CEAW004902

Field Assembly Manual

HD1500-7

DUMP TRUCK

SERIAL NUMBERS **A30001 - A30108**

KOMATSU®

FOREWARD

This manual is provided to aid assemblers during field assembly of the standard Komatsu HD1500-7 dump truck. Variations of design required for specific truck orders may require some modification of the general procedures outlined in this manual. Follow all safety notices, warnings, and cautions provided in this book when assembling the truck.

General assembly pictures and illustrations are used in this manual. At times the illustrations may not reflect the current production truck model.

This manual lists metric (SI) and U.S. standard dimensions throughout.

All location references to “front”, “rear”, “right”, or “left”, are given in respect to the operator's normal seated position.

It is recommended that all maintenance personnel read and understand the materials in the service manual before performing maintenance and/or operational checks on the assembled truck.

This alert symbol is used with the signal words, CAUTION, DANGER, and WARNING in this manual to alert the reader to hazards arising from improper operating and maintenance practices.

DANGER

DANGER Identifies a specific potential hazard which will result in either injury or death if proper precautions are not used.

WARNING

WARNING identifies a specific potential hazard which may result in either injury or death if proper precautions are not used.

CAUTION

CAUTION is used for general reminders of proper safety practices or to direct the reader's attention to avoid unsafe or improper practices which may result in damage to the equipment.

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KOMATSU HD1500-7 DUMP TRUCK

SAFETY RULES, TOOLS & EQUIPMENT

SAFETY RULES

The following list of safety practices is intended for use by personnel during field assembly of the truck.

This list of safety rules is not intended to replace local safety rules or regulations and federal, state, or local laws. The safety precautions recommended here are general and must be used in conjunction with all prevailing local rules and regulations.

1. All personnel must be properly trained for the assembly operation.
2. Wear safety equipment such as safety glasses, hard toe shoes and hard hats at all times during assembly.
3. Thoroughly inspect the assembly site. Remove weeds, debris and other flammable material.
4. Use only solid, hard wood for supports. When using metal support stands, place wood blocks between the support and the frame to prevent metal to metal contact.
5. Inspect all lifting devices. Refer to the manufacturer's specifications for correct capacities and safety procedures when lifting components.
6. Perform a daily inspection of all lifting cables and chains. Replace any questionable items. Use cables and chains that are properly rated for the load to be lifted.
7. DO NOT stand beneath a suspended load. Use of guy ropes are recommended for guiding and positioning a suspended load.
8. Maintain fire control equipment. Inspect fire extinguishers regularly to ensure they are fully charged and in good working condition.
9. Cap screws and/or nuts being replaced must be the same grade as originally supplied.
10. Disconnect the battery charging alternator lead wire before welding on the frame or its components.
11. When welding, connect the ground cable to the part being welded. DO NOT allow welding current to pass through bearings, engine, etc.
12. DO NOT weld the transmission housing unless it has been completely disassembled.
13. DO NOT weld the fuel tank or hydraulic tank unless the tanks have been properly purged and ventilated.
14. Use the proper tools for the job to be performed. Never improvise wrenches, screw drivers, sockets, etc. unless specified.
15. Lifting eyes and hooks must be fabricated from the proper materials and rated to lift the intended load.
16. When the weight of any component(s) or any assembly procedure is not known, contact your customer support manager for further information.

TOOLS AND EQUIPMENT FOR ASSEMBLY

The following equipment is recommended for field assembly of the truck.

1. Equipment and tool storage trailer with a lockable door. Approximately 12 x 2.5 m (40 x 8 ft)
2. Cranes
   a. Two, 45 metric ton (50 ton) cranes to remove the chassis from the freight trailer and place on cribbing. These cranes can also be used to lift the assembled body onto to the chassis.
   b. One, 109-136 metric tons (120-150 ton) crane. The crane is needed to turn the body over after completion of the underside welding. A 45 metric ton (50 ton) crane is also required for this task.
3. One fork lift - 6804 kg (15,000 lb) capacity, with high lift capability.
4. Two, 300 amp portable welding units and an oxy-acetylene cutting set.
5. One, propane torches for weld preheating.
6. Portable air compressor - 3.5 cmm (125 cfm) and 690 kPa (100 psi) capacity.

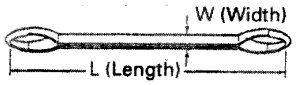
   Two, 15 m (50 ft) air hoses.
7. Metal stands and a sufficient amount of wood cribbing - sizes from 1.2 m x 30.5 cm x 30.5 cm (4 ft. x 12 in. x 12 in.) and 1.2 m x 15 cm x 15 cm (4 ft. x 6 in. x 6 in.) - such as railway cross ties
8. Tire handler - Wiggins/Iowa Mold Tooling.
9. Miscellaneous air tools
10. Ladders - 3.5 m (12 ft), 2.5 m (8 ft), & 2 m (6 ft)
11. Chains, lifting cables, slings:
    - Two, 4 point slings, 3 m (10 ft) in length
    - Two, 4 point slings, 2 m (6 ft) in length
    - Two, 1 m (4 ft) and two, 2 m (6 ft)
    - Two, 3 m (10 ft) nylon straps
    - Four lengths of 2.54 cm x 15 m (1 in. x 50 ft) of rope
12. Two, ratchet pullers - 2.7 metric ton (3 ton)
13. Two, ratchet pullers - 1.4 metric ton (1.5 ton)
14. Set of standard master mechanics hand tools.
    - Thread taps and dies of both inch and metric sizes.
    - Metric sockets and open end wrenches, 6mm to 36mm.
    - Inch sockets and open end wrenches up to 1 3/4 in.
    - Torque wrenches - 339 N·m (250 ft lb) with 18:1 multiplier. Torque wrenches - 339 N·m (600 ft lb) with 4:1 multiplier. Hydrotorque - 1 1/2 in. drive with capability of 5559 N·m (4100 ft lb) or greater.
    - Box wrench 1 3/8 in. (Snap-On p/n X440B) with 12 inch extension to tighten ROPS cap screws.
    - Sockets: 2 1/4 in. (Snap-On P/N J15036) and 2 5/8 in. (Snap-On P/N J15042) to tighten front suspension hardware.
15. Heavy duty 3/4 in. & 1 in. square drive impact wrench sets.
16. Impact sockets for 3/4 in. & 1 in. square drive tools.
17. Special tools (see list, following pages)
18. Two, hydraulic or pneumatic porta-power jacks, 4.5 and 9 metric ton (5 and 10 ton)
19. Various hooks and shackles
20. Miscellaneous: i.e. grinders, containers, rags.
21. Spreader bars for cab and decks.
22. Two ratchet hoists of 2.7 metric ton (3 ton) capacity.
23. Pry bars
24. Solvent - 38 liters (10 gal)
25. Paint remover - 19 liters (5 gal)
26. Rust preventive grease

LIFTING SLING GENERAL INFORMATION

• Nominal Designation

Product name – Type – Belt width – Length
(Example) Poly type – Type E – 50 mm x 3 m

