

Product: KOMATSU 960E-1 Rigid Dump Truck Service Repair Workshop Manual(CEBM021303)

Full Download: <https://www.arepairmanual.com/downloads/komatsu-960e-1-rigid>

[-dump-truck-service-repair-workshop-manualcebm021303/](https://www.arepairmanual.com/downloads/komatsu-960e-1-rigid-dump-truck-service-repair-workshop-manualcebm021303/)

CEBM021303

Shop Manual

960E-1

DUMP TRUCK

SERIAL NUMBERS

A30003 - A30024

KOMATSU®

Sample of manual. Download All 984 pages at:

<https://www.arepairmanual.com/downloads/komatsu-960e-1-rigid-dump-truck-service-repair-workshop-manualcebm021303/>

Product: KOMATSU 960E-1 Rigid Dump Truck Service Repair Workshop Manual(CEBM021303)

Full Download: <https://www.arepairmanual.com/downloads/komatsu-960e-1-rigid>

[-dump-truck-service-repair-workshop-manualcebm021303/](https://www.arepairmanual.com/downloads/komatsu-960e-1-rigid-dump-truck-service-repair-workshop-manualcebm021303/)

Sample of manual. Download All 984 pages at:

<https://www.arepairmanual.com/downloads/komatsu-960e-1-rigid-dump-truck-service-repair-workshop-manualcebm021303/>

DUMP TRUCK

960E

Machine model	Serial number
960E-1	A30003 - A30024

00 Index and foreword

Index

Composition of shop manual	2
Table of contents.....	4

Composition of shop manual

The contents of this shop manual are shown together with Form No. in a list.

Note 1: Always keep the latest version of this manual in accordance with this list and utilize accordingly.

The marks shown to the right of Form No. denote the following:

□: New module (to be filed additionally) ●: Revision (to be replaced for each Form No.)

Note 2: This shop manual can be supplied for each Form No.

Note 3: To file this shop manual in the special binder for management, handle it as follows:

- Place a divider on the top of each section in the file after matching the Tab No. with No. indicated next to each Section Name shown in the table below:
- File overview and other materials in sections in the order shown below and utilize them accordingly.

<u>Section Title</u>	<u>Form Number</u>
Shop Manual, contents binder, binder label and tabs	CEBM021303 ●
00 Index and foreword	
Index	CEN00001-03 ●
Foreword, safety and general information	CEN00002-03 ●
Operating instructions	CEN00003-01
01 Specification	
Specification and technical data	CEN01001-02 ●
10 Structure, function and maintenance standard	
Steering circuit	CEN10001-02 ●
Hoist circuit	CEN10002-01 ●
Brake circuits	CEN10003-02 ●
Suspensions	CEN10004-01 ●
Electrical system, 24 volt	CEN10005-02 ●
Interface module (IM)	CEN30006-00
Electrical system, AC drive	CEN10007-00
Cab air conditioning	CEN10008-01
Reserve engine oil system	CEN10022-00
20 Standard value table	
Standard service value table	CEN20001-00
30 Testing and adjusting	
General information	CEN30001-01 ●
Steering, brake cooling and hoist hydraulic system	CEN30002-01 ●
Brake system	CEN30003-01 ●
Accumulators and suspensions	CEN30004-02 ●
KOMTRAX Plus and payload meter	CEN30005-02 ●
Interface module (IM)	CEN30006-00
Cab air conditioning	CEN30007-01

40 Troubleshooting	
Fuse and circuit breaker locations	CEN40001-01
AC drive system fault codes	CEN40002-00
Troubleshooting by failure code, Part 1	CEN40003-01 ●
Troubleshooting by failure code, Part 2	CEN40004-01 ●
Troubleshooting by failure code, Part 3	CEN40005-02 ●
Troubleshooting by failure code, Part 4	CEN40006-01 ●
Troubleshooting by failure code, Part 5	CEN40007-01 ●
Troubleshooting by failure code, Part 6	CEN40016-00 □
Cab air conditioning	CEN40008-01
Reserve engine oil system	CEN40010-00
50 Disassembly and assembly	
General information	CEN50001-03 ●
Wheels, spindle and rear axle	CEN50002-03 ●
Brake system	CEN50003-03 ●
Steering system	CEN50004-02 ●
Suspensions	CEN50005-03 ●
Hoist circuit	CEN50006-03 ●
Operator cab	CEN50007-02 ●
Body and structures	CEN50008-02 ●
Cab air conditioning	CEN50009-02 ●
Power module	CEN50019-02 ●
90 Diagrams and drawings	
Hydraulic circuit diagrams	CEN90001-00
Electrical circuit diagrams	CEN90002-01

Table of contents

00 Index and foreword	
Index	CEN00001-03
Composition of shop manual	2
Table of contents	4
Foreword, safety and general information	CEN00002-03
Foreword	4
How to read the shop manual	5
General safety	7
Precautions before operating the truck	10
Precautions while operating the truck	12
Working near batteries	15
Precautions before performing service.....	16
Precautions while performing service.....	17
Tires	19
Precautions for performing repairs	20
Precautions for welding on the truck	21
Precautions for drive system service.....	22
Handling electrical equipment and hydraulic components	26
How to read electric wire code	34
Standard torque tables	37
Conversion tables.....	42
Operating instructions	CEN00003-01
Preparing for operation.....	3
Engine start-up	7
After engine start-up	8
Emergency steering system	8
Precautions during truck operation.....	9
Operating on a haul road.....	10
Starting on a grade with a loaded truck	11
Sudden loss of engine power	11
Fuel depletion.....	12
Towing	12
Loading the dump body.....	15
Dumping a load	15
Disabled truck dumping procedure.....	17
Safe parking procedure	18
Normal engine shutdown procedure	19
01 Specification	
Specification and technical data	CEN01001-02
Specification drawing.....	3
Specifications	4
Weight table	6
Fuel, coolant and lubricants	7

