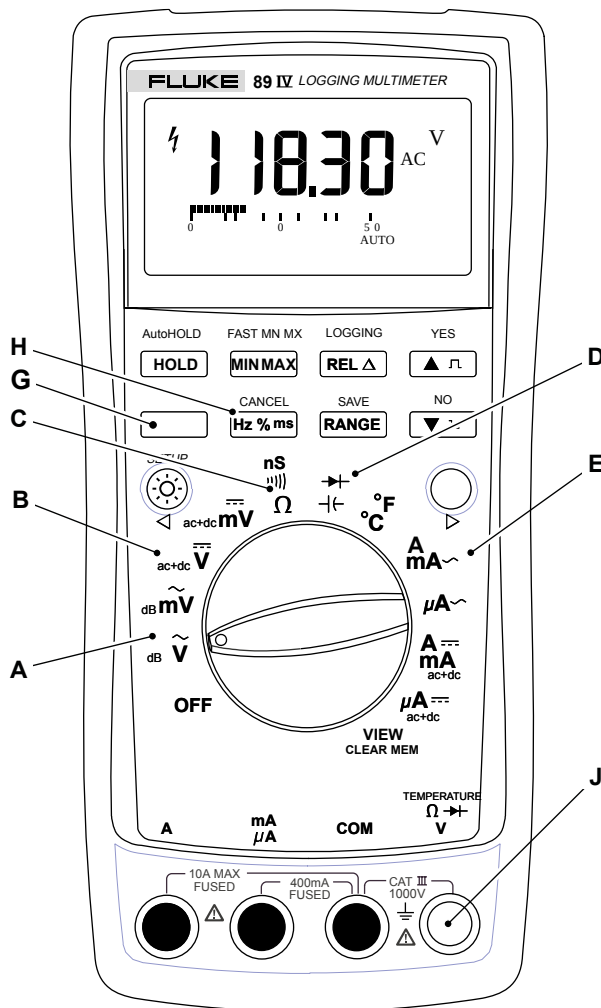
In order to obtain the maximum benefit from the fault finding information contained in the Electrical Section, it is important that the technician fully understands the approach to fault finding and the use of the recommended test equipment, in this case a digital multimeter, or a moving pointer analogue multimeter. The approach is based on a fault finding check list. In tracing the fault from the symptoms displayed you will be directed to make measurements using a multimeter. These instructions are intended to cover the use of the recommended meters.

1. Make sure that the test leads are plugged into the correct sockets. The black test lead should be plugged into the black socket (sometimes, this socket is also marked by a -, or E or marked as COMMON or COM). The red test lead should be plugged into the red socket marked with +, V or Ω .
2. When you make a measurement, make sure that the test probes have a good clean contact with bare metal, free from grease, dirt, and corrosion as these can cause a false reading.
3. When you measure a voltage, make sure that the correct range is selected, that it is set to the selector value equal to or greater than that you are about to measure. e.g. If asked to measure 12 Volts, set the selector to the 12V range. If there is no 12V range, set the selector to the next range higher, 20V for instance. If the meter is set to a range that is too low, it may be damaged. e.g. setting to the 2V range to measure 12V.

Measuring DC Voltage

1. Select the correct range on the multimeter.
 - 1.1. On the digital multimeter, turn the switch to position B.

Figure 207. Typical Digital Multimeter



2. Connect the black probe to the nearest available suitable earth point, usually this will be the starter motor earth, the battery negative, or the chassis. Connect the red probe to the wire or contact from which you are measuring the voltage.

Measuring Resistance

1. Make sure that there is no power to the part of the circuit you are about to measure.
2. Connect one probe at one end of the component or wire to be checked and the other probe at the other end. It does not matter which way round the two probes are placed.
3. Select the correct range on the multimeter.
 - 3.1. Turn the switch to position C and check that the W sign at the right hand side of the display window is on. If the F sign is on instead, press the blue button G to change the reading to Ω. Touch the meter lead probes together and press the REL3 key on

the meter to eliminate the lead resistance from the meter reading.

Measuring Continuity

1. Make sure that there is no power to the part of the circuit you are checking for continuity.
2. Connect one probe to one end of the component or wire to be checked and the other probe to the other end. It does not matter which way round the two probes are placed.
3. Select the correct range on the multimeter.
 - 3.1. On the digital multimeter, turn the switch to position C and check that the beeper symbol appears at the left hand side of the display window. If the F sign is on instead, press the button labelled F. If there is continuity in the circuit, the beeper will sound. If there is no continuity (open circuit), the beeper will not sound.

Measuring Frequency

1. Insert the black plug into the COM socket on the meter and attach the probe to the nearest suitable earth point on the chassis, for example, the battery negative terminal.
2. Insert the red probe into socket J.
3. Turn the selector switch to position A and depress G repeatedly until F is highlighted on the top row of the display.
4. Press button H once.
5. Touch or connect the red probe to the frequency source to be measured. Press and hold the button if an average reading is required.

Testing a Diode or a Diode Wire

A diode wire is a diode with male connector installed on one end and a female connector installed on the other end. The diode is sealed in heatshrink sleeving. To test a Diode or a Diode Wire.

1. On the digital multimeter:
 - 1.1. Turn the switch to position D.
 - 1.2. Press the HOLD button and check that the H sign appears at the top right hand side of the display window.
 - 1.3. Connect the black probe to the end of the diode with a band or to the male connector of the diode wire. Connect the red probe to the other end of the diode or diode wire. If the beeper does not sound the diode or diode wire is faulty.

- 1.4. Connect the red probe to the end of the diode marked with a band, or to the male connector of the diode wire, the black probe should be connected to the other end of the diode or diode wire. If the beeper sounds or the meter does not read O.L., the diode or diode wire is faulty.
- 1.5. Press the HOLD button and check that the H sign disappears from the right hand side of the display window.



15 - Alarm

Contents	Page No.
33-15-00 General	33-173



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

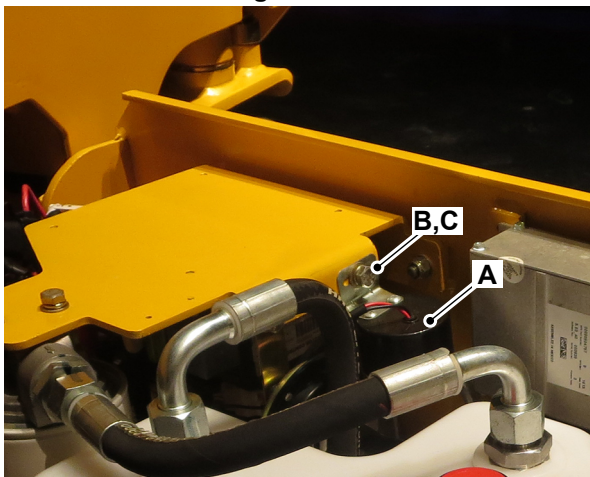
00 - General

Remove and Install

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
4. Disconnect the electrical connector from the alarm.
5. Remove the setscrew and washers.
6. Remove the alarm from the machine.

Figure 208.



- A** Alarm
B Setscrew
C Washers

Install

1. The installation procedure is the opposite of the removal procedure.



24 - Instruments

Contents	Page No.
33-24-04 Control Panel	33-175
33-24-05 Platform Controller	33-187

04 - Control Panel

Introduction	33-175
Component Identification	33-176
Check (Operation)	33-177
Calibrate	33-178
Remove and Install	33-186

Introduction

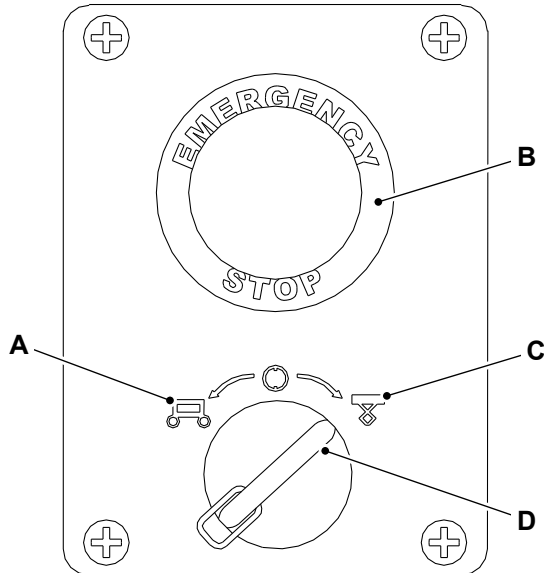
The ground controls are used to operate the machine from the ground, it can also be used to modify the performance of the machine. The ground controls consist of an ECU (Electronic Control Unit), emergency stop button, key switch and circuit breaker.

Activating the function enable button and the up or down at the same time, sends a signal to the ECU .This allows the platform to be raised or lowered at the ground controls.

When the ECU is in the set-up mode, the ground controls are used to adjust the machine options.

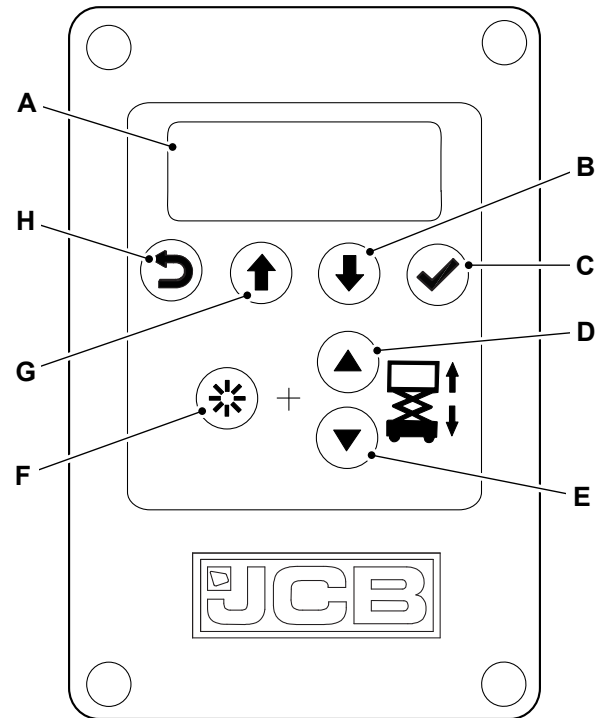
Component Identification

Figure 209. Ground Controller



- A** Ground control position
- B** Emergency stop switch
- C** Platform control position
- D** Key switch

Figure 210. Ground Controller Display



- A** Display
- B** Page down button
- C** Enter button
- D** Raise/Up button
- E** Lower/Down button
- F** Enable button
- G** Page up button
- H** Return button

Check (Operation)

Machine Key Switch

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
 2. Pull out the platform emergency stop button to the ON position.
 3. Pull out the ground emergency stop button to the ON position.
 4. Turn the machine key to the ground control position and do the following.
 - 4.1. Make sure that the power supply indicator light illuminates.
 - 4.2. Make sure that the platform control becomes inactive.
 5. Turn the machine key to the platform control position and do the following.
 - 5.1. Make sure that the power supply indicator light illuminates.
 - 5.2. Make sure that the ground control becomes inactive.
 6. Turn the machine key to the OFF position and do the following.
 - 6.1. Make sure that no power supply indicator light illuminates.
 - 6.2. Make sure that all controls become inactive.
- 3.4. Press the ground emergency stop switch.
 - 3.5. Try to operate/move the machine with ground controls.
 - 3.6. Make sure that the machine does not operate/ move.
 - 3.7. Turn the ignition key to platform control position.
 - 3.8. Try to operate/move the machine with the platform controls.
 - 3.9. Make sure that the machine does not operate/ move.
4. Turn the machine key to the OFF position

Control Panel Functional Test

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Turn the machine key to the ground control position and do the following.
 - 2.1. Make sure that all the ground controls operate normally. Refer to Operator's manual.
3. Check the operation of the platform emergency stop.
 - 3.1. Pull out the platform emergency stop button to the ON position.
 - 3.2. Pull out the ground emergency stop button to the ON position.
 - 3.3. Turn the ignition key to ground control position.

Calibrate

User Adjustments and Lift Set Up

The following menus are displayed once the power is switched on.

Press and hold the Enter button on chassis unit for 5s, then power on the chassis unit.

Table 105.

Menu	Sub-Menu
Speed	Drive High Speed
	Drive Low Speed
	Drive Elevated Speed
	Lift Speed
	Steering Speed
	Steer Boost
Option	Machine Type
	Load Sensor Mode
	Pressure Sensor
	Pothole Guard
	Descent Delay
	Motion Alarm
	Load Sensing
	High Torque
	Battery Drain Alarm
	Change Alarm delay
	Change Lift Shut- Off delay
Calibration	No Load Calibration
	Full Load Calibration
Down limit switch height calibration	Down limit switch height calibration
Descent delay height calibration	Descent delay height calibration
Fault History	View History Fault
	Clear Fault History
Link Host PC	Upgrade Chassis Unit
	Upgrade Platform Controller

Configuration Adjustment

Press Enter button to access the parameter setting option.

Make sure the chassis unit is switched on.

Figure 211.



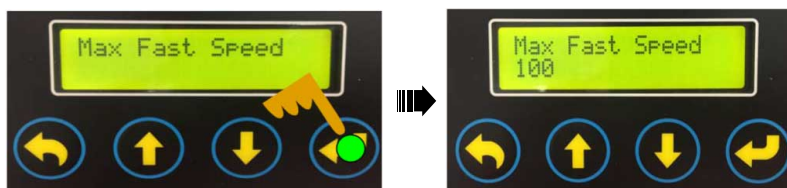
Set Speed

2. Press Enter button to select. Value is displayed on LCD (Liquid Crystal Display).

Drive High Speed

1. Press the Up button to find the maximum speed.

Figure 212.

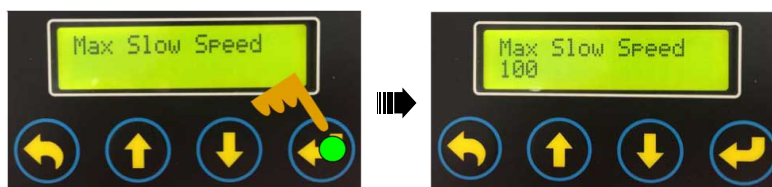


Drive Low Speed

1. Press the Down button to find the low speed.

2. Press Enter button to select. Value is displayed on LCD.

Figure 213.

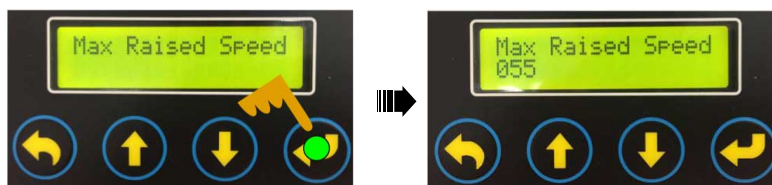


Drive Elevated Speed

1. Press the Up or Down button to find the maximum raised speed.

2. Press Enter button to select. Value is displayed on LCD.

Figure 214.

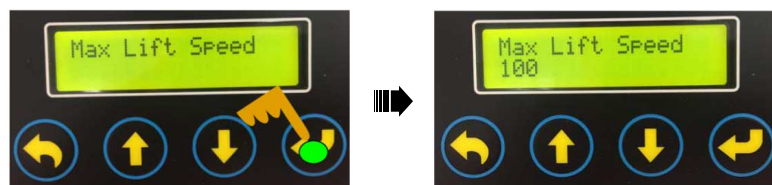


Lift Speed

1. Press the Up or Down button to find the maximum lift speed.

2. Press Enter button to select. Value is displayed on LCD.

Figure 215.

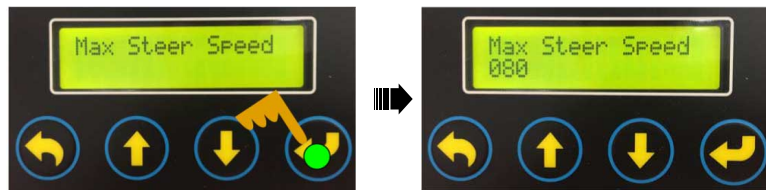


Steering Speed

1. Press the Up or Down button to find the maximum steer speed.

2. Press Enter button to select. Value is displayed on LCD.

Figure 216.



Steer Boost

1. Press the Up or Down button to find the steer boost.
2. Press Enter button to select. Value is displayed on LCD.

Figure 217.

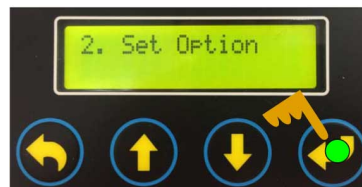


Set Machine Option

Press Enter button to start option setting.

Press Return button and then Down button to access the set option menu.

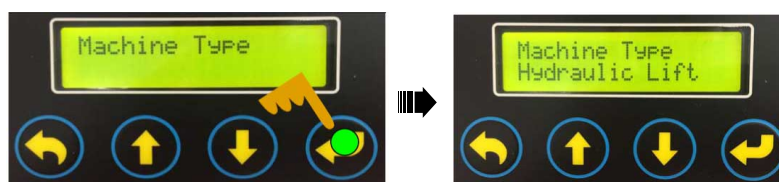
Figure 218.



Machine Type

1. Press Enter button to select machine type.
2. Press Up or Down button to switch the types. Press Enter to select the option.

Figure 219.



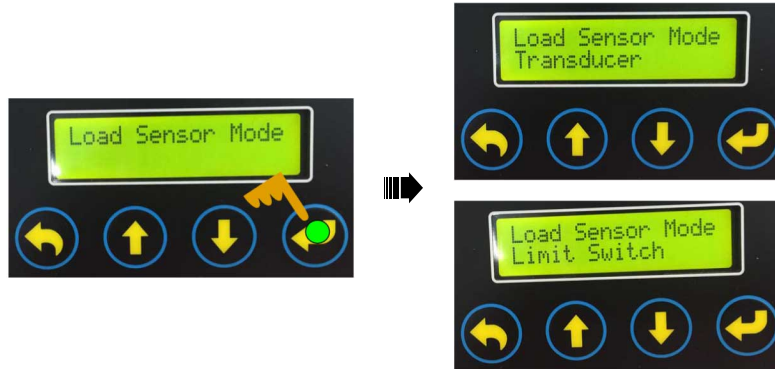
Load Sensor Mode

This mechanical option selects one of two ways to determine if the platform is overloaded.

1. Navigate the load sensor mode under option menu. Press Enter to select.
 - 1.1. Make a note that this menu is password protected. Contact JCB Service for details.

2. Press Up or Down button to switch between transducer and limit switch option.
3. Press Enter to save the option.

Figure 220.



Pressure switch and Angle sensor

- This will signal that the platform is overload by an active high signal to the chassis unit from a pressure switch.

- This allows the chassis unit to do a more detailed sensing of the platform load by reading the cylinder pressure and scissors angle. It is able to notify the operator when the load is greater than 80%, 90%, or 99% of maximum.

Pressure transducer and Angle sensor

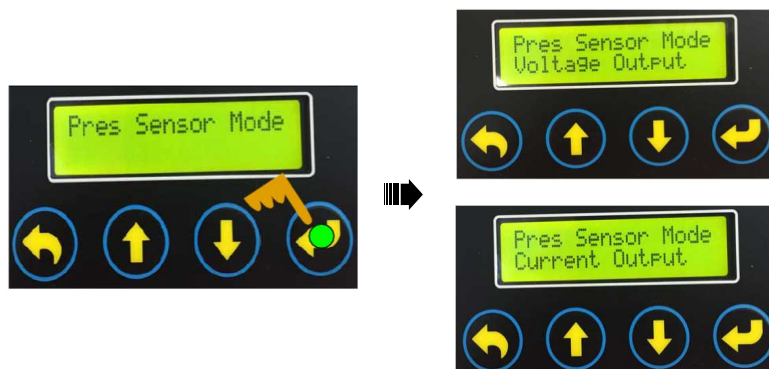
Table 106.

	80% Load limit warning
	90% Load limit warning
	99% Load limit warning
	Overload warning

Pressure Sensor Mode

1. Navigate the pressure sensor mode under option menu. Press Enter to select.
2. Press Up or Down button to switch between voltage type and current type mode.
3. Press Enter to save the option.

Figure 221.



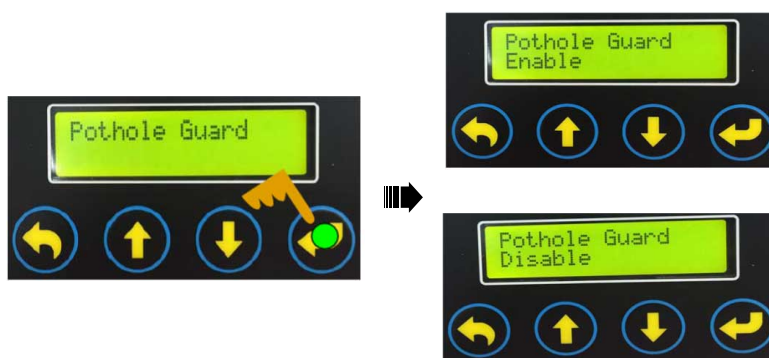
Pothole Guard

If this firmware option is selected, the pothole plate opens when platform is higher than designated height for protection.

1. Navigate the pothole guard under option menu. Press Enter to select.

- 1.1. Make a note that this menu is password protected. Contact JCB Service for details.
2. Press Up or Down button to switch between enable and disable option.
3. Press Enter to save the selected option.

Figure 222.



Descent Delay

If this firmware option is selected and the platform is descending, it will stop at a safety check point to give the operator or bystanders time to remove obstructions from between the scissors.

The joystick enable must be disengaged and then re-engaged (or the Chassis Toggle switch must be released and returned to the down position) and then a short delay must time out before the platform will continue to descend.

1. Navigate the descent delay under option menu. Press Enter to select.
 - 1.1. Make a note that this menu is password protected. Contact JCB Service for details.
2. Press Up or Down button to switch between enable and disable option.
3. Press Enter to save the selected option.

Figure 223.

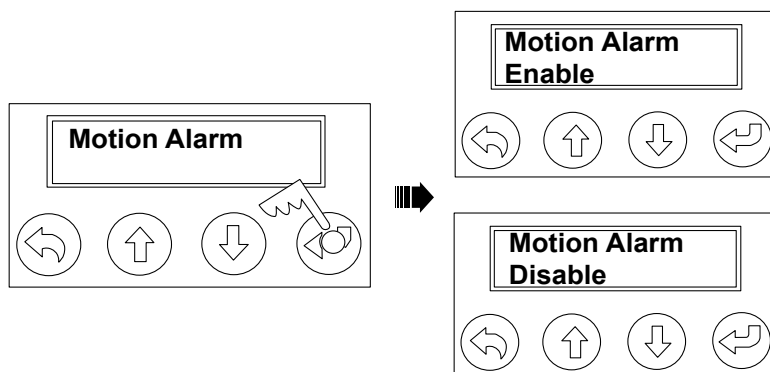


Motion Alarm

If this firmware option is selected, it enables an alarm which will then sound anytime the lift is being driven or the platform is being elevated or lowered.

1. Navigate the motion alarm under option menu. Press Enter to select.
2. Press Up or Down button to switch between enable and disable option.
3. Press Enter to save the selected option.

Figure 224.



Load sensing

If this firmware option is selected, the lift will expect that either a pressure switch or pressure transducer is installed in the scissors lift and lift will notify the operator if an overload condition exists on the platform.

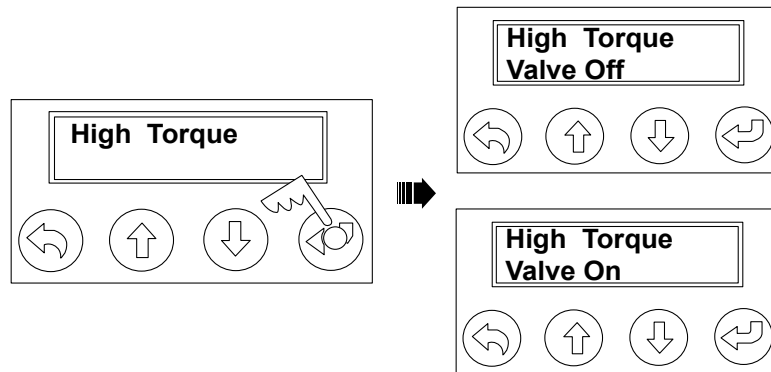
1. Navigate the load sensing under option menu. Press Enter to select.
 - 1.1. Make a note that this menu is password protected. Contact JCB Service for details.

2. Press Up or Down button to switch between enable and disable option.
3. Press Enter to save the selected option.

High Torque

1. Navigate the high torque under option menu. Press Enter to select.
2. Press Up or Down button to switch between enable and disable option.
3. Press Enter to save the selected option.

Figure 225.

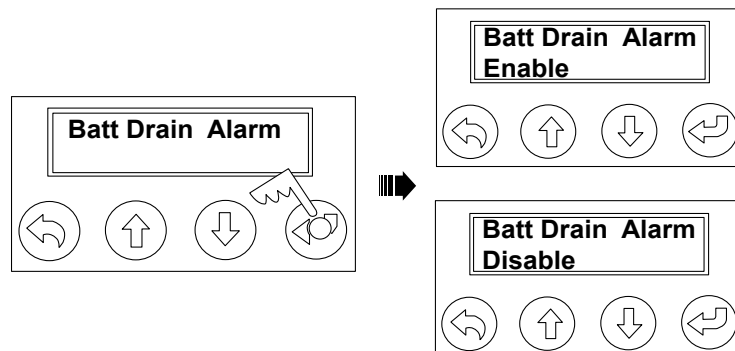


Battery Drain Alarm

If this firmware option is selected, it enables an alarm which will sound anytime if the battery is low.

1. Navigate the battery drain alarm under option menu. Press Enter to select.
2. Press Up or Down button to switch between enable and disable option.
3. Press Enter to save the selected option.

