

# CD15

## Service Manual



8905-1

**This Page Blank**



# SERVICE MANUAL

This Manual has been prepared for and is considered part of -

## CD15

Crane Model Number

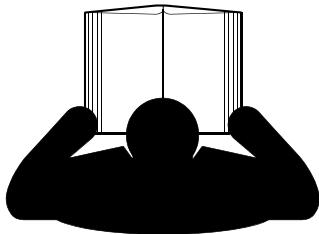

This Manual is Divided into the following Sections:

|            |                                     |
|------------|-------------------------------------|
| SECTION 1  | INTRODUCTION                        |
| SECTION 2  | SAFETY PRACTICES                    |
| SECTION 3  | ELECTRIC SYSTEM                     |
| SECTION 4  | HYDRAULIC SYSTEM                    |
| SECTION 5  | PREVENTATIVE MAINTENANCE            |
| SECTION 6  | ENGINE AND ENGINE SYSTEMS           |
| SECTION 7  | TRANSMISSION AND TORQUE CONVERTER   |
| SECTION 8  | AXLES/DRIVE SHAFTS/WHEELS AND TIRES |
| SECTION 9  | BRAKE SYSTEM                        |
| SECTION 10 | STEERING SYSTEM                     |
| SECTION 11 | STRUCTURALS                         |
| SECTION 12 | SCHEMATICS/WIRING DIAGRAMS          |

### NOTICE

The crane serial number is the only method your Grove distributor or Crane Care Customer Service at Grove has of providing you with correct parts and service information.

The crane serial number is identified on the builder's decal attached to the operator's cab. **Always furnish crane serial number** when ordering parts or communicating service problems with your Grove distributor or Crane Care Customer Service at Grove.

|   |   |
|---|---|
|  | <h2> DANGER</h2> <p><b>An untrained operator subjects himself and others to death or serious injury. Do not operate this crane unless:</b></p> <ul style="list-style-type: none"><li>• You are trained in the safe operation of this crane. Manitowoc is not responsible for qualifying personnel.</li><li>• You read, understand, and follow the safety and operating recommendations contained in the crane manufacturer's manuals and load charts, your employer's work rules, and applicable government regulations.</li><li>• You are sure that all safety signs, guards, and other safety features are in place and in proper condition.</li><li>• The Operator Manual and Load Chart are in the holder provided on crane.</li></ul> |
|---|---|

**California Proposition 65**

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to [www.P65warnings.ca.gov/diesel](http://www.P65warnings.ca.gov/diesel).

Battery posts, terminals, and related accessories contain chemical lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects, and other reproductive harm. Wash hands after handling.

**California Spark Arrestor**

Operation of this equipment may create sparks that can start fires around dry vegetation. A spark arrestor may be required. The owner/operator should contact local fire agencies for laws or regulations relating to fire prevention requirements.

---

The original language of this publication is English.

