

ZEXEL Ass'y No.	104740-0721
Bosch Ass'y No.	9 460 611 113
Bosch Typecode	
Engine Type	WLT
Manufacturer	MAZDA
Edition date	22.08.08 (3)

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)		L				
		Left					

2 Adjustment specification**2.1 Full load delivery**

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	750	750	750		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	kgf/cm2	0	0	0		
P	Boost pressure	mmHg	0	0	0		
S	Average injection quantity	mm3/st.	47.9	47.4	48.4		
S	Difference in delivery	mm3/st.	4		4		
P	Basic		*				
P	Oil temperature	degC	50	48	52		
	Remarks						
		NA					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	750	750	750		
P	Boost pressure	kPa	43.3	42	44.6		
P	Boost pressure	kgf/cm2	0.44	0.426	0.454		
P	Boost pressure	mmHg	325	315	335		
S	Average injection quantity	mm3/st.	64.1	63.6	64.6		
S	Difference in delivery	mm3/st.	5.5		5.5		
P	Basic		*				
P	Oil temperature	degC	50	48	52		
	Remarks						
		CBS					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1000	1000	1000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
S	Average injection quantity	mm3/st.	76.3	75.8	76.8		
S	Difference in delivery	mm3/st.	6.5		6.5		
P	Basic		*				
P	Oil temperature	degC	50	48	52		
	Remarks						
		Full					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	750	750	750		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	kgf/cm2	0	0	0		
P	Boost pressure	mmHg	0	0	0		
C	Average injection quantity	mm3/st.	47.9	46.9	48.9		
C	Difference in delivery	mm3/st.	4.5		4.5		

P	Basic		*				
P	Oil temperature	degC	50	48	52		
	Remarks						
		NA					
CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	750	750	750		
P	Boost pressure	kPa	43.3	42	44.6		
P	Boost pressure	kgf/cm2	0.44	0.426	0.454		
P	Boost pressure	mmHg	325	315	335		
C	Average injection quantity	mm3/st.	64.1	63.1	65.1		
C	Difference in delivery	mm3/st.	6		6		
P	Basic		*				
P	Oil temperature	degC	50	48	52		
	Remarks						
		CBS					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1000	1000	1000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Average injection quantity	mm3/st.	76.3	75.3	77.3		
C	Difference in delivery	mm3/st.	7		7		
P	Basic		*				
P	Oil temperature	degC	50	48	52		
	Remarks						
		Full					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2000	2000	2000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Average injection quantity	mm3/st.	67.8	64.3	71.3		
		About					
P	Oil temperature	degC	50	48	52		

2.2 Governing

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2450	2450	2450		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
S	Average injection quantity	mm3/st.	23.5	20.5	26.5		
S	Difference in delivery	mm3/st.	7		7		
P	Basic		*				
P	Oil temperature	degC	55	52	58		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2800	2800	2800		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Average injection quantity	mm3/st.	5		5		
P	Oil temperature	degC	55	52	58		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2450	2450	2450		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Average injection quantity	mm3/st.	23.5	13.5	33.5		
C	Difference in delivery	mm3/st.	7.5		7.5		
P	Basic		*				
P	Oil temperature	degC	55	52	58		

2.3 Idle

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	380	380	380		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	kgf/cm2	0	0	0		
P	Boost pressure	mmHg	0	0	0		
S	Average injection quantity	mm3/st.	17.3	16.3	18.3		
S	Difference in delivery	mm3/st.	2.2		2.2		
P	Basic		*				
P	Oil temperature	degC	48	46	50		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	380	380	380		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	kgf/cm2	0	0	0		
P	Boost pressure	mmHg	0	0	0		
C	Average injection quantity	mm3/st.	17.3	15.8	18.8		
C	Difference in delivery	mm3/st.	2.2		2.2		
P	Basic		*				
P	Oil temperature	degC	48	46	50		

2.4 Partial injection quantity

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	400	400	400		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	kgf/cm2	0	0	0		
P	Boost pressure	mmHg	0	0	0		
C	Average injection quantity	mm3/st.	30	28	32		
C	Difference in delivery	mm3/st.	3		3		
		About					
P	Oil temperature	degC	48	46	50		

2.5 Start

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	150	150	150		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	kgf/cm2	0	0	0		
P	Boost pressure	mmHg	0	0	0		
S	Average injection quantity	mm3/st.	70	55	90		
P	Basic		*				
P	Oil temperature	degC	48	46	50		
	Remarks						
		Full					

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	150	150	150		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	kgf/cm2	0	0	0		
P	Boost pressure	mmHg	0	0	0		
C	Average injection quantity	mm3/st.	70	50	90		
		About					
P	Oil temperature	degC	48	46	50		
	Remarks						
		Full					