Figure 226.



4. If necessary to change the drain alarm time, do the following.
 - 4.1. Navigate the drain alarm delay under option menu. Press Enter to select.
 - 4.2. The values will be displayed on screen.
 - 4.3. Press Up or Down button to change the value from 00 to 60 on ECU.
5. If necessary to change the drain shut time, do the following.
 - 5.1. Navigate the drain shut delay under option menu. Press Enter to select.
 - 5.2. The values will be displayed on screen.
 - 5.3. Press Up or Down button to change the value from 00 to 60 on ECU.

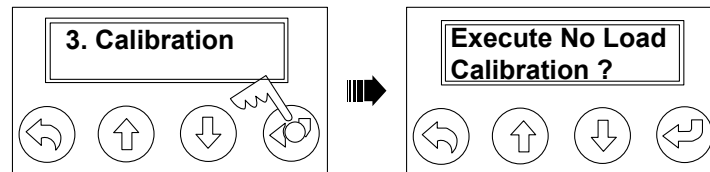
Calibration

No Load Calibration

Calibration is done while there is no load on platform.

1. Press and hold the Enter button on chassis unit for specified time, then turn the key switch to the chassis control position.
Duration: 5s
2. Press Up or Down button to navigate the options. Select the calibration option, then press Enter button. Refer to Figure 227.
3. The LCD displays the "Execute no load calibration?". Press and hold the Enter button for specified time to execute automatic calibration.
Duration: 5s

Figure 227.

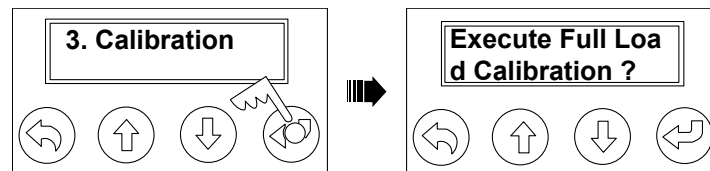


Full Load Calibration

Calibration is done while there is full load on platform.

1. Press and hold the Enter button on chassis unit for specified time, then turn the key switch to the chassis control position.
Duration: 5s
2. Press Up or Down button to navigate the options. Select the calibration option, then press Enter button. Refer to Figure 228.
3. The LCD displays the "Execute full load calibration?". Press and hold the Enter button for specified time to execute automatic calibration.
Duration: 5s

Figure 228.



MECU Debug Mode

During testing the scissor, enters into 'Debug Mode' to check the data between the scissor and platform controller. To enter the Debug mode, press and hold the back button for 5s.

Following parameters can be accessed in the debug mode.

- Angle Sensor
- Pressure sensor 1
- Pressure sensor 2
- Load Percent
- Forward coil
- Reverse coil
- Up coil
- Down coil
- Right coil
- Left coil
- Brake coil
- Battery Voltage
- Switches inputs
- Buttons inputs
- Control Outputs
- Motor speed
- CPU load

Remove and Install

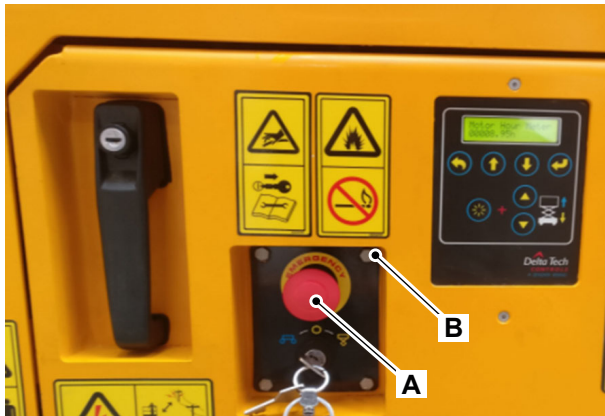
Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Make sure that the emergency stops are in OFF position.
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
5. Remove the screws (x4) and nuts (x4).
6. Carefully remove the ground control panel out of the aperture.
7. Disconnect the electrical connection.
8. Remove the ground control panel.

Install

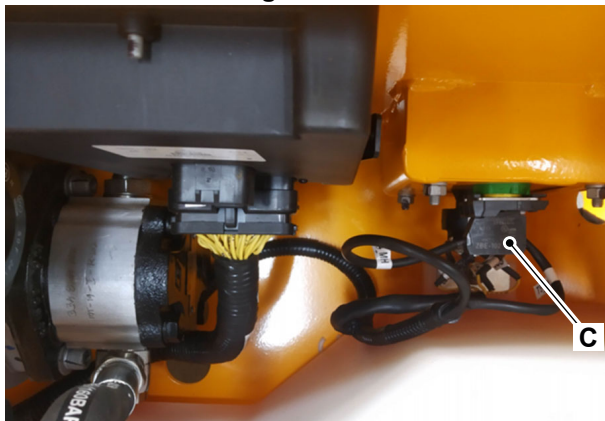
1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the nuts to the correct torque value.

Figure 229.



- A** Ground control panel
B Screws (x4)

Figure 230.



- C** Electrical connection

05 - Platform Controller

Introduction	33-187
Component Identification	33-188
Check (Level)	33-189
Check (Operation)	33-189
Remove and Install	33-190

Introduction

The platform controller is installed in the platform on the front right corner of the machine.

The platform controller consists of a joystick, emergency stop button, mode buttons (drive mode and lift mode), horn, speed selection button and a display.

Component Identification

Figure 231.



- A Joystick
- B Display
- C Drive mode button
- D Speed selection button
- E Emergency stop button
- F Horn
- G Lift Mode button

Figure 232.



- H Enable button

Check (Level)

The platform controller shows the level of battery charge. [Refer to: PIL 33-03-00.](#)

Check (Operation)

Platform Control Functional Test

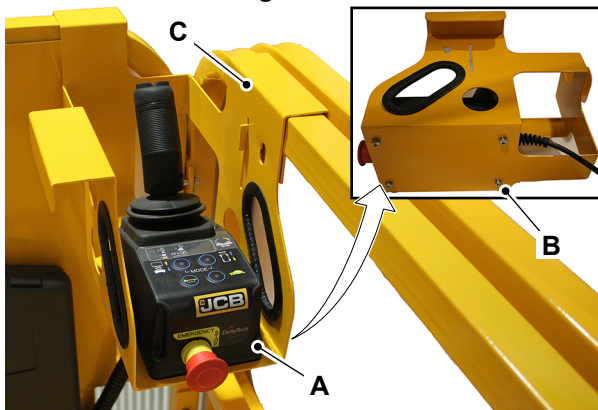
1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Release the platform emergency stop switch.
3. Release the ground emergency stop switch.
4. Turn the ignition key to the platform control position and do the following.
 - 4.1. Make sure that all the platform controls operate normally. Refer to Operator's manual.
5. Check the operation of the platform emergency stop.
 - 5.1. Release the platform emergency stop switch.
 - 5.2. Release the ground emergency stop switch.
 - 5.3. Turn the ignition key to ground control position.
 - 5.4. Press the platform emergency stop switch.
 - 5.5. Try to operate/move the machine with ground controls.
 - 5.6. Make sure that the machine does not operate/ move.
 - 5.7. Turn the ignition key to platform control position.
 - 5.8. Try to operate/move the machine with the platform controls.
 - 5.9. Make sure that the machine does not operate/ move.
6. Turn the ignition key to the OFF position.

Remove and Install

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Make sure that the emergency stops are in OFF position.
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Disconnect the electrical connector from the platform control panel.
5. Remove the screws (x4).
6. Remove the platform control panel from the cradle.

Figure 233.



- A** Platform control panel
B Screws
C Cradle

Install

1. The installation procedure is the opposite of the removal procedure.



36 - Horn

Contents	Page No.
33-36-00 General	33-193



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction	33-193
Technical Data	33-194
Check (Operation)	33-194
Remove and Install	33-195

Introduction

▲ WARNING The horn is very loud. Any person nearby the machine must wear ear protection. If you do not wear ear protection your hearing may be permanently damaged.

The horn must be working correctly for safe machine operation.

The horn is activated at the platform control panel and sounds at the ground as a warning to ground personnel. An improperly functioning horn will prevent the operator from alerting the ground personnel of hazards or unsafe conditions.

Use the horn wherever necessary, but particularly at blind corners and when you are reversing the machine.

Technical Data

Table 107.

Description	Data
Voltage	24V
Current	Less than 3A
Frequency (Low)	335 $\pm$ 20Hz
Frequency (High)	400 $\pm$ 20Hz
Sound level	105-118 dB

Check (Operation)

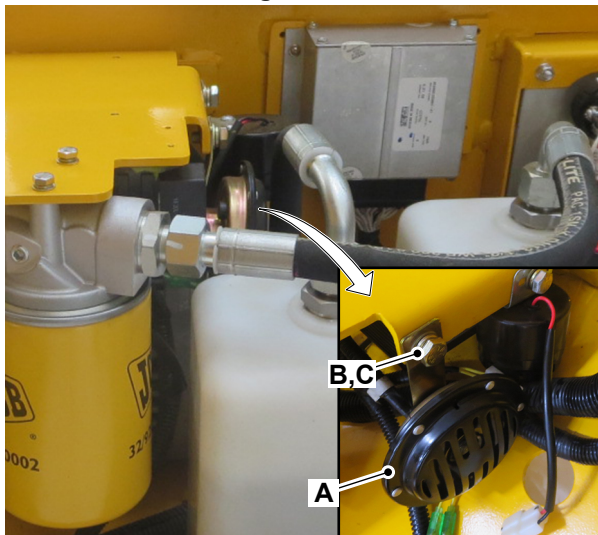
1. Turn the key switch to platform control and pull out the red Emergency Stop button to the ON position at both the ground and platform controls.
2. Push down the horn button at the platform controls. The horn should sound.
3. If the horn fails to sound, investigate further. Check the fuse, check the wiring, make sure that the horn is repaired or replaced before the machine is used again.

Remove and Install

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
4. Disconnect the electrical connectors from the horn.
5. Remove the setscrew and washers.
6. Remove the horn from the machine.

Figure 234.



- A** Horn
- B** Setscrew
- C** Washer

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Tighten the screw to the correct torque value.



42 - Exterior Light

Contents

Page No.

33-42-39 Hazard Warning Light	33-197
-------------------------------------	--------

39 - Hazard Warning Light

Introduction	33-197
Remove and Install	33-198

Introduction

The hazard warning lights are intermittent flashing indicator lights that flash in unison to warn surrounding personnel about the machine is in operation.

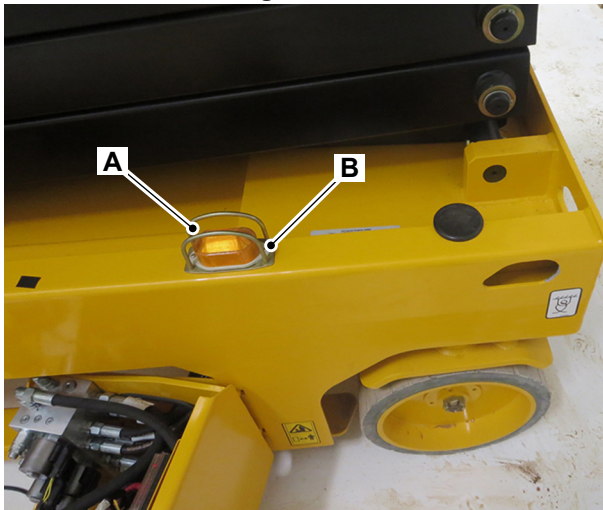
In normal machine operation the hazard warning lights will flash at a rate of 60 flashes per minute. If a fault condition occurs, the flash rate will increase to 120 flashes per minute.

Remove and Install

Remove

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Remove the screw (x2).
4. Lift the light out of the aperture.
5. Disconnect the electrical connection from the warning light.
6. Remove the warning light away from the machine.

Figure 235.



- A** Warning light
B Screw (x2)

Install

1. The installation procedure is the opposite of the removal procedure.



45 - Control Module

Contents	Page No.
33-45-03 Machine Control	33-201
33-45-66 Motor Controller	33-207



Notes:

03 - Machine Control

Introduction	33-201
Diagram	33-202
Calibrate	33-204
Remove and Install	33-206

Introduction

The MECU (Machine Electronic Control Unit) is located inside the hydraulic compartment.

The MECU receives inputs from various switches and sensors. The main function of the MECU is to control the safety and functionality of the machine.

Internal software data enables the MECU to process inputs and respond with the applicable outputs.

Diagram

Table 108. PIN Definition

Pin	Input/Output	Function	Character
1	Input	Reserved	24V
2	Input	Reserved	24V
3	Output	LED (Light Emitting Diode) control	24V /2.5A
4	Power	Drive valve power	24V /7A
5	Power	Drive Valve power	24V /7A
6	Output	Raise valve control	24V /2.5A
7	Output	Forward valve control	24V /2.5A
8	Output	MC enable	24V /2.5A
9	Output	MC speed control	0–4V /0.01A
10	Input	Reserved	24V
11	Input	Reserved	0–5V
12	Input	Reserved	24V
13	Communication	PCU Communication	CAN (Controller Area Network) level
14	Input	Chassis key switch	24V /0V
15	Power	Ground	0V /2A
16	Input	Angle sensor	0–5V
17	Input	Reserved	0–5V
18	Output	Down valve control	24V /2.5A
19	Output	Steer left valve control	24V /2.5A
20	Output	Horn control	24V /2.5A
21	Output	Buzzer control	0V /1A
22	Input	Pothole switch	24V (Pothole ON), 0V (Pothole close)
23	Input	Up Limit Switch	24V (Lower than Up limit), 0V (Higher than Up limit)
24	Communication	PCU	CAN level
25	Power	Power	24V /2A
26	Input	Reserved	0–5V
27	Output	Reserved	0–5V /0.01A
28	Input	Reserved	5V
29	Output	Reverse valve control	24V /2.5A

Pin	Input/Output	Function	Character
30	Output	Steer Right Valve Control	24V /2.5A
31	Output	Parallel Valve Control	24V /2.5A
32	Output	Reserved	24V /2.5A
33	Input	Reserved	24V
34	Input	Tilt switch	24V (Level), 0V (Tilt)
35	Input	Down limit switch	24V (Lower than down limit), 0V (higher than down limit)

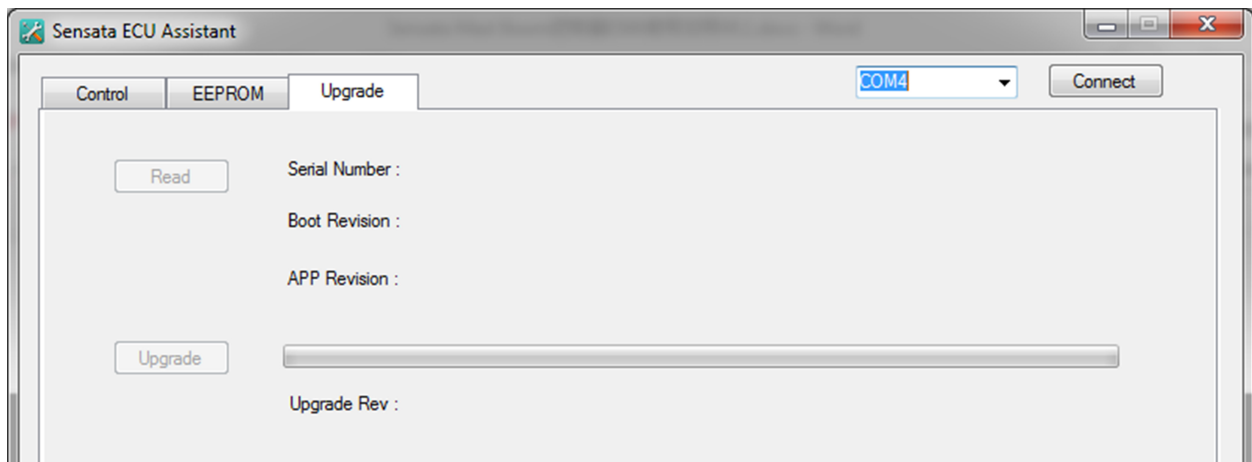
Table 109. Optional PIN

Pin	Input/Output	Function	Character
1	Output	Reserved	24V /2.5A
2	Input	Reserved	0–5V
3	Output	Reserved	5V
4	Communication	Reserved	CAN level
5	Communication	Reserved	CAN level
6	Input	Reserved	0.004–0.02A
7	Input	Reserved	0.004–0.02A
8	Output	Reserved	24V /2.5A
9	Output	Reserved	24V /2.5A
10	Output	Reserved	0–5V /0.01A
11	Input	Reserved	24V
12	Input	Reserved	24V
13	Input	Reserved	24V
14	Output	Reserved	24V /2.5A

Calibrate

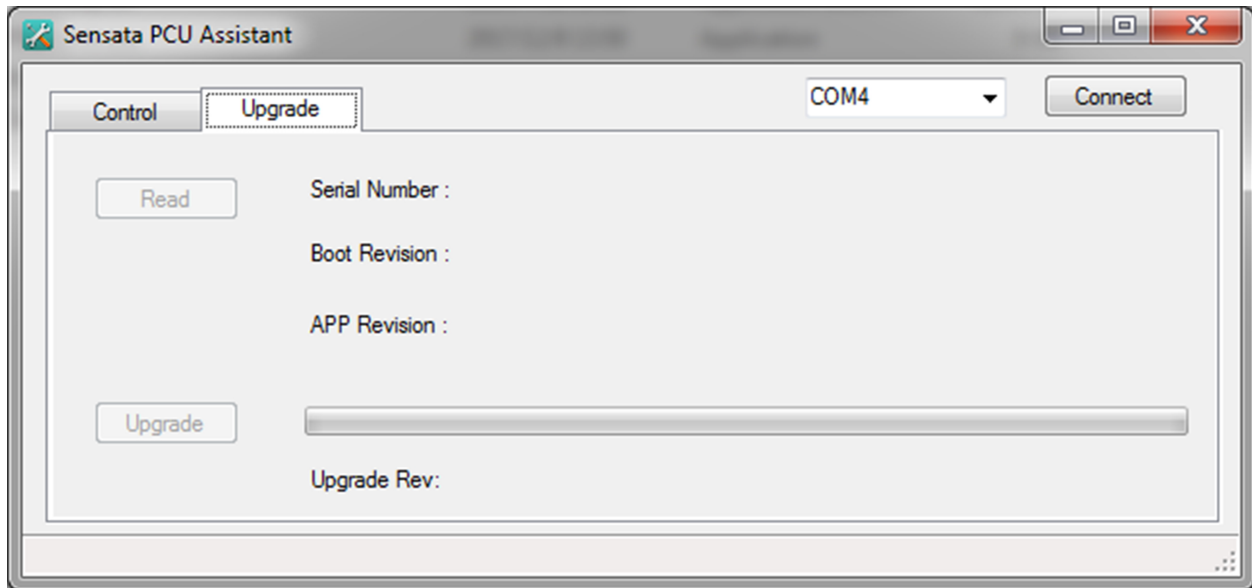
1. If the version for the platform and base ECU (Electronic Control Unit) is not correct, or you need to change the software specification, do the following steps.
2. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
3. Press and hold the Enter button and toggle the key switch to chassis control mode.
 - 3.1. The "1.Set Speed" will reflect in LCD (Liquid Crystal Display) of ECU panel.
4. Release the Enter button.
5. Choose Up or Down button to go to "6.Link Host PC" option.
6. Press Enter button to select "ECU PC" or "PCU PC".
7. Connect the USB (Universal Serial Bus) wire to laptop/computer.
8. Open the firmware "Sensata ECU Assistant" or "Sensata PCU Assistant" in the laptop/computer to update the software.
9. Update the ECU as follows.
 - 9.1. Choose the correct COM port, and click "Connect" button
 - 9.2. Read the software information from ECU.
 - 9.3. Update the software.

Figure 236.



10. Update the PCU (Platform control unit) as follows.
 - 10.1. Choose the correct COM port, and click "Connect" button
 - 10.2. Read the software information from PCU.
 - 10.3. Update the software.

Figure 237.

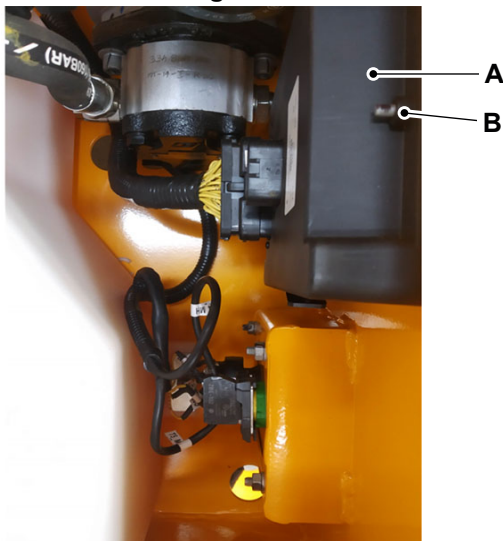


Remove and Install

Remove

1. Obey all electrical system health and safety information.
[Refer to: PIL 33-00-00.](#)
2. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Open the hydraulic compartment cover.
[Refer to: PIL 06-06-09.](#)
5. Remove the screws (x2).
6. Disconnect the electrical connection.
7. Remove the MECU (Machine Electronic Control Unit).

Figure 238.



- A** MECU
B Screws (x2)

Install

1. The installation procedure is the opposite of the removal procedure.
2. Calibrate the MECU.
[Refer to: PIL 33-45-03.](#)

66 - Motor Controller

Introduction	33-207
Diagram	33-208
Clean	33-209
Remove and Install	33-209

Introduction

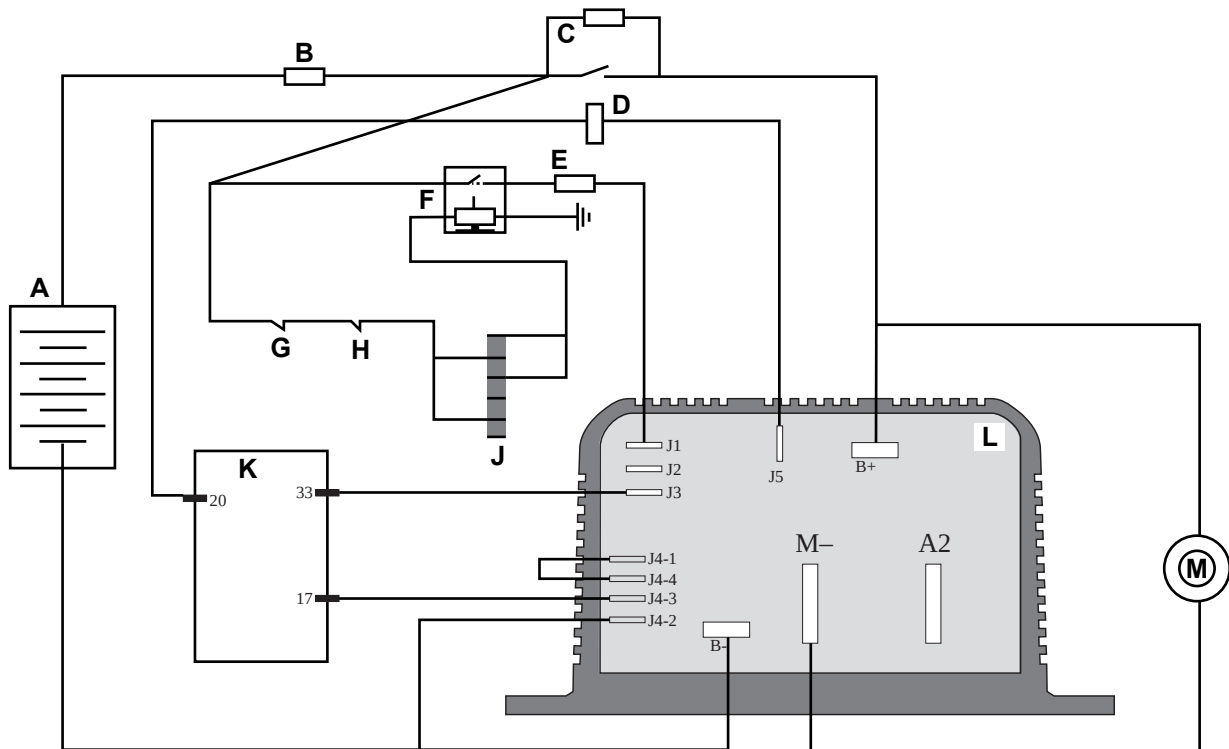
The pump motor control module controls the speed of the electric motor connected to the hydraulic pump. The speed is determined by inputs from the MECU (Machine Electronic Control Unit).

The pump motor control module generates error codes which are monitored and displayed by the MECU through the display screens. For the applicable error codes on Servicemaster. [Refer to: PIL 33-57-90.](#)

This is not a serviceable component. If the component is damaged, you must replace the complete unit.

Diagram

Figure 239.



- | | |
|---|---|
| A Battery | B Primary fuse (200A) |
| C DC (Direct Current) contactor resister | D DC contactor |
| E Secondary fuse | F Control relay |
| G Platform emergency stop switch | H Ground emergency stop switch |
| J Ignition switch | K MECU (Machine Electronic Control Unit) |
| L Motor controller | M Control motor |

Clean

▲ WARNING You could get killed or injured if you touch the Battery positive and Battery negative terminals of the motor controller. The controller is installed with energy storing devices (capacitors). You must discharge the controller before you remove or install.

1. Obey all electrical system health and safety information.

[Refer to: PIL 33-00-00.](#)

2. Make the machine safe.

[Refer to: PIL 01-03-27.](#)

3. Disconnect the quick disconnect handle.

[Refer to: PIL 33-05-00.](#)

4. Take care when handling the motor controller. The motor controller may contain a significant amount of stored electrical energy and could cause serious harm.