**SECTION 1 ..... Introduction**

- General ..... 1-2
  - Supplemental Information ..... 1-2
  - Safety Information ..... 1-2
  - Basic Nomenclature ..... 1-2
- Directional Reference ..... 1-2
- Identification Plates ..... 1-5
- General Specifications ..... 1-6
  - Boom ..... 1-6
  - Electrical System ..... 1-6
  - Engine ..... 1-6
  - Fuel Tank ..... 1-6
  - Hydraulic System ..... 1-6
  - Mast ..... 1-6
  - Outriggers ..... 1-6
  - Tires ..... 1-6
  - Travel Speeds (approximate) ..... 1-7
  - Weight (GVW) ..... 1-7
  - Wire Rope ..... 1-7
- Dimensions (Side View) ..... 1-8
- Dimensions (Top View and Rear View) ..... 1-9
- General Maintenance ..... 1-10
  - Cleanliness ..... 1-10
    - After Cleaning ..... 1-10
  - Removal and Installation ..... 1-10
  - Disassembly and Assembly ..... 1-10
  - Pressing Parts ..... 1-11
  - Locking Devices ..... 1-11
  - Wires and Cables ..... 1-11
  - Shims ..... 1-11
  - Hoses and Tubes ..... 1-11
  - Bearings ..... 1-12
  - Gaskets ..... 1-12
  - Batteries ..... 1-12
  - Hydraulic Systems ..... 1-13
  - Electrical System ..... 1-14
  - Fatigue of Welded Structures ..... 1-14
  - Loctite® ..... 1-15
  - Fasteners and Torque Values ..... 1-15
- Weld Studs ..... 1-30
- Hydraulic Fitting ..... 1-30
  - F.F.F.T. METHOD (Flats from Finger Tight) ..... 1-30
  - 37° Flared Steel Fitting - Tube or Hose to Fitting ..... 1-30
  - Adjustable Straight ..... 1-31
- Wire Rope ..... 1-32
  - General ..... 1-32
    - Environmental Conditions ..... 1-32
    - Dynamic Shock Loads ..... 1-32
    - Lubrication ..... 1-32
    - Precautions and Recommendations During Inspection or Replacement ..... 1-32
  - Wire Rope Inspection (Running Ropes and Pendant Cables) ..... 1-33
  - Keeping Records ..... 1-33
  - Frequent Inspection ..... 1-33
  - Wire Rope Inspection (Boom Extension and Retraction Cables) ..... 1-34
  - Wire Rope Inspection/Replacement (All Wire Rope) ..... 1-34
  - Seizing Wire Rope ..... 1-35

|  |      |
|--|------|
| O-ring, Seal and Elastic Nut Replacement .....             | 1-36 |
| Hydraulic Pressure Testing .....                           | 1-36 |
| <b>SECTION 2..... Safety Practices</b>                     |      |
| Introduction.....  | 2-1  |
| Signal Words .....   | 2-1  |
| Signal Word .....  | 2-1  |
| Personal Considerations .....                              | 2-2  |
| Equipment Considerations.....                              | 2-2  |
| General Considerations .....                               | 2-3  |
| Operational Considerations .....                           | 2-3  |
| Environmental Protection .....                             | 2-4  |
| Final Word .....   | 2-4  |
| <b>SECTION 3..... Electric System</b>                      |      |
| General.....   | 3-1  |
| Comparing an Electrical System to a Hydraulic System ..... | 3-1  |
| Magnetism .....  | 3-2  |
| Main Electrical System.....                                | 3-2  |
| General .....  | 3-2  |
| Wire Harnesses .....                                       | 3-2  |
| Fuses .....  | 3-2  |
| Charging System .....                                      | 3-5  |
| Alternator and Voltage Regulator .....                     | 3-5  |
| Batteries.....   | 3-5  |
| Battery Disconnect Switch .....                            | 3-5  |
| Voltmeter .....  | 3-5  |
| Special Precautions.....                                   | 3-5  |
| Battery Maintenance and Charging .....                     | 3-5  |
| Starting Circuit .....                                     | 3-6  |
| General Inspections.....                                   | 3-6  |
| gauge Cluster .....  | 3-8  |
| General .....  | 3-8  |
| Gauges .....   | 3-8  |
| Engine Diagnostic Connector .....                          | 3-9  |
| Accessory Circuits .....                                   | 3-10 |
| Anti-Two Blocking System .....                             | 3-10 |
| Electric Swivel .....                                      | 3-10 |
| Rated Capacity Limiter (RCL) System.....                   | 3-10 |
| Heater .....   | 3-10 |
| Troubleshooting .....                                      | 3-11 |
| <b>SECTION 4..... Hydraulic System</b>                     |      |
| General Description .....                                  | 4-2  |
| General .....  | 4-2  |
| Hydraulic System.....                                      | 4-2  |
| Troubleshooting .....                                      | 4-2  |
| Troubleshooting Aids.....                                  | 4-2  |
| Troubleshooting Procedures .....                           | 4-3  |
| Troubleshooting Guides .....                               | 4-3  |
| Hydraulic Pump .....                                       | 4-9  |
| Description.....   | 4-9  |
| Pump Output Test .....                                     | 4-9  |
| Pump Margin (Stand-By) Pressure Check/Adjustment .....     | 4-9  |
| Dump Valve .....   | 4-9  |
| Main Control Valve .....                                   | 4-11 |

