

SERVICE MANUAL

BX20 SERIES FORKLIFT TRUCKS

Federal Environmental Protection Agency (EPA) Emission-Control Compliant
S/N 580001A~

Gasoline & LPG	FG20/25/30/35S(H)(T/C)(LS/US)-14 FG20/25/30C-14 FG20/25T(US)(LS)-14 FG20/25/30HT(US)(LS)-14
Diesel	FD20/25/30T(US)-14

BX20



WARNING

Read and observe all warnings on this unit before operating it.

DO NOT operate this equipment unless all factory-installed guards and shields are properly secured in place.

KOMATSU®

REVISED: SEPTEMBER 2014

The information and specifications contained herein were accurate at the time of publication, but may change without notice as required for product improvements. Neither Komatsu Forklift U.S.A. nor its parent company nor any of its subsidiaries will be held responsible for damages due to misuse or inappropriate use of its products.

© Copyright 2014, Komatsu Forklift U.S.A., LLC. No part of this document may be photocopied or reproduced in any way without prior written consent of Komatsu Forklift U.S.A.

CONTENTS

CONTENTS	3
FOREWORD	9
ENGINE SERIAL NUMBER LOCATION	10
APPLICABLE BX20 EPA LIFT TRUCK MODELS	11
FEDERAL EPA EMISSION CONTROL STATEMENTS	12
1. SAFETY	
1.1 SAFETY MANAGEMENT	1-2
1.2 SAFE TRAVEL	1-7
1.3 LOADING OPERATIONS	1-15
1.4 SAFETY IN PERIODIC MAINTENANCE	1-20
1.5 TOWING	1-26
1.6 STRUCTURE AND STABILITY OF THE LIFT TRUCK	1-27
1.7 SAFETY LABELS	1-30
1.8 OPTIONAL EQUIPMENT	1-36
2. GENERAL INFORMATION & SPECIFICATIONS	
2.1 SPECIFICATIONS - MAST DATA & FEATURES - INDOOR & OUTDOOR TRUCKS	2-2
2.2 SPECIFICATIONS - MAST DATA & FEATURES)	2-3
2.3 TRUCK DATA - PNEUMATIC TIRE LIFT TRUCKS (OUTDOOR)	2-4
2.4 TRUCK DATA - CUSHION TIRE LIFT TRUCKS (INDOOR)	2-10
2.5 PERIODIC REPLACEMENT OF CONSUMABLE PARTS	2-12
2.6 STANDARD TIGHTENING TORQUE FOR PIPE JOINTS	2-13
2.7 STANDARD TIGHTENING TORQUE FOR BOLTS	2-14
3. SERVICE DATA	
3.1 SERVICE DATA-GASOLINE ENGINE TRUCKS-PNEUMATIC	3-2
3.2 SERVICE DATA-GASOLINE ENGINE LIFT TRUCKS-CUSHION	3-4
3.3 SERVICE DATA – DIESEL ENGINE LIFT TRUCKS	3-6
4. TEST, ADJUST AND MEASURE	
4.1 ADJUST IGNITION TIMING	4-2
4.2 ADJUST INJECTION TIMING MARK (DIESEL ONLY)	4-2
4.3 ADJUST NO-LOAD ROTATING SPEED (DIESEL ONLY)	4-3
4.4 ADJUST SPARK PLUG GAP	4-3
4.5 ADJUST VALVE CLEARANCE	4-4
4.6 ADJUST FAN BELT TENSION	4-6
4.7 MEASURE ENGINE CYLINDER COMPRESSION	4-6
4.8 ADJUST THE PARKING BRAKE LEVER	4-8
4.9 MEASURE HYDRAULIC DRIFT ON LIFT & TILT CYLINDERS	4-9
4.10 ADJUST THE ACCELERATOR PEDAL	4-10
4.11 THROTTLE POSITION SENSOR SYSTEM	4-11
4.12 ACCELERATOR PEDAL POSITION SENSOR	4-12
4.13 ADJUST THE CLUTCH/BRAKE PEDAL (MANUAL TRANSMISSION)	4-14
4.14 CHECK BRAKE FLUID	4-15

CONTENTS

4.15	MEASURE BRAKE STOPPING DISTANCE (BRAKING EFFECT)	4-15
4.16	ADJUST THE STOP LAMP SWITCH	4-15
4.17	ADJUST THE INCHING/BRAKE PEDAL (TORQFLOW TRUCKS)	4-16
4.18	CHECK TORQFLOW CLUTCH ACTUATION PRESSURE	4-18
4.19	CHECK TORQUE CONVERTER STALL SPEED	4-18
4.20	TEST SPECIFIC GRAVITY OF BATTERY ELECTROLYTE	4-19
4.21	CHECK TIRES AND ADJUST PNEUMATIC TIRE PRESSURE	4-20
4.22	MEASURE MINIMUM LEFT AND RIGHT TURNING RADIUS	4-21
4.23	MEASURE HYDRAULIC CONTROL VALVE RELIEF PRESSURE	4-22