10 Structure, function and maintenance standard

Steering circuit	CEN10001-02
Steering circuit operation.....	3
Steering circuit components	5
Flow amplifier operation	8
Steering/brake pump operation	17
Steering cylinder wear data	20
Hoist circuit	CEN10002-01
Hoist circuit operation.....	3
Hoist circuit components	4
Hoist pilot valve operation	8
Hoist cylinder wear data	18
Brake circuits	CEN10003-02
General information.....	3
Service brake circuit operation	4
Secondary braking and auto apply	4
Parking brake circuit operation.....	6
Wheel brake lock circuit operation	7
Brake warning circuit operation	7
Brake assembly wear data	9
Suspensions	CEN10004-01
General information.....	3
Front suspension wear data	3
Rear suspension wear data	4
Electrical system, 24V	CEN10005-02
Battery supply system	3
Auxiliary control cabinet components	4
Relay boards	6
Body-up switch	10
Hoist limit switch.....	11
Interface module (IM)	CEN10006-00
General information.....	3
Sensors	3
Interface module inputs and outputs	4
Electrical system, AC drive	CEN10007-00
General system operation	3
AC drive system components	5
PSC software functions	7
Alternator field control	12
Event detection and processing	14
Event logging and storage	15
Serial data communications	17
Abnormal conditions/overriding functions	18
AC drive system component table	20

Cab air conditioning	CEN10008-01
General information.....	2
Principles of refrigeration.....	3
Air conditioning system components.....	5
Air conditioning system electrical circuit.....	9
Reserve engine oil system	CEN10022-00
General information.....	3
Operation.....	4
Remote tank fill system	5
20 Standard value table	
Standard value table	CEN20001-00
Standard value table for truck.....	3
30 Testing and adjusting	
General information	CEN30001-01
Special tools	3
Steering, brake cooling and hoist hydraulic system	CEN30002-01
General information on system checkout.....	3
Steering system checkout procedures	3
Steering system checkout data sheet.....	9
Brake cooling and hoist system checkout procedures	11
Brake cooling and hoist system checkout data sheet	16
Hydraulic system flushing procedure	17
Brake system	CEN30003-01
General information on system checkout.....	3
Brake circuit checkout procedure	3
Brake system checkout data sheet	14
Brake piston leakage test.....	18
Brake seal pressure test.....	18
Wet disc brake bleeding procedure.....	19
Parking brake bleeding procedure	19
Brake disc wear inspection.....	20
Brake valve bench test and adjustment	22
Dual relay valve bench test and adjustment.....	25
Accumulators and suspensions	CEN30004-02
Accumulator charging and storage.....	3
Accumulator leak testing	8
Suspension oiling and charging procedures	10
Suspension pressure test.....	17
KOMTRAX Plus and payload meter	CEN30005-02
KOMTRAX Plus and payload meter software	3
KOMTRAX Plus controller initial setting procedure.....	4
KOMTRAX Plus initialization check list	11
KOMTRAX Plus initialization form.....	13
Precautions for replacing KOMTRAX Plus controller	14

KOMTRAX Plus controller checkout procedure	19
Payload meter initial setting procedure	22
Interface module (IM)	CEN30006-00
Interface module software	3
Interface module checkout procedures	5
Cab air conditioning	CEN30007-01
General information	2
Service tools and equipment	3
Detecting leaks	6
System performance test	7
Checking system oil	8
System flushing	9
Installing the manifold gauge set	10
Recovering and recycling refrigerant	11
Evacuating the air conditioning system	13
Charging the air conditioning system	14
A/C drive belt checkout procedure	15
40 Troubleshooting	
Fuse and circuit breaker locations	CEN40001-01
Fuse and circuit breaker locations	3
AC drive system fault codes	CEN40002-00
DID panel fault code tables	3
Troubleshooting by fault code, Part 1	CEN40003-01
Fault Code A001: Left front suspension pressure sensor signal high	3
Fault Code A002: Left front suspension pressure sensor signal low	4
Fault Code A003: Right front suspension pressure sensor signal high	5
Fault Code A004: Right front suspension pressure sensor signal low	6
Fault Code A005: Left rear suspension pressure sensor signal high	7
Fault Code A006: Left rear suspension pressure sensor signal low	8
Fault Code A007: Right rear suspension pressure sensor signal high	9
Fault Code A008: Right rear suspension pressure sensor signal low	10
Fault Code A009: Incline sensor signal high	11
Fault Code A010: Incline sensor signal low	12
Fault Code A011: Payload meter speed sensor signal has failed	13
Fault Code A013: Body up switch has failed	14
Fault Code A014: Payload meter checksum computation has failed	15
Fault Code A016: Payload meter write to flash memory has failed	16
Fault Code A017: Payload meter flash memory read has failed	17
Fault Code A018: Right rear flat suspension cylinder warning	18
Fault Code A019: Left rear flat suspension cylinder warning	20
Fault Code A022: Carryback load excessive	22
Fault Code A100: An open circuit breaker has been detected on a relay board	25
Fault Code A101: High pressure detected across an hydraulic pump filter	26
Fault Code A105: Fuel level sensor shorted to ground, indicating a false high fuel level	28
Fault Code A107: GE has generated a propel system caution	30

