

F435521\_02

660D Skidder

# Workshop Manual

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## 0010 How To Use This Book.

### 1. Serial Numbers

This Manual covers the following range of 660 Skidder serial numbers:

**10EC1079 and up**

### 2. Component Numbers

The manual is divided into Chapters. Chapter 1, for example, details the engine system and includes the engine mounting, cooling system, coupling, exhaust and air intake systems. Each chapter starts with a Table of Contents giving details and page references.

Each Chapter is further divided into smaller sections. Each section is identified with a unique number that relates to the warranty system. For example, all parts used in the engine air intake system are found under section 1700.

### **3. Page Layout**

At the top of each page are two sets of numbers.

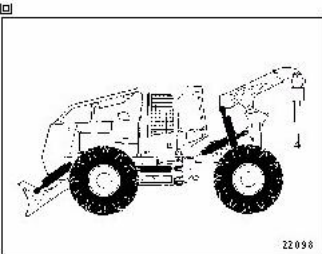

The 'page' number, at the outside corner, consists of the four digit section number followed by the page number in that section. Each section is numbered sequentially from one. For example, 1800 - 3, would be the third page of Section 1800, Exhaust System.

The 'Issue' number also comprises two sets of numbers separated by a hyphen. The first numbers identify the issue date of that section of the manual. The numbers following the hyphen are the issue number of the section and are used to control updating in the field. For example, 06/2000 - 02, would indicate Revision 2, released June, 2000.

At the bottom of each page is a model identification and the type of manual.

The model identification may identify a unique product or a range of products (660 for example).

## 3. Page Layout

Timberjack	Issue 01/99-01	Page 280Q+1
<u>2800 Cylinders</u>		
<u>1. Description and Operation</u>		
<u>1.1 Cylinder Arrangements</u>		
<p>With the exception of the cylinder used on the single arch, all the cylinders used for the decking blade, steering and boom / arch functions have the same general arrangement. The same service procedures can be used for all the cylinders.</p>		22098
<p>The cylinders vary in dimensions and specifications and their component parts are not interchangeable.</p>		
<p>The internal arrangement of the cylinder used for the single arch function is different from the other cylinders. In this type of cylinder the piston is retained by a bolt and washer instead of a nut threaded onto the piston rod. All other service procedures are the same.</p>		

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360/460 Workshop

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## 4. Abbreviations

The abbreviations in the following list are used throughout Timberjack publications. While we have endeavored to use 'industry standard' abbreviations wherever possible, common practice mandates that historical usage be maintained.

ADJ	adjust; adjuster	F	Fahrenheit
ADPTR	adapter	FD	front drive
ALT	alternator	FH	flat head
ANG	angle	FLT	flat foot
ASSY	assembly	FT	feet
AUX	auxiliary	FTG	fitting
AWG	American Wire Gage	FWD	forward
BATT	battery	GP	group
BLK	black; block	GR	grapple
BLU	blue	GRN	green
BRG	bearing	HARN	harness
BRK	brake	HD	heavy duty
BS	bar saw	HDLNR	headliner
BU	backup	HH	hex head
BUSH	bushing	HP	high pressure
C	Celsius; Centigrade	HSG	housing
CARR	carrier	HYD	hydraulic
CBL	cable	ID	inside diameter
CF	carrier frame	IN	inch; inches
CHK	check	INCL	includes
CM	centimeter	INSTR	instrument
CMPSR	compressor	INT	internal
CONV	converter	JS	joystick
CRDL	cradle	LF	left front
CS	capscrew	LG	long
CTR	circle saw center	LH	left hand
CUM	Cummins	LK	lock
CYL	cylinder	LP	low pressure
D	diameter	LR	left rear
DEG	degree(s)	LWR	lower
DL	delimber		
EL	elbow		
EMGCY	emergency		
ENG	engine		
EXT	extension		