<Type E>



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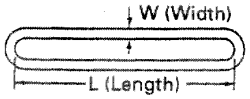
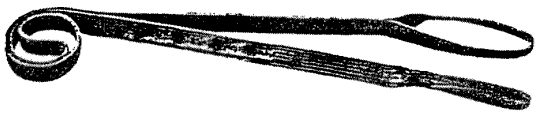
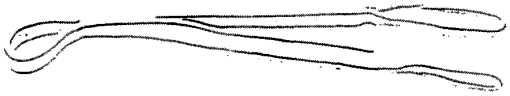
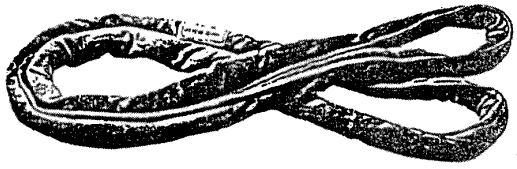
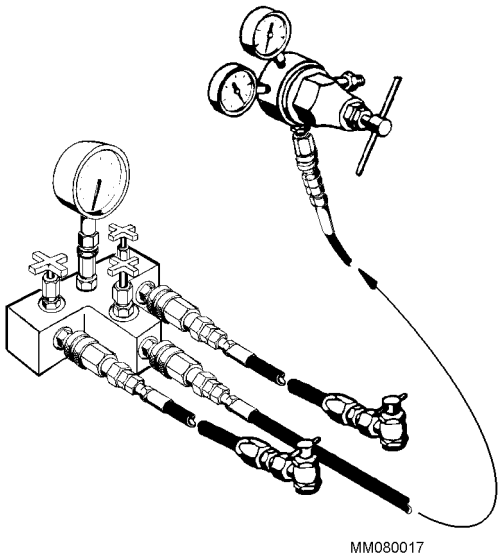


	Product Name (Material)	Belt width (mm)	Shape (Type E (I specification) and Type N (Endless specification) are available for all products.)	Color
Belt Sling (Available in any your desired length)	**Poly Type (P Type) (Polyester)** Class III for general use Features: Soft belt with little elongation and great wear resistance.	25 mm 40 mm 50 mm 75 mm 100 mm 150 mm 200 mm 300 mm		Light blue
	Limit Type (L Type) (Nylon and Polyester) Class III for general use Features: The disposal criterion can be found at a glance.	25 mm 35 mm 50 mm 75 mm 100 mm 150 mm 200 mm 300 mm		Blue
	Just Type (J Type) (Nylon) Class III for general use Features: Great wear resistance	25 mm 35 mm 50 mm 75 mm 100 mm		Yellow
	Medical Type (M Type) for oxidation rinsing (Polypropylene) Class I for chemical Features: Great chemical resistance	25 mm 50 mm 75 mm 100 mm		Off-white
Soft Sling	**SS Type (Nylon & Polyester)** Length: Available in any length between 0.5 m and 10 m	Working load (tf) 0.5 t 1.0 t 1.5 t 2.0 t 3.0 t 5.0 t		Gray Violet Blue Green Yellow Red
	SS Type for heavy goods (Nylon & Polyester) Length: Available in any length between 2 m and 10 m	10 t 15 t 20 t 25 t		Blue



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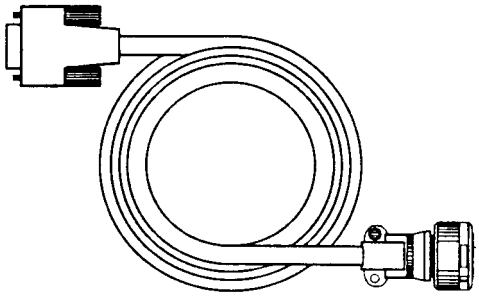
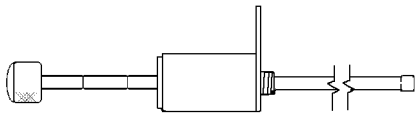
PART NO.	DESCRIPTION	USE
EC3331	NItrogen Charging Kit	Suspension & accumulator nitrogen charging
NOTE: Not included with all trucks.		



PART NO.	DESCRIPTION	USE
569-86-87361	Download Harness	PLM Download Data



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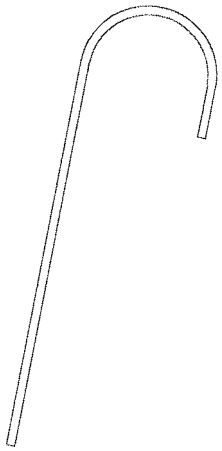
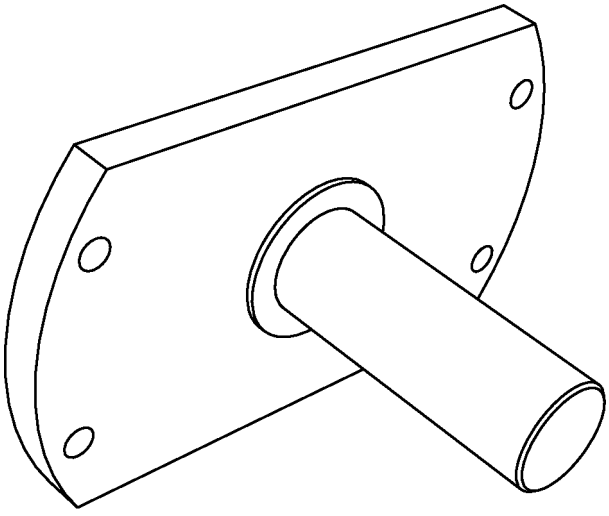
PART NO.	DESCRIPTION	USE
562-98-31301	Disc Gauge	Brake Disc Wear Tool

PART NO.	DESCRIPTION	USE
PC2061	Belt Tension Tester	A/C Belt Tension



PART NO.	DESCRIPTION	USE
EL8868	V-Belt Alignment Tool	Aligning A/C pulleys



M080032

PART NO.	DESCRIPTION	USE
SE21188	Driveshaft Alignment Tool	Aligning driveline components

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
	AXLE SPINDLES FUEL TANK DECK SUPPORTS	UPRIGHTS DECK SUPPORTS WELD DECK SUPPORTS	BRAKE CABINET WELD UPRIGHTS DECKS (SUB RH DECK) CAB HOSES	FINISH DECKS CONNECT PIPING	EXHAUST RIMS & TIRES	SERVICE CHECKOUTS START TRUCK	BODY BODY & EXHAUST FINAL CHECKS
CHASSIS ASSEMBLY							
3 ASSEMBLERS 	→	→	→	→	→	→	→
2 WELDERS 		→	→				
2 CRANES 	→ 2 CRANES		→ 1 CRANE	→	→	→	→
BODY ASSEMBLY							
3 WELDERS 	→	→	→	→	→		

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ASSEMBLY SCHEDULE AND RESOURCE LAYOUT

MAJOR COMPONENTS AND SPECIFICATIONS

Engine

The Komatsu HD1500-7 dump truck is powered by a Komatsu SDA12V160 diesel engine. This engine is Tier 1 compliant.

Transmission

The Torqflow transmission is a planetary gear, multiple disc clutch transmission. The transmission is hydraulically actuated and force-lubricated for optimum heat dissipation. consists A three-element, single-stage, two-phase torque converter is mounted to the front of the transmission.