Fault Code A108: GE has generated a propel system temperature caution.....	31
Fault Code A109: GE has generated a propel system reduced level signal.....	32
Fault Code A111: Low steering pressure warning.....	33
Fault Code A115: Low steering precharge pressure detected.....	34
Fault Code A117: Low brake accumulator pressure warning.....	36
Fault Code A118: Brake pressure is low while in brake lock.....	38
Fault Code A123: GE has generated a reduced retarding caution.....	40
Fault Code A124: GE has generated a no propel / no retard warning.....	41
Fault Code A125: GE has generated a no propel warning.....	42
Fault Code A126: Oil level in the hydraulic tank is low.....	43
Fault Code A127: IM-furnished +5 volt output for sensors is low.....	44
Fault Code A128: IM-furnished +5 volt output for sensors is high.....	46
Fault Code A139: Low fuel warning.....	48
Troubleshooting by fault code, Part 2	CEN40004-01
Fault Code A145: Hydraulic temperature sensors cause advance of engine rpm to advance level 1 for cooling of hydraulic oil.....	4
Fault Code A146: Hydraulic temperature sensors cause advance of engine rpm to advance level 2 for cooling of hydraulic oil.....	6
Fault Code A152: Starter failure.....	8
Fault Code A153: Battery voltage is low with the truck in operation.....	10
Fault Code A154: Battery charging voltage is excessive.....	12
Fault Code A155: Battery charging voltage is low.....	13
Fault Code A158: Fuel level sensor is open or shorted high, indicating a false low fuel level.....	14
Fault Code A166: Left rear hydraulic oil temperature sensor is low.....	16
Fault Code A167: Right rear hydraulic oil temperature sensor is low.....	18
Fault Code A168: Left front hydraulic oil temperature sensor is low.....	20
Fault Code A169: Right front hydraulic oil temperature sensor is low.....	22
Fault Code A170: Left rear hydraulic oil temperature sensor is high.....	24
Fault Code A171: Right rear hydraulic oil temperature sensor is high.....	25
Fault Code A172: Left front hydraulic oil temperature sensor is high.....	26
Fault Code A173: Right front hydraulic oil temperature sensor is high.....	27
Fault Code A184: J1939 data link is not connected.....	28
Fault Code A190: Auto lube control has detected an incomplete lube cycle.....	30
Fault Code A194: Left front hydraulic oil temperature is high.....	32
Fault Code A195: Right front hydraulic oil temperature is high.....	33
Fault Code A196: Left rear hydraulic oil temperature is high.....	34
Fault Code A197: Right rear hydraulic oil temperature is high.....	35
Fault Code A198: Hoist pressure 1 sensor is high.....	36
Fault Code A199: Hoist pressure 2 sensor is high.....	37
Fault Code A200: Steering pressure sensor is high.....	38
Fault Code A201: Brake pressure sensor is high.....	39
Fault Code A202: Hoist pressure 1 sensor is low.....	40
Fault Code A203: Hoist pressure 2 sensor is low.....	42
Fault Code A204: Steering pressure sensor is low.....	44
Fault Code A205: Brake pressure sensor is low.....	46
Fault Code A206: Ambient temperature sensor is high.....	48

Fault Code A207: Ambient temperature sensor is low	49
Troubleshooting by fault code, Part 3	CEN40005-02
Fault Code A212: Bad truck speed signal	4
Fault Code A213: Parking brake should have applied but is detected as not having applied...	6
Fault Code A214: Parking brake should have released but is detected as not having released	10
Fault Code A215: Brake auto apply valve circuit is defective	14
Fault Code A216: An open or short to ground has been detected in the parking brake command valve circuit.....	16
Fault Code A223: Excessive engine cranking has occurred or a jump start has been attempted	18
Fault Code A230: Parking brake has been requested while truck still moving	20
Fault Code A231: The body is up with engine running and brakes not on.....	22
Fault Code A235: Steering accumulator is in the process of being bled down	24
Fault Code A236: The steering accumulator has not properly bled down after 90 seconds...	26
Fault Code A237: The CAN/RPC connection to the display is open.....	28
Fault Code A240: The key switch input to the interface module is open	29
Fault Code A242: Fuel gauge within the dash display panel is defective	30
Fault Code A243: Engine coolant temperature gauge within the dash display panel is defective	31
Fault Code A244: Drive system temperature gauge within the dash display panel is defective	32
Fault Code A245: Hydraulic oil temperature gauge within the dash display panel is defective	33
Fault Code A246: Payload meter reports truck overload	34
Fault Code A247: Low steering pressure warning	36
Fault Code A248: Status module within the dash display panel is defective.....	38
Fault Code A249: Red warning lamp within the dash display (driven by IM) is shorted	39
Fault Code A250: Battery voltage is low with the truck parked	40
Fault Code A251: Sonalert used with the dash display (driven by IM) is open or shorted to ground	42
Fault Code A252: Start enable output circuit is either open or shorted to ground.....	44
Fault Code A253: Steering bleed circuit is not open while running	46
Fault Code A256: Red warning lamp in the dash display (driven by IM) is open	48
Fault Code A257: Payload CAN/RPC is not connected	49
Fault Code A258: Steering accumulator bleed pressure switch circuit is defective	50
Troubleshooting by fault code, Part 4	CEN40006-01
Fault Code A260: Parking brake failure	4
Fault Code A261: Low brake accumulator pressure warning	6
Fault Code A262: Steering bleed valve circuit open during shutdown	8
Fault Code A264: Parking brake relay circuit is defective	10
Fault Code A265: Service brake failure	12
Fault Code A266: Selector lever was not in park while attempting to crank engine	14
Fault Code A267: Parking brake was not set while attempting to crank engine	15
Fault Code A268: Secondary engine shutdown while cranking	16
Fault Code A270: Brake lock switch power supply is not on when required	18
Fault Code A271: Shifter not in gear	22

Fault Code A272: Brake lock switch power supply is not off when required	24
Fault Code A273: A fault has been detected in the hoist or steering pump filter pressure switch circuit	27
Fault Code A274: A brake setting fault has been detected	28
Fault Code A275: A starter has been detected as engaged without a cranking attempt	30
Fault Code A276: The drive system data link is not connected	32
Fault Code A277: Parking brake applied while loading	34
Fault Code A278: Service brake applied while loading	36
Fault Code A279: Low steering pressure switch is defective	38
Fault Code A280: Steering accumulator bleed down switch is defective	39
Fault Code A281: Brake lock degrade switch is defective	40
Fault Code A282: The number of excessive cranking counts and jump starts without the engine running has reached 7	42
Fault Code A283: An engine shutdown delay was aborted because the parking brake was not set	44
Fault Code A284: An engine shutdown delay was aborted because the secondary shutdown switch was operated	46
Fault Code A285: The parking brake was not set when the key switch was turned off.....	48
Fault Code A286: A fault was detected in the shutdown delay relay circuit	50
Fault Code A292: The shutdown delay relay has remained on after the latched key switch circuit is off.....	52
Troubleshooting by fault code, Part 5	CEN40007-01
Fault Code A303: Shifter is defective	4
Fault Code A304: Auto lube grease level fault	6
Fault Code A305: Auto lube circuit is defective	8
Fault Code A307: Both GE inverters are disabled	10
Fault Code A309: No brakes applied when expected	12
Fault Code A310: Low fuel warning	14
Fault Code A311: Brake lock switch is on when it should not be	16
Fault Code A312: DCDC converter 12 volt circuit sensing is producing low readings	18
Fault Code A313: DCDC converter 12 volt circuit sensing is producing high readings.....	19
Fault Code A315: DCDC converter 12 volt circuit is low	20
Fault Code A316: Starter engagement has been attempted with engine running	22
Fault Code A317: Operation of brake auto apply valve without a detected response.....	24
Fault Code A318: Unexpected power loss to interface module	26
Fault Code A320: Data link reports GE propel system caution fault but wired input does not	28
Fault Code A321: Data link reports GE propel system temp caution fault but wired input does not	30
Fault Code A322: Data link reports GE propel system reduced level fault but wired input does not	32
Fault Code A323: Data link reports GE reduced retard level fault but wired input does not ...	34
Fault Code A324: Data link reports DC link voltage but wired input does not	36
Fault Code A325: Data link reports GE no propel/retard fault but wired input does not.....	38
Fault Code A326: Data link reports GE no propel fault but wired input does not	40
Fault Code A327: Data link reports GE at rest but wired input does not	42
Fault Code A328: Drive system not powered up	44