5. INSPECTION

5.1	INSPECT ENGINE STARTING OPERATION	5-2
5.2	INSPECT ENGINE RUNNING CONDITION	5-2
5.3	INSPECT AIR CLEANER ASSEMBLY	5-2
5.4	INSPECT FOR LOOSE CYLINDER HEAD MOUNTING BOLTS & RE-TORQUE	5-3
5.5	INSPECT ENGINE MOUNTS	5-3
5.6	INSPECT THE ENGINE LUBRICATING SYSTEM	5-3
5.7	INSPECT ENGINE FUEL SYSTEM	5-4
5.8	INSPECT LPG VAPORIZER FOR TAR BUILDUP	5-4
5.9	INSPECT THE BLOW-BY GAS RECIRCULATION SYSTEM	5-5
5.10	INSPECT COOLING SYSTEM AND RADIATOR	5-6
5.11	INSPECT CHARGING SYSTEM WIRING	5-6
5.12	INSPECT LPG VAPORIZER FOR TAR BUILDUP (EVERY MONTH)	5-6
5.13	INSPECT THE BLOW-BY GAS RECIRCULATION SYSTEM	5-7
5.14	INSPECT COOLING SYSTEM AND RADIATOR	5-8
5.15	INSPECT CHARGING SYSTEM WIRING	5-8
5.16	INSPECT WHEEL TORQUE VALUES	5-8
5.17	INSPECT STEERING	5-8
5.18	INSPECT STEERING WHEEL	5-9
5.19	INSPECT THE POWER STEERING SYSTEM	5-9
5.20	INSPECT BRAKE SYSTEM RODS, CABLES AND LINKS	5-9
5.21	INSPECT BRAKE PIPING AND CONNECTIONS	5-9
5.22	INSPECT BRAKE MASTER AND WHEEL CYLINDERS	5-10
5.23	INSPECT BRAKE SHOES AND ASSOCIATED PARTS	5-10
5.24	INSPECT BRAKE DRUMS	5-10
5.25	INSPECT BRAKE BACKING PLATES	5-11
5.26	INSPECT LOAD FORKS	5-11
5.27	INSPECT MAST	5-12
5.28	INSPECT FORK CARRIAGE	5-12
5.29	INSPECT LIFT CHAINS	5-13
5.30	INSPECT CHAIN WHEELS	5-13
5.31	INSPECT ATTACHMENTS	5-13
5.32	INSPECT HYDRAULIC TANK	5-14
5.33	INSPECT CHASSIS AND ATTACHMENT PIPING	5-14
5.34	INSPECT HYDRAULIC PUMP	5-14
5.35	INSPECT LIFT CYLINDER	5-14
5.36	INSPECT TILT CYLINDERS	5-14
5.37	INSPECT ATTACHMENT CYLINDERS (IF EQUIPPED)	5-14

5.38	INSPECT LIFT TRUCK CHASSIS AND FRAME	5-14
5.39	INSPECT CAB (IF EQUIPPED)	5-14
5.40	INSPECT THE OPERATOR'S SEAT	5-15
5.41	INSPECT EQUIPMENT USED FOR ACCESSING THE LIFT TRUCK	5-19
5.42	INSPECT DISPLAY PANEL	5-19
5.43	INSPECT OVERHEAD GUARD	5-19
5.44	INSPECT LIGHTS, GAUGES AND WARNING DEVICES	5-19
5.45	INSPECT REAR VIEW MIRROR AND REFLECTORS	5-19

6. MAINTENANCE OPERATIONS

6.1	LUBRICANT LIST - K21 AND K25 ENGINES	6-2
6.2	LUBRICANT LIST - 4D94E ENGINE	6-3
6.3	OIL AND GREASING CHART	6-4
6.4	CHANGE ENGINE OIL AND FILTER - GASOLINE/LP ENGINES	6-5
6.5	DIFFERENTIAL CASE	6-6
6.6	TORQFLOW TRANSMISSION CASE	6-7
6.7	CHANGE OIL IN HYDRAULIC TANK	6-7
6.8	REPLACE THE FUEL FILTER	6-8
6.9	CLEAN AND/OR REPLACE AIR CLEANER ELEMENT	6-9