The Torqflow transmission is capable of seven forward speeds and one reverse speed. Automatic shifting is controlled by an electronic shift control system with automatic clutch modulation in all gears. A lockup system consisting of a wet, double-disc clutch, is activated in F1-F7 gears for increased fuel savings.

Final Drive

The final drive consists of a plug-in differential with planetary wheel drive.

Operator's Cab

The HD1500-7 operator's cab has been engineered for maximum operator comfort and to allow for efficient and safe operation of the truck.

The cab provides for wide visibility, with an integral four-post ROPS/FOPS, and an advanced analog operator environment. It includes the following: tinted safety-glass windshield, power-operated side windows, deluxe interior with a fully adjustable seat with lumbar support, fully adjustable tilt steering wheel, controls mounted within easy reach of the operator, and an electronic display/monitoring panel to keep the operator informed of the truck's operating circuits. Audible alarms and indicator lights warn the operator of system malfunctions.

Power Steering

The HD1500-7 truck is equipped with a full time power steering system. The system provides positive steering control with minimum effort by the operator. Nitrogen-charged accumulators automatically provide emergency power if steering pressure is reduced below an established minimum.

Brake System

Depressing the brake pedal, or operating the retarder, actuates the hydraulic front and rear service brakes. Both front and rear service brakes are oil-cooled, multiple-disc brakes. The brakes are automatically applied when engine speed exceeds the rated revolutions for the shift range. The system includes two nitrogen-charged accumulators for quick response. The accumulators provide emergency braking if a problem occurs in the primary braking circuit.

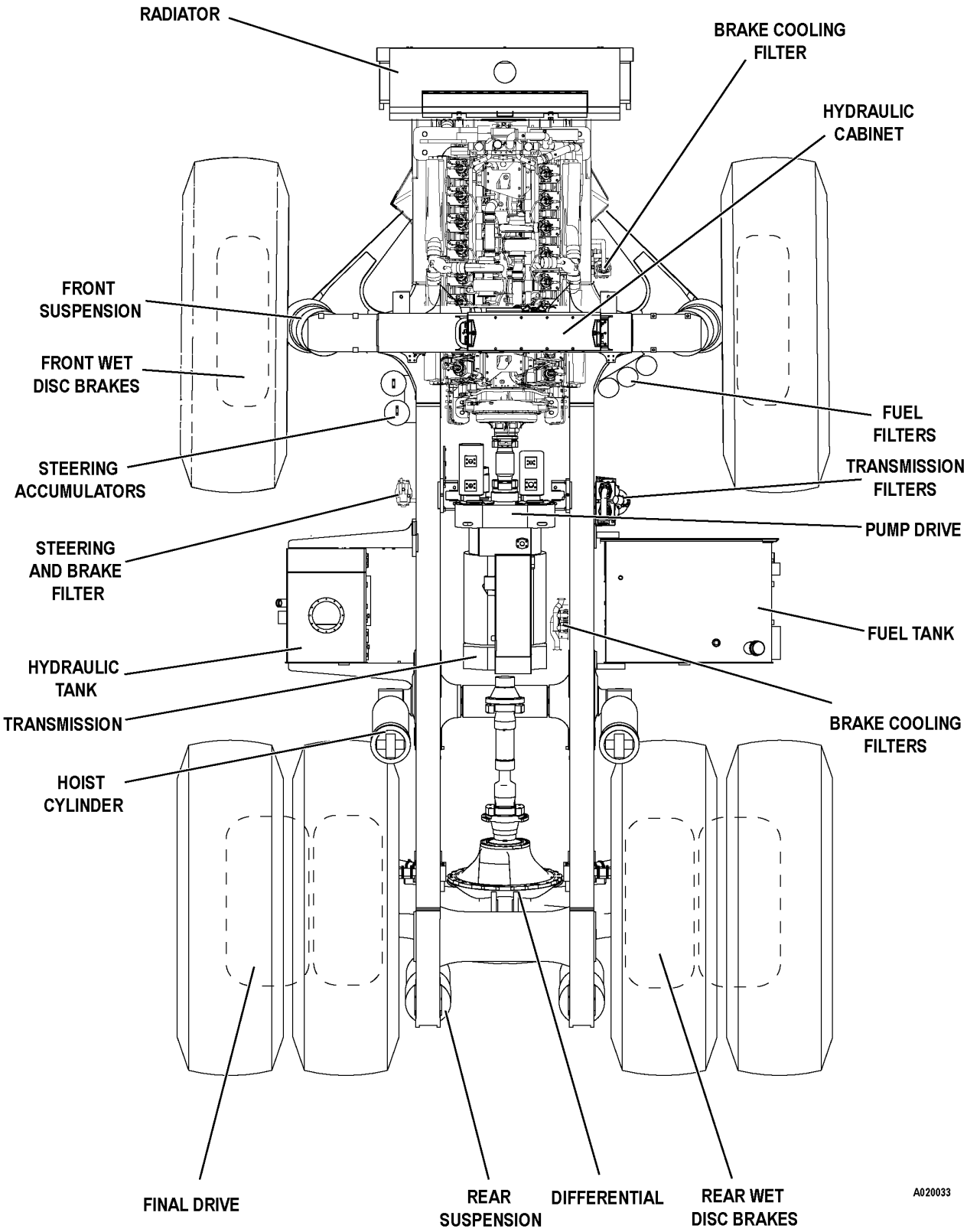
Retarder

The operator can manually apply both the front and rear oil-cooled, multiple-disc brakes by actuating the retarding system. The retarder control lever is mounted on the steering column.

The retarding system is also equipped with an Automatic Retard Speed Control (ARSC) system. The system automatically applies the retarder to maintain the set speed as initiated by the operator. Refer to Section 32, Operator Cab and Controls, for more information on the ARSC system.

Suspension

Hydro-pneumatic suspension cylinders are mounted at each wheel to reduce shock. The suspensions provide riding comfort for the operator and machine stability for safe travel.



MAJOR COMPONENT LOCATION

SPECIFICATIONS

Engine

Komatsu SDA12V160*
Number of Cylinders 12
Operating Cycle (diesel) 4-Stroke
Rated . 1108 kW (1486 SAE Brake HP) @ 1900 rpm
Flywheel . . . 1048 kW (1406 SAE HP) @ 1900 rpm
Weight (dry) . . . . . 5813 kg (12,815 lbs)
* Tier 1 Compliant

Transmission

Automatic Electronic Shift Control with Automatic Clutch Modulation In All Gears.