5. Remove any dirt or corrosion from the power and signal connector areas.

6. Clean the motor controller with a moist cloth.

7. Dry the motor controller before you connect the battery again.

8. Connect the quick disconnect handle.

[Refer to: PIL 33-05-00.](#)

Remove and Install

▲ WARNING You could get killed or injured if you touch the Battery positive and Battery negative terminals of the motor controller. The controller is installed with energy storing devices (capacitors). You must discharge the controller before you remove or install.

This component is not serviceable, if it fails replace the complete unit.

Remove

1. Obey all electrical system health and safety information.

[Refer to: PIL 33-00-00.](#)

2. Make the machine safe.

[Refer to: PIL 01-03-27.](#)

3. Disconnect the quick disconnect handle.

[Refer to: PIL 33-05-00.](#)

4. Open the hydraulic compartment cover.

[Refer to: PIL 06-06-09.](#)

5. Carefully disconnect the battery leads from the motor controller ECU (Electronic Control Unit).

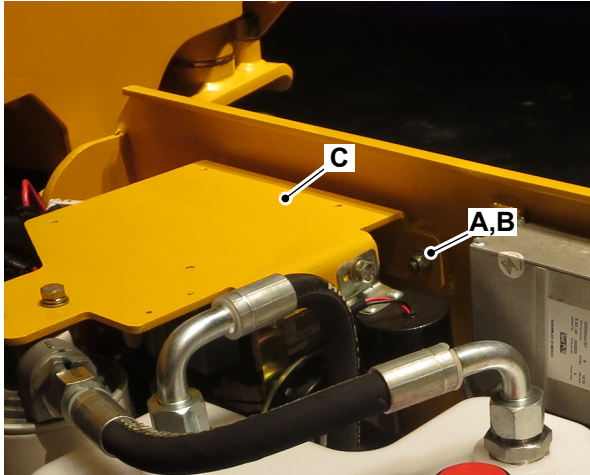
- 5.1. Disconnect the negative battery lead (Black) first.

- 5.2. Make sure you do not touch the battery positive pin and battery negative pin of the motor controller at the same time or you could be electrocuted.

6. Support the mounting bracket.

7. Remove the locknut (x2) and bolts (x2).

Figure 240.

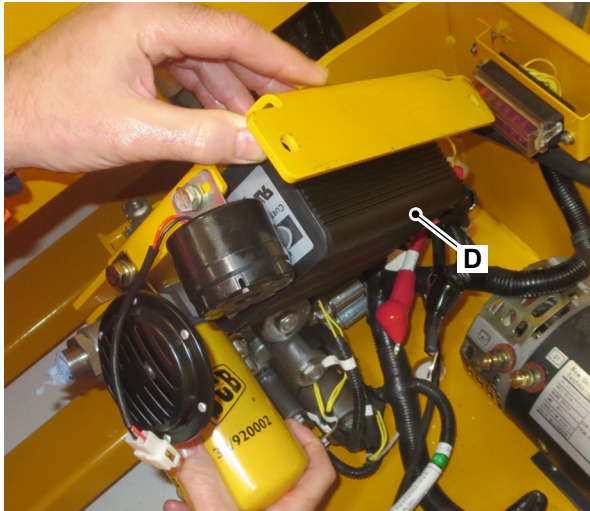


- A** Locknut (x2)
- B** Bolts (x2)
- C** Mounting bracket

8. Carefully move the mounting bracket assembly to reveal the motor controller ECU.

- 8.1. Take care not to pull or stretch the electrical harness or hydraulic hoses.

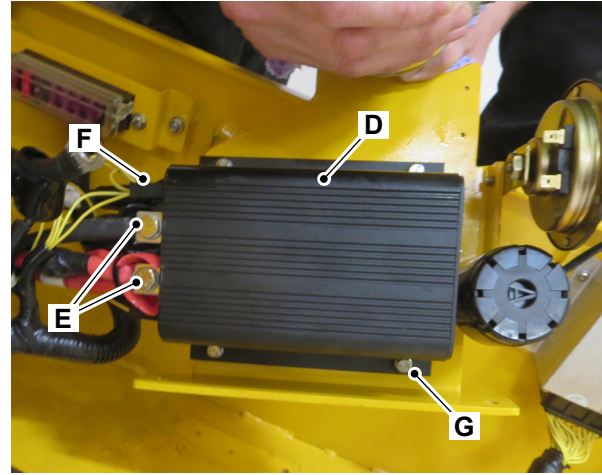
Figure 241.



- D** Motor controller ECU

9. Disconnect the electrical connectors from the motor controller ECU.
10. Remove the setscrews (x4).
11. Remove the motor controller ECU from the machine.

Figure 242.



- D** Motor controller ECU
- E** Battery leads
- F** Electrical connectors
- G** Setscrews (x4)

Install

1. The installation procedure is the opposite of the removal procedure.



57 - Electronic Diagnostic

Contents	Page No.
33-57-03 Servicemaster	33-213
33-57-90 Error Codes	33-224



Notes:

03 - Servicemaster

Introduction	33-213
Preparation	33-216
Disconnect and Connect	33-222

Introduction

JCB Servicemaster is an application to allow engineers to diagnose and setup the various electronic control units within the JCB product range. The tools comprise of a front end generic user interface that allows the user to select the machine which they wish to work on as well as a number of various tools which allow:

- Programming electronic control units
- Diagnosing electronic issues
- Setup of various options
- Checking the service history of the machine.

JCB Servicemaster is updated on a monthly basis by incorporating Web Update. This is a program which works alongside Servicemaster to let the user know and allow them to download an update as and when it becomes available.

JCB Servicemaster software is for use with Microsoft Windows and a laptop personal computer. The laptop computer is connected to the machine diagnostic socket using special cables and an adaptor commonly referred to as DLA (Data Link Adaptor). A second generation DLA 2.0 has been launched and operates in essentially the same way as the original DLA. There are a couple of slight differences to the DLA 2.0. Refer to system information bulletin SI044 for more details.

Use Servicemaster software to:

- Display data from a machine ECU (Electronic Control Unit)
- Change data stored in a ECU

Servicemaster software communicates with the machine ECM (Engine Control Module) using the CAN (Controller Area Network)bus, refer to Control Modules (PIL 33-45).

Diagnostics Tool - User Guide

Introduction

The diagnostics software tool is part of the JCB Servicemaster software suite. The diagnostics software is designed to be an easy to use fault finding tool.

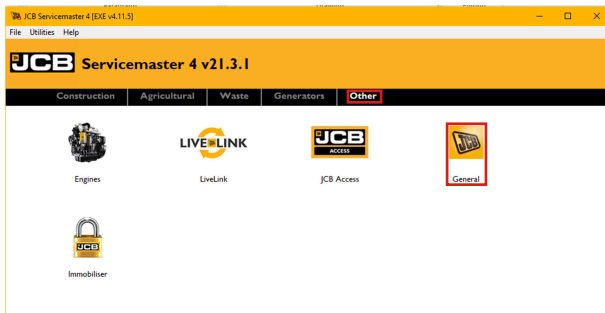
Connecting the Diagnostics

To use Diagnostics your laptop computer must be connected to the machine CAN bus.

Starting the Diagnostics

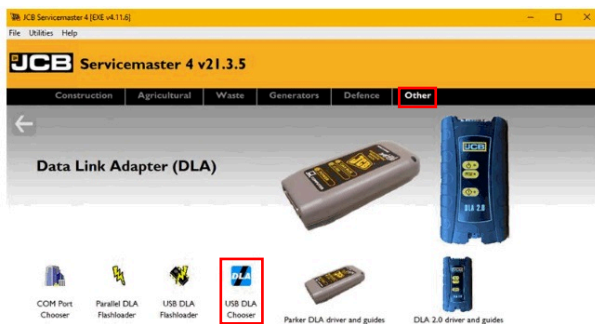
1. Turn ON the machine ignition and additionally start the engine if required (taking normal precautions).
2. Run JCB Servicemaster as administrator on the laptop computer.

Figure 243.



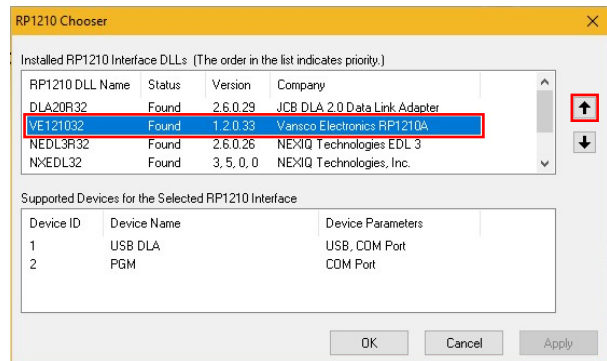
3. In Servicemaster go to "Other>General>DLA".
 - 3.1. Left click on "USB DLA Chooser".

Figure 244.



4. A new window will open. Refer to Figure 245.
 - 4.1. Make sure the sequence is correct based on the DLA you are using to plug in. The driver for the DLA in use should be on the top.
 - 4.2. Use arrows on the right side of the window to move the desired driver to move at the top.
 - 4.3. Click "Apply" and then click on "Ok".

Figure 245.



Flashloader Tool-User Guide

The Flashloader software tool is part of the JCB Servicemaster software suite. If the ECU is replaced and the data file in its flash memory is not applicable it will be necessary to flash the ECU memory with the correct data file. The Flashloader software tool can be used to access the data file name currently loaded in the ECU memory and is necessary upload a new data file to the ECU.

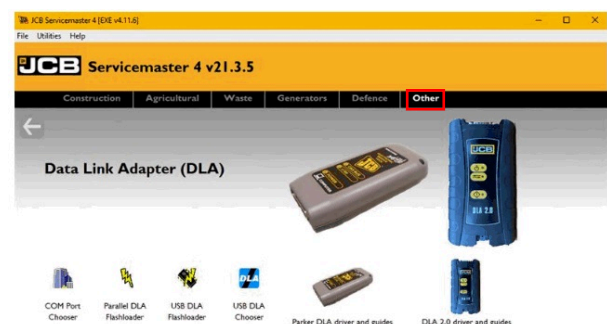
Connecting Flash Loader

To use Flashloader your laptop computer must be connected to the machine CANbus.

Starting Flashloader

1. Turn ON the machine ignition but DO NOT start the engine.
2. Start JCB Servicemaster on the laptop computer.

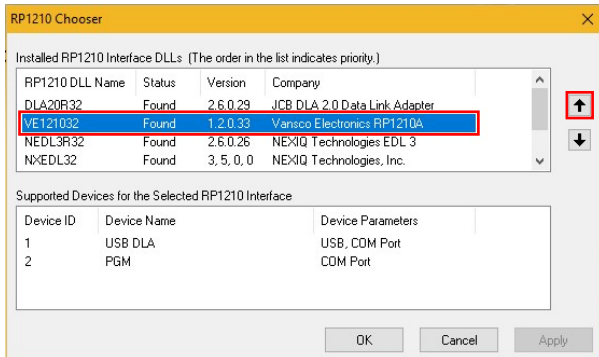
Figure 246.



3. Make sure that the correct DLA is selected in the chooser. Go to Other>General>DLA>USB DLA Chooser. The DLA Chooser window opens. Make sure the sequence is correct based on the DLA you are using to plug in. The driver for the DLA in use should be on the top. Use arrows on the right side of the window to move the desired driver to move at the top.

- Click "Apply" and then click on "Ok". Refer to Figure 247.

Figure 247.



Using Flashloader

Important: Do not turn off the ignition or isolate the system by accidentally engaging the operators seat isolation switch when using the flashloader. This will interrupt the flash signal to the ECU and will irreparably damage the ECU.

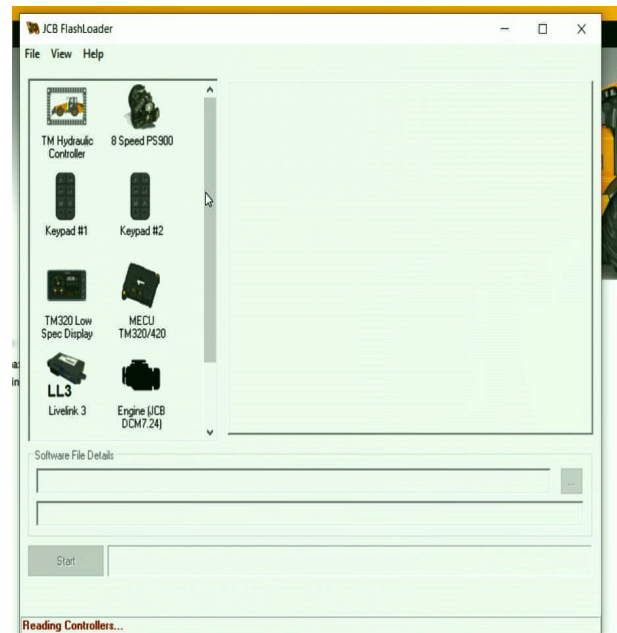
- Make sure that the machine ignition switch is set to ON but do not start the engine.
- Click on the flashloader icon. Refer to Figure 248.

Figure 248.



- Click on the ECU icon.
- Click on the Browse button and select the correct data file. Click Open.

Figure 249. Typical



- Click on the Start button. A confirmation window will appear. Click on the Yes to start the reprogramming of the ECU. The progress bar is displayed.
- When the programming is complete, switch the machine ignition to the OFF position.
- Before starting the machine make sure that the machine setup data is correct. You must check that all other relevant machine settings are correctly configured. Use the setup software tool.

Preparation

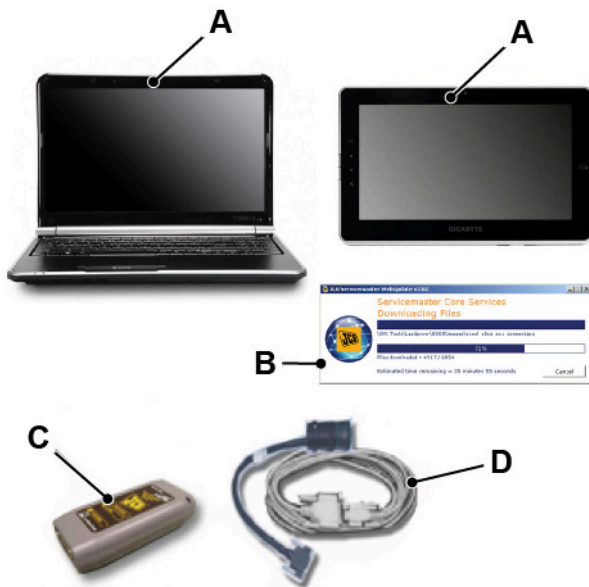
Set-up Servicemaster

The procedures below describe how to set up Servicemaster for USB (Universal Serial Bus) compatible equipment. There are other procedures and options. These are described in detail in the Servicemaster help files.

Before you start Servicemaster set up procedure make sure that you have the following:

- 1 A Microsoft Windows compatible laptop computer with a USB port. Refer to Figure 250.
 - a Make a note that Servicemaster can be tested on Windows 10 only.
- 2 The latest Servicemaster software (internet connection for web updates). Refer to Figure 250.
- 3 A JCB compatible DLA (Data Link Adaptor). Refer to Figure 250.
- 4 The correct connection cables. Refer to Figure 250.
 - a Do not connect any cables to the laptop, DLA or machine at this time.

Figure 250.



- A Laptop computer
 B Servicemaster software
 C DLA
 D Connection cables

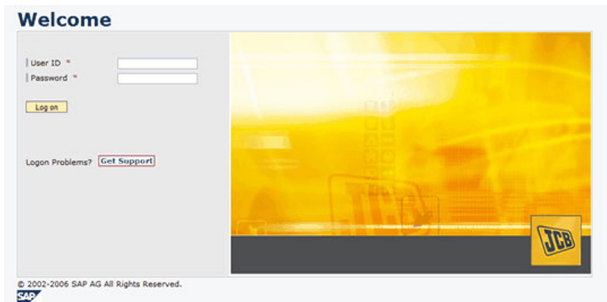
JCB Servicemaster Web Update - New Installation

Once you install JCB Servicemaster on your laptop/PC you will need to keep it updated. JCB

Servicemaster is updated through the "JCB Web Update" program. Do the below steps to download and install the JCB web update.

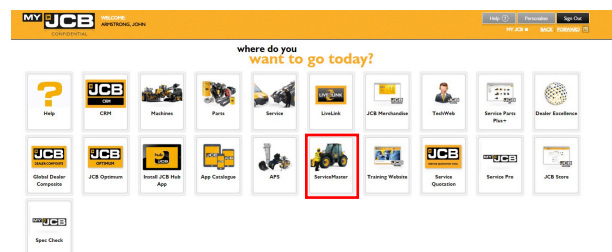
1. Use the web address www.business.jcb.com to install JCB web update.
2. A web page will open on the screen. Refer to Figure 251.

Figure 251.



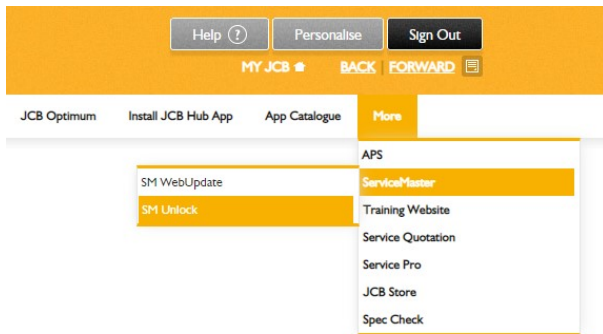
3. If you do not already have a User ID and Password, click the "Get Support" option.
 - 3.1. Apply for an account to get access to JDS (JCB Distribution System) and SPP (Service Parts Pro).
4. Once you are logged in, you will find Servicemaster icon on the screen.
 - 4.1. Click the "Servicemaster" icon.

Figure 252.



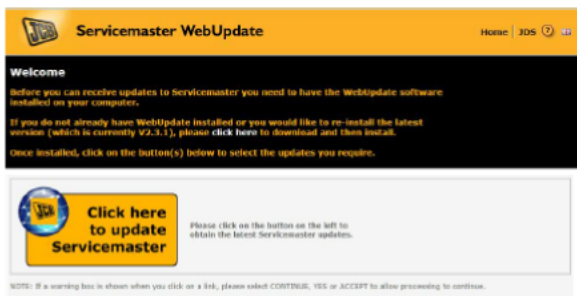
5. Go to More>ServiceMaster>SM WebUpdate.

Figure 253.



6. A new "Servicemaster Web Update" screen will open. Refer to Figure 254.

Figure 254.

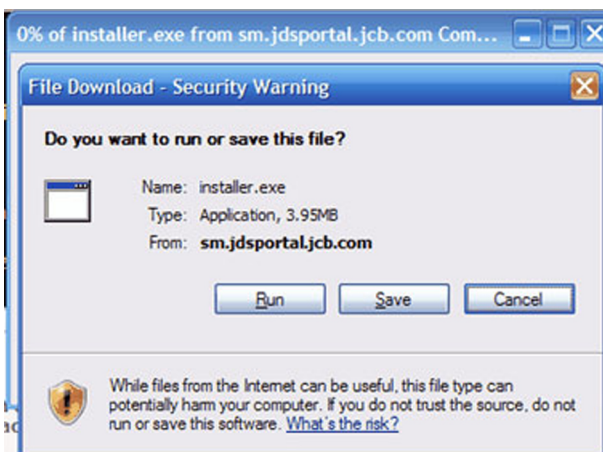


- 6.1. Click the "click here" link which is the orange colour text sentence to download JCB web update.

7. A new "File Download - Security Warning" window will appear on the screen. Refer to Figure 255.

- 7.1. Click the "Run" option to start download.

Figure 255.



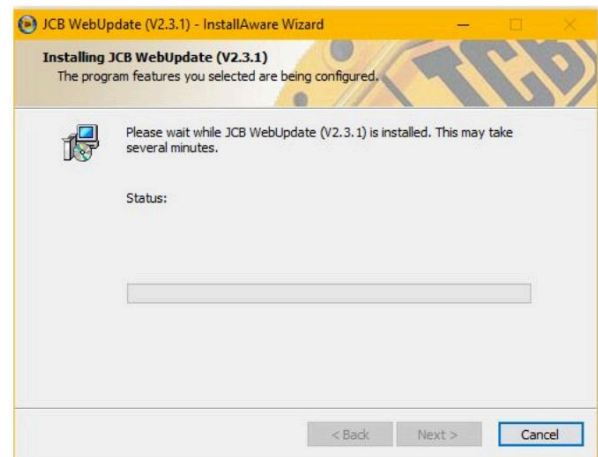
8. Due to the computer system firewall, you may get warning window "Internet Explorer - Security Warning".

- 8.1. Click the "Run" option to proceed.

9. A new "JCB Web Update (V2.3.1) Installation Wizard" window will open. Refer to Figure 256.

- 9.1. Once the download is finished, it will automatically run.

Figure 256.



10. The "JCB Web Update" program shortcut will be created on the computer desktop. Refer to Figure 257.

Figure 257.



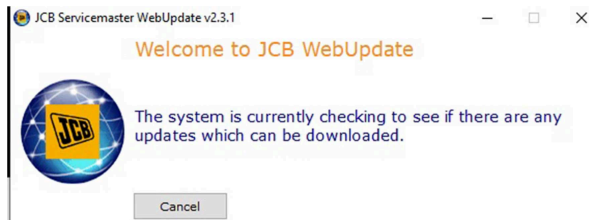
11. Refer to the below section "Servicemaster Update" program to update Servicemaster.

Servicemaster Updates - "JCB Web Update" Program

The updates for Servicemaster is downloaded through the "JCB Web Update" program on a laptop/ PC. Refer to the below steps.

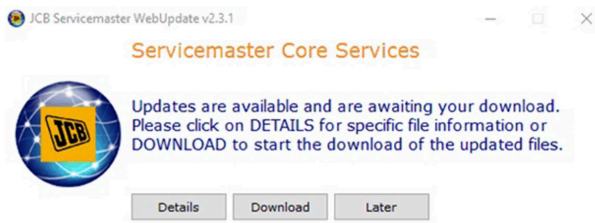
1. Run the "JCB WebUpdate" program either by using desktop shortcut or "Help" menu within Servicemaster, to do a Servicemaster update.
2. The "JCB WebUpdate" program will check for updates. Refer to Figure 258.

Figure 258.



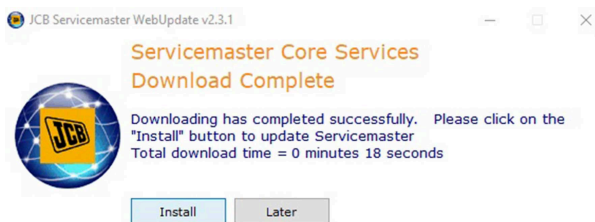
3. The "JCB WebUpdate" program will inform you if there is any to download. Refer to Figure 259.

Figure 259.



- 3.1. You may click the "Details" option to check which files have been changed, added or removed.
- 3.2. Click the "Download" option to download the updates.
4. Once the updates are downloaded, the "JCB Web Update" will give the option to install them. Refer to Figure 260.
- 4.1. You may select options to install the updates immediately or at a later date.

Figure 260.

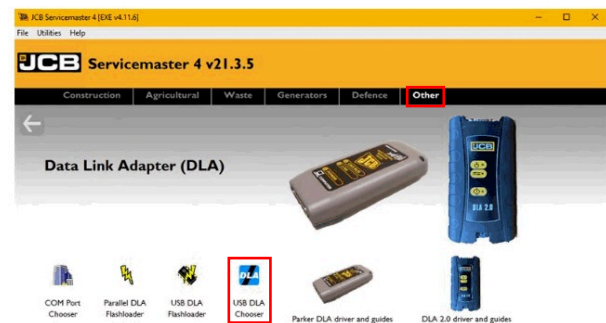


DLA Driver Software - Installation

When you use Servicemaster for the first time on your laptop/PC (which is newly installed with Servicemaster software), the DLA driver software is necessary to install first. Do the below steps to install the DLA driver software.

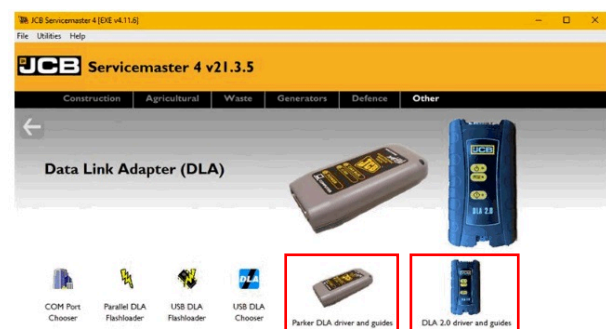
1. Once you complete the DLA driver software installation procedure, it will not require to be done again on your laptop/PC.
2. Do not connect the DLA or cables to the machine or laptop/PC before you install the DLA driver software.
3. Open Servicemaster on your laptop computer.
4. Click the "Other" tab to get access to the "General" icon.
5. Click the "General" icon to get access to the "DLA" icon.
6. Click the "DLA" icon. Refer to Figure 261.

Figure 261.



7. Click on DLA driver and guides icon. Refer to Figure 262.

Figure 262.



8. Based upon the driver you want to install. Refer to Figure 262. Select the appropriate version of DLA.
9. Select V1.10 USB DLA. Refer to Figure 263.
- 9.1. Obey the window instructions to complete the DLA driver software installation.

Figure 263.



10. Select DLA 2.0 Drivers [v2.6.0.29]. Refer to Figure 264.
- 10.1. Obey the window instructions to complete the DLA driver software installation.

Figure 264.