7. REMOVAL, DISASSEMBLY, ASSEMBLY, & INSTALLATION

7.1	OVERALL DISASSEMBLY AND ASSEMBLY DRAWING	7-2
7.2	WEIGHT TABLE - COMPONENT ASSEMBLIES AND PARTS	7-4
7.3	ENGINE	7-5
7.4	TRANSMISSION AND DRIVE AXLE	7-9
7.5	DISASSEMBLE CLUTCH (MANUAL TRANSMISSION TRUCKS)	7-13
7.6	ASSEMBLE CLUTCH (MANUAL TRANSMISSION TRUCKS)	7-16
7.7	INSTALL TORQUE CONVERTER	7-17
7.8	INSTALL TRANSMISSION AND DRIVE AXLE	7-17
7.9	INSTALL PEDAL ASSEMBLY & BRAKE PIPING	7-17
7.10	BRAKE MASTER CYLINDER	7-18
7.11	CLUTCH MASTER CYLINDER - MANUAL SHIFT TRUCKS	7-23
7.12	CLUTCH RELEASE CYLINDER	7-24
7.13	BLEED AIR FROM BRAKE SYSTEM LINES	7-28
7.14	STEERING AXLE	7-29
7.15	STEERING AXLE - LUBRICATION AND ADJUSTMENTS	7-34
7.16	POWER STEERING VALVE (OSPC)	7-38
7.17	POWER STEERING VALVE - TROUBLESHOOTING CHART	7-39
7.18	POWER STEERING CYLINDER	7-60
7.19	WHEEL BRAKE	7-61
7.20	CLUTCH TRANSMISSION	7-66
7.21	DRIVE AXLE	7-75
7.22	DIFFERENTIAL - DIRECT DRIVE TRANSMISSION	7-79
7.23	ADJUST DIRECT DRIVE DIFFERENTIAL	7-81
7.24	DIFFERENTIAL - TORQFLOW TRANSMISSION	7-85
7.25	ADJUST RING GEAR BACKLASH	7-93
7.26	TORQFLOW TRANSMISSION W/ TORQUE CONVERTER	7-97
7.27	DISASSEMBLE TORQFLOW TRANSMISSION	7-106

CONTENTS

7.28	TORQUE CONVERTER DISASSEMBLY / ASSEMBLY	7-108
7.29	TORQFLOW TRANSMISSION DISASSEMBLY / ASSEMBLY	7-109
7.30	TORQFLOW TRANSMISSION - CONTROL VALVE	7-118
7.31	HYDRAULIC CONTROL VALVE	7-127
7.32	HYDRAULIC PUMP	7-129
7.33	TILT CYLINDER	7-133
7.34	REMOVE MAST	7-137
7.35	INSTALL MAST	7-138
7.36	LIFT CYLINDER	7-138
7.37	CYLINDER SEAL SERVICE KITS	7-146
7.38	SIDESHIFTER	7-150

8. MASTS

E-MS SERIES LIMITED FREE LIFT 2-STAGE MAST (R3)	8-1
INTRODUCTION	8-2
INSTALLATION INSTRUCTIONS	8-3
PERIODIC MAINTENANCE	8-7
TROUBLESHOOTING	8-8
SERVICE	8-9
E-MD SERIES FULL FREE LIFT 2-STAGE MAST (R2)	8-29
INTRODUCTION	8-30
INSTALLATION INSTRUCTIONS	8-31
PERIODIC MAINTENANCE	8-44
TROUBLESHOOTING	8-45
SERVICE	8-46
E-MT SERIES FULL FREE LIFT 3-STAGE MAST (R9)	8-71
INTRODUCTION	8-72
INSTALLATION INSTRUCTIONS	8-73
PERIODIC MAINTENANCE	8-89
TROUBLESHOOTING	8-90
SERVICE	8-91
D-MQ SERIES 4-STAGE MAST (R13)	8-117
INTRODUCTION	8-118
INSTALLATION	8-119
PERIODIC MAINTENANCE	8-132
TROUBLESHOOTING	8-134
SERVICE	8-135
D-MS SERIES LIMITED FREE LIFT 2-STAGE MAST (R4)	8-169
INTRODUCTION	8-170
INSTALLATION INSTRUCTIONS	8-171
PERIODIC MAINTENANCE	8-180
TROUBLESHOOTING	8-181
SERVICE	8-182

