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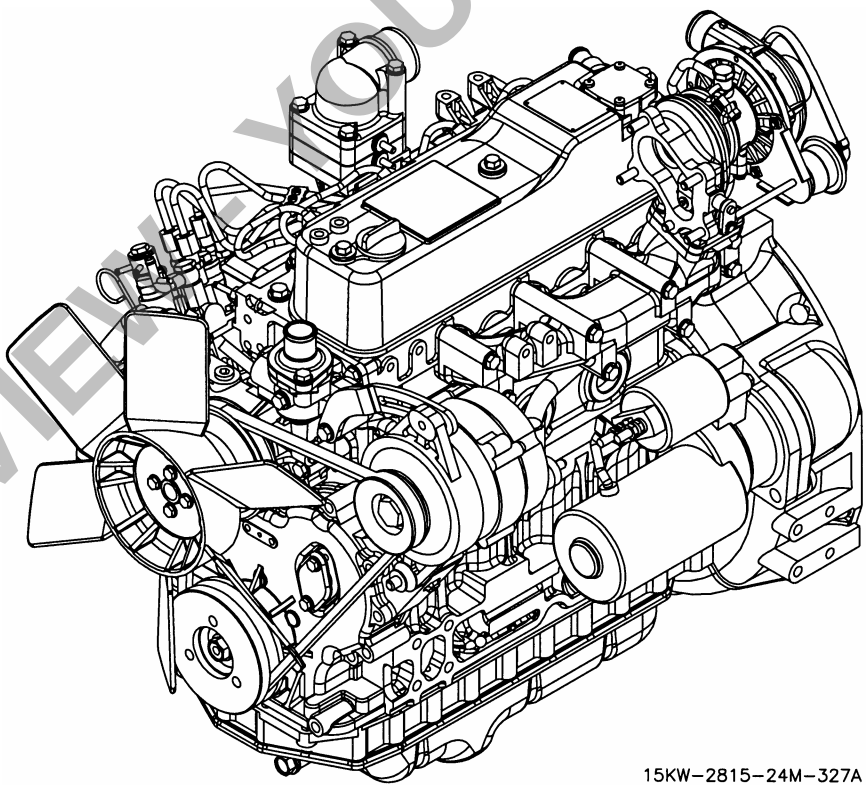
TECHNICAL MANUAL

FIELD AND SUSTAINMENT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

FOR

YANMAR
DIESEL ENGINE
4TNV84T-DFM
4 CYLINDER 2.0 LITER

NSN 2815-01-538-4257 (EIC: N/A)



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***This manual supersedes TM 9-2815-538-24&P dated 15 June 2008.**
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DEPARTMENTS OF THE ARMY AND THE AIR FORCE