- General . . . . . 4-11
- Inlet Section . . . . . 4-11
- Working Valve Sections . . . . . 4-11
- Load Sense Relief Valve Pressure Check/Adjustment . . . . . 4-13
- Priority Flow Load Sense and Accumulator Relief Pressure Check/Adjustment . . . . . 4-13
- Hydraulic Swivel . . . . . 4-14
  - General . . . . . 4-14
  - Functions . . . . . 4-14
  - Troubleshooting . . . . . 4-15
- Boom Lift Circuit . . . . . 4-15
  - General . . . . . 4-15
  - Oil Flow . . . . . 4-15
  - Holding Valve . . . . . 4-15
  - Lift Cylinder Leakage Check . . . . . 4-15
- Telescope Circuit . . . . . 4-16
  - General . . . . . 4-16
  - Oil Flow . . . . . 4-16
  - Holding Valve . . . . . 4-16
  - System Relief Valves . . . . . 4-16
  - Telescope Pressure Check/Adjustment . . . . . 4-16
  - Telescope Cylinder Leakage Test . . . . . 4-17
- Hoist Circuit . . . . . 4-19
  - General . . . . . 4-19
  - Oil Flow . . . . . 4-19
  - Brake Holding Valve . . . . . 4-19
  - Drum Rotation/Minimum Wrap Sensor . . . . . 4-19
- Swing Circuit . . . . . 4-20
  - General . . . . . 4-20
  - Oil Flow . . . . . 4-20
  - Optional Swing Lock . . . . . 4-21
  - Swing Pressure Check/Adjustment (without Swing Lock) . . . . . 4-21
  - Swing Pressure Check/Adjustment (with Swing Lock) . . . . . 4-21
- Anti-two Blocking System . . . . . 4-23
  - General . . . . . 4-23
  - System Operation . . . . . 4-23
- Outrigger Circuit . . . . . 4-24
  - General . . . . . 4-24
  - Oil Flow . . . . . 4-24
  - Outrigger Monitoring System (OMS) . . . . . 4-25
- Under Deck Winch Circuit . . . . . 4-25
  - General . . . . . 4-25
  - Oil Flow . . . . . 4-25
  - Under Deck Winch Pressure Check/Adjustment . . . . . 4-25
- Component Repair . . . . . 4-26
  - General . . . . . 4-26
  - Hydraulic Pump Repair . . . . . 4-26
  - Swing Motor . . . . . 4-28
  - Hydraulic Swivel . . . . . 4-36
  - Hydraulic Cylinders . . . . . 4-40

**SECTION 5 . . . . . Preventative Maintenance**

- Introduction . . . . . 5-1
  - Spark Arresting Mufflers . . . . . 5-1
  - Safety List . . . . . 5-2
- Lubricants . . . . . 5-2
- Environmental Protection . . . . . 5-2