D-MD SERIES FULL FREE LIFT 2-STAGE MAST (R5)	8-201
INTRODUCTION	8-202
INSTALLATION INSTRUCTIONS	8-203
PERIODIC MAINTENANCE	8-208
TROUBLESHOOTING	8-209
SERVICE	8-210
D-MT SERIES FULL FREE LIFT 3-STAGE MAST (R3)	8-233
INTRODUCTION	8-234
INSTALLATION INSTRUCTIONS	8-236
PERIODIC MAINTENANCE	8-246
TROUBLESHOOTING	8-247
SERVICE	8-248

APPENDIX

BX20 WIRING - GASOLINE - SHEET 1	A-1
BX20 WIRING - GASOLINE - SHEET 2	A-3
BX20 WIRING - GASOLINE - SHEET 3	A-5
BX20 WIRING - GASOLINE - LP - SHEET 1	A-7
BX20 WIRING - GASOLINE - LP - SHEET 2	A-9
BX20 WIRING - GASOLINE - LP - SHEET 3	A-11
BX20 WIRING - GASOLINE - DUAL-FUEL - SHEET 1	A-13
BX20 WIRING - GASOLINE - DUAL-FUEL - SHEET 2	A-15
BX20 WIRING - GASOLINE - DUAL-FUEL - SHEET 3	A-17
BX20 WIRING - GASOLINE - UL-GS - SHEET 1	A-19
BX20 WIRING - GASOLINE - UL-GS - SHEET 2	A-21
BX20 WIRING - GASOLINE - UL-GS - SHEET 3	A-23
BX20 WIRING - LP - UL-LPS - SHEET 1	A-25
BX20 WIRING - LP - UL-LPS - SHEET 2	A-27
BX20 WIRING - LP - UL-LPS - SHEET 3	A-29
BX20 WIRING - 4D94E - DIESEL	A-31
BX20 TORQFLOW TRANSMISSION - HYDRAULIC CIRCUIT DIAGRAM	A-33
ADJUSTING CLUTCH/BRAKE PEDAL - CLUTCH-TYPE TRUCK	A-35
ADJUSTING INCHING/BRAKE PEDAL - TORQFLOW TRUCK	A-37
TROUBLESHOOTING DIAGRAM - SHEET 1	A-39
TROUBLESHOOTING DIAGRAM - SHEET 2	A-41

FOREWORD

This Service Manual has been developed as an information resource to help the reader learn about, understand, repair and maintain the BX20 Series forklift trucks, and the various equipment, systems, inspections, sensors, diagnostic procedures and diagnostic equipment utilized to maintain, adjust and troubleshoot these systems. Although reference is made to maintenance procedures necessary to perform servicing of this vehicle, you should refer to the applicable *Operation and Maintenance Manual* for these lift trucks for more complete maintenance information.

Komatsu is involved in a concentrated and highly technical program of designing and developing cleaner burning, more efficient and more powerful engines for use in the industrial truck market. As a result, new computerized sensors, systems and diagnostic monitors have been created to make the job of maintaining and repairing these systems simple and easy.

Read this manual carefully, refer to it often and learn the repair, testing and adjustment procedures to the best of your ability. Please note that some illustrations are generic and may not look exactly like your unit in every detail.

Ensure that, when you are working on or around industrial trucks, **Safety is priority Number One**. Read, understand and obey all **WARNINGS** and **CAUTIONS**.

Follow the instructions and procedures presented in this manual when working on these lift trucks and their systems. Damage to the equipment, and possible injury to yourself or others, may result if these procedures are not adhered to carefully.

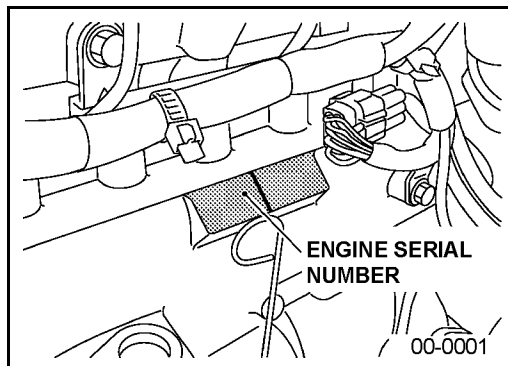
Keep this manual nearby and accessible for use when necessary. If this book becomes dirty, worn or illegible, contact Komatsu for a replacement. The procedures outlined in this manual will be updated periodically. Be sure that you have the latest revision in order to learn the newest information available. Revision dates will be clearly displayed on the lower left hand corner of the cover page.

This will aid in maintaining your equipment in excellent condition and in ensuring that these lift trucks will operate safely at maximum efficiency.

ENGINE SERIAL NUMBER LOCATION

The K21/K25 engine serial number is stamped on an angled and machined pad on the right side of the engine block in the center just beneath the valve cover.