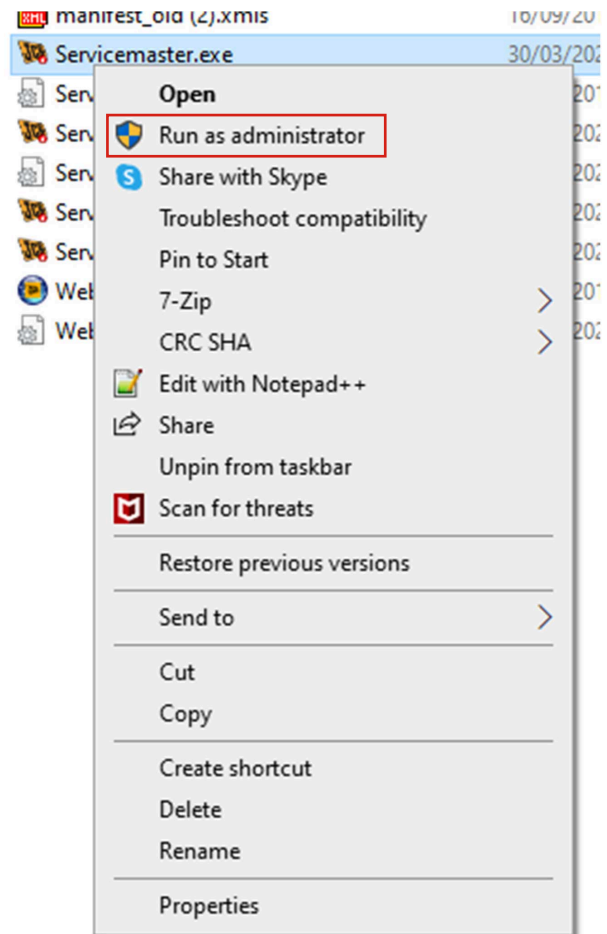
DLA 2.0 Drivers
[v2.6.0.29]

Switch between Parker and DLA 2.0

Switch from Parker DLA to DLA 2.0

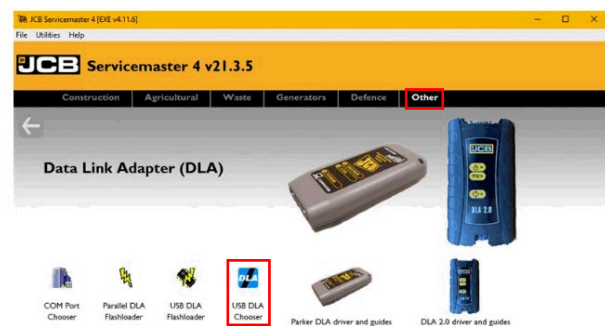
1. On your laptop/PC go to "C:\JCB_Servicemaster_2".
- 1.1. Right click on "Servicemaster.exe" file and select "Run as Administrator".

Figure 265.



2. In Servicemaster go to "Other>General>DLA".
- 2.1. Left click on "USB DLA Chooser".

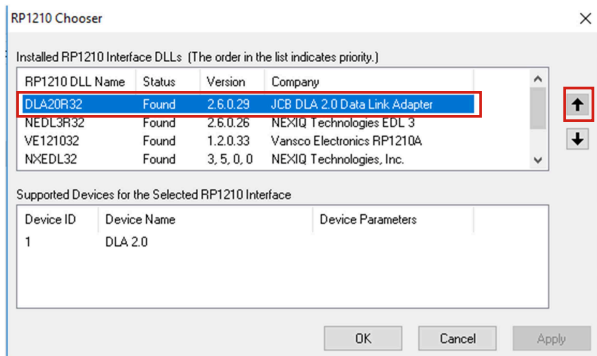
Figure 266.



3. A new window will open.
- 3.1. Select the "DLA20R32" item and move it to the top of the box with the highlighted arrow on the right side.
- 3.2. Click "Apply" and then click on "Ok".

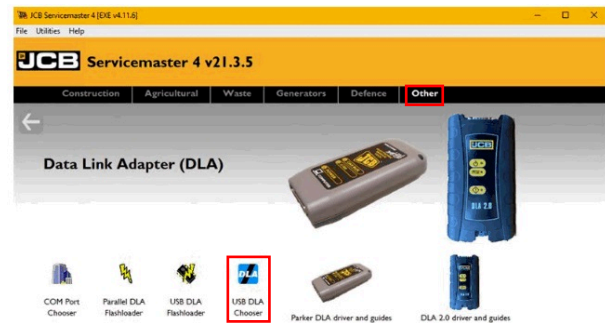
3.3. The DLA 2.0 is now ready to use.

Figure 267.



2.1. Left click on "USB DLA Chooser".

Figure 269.

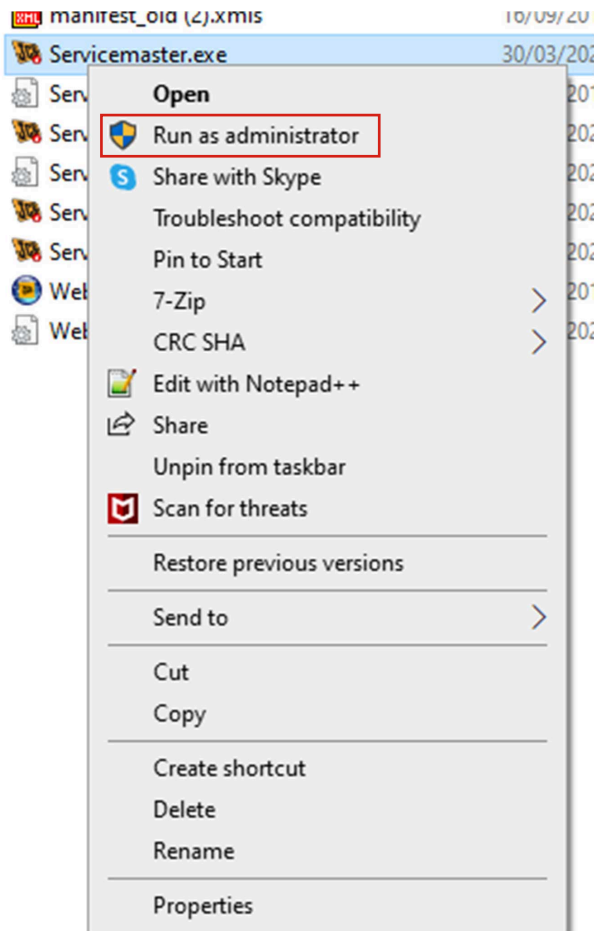


Switch from DLA 2.0 to Parker DLA

1. On your laptop/PC go to "C:\JCB_Servicemaster_2".

1.1. Right click on "Servicemaster.exe" file and select "Run as Administrator".

Figure 268.



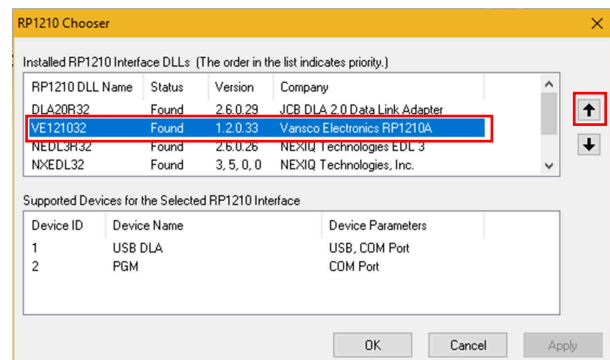
3. A new window will open. Refer to Figure 270.

3.1. Select the "VE121032" item and move it to the top of the box with the highlighted arrow on the right side.

3.2. Click "Apply" and then click on "Ok".

3.3. The Parker DLA is now ready to use.

Figure 270.



DLA Type and Communications Port - Configuration

When you use Servicemaster for the first time on your laptop/PC (which is newly installed with Servicemaster software) make sure that the correct DLA and laptop/PC port is selected to communicate with the DLA. Do the below steps to configure the DLA with the laptop/PC.

- Once you complete the DLA configuration, it will not require to be done again on your laptop/PC.
- Open Servicemaster on your laptop computer.
- Click the "Other" tab to get access to the "General" icon.
- Click the "General" icon to get access to the "DLA" icon.

2. In Servicemaster go to "Other>General>DLA".

5. Click the "DLA" icon.
6. Select and open the "COM Port Chooser" icon. Refer to Figure 271.

Figure 271.



7. A new "DLA Com Port Chooser" window will open.
 - 7.1. Select the "USB /Serial DLA" device and click the "Apply" option to confirm.
 - 7.2. Make a note that the older DLA and laptop computers may not be compatible with the USB ports. Select the "Parallel/Serial DLA" device in the DLA chooser.

DLA Firmware File - Check

Upon plugin of the DLA 2.0 from laptop to a machine and powered ON, the driver will update the Firmware on the device (DLA"2). Upon Servicemaster updates the latest DLA 2 Driver will also update. If update is needed the system will prompt an 'update required' message. If user selects 'OK' update happens automatically.

The DLA has software embedded in its own flash memory. This file must be replaced with a new one when new firmware is released. You will only have to Check the DLA firmware file version if you receive a new Servicemaster version or use a different DLA.

1. Make sure that the DLA is connected to the laptop computer.
2. Open Servicemaster on your laptop computer.
3. Click the "Other" tab to get access to the "General" icon.
4. Click the "General" icon to get access to the "DLA" icon.
5. Click the "DLA" icon.
6. Select and open the "USB DLA Flashloader" icon. Refer to Figure 272.
 - 6.1. Make a note that the older DLA and laptop computers may not be compatible

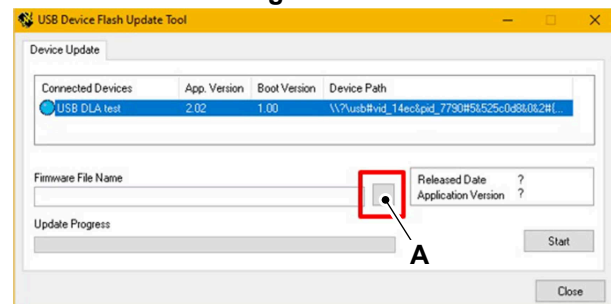
with the USB ports. Select and open the "Flashloader for Serial/Parallel DLA" icon.

Figure 272.



7. A window "USB Device Flash Update Tool" will open. Refer to Figure 273.
 - 7.1. The firmware details in the DLA are displayed with the application version (for example - 1.04). Refer to Figure 273.

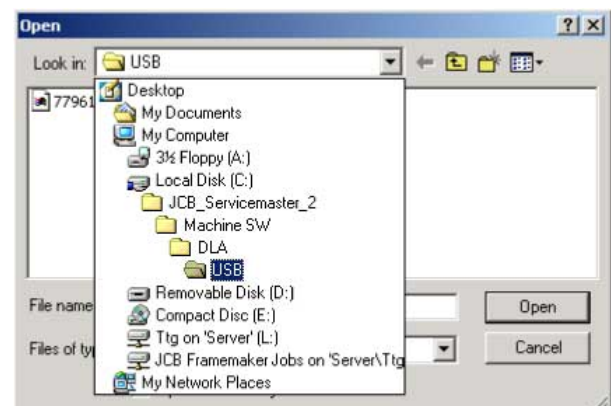
Figure 273.



A Browse option

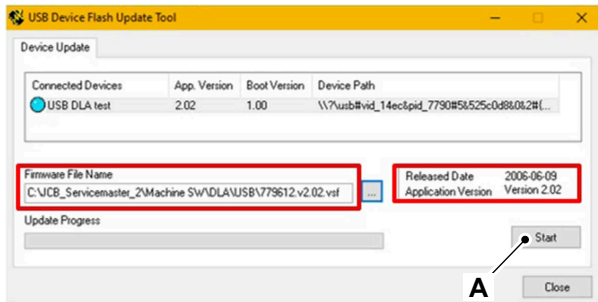
8. Check for a new firmware file.
 - 8.1. Click the "Browse" option and find the file stored within the JCB Servicemaster directory on your laptop hard drive. Refer to Figure 274.
 - 8.2. Select the file and click the "Open" option.

Figure 274.



- 8.3. The selected file appears in the "firmware file name" field together with its release date and application version (for example - 2.01). Refer to Figure 275.

Figure 275.



A Start option

9. Load a new firmware file.
 - 9.1. If the firmware in the DLA is not up to date, load the new file.
10. Click the "Start" option and obey the on-screen instructions.

Disconnect and Connect

Special Tools

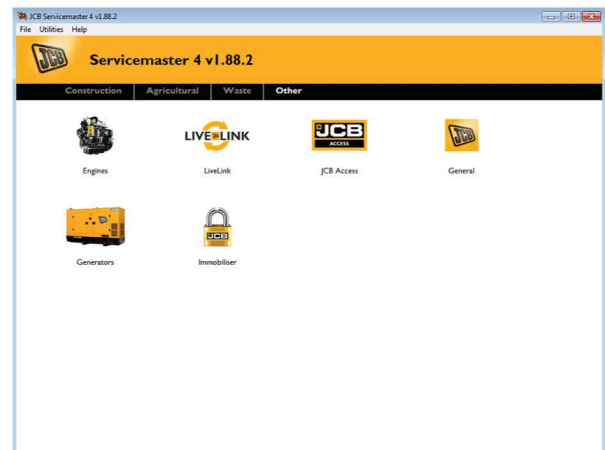
Description	Part No.	Qty.
Diagnostics Lead - K500 Controller	401/L7085	1

1. To use Servicemaster, connect your laptop computer to the platform controller with the specified cable.

Special Tool: Diagnostics Lead - K500 Controller (Qty.: 1)

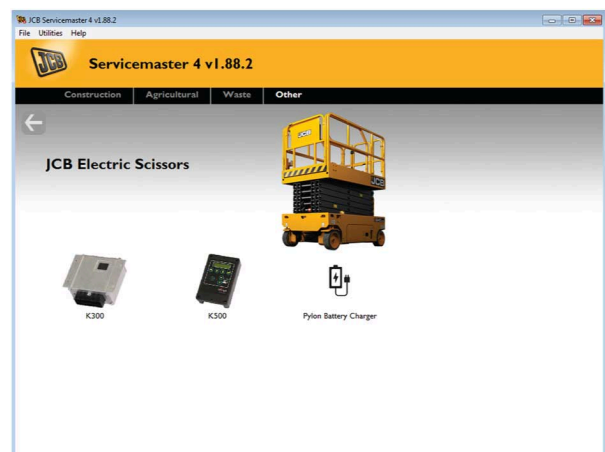
2. Launch the Servicemaster on your laptop computer.
3. Go to the tab 'Other'.
4. Select the product 'JCB Access'.

Figure 276.



5. Click on the 'JCB Electrical Scissors'.
6. Click on the 'K500'.

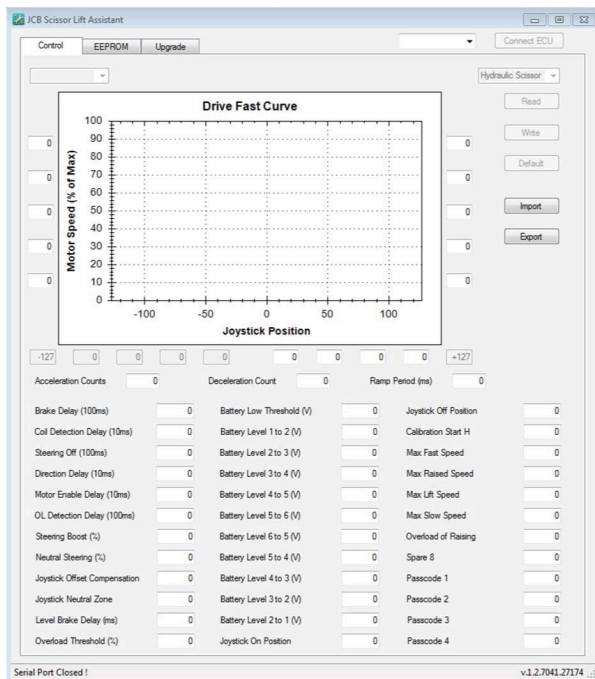
Figure 277.



- 6.1. Use the 'JCB LK500 Help Files' as required.

7. Launch the 'JCB Scissor Lift Assistant'.

Figure 278.



90 - Error Codes

Introduction	33-224
Technical Data	33-225

Introduction

This machine has two display screens to display the fault codes.

- MECU (Machine Electronic Control Unit), installed in the hydraulic compartment. [Refer to: PIL 33-45-03.](#)
- Platform ECU (Electronic Control Unit) part of platform control panel, installed on the platform. [Refer to: PIL 33-24-05.](#)

Technical Data

Diagnostic Trouble Codes (DTC)

Error codes can be displayed on platform control display as well as on the ground control display.

When an alarm sounds the relevant error code will be displayed on the display.

Table 110.

Display	Description	Lift Reaction	Operator Instructions
01	System initialization fault	Disables all motion	Check the ECU (Electronic Control Unit), If necessary replace the faulty ECU.
02	System communication fault	Disables all motion	Check communications cable connections and other wiring. If necessary, replace the PCU (Platform Control Unit) or ECU.
03	Invalid option setting fault	Disables all motion	Set appropriate option for lift.
04	Load sensing data fault	Warning only	Contact JCB Service.
12	Chassis up or down switch ON at power-up fault	Disables chassis control	Check communications cable connections and other wiring. If necessary, replace the ECU.
18	Pothole guard fault	Disables lifting and driving	Check that the pothole guards are extended. Check the pothole limit switches. Check wires to the switches. Check the down limit switch and connections.
31	Pressure sensor 1 fault	Disables all motion	Check the sensor and wiring to the sensor. Make sure that the correct option is properly selected for load sensing.
32	Angle sensor fault	Disables all motion	Check the sensor and wiring to the sensor. Make sure that the correct option is properly selected for load sensing.
33	Sleep mode to prevent battery drain	Lift slow to elevated speed	Press the Lift and drive buttons on the platform controller to awake the machine.
36	Limp mode	Lift slow to elevated speed	Battery voltage is low, charge the battery.
42	Platform left turn switch ON at power-up message	Diagnostic message only	Make sure that nothing is holding the Joystick toggle switches down. If the toggle switches are not faulty replace the joystick or PCU.
43	Platform right turn switch ON at power-up message	Diagnostic message only	Make sure that nothing is holding the Joystick toggle switches down. If the toggle switches are not faulty replace the joystick or PCU.
46	Platform joystick enable switch ON at power-up message	Disables platform control	Make sure that nothing is holding the enable switch closed. Check the neutral zone parameters. If necessary, replace the joystick or PCU.

Display	Description	Lift Reaction	Operator Instructions
47	Platform joystick not in neutral at power-up message	Diagnostic message only	Make sure that the Joystick is in the neutral position. Check the neutral zone parameter setting in the LabView Programmer. If necessary replace the joystick or the PCU.
52	Drive forward coil fault	Disables lifting and driving	Check the connections to the Coil's terminals. Make sure that the coil is not open or shorted.
53	Drive reverse coil fault	Disables lifting and driving	Check the connections to the Coil's terminals. Make sure that the coil is not open or shorted.
54	Lift Up coil fault	Disables lifting and driving	Check the connections to the Coil's terminals. Make sure that the coil is not open or shorted.
55	Lift Down coil fault	Disables lifting and driving	Check the connections to the Coil's terminals. Make sure that the coil is not open or shorted.
56	Steer right coil fault	Disables lifting and driving	Check the connections to the Coil's terminals. Make sure that the coil is not open or shorted.
57	Steer left coil fault	Disables lifting and driving	Check the connections to the Coil's terminals. Make sure that the coil is not open or shorted.
58	General brake coil fault	Disables lifting and driving	Check the connections to the Coil's terminals. Make sure that the coil is not open or shorted.
59	Parallel coil fault	Disables lifting and driving	Check the connections to the Coil's terminals. Make sure that the coil is not open or shorted.
60	Motor controller wiring broken	Disables lifting and driving	Check connections of motor controller and DC contactor resistor connections. If necessary, replace the motor controller.
61	Internal memory fault on motor controller	Disables lifting and driving	Re-start the machine. If necessary replace the motor controller.
62	Internal short fault on motor controller (MOSFET)	Disables lifting and driving	Re-start the machine. If necessary replace the motor controller.
64	Machine wiring harness fault	Disables lifting and driving	Check the wiring harness. If necessary, replace the damaged harness.

Display	Description	Lift Reaction	Operator Instructions
68	Battery low voltage fault at motor controller	Disables all motion	Check battery voltage. If necessary, charge the battery. Check the battery connections. If necessary, tighten or clean the battery terminals and connections. Check the voltage to the ECU and PCU.
69	Motor controller throttle fault	Disables lifting and driving	Check connection to throttle input. Repair or replace the harness, or the motor controller.
70	Main contactor coil short	Disables lifting and driving	Check connections. Repair or replace the faulty contactor.
71	Main contactor weld fault	Disables lifting and driving	Check DC contactor functionality.
72	Motor controller main contactor driver fault	Disables lifting and driving	Replace Motor controller.
77	Motor controller over temperature cut-off	Disables lifting and driving	Check temperature of motor controller and allow to cool. If necessary, replace the motor controller.
80	Over 80% load warning	Warning only	Check the platform load.
85	Pressure sensor 2 fault	Disables all motion	Calibrate the pressure sensor.
86	Down limit switch fault	Disables all motion	Calibrate the pressure sensor.
87	Up limit switch fault	Warning only	Check wiring connections inside switch. if necessary, replace the up limit switch.
90	Over 90% load warning	Warning only	Platform is getting close to its limit of weight. Do not add more load.
99	Over 99% load warning	Warning only	Platform has reached its limit of weight. Do not add more load.
OL	Overloaded platform fault	Disables all motion	Remove the excess load immediately.
LL	Machine tilted beyond safe limits fault	Disables lifting and driving	If the machine is tilted, make the machine level. If the machine is level, check the tilt sensor and wiring to the tilt sensor.
LF	Up/Down Control Fault	Warning only	Re-start the machine. If necessary, replace the angle sensor.

If the machine reports an error on the display while driving with platform raised, lower the platform and move the machine to a smooth firm level surface. For more information, please contact your local JCB dealer.

In the event of an overload alarm 'OL', remove the excess load from the platform. Machine will not raise or lower until load is reduced.

84 - Sensor

Contents	Page No.
33-84-00 General	33-229
33-84-07 Hydraulic Pressure	33-231
33-84-60 Tilt	33-233
33-84-63 Angle	33-236
33-84-82 Pothole Protection System	33-239
33-84-84 Platform Upper Limit	33-242
33-84-85 Platform Down Limit	33-245

00 - General

Introduction	33-229
Component Identification	33-230

Introduction

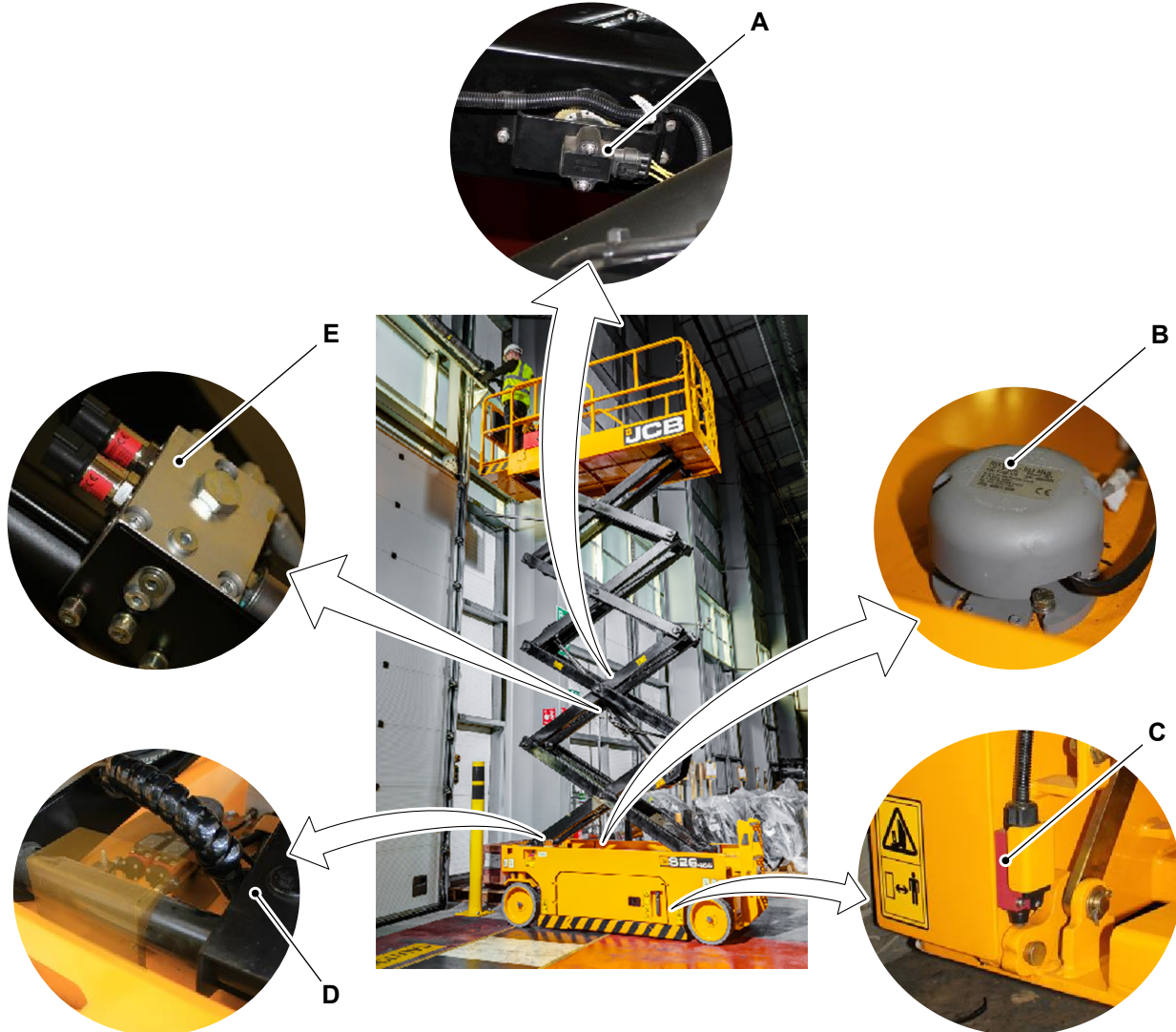
There are various sensors installed on the machine that control different functions.