Torque Converter . . . . . 3-Element, Single-stage, ... Two-phase
Lockup Clutch . . . . . Wet, Double-disc, ... Activated in F1-F7 gears.
Transmission . . . . . 7 Forward Speeds, 1 Reverse . . . . . Planetary Gear, Multiple Disc Clutch, ... Hydraulically Actuated, Force-lubricated

Gear	kph	mph
1	11.0	6.8
2	14.6	9.1
3	19.5	12.1
4	24.5	15.2
5	32.6	20.3
6	44.2	27.5
7	58.0	36.0
Reverse	10.6	6.6

Final Drive

Final Drive . . . . . Plug-in Differential . . . . . with Planetary Wheel Drive

Reduction Ratios:
- Bevel Set 2.647:1
- Planetary Final Drive 7.235:1
- Total Reduction 19.151:1

Electrical System

Batteries (series-parallel) . . 4 x 12V / 140 Amp-Hour
Alternator . . . . . 24 Volt, 140 Amp Output
Lighting . . . . . 24 Volt
Cranking Motors . . . . . Two - 24 Volt Electric

Service Capacities

	Liters	U.S Gallons
Engine (Includes Lube Oil Filters)	193	(51)
Cooling System	532	(141)
Fuel Tank	2120	(560)
Transmission And Torque Converter	153	(41)
Hydraulic System	900	(238)
Differential	297	(78)
Final Drive (each planetary)	120	(32)

Hydraulic System

Hydraulic Pumps . . . . . (3)
- Hoist (Tandem Gear) . . . . 805 l/min. (213 gpm) @ 18 960 kPa (2,750 psi)
- Steering (Piston) . . . 221 l/min. (58.5 gpm) @ 18 960 kPa (2,750 psi)
- Brake (Tandem Gear) . . . . . 1512 l/min. (400 gpm)

Hoist Control Valve . . . . . Spool Type
Positions . . . . . Raise, Hold, Float, and Lower
Hydraulic Cylinders
- Hoist . . . . . 3-Stage Telescoping Piston
- Steering . . . . . Twin - Double Acting Piston

Relief Valve Setting . . . . . 18 960 kPa (2,750 psi)
Filtration . . . . . In-line Replaceable Elements
- Suction . . . . . Single, Full Flow, 100 Mesh
- Hoist & Steering . . . . . Dual, Full Flow, In-line . . . . . High Pressure. Beta 12 Rating = 200
- Transmission . . . . . Dual, High Pressure

Service Brakes

Actuation: . . . . . All-Hydraulic
- Front . . . . . Oil-Cooled, Multiple-Disc
- Rear . . . . . Oil-Cooled, Multiple-Disc . . . . . Both act as service and retarder brakes

Retarder Brakes:
- Normally Applied . . . . . Manually By Operator. . . . . (w/ ARSC control)
- Automatically Actuated . . . . . when engine speed exceeds the rated revolutions of the shift position for the transmission.

Parking Brake: . . . . . Spring-Applied, Oil Released . . . . Dry Caliper Disc Actuates On Rear Drive Shaft
Emergency Brakes: Manual or automatic operation.

Steering

Turning Circle Diameter (SAE) . . . . . 24.4 m (80 ft)
Automatic Emergency Steering . . . . 2 Accumulators

Tires

Rock Service (E-3) . . . . . Tubeless
Standard 33.00 R51
Rim Size . . . . . 61x 12.95 x 12.7 cm (24 x 51 x 5 in.)
Phase II Generation™ . . . . . Separable Tire Rims

Dump Body Capacity (Standard)

Struck . . . . . 54 m^3 (71 yds^3)
Heaped @ 2:1 (SAE) . . . . . 78 m^3 (102 yds^3)

Overall Truck Dimensions

Loading Height . . . . . 4.965 m (16' 3")
Minimum Clearance Height . . . . . 5.85 m (19' 2")
Overall Length . . . . . 11.37 m (37' 4")
Maximum Width . . . . . 6.62 m (21' 9")

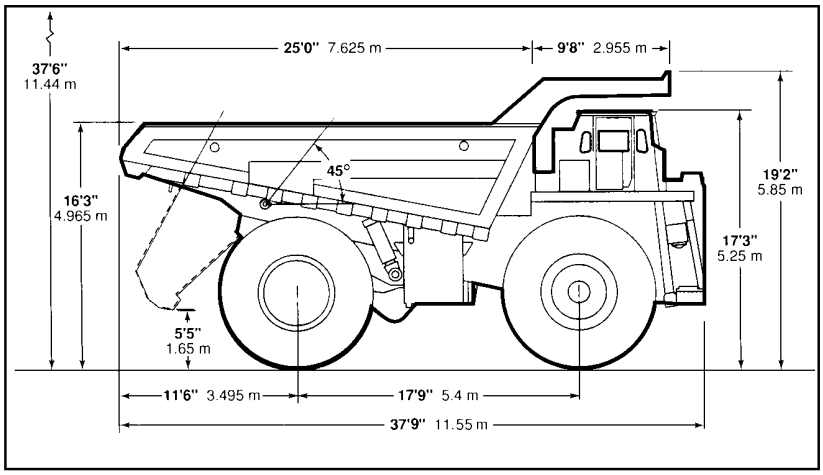
Weight Distribution

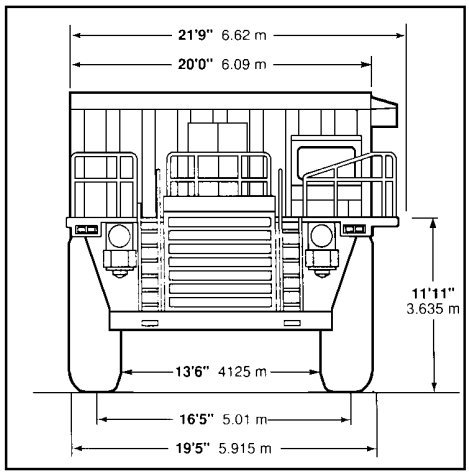
Empty	**Kilograms**	**Pounds**
Front Axle	51,714	114,008
Rear Axle	54,041	119,140
Total	105,755	233,148

Loaded (150 Ton Payload)

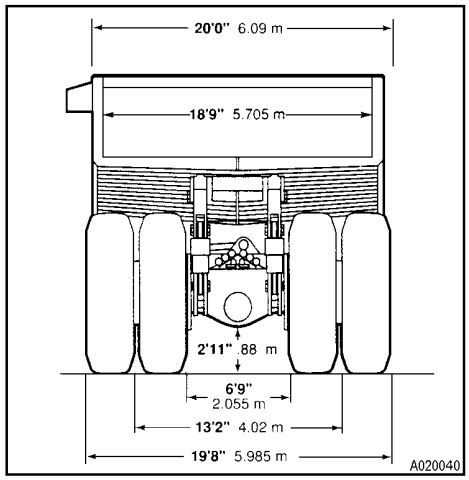
	Kilograms	**Pounds**
Front Axle	83,824	184,800
Rear Axle	165,651	365,199
Total *	249 475	550,000

*Not to Exceed 249 475 kg (550,000 lbs.).
Including Options, Fuel & Payload





All dimensions are with **71/102 yd.**³ 54/78 m^3 body.
Vertical dimensions are for standard empty vehicle — subtract **4"**/100 mm for vehicle loaded to max. GVW.
Minimum ground clearance (at max. GVW)..... **2'9"** 838 mm



MAJOR COMPONENT WEIGHTS

⚠WARNING

The condition of lifting slings, chains, and/or cables used for lifting components must be inspected before each use. Lifting equipment must be in good condition and rated for approximately two times the weight being lifted. DO NOT use worn or damaged lifting equipment. Serious injury and damage may result.

Optional equipment added onto the truck may cause an increase to the component weights listed in this chapter. Contact your customer support manager for concerns or questions about lifting truck components.