The machined boss is split vertically by a groove. The Engine Model number is on the left pad and the Engine Serial number is on the right pad.



APPLICABLE BX20 EPA LIFT TRUCK MODELS

Model	Description
Gasoline Models	
FG20C-14	4,000 lb. capacity, K21 Engine, Clutch Spec, Pneumatic Tire
FG20T-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, Pneumatic Tire
FG20TUS-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, Gasoline Special, Pneumatic Tire
FG20TLS-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG20ST-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, Cushion Tire
FG20STUS-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, Gasoline Special, Cushion Tire
FG20STLS-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, LP Special, Cushion Tire
FG20HT-14	4,000 lb. capacity, K25 Engine, Torqflow Spec, Pneumatic Tire
FG20HTLS-14	4,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG20SHT-14	4,000 lb. capacity, K25 Engine, Torqflow Spec, Cushion Tire
FG25C-14	5,000 lb. capacity, K21 Engine, Clutch Spec, Pneumatic Tire
FG25T-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, Pneumatic Tire
FG25TUS-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, Gasoline Special, Pneumatic Tire
FG25TLS-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG25ST-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, Pneumatic Tire
FG25STUS-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, Gasoline Special, Cushion Tire
FG25STLS-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, LP Special, Cushion Tire
FG25HT-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, Pneumatic Tire
FG25HTUS-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, Gasoline Special, Pneumatic
FG25HTLS-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG25SHT-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, Cushion Tire
FG25SHTLS-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Cushion Tire
FG30C-14	6,000 lb. capacity, K21 Engine, Clutch Spec, Pneumatic Tire
FG30HT-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, Pneumatic Tire
FG30HTUS-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, Gasoline Special, Pneumatic Tire
FG30HTLS-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG30SHT-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, Cushion Tire
FG30SHTLS-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Cushion Tire
Diesel Models	
FD20T-14	4,000 lb. capacity, 4D94E Engine, Torqflow Trans, Diesel, Pneumatic Tire
FD20TUS-14	4,000 lb. capacity, 4D94E Engine, Torqflow Trans, Diesel Special, Pneumatic Tire
FD25T-14	5,000 lb. capacity, 4D94E Engine, Torqflow Trans, Diesel, Pneumatic Tire
FD25TUS-14	5,000 lb. capacity, 4D94E Engine, Torqflow Trans, Diesel Special, Pneumatic Tire
FD30T-14	6,000 lb. capacity, 4D94E Engine, Torqflow Trans, Diesel, Pneumatic Tire
FD30TUS-14	6,000 lb. capacity, 4D94E Engine, Torqflow Trans, Diesel Special, Pneumatic Tire

FEDERAL EPA EMISSION CONTROL STATEMENTS

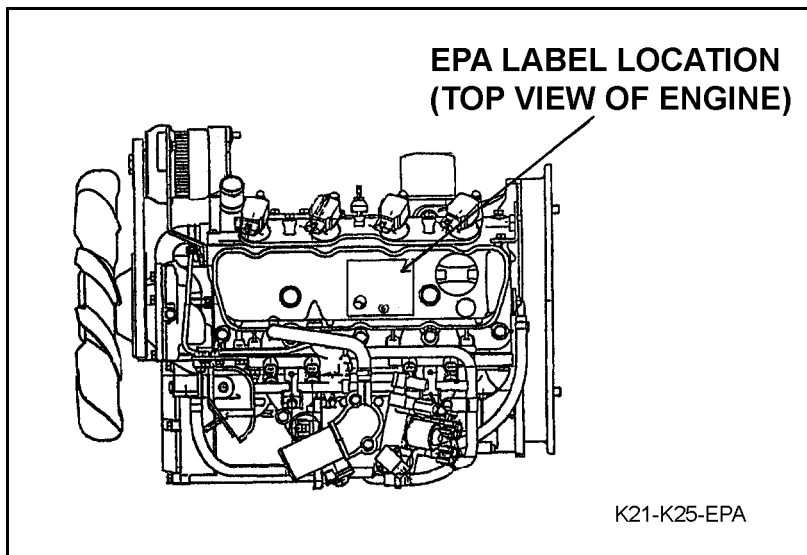
FEDERAL EPA EMISSION CONTROL STATEMENT FOR OFF-ROAD LSI (NON-DIESEL) ENGINES (K21 AND K25 ENGINES)

This section presents information concerning the correct labeling, warranty, parts and maintenance of K21 and K25 engines in order to comply with the EPA off-road, large-spark-ignition (LSI) engine regulations.

1. LABELS REQUIRED AND LABEL LOCATIONS

All "K" series engines will display the required identification label as follows.