The sensors are factory set and should not need adjustment, if however there is a fault (alarm or horn sounds) or if a new component is installed, the sensors may need calibrating, follow the calibration procedures in this manual to adjust the sensors to the correct settings.

The sensors are not serviceable, therefore they must be replaced in the event of damage.

Component Identification

Figure 279.



- A Angle sensor
- C Pothole protection switches (x2)
- E Pressure sensor (x2)

- B Tilt sensor
- D Platform Limit switches (x2)

07 - Hydraulic Pressure

Introduction	33-231
Check (Operation)	33-232
Remove and Install	33-232

Introduction

This machine is installed with the two hydraulic pressure sensors. They are mounted to a manifold block on the lift arm cylinder ram.

The hydraulic pressure sensors measure the cylinder head side pressure and send a signal to the MECU (Machine Electronic Control Unit) for the overload system.

Check (Operation)

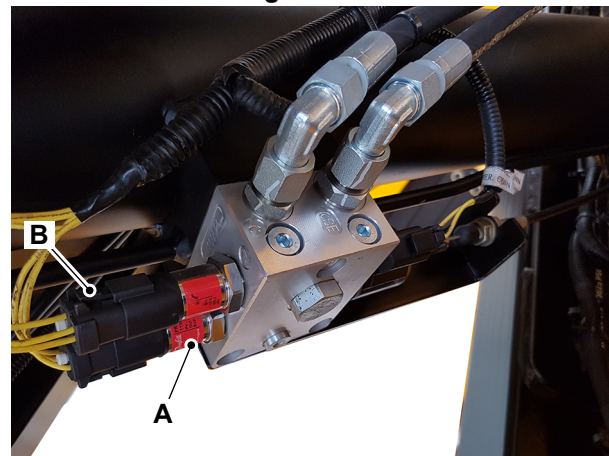
1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Add the specified rated load to the platform.
Percentage: 105%
[Refer to: PIL 01-48-10.](#)
3. Make sure that warning alarm sounds.

Remove and Install

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Disconnect the electrical connector from the pressure sensor.
5. Remove the sensor from the lift cylinder control valve.

Figure 280.



- A** Pressure sensor
B Electrical connector

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Tighten the pressure sensors to the correct torque value.
3. Make sure that the connectors are dry and free from hydraulic oil.
4. Make sure that all the connectors are correctly connected.

60 - Tilt

Introduction	33-233
Calibrate	33-234
Remove and Install	33-235

Introduction

The machine is installed with a tilt sensor. It is mounted directly to the chassis.

The tilt sensor measures the chassis angle from the horizontal position.

The tilt sensor sends a signal (24V) to the MECU (Machine Electronic Control Unit) if the chassis is within the safe level (below 3° front-to-back and below 1.5° side-to-side). If the chassis is over the safe tilt limit, the sensor sends a signal to the MECU and the warning light is lit at the platform ECU (Electronic Control Unit).

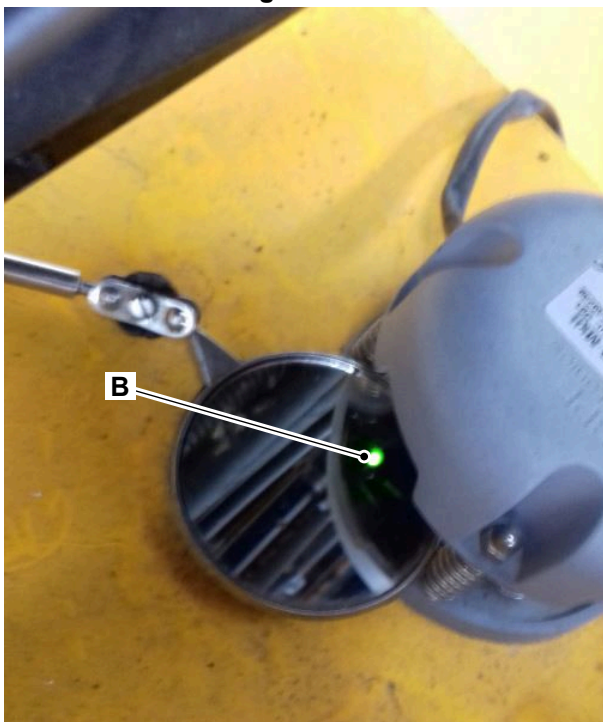
Calibrate

Special Tools

Description	Part No.	Qty.
Tilt sensor calibration lead	400/J2673	1

- Important: It is safety critical that the level of the ground is confirmed as flat during this calibration.
- Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
- When the machine is on level ground (specified angle in each direction), do the following.
Angle: 0°
 - Switch the ignition on. Make sure there is power to the tilt switch. Check the green LED (Light Emitting Diode) is lit.

Figure 281.



B Green LED

- Connect the tilt sensor calibration lead to the specified power supply.
Voltage: 24V
[Special Tool: Tilt sensor calibration lead](#)
(Qty.: 1)
- Allow the lead to be connected with power supply for the specified duration.
Duration: 3–7s
- This sets the zero position.

- Disconnect the tilt sensor calibration lead from the power source.
 - The green colour LED must blink. If the LED is not blinking it could be that the electrical terminal is corroded at A.
- Note that the tilt sensor is pre-set to sideways tilt by the specified angle from the horizontal.
Angle: 1.5°
 - Note that the tilt sensor is pre-set to lengthways tilt by the specified angle from the horizontal.
Angle: 3°

Figure 282.



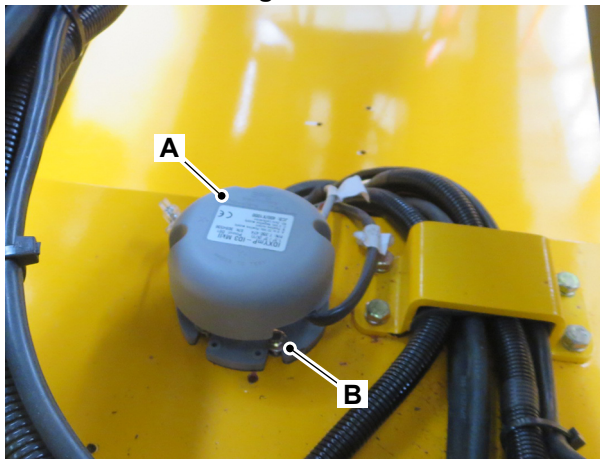
A Electrical terminal

Remove and Install

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Disconnect the electrical connector from the tilt sensor.
5. Remove the screws (x3).
6. Remove the tilt sensor from the machine.

Figure 283.



- A** Tilt sensor
B Screws (x3)

Install

1. The installation procedure is the opposite of the removal procedure.
2. Calibrate the tilt sensor.
[Refer to: PIL 33-84-60.](#)

63 - Angle

Introduction	33-236
Calibrate	33-237
Remove and Install	33-237

Introduction

For: S1530E [RAJ], S1930E [RAJ]
..... Page 33-236
For: S2032E [RAJ], S2632E [RAJ], S2646E
[RAJ], S3246E [RAJ], S4046E [RAJ],
S4550E [RAJ] Page 33-236

(For: S1530E [RAJ], S1930E [RAJ])

The angle sensor for this machine is mounted to the chassis on a bracket against the front fixed scissor pin.

The angle sensor measures the scissor pack angle continuously. It sends a signal to the MECU (Machine Electronic Control Unit) to determine the platform height. This signal is used for the overload system, downward stop height and diagnostics of the down limit switch.

(For: S2032E [RAJ], S2632E [RAJ],
S2646E [RAJ], S3246E [RAJ], S4046E
[RAJ], S4550E [RAJ])

The angle sensor for this machine is mounted to the inner scissor boom on the centre pin.

The angle sensor measures the scissor arm assembly angle continuously. It sends a signal to the MECU to determine the platform height. This signal is used for the overload system, downward stop height and diagnostics of the down limit switch.

Calibrate

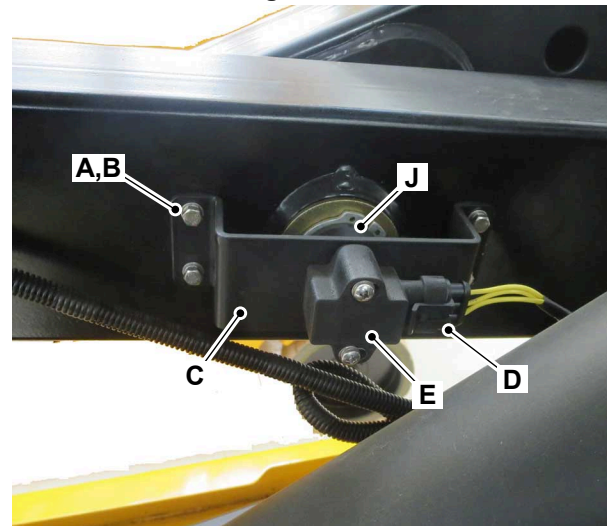
Refer to: PIL 01-12-00.

Remove and Install

Remove

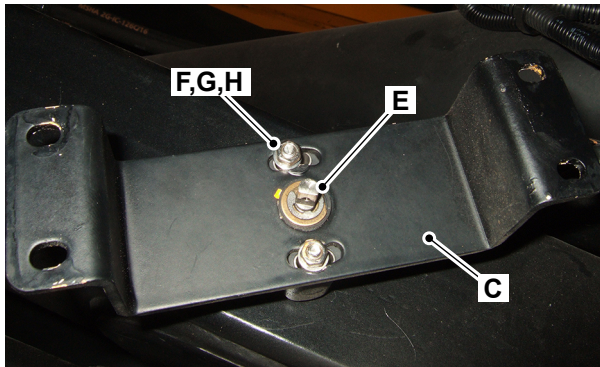
1. Make the machine safe with the platform raised.
Refer to: PIL 01-03-27.
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
Refer to: PIL 01-03-27.
3. Disconnect the battery quick disconnect handle.
Refer to: PIL 33-05-00.
4. Disconnect the electrical connector from the angle sensor.
5. Remove the bolt 1 (x4) and washer 1 (x4).
6. Remove the angle sensor with bracket from the scissor arm.

Figure 284.



- A** Bolt 1 (x4)
- B** Washer 1 (x4)
- C** Bracket
- D** Electrical connector
- E** Angle sensor
- J** Machined boss

- 6.1. Make a note that there is a machined boss installed in the pivot pin and the angle sensor is housed within this machined boss.
7. Remove the bolt 2 (x2), washer 2 (x2) and nut (x2).
8. Remove the angle sensor from the bracket.

Figure 285.

- C Bracket
- E Angle sensor
- F Bolt (x2)
- G Washer 2 (x2)
- H Nut (x2)

Install

1. The installation procedure is the opposite of the removal procedure.
2. Calibrate the angle sensor.
[Refer to: PIL 33-84-63.](#)
3. Calibrate the overload system.
[Refer to: PIL 01-12-00.](#)



82 - Pothole Protection System

Introduction	33-239
Calibrate	33-240
Remove and Install	33-241

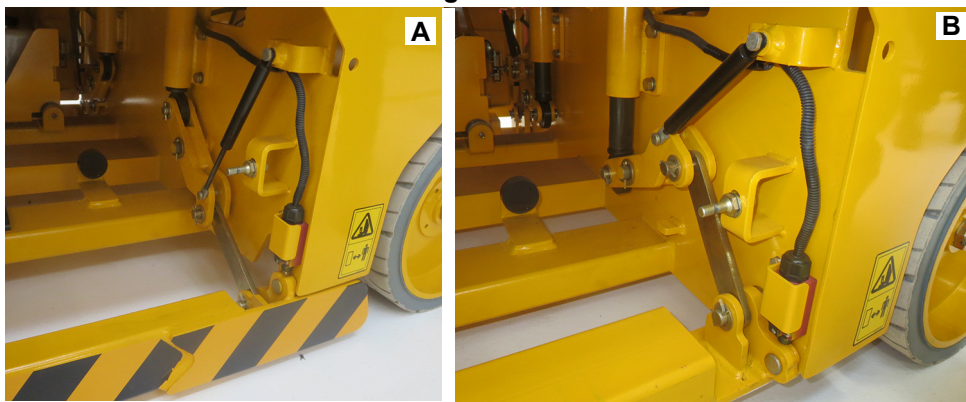
Introduction

The pothole protection limit switch is located on both the pothole protection plates. This detects when the pothole protection plate is fully extended and sends a signal to the MECU (Machine Electronic Control Unit). This signal is used by MECU to determine if the plates are deployed correctly.

Calibrate

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Check operation of the pothole protection system.
[Refer to: PIL 06-94-00.](#)
3. If the pothole protection alarm is not triggered, do the following.
 - 3.1. Lower the platform.
 - 3.2. Check the pothole limit switches. Make sure that they are correctly pressed.
4. If one of the switches is not pressed when the plates are stowed, move the pothole limit switch closer to the plate.
 - 4.1. The pothole switches must be fully pressed in when the plates are stowed.
 - 4.2. The pothole switches must be fully relaxed out when the plates are deployed.

Figure 286.



A Pothole plate deployed / Pothole switch relaxed

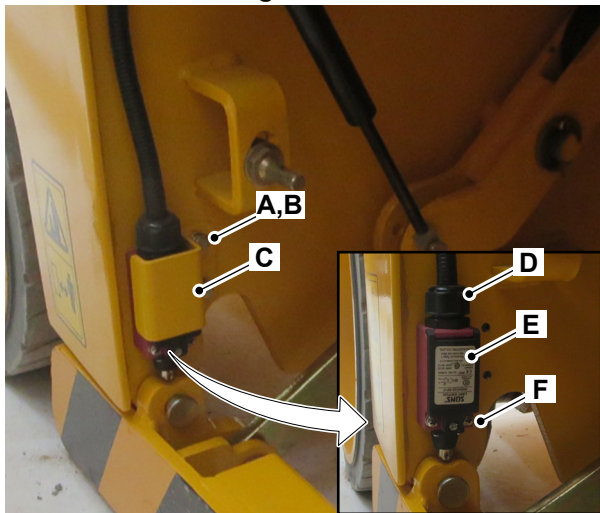
B Pothole plate stowed / Pothole switch pressed

Remove and Install

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Remove the bolt (x2) and washer (x2).
4. Remove the bracket.
5. Remove the screw (x2).
6. Disconnect the electrical connector.
7. Remove the switch from the machine.

Figure 287.

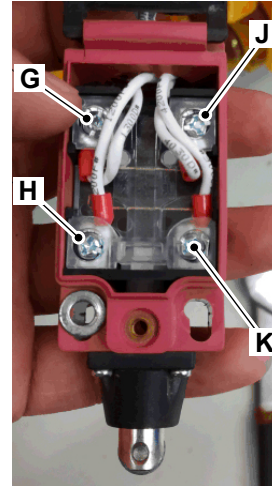


- A** Bolt (x2)
- B** Washer (x2)
- C** Bracket
- D** Electrical connector
- E** Switch
- F** Screw (x2)

Install

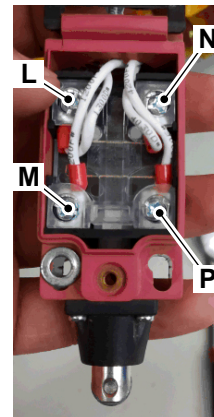
1. The installation procedure is the opposite of the removal procedure. Additionally do the following step.
2. Make sure that the wire connections installed at correct location.

Figure 288. Pothole - Left side



- G** Wire 1300D-21
- H** Wire 1200F-13
- J** Wire 4030D-22
- K** Wire 4200F-14

Figure 289. Pothole - Right side



- L** Wire 4030D-21
- M** Wire 1200F-13
- N** Wire 4300D-22
- P** Wire 4200F-14



84 - Platform Upper Limit

Introduction	33-242
Calibrate	33-243
Remove and Install	33-243

Introduction

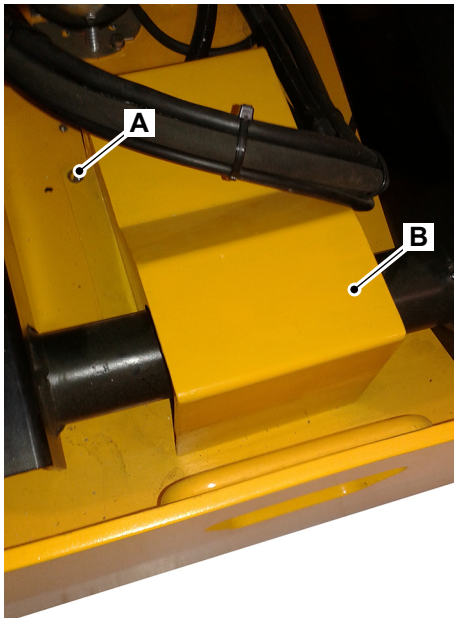
The platform upper limit switch is located at the front fixed scissor pin on a cam/tab. This detects when the platform is fully raised and sends a signal to the MECU (Machine Electronic Control Unit). This limits the platform elevation.

Calibrate

Set the Up Limit Switch Position

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Raise the platform to full extension of the lift cylinder or until the up limit switch stops the platform.
3. Lower the platform.
 - 3.1. Remove the screw 1 (x4).
 - 3.2. Remove the bracket to access the platform up limit switch.

Figure 290.



- A** Screw 1 (x4)
B Bracket

- 3.3. Adjust the up limit switch position in the direction required.
4. Do the step 1 and 2 again until the platform stops just before reaching full extension of the lift cylinder.

Remove and Install

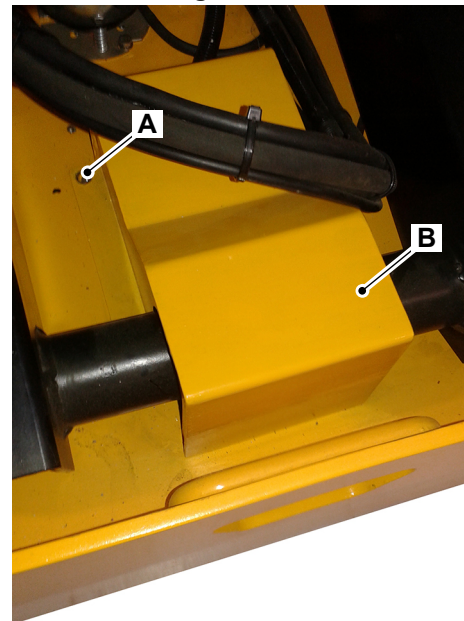
Consumables

Description	Part No.	Size
Wiring Splice-Bootlace (1mm Red)	7205/0100	-

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Remove the screw 1 (x4).
5. Remove the bracket to access the platform upper limit switch.

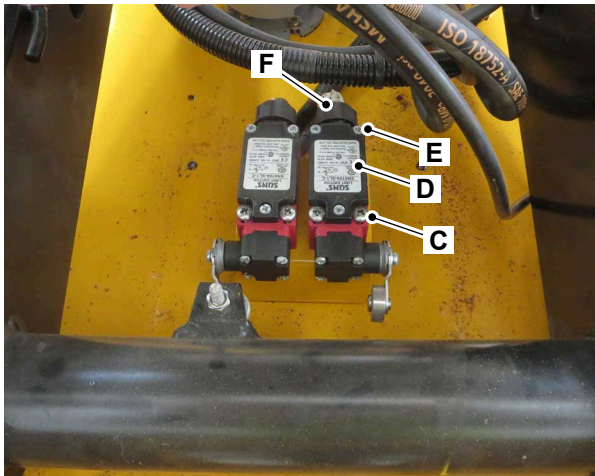
Figure 291.



- A** Screw 1 (x4)
B Bracket

6. Remove the screw 2 (x2).
7. Remove the platform upper limit switch from the machine.
8. Remove the screw 3 (x3).
9. Remove the cover plate.

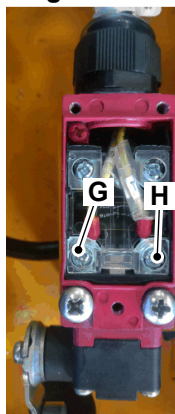
Figure 292.



- C** Screw 2 (x2)
- D** Cover plate
- E** Screw 3 (x3)
- F** Plastic cap

10. Loosen the screw 4 (x2).
11. Remove each wire from the terminal block.

Figure 293.



- G** Wire 4300B - Bottom right
- H** Wire 1300B - Bottom left

12. Loosen the plastic cap and pull out the wires from the platform upper limit switch.

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Make sure that the wire connections installed at correct location. Refer to Figure 293.
3. Before you connect the wires check the condition of the crimped terminals of the wires. If damaged, crimp the wire terminals with suitable bootlace ferrule tool.

[Consumable: Wiring Splice-Bootlace \(1mm Red\)](#)

[Refer to: PIL 33-12-00.](#)

4. Make sure that the conduit on the harness is placed into the cap nut to make sure of correct sealing.
5. Make sure that when you install the bracket, you do not damage the harness.
6. Calibrate the platform upper limit switch.

[Refer to: PIL 33-84-84.](#)

85 - Platform Down Limit

Introduction	33-245
Calibrate	33-246
Remove and Install	33-247

Introduction

The platform down limit switch is located at the front fixed scissor pin on a cam/tab. This detects when the platform is close to stowed position and sends a signal to the MECU (Machine Electronic Control Unit).

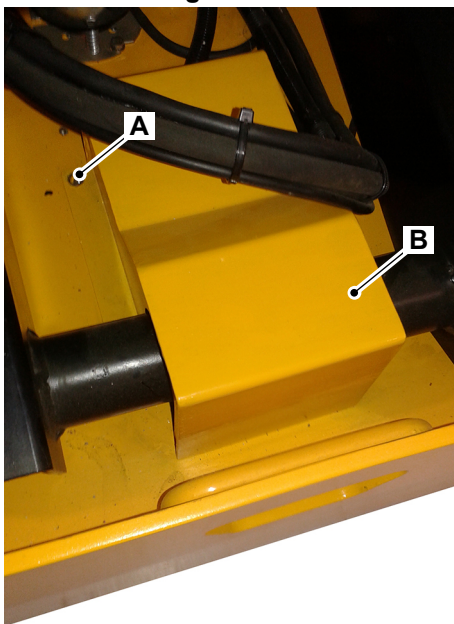
The output of the down limit switch is used to detect when the platform is in a stowed or closed position. This output is used for the overload system, over tilt system and the elevated drive speed (reduced forward/reverse travel speed when the platform is raised).

Calibrate

Set the Down Limit Switch Position

1. Make the machine safe.
[Refer to: PIL 01-03-27.](#)
2. Lower the platform to the stowed position.
3. Make sure that there is no load on the platform.
4. If the downward stop height is set by the angle sensor, reset the safety height to ground position.
[Refer to: PIL 33-84-63.](#)
5. Raise the platform to above the down limit switch.
6. Lower the platform until the platform stops automatically.
 - 6.1. This should identify the switching position of the down limit switch.
 - 6.2. Remove the screw 1 (x4).
 - 6.3. Remove the bracket to access the platform upper limit switch.

Figure 294.



- A** Screw 1 (x4)
B Bracket

7. Adjust the down limit switch up or down position according to the platform height.
 - 7.1. The correct down limit switch position should stop the platform at a specified distance before the stowed position.
Distance: 1m
8. Set the down limit switch position as follows.
 - 8.1. If the downward stop height is set by the angle sensor, reset the safety height to ground position.
[Refer to: PIL 33-84-63.](#)
 - 8.2. Raise the platform to above the switching position of the down limit switch.
 - 8.3. Make sure that the cam is no longer pressing on the switch.
 - 8.4. Lower the platform until the platform stops automatically. This should identify the switching position of the down limit switch.
 - 8.5. Adjust the cam position to increase or decrease the switching position of the down limit switch according to the platform height. Refer to Table 111.
 - 8.6. Reset the downward stop height.
[Refer to: PIL 33-84-63.](#)

Table 111.

	S1530E	S1930E	S2032E	S2632E	S2646E	S3246E	S4046E	S4550E
Down limit height ⁽¹⁾	1.6m	1.6m	2m	2.2m	2.2m	2.4m	2.5m	2.5m

(1) Make a note that the heights are measured from the ground to the base of the platform.

Remove and Install

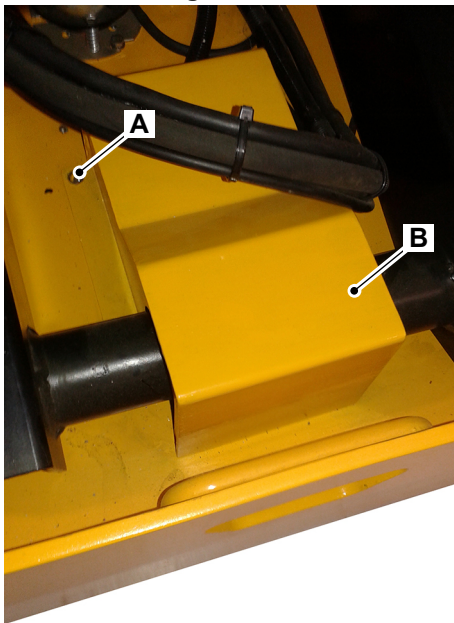
Consumables

Description	Part No.	Size
Wiring Splice-Bootlace (1mm Red)	7205/0100	-

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Remove the screw 1 (x4).
5. Remove the bracket to access the platform down limit switch.