NOTE: All component weights are dry weights. The additional weight of coolant, fuel, and oil that may be in the components are not calculated into this list.

ITEM	KILOGRAMS	POUNDS
CHASSIS AND CAB		
Chassis	32,228	71,050
Wheel Rim	1003	2211
Tire 33R51	2177	4800
Wheel & Tire Assembly	3180	7011
Center Deck	239	527
Left Deck	454	1000
Right Deck with Battery Box and Handrails	1021	2250
RH Deck Support	159	350
LH ROPS Support	590	1300
RH Upright	454	1000
LH Upright	374	825
Operator's Cab	2019	4450
RH/LH Ladders	45	100
Rear Ladder	45	100
Fire Shield	79	175

ITEM	KILOGRAMS	POUNDS
ENGINE, TRANSMISSION AND RELATED COMPONENTS		
Engine	6431	14,178
Radiator	1191	2626
Upper Grille	30	66
Lower Grille	23	51
Transmission	3268	7205
Battery Box with batteries	363	800
FRONT AXLE COMPONENTS		
Front Wheel Hub, Suspension Cylinder & A-arm	3629	8000
Steering Cylinder	131	289
FLUID COMPONENTS		
Steering Accumulator	140	309
Hydraulic Tank	685	1510
Fuel Tank	975	2150
Hydraulic Brake Cabinet	343	756
REAR AXLE COMPONENTS		
Rear Suspension Cylinder	455	1003
Rear Axle Links	110	243
Anti-Sway Bar	91	201
Rear Axle	14,288	31,500

FIELD WELDING FOR ASSEMBLY OR REPAIR

When welding on Komatsu equipment, whether at initial field assembly or during normal maintenance repairs, special procedures must be followed.

Due to the continuous program of research and development, periodic revisions may be made to this publication. It is recommended that customers contact their distributors for information on the latest revision.

The welding information contained in this chapter is general information that must be followed unless otherwise specified in a detailed repair procedure provided on an engineering drawing or a detailed specific repair procedure. Additional specific information, or detailed instructions can be obtained through your local Komatsu customer support manager.

WELDER QUALIFICATION AND TRAINING

The welding technique must be of the highest standard to produce the soundest weld possible. Only welders who have been trained and qualified for structural steel welding in all positions, in conformance with the American Welding Society (AWS) D1.1 or (AWS) D14.3 only, are allowed to perform the welding. The welding instructions for field assembly of Komatsu components are normally provided by engineering drawings. Additional detailed welding instructions for field repairs are provided in the field repair manual SEB14001. A full understanding of the AWS standard welding symbols is necessary to perform and inspect such field welds. Weld sizes specified on the drawings are intended to reflect minimum requirements.

WELD PROCEDURES

Electric arc welding, either the semi-automatic “MIG” (GMAW), Flux Core (FCAW), or “Stick” electrode welding (SMAW), are approved processes for field installation and maintenance welding. Welding of highly stressed structural members such as castings, torque tubes, top and bottom plates on the frame rails, and the curved intersection points of frames should be done with the specific detailed instructions from Komatsu Product Service. See Annex A for repair procedures. These repair procedures are detailed instructions for most high stressed structural members.

APPROVED CONSUMABLES

GMAW - LW102-15 or ER80S-D2

FCAW - E70T-5, E71T-8, or E71T8-NI1

SMAW - E7018-1, E8018-C1, or E8018-C3

WELD QUALITY REQUIREMENTS

1. Each weld must be homogeneous with low porosity, free from cracks, and slag inclusions.
2. Each weld must have complete fusion between the base metal and weld metal added by the electrode.
3. All welds must be reasonably smooth, without excessive deformity, and all craters filled. No cracks are permitted.
4. The toe of a weld to a stressed member must have a smooth transition. Excessive convexity in multi-pass fillet welds is not permitted. Excessive convexity produces high residual stress in the throat of the weld, and is not permitted.
5. Undercut in excess of 0.8 mm (0.03 in.) on critical welds must be reworked by the application of welding an additional cover pass. It is important that this pass is blended with the existing weld.

6. When welding in the vertical position, always weld using the vertical up technique. Large wash weld weaves should not be used when welding on truck frames. Properly applied multiple pass welding is the required procedure on truck frames.
7. Slag is to be removed from all weld beads, and must be completely removed before each pass in a multiple pass procedure. It is also required that all slag is removed and tie in all areas. Grind all welds where a weld crosses or intersects with another weld.

MATERIALS, CONTROLS, AND PRECAUTIONS

The steel used in the fabrication of all Komatsu equipment is of high strength low alloy (HSLA) material of different grades. The standard dump body main plates are made from abrasion resistant materials. These materials offer themselves very well to welding during fabrication, and repair.

The welding consumables are often supplied by Komatsu America Corp. with the new equipment as part of the field welding / assembly package. For field welding and repairs, the approved consumables as detailed, should be procured from a local, reliable supplier. Other highly specialized welding consumables are available but have limited use on Komatsu structural components. Approval is required from your Komatsu customer support manager.

Control of the welding area environment is essential for producing proper and sound welds. Essentially, five areas require attention and control.

1. Air Movement - Avoid areas where air movement from wind, drafts, or blowers is prevalent. This is particularly important when a shielding gas is being used as part of the welding process.
2. Low Ambient Temperature - DO NOT weld in temperatures below 50°F (10°C). At low temperature conditions, preheating of all welding joint work areas is required. See preheat and post heating requirements as detailed in Annex A.
3. Weld Cooling - Protect the weld area from a rapid cooling rate. Heat retardation may be accomplished through the use of heat lamps, torches, insulating blankets, etc.
4. Moisture - Any moisture on the steel surfaces to be welded must be removed before welding. Electrodes must be stored in sealed containers until needed. Electrodes must be kept in a warming oven at the work location until used to prevent any moisture absorption which might affect weld quality.
5. Foreign Materials - Any foreign substances (dirt, paint, rust, scale, and carbon deposits from cuttings) must be removed prior to welding. Clean all weld areas and surfaces with a grinder to ensure that all foreign materials have been removed.

WELD INSPECTION

All welding repairs are subject to inspection by a Komatsu appointed inspector or laboratory to insure quality. After the weld has been made it can be inspected by a number of non-destructive evaluation techniques. The inspections can include any of the methods listed below. All assembly welds and weld repairs that are deemed unacceptable by the inspector must be corrected at no additional cost to Komatsu. All weld repairs are also subject to additional inspection.

1. Visual Inspection - This is the process of looking for potential defects such as undersized welds that can be checked with weld gauges for, surface cracks, surface porosity, craters, and undercuts.

2. Dye Penetrant Inspection - This is an easily applied process which indicates cracks or surface conditions. The process is relatively inexpensive, but does not produce a permanent record except by normal photography.
3. Fluorescent Penetrant Inspection - Similar to dye penetrant inspection. This process uses a black (ultraviolet) light for increased efficiency and accuracy.
4. Magnetic Particle Inspection - This process requires special equipment that is usually more costly than the dye penetrant inspections. This process does not provide a permanent record except by normal photography.
5. Ultrasonic Inspection - This is a popular method of examining weld discontinuities. Specialized equipment and operator certification is required. With some equipment printed data is available of the test providing a permanent record. Also, operator records with equipment settings and test results are normally recorded.
6. X-Ray Inspection - This process provides a view of the weld and base materials but it is highly specialized. This procedure provides a permanent visual record, but is more expensive than most other inspection techniques.