Fault Code A329: Data link reports the body is not down but wired input says it is	46
Fault Code A330: Data link reports dynamic retard operating state but wired input does not	48
Troubleshooting by fault code, Part 6	CEN40016-00
Fault Code A350: Overload on output 1B	3
Fault Code A351: Overload on output 1E	4
Fault Code A352: Overload on output 1H	6
Fault Code A353: Overload on output 1J	7
Fault Code A354: Overload on output 1K	8
Fault Code A355: Overload on output 1L	10
Fault Code A356: Overload on output 1M	11
Fault Code A357: Overload on output 1N	12
Fault Code A358: Overload on output 1P	13
Fault Code A359: Overload on output 1R	14
Fault Code A360: Overload on output 1S	15
Fault Code A361: Overload on output 1T	16
Fault Code A362: Overload on output 1U	18
Fault Code A363: Overload on output 1X	20
Fault Code A364: Overload on output 1Y	22
Fault Code A365: Overload on output 1Z	23
Cab air conditioning	CEN40008-01
Preliminary checks	3
Diagnosis of gauge readings and system performance	3
Troubleshooting by manifold gauge set readings	4
Reserve engine oil system	CEN40010-00
Pumping unit LED signals	3
50 Disassembly and assembly	
General information	CEN50001-03
Special tools	3
Wheels, spindles and rear axles	CEN50002-03
General information for tires and rims	3
Removal and installation of front wheel	4
Removal and installation of rear wheel	6
Removal and installation of tires	8
Removal and installation of front wheel hub and spindle	10
Disassembly and assembly of front wheel hub and spindle	14
Removal and installation of rear axle	19
Removal and installation of anti-sway bar	21
Removal and installation of pivot pin	22
Pivot eye and bearing service	23
Removal and installation of wheel motor	25
Removal and installation of rear brake assembly	30
Brake system	CEN50003-03
Removal and installation of brake valve	3
Disassembly and assembly of brake valve	4

Removal and installation of dual relay valve	11
Disassembly and assembly of dual relay valve	13
Removal and installation of brake manifold.....	15
Disassembly and assembly of brake manifold	16
Removal and installation of brake accumulator.....	17
Disassembly and assembly of brake accumulator	18
Disassembly and assembly of wheel brake	21
Removal and installation of parking brake	33
Disassembly and assembly of parking brake	35
Steering system	CEN50004-02
Removal and installation of steering control unit.....	3
Disassembly and assembly of steering control unit	5
Removal and installation of steering column.....	10
Removal and installation of steering wheel	11
Removal and installation of bleed down manifold	13
Removal and installation of flow amplifier	15
Disassembly and assembly of flow amplifier	15
Removal and installation of steering cylinders and tie rod	18
Disassembly and assembly of steering cylinders.....	20
Removal and installation of steering/brake pump	21
Disassembly and assembly of steering/brake pump	24
Removal and installation of steering accumulators	33
Disassembly and assembly of steering accumulators.....	34
Suspensions	CEN50005-03
Removal and installation of front suspension.....	3
Minor front suspension repairs (lower bearing and seals).....	10
Major front suspension rebuild	11
Removal and installation of rear suspension.....	13
Disassembly and assembly of rear suspension	16
Hoist circuit	CEN50006-03
Removal and installation of hoist pump.....	3
Disassembly and assembly of hoist pump	5
Removal and installation of hoist valve	13
Disassembly and assembly of hoist valve	14
Overcenter valve manifold service	21
Removal and installation of hoist pilot valve.....	22
Disassembly and assembly of hoist pilot valve	23
Removal and installation of hoist cylinders	25
Disassembly and assembly of hoist cylinders	27
Operator cab	CEN50007-02
Removal and installation of operator cab	3
Removal and installation of cab door	6
Disassembly and assembly of cab door.....	6
Adjustment of cab door	13
Removal and installation of side window glass	15
Removal and installation of windshield and rear window glass.....	17

