ZEXEL Ass'y No.	104780-7265
Bosch Ass'y No.	9 460 613 922
Bosch Typecode	
Engine Type	4B
Manufacturer	TOYOTA
Edition date	14.03.02 (2)

1 Adjustment conditions

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
	Test oil		ISO4113orSAEJ967 d				
		1404 Test oil					
P	Test oil temperature	degC	45	45	50		
	Nozzle		105780-0060				
	Bosch type code		NP-DN0SD1510				
	Nozzle holder		105780-2150				
P	Opening pressure	MPa	13	13	13.3		
P	Opening pressure	kgf/cm2	133	133	136		
	Injection pipe		157805-7320				
P	Injection pipe	mm	2-6-450				
		Inside diameter - outside diameter - length (mm)					
	Joint assembly		157641-4720				
	Tube assembly		157641-4020				
P	Transfer pump pressure	kPa	20	20	20		
P	Transfer pump pressure	kgf/cm2	0.2	0.2	0.2		
	Direction of rotation (viewed from drive side)		R				
		Right					
	Checker parts number		407980-2270				
	ECU part number		407913-1342				
P	ECU power supply D.C.	V	12	12	12		
P	TCV drive power supply	V	20	20	20		
P	TCV drive power supply D.C.	Hz	60	60	60		
	Wire harness		407980-2300				
	Intermediate harness		407980-2420				

2 Adjustment specification

2.1 Full load delivery

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
S	Average injection quantity	mm3/st.	64	63.5	64.5		
S	Difference in delivery	mm3/st.	3		3		
P	Basic		*				
	Remarks						
		Full					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		

S = Setting value, C = Check value)
OT = Outside Tolerance (X is set)

P	Boost pressure	kPa	26.7	25.4	28		
P	Boost pressure	mmHg	200	190	210		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
S	Average injection quantity	mm3/st.	59	58.5	59.5		
S	Difference in delivery	mm3/st.	3		3		
P	Basic		*				
	Remarks						
		CBS					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
S	Average injection quantity	mm3/st.	55	54.5	55.5		
S	Difference in delivery	mm3/st.	3		3		
P	Basic		*				
	Remarks						
		NA					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2050	2050	2050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	24.1	19.6	28.6		
C	Difference in delivery	mm3/st.	6		6		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1900	1900	1900		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	52.9	48.9	56.9		
C	Difference in delivery	mm3/st.	6		6		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1750	1750	1750		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	63.4	60.9	65.9		
C	Difference in delivery	mm3/st.	3		3		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1400	1400	1400		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	64.4	62.9	65.9		
C	Difference in delivery	mm3/st.	3		3		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1400	1400	1400		

P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	54.2	51.7	56.7		
C	Difference in delivery	mm3/st.	3		3		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	64	63	65		
C	Difference in delivery	mm3/st.	3		3		
	Remarks						
		Full					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	34.7	33.4	36		
P	Boost pressure	mmHg	260	250	270		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	61.6	60.1	63.1		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	26.7	25.4	28		
P	Boost pressure	mmHg	200	190	210		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	59	58	60		
C	Difference in delivery	mm3/st.	3		3		
	Remarks						
		CBS					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	55	54	56		
C	Difference in delivery	mm3/st.	3		3		
	Remarks						
		NA					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	700	700	700		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	61.4	58.9	63.9		
C	Difference in delivery	mm3/st.	3		3		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	500	500	500		
P	Boost pressure	kPa	73.3	72	74.6		

P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	56.2	53.7	58.7		
C	Difference in delivery	mm3/st.	3		3		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	500	500	500		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	46.6	44.1	49.1		
C	Difference in delivery	mm3/st.	3		3		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	100	100	100		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
C	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	75	70	80		
C	Difference in delivery	mm3/st.	7		7		

2.2 Governing

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1900	1900	1900		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
S	Average injection quantity	mm3/st.	52.9	50.9	54.9		
S	Difference in delivery	mm3/st.	6		6		
P	Basic		*				

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2300	2300	2300		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	5		5		

2.3 Idle

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	350	350	350		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
S	Average injection quantity	mm3/st.	13.6	11.6	15.6		
S	Difference in delivery	mm3/st.	2		2		
P	Basic		*				

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	700	700	700		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	3		3		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	350	350	350		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	13.6	11.1	16.1		
C	Difference in delivery	mm3/st.	2		2		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	260	260	260		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	50		50		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	200	200	200		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	70	70			

2.4 Start

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	100	100	100		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
S	Average injection quantity	mm3/st.	75	70	80		
S	Difference in delivery	mm3/st.	7		7		
P	Basic		*				
	Remarks						
		Full					

2.5 Stop

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	375	375	375		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	mmHg	0	0	0		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Average injection quantity	mm3/st.	0	0	0		
	Remarks						
		Magnet OFF					

2.6 Overflow

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Overflow quantity	cm3/min	669	540	798		

2.7 Pump chamber pressure

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT

P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	54	54	54		
S	Pressure	kPa	628	608	648		
S	Pressure	kgf/cm2	6.4	6.2	6.6		
P	Basic		*				