Location on K21/K25 Series engines:



Emission compliance label (SAMPLE shown below)

4.375 inch (111.125 mm)		2003 DEC							
EMISSION CONTROL INFORMATION		2004							
ENGINE FAMILY: 4NSXB02.147C ENGINE DISPLACEMENT: 2.1 LITER		JAN							
ENGINE MAXIMUM POWER: 55.7 HP		FEB							
THIS ENGINE IS CERTIFIED TO OPERATE ON LPG		MAR							
ENGINE'S USEFUL LIFE IS 5000 HOURS OF OPERATION OR SEVEN YEARS		APR							
EXHAUST EMISSION CONTROL TYPE: TBI, TWC, HO2S		MAY							
TEST MODE: VARIABLE-SPEED ONLY		JUN							
<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">IDLE SPEED</td> <td>NO OTHER ADJUSTMENTS NEEDED</td> </tr> <tr> <td>VALVE LASH</td> <td>0.38 MM (HOT)</td> </tr> <tr> <td>SPARK PLUG GAP</td> <td>0.9 MM</td> </tr> </table>		IDLE SPEED	NO OTHER ADJUSTMENTS NEEDED	VALVE LASH	0.38 MM (HOT)	SPARK PLUG GAP	0.9 MM	JUL	
IDLE SPEED	NO OTHER ADJUSTMENTS NEEDED								
VALVE LASH	0.38 MM (HOT)								
SPARK PLUG GAP	0.9 MM								
		AUG							
		SEP							
		OCT							
		NOV							
		DEC							
THIS ENGINE MEETS CALIFORNIA AND U.S. EPA REGULATIONS FOR 2004 LARGE NONROAD ENGINES									
NISSAN MOTOR CO., LTD		K21L							

2. WARRANTY

The following statement is hereby provided as required by regulations of the United States Environmental Protection Agency (EPA).

YOUR WARRANTY RIGHTS AND OBLIGATIONS

All off-road large spark-ignition (LSI) engines must be designed, built and equipped to meet the Federal EPA's stringent anti-smog standards.

Komatsu Forklift U.S.A., LLC ("KFI") must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, damage, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor, regulator or fuel-injection system, ignition system, engine computer module (ECM), catalytic converter and air induction system.

Also included may be sensors, hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, an Authorized Komatsu Forklift Dealer will repair your LSI engine at no cost to you, including diagnosis, parts and labor.

MANUFACTURER'S WARRANTY COVERAGE

Beginning January 1, 2004 off-road large spark-ignition EPA engines are warranted for the time periods listed below. If any emission-related part on your engine is defective, the part will be repaired or replaced by an Authorized Komatsu Forklift Dealer.

OWNER'S WARRANTY RESPONSIBILITIES

As the off-road LSI engine owner, you are responsible for the performance of the required maintenance listed in your Operation and Maintenance Manual.

KFI recommends that you retain receipts covering maintenance on your off-road engine, but KFI cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

As the off-road large spark-ignition engine owner, you should be aware, however, that KFI may deny you warranty coverage if your off-road large spark-ignition engine, or a part thereof, has failed due to abuse, damage, neglect, improper maintenance or unapproved modifications.

Your engine is designed to operate on gasoline and/or LPG fuel. Use of any other fuel may result in your engine no longer operating in compliance with the Federal EPA's emissions requirements.

You are responsible for initiating the warranty process. It is suggested that you present your off-road large spark-ignition engine to an Authorized Komatsu Dealer as soon as you become aware that a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact the Komatsu Product Support Dept. at (847) 437-5800.

In addition to the standard warranty periods, the components listed below are covered by the following specific warranty periods.

FEDERAL EPA EMISSION CONTROL STATEMENTS

EMISSION CONTROL WARRANTY – 36 MONTHS OR 2,500 HOURS FOR GENERAL PARTS

For the first 2,500 operating hours, or for a period of thirty-six months from the date of the first use by the original purchaser from an Authorized Komatsu Forklift Dealer, whichever occurs first, KFI warrants the following emission-related parts:

- Oxygen sensor
- Water temperature sensor
- LPG injector
- LPG solenoid
- Mass air flow sensor
- Ignition coil
- Camshaft position sensor
- Spark plugs
- PCV valve
- Gasoline injector
- LPG pressure sensor
- LPG switching module
- Throttle chamber
- Crankshaft position sensor
- Distributor

EMISSION CONTROL WARRANTY – 36 MONTHS OR 4,000 HOURS FOR POWER TRAIN PARTS

- Intake manifold
- Exhaust manifold

EMISSION CONTROL WARRANTY – 60 MONTHS OR 3,500 HOURS FOR GENERAL PARTS

- ECM
- Catalytic converter
- Vaporizer

NOTICE

Follow the instructions in the Operations Manual concerning any other maintenance programs not required for EPA compliance.