Removal and installation of windshield wiper motor	18
Removal and installation of windshield wiper arm	19
Removal and installation of windshield wiper linkage	20
Removal and installation of operator seat	21
Removal and installation of passenger seat	22
Removal and installation of seat belt	23
Body and structures	CEN50008-02
Removal and installation of dump body	3
Removal and installation of body pads	6
Removal and installation of diagonal ladder/hood and grille assembly	8
Removal and installation of right deck	10
Removal and installation of left deck	12
Removal and installation of fuel tank	14
Removal and installation of fuel gauge sender	16
Disassembly and assembly of fuel tank breather	17
Removal and installation of hydraulic tank	18
Cab air conditioning	CEN50009-02
Replacement of air conditioning system components	3
Disassembly and assembly of compressor clutch	5
Power module, engine and alternator	CEN50019-02
Removal and installation of power module	3
Removal and installation of alternator	11
Removal and installation of engine	16
Removal and installation of radiator	17
Repairing the radiator	20
90 Diagrams and drawings	
Hydraulic circuit diagrams	CEN90001-00
Steering, hoist and brake cooling hydraulic circuit diagram	EM7616
Brake hydraulic circuit diagram	EM7623
Electrical circuit diagrams	CEN90002-01
Electrical circuit diagram - index & symbols	XS5701
Electrical circuit diagram - circuit locator sheet	XS5702
Electrical circuit diagram - circuit locator sheet	XS5703
Electrical circuit diagram - battery box	XS5704
Electrical circuit diagram - 24V power distribution & circuit protection	XS5705
Electrical circuit diagram - 24V power distribution & circuit protection	XS5706
Electrical circuit diagram - engine control wiring	XS5707
Electrical circuit diagram - engine control wiring	XS5708
Electrical circuit diagram - engine control wiring	XS5709
Electrical circuit diagram - engine control wiring	XS5710
Electrical circuit diagram - keyswitch, timed engine shutdown & auto lube system	XS5711
Electrical circuit diagram - engine start circuit	XS5712
Electrical circuit diagram - brake control wiring	XS5713
Electrical circuit diagram - brake control wiring	XS5714
Electrical circuit diagram - steering & hoist pressure switch wiring	XS5715

Electrical circuit diagram - operator drive system controls	XS5716
Electrical circuit diagram - operator drive system controls	XS5717
Electrical circuit diagram - electronic dash panel	XS5718
Electrical circuit diagram - operator cab light controls & horn	XS5719
Electrical circuit diagram - operator cab light controls & horn	XS5720
Electrical circuit diagram - operator cab windows & wipers	XS5721
Electrical circuit diagram - operator cab radio & seat wiring	XS5722
Electrical circuit diagram - clearance lights, fog lights & headlights	XS5723
Electrical circuit diagram - hazard light wiring	XS5724
Electrical circuit diagram - heater & air conditioning controls	XS5725
Electrical circuit diagram - diagnostic ports - GE	XS5726
Electrical circuit diagram - diagnostic ports - VHMS & GE	XS5727
Electrical circuit diagram - modular mining interface	XS5728
Electrical circuit diagram - interface module inputs & outputs	XS5729
Electrical circuit diagram - interface module inputs & outputs	XS5730
Electrical circuit diagram - interface module inputs & outputs	XS5731
Electrical circuit diagram - interface module inputs & outputs	XS5732
Electrical circuit diagram - payload meter III circuits	XS5733
Connectors table and arrangement drawing	HE487

NOTES

960E Dump truck

Form No. CEN00001-03

© 2010 KOMATSU
All Rights Reserved
Printed in USA 10-10

DUMP TRUCK

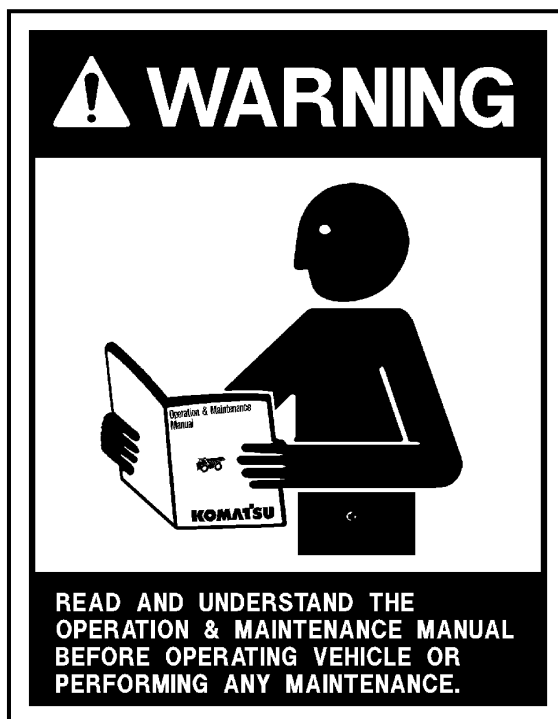
960E

Machine model	Serial number
960E-1	A30003 and up

00 Index and foreword

Foreword, safety and general information

Foreword	4
How to read the shop manual	5
General safety.....	7
Precautions before operating the truck	10
Precautions while operating the truck	12
Working near batteries.....	15
Precautions before performing service	16
Precautions while performing service	17
Tires	19
Precautions for performing repairs.....	20
Precautions for welding on the truck.....	21
Precautions for drive system service	22
Handling electrical equipment and hydraulic components.....	26
How to read electric wire code	34
Standard torque tables.....	37
Conversion tables	42



Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read and understand this manual before operating or maintaining this machine.

This manual should be kept in or near the machine for reference, and periodically reviewed by all personnel who will come into contact with it.

This material is proprietary to Komatsu America Corp (KAC), and is not to be reproduced, used, or disclosed except in accordance with written authorization from KAC.

It is the policy of the Company to improve products whenever it is possible and practical to do so. The Company reserves the right to make changes or add improvements at any time without incurring any obligation to install such changes on products sold previously.

Because of continuous research and development, periodic revisions may be made to this publication. Customers should contact their local Komatsu distributor for information on the latest revision.

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

CALIFORNIA
Proposition 65 Warning

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



NON-OEM PARTS IN CRITICAL SYSTEMS

For safety reasons, Komatsu America Corp. strongly recommends against the use of non-OEM replacement parts in critical systems of all Komatsu equipment. Critical systems include but are not limited to steering, braking and operator safety systems.

Replacement parts manufactured and supplied by unauthorized sources may not be designed, manufactured or assembled to Komatsu's design specifications; accordingly, use of such parts may compromise the safe operation of Komatsu products and place the operator and others in danger should the part fail.

Komatsu is also aware of repair companies that will rework or modify an OEM part for reuse in critical systems. Komatsu does not generally authorize such repairs or modifications for the same reasons as noted above.

Use of non-OEM parts places full responsibility for the safe performance of the Komatsu product on the supplier and user. Komatsu will not in any case accept responsibility for the failure or performance of non-OEM parts in its products, including any damages or personal injury resulting from such use.