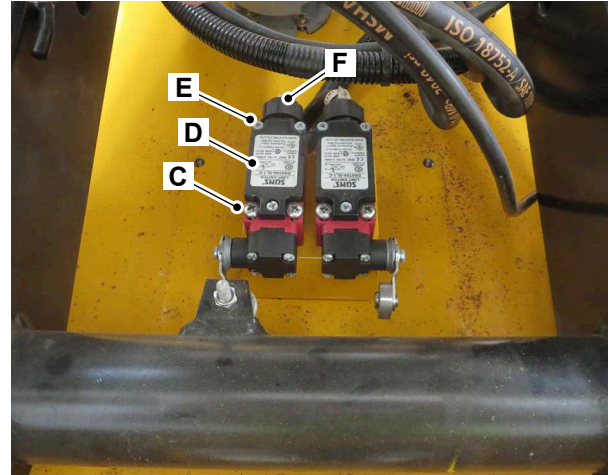
Figure 295.



- A** Screw 1 (x4)
- B** Bracket

6. Remove the screw 2 (x2).
7. Remove the platform down limit switch from the machine.
8. Remove the screw 3 (x3).
9. Remove the cover plate.

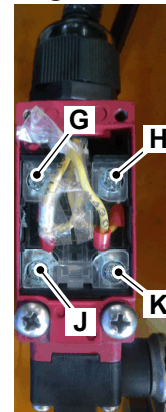
Figure 296.



- C** Screw 2 (x2)
- D** Cover plate
- E** Screw 3 (x3)
- F** Plastic cap

10. Loosen the screw 4 (x4).
11. Remove each wire from the terminal block.

Figure 297.



- G** Wire 4200A - 23
- H** Wire 1200A - 24
- J** Wire 1300A - 16
- K** Wire 4300A - 15

12. Loosen the plastic cap and remove the wires from the platform down limit switch.

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Make sure that the wire connections installed at correct location. Refer to Figure 297.
3. Before you connect the wires check the condition of the crimped terminals of the wires. If damaged, crimp the wire terminals with suitable bootlace ferrule tool.

Consumable: Wiring Splice-Bootlace (1mm Red)
Refer to: PIL 33-12-00.

4. Make sure that the conduit on the harness is placed into the cap nut to make sure of correct sealing.
5. Make sure that when you install the bracket, you do not damage the harness.
6. Calibrate the platform down limit switch.

Refer to: PIL 33-84-85.



86 - Solenoid

Contents	Page No.
33-86-00 General	33-251



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



00 - General

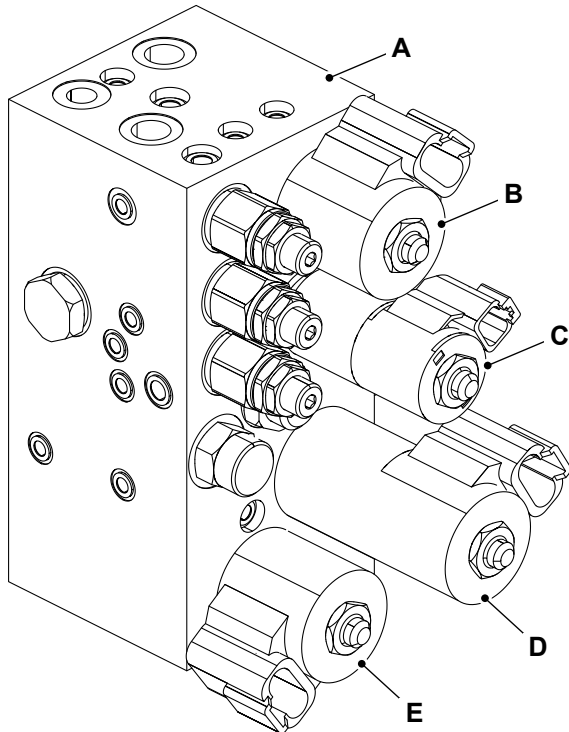
Introduction	33-251
Component Identification	33-252

Introduction

The solenoid valves are an integrated device containing an electromechanical solenoid which actuates a hydraulic valve, or a solenoid switch.

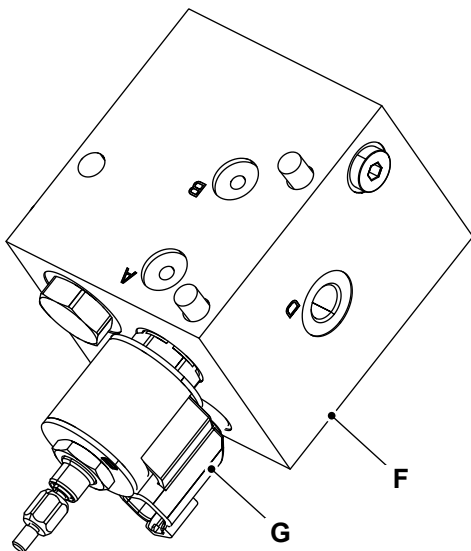
Component Identification

Figure 298. Main control valve block



- A** Main control valve block
- B** Solenoid - Platform lifting solenoid
- C** Solenoid - Steering
- D** Solenoid - Drive solenoid
- E** Solenoid - Brake release

Figure 299. Lift cylinder control valve



- F** Lift cylinder control valve
- G** Lowering solenoid



95 - AC Circuit

Contents	Page No.
33-95-09 Residual Current Circuit Breaker with Overcurrent protection (RCBO)	33-255
33-95-75 AC Connector	33-258



Notes:

09 - Residual Current Circuit Breaker with Overcurrent protection (RCBO)

Introduction	33-255
Check (Operation)	33-256
Remove and Install	33-256

Introduction

▲ WARNING Working with equipment that runs on Alternating Current (AC) could be dangerous. Any maintenance work on such equipment should be done by an authorised electrical engineer or a suitably trained person. All maintenance work must comply with ISO 60204-1 in Europe.

An RCBO (Residual current Circuit Breaker with Over current protection) (or GFCI in North America) is a type of circuit breaker with two functions.

- To protect life.
- To protect an overload on the circuit (overcurrent and short circuit).

The RCBO has two circuits for detecting an imbalance and an overload but use the same interrupt method (breaker or trip).

Check (Operation)

Make sure the RCBO (Residual current Circuit Breaker with Over current protection) is checked in line with the maintenance schedules. [Refer to: PIL 78-24-09.](#)

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
3. Connect the AC (Alternating Current) power source.
4. Press the test button on the RCBO.
 - 4.1. Make sure that the switch goes to the OFF position.

Remove and Install

Consumables

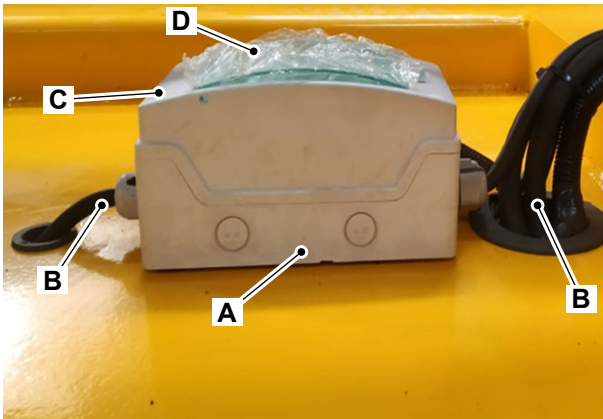
Description	Part No.	Size
Wiring Splice-Bootlace (2.5mm Grey)	7205/0250	-

⚠ WARNING Working with equipment that runs on Alternating Current (AC) could be dangerous. Any maintenance work on such equipment should be done by an authorised electrical engineer or a suitably trained person. All maintenance work must comply with ISO 60204-1 in Europe.

Remove

1. Make the machine safe with the platform raised.
[Refer to: PIL 01-03-27.](#)
2. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
3. Disconnect the battery quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
4. Disconnect the AC (Alternating Current) power source.
5. Open the guard cover. Refer to Figure 300.
6. Move the switch to the OFF position.
7. Remove the cover plate. Refer to Figure 300.
8. Remove the screws to disconnect the wires from the RCBO (Residual current Circuit Breaker with Over current protection).
9. Remove the yellow tabs.
10. Remove the RCBO unit from the machine.

Figure 300.



- A** RCBO unit
- B** Cable wires Knob
- C** Cover plate
- D** Guard cover

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Before you connect the wires check the condition of the crimped terminals of the wires. If damaged, crimp the wire terminals with suitable bootlace ferrule tool.
[Consumable: Wiring Splice-Bootlace \(2.5mm Grey\)](#)
[Refer to: PIL 33-12-00.](#)
3. Check the operation of the RCBO unit.
[Refer to: PIL 33-95-09.](#)

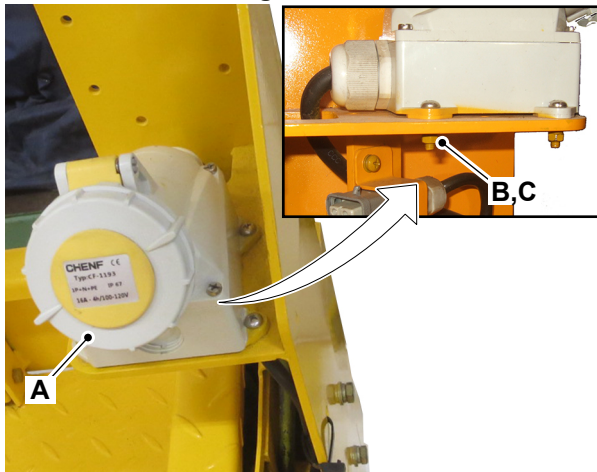
75 - AC Connector

Remove and Install

Remove

1. Make the machine safe with the platform lowered.
[Refer to: PIL 01-03-27.](#)
2. Disconnect the quick disconnect handle.
[Refer to: PIL 33-05-00.](#)
3. Remove the screw 1 (x4) and nut 1 (x4).
4. Remove the AC (Alternating Current) connector assembly from the machine.

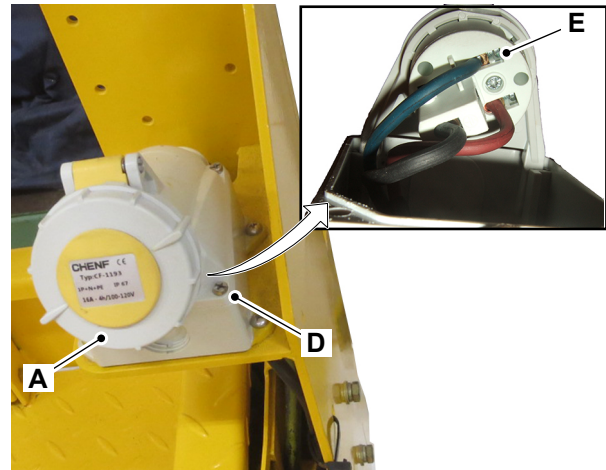
Figure 301.



- A** AC connector
- B** Screw 1 (x4)
- C** Nut 1 (x4)

5. Remove the screw (x4).
6. Disassemble the AC connector assembly.
7. Loosen the screw 3 (x3).
8. Remove the wires from the AC connector.

Figure 302.



- A** AC connector
- D** Screw 2 (x4)
- E** Screw 3 (x3)

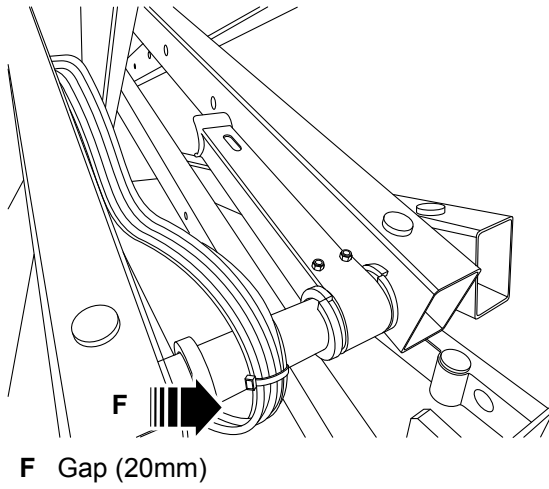
- 8.1. Make a note that each wire terminal is installed with bootlace ferrules.
9. Raise the platform.
10. Install the maintenance strut. Danger or injury will result if the scissor arm is not supported fully.
[Refer to: PIL 01-03-27.](#)
11. Remove the cable ties from the scissor arm.
12. Disconnect the other end of wires from the RCBO (Residual current Circuit Breaker with Over current protection).
[Refer to: PIL 33-95-09.](#)
13. Remove the cable wire from the machine.

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Check the condition of the cables. If damaged, replace them.
3. Make a note that the AC cables should be separated as far from the DC (Direct Current) cables as possible.
4. When you route the cable wires on the scissor arm, make sure you keep the specified gap at each scissor arm pivot. Do not install the cables too tight.

Distance: 20mm

Figure 303.





Notes:

72 - Fasteners and Fixings

Contents	Page No.
72-00 Fasteners and Fixings	
72-00-00 General	72-3
72-03 Screws	
72-03-00 General	72-7
72-06 Bolts	
72-06-00 General	72-11



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



00 - Fasteners and Fixings

Contents	Page No.
72-00-00 General	72-3



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction

JCB Fasteners (Before September 2017)

Some external fasteners on JCB machines are manufactured using an improved type of corrosion resistant finish. This type of finish is called Dacromet and replaces the original Zinc and Yellow Plating used on earlier machines. The two types of fasteners can be readily identified by colour and part number suffix. Refer to Table 1. Fastener Types.

Table 112.

Fastener Type	Colour	Part Number Suffix
Zinc and Yellow	Golden Finish	Z (e.g. 1315/3712Z)
Dacromet	Mottled Silver Finish	D (e.g. 1315/3712D)

Note: As the Dacromet fasteners have a lower torque setting than the Zinc and Yellow fasteners, the torque figures used must be relevant to the type of fastener.

A Dacromet bolt should not be used in conjunction with a Zinc or Yellow plated nut, as this could change the torque characteristics of the torque setting further. For the same reason, a Dacromet nut should not be used with a Zinc or Yellow plated bolt.

All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.

Dacromet bolts, due to their high corrosion resistance are used in areas where rust could occur. Dacromet bolts are only used for external applications. They are not used in internal applications.

JCB Fasteners (After September 2017)

Table 113.

Fastener Type	Colour	Part Number Suffix
Zinc flake-silver	White aluminium (silver-grey), Dull	D (e.g. 1315/3712D)
Zinc and heavy trivalent passivated with seal	Silver (Bright iridescent)	V (e.g. 1315/3712V)
Zinc Nickel - silver/grey	Dark, dull silver grey	Not assigned

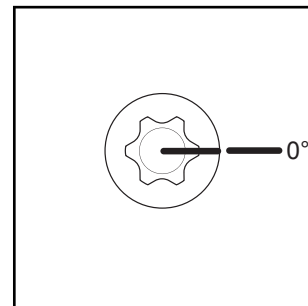
Fastener Type	Colour	Part Number Suffix
Zinc Nickel - black	Black, chalky texture	N (e.g. 1315/3712N)
Zinc flake - black	Black, slight gloss	B (e.g. 1315/3712B)

Tightening Method

The following example explains the recommended torque and angle procedure. A torque angle gauge should be used for accuracy, but as a visual check, the bolts can be match marked as described below.

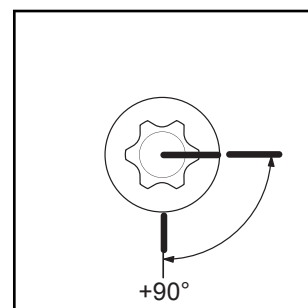
1. Tighten the bolt to the specified torque (specified torque values will be detailed in the relevant PIL sections).
2. Mark a line across the centre of the bolt, and a second line on the part to be clamped - the two lines should be aligned. Refer to Figure 304.

Figure 304.



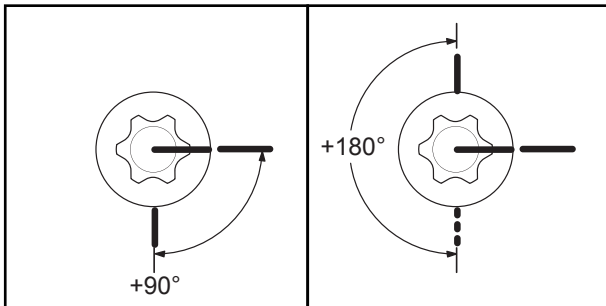
3. Mark a third line at the specified torque angle - in this instance the additional torque angle is 90°. This line must be marked the specified angle in a clockwise direction (to further tighten the bolt). Refer to Figure 305.

Figure 305.



4. In some instances, angle torque tightening can be specified in two stages, for instance in this example, the first angle quoted is 90° and then a second angle of 180°. The additional 180° angle is from the LAST tightened position. Refer to Figure 306.

Figure 306.



5. Tighten the bolt so that the line on the bolt aligns with the angle(s) marked on the item to be clamped - remember, to ensure complete accuracy an angle gauge should be used.



[illegible]

00 - General

Introduction	72-7
Technical Data	72-8

Introduction

Use the torque setting tables (Technical Data) only where no torque setting is specified in the text. Note: Dacromet fasteners are lubricated as part of the plating process, do not lubricate. Torque settings are given for the following conditions:

Table 114. Up to September 2017

Type	Condition 1	Condition 2
no coating	Unlubricated fasteners	Zinc flake silver (Dacromet) fasteners.
2 (obsolete from September 2017).	Zinc fasteners	Lubricated zinc and yellow plated fasteners.
3, 4 (obsolete from September 2017).	Yellow plated fasteners	Where there is a natural lubrication. For example, cast iron components.

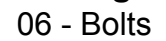
Table 115. From September 2017

Type	Condition 1	Condition 2
no coating	Unlubricated fasteners	Dacromet) fasteners.
1	Zinc flake - silver	Zinc flake silver (Dacromet) fasteners.
5	Zinc and heavy trivalent with seal	
7	Zinc nickel - silver	
8	Zinc nickel - black	
9	Zinc flake - black	

Technical Data

**Table 116. Torque Settings - Internal
Hexagon Headed Capscrews (Zinc)**

Bolt Size	
mm	N·m
3	2
4	6
5	11
6	19
8	46
10	91
12	159
16	395
18	550
20	770
24	1,332





This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction	72-11
Technical Data	72-12

Introduction

Use the torque setting tables (Technical Data) only where no torque setting is specified in the text. Note: Dacromet fasteners are lubricated as part of the plating process, do not lubricate. Torque settings are given for the following conditions:

Table 117. Up to September 2017

Type	Condition 1	Condition 2
no coating	Unlubricated fasteners	Zinc flake silver (Dacromet) fasteners.
2 (obsolete from September 2017).	Zinc fasteners	Lubricated zinc and yellow plated fasteners.
3, 4 (obsolete from September 2017).	Yellow plated fasteners	Where there is a natural lubrication. For example, cast iron components.

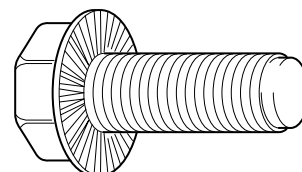
Table 118. From September 2017

Type	Condition 1	Condition 2
no coating	Unlubricated fasteners	Dacromet) fasteners.
1	Zinc flake - silver	Zinc flake silver (Dacromet) fasteners.
5	Zinc and heavy trivalent with seal	
7	Zinc nickel - silver	
8	Zinc nickel - black	
9	Zinc flake - black	

Verbus-Ripp Bolts

Torque settings for these bolts are determined by the application. Refer to the relevant procedure for the required settings.

Figure 307.



Technical Data

From JCB standard STD00019 issue 15.

1. This information does not apply to:-
 - 1.1. Hydraulic fittings (i.e. BSP, SAE O-ring boss, UNF, four bolt split flange and JIC).
 - 1.2. Locking type fasteners (those with a nylon insert, or with distorted thread nuts such as Cleveloc).
2. For information on fastener conditions, refer to fasteners and fixings, bolts, general, introduction.

Table 119. Torque Settings - UNF S Fasteners

Bolt Size	Treads per Inch	Hexa-gon (A/F)	Condition 1	Condition 2
in	in	in	N·m	N·m
(1/4 in)	28	7/16	11.2	10
(5/16 in)	24	1/2	22.3	20
(3/8 in)	24	9/16	40	36
(7/16 in)	20	5/8	64	57
(1/2 in)	20	3/4	98	88
(9/16 in)	18	13/16	140	126
(5/8 in)	18	15/16	196	177
(3/4 in)	16	1 1/8	343	309
(7/8 in)	14	1 15/16	547	492
(1 in)	12	1 1/2	814	732
(1 1/8 in)	12	1 7/8	1,181	1,063
(1 1/4 in)	12	2 1/4	1,646	1,481

Table 120. Torque Settings - UNF X Fasteners

Bolt Size	Treads per Inch	Hexa-gon (A/F)	Condition 1	Condition 2
in	in	in	N·m	N·m
(1/4 in)	28	7/16	17.6	15.9
(5/16 in)	24	1/2	35.2	31.6
(3/8 in)	24	9/16	64	57
(7/16 in)	20	5/8	101	91
(1/2 in)	20	3/4	155	139
(9/16 in)	18	13/16	221	199
(5/8 in)	18	15/16	310	279
(3/4 in)	16	1 1/8	542	488
(7/8 in)	14	1 15/16	864	777
(1 in)	12	1 1/2	1,285	1,156
(1 1/8 in)	12	1 7/8	1,865	1,679
(1 1/4 in)	12	2 1/4	2,598	2,339

Table 121. Torque Settings - Coarse Metric Grade 8.8 Fasteners

Bolt Size	Tread Pitch	Hexa-gon (A/F)	Condition 1	Condition 2
mm	mm	mm	N·m	N·m
4	0.7	7	2.9	2.6
5	0.8	8	5.8	5.2
6	1	10	9.9	9
8	1.25	13	24	22
10	1.5	17	47	43
12	1.75	19	83	74
14	2	22	132	119
16	2	24	205	184
20	2.5	30	400	360
24	3	36	690	621
30	3.5	46	1,372	1,235
36	4	55	2,399	2,159

Table 122. Torque Settings - Coarse Metric Grade 10.9 Fasteners

Bolt Size	Thread Pitch	Hexa-gon (A/F)	Condition 1	Condition 2
mm	mm	mm	N·m	N·m
4	0.7	7	4	3.6
5	0.8	8	8.1	7.3
6	1	10	13.9	12.5
8	1.25	13	34	30
10	1.5	17	67	60
12	1.75	19	116	104
14	2	22	185	167
16	2	24	288	259
20	2.5	30	562	506
24	3	36	971	874
30	3.5	46	1,930	1,737
36	4	55	3,374	3,036

Table 123. Torque Settings - Coarse Metric Grade 12.9 Fasteners

Bolt Size	Thread Pitch	Hexa-gon (A/F)	Condition 1	Condition 2
mm	mm	mm	N·m	N·m
4	0.7	7	4.8	4.4
5	0.8	8	9.8	8.8
6	1	10	16.6	15
8	1.25	13	40	36
10	1.5	17	80	72
12	1.75	19	139	125
14	2	22	223	200
16	2	24	345	311

Bolt Size	Thread Pitch	Hexagon (A/F)	Condition 1	Condition 2
mm	mm	mm	N·m	N·m
20	2.5	30	674	607
24	3	36	1,165	1,048
30	3.5	46	2,316	2,084
36	4	55	4,049	3,644

Table 124. Torque Settings - Rivet Nuts / Bolts

Bolt Size	
mm	N·m
3	1.2
4	3
5	6
6	10
8	24
10	48
12	82



Notes:



75 - Consumable Products

Contents	Page No.
Acronyms Glossary	75-2
75-00 Consumable Products	
75-00-00 General	75-3
75-00-03 Parts List	75-5
75-09 Fluids	
75-09-00 General	75-7
75-10 Locking Fluids	
75-10-00 General	75-9
75-14 Solvents and Primers	
75-14-00 General	75-13
75-15 Adhesive	
75-15-00 General	75-17
75-16 Sealant	
75-16-00 General	75-23



Acronyms Glossary

PTFE Polytetrafluoroethylene



00 - Consumable Products

Contents	Page No.
75-00-00 General	75-3
75-00-03 Parts List	75-5

[illegible]

00 - General

Introduction	75-3
Health and Safety	75-4

Introduction

JCB recommend that you use the JCB lubricants shown as they have been verified by JCB for use on JCB machines. However, you could use other lubricants that are equivalent to the JCB standards and quality or offer the same machine component protection.

Before you start work, make sure that:

- All safety precautions are observed in accordance with the information contained within the relevant support documentation.
- The consumables are used in accordance with the manufacturer's recommendations.
- The consumables shown are available in the correct quantity.

Consumables other than those listed may be required. It is expected that general consumables will be available in any well equipped workshop or be available locally.

Health and Safety

Fluid Under Pressure

Fine jets of fluid at high pressure can penetrate the skin. Keep face and hands well clear of fluid under pressure and wear personal protective equipment. Hold a piece of cardboard close to suspected leaks and then examine the cardboard for signs of fluid. If fluid penetrates your skin, get medical help immediately.

Hygiene

JCB lubricants are not a health risk when used correctly for their intended purposes.

However, excessive or prolonged skin contact can remove the natural fats from your skin, causing dryness and irritation.

Low viscosity oils are more likely to do this, so take special care when handling used oils, which might be diluted with fuel contamination.

Whenever you are handling oil products you must maintain good standards of care and personal and plant hygiene. For details of these precautions we advise you to read the relevant publications issued by your local health authority, plus the following.

Storage

Always keep lubricants out of the reach of children.

Never store lubricants in open or unlabelled containers.

Waste Disposal

▲ CAUTION It is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants.

Used fluids and/or lubricants, filters and contaminated materials must be disposed of in accordance with local regulations. Use authorised waste disposal sites.

CAUTION Damaged or spent batteries and any residue from fires or spillage must be put in a suitable closed receptacle and must be disposed of in accordance with local environmental waste regulations.