15 February 2009

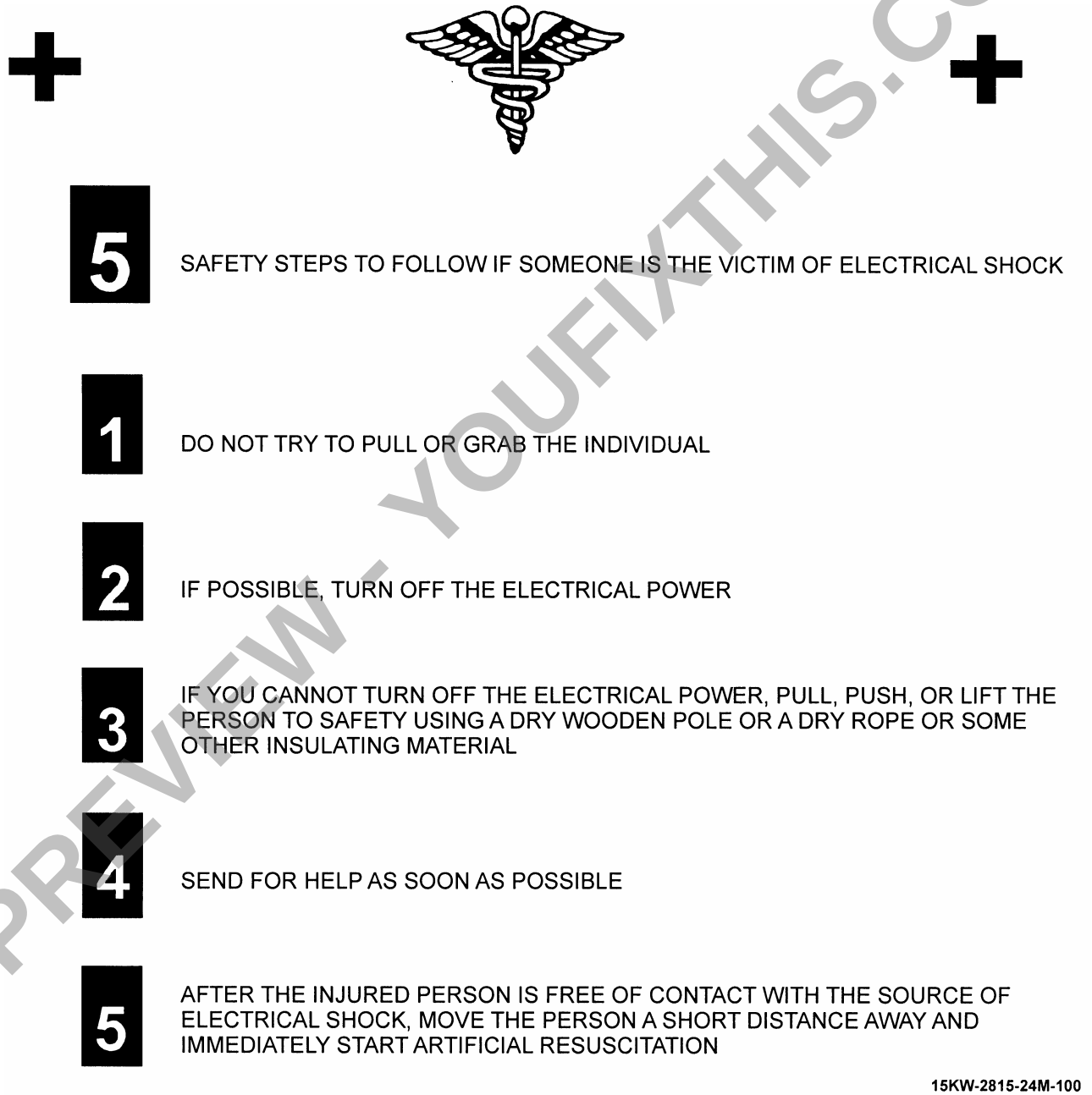
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WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions may result in serious injury or death to personnel. Also included are explanations of safety and hazardous material icons.

FIRST AID

For first aid, refer to FM 4-25.11.



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WP Sequence No.

WARNING SUMMARY

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EQUIPMENT DATA

Table 1 lists equipment data for the diesel engine.

Table 1. Diesel Engine Equipment Data

EQUIPMENT	DATA
Overall length	27.53 in. (69.9 cm)
Width	20.18 in. (51.3 cm)
Height	26.52 in. (67.4 cm)
Weight (dry)	419 lb (190 kg)
Manufacturer	Yanmar
Model	4TNV84T
Part number	4TNV84T-DFM
Type	Four cylinder, in-line, four cycle, turbocharged diesel
Bore	3.307 in. (84 mm)
Stroke	3.543 in. (90 mm)
Displacement	121.7 in^3 (1.995L)
Compression ratio	20:1
Valves per cylinder	4 (2 inlet; 2 exhaust)
Valve lash setting (cold engine)	
Inlet	0.0059 to 0.098 in. (0.15 to 0.25 mm)
Exhaust	0.0059 to 0.098 in. (0.15 to 0.25 mm)
Cooling system	
Type	Designed for pressurized radiator and coolant pump
Normal operating temperature	170°F to 200°F (77°C to 93°C)
Thermostat opening	157°F to 162.5°F (69.5°C to 72.5°C)
Thermostat full open	185°F (85°C)
Lubrication system	
Type	Forced lubrication
Pump type	Trochoid, engine gear driven
Capacity	6 qt (5.7L)
Normal operating pressure	43 to 56 psi (294 to 391 kPa)
Fuel system	
Fuel type	DF-1, DF-2, DF-A, JP-4, JP5, JP8
Fuel consumption rate	1.5 gph (5.7 lph)
Rated loads	33 bhp at 1,500 rpm 40 bhp at 1,800 rpm 44 bhp at 2,000 rpm
Torque available	116 lb-ft (157.3 Nm) at 1,800 rpm