Foreword

This manual is written for use by the operator and/or the service technician. It is designed to help these persons to become fully knowledgeable of the truck and all of its systems in order to keep it operating safely and efficiently. All operators and maintenance personnel should read and understand the information in this manual before operating the truck or performing maintenance and/or operational checks on the truck. All safety notices, warnings, and cautions should be understood and followed when operating the truck or performing repairs on the truck.

The first section covers component descriptions, truck specifications and safe work practices, as well as other general information. The major portion of the manual pertains to disassembly, service and reassembly. Each major serviceable area is dealt with individually. For example, the disassembly, service and reassembly of the radiator group is discussed as a unit. The same is true of the engine and engine accessories, and so on through the entire mechanical detail of the truck. Disassembly should be carried only as far as necessary to accomplish needed repairs.

The illustrations used in this manual are *typical* of the component shown and may not be an *exact* reproduction of what is found on the truck.

This manual shows dimensioning of U.S. standard and metric (SI) units throughout. All references to "right," "left," "front," or "rear" are made with respect to the operator's normal seated position unless specifically stated otherwise.

When assembly instructions are provided without references to specific torque values, standard torque values should be used. Refer to "Standard torque tables" later in this section. Specific torques, when provided in the text, are in bold face type, such as **135 Nm (100 ft lb)**. All torque specifications have $\pm 10\%$ tolerance unless otherwise specified.

A product identification plate is located on the frame in front of the right side front wheel. It designates the Truck Model Number, Product Identification Number (vehicle serial number), and Maximum GVW (Gross Vehicle Weight) rating.

The KOMATSU truck model designation consists of three numbers and one letter (i.e. 930E).

The three numbers represent the basic truck model.

The letter "E" designates an Electrical wheel motor drive system.

The Product Identification Number (vehicle serial number) contains information which identifies several characteristics of this unit. For a more detailed explanation, refer to the Operation and Maintenance Manual.

The Gross Vehicle Weight (GVW) is what determines the load on the drive train, frame, tires, and other components. The vehicle design and application guidelines are sensitive to the maximum GVW.

GVW is *total weight*: **empty vehicle weight + fuel & lubricants + payload**.

To determine the *allowable payload*, fill all lubricants to the proper level and fill the fuel tank of an empty truck (which includes all accessories, body liners, tailgates, etc.), and then weigh the truck. Record this value and subtract it from the GVW. The result is the allowable payload.

NOTE: Accumulations of mud, frozen material, etc, become part of the GVW and reduces the allowable payload. To maximize payload and to keep from exceeding the maximum GVW rating, these accumulations should be removed as often as practical.

Exceeding the allowable payload will reduce the expected life of truck components.

How to read the shop manual

- Some attachments and optional parts in this shop manual may not be delivered to certain areas. If one of them is required, consult KOMATSU distributors.
- Materials and specifications are subject to change without notice.
- Shop manuals are divided into the “Chassis volume” and “Engine volume”. For the engine unit, see the engine volume of the engine model mounted on the machine.

Composition of shop manual

This shop manual contains the necessary technical information for services performed in a workshop. For ease of understanding, the manual is divided into the following sections.

00. Index and foreword

This section explains the shop manuals list, table of contents, safety, and basic information.

01. Specification

This section explains the specifications of the machine.

10. Structure, function and maintenance standard

This section explains the structure, function, and maintenance standard values of each component. The structure and function sub-section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting. The maintenance standard sub-section explains the criteria and remedies for disassembly and service.

20. Standard value table

This section explains the standard values for new machine and judgement criteria for testing, adjusting, and troubleshooting. This standard value table is used to check the standard values in testing and adjusting and to judge parts in troubleshooting.

30. Testing and adjusting

This section explains measuring instruments and measuring methods for testing and adjusting, and method of adjusting each part. The standard values and judgement criteria for testing and adjusting are explained in Testing and adjusting.

40. Troubleshooting

This section explains how to find out failed parts and how to repair them. The troubleshooting is divided by failure modes.

50. Disassembly and assembly

This section explains the special tools and procedures for removing, installing, disassembling, and assembling each component, as well as precautions for them. In addition, tightening torque and weight of components are also explained.

90. Diagrams and drawings

This section gives hydraulic circuit diagrams and electrical circuit diagrams.

Revision and distribution

Any additions, revisions, or other change of notices will be sent to KOMATSU distributors. Get the most up-to-date information before you start any work.

Symbols



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



“DANGER” identifies a specific potential hazard WHICH WILL RESULT IN EITHER INJURY OR DEATH if proper precautions are not taken.



“WARNING” identifies a specific potential hazard WHICH MAY RESULT IN EITHER INJURY OR DEATH if proper precautions are not taken.



“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.

General safety

Safety records from most organizations will show that the greatest percentage of accidents are caused by unsafe acts performed by people. The remainder are caused by unsafe mechanical or physical conditions. Report all unsafe conditions to the proper authority.

The following safety rules are provided as a guide for the operator. However, local conditions and regulations may add many more to this list.



Read and follow all safety precautions. Failure to do so may result in serious injury or death.

Safety rules

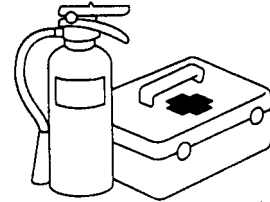
- Only trained and authorized personnel may operate and maintain the truck.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the truck.
- When working with another operator or a person on work site traffic duty, make sure that all personnel understand all hand signals that are to be used.

Safety features

- Make sure that all guards and covers are in their proper position. Have any damaged guards and covers repaired. (See Operating Instructions - "Preparing For Operation".)
- Learn the proper use of safety features such as safety locks, safety pins, and seat belts. Use these safety features properly.
- Never remove any safety features. Always keep them in good operating condition.
- Improper use of safety features could result in serious bodily injury or death.
- Check the seat belt fabric, buckle and hardware for damage or wear. Replace any worn or damaged parts immediately.
- The seat belts must be replaced 5 years after seat belt manufacture, or after every 3 years of use, whichever comes first.