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	500	500	500		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Pressure	kPa	549	520	578		
C	Pressure	kgf/cm2	5.6	5.3	5.9		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	54	54	54		
C	Pressure	kPa	628	589	667		
C	Pressure	kgf/cm2	6.4	6	6.8		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1750	1750	1750		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Pressure	kPa	745	716	774		
C	Pressure	kgf/cm2	7.6	7.3	7.9		

2.8 Timer

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	54	54	54		
S	Timer stroke	mm	2.7	2.5	2.9		
P	Basic		*				

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	100	100	100		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Timer stroke	mm	3.4	1.9	4.9		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	54	54	54		
C	Timer stroke	mm	2.7	2.3	3.1		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1750	1750	1750		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	54	54	54		
C	Timer stroke	mm	3.4	2.9	3.9		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1750	1750	1750		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	72	72	72		
C	Timer stroke	mm	7.5	7	8		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2000	2000	2000		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	100	100	100		
C	Timer stroke	mm	9.85	9.5	10.2		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2000	2000	2000		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	0	0	0		
C	Timer stroke	mm	0	0	0		

2.9 TPS output

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	0	0	0		
S	TPS output voltage	V	0.51	0.382	0.638		
P	Basic		*				

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	0	0	0		
C	TPS output voltage	V	0.51	0.382	0.638		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1050	1050	1050		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		
P	TCV duty (%) F TCV 60Hz	%	54	54	54		
C	TPS output voltage	V	1.005	0.824	1.186		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1750	1750	1750		
P	Boost pressure	kPa	73.3	72	74.6		
P	Boost pressure	mmHg	550	540	560		

P	TCV duty (%) F TCV 60Hz	%	72	72	72		
C	TPS output voltage	V	1.885	1.611	2.159		

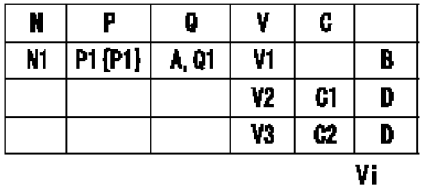
2.10 Magnet

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
C	Max. applied voltage	V	16	16	16		
P	Test voltage	V	25	24	26		

2.11 Additional device adjustment

2.11.1 Additional device 1

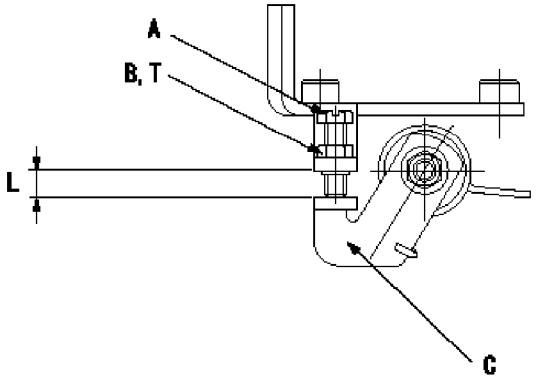
Name	POTENTIOMETER ADJUSTMENT

N1=1050(r/min) P1=73.3(kPa) P2=550(mmHg) Q1=43.9+-0.5(mm3/st) V1=4.67+-0.03(V) V2=8.58+-0.93(V) V3=1.42+-0.93(V) Vi=10(V)	
N1=1050(r/min) Q1=43.9+-0.5(mm3/st) V1=4.67+-0.03(V)	N = pump speed P = boost pressure Q = injection quantity V = potentiometer C = control lever position B = adjusting point D = check point C1 = idle C2 = full speed A = TCV duty 100% Vi = applied voltage input Adjusting method (dummy bolt method): because the potentiometer is a reverse operation type, u se caution at adjustment. 1. At pump speed N = N1 and injection quantity Q = Q1, hold the dummy bolt against the control l ever and fix using the locknut. At this time move the control lever only from closed to open (idle to full speed). Caution: When it is necessary to return the control lever, first return it once to the idle position an d then perform readjustment. 2. When adjusting the potentiometer, position the control lever against the dummy bolt and adjust the potentiometer so that the output voltage is V1. 3. After completing adjustment remove the dummy bolt. Confirm that the potentiometer output volt age is as specified above at the control lever idle position and full position.

2.11.2 Additional device 2

Name	STOP LEVER ADJUSTMENT

L=4.5~10.6(mm)
T=3.4~4.9(Nm)(0.35~0.5(kgfm))



A = adjusting bolt
B = locknut
C = stop lever
Adjusting the stop lever's starting injection quantity
At injection quantity adjustment, adjust adjusting bolt A so that the starting injection quantity is as specified.
Fix using nut (B) (Tightening torque T).

3 Assembly dimension

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
S	K dimension	mm	3.3	3.2	3.4		
S	KF dimension	mm	5.9	5.8	6		
S	MS dimension	mm	1.8	1.7	1.9		
S	BCS stroke	mm	2.8	2.6	3		
S	Pre-stroke	mm	0.2	0.18	0.22		
S	Control lever angle alpha	deg.	17	13	21		
S	Control lever angle beta	deg.	43	38	48		