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FIELD LEVEL
DIESEL ENGINE, 4TNV84T-DFM
NSN 2815-01-538-4257
TROUBLESHOOTING INDEX

TROUBLESHOOTING INDEX

Malfunction/Symptom	Work Package and Page No.
1. Engine does not start (slow starter motor assembly rotation or no starter motor assembly rotation)	0005 00-1
2. Engine does not start (engine turns over at normal speed)	0005 00-2
3. Engine starts, but soon stops, with little or no exhaust smoke	0005 00-4
4. Engine starts, but soon stops, with excessive exhaust smoke	0005 00-5
5. Insufficient engine output with normal exhaust color	0005 00-6
6. Insufficient engine output with white exhaust smoke	0005 00-7
7. Insufficient engine output with black exhaust smoke	0005 00-9
8. Excessive white smoke while under load	0005 00-10
9. Excessive black smoke while under load	0005 00-12
10. High knocking sound during combustion	0005 00-14
11. Abnormal combustion sound	0005 00-14
12. Uneven combustion sound	0005 00-15
13. Uneven engine speed (hunting) while idling	0005 00-16
14. Uneven engine speed (hunting) while under load	0005 00-16
15. Excessive engine vibration	0005 00-17
16. Excessive turbocharger assembly vibration or noise	0005 00-18
17. Slow turbocharger assembly response	0005 00-18
18. Difficulty with engine when returning from high speed to low speed	0005 00-18
19. Excessive fuel consumption	0005 00-19
20. Excessive oil consumption	0005 00-19
21. Fuel in engine oil	0005 00-20
22. Oil mixed with coolant	0005 00-20
23. Low oil pressure	0005 00-21
24. Excessive blow-by gas	0005 00-21
25. Engine overheats	0005 00-22
26. Low coolant temperature	0005 00-24
27. Air intake pressure drops	0005 00-24
28. Air intake pressure rises	0005 00-25
29. Exhaust temperature rises	0005 00-25

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FIELD LEVEL
DIESEL ENGINE, 4TNV84T-DFM
NSN 2815-01-538-4257
TROUBLESHOOTING PROCEDURES

INITIAL SETUP:

Tools and Special Tools
Tool kit, general mechanic's (item 5, WP 0035 00)
Shop equipment, automotive, common no. 1 (item 2, WP 0035 00)
Shop equipment, automotive, supplemental set no. 2 (item 1, WP 0035 00)

Personnel Required
One

References
WP 0010 00
WP 0012 00 and WP 0013 00
WP 0016 00 and WP 0017 00
WP 0019 00 and WP 0020 00
WP 0022 00
WP 0024 00 and WP 0025 00
WP 0027 00 and WP 0028 00
End item configuration manual

INTRODUCTION

This work package contains troubleshooting information with a list of symptoms, malfunctions, tests/ inspections, and corrective actions required to return the diesel engine to normal operation. The tests/ inspections and corrective actions should be performed in the order listed. If the first corrective action step is normal, proceed to the next step. The corrective actions will refer to a work package in this manual or the end item configuration manual. Troubleshooting procedures in this manual cannot list all possible malfunctions or tests/inspections required for corrective action. If a symptom/malfunction is not listed or is not corrected by the listed corrective action, refer to the end item configuration manual troubleshooting procedures.