All waste products must be disposed of in accordance with all the relevant regulations.

The collection and disposal of used hydraulic oil must be in accordance with any local regulations. Never pour used hydraulic oil into sewers, drains or on the ground.

Handling

New Oil

There are no special precautions needed for the handling or use of new oil, beside the normal care and hygiene practices.

Used Oil

Here are precautions to protect your health when handling used hydraulic oil:

- Avoid prolonged, excessive or repeated skin contact with used oil
- Apply a barrier cream to the skin before handling used oil. Note the following when removing hydraulic oil from skin:
 - Wash your skin thoroughly with soap and water
 - Using a nail brush will help
 - Use special hand cleansers to help clean dirty hands
 - Never use petrol, diesel fuel, or paraffin for washing
- Avoid skin contact with oil soaked clothing
- Don't keep oily rags in pockets
- Wash dirty clothing before re-use
- Throw away oil-soaked shoes

First Aid - Oil

Eyes

In the case of eye contact, flush with water for 15min. If irritation persists, get medical attention.

Swallowing

If oil is swallowed do not induce vomiting. Get medical advice.

Skin

In the case of excessive skin contact, wash with soap and water.

Spillage

Absorb with sand or a locally approved brand of absorbent granules. Scrape up and remove to a chemical disposal area.

Fires

▲ WARNING Do not use water to put out an oil fire. This will only spread it because oil floats on water.

Extinguish oil and lubricant fires with carbon dioxide, dry chemical or foam.



03 - Parts List



09 - Fluids

Contents

Page No.

75-09-00 General	75-7
------------------------	------

00 - General

Introduction

It is most important that you read and understand this information and the publications referred to. Make sure all your colleagues who are concerned with lubricants read it too.

Hygiene

JCB lubricants are not a health risk when used properly for their intended purposes.

However, excessive or prolonged skin contact can remove the natural fats from your skin, causing dryness and irritation.

Low viscosity oils are more likely to do this, so take special care when handling used oils, which might be diluted with fuel contamination.

Whenever you are handling oil products you should maintain good standards of care and personal and plant hygiene. For details of these precautions we advise you to read the relevant publications issued by your local health authority, plus the following.

Storage

Always keep lubricants out of the reach of children. Never store lubricants in open or unlabelled containers.

Waste Disposal

All waste products should be disposed of in accordance with all the relevant regulations.

The collection and disposal of used oil should be in accordance with any local regulations.



10 - Locking Fluids

Contents

Page No.

75-10-00 General	75-9
------------------------	------

00 - General

Introduction	75-9
Technical Data	75-10

Introduction

All locking fluids should be used at all times in line with the manufacturer's recommendations.

Locking fluids are used for the locking of threaded fasteners and for the retention of ball & roller bearings and similar cylindrical items on to shafts and into housings. These fluids consist of an anaerobic resin in a liquid form which hardens when confined between closely fitting metal to metal and many metal to non-metal surfaces.

The fluids available possess a wide span of break-loose strengths, viscosities and gap filling properties and are marketed for a variety of locking and retaining purposes requiring different strength grades. Some of the sealants in use in JCB are also of anaerobic resin type and only differ from the locking fluids in respect of viscosity and other technical details.

Strength grades

Various strength grades of fluid are available, the highest strength type for permanent locking where disassembly is unlikely, medium strength for permanent locking but allowing disassembly with ordinary tools and low strength for locking of components where frequent adjustment or easy dismantling is required.

It is recommended that trials be carried out before scheduling locking fluids for any new type of application that has not been already proved as satisfactory in production or when use at elevated temperatures is intended.

Additional technical information is normally available from the product manufacturers.

Approved locking fluids

The table shown in Technical Data shows the approved locking fluids available to use on JCB machines. The table also provides basic details to help with selection of locking fluids. More up to date information can be found on the manufacturer's website.

Technical Data

Table 125. Locking Fluids Approved Product Information

Subsec- tion	Commer- cial name	Product Number	Colour	Shelf life	Strength	Comments
High strength	Loctite 270 ⁽¹⁾	4101/0100	Green fluores- cent	365d	80–120bar (1,159.4– 1,739.1psi) breakaway strength	For the retention of threads up to M20 di- ameter where disassembly is unlikely and for locking bearings etc. onto shafts and into housing. Has a maximum gap fill of 0.05mm.
	R.A.S. threadlock for studs ⁽¹⁾		Red			
High strength	Loctite 638	4101/1400	Green, UV fluo- rescent	365d	More than 250bar (3,623.2psi) compres- sive shear strength	Maximum gap fill of 0.25mm. Maximum strength at room temperature.
High strength	Per- mabond A115 ⁽¹⁾	4101/0500	Red, fluo- rescent	365d	100–150bar (1,449.3– 2,173.9psi) prevailing strength	Fast curing (10–15min) thread locking up to M20, especially for use on oily surfaces, plated and clean parts.
	Loctite 262					
High strength	Loctite 648 ⁽¹⁾	4101/0600	Green, fluores- cent	365d	More than 250bar (3,623.2psi) compres- sive shear strength	Designed for holding gears and sprockets onto gearbox shafts and rotors on electric motor shafts.
	Per- mabond A118					
High strength	Loctite 2701	4101/1700	Green	365d	260–500bar (3,768.1– 7,246.3psi) breakaway torque	Designed for permanent locking and seal- ing of threaded fasteners. Particularly suit- ed for use on inactive substrates and/or where maximum resistance to hot oil is re- quired.
Medium to high	Loctite 243	4101/1100	Blue	365d	140–340bar (2,029.0– 4,927.5psi) breakaway torque	Suitable for all nuts, bolts, screws up to M36.
Medium strength	Per- mabond A119 ⁽¹⁾	4101/0900	Blue	365d	80–120bar (1,159.4– 1,739.1psi) static shear strength	Maximum gap fill of 0.25mm. Handling strength in 10–15min.
Medium strength	Loctite 640	4101/1200	Green, fluores- cent	365d	150–330bar (2,173.9– 4,782.6psi) static shear strength	Product has a slow cure rate, used on parts unlikely to be disassembled.
Medium strength	Loctite 242 ⁽¹⁾	4101/0200	Blue, fluores- cent	365d	80–120bar (1,159.4– 1,739.1psi) static shear strength	Suitable for all nuts, bolts and screws up to M36 and hydraulic fittings up to 25mm in di- ameter. Permabond A113 and A1042 are the preferred choices. The difference be- tween A113 and A1042 is timing for han- dling and working strength. A113 handling time 10–25min, working strength 1h. A1042 handling time 5–10min, working strength 30min.
	Per- mabond A1042					
	Per- mabond A113					

Subsec- tion	Commer- cial name	Product Number	Colour	Shelf life	Strength	Comments
Low strength	Loctite 222	4101/0300	Purple, fluores- cent	365d	15–40bar (217.4– 579.7psi)	For screwed fasteners up to M20 that re- quire easy disassembly or frequent ad- justment. Maximum gap fill of 0.05mm. Achieves handling strength in 10–30min.
Low strength	Per- mabond A1098	4101/1500	Blue	365d	120bar (1,739.1psi) shear strength	Allows dismantling of parts for mainte- nance. Suitable for sealing small hydraulic and pneumatic fittings. Handling strength in 5–10min.
Low strength	Loctite 567	4101/1600	Off- white	365d	17bar (246.4psi) breakaway torque	For the locking and sealing of metal ta- pered threads and fittings. High lubricat- ing properties prevent galling on stainless steel, aluminium and all other metal pipe threads and fittings.
Very low strength	Loctite 932 ⁽¹⁾	4101/0400	Brown/ red	365d	7–18bar (101.4– 260.9psi) average shear strength	Can be disassembled with hand tools. 10– 30min cure time for handling strength. Used on large diameter screw threads bigger than 50mm.
	Per- mabond A011					

(1) This is a non preferred product.



14 - Solvents and Primers

Contents

Page No.

75-14-00 General	75-13
------------------------	-------



00 - General

Introduction	75-13
Technical Data	75-14

Introduction

This section contains information on primers, solvents, cleaning solutions etc. that are in use at JCB.

All primers and solvents should be used at all times in line with the manufacturer's recommendations.

Approved primers and solvents

The table shown in Technical Data shows the approved primers and solvents available to use on JCB machines. The table also provides basic details to help with the selection of primers and solvents. More up to date information can be found on the manufacturer's website.

Technical Data

Table 126. Primers and Solvents Approved Product Information

Subsec- tion	Commer- cial name	Product Number	Colour	Shelf life	Drying Time	Comments
Activa- tor/Primer	Loctite 770	332/U7901	Colour- less	365d	Less than 5s	Used to make low energy surfaces suit- able for bonding with cyanoacrylate adhe- sives. It is recommended for polyethylene, polypropylene, PTFE and thermoplastic rubber materials. Can be used with Loctite 406 (332/U7899).
Activator	Loctite 7455	4104/1700	Clear amber	730d	Apply and leave to dry for 30s be- fore apply- ing adhe- sive	HIGHLY FLAMMABLE. Organic accelera- tor, non CFC solvent based surface activa- tor. Designed to promote the speed of cure of cyanoacrylic adhesives.
Activator	Loctite 7471 ^(*) Per- mabond A905	4104/0200	Colour- less	365d	1–3min	Used with anaerobic products it increases cure speed. Recommended for inert sur- faces and large bond gaps.
Water proofing	Loctite water proofing	4104/0500	-	-	-	A water proofing solution for protecting joints made using cyanoacrylate adhesive. Apply to Loctite 495 (4103/0900).
Solvent	Loctite 7063 ^(*)	4104/1500	Colour- less	365d	1min at 20°C (68.0°F)	HIGHLY FLAMMABLE, cleaner and de- greaser. Removes grease, oil and dirt from electrical parts, tools and precision equip- ment.
Cleaning fluid	Loctite 7070	4101/2200	Colour- less	365d	No wipe 5–10min, post wipe 1–2min	Cleaning treatment to remove most greas- es, oils, lubrication fluids and metal cuttings
Cleaning fluid	Simple green ex- treme	332/E9240	Colour- less	365d	-	An all purpose cleaner and degreaser used diluted in water for direct, spray and dip tank procedures.
Applica- tion fluid	A4G- BCJCB	4104/3300	Blue	730d	-	Vinyl labels application fluid for use with the insignia/livery labels.
Gasket cleaner	Loctite 7200	4104/3200	Colour- less	730d	Allow 10– 15min for gasket, 30min for silicone gasket.	This is a product to aid the removal of cured chemical gaskets. Apply for time specified and remove gasket with soft scraper.
Hand cleaner	Loctite 7855	4104/3100	Light grey	540d	-	Is a heavy duty hand cleaner, specially for- mulated for the most difficult to remove soils like polyurethane, paints, primers, ad- hesives etc. The product is free from sil- icone and harsh solvents. Can be used without water.
Hand cleaner	Sika hand cleaner	4104/1300	Off white	-	-	A non-abrasive hand cleaner for use when using direct glazing materials.

Subsec- tion	Commer- cial name	Product Number	Colour	Shelf life	Drying Time	Comments
Direct glazing	Sika acti- vator	4104/2100	Clear	365d	10min mini- mum drying time	HIGHLY FLAMMABLE. A cleaning and acti- vating agent specifically formulated for the treatment of bonded faces in direct glaz- ing applications prior to applying the direct glazing adhesive.
Direct glazing	Sika re- mover 208 (use 4104/3600) ⁽¹⁾	4104/1900	Trans- parent	-	-	A cleaning agent for removing contami- nates on painted surfaces and glass.
Direct glazing	Sika cleaner 205 (use 4104/3600) ⁽¹⁾	4104/1200	Clear	-	-	A cleaning agent for removing contami- nates on painted surfaces and glass.
Direct glazing	Sika primer 209 (use 4104/3500) ⁽¹⁾	4104/2300	Black	270d	-	Used to prepare painted surfaces and plas- tic substrates prior to bonding with Sikaflex products.
Direct glazing	Sika akti- vator	4104/2400	Clear	365d	10min at more than 15°C (59.0°F) or 30min at less than 15°C (59.0°F)	Used to clean and give improved adhe- sion on glass, ceramic-coated glass, the cut face of old polyurethane adhesive beads, polyurethane coated windows glass and paints.
Active wipe for surface	Tero- stat 8560 AC-25	4104/3400	Colour- less	270d	Minimum 30s and maximum 1h	Applied with a clean cloth to the surface, the adhesive may then be applied after the drying time. Applied to glass or ceramic coating but only in the bonding area.
Direct glazing	Terostat 8519 P	4102/3500	Black	365– 540d	Approx. 2min	Used to promote adhesion in direct glazing to glass and glass ceramics.
Cleaner	Teroson FL clean- er	4104/3600	Clear	730d	Depend- ing on con- ditions be- tween 2– 10min.	Used for degreasing and cleaning of sub- strates prior to application of adhesives and sealants.
Adhe- sion pro- moter	3M AP III	4104/3700	-	-	-	Used to prepare a painted surface before adhering (LDL) door seals (to increase ad- hesion of 3M 5337A) before installation of the cab.

(1) This is a non preferred product.



15 - Adhesive

Contents

Page No.

75-15-00 General	75-17
------------------------	-------

00 - General

Introduction	75-17
Technical Data	75-18

Introduction

All adhesives should be used at all times in line with the manufacturer's recommendations.

Adhesives are used for the bonding of a number of engineering materials used in production at JCB. Many types are available on the market but in the interests of variety reduction and economy only a limited selection is purchased for regular use.

Types of adhesive

Various types of adhesive are covered by JCB Standards:

1. General purpose adhesives for bonding laminated plastics, wood, rubber etc. to themselves and to each other.
2. The more expensive cyanoacrylate adhesives for use where high strength, resistance to many chemicals and fast cure times are required.
3. Adhesives specially developed for bonding of foam rubber to painted metal surfaces.

Additional health and safety for cyanoacrylates

These adhesives require very careful handling on account of their exceptional properties. They bond together strongly and rapidly to most surfaces including body tissue, the curing process being initiated by surface moisture. For further information on cyanoacrylates refer to the Manufacturer's recommendations.

Approved adhesives

The tables shown in Technical Data are the approved adhesives available to use on JCB machines. The tables also provide basic details to help with the selection of adhesives. More up to date information can be found on the manufacturer's website.

Technical Data

Table 127. Adhesives Approved Product Information

Subsec-tion	Commer-cial name	Product Number	Colour	Shelf life	Technical data	Comments
High strength	Per-mabond 5002	4103/3100	Mixed grey	730d	3–5min for handling strength	Two part adhesive mixed in equal parts. A toughened adhesive system which bonds metals, plastics, wood, glass, ceramics and composites; even plated or coated surfaces can be securely fastened.
High strength	Loctite 601	4103/1000	Green fluorescent	365d	160–300bar (2,318.8–4,347.8psi) static shear strength	This product is a single component anaerobic adhesive. Used to bond cylindrical fitting parts, particularly where low viscosity is required. Maximum gap fill is 0.15mm.
Cyano-acrylate	Loctite 424	4103/3500	Colourless to straw	-	180–260bar (2,608.7–3,768.1psi) shear strength	Suitable for most materials including plastic and rubber. Takes 30s to cure to working strength.
Cyano-acrylate	Loctite 401	4103/2300	Colourless	180d	180–260bar (2,608.7–3,768.1psi) tensile strength	Designed for general purpose use. For use on acidic and porous surfaces, reaching handling strength in seconds. Materials include plated metals, composite materials, wood, cork, foam, leather and paper.
Cyano-acrylate	Loctite 406	332/U7899	Colourless	180d	180–260bar (2,608.7–3,768.1psi) lap shear strength	Designed for bonding of plastics and elastomeric materials where very fast fixturing is required. Can be used with Loctite 770 as a primer (332/U7901)
Cyano-acrylate	Loctite 410	4103/2400	Black	120d	220bar (3,188.4psi) lap shear strength	0.2mm, gap fill. A rubber toughened ethyl cyanoacrylate adhesive with enhanced resistance to peel and shock. Bonds rubber, metals and plastics for use in difficult conditions.
Cyano-acrylate	Loctite 480	4103/3800	Black	-	220–300bar (3,188.4–4,347.8psi) lap shear strength	A rubber toughened adhesive with increased flexibility and peel strength along with enhanced resistance to shock.
Cyano-acrylate	Loctite 495 ⁽¹⁾	4103/0900	Colourless	270d	12h maximum cure time	High speed bonding, suitable for rubber to itself and other materials reaching handling strength in a matter of seconds. Joint must be waterproofed with Loctite water proofing (4104/0500).
	Per-mabond C2					
Low strength	Dunlop 1727	4103/1100	Clear to light straw	90d	-	Sprayable adhesive, non-structural applications. For the bonding of flexible foam to themselves, wood, painted metal, chip-board, fibreglass, hessian, felt etc.
	British vita company VB 165					

Subsec- tion	Commer- cial name	Product Number	Colour	Shelf life	Technical data	Comments
Acrylic foam strip ad- hesive	3M 4941P	4103/3900	Dark grey	730d	Peel ad- hesion 350N/ 100mm	High bond acrylic double sided foam tape. Its allows more complete bond contact area when bonding rigid or irregular materials due to its conformability. Its core adhesive composition makes the product well suited to many paints and primers.
General purpose gap fill- ing ma- terial	Araldite XD 580	4103/1400	Clear / cream	730d	560bar (8,115.9psi) flexural strength	Two part, equal parts by weight. Wear pad fixing to castings and telescopic compo- nents, alignments of fixings pads without expensive machining. This product is a general purpose gap-filling material. Cure time 2h at 25°C (77.0°F).
Methacry- late	Loctite Speed- bonder H3151	4103/3600	Cream to light yellow	-	-	This is a sag resistant, two component, equal parts, methacrylate adhesive system formulated to bond automotive grade cold rolled steel without the use of an external primer. Suitable for bonding a wide variety of plastic and metal substrates. Provides a long open time (40–60min) for correct align- ing of parts.
Methacry- late	Plexus MA420	4103/3700	Off- white or blue	365d	-	Two part methacrylate adhesive for struc- tural bonding of thermoplastic, metal and composite assemblies. Combined at 10:1 ratio. It has a working time of 4–6min.
Structur- al plastic	Scotch- weld DP-8005	332/S7420	Black	180d	-	Two part acrylic based adhesive (10:1 ra- tio by vol.) that can bond many low surface energy plastics, including many grades of polypropylene, polyethylene and TPO's without special surface preparation.
General purpose adhesive	Evo-Stick 528 ⁽¹⁾	4103/0800	-	365d	HIGHLY FLAMMA- BLE	A thin even film of adhesive should be ap- plied to both surfaces being bonded and al- lowed to become touch dry. This is a con- tact adhesive and coated surfaces can- not therefore be slid into position since the bond forms on contact. It is often conve- nient to align the parts along an edge and then bring the two areas into contact.
Direct glazing	Sika 250PC Sikat- ack Ultra- fast (use 4103/4000 or 4102/4900) ⁽¹⁾	4103/2100	Black	-	-	A one component polyurethane pre-poly- mer based adhesive. A mastic adhesive which reacts with atmospheric moisture to form a rubber like solid.
Direct glazing	Sika 255FC (use 4102/5000) ⁽¹⁾	4103/2200	Black	-	-	For bonding glass to cab frames. A mas- tic adhesive which reacts with atmospheric moisture to form a rubber like solid. When using this product ensure both surfaces are clean and dry. Use Sika cleaner 205 (4104/1200).
Direct glazing	Sikaflex 552 (use 4102/5000) ⁽¹⁾	4103/3200	Black	-	-	A high performance, elastic, gap, filling one part structural adhesive cures on exposure to atmospheric moisture to form a durable elastomer. Contains no isocyanate.

Subsec- tion	Commer- cial name	Product Number	Colour	Shelf life	Technical data	Comments
Industri- al grade epoxy adhesive	Loctite Hysol E-214 HP	333/Y7062	Light Grey Paste	-	307bar (4,449.3psi) tensile strength	Single component, heat activated formu- lation develops tough, strong, structur- al bonds which provide excellent peel re- sistance and impact strength. When ful- ly cured, the product offers superior ther- mal shock resistance, excellent mechan- ical and electrical resistance properties and withstands exposure to a wide vari- ety of solvents and chemicals. Bonds to a wide variety of materials, including metals, glass, ceramics and plastics. Cure at 120°C (247.8°F) or above until completely firm. Heat up to 150°C (301.8°F) for 2h, to maxi- mize properties.
Anaero- bic ad- hesive (Dimethacry- late)	Scotch- weld RT-20	333/L9575	Green	365d	-	Single component anaerobic adhesives de- signed to secure cylindrical metal assem- blies such as bearings on shafts, bush- ings, sleeves, housings, and keyways. Help prevent loosening, corrosion and leak- age caused by shock and vibration. Full cure time 24h. Temperature range = -54°C (129.1°F) to 450°C (841.4°F). Not recom- mended for use on most plastics due to po- tential cracking of plastic parts.
Direct glazing	Teroson 939CT / Terostat MS939	4102/5000	Black	365d in orig- inal pack- aging	-	Skin formation time: approx. 10min. Cure rate: approx. 3mm/24h.
Direct glazing	Terostat 8900 HV	4103/4000	Black	180d	80bar (1,159.4psi) tensile strength	One component, pumpable adhe- sive/sealant based on polyurethane, which cures by reaction with moisture to an elas- tic rubber. The skin formation and curing time are dependent on humidity, tempera- ture and depth of joint. High temperature and high moisture reduces curing time. Sag resistant, temperature range of -40°C (103.9°F) to 90°C (193.9°F).
Direct glazing	Tero- stat 8594 HMLC	4103/4100	Black	270d	85bar (1,231.9psi) tensile strength	Single component, moisture curing, ad- hesive/sealant for repair. Product with high shear modulus and low conductivity. Suitable for all applications that require very high electrical insulation of the adhesive used for the bonding of windows. Sag resis- tant.

Subsec- tion	Commer- cial name	Product Number	Colour	Shelf life	Technical data	Comments
Direct glazing	Terostat 8900 LV	4103/4200	Black	365d in car- tridges 180d in sausage pack. 180d in hob- bocks and drums	80bar (1,159.4psi) tensile strength	One component, pumpable adhe- sive/sealant based on polyurethane, which cures by reaction with moisture to an elas- tic rubber. The skin formation and curing time are dependent on humidity, tempera- ture and depth of joint. High temperature and high moisture reduces curing time. Sag resistant, temperature range of -40°C (103.9°F) to 90°C (193.9°F) short exposure (up to 1h) of 130°C (265.8°F).
Direct glazing	Sikaflex 295 UV	4103/4300	Black, white	365d	-	Direct glazing adhesive for plastic glaz- ing panels. One component polyurethane adhesive of paste like consistency. 60min tack free time, 1d cure time (4mm at 23°C (73.4°F)). Good UV, fresh water and sea- water resistance. Do not apply below tem- peratures of 10°C (50.0°F) or above 35°C (95.0°F).
High strength retainer	Loctite 603	4103/2500	-	-	-	Used for bearings.
Direct glazing	Teroson MS 660	4103/5000	Clear	365d	-	Area must be clean, dry, oil and grease free and not be in permanent contact with wa- ter. Provides a long open time approximate- ly 15min for correct aligning of parts.
Medium strength thread- locker	Loctite 2400	4103/5100	Blue	-	-	Can be used in place of Loctite 243.
Direct glazing	Terostat 8910 (al- so known as Tero- son PU 8910)	4103/5200	Black	-	Cure rate 3.5mm/24h	component with high viscosity, pumpable adhesive / sealant cures by reaction with moisture, humidity and temperature. Pro- vides a long open time approximately 10min for correct aligning of parts.
Flange adhesive	Teroson RB 5100	320/B4113	Greyish black	90d	-	Thermosetting component, solvent free, re- active rubber based flange adhesive
Structur- al adhe- sive	AK 348	4103/5300	-	-	-	Used as structural adhesive.
Structur- al adhe- sive	Loctite V1315	4103/5400	Cream, Off white	365d	-	Used for bonding powder coated glazing strips onto the powder coated cab welded assemblies.

(1) This is a non preferred product.



16 - Sealant

Contents	Page No.
75-16-00 General	75-23

00 - General

Introduction	75-23
Technical Data	75-24

Introduction

All sealants should be used at all times in line with the manufacturer's recommendations. Sealants are used mainly for the sealing of screwed joints, sealing flanges and flat surfaces and where gap filling properties are required.

Types of Sealant

Various types of sealant are specified in JCB Standards:

1. Those for the sealing of screwed joints.
2. Sealants for joining flanges and flat surfaces. (Flange size and likelihood of dismantling require consideration when selecting this type of sealant).
3. Sealants for use where gap filling properties are required. (The gap dimensions, joint movement if any, type of materials being joined and aesthetic appearance require consideration when selecting this type of sealant).

Approved Sealants

The table shown in Technical Data are the approved sealants available to use on JCB machines. The table also provides basic details to help with selection of sealants. More up to date information can be found on the manufacturer's website.