## 4. Abbreviations

MACH	machine	SEC	section
MECH	mechanism	SH	socket head
MM	millimeter	SHT	sheet
MT	mount	SKT	socket
MTG	mounting; mating	SLTD	slotted
MTR	motor	SN	serial number
		SPCL	special
OBS	obsolete	SPD	speed
OD	outside diameter	SPI	single pump isolated
OPR	operator	SPRSN	suppression
OPT	optional	SQ	square
ORN	orange	STD	standard
PC	piece	TEMP	temperature
PF	power frame	TJ	Timberjack
PHIL	Phillips	TS	topping saw
PIN	pinion	TYP	typical
PKG	package		
PLCS	places	UPR	upper
PNL	panel		
PO	part of...	VIO	violet
PRESS	pressure	VLV	valve
PSI	pounds/square inch		
		W/	with
REF	reference	W/G	with guard
REINF	reinforce; reinforcing	W/O	without
REINFMT	reinforcement	WHT	white
REV	reverse	WLDMT	weldment
RF	right front	WS	windshield
RH	right hand	WSHR	washer
RLF	relief		
RND	round	5P	five port
RR	right rear	8P	eight port
		9P	nine port
		10P	ten port

## 0020 Chapters and Sections Contents

### Chapters:

- 0000 .. General
- 1000 .. Power Unit
- 2000 .. Hydraulics
- 3000 .. Electrical
- 4000 .. Power Train
- 5000 .. Cab
- 6000 .. Frames
- 7000 .. Crane/Tree Handling
- 8000 .. not used in this manual
- 9000 .. Indexes

## **1. Chapters and Sections Contents**

### **0000 General**

#### 0010 How to Use This Book

1. Serial Numbers
2. Component Numbers
3. Page Layout
4. Abbreviations

#### 0020 Chapters and Sections

#### 0030 Foreword and Warranty

1. Foreword
2. Emissions Control Warranty Statement
3. Customer Feedback
4. Modifications or Repairs to Roll-over Protective Structures (ROPS)
5. Non-approved Field Product Changes
6. Sound Information
7. Registered Trademarks
8. Warranty

#### 0040 Safety Information

1. General
2. Safety Symbol
3. Understanding Signal Words
4. Skidder Safety Features
5. General Safety Precautions
6. Operating Safety Precautions
7. Servicing Safety Precautions
8. Transporting on Public Roads
9. Fire Prevention
10. What to Do if the Machine Catches Fire
11. 660D Skidder Safety Decals

#### 0060 Component Locators

1. General
2. Component Locators
  - 2.1 Engine Component Locator
  - 2.2 Hydraulic Component Locator
  - 2.3 Electrical Component Locator
  - 2.4 Power Train Component Locator
  - 2.5 Cab Component Locator
  - 2.6 Frames Component Locator
  - 2.7 Tree Handling Component Locator

## 1. Chapters and Sections Contents

- 0070     Towing/Transporting the Skidder
1. Towing Over a Short Distance
  2. Releasing the Brakes
  3. Towing Procedure
  4. Transporting the Skidder
  5. Driving the Skidder on the Road
- 0080     Repairs
1. Troubleshooting Techniques
  2. Welding
  3. Hydraulics
  4. Storage
    - 4.1 Preparing the Machine for Storage
    - 4.2 Monthly Storage Procedure
  5. Periodic Maintenance Checklist

## **1. Chapters and Sections Contents**

### **1000 Power Unit**

1100

#### Engine

1. Description and Operation
  - 1.1 General
  - 1.2 Lubrication System
  - 1.3 Cooling System
  - 1.4 Air Intake and Exhaust System
  - 1.5 Turbocharger
  - 1.6 Fuel System
  - 1.7 Start Aid
  - 1.8 Engine Option Codes
  - 1.9 Other technical Documents
2. Engine Specifications
3. Engine Operation
  - 3.1 Pre-Start Checks
  - 3.2 Before Starting the Engine
  - 3.3 Starting the Engine
  - 3.4 Stopping the Engine
  - 3.5 Reducing Engine Load
4. Engine Break-In Period
5. Engine Oil
  - 5.1 Checking Engine Oil
  - 5.2 Changing Engine Oil and Filter
6. Inspecting Alternator Belt
7. Checking and Replacing Hub Vibrational Damper
8. Checking Engine Valve Lash Clearance
9. Replacing Start Aid Can
10. Engine Tune-Up
  - 10.1 Preliminary Engine Testing Before Tune-Up
  - 10.2 General Tune-Up Recommendations
11. Engine Troubleshooting