TROUBLESHOOTING PROCEDURES

SYMPTOM
Engine does not start (slow starter motor assembly rotation or no starter motor assembly rotation).

MALFUNCTION
Battery charging alternator (24 Vdc) malfunction.

CORRECTIVE ACTION
1. Gain access to batteries (end item configuration manual).
2. Start engine (end item configuration manual). Set engine speed to at least 1,000 rpm.
3. Measure Direct Current (DC) voltage across batteries. Voltage should be 26.4 to 31.0 Vdc.
4. If voltage is above or below limit, replace battery charging alternator (24 Vdc) (WP 0010 00).

MALFUNCTION
Battery voltage drop.

CORRECTIVE ACTION
1. Inspect connections (end item configuration manual).
2. Charge battery (end item configuration manual).
3. Replace battery (end item configuration manual).

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FIELD LEVEL
DIESEL ENGINE, 4TNV84T-DFM
NSN 2815-01-538-4257
PMCS, INCLUDING LUBRICATION INSTRUCTIONS

INITIAL SETUP:

Tools and Special Tools
Tool kit, general mechanics
(item 5, WP 0035 00)

References
WP 0006 00 thru WP 0032 00
End item configuration manual

Personnel Required
One

PMCS

Table 1. Preventive Maintenance Checks and Services.

ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	First 50 hours	0.5	Fan V-belts	1. Check fan V-belts for wear or cracks (WP 0011 00).	Fan V-belts worn or cracked.
				2. Check fan V-belt tension and adjust tension if required (WP 0010 00).	Fan V-belts out of adjustment.
2	First 50 hours	0.3	Engine oil and filter	1. Drain lubricating oil. Fill with correct oil (end item configuration manual).	Lubricating oil not changed.
				2. Replace oil filter when lubricating oil is changed (end item configuration manual).	Oil filter not changed.
3	300 hours	0.3	Engine oil and filter	1. Drain lubrication oil. Fill with correct oil (end item configuration manual).	Lubricating oil not changed.
				2. Replace oil filter when lubrication oil is changed (end item configuration manual).	Oil filter not changed.
4	300 hours	0.7	Engine	Check engine, to include hoses, manifolds, etc., for damage, corrosion, missing parts, and secure mounting (WP 0006 00 thru WP 0032 00).	Engine/parts damaged, corroded, or missing/loose.
5	300 hours	0.3	Starter cables	1. Check starter cable connections for damage, rusted/corrosion, missing parts, and secure mounting (end item configuration manual).	Cables/parts damaged, rusted/ corroded, or missing/loose.

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TORQUE TABLES - Continued

Table 1. Standard Dry Torque Limits.

SIZE			SAE GRADE NO. 2		SAE GRADE NO. 5		SAE GRADE NO. 6 OR 7		SAE GRADE NO. 8	
DIA IN.	THREADS PER IN.	DIA MM	LB-FT	NM	LB-FT	NM	LB-FT	NM	LB-FT	NM
1/4	20	6.35	5	7	8	11	10	14	12	16
1/4	28	6.35	6	9	10	14	12	16	14	19
5/16	18	7.94	11	15	17	23	21	28	25	34
5/16	24	7.94	12	16	19	26	24	33	25	34
3/8	16	9.53	20	27	30	41	40	54	45	61
3/8	24	9.53	23	31	35	47	45	61	50	68
7/16	14	11.11	30	41	50	68	60	81	70	95
7/16	20		35	47	55	75	70	95	90	108
1/2	13	12.70	50	68	75	102	95	129	110	149
1/2	20		55	75	90	122	100	135	120	163
9/16	12	14.29	65	85	110	149	135	183	150	203
9/16	18		75	102	120	163	150	203	170	231
5/8	11	15.88	90	122	150	203	190	258	220	298
5/8	18		100	136	180	244	210	285	240	325
3/4	10	19.05	160	217	260	353	240	434	380	515
3/4	16		180	244	300	407	360	488	420	597
7/8	9	22.23	140	190	400	542	520	705	600	814
7/8	14		155	210	440	597	580	786	660	895
1	8	25.40	220	298	580	786	800	1085	900	1220
1	12		240	325	640	868	860	1166	1000	1350
1-1/8	7	25.58	300	407	800	1085	1120	1519	1280	1736
1-1/8	12		340	461	880	1193	1260	1709	1440	1953
1-1/4	7	31.75	420	570	1120	1519	1580	2142	1820	2468
1-1/4	12		460	624	1240	1681	1760	2387	2000	2712
1-3/8	6	34.93	560	759	1460	1980	2080	2820	2380	3227
1-3/8	12		640	868	1680	2278	2360	3227	2720	3688
1-1/2	6	38.10	740	1003	1940	2631	2780	3770	3160	4285
1-1/2	12		840	1139	2200	2983	3100	4204	3560	4827