RECORDS

Komatsu requires record keeping of all welding work. This information is valuable when personnel or job conditions change. The service and warranty departments of Komatsu must be provided with inspection reports and photographs of the weld area before, during, and after the repair. The photographs must be clear and close enough to show the weld joint preparation complete, with backer bars installed, etc. just prior to welding. These photos easily identify if the required preheating and post heating have been done with a three inch circumference around the weld repair area. Without this documentation, Komatsu will not cover any weld repair claim made under warranty. No exceptions will be made.

ANNEX A

The following are general repair procedures, which must be followed for all repair and rework of major load carrying members on Komatsu equipment.

1. The repair or rework area must be protected from wind and moisture during the entire procedure. If the repair work is to done outside additional precautions must be taken to protect the weld repair process from outside elements. All welding should be done at an ambient temperature of 10°C (50°F) or above.
2. Clean and grind the entire repair area to remove all rust, grease, oils, paint, and any other foreign materials likely to contaminate the weld.

3. Air arc the entire crack leaving a V-shape joint. The depth of the V (or U shaped) joint will be determined by the depth of the crack. The width to depth ratio should be approximately 1.25:1 and never less than 1:1. All cracks through the parent material will require a slightly wider root opening than the original, usually 6 mm (0.25 in.) to allow the installation of a backup strip. Backup strips are required for all cracks that have gone through the parent material and cannot be welded from both sides. If a weld repair allows access to both sides of the plate, no backup strip is required as long as complete weld penetration is achieved. If backup strips are not used, the surface profile on both sides must be ground smooth with no undercut. Documentation must support this repair. Photographs of surface condition are required by the service and warranty departments of Komatsu.
4. Use dye penetrant to ensure the cracks are completely removed.
5. After air arcing and inspections (Steps 3 & 4) all areas cut by the air arc should be cleaned thoroughly with a grinder to remove all possible carbon deposits and dye penetrant.
6. Fill gouges with weld and grind all surfaces smooth to avoid defects in the new weld.
7. Grind all surfaces to be welded so they are free of slag, rust, and any other foreign materials.
8. Preheat the entire weld joint area until the surrounding surface area reaches 150°C (300°F) at a distance of 76 mm (3 in.) from all areas to be welded.
9. All welds are to be made with approved consumables only. The SMAW (Stick) welding rod must be used within four hours after being removed from a new sealed container or from a 52°C (125°F) minimum drying oven. Any rod that exceeds this exposure time must be dried for one hour at 427°C (800°F) before being used. Keep all weld starts and stops to a minimum.
10. When the weld is complete, immediately (before the weldment cools) post heat the entire weld area to 150°C (300°F). Even if the area is over 150°C (300°F) heat must be applied to maintain this temperature for 15 minutes, and then allow it to cool slowly. In some cases this might require wrapping with insulation blankets.
11. Grind all butt-welded repairs smooth using 36 or finer grit grinding material. All grinding marks should be parallel to the direction of primary stress if possible (and if known).
12. Hammer peen the toes of repair fillet welds as detailed in Annex B, see attached.
13. Inspect repaired areas (for surface defects) using magnetic particle or dye penetrant inspection procedures.
14. If surface defects are found, remove all defects by grinding to a maximum depth of 1.5 mm (0.06 in.). Larger defects must be removed as per the above mentioned procedures. All spot welding also requires preheating and post heating.

ANNEX B

1.0 TOE HAMMER PEENING

Equipment:

1. Hand held pneumatic hammer
2. Adequate air supply
3. Adequate lighting
4. 6 mm (0.25 in.) diameter spherical tip bit
5. Protective clothing, gloves, includes eye, face, and ear protection.

Procedure

1. The toe of the weld should serve as a guide for the peening tool resulting in the area of deformation being approximately equally divided between the base material and the weld metal face to the specified depth and not to exceed 5 mm (0.19 in.) in width. Refer to Figure 4-1.

NOTE: Peening shall only be performed after weld acceptance by visual inspection.

2. The weld must have a smooth profile and the toe must have a good transition to the parent material (no overlap) before the peening operation is performed. Grinding the weld face and toe area is permitted to correct unacceptable conditions. Visual inspection/acceptance is to be done after peening with the appropriate radius and depth gauge.
3. Hold the hammer tool at approximately one half the included angle between the weld face and the parent material and perpendicular to the direction of travel. This will normally require approximately four passes of the peening tool with the pressure of near full operator weight being applied. The depth of the indentation must be between 0.6 mm to 0.8 mm (0.02 to 0.03 in.).

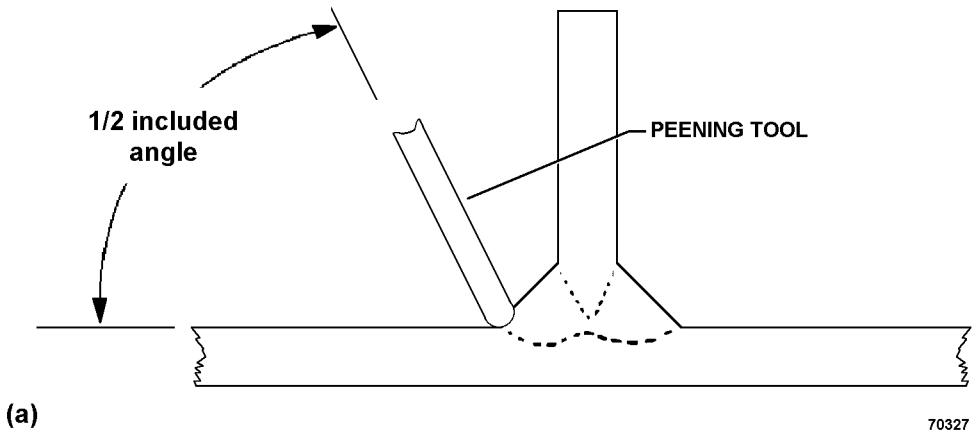
2.0 TOE GRINDING WITH A ROTARY BURR

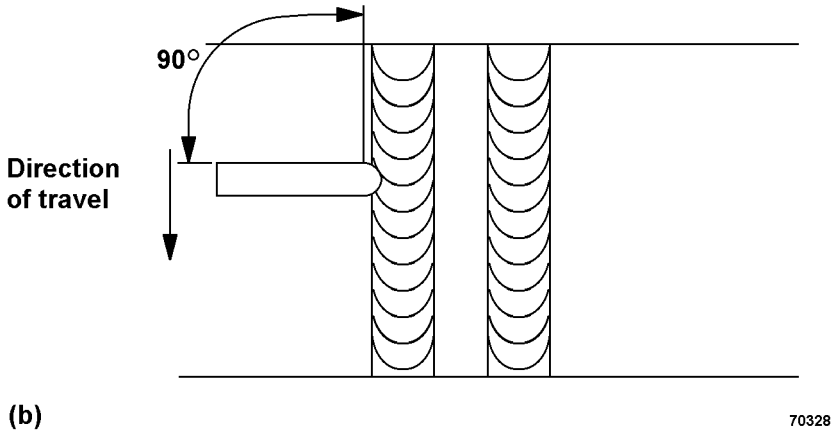
Equipment:

1. High speed rotary air tool (15,000-20,000 rpm)
2. Tungsten carbide rotary burr 13 mm (0.50 in.) diameter with 13 mm (0.50 in.) spherical tip
3. Adequate air supply
4. Adequate lighting
5. Protective clothing, gloves, includes eye, face, and ear protection

Procedure

1. The toe of the weld should serve as a guide for the burr tool resulting in the material removed being approximately equally divided between the base material and the weld metal face to the specified depth and not exceed 8 mm (0.31 in.) in width. Refer to Figure 4-2.
2. The weld must have a smooth profile and the toe must have a good transition to the parent material (no overlap) before the grinding operation is performed. Grinding the weld face and toe area is permitted to correct unacceptable conditions. Visual inspection/acceptance to be done after grinding with the appropriate radius and depth gauge.
3. The axis of the tool should be maintained at about 45° to the parent plate and inclined at about 45° to the direction of travel. The depth of the grinding must be between 0.8 mm to 1.0 mm (0.030 to 0.040 in.). The final surface must be clean, smooth and free of all traces of undercut or slag.





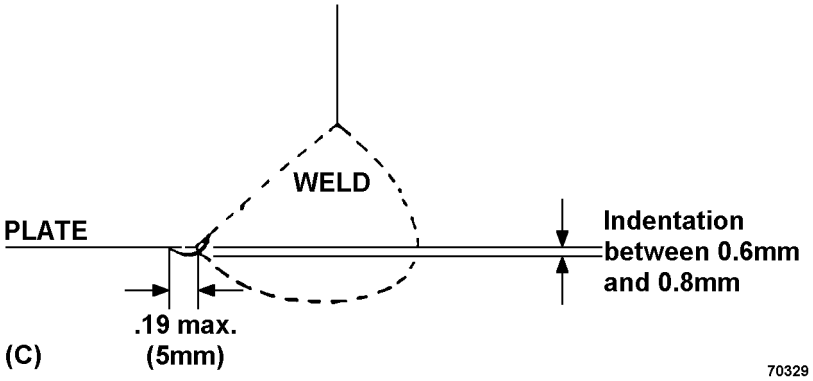
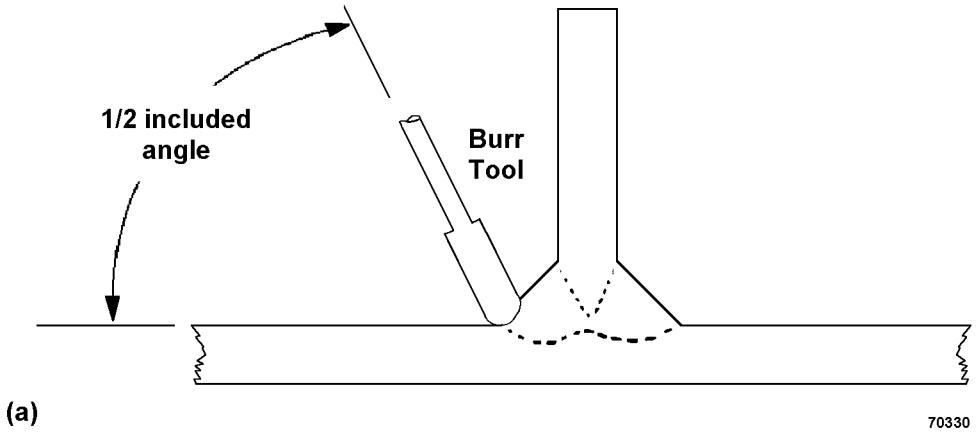
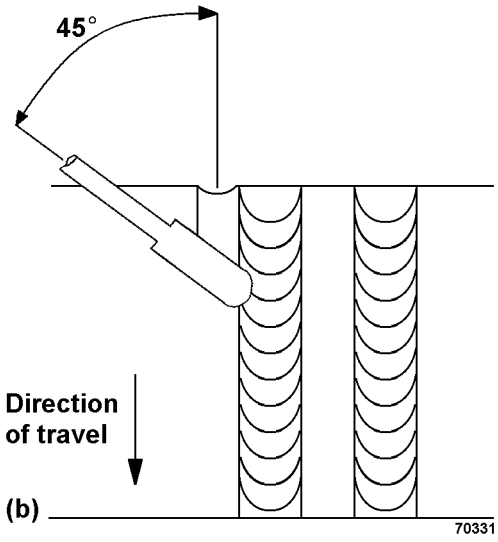


FIGURE 4-1. TOE HAMMER PEENING





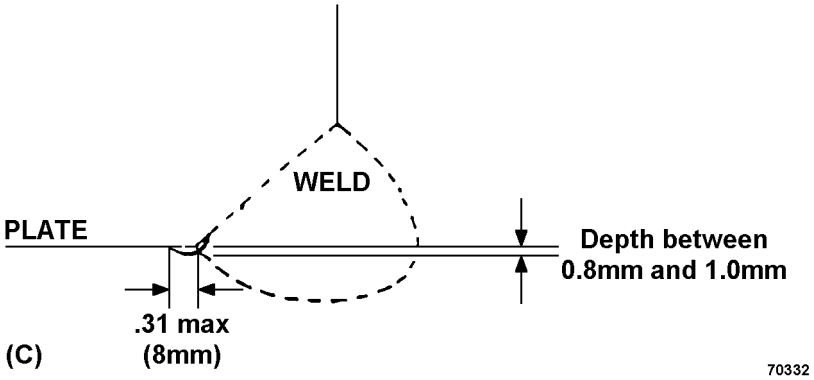


FIGURE 4-2. TOE GRINDING WITH A ROTARY BURR

BIBLIOGRAPHY

American Welding Society Bulletin No. D14.3-94/ D1.1 - Specification for Welding Earthmoving and Construction Equipment

Metals and How to Weld Them - James F. Lincoln Arc Welding Foundation. Cleveland, Ohio