Technical Data

Table 128. Sealants Approved Product Information

Subsec- tion	Com- mercial name	Product Number	Colour	Shelf life	Technical data	Comments
High strength	Loctite 275 ⁽¹⁾	4102/0500	Green	730d	250bar (3,623.2psi) torque strength (on M8)	Non drip formulation, used on larger fittings, coarse threads.
	Per- mabond A140					
High strength	Forge- way 240FC ⁽¹⁾	4102/3100	Yellow	270d	25bar (362.3psi) breaking strength	Can be painted over with some 2 pack paint. Maximum width of joint =35mm, min- imum width =2mm, minimum depth =2mm. Recommended depth of joint = width of joint.
Medium to high strength	Loctite 620	4102/3500	Green	-	More than 241bar (3,492.7psi) shear strength	Used for locating pins in radiator assem- blies, sleeves into pump housings and bearings in auto transmissions. Not suitable for plastics. Diametrical clearance: up to 0.2mm
Medium strength	Loc- tite 518 Gasket Elimina- tor	4102/2000	Red, fluo- rescent	365d	90bar (1,304.3psi) tensile strength	Typically used as form-in-place gasket on rigid flanged connections.
Medium strength	Loctite 5182	4102/4100	Red gel, fluores- cent	-	80bar (1,159.4psi) shear strength	It is manufactured to minimise air bubbles in the package. Used to seal gaskets, hous- ings, cases and covers. It can also be used to repair and replace cut gaskets (up to 0.08mm in thickness).
Medium strength	Loctite 595	4102/2500	Clear	365d	6mm gap filling	Formulated to withstand weathering and extreme temperature cycling. Used for pot- ting, coating and sealing. Can be applied horizontal, vertical and overhead.
Medium strength	Loctite 577 ⁽¹⁾	4102/1900	Yellow	365d	170bar (2,463.8psi) breakaway torque	A fast curing thread sealant used on coarse threads and pipe fittings up to 75mm thread size. Clearance for gap filling 0.8mm.
	Per- mabond A1044					
Medium strength	Loctite 2431	4102/2700	Blue	365d	140– 340bar (2,029.0– 4,927.5psi) breakaway torque	Taper thread sealant, non-fluorescing to see oil leaks. Suitable for all taper fittings up to M36.
Low strength	Clayton Dewan- dre air brake sealant SC1252	4102/2200	White opaque	12h full cure	Maximum seal pres- sure 29bar (420.3psi)	Seals pipes and plugs against leakage of air, fuels, lubricants and coolants. Hardens to a tough seal resistant to shock and vibra- tion. Easily dismantled.
Low strength	Red Her- metite	4102/0800	Red	-	Resistant to oil	Non-hardening paste jointing for joints reg- ularly opened for servicing.

Subsec- tion	Com- mercial name	Product Number	Colour	Shelf life	Technical data	Comments
Low strength	Loctite 572	4102/1100	White opaque	730d	40–100bar (579.7– 1,449.3psi) breakaway torque	Used where slow cure is required to permit component alignment. PTFE (Polytetraflu- roethylene) filler.
Gas- keting medium strength	Loc- tite 509 Gasket Elimi- nator Flange Sealant	4102/3200	Blue to green	-	72h full strength on steel	Easy disassembly, used as form-in-place gasket. 0.2mm gap filling.
Gas- keting medium strength	Loctite 574 ⁽¹⁾ Per- mabond A136	4102/1200	Red	730d	2h working strength	Does not creep or relax after curing, no bolt re-tightening is required. Oil resistant. Ideal for formed in-situ gaskets.
Sealant for gas- kets	Loctite FAG 2 / Loctite 5922	4102/2600	Black	365d	Resists pres- sures up to 345bar (5,000.0psi)	Used to dress new or worn gaskets. Dries slowly, sets to pliable film for easy dismant- ling.
Rubber jointing com- pound	Dow corning 781 Loc- tite su- perflex clear RTV3 EVO- stick stan- dard in- dustri- al clear silicone sealant Dun- lop high modulus silicone sealant DP2205	4102/0900	Clear or translu- cent	270d	16.7bar (242.0psi) tensile strength	A synthetic rubber joint sealant suitable for joints between non-porous surfaces such as glass and metal, metal and metal where relatively large gap filling properties are re- quired. Suitable for vertical and overhead applications under normal atmospheric con- ditions. Joint movement approx. +/-12.5%. Cure time to 6mm depth in 24h.
Epoxy resin	Loc- tite fast epoxy sealant	4102/2400	Slightly coloured / transpar- ent	-	-	0.05L container requires special bi-mixer (gun) so it is mixed as dispensed, 0.024L is mixed by hand.
Room tempera- ture vul- canising	Loctite 5910, Flange sealant, RTV Sil- icon	4102/3400	Metal- lic black paste	-	Dry to touch in 40min	Designed for flange sealing, good resis- tance to oils and allows high joint move- ment.

Subsec- tion	Com- mercial name	Product Number	Colour	Shelf life	Technical data	Comments
Room tempera- ture vul- canising	Loctite 5970	4102/4200	Black	730d	18bar (260.9psi) tensile strength	Used for gaskets. Excellent resistance to engine oils. Typical applications include stamped sheet metal covers (timing covers and oil sumps) where good oil resistance and the ability to withstand high joint-move-ment are required.
Room tempera- ture vul- canising	Loc- tite su- perflex black silicone	4102/2900	Black	270d	16bar (231.9psi) tensile strength	Thixotropic allowing easy application, hori- zontal, vertical and overhead. Seals against water and many solvents.
Room tempera- ture vul- canising	Loctite 5901	4102/3700	Grey	730d	14bar (202.9psi) shear strength	Designed specifically for on line, low pres- sure tests carried out before product be- gins to cure. Product exhibits excellent re- sistance to automotive engine oils. Primari- ly for flange sealing, it withstands high joint- movement requirements.
Room tempera- ture vul- canising	Loctite 5368	4102/3900	Black paste	730d	20bar (289.9psi) tensile strength	Generally used for sealing applications, but also for bonding and for high temperature protection.
Room tempera- ture vul- canising	Loctite 5366	4102/4000	Clear paste	730d	20bar (289.9psi) shear strength	Designed specifically for use as a bond- ing agent to ensure perfect sealing, as well as bonding and protection. Examples are sealing side windows in trains, seal- ing heat sources (heat exchangers and wa- ter heaters) and for protection/insulation of electrical boxes.
Room tempera- ture vul- canising	Hylomar 607	332/D5695	Black paste	540d	40bar (579.7psi) tensile strength	A special purpose adhesive and sealant that can be used for a variety of applica- tions. It has good resistance to oils and aqueous anti-freeze agents, and is particu- larly suitable for high strength applications in odour sensitive environments.
Joining oil pan to bedplate	Loctite 5900	4102/3800	Black paste	730d	14bar (202.9psi) shear strength	JCB Service ONLY. Introduced for joining the oil pan to the bedplate face during ser- vice. High resistance to engine oils. The joint should be clamped to spread the ad- hesive and allowed to cure for 7d before heavy service duty.
Anti-cor- rosive	To mil- itary spec TT- P-1757B 1CY	4102/4300	Yellow	-	Type 1 Class C	Used to coat surfaces of dissimilar metals prior to assembly to prevent corrosion. Zinc chromate containing substance ideal for ap- plication to joints between aluminium and steel to prevent corrosion and seizure. FOR USE ON MILITARY VEHICLES ONLY.
Gas- keting medium strength	Bondloc B555	4102/4500	Clear/ Opaque	-	Full cure time 24h. 50bar (724.6psi) tensile strength	B555 is an anaerobic gasket sealant. It seals close fitting joints between rigid metal faces and flanges. Tensile strength to ISO 6922.

Subsec- tion	Com- mercial name	Product Number	Colour	Shelf life	Technical data	Comments
Seam sealant	Terolan 3412 AA-25	4102/4600	Light grey	90d	-	Serves as a seam sealant between sheet metal butt and overlap joints (interior seams) on vehicle bodies. Can be cured at temperatures of minimum 140°C (283.8°F) (effective metal temperature) for 15min. The material is applied to electro-dip coated steel sheets.
Direct glazing	Sikaflex 221 (use 4102/4800)	4102/2800	Yellow	-	-	Direct glazing one component polyurethane based adhesive and sealant compound. Tack free time of 50min.
Direct glazing	Sikaflex 252 (use 4102/4700) ⁽¹⁾	4102/2300	Black	-	-	A one component polyurethane pre-polymer based sealant. For sealing glass to frames. A mastic sealant which reacts with atmospheric moisture to form a rubber like solid.
Direct glazing	Teroson PU92 CT	4102/4700	-	365d in orig- inal pack- aging	-	The substrates must be clean, dry, oil and grease free. Skin formation time: approx. 20min Cure rate: approx. 4mm/24h
Direct glazing	930 JCB Branded yellow CT	4102/4800	Yellow	365d in orig- inal pack- aging	-	The substrates must be clean, dry, oil and grease free. It can be necessary to roughen the surface or to use a primer/adhesion promoter to provide optimum adhesion. When manufacturing of plastics, external release agents are often used; these agents must be absolutely removed prior. Skin formation time : approx. 20min Cure rate : approx. 4mm/24h
Direct glazing	Terostat 8597 CT	4102/4900	Black	540d in orig- inal pack- age	-	Isocyanate free solution. Designed for use without primer or activator. When you use this sealant on operator station, it should be used with Teroson PU 8519P black primer (and Teroson 450 clear adhesion promoter when specified specially). Cross compatible with all OEM / OES / AAM DGX sealants, including MS and PU chemistry (any remaining bead must be fully cured before application).
Silicone sealant - Heat re- sistant	Si- ka/Ever- build Heat Mate	4102/5100	Black	-	-	High modulus permanently flexible 100% silicone. Temperature resistant up to 300°C (571.6°F). Ideal for sealing industrial and high performance gaskets, oven doors etc.
Gas- ket and sealing	Loctite 510	4102/6100	Opaque pink	-	-	Introduced for Heavy products India (swing motor/ gearbox face).



75 - Consumable Products

16 - Sealant
00 - General

Subsec- tion	Com- mercial name	Product Number	Colour	Shelf life	Technical data	Comments
Polymer sealant	Terostat MS 930	4102/5200	White	-	-	Silane modified polymer sealant. used on roof panels of power products.
Silicon sealant	Rain- bow - RAL coloured silicone	4102/5300	Yellow	-	-	Contains fungicide. used on roof panels of power products.

(1) This is a non preferred product.

78 - After Sales

Contents	Page No.
Acronyms Glossary	78-2
78-24 Maintenance Schedules	
78-24-00 General	78-3
78-24-03 Maintenance Intervals	78-4
78-24-06 Pre-start Cold Checks, Service Points and Fluid Levels	78-5
78-24-09 Functional Tests and Final Inspection	78-7
78-81 Clothing and Personal Protective Equipment (PPE)	
78-81-00 General	78-11
78-93 Special Tools	
78-93-00 General	78-13
78-93-03 Parts List	78-14
78-96 Units of Measurement	
78-96-00 General	78-21



Acronyms Glossary

AC	Alternating Current
RCBO	Residual current Circuit Breaker with Over current protection



24 - Maintenance Schedules

Contents	Page No.
78-24-00 General	78-3
78-24-03 Maintenance Intervals	78-4
78-24-06 Pre-start Cold Checks, Service Points and Fluid Levels	78-5
78-24-09 Functional Tests and Final Inspection	78-7



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

00 - General

Introduction

The schedules show the service tasks which must be done and their intervals.

The services must be done at either the hourly interval or the calendar equivalent, whichever occurs first.

The intervals given in the schedules must not be exceeded. If the machine is operated under severe conditions (high temperature, dust, water, etc.) shorten the intervals.

Table 129.

○	Service task can be completed by a competent operator. Details of how to complete the service task are given in the Operator's Manual.
□	We recommend that a Service Engineer completes the service task. Details of how to complete the service task are given in the Service Manual.

03 - Maintenance Intervals

Introduction

Table 130.

Interval (h)	Calendar Equivalent
10	Daily
50	Weekly
250	Three months
500	Six months
1000	Yearly
2000	Two years

06 - Pre-start Cold Checks, Service Points and Fluid Levels

Introduction

Table 131.

Component	Task	Daily	Weekly	3 Months	6 Months	Yearly	2 Years
Operator's manual	Check (condition)	○	○	□	□	□	□
Safety labels	Check (condition)	○	○	□	□	□	□
Hydraulic hoses	Check (condition)	○	○	□	□	□	□
Hydraulic oil	Check (level)	○	○	□	□	□	□
Hydraulic oil	Check (leaks)	○	○	□	□	□	□
Hydraulic oil	Replace						□
Hydraulic return filter	Replace					□	□
Vent filter - hydraulic tank	Replace						□
Battery electrolyte	Check (level)	○	○	□	□	□	□
Battery electrolyte	Check (leaks)	○	○	□	□	□	□
Battery leads	Check (condition)	○	○	□	□	□	□
All electrical cables and conductors	Check (condition)	○	○	□	□	□	□
Welds	Check (condition)	○	○	□	□	□	□
Machine damage, missing parts	Check (condition)	○	○	□	□	□	□
Fasteners	Check (condition)	○	○	□	□	□	□
Lateral guard rail	Check (condition)	○	○	□	□	□	□
Scissor base & basket sliders	Check (condition)					□	□
Wheel rim and tyre	Check (condition)			□	□	□	□
Lift ram(s)	Grease				□	□	□
Steer pivots	Grease				□	□	□
Scissor base slider	Grease			□	□	□	□
Scissor basket slider	Grease				□	□	□
Scissor arm bush	Check (condition)					□	□
Wheel nut split pin	Check (condition)	○	○	□	□	□	□
Tilt sensor	Check (condition)	○	○	□	□	□	□



Component	Task	Daily	Weekly	3 Months	6 Months	Yearly	2 Years
Pothole protection system	Check (condition)	○	○	□	□	□	□
Lanyard anchor point on platform	Check (condition)	○	○	□	□	□	□

09 - Functional Tests and Final Inspection

Introduction

Table 132.

Component	Task	Daily	Weekly	3 Months	6 Months	Yearly	2 Years
Ground controller							
Emergency stop	Check (operation)	○	○	□	□	□	□
Platform raise and lower functions	Check (operation)	○	○	□	□	□	□
Platform emergency lowering	Check (operation)	○	○	□	□	□	□
Ignition switch	Check (operation)	○	○	□	□	□	□
Platform controller							
Emergency stop	Check (operation)	○	○	□	□	□	□
Platform raise and lower functions	Check (operation)	○	○	□	□	□	□
Horn	Check (operation)	○	○	□	□	□	□
Steering	Check (operation)	○	○	□	□	□	□
Drive and brake	Check (operation)	○	○	□	□	□	□
General							
Limited driving speed (with platform lifted and stowed)	Check (operation)	○	○	□	□	□	□
Tilt sensor	Check (operation)	○	○	□	□	□	□
Pothole protection system	Check (operation)	○	○	□	□	□	□
Ventilation system- hydraulic tank	Check (operation)			□	□	□	□
Overload system	Check (operation)				□	□	□
Hydraulic system pressure	Check (settings)				□	□	□
Hydraulic system functional test	Check (operation)				□	□	□
Overload test	Check (operation)				□	□	□
RCBO (Residual current Circuit Breaker with Over current protection)	Check (operation)				□	□	□



78 - After Sales

24 - Maintenance Schedules
09 - Functional Tests and Final Inspection

Component	Task	Daily	Weekly	3 Months	6 Months	Yearly	2 Years
AC (Alternating Current) power to platform and charger cables	Visual inspection			☐	☐	☐	☐
AC power to platform and charger cables	Check (operation)				☐	☐	☐



81 - Clothing and Personal Protective Equipment (PPE)

Contents	Page No.
78-81-00 General	78-11

[illegible]

00 - General

Introduction

Do not wear loose clothing or jewellery that can get caught on controls or moving parts. Wear protective clothing and personal safety equipment issued or called for by the job conditions, local regulations or as specified by your employer.



Contents

78-93-00 General	78-13
78-93-03 Parts List	78-14

00 - General

Introduction

The tools shown are the special tools required for completing the procedures described in this manual. These tools are available from JCB Service or in some instances can be manufactured locally.

The tools are divided into three categories:

- Special Tool = Only available from JCB.
- Recommended Tool = Available from JCB but other tool manufacturers/suppliers may offer a tool with the same characteristics.
- General Tool = A tool which is widely available.

Tools other than those listed will be required. It is expected that such general tools will be available in any well equipped workshop or be available locally from any good tool supplier.

Before you start work, make sure that all safety precautions are observed in accordance with the information contained within the relevant support documentation.

03 - Parts List

Introduction

Introduction 78-14

Component Identification 78-15

01 - Machine

Tool Category	Part No.	Description	Qty.	Comments
Special Tool	400/J2673	Tilt sensor calibration lead	1	

27 - Driveline

Tool Category	Part No.	Description	Qty.	Comments
Recommended Tool		Wheel Chock - JC/405217	6	
General Tool	334/F1285	Forklift Jack	1	
Special Tool	400/K4721	Puller Tool	1	

30 - Hydraulic System

Tool Category	Part No.	Description	Qty.	Comments
Special Tool	892/01255	Hydraulic Flushing Rig	1	
Recommended Tool	892/01268	Digital Pressure Gauge 0-400 bar	1	
Special Tool	892/01271	Hose for Pressure Gauge	1	
Special Tool	998/11051	Digital Hydraulic Pressure Test Kit	1	

33 - Electrical System

Tool Category	Part No.	Description	Qty.	Comments
General Tool	333/H5664	Meter (hydrometer)	1	
Special Tool	400/J2673	Tilt sensor calibration lead	1	
Special Tool	400/J3606	6V Battery Lifting Tool	1	
Special Tool	400/K9854	12V Battery Lifting Tool	2	
Special Tool	401/L7085	Diagnostics Lead - K500 Controller	1	
General Tool	892/00349	Wiring Crimp Tool	1	
General Tool	892/00350	Butane Heater	1	

Component Identification

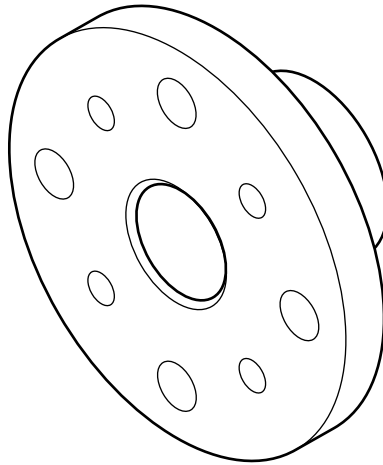
Recommended Tool - - Wheel Chock - JC/405217



General Tool - 333/H5664 - Meter (hydrometer)

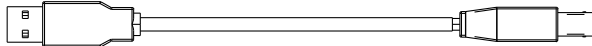
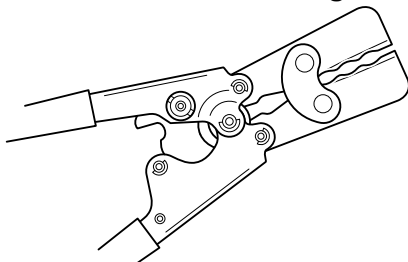


General Tool - 334/F1285 - Forklift Jack**Special Tool - 400/J2673 - Tilt sensor calibration lead****Special Tool - 400/J3606 - 6V Battery Lifting Tool**

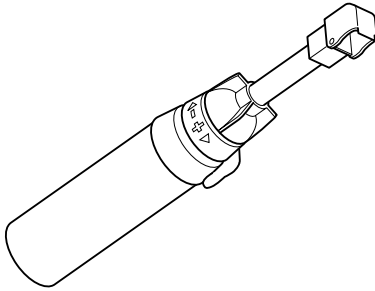
Special Tool - 400/K4721 - Puller Tool


Use with M14 Bolts (x4), 1315/3610D, M20 Bolt (x1)
1315/3814D

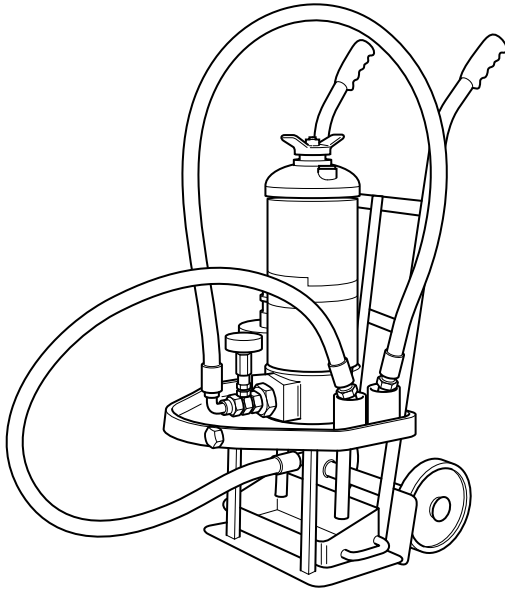
Special Tool - 400/K9854 - 12V Battery Lifting Tool

Special Tool - 401/L7085 - Diagnostics Lead - K500 Controller

General Tool - 892/00349 - Wiring Crimp Tool


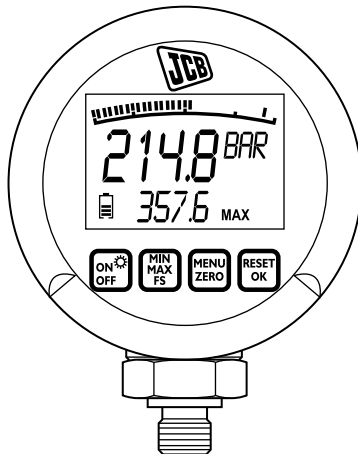
General Tool - 892/00350 - Butane Heater

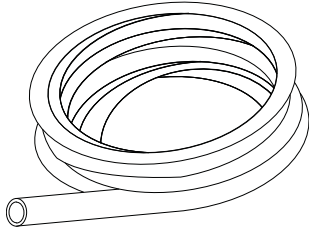
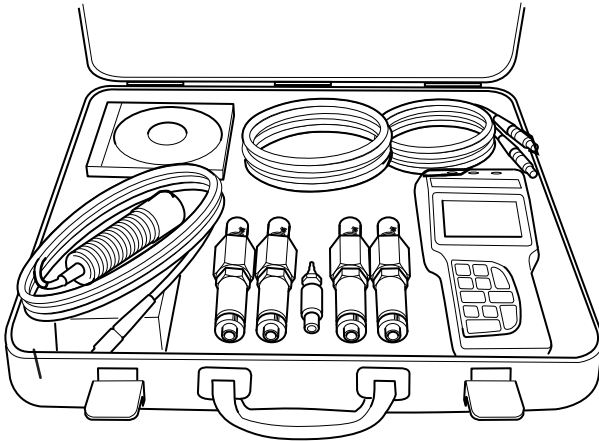


Special Tool - 892/01255 - Hydraulic Flushing Rig



Recommended Tool - 892/01268 - Digital Pressure Gauge 0-400 bar



Special Tool - 892/01271 - Hose for Pressure Gauge

Special Tool - 998/11051 - Digital Hydraulic Pressure Test Kit


Item	Part No.	Description	Qty.
1	998/11052	Hand Held 4-Channel ServiceMaster Unit	1
2	998/11053	SensoWin Software Kit and PC Cable	1
3	998/11054	Equipment Case	1
4	998/11055	0-600 Bar Pressure Transducer	2
5	998/11056	0-100 Bar Pressure Transducer	2
6	998/11057	RPM Tachometer (includes fixed cable, 2 metres)	1
7	998/11058	5 Metre Connecting Cable	1
8	998/11059	M16 Metric Adaptors for Test Points	4
9	998/11060	400mm Test Hose 90° HSP to M16	2
10	998/11061	400mm Test Hose Straight HSP to M16	2



96 - Units of Measurement

Contents	Page No.
78-96-00 General	78-21

00 - General

Technical Data

The standard units of measurement used by JCB are listed below together with the formula for conversion for countries using non metric standards.

Standard Units

Table 133. Force

Measurement (unit)	Convert to	Multiply by
Newton (N)	Kilogram force (kgf)	0.102
	Pound force (lbf)	0.225

Table 134. Length

Measurement (unit)	Convert to	Multiply by
Millimetre (mm)	Inch (in)	0.0394
Metre (m)	Feet (ft)	3.281
	Yard (yd)	1.094
Kilometre (km)	Mile (mile)	0.621

Table 135. Mass

Measurement (unit)	Convert to	Multiply by
Gram (g)	Ounce (oz)	0.035
Kilogram (kg)	Pound (lb)	2.205
Tonne	Ton	0.984

Table 136. Speed

Measurement (unit)	Convert to	Multiply by
Kilometre/Hour (km/h)	mile/hour (mph)	0.621
Metre/Second (m/s)	feet/second (ft/s)	3.281

Table 137. Volume

Measurement (unit)	Convert to	Multiply by
Cubic Centimetre (cm ³)	Cubic Inch (in ³)	0.061
Cubic Metre (m ³)	Cubic Foot (ft ³)	35.315
	Cubic Yard (yd ³)	1.308
Millilitre (ml)	Fluid ounce (fl oz)	0.035
Litre (l)	UK Gallon	0.220
	US Gallon	0.264

Table 138. Flow

Measurement (unit)	Convert to	Multiply by
Litre/Minute (L/m)	UK Gal- lon/Minute	0.220
	US Gal- lon/Minute	0.264

Table 139. Area

Measurement (unit)	Convert to	Multiply by
Square Millimetre (mm ²)	Square Inch (in ²)	0.0015
Square Metre (m ²)	Square Foot (ft ²)	10.764
	Square Yard (yd ²)	1.196

Table 140. Torque

Measurement (unit)	Convert to	Multiply by
Newton metre (Nm)	Pound force foot (lb f ft)	0.7376

Table 141. Pressure

Measurement (unit)	Convert to	Multiply by
Bar	Pound force/ inch ² (psi)	14.5

Table 142. Temperature

Measurement (unit)	Convert to	Formula
Degrees Celsius (°C)	Degrees Fahrenheit (°F)	Multiply by 9, Divide by 5, Add 32

Table 143. Power

Measurement (unit)	Convert to	Multiply by
KiloWatt (kW)	Horsepower (hp)	1.341

Table 144. Time

Measurement (unit)
Second (s)
Minute (min)
Hour (h)

Table 145. Current

Measurement (unit)
Ampere (A)

Table 146. Voltage

Measurement (unit)
Volt (V)

Table 147. Noise Levels

Measurement (unit)
Sound pressure level (LpA)
Sound power level (LwA)