Fire extinguisher and first aid kit

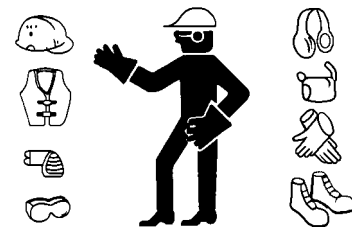
- Make sure that fire extinguishers are accessible and proper usage techniques are known.
- Provide a first aid kit at the storage point.
- Know what to do in the event of a fire.
- Keep the phone numbers of persons you should contact in case of an emergency on hand.



A0055070

Clothing and personal items

- Avoid loose clothing, jewelry, and loose long hair. They can catch on controls or in moving parts and cause serious injury or death. Also, never wear oily clothes as they are flammable.
- Wear a hard hat, safety glasses, safety shoes, mask and gloves when operating or maintaining a truck. Always wear safety goggles, hard hat and heavy gloves if your job involves scattering metal chips or minute materials, particularly when driving pins with a hammer or when cleaning air cleaner elements with compressed air. Also, ensure that the work area is free from other personnel during such tasks.



A0055010

Leaving the operator seat

When preparing to leave the operator's seat, do not touch any control lever that is not locked. To prevent accidental operations from occurring, always perform the following:

- Move the directional control lever to PARK. **Do not use the wheel brake lock when the engine will be turned off.**
- Lower the dump body to the frame.
- Stop the engine. When exiting the truck, always lock compartments and take the keys with you. If the truck should suddenly move or move in an unexpected way, this may result in serious bodily injury or death.

Mounting and dismounting

- Use the handrails and steps when getting on or off the truck.
- Never jump on or off the truck. Never climb on or off a truck while it is moving.
- When climbing on or off a truck, face the truck and use the hand-hold and steps.
- Never hold any control levers when getting on or off a truck.
- Always maintain three-point contact with the hand-holds and steps to ensure that you support yourself.
- When bringing tools into the operator's compartment, always pass them by hand or pull them up by rope.
- If there is any oil, grease, or mud on the hand-holds or steps, wipe them clean immediately. Always keep these components clean. Repair any damage and tighten any loose bolts.

Fire prevention for fuel and oil

- Fuel, oil, and antifreeze can be ignited by a flame. Fuel is extremely flammable and can be hazardous. Keep flames away from flammable fluids.
- Keep oil and fuel in a designated location and do not allow unauthorized persons to enter.
- When refueling, stop the engine and do not smoke.
- Refueling and oiling should be done in well ventilated areas.
- Tighten all fuel and oil tank caps securely.



A0055020



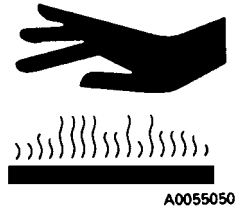
A0055030



A0055040

Precautions with high temperature fluids

Immediately after truck operation, engine coolant, engine oil, and hydraulic oil are at high temperatures and are pressurized. If the cap is removed, the fluids are drained, the filters are replaced, etc., there is danger of serious burns. Allow heat and pressure to dissipate before performing such tasks and follow proper procedures as outlined in the service manual.



To prevent hot coolant from spraying:

1. Stop the engine.
2. Wait for the coolant temperature to decrease.
3. Depress the pressure release button on the cap to vent cooling system pressure.
4. Turn the radiator cap slowly to release the pressure before removing.

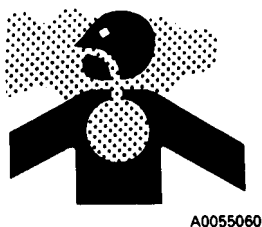
To prevent hot engine oil spray:

1. Stop the engine.
2. Wait for the oil temperature to cool down.
3. Turn the cap slowly to release the pressure before removing the cap.

Asbestos dust hazard prevention

Asbestos dust is hazardous to your health when inhaled. If you handle materials containing asbestos fibers, follow the guidelines below:

- Never use compressed air for cleaning.
- Use water for cleaning to control dust.
- Operate the truck or perform tasks with the wind to your back whenever possible.
- Use an approved respirator when necessary.



Prevention of injury by work equipment

Never enter or put your hand, arm or any other part of your body between movable parts such as the dump body, chassis or cylinders. If the work equipment is operated, clearances will change and may lead to serious bodily injury or death.

Unauthorized modification

Any modification made to this vehicle without authorization from Komatsu America Corp. can possibly create hazards.

Before making any modification, consult the authorized regional Komatsu America Corp. distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorized modification.

Precautions when using ROPS

The ROPS is intended to protect the operator if the truck should roll over. It is designed not only to support the load of the truck, but also to absorb the energy of the impact.

- The Rollover Protection Structure (ROPS) must be properly installed before the truck is operated.
- ROPS installed on equipment manufactured and designed by Komatsu America Corp. fulfills all of the regulations and standards for all countries. If it is modified or repaired without authorization from Komatsu, or if it is damaged when the truck rolls over, the strength of the structure will be compromised and will not be able to fulfill its intended purpose. Optimum strength of the structure can only be achieved if it is repaired or modified as specified by Komatsu.
- When modifying or repairing the ROPS, always consult your nearest Komatsu distributor.
- Even with the ROPS installed, the operator must always use the seat belt when operating the truck.

Precautions for attachments

- When installing and using optional equipment, read the instruction manual for the attachment and the information related to attachments in this manual.
- Do not use attachments that are not authorized by Komatsu America Corp. or the authorized regional Komatsu distributor. Use of unauthorized attachments could create a safety problem and adversely affect the proper operation and useful life of the truck.
- Any injuries, accidents, and product failures resulting from the use of unauthorized attachments will not be the responsibility of Komatsu America Corp. or the authorized regional Komatsu distributor.

Precautions for starting the truck

Start the engine from the operator seat only. Never attempt to start the engine by shorting across the cranking motor terminals. This may cause a fire, serious injury or death to anyone in truck's path.



Precautions before operating the truck

Safety is thinking ahead. Prevention is the best safety program. Prevent a potential accident by knowing the employer's safety requirements and all necessary job site regulations. In addition, know the proper use and care of all the safety equipment on the truck. Only qualified operators or technicians should attempt to operate or maintain a Komatsu machine.