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FIELD AND SUSTAINMENT LEVEL
DIESEL ENGINE, 4TNV84T-DFM
NSN 2815-01-538-4257
CYLINDER BLOCK ASSEMBLY
REPAIR PARTS LIST

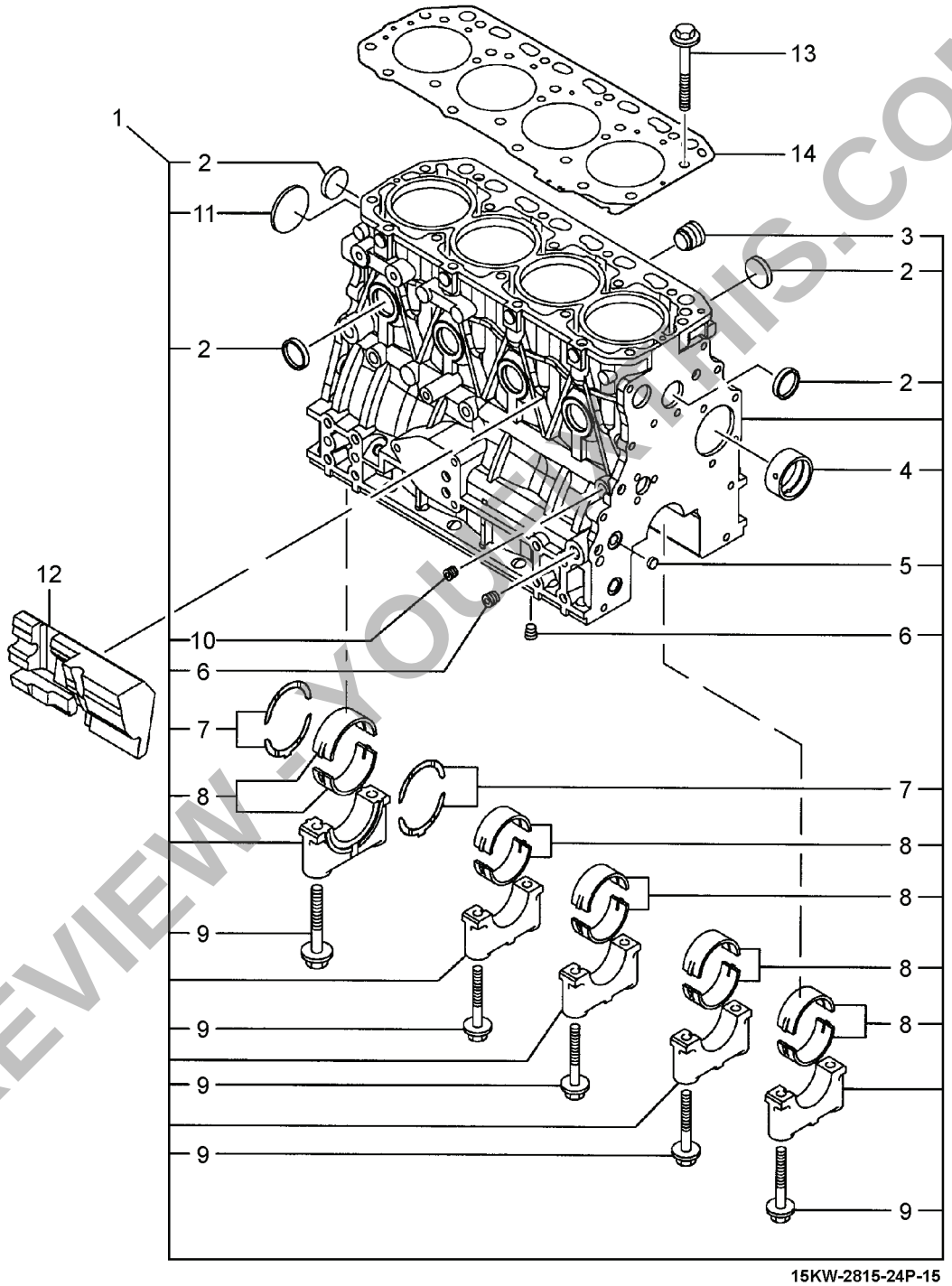


Figure 2. Cylinder Block Assembly.

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(1) ITEM NO.	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 01 ENGINE BLOCK ASSEMBLY	
					FIG. 2. CYLINDER BLOCK ASSEMBLY	
1	XBHHH		0AK42	729508-01560	BLOCK ASSEMBLY, CYLINDER	1
2	XBHZZ		0AK42	27241-300000	PLUG	8
3	XBHZZ		0AK42	171051-01921	PLUG	1
4	PAHZZ	3120-99-549-3927	0AK42	129795-02411	BUSHING, CAMSHAFT	1
5	XBHZZ		0AK42	27241-120000	PLUG	2
6	XBHZZ		0AK42	124160-01910	PLUG	3
7	PAHZZ	3120-01-454-6117	0AK42	129150-02930	BEARING, HALF SET, SLEEVE	2
7	PAHZZ	3120-01-546-8931	0AK42	129150-02940	BEARING, HALF SET, SLEEVE	2
8	PAHZZ	3120-01-547-0495	0AK42	129001-02930	BEARING, HALF SET, SLEEVE	5
8	PAHZZ	3120-01-546-8480	0AK42	129150-02870	BEARING, HALF SET, SLEEVE	5
9	PAHZZ	5306-01-546-4269	0AK42	129150-02020	BOLT, MACHINE	10
10	XBHZZ		0AK42	124060-01050	PLUG	1
11	XBHZZ		0AK42	129001-01250	PLUG	1
12	PAFZZ		0AK42	129004-01190	SPACER, SPECIAL SHAPED	1
13	PAFZZ	5306-01-547-0465	0AK42	129150-01200	BOLT, MACHINE	18
14	PAFZZ	5330-01-546-7537	0AK42	129508-01330	GASKET, CYLINDER HEAD	1
					END OF FIGURE	

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WARNING SUMMARY - Continued

SAFETY AND HAZARDOUS MATERIAL

This manual describes physical and chemical processes that may require the use of chemicals, solvents, paints, or other commercially available material. Users of the manual should obtain the material safety data sheets (Occupational Safety and Health Act (OSHA) Form 20 or equivalent) from the manufacturers or suppliers of materials to be used. Users must be completely familiar with manufacturer/supplier information and adhere to their procedures, recommendations, warnings, and cautions for safe use, handling, storage, and disposal of these materials.

EXPLANATION OF SAFETY WARNING ICONS



ELECTRICAL - electrical wire to hand with electricity symbol running through hand shows that shock hazard exists.



HOT AREA - hand over object radiating heat shows that part or area is hot and can burn.



HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique or failure to share lifting task with other persons.



HEAVY PARTS - hand with heavy object on top shows that heavy parts can crush and harm if dropped.



HEAVY PARTS - foot with heavy object on top shows that heavy parts can crush and harm if dropped



MOVING PARTS - hand with figures caught between gears shows that the moving parts of the equipment present a danger to life or limb.



SHARP OBJECT - pointed object in hand shows that a sharp object presents a danger to limb.

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REMOVAL

1. Remove four bolts (figure 1, item 1) and fuel injector valve retainers (figure 1, item 2) from cylinder head assembly (figure 1, item 3).

2. Remove four fuel injectors (figure 1, item 4), nozzle seats (figure 1, item 5), and nozzle protectors (figure 1, item 6) from cylinder head assembly (figure 1, item 3).

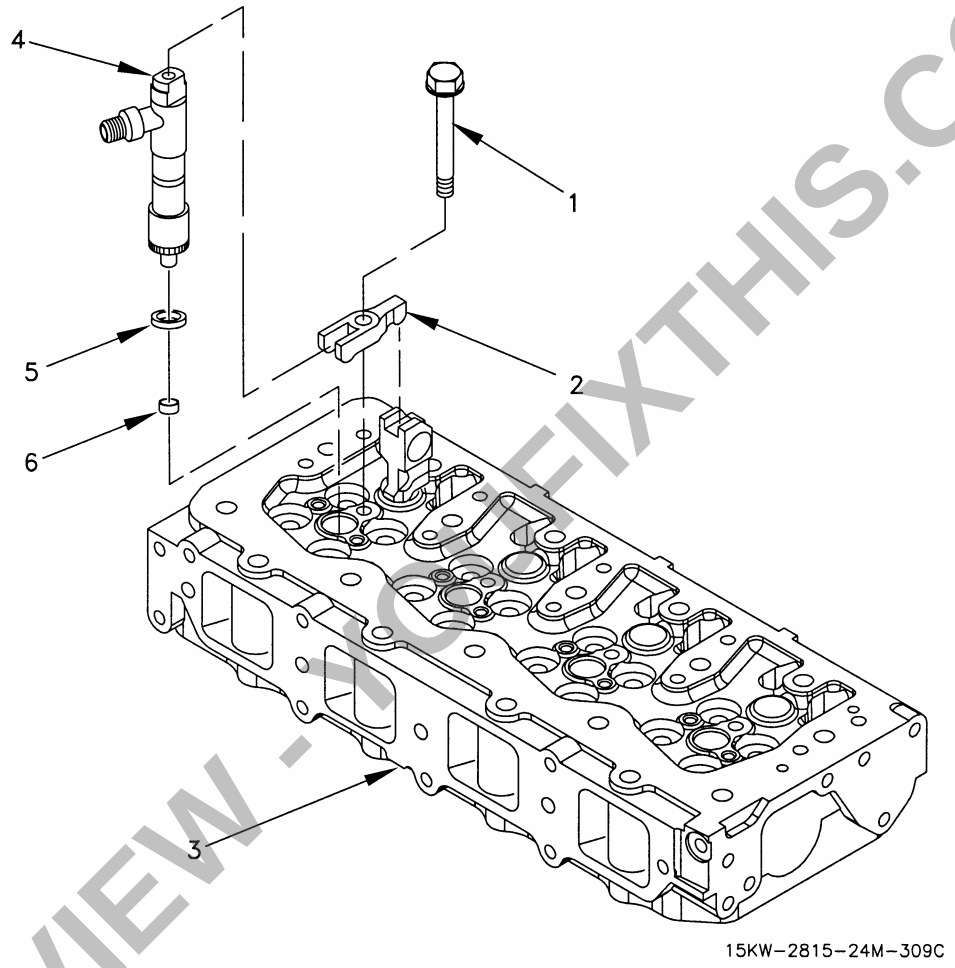


Figure 1. Fuel Injectors.

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