Maintenance Records . . . . . 5-2

Maintenance . . . . . 5-2

    Preparation . . . . . 5-2

    Hydraulic System Maintenance Precautions . . . . . 5-3

    Label Parts when Disassembling . . . . . 5-3

    Hydraulic Oil Recommendations . . . . . 5-3

    Draining and Flushing . . . . . 5-3

    Removing Air From the Hydraulic System . . . . . 5-4

    Parts Replacement . . . . . 5-4

Special Maintenance . . . . . 5-5

    Delivery Inspection . . . . . 5-5

    After First 50 Hours of Operation (New Cranes) . . . . . 5-5

    After First 100 Hours of Operation (New Cranes) . . . . . 5-5

    Cranes Not In Regular Use . . . . . 5-5

Maintenance Schedule and Checklist . . . . . 5-5

Lubrication Schematic . . . . . 5-8

    Lubrication Symbols . . . . . 5-9

    Lubrication Legend . . . . . 5-9

    Lubrication Notes . . . . . 5-10

Lubrication Points . . . . . 5-11

Scheduled Maintenance . . . . . 5-13

    Daily (Walk-around) Inspection . . . . . 5-13

    50 Hours of Operation (Weekly) . . . . . 5-17

    100 Hours of Operation (Two Weeks) . . . . . 5-19

    250 Hours of Operation (Monthly) . . . . . 5-19

    500 Hours of Operation (3 Months) . . . . . 5-23

    1000 Hours of Operation (6 Months) . . . . . 5-27

    2000 Hours of Operation (Yearly) . . . . . 5-32

Miscellaneous Maintenance . . . . . 5-33

    Batteries/Charging System . . . . . 5-33

    Fuel System . . . . . 5-34

    Fuse Replacement . . . . . 5-34

Carwell® Rust Inhibitor . . . . . 5-35

    Protecting Cranes From Rusting . . . . . 5-35

    Cleaning Procedures . . . . . 5-36

    Inspection and Repair . . . . . 5-36

    Application . . . . . 5-37

    Areas of Application . . . . . 5-37

**SECTION 6 . . . . . Engine and Engine Systems**

General . . . . . 6-1

Engine Types . . . . . 6-1

Engine Performance . . . . . 6-1

Engine RPM . . . . . 6-1

Engine Crankcase System . . . . . 6-1

    Crankcase Oil Data . . . . . 6-1

Engine Cooling System . . . . . 6-2

    Coolant Requirements . . . . . 6-2

    Radiator Cap and Overflow Bottle . . . . . 6-3

    Thermostat . . . . . 6-3

Engine Fuel System . . . . . 6-3

    Diesel Engine Fuel System Description . . . . . 6-3

    QSF Engine Electronic Controlled Fuel System Units . . . . . 6-4

    Types of Fuel to Use . . . . . 6-4

Engine Air Intake System . . . . . 6-5

Engine Air Intake System . . . . . 6-5



Engine Exhaust System . . . . . 6-5  
     Slip Joint Exhaust Connectors . . . . . 6-5  
 Removal and Installation . . . . . 6-7  
     Removal . . . . . 6-7  
     Installation . . . . . 6-8

**SECTION 7 . . . . . Transmission and Torque Converter**

Four-Wheel Drive (4WD) Transmission . . . . . 7-2  
     4WD General Technical Data . . . . . 7-2  
     4WD Clutch Solenoid Technical Data . . . . . 7-3  
     4WD Description of Operation . . . . . 7-4  
     4WD Clutch Identification . . . . . 7-8  
     4WD Solenoid Identification . . . . . 7-9  
     4WD General Troubleshooting . . . . . 7-10  
     4WD Electrical Troubleshooting . . . . . 7-12  
     Tips On Common Problems . . . . . 7-18  
     Testing . . . . . 7-18  
     Test for Clutch Leakage . . . . . 7-19  
     Converter Stall Test . . . . . 7-21  
     Pressure and Flow Tests . . . . . 7-22  
     4WD Transmission Repair Tools . . . . . 7-24  
     Servicing Torque Converter . . . . . 7-26  
 Two-Wheel Drive (2WD) Transmission . . . . . 7-28  
     2WD General Technical Data . . . . . 7-28  
     2WD Solenoid Valve Engagement . . . . . 7-29  
     2WD Transmission Description of Operation . . . . . 7-30  
     2WD Transmission to Engine Installation Procedure . . . . . 7-32  
     Servicing Machine After Transmission Overhaul . . . . . 7-34  
     Cleaning and Inspection . . . . . 7-34  
     2WD Troubleshooting . . . . . 7-35