Procedure Handbook of Arc Welding - Lincoln Electric Company, Cleveland, Ohio

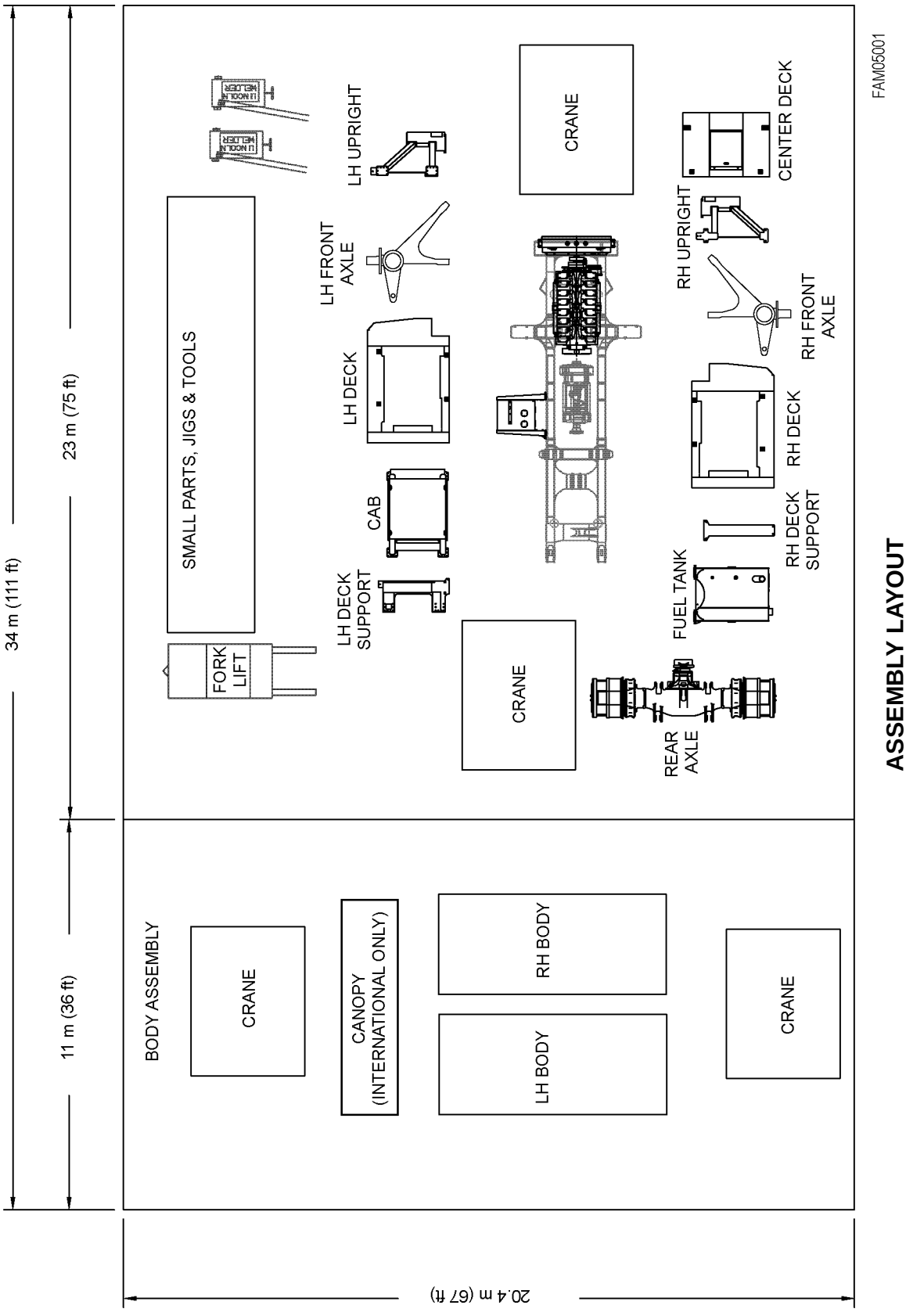
American Welding Society - Welding Handbook

British Standard BS5135 - Metal Arc Welding of Carbon and Carbon-Manganese Steels

Welding Steels Without Hydrogen Cracking - The Welding Institute, F. R. Coe, Author

RECEIVING & ASSEMBLY PREPARATION

1. Inspect all components for possible shipping damages. Note any damage found and report to shipping agent.
2. Spread out all parts and organize per unit number. Check for missing parts. List the unit number of all major components. Verify the cab and decks are with the correct chassis.
3. Inspect rear suspension spherical bearings to ensure proper pin fit and movement.
4. Install support blocks under the frame at the hoist cylinder mounts. The support blocks must be approximately 76 cm (30 in.) high.
5. Clean all mounting surfaces on the chassis and on the individual components.
6. Check all electrical connectors and verify they are free of paint and/or corrosion. Clean any connector with questionable electrical continuity.
7. Check all factory installed components for the proper tightening torque.
8. Arrange the work site as shown on the following page.



ASSEMBLY LAYOUT

CHASSIS ASSEMBLY

Due to differences in machine configurations and shipping restrictions/requirements throughout the world, the shipping and packaging of large machines varies. Photographs or illustrations used in the following procedures are provided as general guidelines only. Actual assembly may be different, but this general procedure provides a basic outline for assembly.

Items like the hydraulic tank and the accumulators may have been removed for shipping and will have to be locally installed.

Each shipment may be different, depending on the truck configuration and destination.

RECOMMENDED ASSEMBLY DATA

1. Service Report (Pre-Delivery)
2. Acknowledgement of Receipt of Company Warranty
3. Assembly Blueprints & Schematics
4. Fluid Specifications (refer to the lubrication chart in Section 10, Appendix)
5. Suspension Oiling & Charging Procedure (available in Section 10, Appendix)
6. Toe-In Adjustment Procedure (Section 10, Appendix)
7. Hydraulic Checkout Procedure (Section 10, Appendix)
8. Hydraulic Brake Checkout Procedure (Section 10, Appendix)
10. Filter List (available in parts book)
11. Lubrication & Service PM Forms (available in the operation and maintenance manual)
12. Component Weights - for crane reference (available in Section 3 of this manual)
13. Standard Torque Chart (available in Section 10 of this manual)

BASIC ASSEMBLY PROCEDURE

1. Site preparation
2. Unload truck components
3. Assemble the chassis
4. Weld the body

NOTE: Chassis assembly and body welding may be done in either order, or simultaneously. The most logical order depends on available resources such as cranes, welders, assemblers, etc.

5. Static checkout (electrical & mechanical)
6. Install the body
7. Dynamic checkout (electrical & mechanical)
8. Site cleanup

ORDER OF ASSEMBLY

The following list outlines a general assembly order for building the truck. It is possible for some of these tasks to be performed out of order depending on factors such as manpower and location on the truck. Before changing the order of assembly, however, consider the impact on subsequent tasks.

NOTE: As stated earlier, shipping and packaging of large machines will vary. Some of these steps may change due to different shipping configurations and/or truck options.

1. Chassis - Unload and place on support blocks
2. Connect the rear axle.
3. Front suspension, wheel and brake assembly
4. Fuel tank
5. Fit LH upright
6. Fit RH upright

⚠ IMPORTANT ⚠

Do not weld the uprights until all decks and the operator cab are installed. Ratchet pullers may be required to help align the structures for a proper fit.

7. Fit LH deck/ROPS support
8. Fit RH deck support
9. Weld deck supports
10. Air intake tubes
11. RH deck, handrail and mirrors
12. Hydraulic brake cabinet
13. LH deck and handrails
14. Operator cab
15. Weld both uprights
16. Front ladders
17. Wheels and tires
18. Install the dump body
19. Connect hoist cylinders
20. Install body accessories - mud flaps, body position switches, etc.
21. Clean the truck
22. Install decals
23. Install lighting wiring
24. Check and adjust suspension oiling and charging
25. Charge accumulators
26. Add fluids

NOTE: Prior to starting the engine, ensure the steering pump case is full of oil.

27. Perform system check-outs
28. Clean the assembly area
29. Touch up paint
30. Operator training
31. Install fire suppression system, if applicable