For questions and additional information concerning EPA Diesel Engine Exhaust Regulations, contact:

Komatsu Forklift U.S.A., LLC
c/o Komatsu American Corp.
One Continental Towers
1701 W. Golf Rd.
Rolling Meadows, IL 60008
(847) 437-5800

FEDERAL EPA EMISSION CONTROL STATEMENT FOR OFF-ROAD DIESEL ENGINES (4D94E ENGINES)

Exhaust emissions produced by diesel engines are regulated by the United States Environmental Protection Agency (EPA). This section presents information concerning the correct labeling,

FEDERAL EPA EMISSION CONTROL STATEMENTS

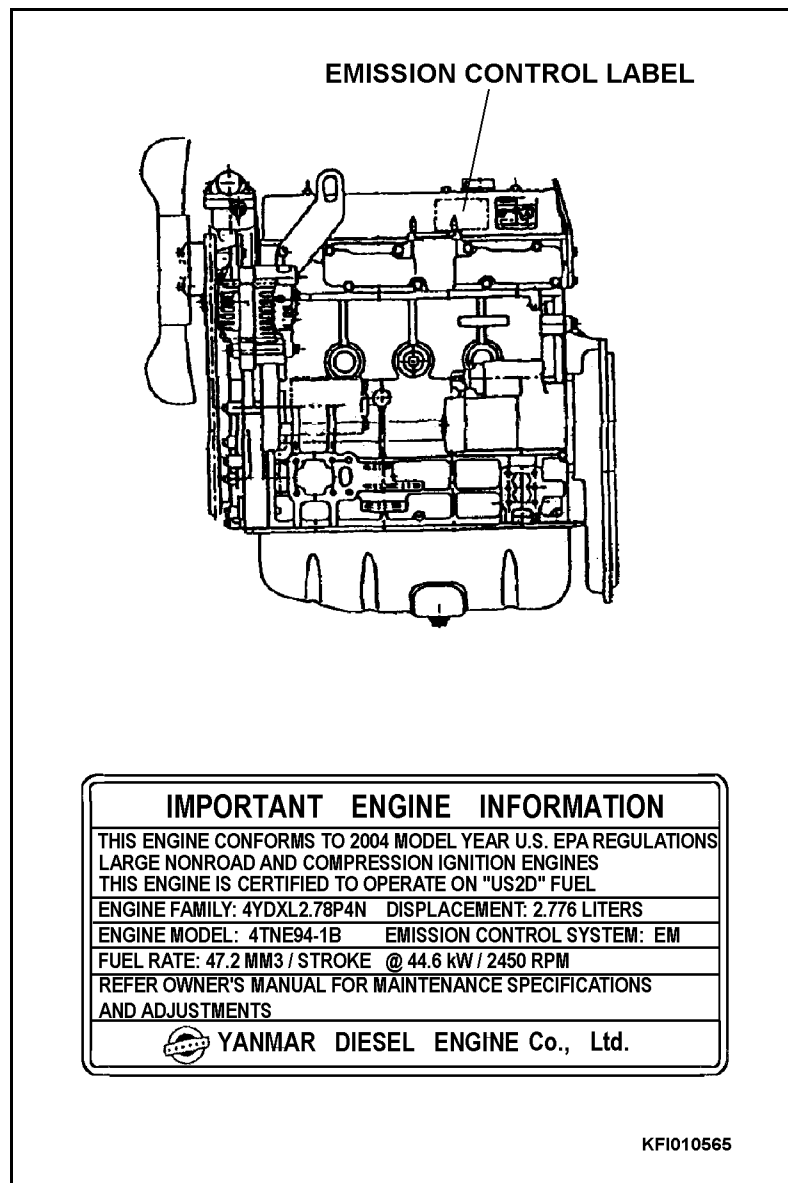
warranty, parts and maintenance of 4D94E diesel engines in order to comply with current EPA regulations.

LABELS REQUIRED AND LABEL LOCATIONS

All certified 4D94E diesel engines will display the required identification label as follows:

- 4D94E diesel engines: Labels will be affixed to all appropriate engines on KFI production trucks.

Location on 4D94E Series diesel engines:



WARRANTY

The following statement is hereby provided as required by regulations of the United States Environmental Protection Agency (EPA).