**SECTION 8 . . . . . Axles/Drive Shafts/Wheels and Tires**

Description . . . . . 8-2  
     Front Axle . . . . . 8-2  
     Rear Axle . . . . . 8-2  
 Technical Data . . . . . 8-3  
     Front Drive Axle . . . . . 8-3  
     Rear Drive Axle . . . . . 8-3  
     Rear Non-Drive Axle . . . . . 8-4  
 Front Drive Axle Repair . . . . . 8-4  
     Removal . . . . . 8-4  
     Installation . . . . . 8-4  
     Special Tools . . . . . 8-4  
     Replacing the Pinion Oil Seal . . . . . 8-7  
     Axle Hub Repair . . . . . 8-9  
     Drive Head Repair . . . . . 8-11  
 Rear Axle Repair . . . . . 8-21  
     Removal . . . . . 8-21  
     Installation . . . . . 8-21  
     Service Tools . . . . . 8-21  
     Replacing the Pinion Oil Seal . . . . . 8-21  
     Axle Hub Repair . . . . . 8-23  
     Drive Head Repair (Drive Axles Only) . . . . . 8-29  
 Drive Shafts . . . . . 8-33  
     Removal . . . . . 8-33  
     Disassembly . . . . . 8-33

|                             |      |
|-----------------------------|------|
| Inspection .....            | 8-33 |
| Assembly .....              | 8-33 |
| Installation .....          | 8-34 |
| Lubrication Procedure ..... | 8-34 |
| Wheel & Tires .....         | 8-35 |
| Tire Inflation .....        | 8-35 |
| Wheel Lug Nuts .....        | 8-35 |
| Tire Mounting .....         | 8-35 |

**SECTION 9. .... Brake System**

|  |      |
|--|------|
| Technical Data .....                                   | 9-3  |
| Front Axle Brakes .....                                | 9-3  |
| Rear Axle Brakes .....                                 | 9-3  |
| Accumulator .....                                      | 9-3  |
| Accumulator Charging Valve .....                       | 9-3  |
| Priority Flow Control Valve .....                      | 9-3  |
| Description .....                                      | 9-5  |
| Service Brake System Operation .....                   | 9-5  |
| Parking Brake System Operation .....                   | 9-6  |
| Maintenance And Adjustments .....                      | 9-7  |
| Service Brake Bleeding .....                           | 9-7  |
| Parking Brake Bleeding .....                           | 9-8  |
| Parking Brake Adjustment .....                         | 9-8  |
| Accumulator Charging .....                             | 9-8  |
| Residual Brake System Pressure .....                   | 9-9  |
| Tests .....  | 9-9  |
| Brake Piston Seal Leakage Test (Front Axle Only) ..... | 9-9  |
| Service Brake Repair .....                             | 9-10 |
| Front Axle Brakes .....                                | 9-10 |
| Rear Axle Brakes .....                                 | 9-13 |
| Parking Brake Repair .....                             | 9-14 |
| Lining Kit Replacement .....                           | 9-14 |
| Repair Kit Installation .....                          | 9-15 |
| Seal Kit Installation .....                            | 9-17 |
| Brake Modulating Valve Repair .....                    | 9-18 |
| Removal .....  | 9-18 |
| Disassembly .....                                      | 9-18 |
| Assembly .....   | 9-19 |
| Installation .....                                     | 9-19 |
| Troubleshooting .....                                  | 9-20 |
| Service Brakes .....                                   | 9-20 |