1300

#### Engine Mounting

1. Engine/Transmission Removal and Installation
  - 1.1 General
  - 1.2 Access to Engine/Transmission
  - 1.3 Wiring Harnesses
  - 1.4 Engine Hoses
  - 1.5 Engine Mechanical Connections
  - 1.6 Transmission Hoses
  - 1.7 Transmission Mechanical Connections
  - 1.8 Engine and Transmission Mounts

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## **1. Chapters and Sections Contents**

- 1400     Fuel System
- 1. Description and Operation
    - 1.1 General
    - 1.2 Primary Filter (Fuel/water Separator)
    - 1.3 Final Fuel Filter
    - 1.4 Fuel Supply Pump
    - 1.5 Fuel Injection System
    - 1.6 Fuel Shut-off Solenoid
  - 2. Checking the Fuel level
  - 3. Draining Water from Fuel Tank
  - 4. Filters
    - 4.1 Checking the Primary Filter (Fuel/water Separator)
    - 4.2 Replacing the Primary Filter (Fuel/water Separator)
    - 4.3 Replacing the Final Fuel Filter
    - 4.4 Replacing the Final Fuel Filter Check Valve
  - 5. Bleeding the Fuel System
  - 6. Fuel Tank Removal and Installation
    - 6.1 Fuel Tank Removal
    - 6.2 Fuel Tank Installation
- 
- 1500     Cooling System
- 1. Description and Operation
  - 2. Cooling System Components
  - 3. Checking the Engine Coolant Level
  - 4. Checking the Engine Coolant Condition
  - 5. Replacing the Engine Coolant
  - 6. Flushing the Cooling System
  - 7. Cleaning the Oil Cooler and Radiator
  - 8. Radiator Removal and Installation
    - 8.1 Radiator Removal
    - 8.2 Radiator Installation
  - 9. Testing and Maintaining the Engine Coolant
    - 9.1 General
    - 9.2 Recommended Fluids
    - 9.3 Solder Bloom
    - 9.4 Cooling System Cleaners
    - 9.5 Maintenance Records
  - 10. Optional Sand Grill
  - 11. Cooling System Troubleshooting

## **1. Chapters and Sections Contents**

- 1600      Coupling  
1. Description and Operation  
2. Engine Removal and Installation  
    2.1 Removal of Engine from Transmission  
    2.2 Installation of Engine on Transmission
- 1700      Air Intake System  
1. Description and Operation  
    1.1 Air Cleaner  
2. Air Intake Assembly  
    2.1 Air Intake Components  
    2.2 Assembly  
3. Precleaner  
4. Air Filter Replacement  
5. Extending Turbocharger Life
- 1800      Exhaust System  
1. Description and Operation  
2. Exhaust System Assembly  
    2.1 Exhaust System Installation  
    2.2 Seal Clamp Installation



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## **1. Chapters and Sections Contents**

### **2000    Hydraulics**

#### 2000    Hydraulics Systems

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2. Main Hydraulic System
  - 2.1 Description and Operation
  - 2.2 Checking the Hydraulic Fluid Level
  - 2.3 Draining the Hydraulic System
  - 2.4 Filling the Hydraulic System
  - 2.5 De-aerating the Main Hydraulic System
3. Hydraulic System Cleaning
4. Transmission Charge System
  - 4.1 Description and Operation
5. Hydraulic Testing
  - 5.1 Hydraulic Test Tools
  - 5.2 Hydraulic Circuit Testing
  - 5.3 Controls
  - 5.4 Compensators and Pressure Relief Valves
6. Schematics
  - 6.1 Line Sizing and Routing
  - 5.2 Reservoir Locations
  - 6.3 Hydraulic Schematic - Cable Skidder
  - 6.4 Hydraulic Schematic - Grapple Skidder
  - 6.5 Transmission Schematic
7. Hydraulic Schematic Symbols
  - 7.1 Miscellaneous Units
  - 7.2 Pumps and Motors
  - 7.3 Cylinders
  - 7.4 Methods of Operation
8. Hydraulic System Troubleshooting