Safe practices start before the operator gets to the equipment.

Safety at the worksite

- When walking to and from a truck, maintain a safe distance from all machines even when the operator is visible.
- Before starting the engine, thoroughly check the area for any unusual conditions that could be dangerous.
- Examine the road surface at the job site and determine the best and safest method of operation.
- Choose an area where the ground is as horizontal and firm as possible before performing the operation.
- If you need to operate on or near a public road, protect pedestrians and cars by designating a person for work site traffic duty or by installing fences around the work site.
- The operator must personally check the work area, the roads to be used, and the existence of obstacles before starting operations.
- Always determine the travel roads at the work site and maintain them so that it is always safe for the machines to travel.
- If travel through wet areas is necessary, check the depth and flow of water before crossing the shallow parts. Never drive through water that exceeds the permissible water depth.

Fire prevention

- Remove wood chips, leaves, paper, and other flammable items that have accumulated in the engine compartment. Failure to do so could result in a fire.
- Check the fuel, lubrication, and hydraulic systems for leaks. Repair any leaks. Clean any excess oil, fuel or other flammable fluids, and dispose of them properly.
- Make sure that a fire extinguisher is present and in proper working condition.
- Do not operate the truck near open flames.



A0055020

Ventilation in enclosed areas

If it is necessary to start the engine within an enclosed area, provide adequate ventilation. Inhaling exhaust fumes from the engine can kill.



A0055060

Preparing for operation

- Always mount and dismount while facing the truck. Never attempt to mount or dismount the truck while it is in motion. Always use handrails and ladders when mounting or dismounting the truck.
- Check the deck areas for debris, loose hardware and tools. Check for people and objects that might be in the area.
- Become familiar with and use all protective equipment devices on the truck and ensure that these items (anti-skid material, grab bars, seat belts, etc.) are securely in place.

Mirrors, windows and lights

- Remove any dirt from the surface of the windshield, cab windows, mirrors and lights. Good visibility may prevent an accident.
- Adjust the rear view mirror to a position where the operator can see best from the operator's seat. If any glass or light is broken, replace it with a new part.
- Make sure that the headlights, work lights, and taillights are in proper working order. Make sure that the truck is equipped with the proper work lamps that are needed for the operating conditions.

In operator cab (before starting the engine)

- Do not leave tools or spare parts lying around. Do not allow trash to accumulate in the cab of the truck. Keep all unauthorized reading material out of the truck cab.
- Keep the cab floor, controls, steps and handrails free of oil, grease, snow and excess dirt.
- Read and understand the contents of this manual. Pay special attention to the sections pertaining to safety and operating instructions. Become thoroughly acquainted with all gauges, instruments and controls before attempting operation of the truck.
- Read and understand the **WARNING** and **CAUTION** decals in the operator's cab.
- Make sure that the steering wheel, horn, controls and pedals are free of any oil, grease or mud.
- Check the operation of the windshield wiper, condition of wiper blades, and the washer fluid reservoir level.
- Be familiar with all steering and brake system controls, warning devices, road speeds and loading capabilities before operating the truck.

Seat Belts

- On both driver and passenger seats, check the seat belt fabric, buckle, all belt retractors and hardware for damage or wear. Replace any worn or damaged parts immediately.
- Even if there are no signs of damage, replace both driver and passenger seat belts 5 years after seat belt manufacture, or every 3 years after start of use, whichever comes first. The passenger seat belt date of manufacture label is sewn into the seat belt near the buckle. The driver seat belt date of manufacture label is sewn into the shoulder harness belt, near the retractor end.

Precautions while operating the truck

When starting the engine

- Never attempt to start the engine by shorting across cranking motor terminals. This may cause a fire, or serious injury or death to anyone in truck's path.
- Never start the engine if a warning tag has been attached to the controls.
- When starting the engine, sound the horn as an alert.
- Start and operate the truck only while seated in the operator's seat.
- Do not allow any unauthorized persons in the operator's compartment or any other place on the truck.

General truck operation

- Wear the seat belt at all times.
- Only authorized persons are allowed to ride in the truck. Riders must be in the cab and belted in the passenger seat.
- Do not allow anyone to ride on the decks or steps of the truck.
- Do not allow anyone to get on or off the truck while it is in motion.
- Do not move the truck in or out of a building without a signal person present.
- Know and obey the hand signal communications between operator and spotter. When other machines and personnel are present, the operator should move in and out of buildings, loading areas, and through traffic under the direction of a signal person. Courtesy at all times is a safety precaution.
- Immediately report any adverse conditions at the haul road, pit or dump area that may cause an operating hazard.
- Check for flat tires periodically during a shift. If the truck has been operating on a "flat", do not park the truck inside a building until the tire cools. If the tire must be changed, do not stand in front of the rim and locking ring when inflating a tire mounted on the truck. Observers should not be permitted in the area and should be kept away from the side of such tires.



The tire and rim assembly may explode if subjected to excessive heat. Personnel should move to a remote or protected location if sensing excessively hot brakes, smelling burning rubber or observing evidence of fire near the tire and wheel area.

If the truck must be approached to extinguish a fire, those personnel should do so only while facing the tread area of the tire (front or back) unless protected by using large heavy equipment as a shield. Stay at least 15 m (50 ft) from the tread of the tire.

In the event of fire in the tire and wheel area (including brake fires), stay away from the truck for at least 8 hours or until the tire and wheel are cool.

- Keep serviceable fire fighting equipment on hand. Report empty extinguishers for replacement or refilling.
- Always place the directional control lever in the PARK when the truck is parked and unattended. Do not leave the truck unattended while the engine is running.
- Park the truck a safe distance away from other vehicles as determined by the supervisor.
- Stay alert at all times! In the event of an emergency, be prepared to react quickly and avoid accidents. If an emergency arises, know where to get prompt assistance.

Ensuring good visibility

- When working in dark places, install work lamps and head lamps. Set up extra lighting in the work area if necessary.
- Discontinue operations if visibility is poor, such as in mist, snow, or rain. Wait for the weather to improve to allow the operation to be performed safely.