**SECTION 10. .... Steering System**

|   |       |
|---|-------|
| Description .....                                       | 10-1  |
| General .....   | 10-1  |
| Steering Modes .....                                    | 10-1  |
| Two-Wheel Steering .....                                | 10-4  |
| Four-Wheel Steering .....                               | 10-4  |
| Crab Steering .....                                     | 10-5  |
| Steering Proximity Switches .....                       | 10-6  |
| Proximity Switch Operation .....                        | 10-6  |
| Proximity Switch Operational Check and Adjustment ..... | 10-6  |
| Steering Orbital .....                                  | 10-7  |
| Description .....                                       | 10-7  |
| orbital Repair .....                                    | 10-8  |
| Steering Cylinder .....                                 | 10-20 |

Special Tools ..... 10-20  
 Cylinder Repair ..... 10-20  
 Steering System Troubleshooting ..... 10-24

**SECTION 11 ..... Structural**

Safety ..... 11-3  
 Boom Extension Assembly ..... 11-3  
     Boom Extension Removal ..... 11-3  
     Boom Extension Installation ..... 11-3  
 Boom ..... 11-5  
     Boom Removal ..... 11-5  
     Boom Installation ..... 11-5  
     Boom Assembly Drawing ..... 11-6  
     Boom Assembly Drawing Legend ..... 11-17  
     Boom Disassembly ..... 11-18  
     Boom Assembly ..... 11-18  
 Boom Cable Tensioning ..... 11-21  
     Tensioning Procedure for all Booms ..... 11-21  
     Tensioning Procedure for 4 Section Boom ..... 11-22  
     Tensioning Procedure for 3-Section Boom ..... 11-24  
 Boom Wear Pad Adjustment ..... 11-25  
     4-Section Boom ..... 11-25  
     3-Section Boom ..... 11-25  
 Wire Rope, Sheaves and Hoist Blocks ..... 11-26  
     Wire Rope Description ..... 11-26  
     Wire Rope Safety ..... 11-26  
     Wire Rope Inspection ..... 11-27  
     Sheave Inspection ..... 11-28  
     Wire Rope Lubrication ..... 11-28  
     Wire Rope Installation ..... 11-28  
 Hoist ..... 11-31  
     Description ..... 11-31  
     Hoist Maintenance ..... 11-31  
     Hoist Warm-up Procedure ..... 11-31  
     Hoist Lifting Equipment ..... 11-31  
     Hoist Removal ..... 11-31  
     Hoist Installation ..... 11-31  
 Drum Rotation/Minimum Wrap Indicator ..... 11-32  
     Replacing the DRI/MWI Sensor ..... 11-32  
     Programming the Minimum Wrap Indicator ..... 11-33  
     Hoist Disassembly ..... 11-35  
     Hoist Assembly ..... 11-36  
     Servicing Hoist Motor ..... 11-36  
     Servicing Brake ..... 11-37  
     Servicing Planetary Sets ..... 11-37  
 Hoist Troubleshooting ..... 11-38  
 Turntable Bearing ..... 11-41  
     Bearing Lubrication ..... 11-41  
     Bearing Bolt Torque ..... 11-41  
     Bearing Wear ..... 11-41  
     Bearing Replacement ..... 11-43  
 Swing Gearbox and Pinion ..... 11-47  
     Swing Gearbox Maintenance ..... 11-47  
     Swing Gear/Pinion Maintenance ..... 11-47  
     Swing Gear and Pinion Backlash ..... 11-47  
     Swing Gearbox Repair ..... 11-49

TOC

Outrigger Monitoring System ..... 11-51  
    Proximity Switch Removal ..... 11-51  
    Proximity Switch Installation ..... 11-51  
Outriggers ..... 11-53  
    Outrigger Removal ..... 11-53  
    Disassembly ..... 11-54  
    Assembly ..... 11-54  
    Installation ..... 11-54

**SECTION 12. .... Schematics/Wiring Diagrams**

**Thanks for your reading.**

**Please click here to download complete manual instantly.**

**And can also choose other manuals.**

**Feel free --->write to me with any questions.**

**Our service email:**

**manuals007@hotmail.com**