## **1. Chapters and Sections Contents**

- 2110      Work Pump
- 1 Description and Operation
    - 1.1 General
  - 2. Work Pump Components
  - 3. Theory of Operation
    - 3.1 Variable Pumps
    - 3.2 Pressure Compensator
    - 3.3 Pump Unloading Solenoid
  - 4. Work Pump Specifications
  - 5. Work Pump Removal
  - 6. Work Pump Installation
  - 7. Work Pump Disassembly
    - 7.1 General
    - 7.2 Control Group
    - 7.3 Control Unit
    - 7.4 Control Unit Disassembly
    - 7.5 Control Unit Assembly
    - 7.6 Valve Plate Group
    - 7.7 Rotating Group
    - 7.8 Driveshaft Group
    - 7.9 Swashplate Group
  - 8. Work Pump Assembly
    - 8.1 Swashblock Group
    - 8.2 Driveshaft Group
    - 8.3 Rotating Group
    - 8.4 Valve Plate Group
    - 8.5 Control Group
    - 8.6 Shaft Torque Test
  - 9. Pump Delivery Tests
    - 9.1 General
    - 9.2 Pump Case Drain Flow Test
    - 9.3 Case Drain Flow Test Procedure
  - 10. Work Pump Troubleshooting
- 2120      Transfer Pump
- 1. Description and Operation
  - 2. Transfer Pump Troubleshooting
- 2400      Valves
- 1. Valves Locator
  - 2. Control Valves
  - 3. Auxilliary Valves
  - 4. Joystick Valve

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## 1. Chapters and Sections Contents

- 2410     Control Valves
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  2. Control Valve Removal and Installation
    - 2.1 Decking Blade Control Valve Removal
    - 2.2 Decking Blade Control Valve Installation
    - 2.3 Grapple Control Valve Removal
    - 2.4 Grapple Control Valve Installation
  3. Control Valve Servicing
    - 3.1 Typical Control Valve Components
    - 3.2 Control Valve Disassembly
    - 3.3 Control Valve Assembly
    - 3.4 Link Operated Spool Section Components
    - 3.5 Link Operated Spool Section Disassembly
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    - 3.7 Pilot Operated Spool Section Components
    - 3.8 Pilot Operated Spool Section Disassembly
    - 3.9 Pilot Operated Spool Section Assembly
    - 3.10 Solenoid Operated Spool Section Components
    - 3.11 Solenoid Operated Spool Section Disassembly
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    - 3.13 Relief Valves
    - 3.14 Relief Valve Disassembly
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  4. Control Valve Internal Leakage Test
  5. Control Valve Hoses and Fittings
- 2420     Auxilliary Valves
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    - 2.2 Priority Valve Removal
    - 2.3 Priority Valve Installation
    - 2.4 Priority Valve Servicing
    - 2.5 Priority Valve Testing
  3. Orbitrol Steering Control Valve
    - 3.1 Description and Operation
  4. Steering Control Unit Components
  5. Steering Control Unit Servicing Tools
  6. Steering control Unit Disassembly
  7. Steering Control Unit Assembly
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  2. Joystick Components
  3. Joystick Removal and Installation
  4. Joystick Servicing

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  2. Steering Cylinder Removal and Installation
    - 2.1 Steering Cylinder Removal
    - 2.2 Steering Cylinder Installation
  3. Steering Control Unit Removal and Installation
    - 3.1 Steering Control
    - 3.2 Steering Control Unit Removal
    - 3.3 Steering control Unit Installation
  4. Steering Troubleshooting
- 2600     Brake Hydraulics
1. Description and Operation
  2. Manual Parking Brake Release System
    - 2.1 General
    - 2.2 Manually Releasing the Parking Brake
    - 2.3 Manually Refilling the Accumulator
    - 2.4 Manually Discharging the Accumulator
    - 2.5 System Testing
  3. Brake System Valves
  4. Bleeding the Brakes
- 2700     Hydraulic Tank and Filters
1. Description and Operation
    - 1.1 Hydraulic Tank
    - 1.2 Hydraulic Tank Components
    - 1.3 Filters
  2. Hydraulic Tank Removal
  3. Hydraulic Tank Installation
  4. Changing Hydraulic Oil Filter
- 2800     Cylinders
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    - 1.1 General
    - 1.2 Cylinder Components
  2. Cylinder Removal and Installation
  3. Cylinder Disassembly
  4. Cylinder Assembly
    - 4.1 Rod Guide Assembly
    - 4.2 Piston Assembly
    - 4.3 Piston Rod Assembly
    - 4.4 Cylinder Assembly
  5. Cylinder Internal Leakage Test
  6. Hydraulic Cylinder Troubleshooting
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