YOUR WARRANTY RIGHTS AND OBLIGATIONS

FEDERAL EPA EMISSION CONTROL STATEMENTS

The Federal EPA and Komatsu Forklift U.S.A., LLC (hereinafter referred to as "KFI") are pleased to explain the emission control system warranty on your 2004 or later Diesel heavy duty off-road engine. All new, heavy-duty off-road engines must be designed, built and equipped to meet the EPA's stringent anti-smog standards. KFI must warrant the emission control system on your engine for the period of time listed below, provided there has been no abuse, damage, neglect or improper maintenance of your engine.

Your emission control system may include parts such as fuel injection pump. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, an authorized Komatsu dealer will repair the heavy-duty off-road engine at no cost to the owner, including diagnosis, parts and labor.

Now, KFI hereby certifies that diesel engines for lift trucks produced in 2004 model year and after shall be regulated by Federal EPA exhaust gaseous regulations. The difference between current and EPA-certified engines is only the label attached on the engine. See available drawing and/or illustration of emission label and its location.

MANUFACTURER'S WARRANTY COVERAGE

Beginning January 1, 2004 heavy-duty off-road EPA engines are warranted for a period of five (5) years, or three-thousand (3,000) hours of operation, whichever occurs first. If any emission-related part on your engine is defective, the part will be repaired or replaced by at an authorized Komatsu Forklift dealer.

EMISSION-RELATED PARTS

- Fuel injection pump
- Fuel injection nozzles
- Turbocharger

OWNER'S WARRANTY RESPONSIBILITIES

As the heavy-duty off-road engine owner, you are responsible for the performance of the required maintenance listed in owner's manual (Instruction Manual). KFI recommends that you retain all receipts and records covering the maintenance on your engine, but KFI cannot deny warranty solely for the lack of receipts and records or for your failure to ensure the performance of all scheduled maintenance. For your reference, the following is an emission control maintenance schedule for certified Diesel engines.

- Check oil level and coolant level – Everyday
- Change of lubricating – Every 200 hours
- Change lubricating oil filter – Every 200 hours
- Initial adjustment of valve clearance – Every 200 hours
- Change fuel filter – Every 500 hours
- Check turbocharger, rebuild or replace if necessary – Every 2,000 hours
- Adjust valve clearance – Every 2,000 hours
- Check fuel injection nozzles, replace if necessary – Every 2,000 hours

Keep records to show proof of compliance with the required maintenance practices and intervals.

- As the heavy-duty off-road engine owner you should, however, be aware that KFI may deny your warranty coverage if your heavy-duty off-road engine or part has failed due to abuse, damage, neglect, improper maintenance or disapproved modifications.
- Your engine is designed to operate on commercial diesel fuel only. Use of any other fuel in our engine will result in the engine operating in non-compliance with the Federal EPA regulations.

You are responsible for initiating the warranty process. It is suggested that you present your heavy duty off-road engine to an authorized Komatsu dealer as soon as you become aware that problem exists. The warranty repair should be completed by the dealer as expeditiously as possible.

- If you have any questions regarding your warranty rights and responsibilities, you should contact the authorized KFI dealer.

LIMITATIONS

KFI is not responsible for resultant damages to an emission-related part or component resulting from:

- Any application or installation KFI deems improper as explained in the Instruction Manual.
- Attachments, accessory items or parts not authorized for use by KFI.
- Improper off-road engine maintenance, repair or abuse.
- Owner's unreasonable delay in making the product available after being notified of a potential product problem.

This warranty is in addition to the KFI standard warranty applicable to the off-road engine product involved.

Remedies under this warranty are limited to the provision of material and services as specified

FEDERAL EPA EMISSION CONTROL STATEMENTS

herein. KFI is not responsible for incidental or consequential damages, such as downtime or lost use of the forklift truck.

CUSTOMER ASSISTANCE – EMISSION CONTROL SYSTEMS WARRANTY

Komatsu Forklift aims to ensure that the Emission Control Systems Warranty is properly administered. In the event that you do not receive the warranty service to which you believe you are entitled under the Emission Control Systems Warranty, call or write to your Komatsu Forklift Dealer.

Authorized dealers are recommended for major maintenance and repair work, as they are staffed with trained personnel, proper tools and are aware of the latest maintenance methods and procedures. Owners and others who desire to perform their own work should purchase a service manual and obtain current service information from their KFI engine dealer.

NOTICE

Follow the instructions in the Operations Manual concerning any other maintenance programs not required for EPA compliance.

For questions and additional information concerning EPA Diesel Engine Exhaust Regulations, contact:

Komatsu Forklift U.S.A., LLC
c/o Komatsu American Corp.
One Continental Towers
1701 W. Golf Rd.
Rolling Meadows, IL 60008
(847) 437-5800