2.6 Stop

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	380	380	380		
P	Boost pressure	kPa	0	0	0		
P	Boost pressure	kgf/cm2	0	0	0		
P	Boost pressure	mmHg	0	0	0		
C	Average injection quantity	mm3/st.	0	0	0		
P	Oil temperature	degC	48	46	50		
	Remarks						
		Magnet OFF					

2.7 Overflow

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1000	1000	1000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Overflow quantity	cm3/min	400	270	530		
P	Oil temperature	degC	50	48	52		

2.8 Pump chamber pressure

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1000	1000	1000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
S	Pressure	kPa	510	481	539		
S	Pressure	kgf/cm2	5.2	4.9	5.5		
P	Basic		*				
P	Oil temperature	degC	50	48	52		
CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	500	500	500		

P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Pressure	kPa	392	343	441		
C	Pressure	kgf/cm2	4	3.5	4.5		
P	Oil temperature	degC	48	46	50		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1000	1000	1000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Pressure	kPa	510	471	549		
C	Pressure	kgf/cm2	5.2	4.8	5.6		
P	Basic		*				
P	Oil temperature	degC	50	48	52		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2000	2000	2000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Pressure	kPa	735	686	784		
C	Pressure	kgf/cm2	7.5	7	8		
P	Oil temperature	degC	50	48	52		

2.9 Timer

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1000	1000	1000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
S	Timer stroke	mm	4.4	4.2	4.6		
P	Basic		*				
P	Oil temperature	degC	50	48	52		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	500	500	500		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Timer stroke	mm	1.8	1	2.6		
P	Oil temperature	degC	48	46	50		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	1000	1000	1000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Timer stroke	mm	4.4	4	4.8		
P	Basic		*				
P	Oil temperature	degC	50	48	52		

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	2000	2000	2000		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Timer stroke	mm	9	8.2	9.8		
P	Oil temperature	degC	50	48	52		

2.10 Magnet

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
C	Max. applied voltage	V	8	8	8		
P	Test voltage	V	13	12	14		

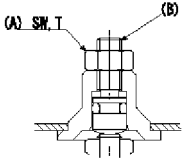
2.11 Compensator

2.11.1 Load-timer adjustment

CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	750	750	750		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm2	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
S	Average injection quantity	mm3/st.	49	48.5	49.5		
S	Timer stroke TA	mm	2.5	2.3	2.7		
S	Timer stroke variation dT	mm	0.7	0.7	0.7		
		About					

P	Basic		*				
P	Oil temperature	degC	50	48	52		
CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	750	750	750		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm ²	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Average injection quantity	mm ³ /st.	49	48	50		
C	Timer stroke TA	mm	2.5	2.1	2.9		
C	Timer stroke variation dT	mm	0.7	0.7	0.7		
		About					
P	Basic		*				
P	Oil temperature	degC	50	48	52		
CAT	Designation	Unit	Set value	min.	max.	Actual values	OT
P	Pump speed	r/min	750	750	750		
P	Boost pressure	kPa	80	78.7	81.3		
P	Boost pressure	kgf/cm ²	0.82	0.806	0.834		
P	Boost pressure	mmHg	600	590	610		
C	Average injection quantity	mm ³ /st.	30	28.5	31.5		
C	Timer stroke TA	mm	1.5	0.7	2.3		
C	Timer stroke variation dT	mm	1.7	1.7	1.7		
		About					
P	Oil temperature	degC	50	48	52		

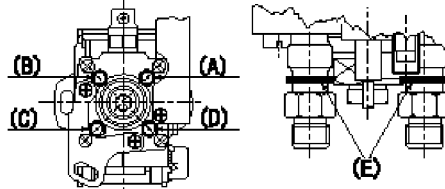
2.11.2 BCS adjustment

Name	BOOST COMPENSATOR ADJUSTMENT
SW=10mm T=6~9N-m(0.6~0.9kgf-m)	
N1=750r/min N2=750r/min P1=43.3kPa(325mmHg) P2=0kPa(0mmHg) T=6~9N-m(0.6~0.9kgf-m)	<p>BCS adjustment procedure</p> <ol style="list-style-type: none"> 1. At full boost pressure, set so that the full injection quantity is within the specifications (adjusting point). 2. Perform boost compensator intermediate operation point adjustment (pump speed N1, boost pressure P1). 3. When injection quantity at boost pressure P2 and pump speed N2 is not as specified, loosen nut (A) and adjust position of screw (B) so that injection quantity is as specified. The screw position should be within +-1 turn of initial position. 4. The nut tightening torque is T.

2.12 Additional device adjustment

2.12.1 Additional device 1

Name CONTROL STANDARD AT IDLING



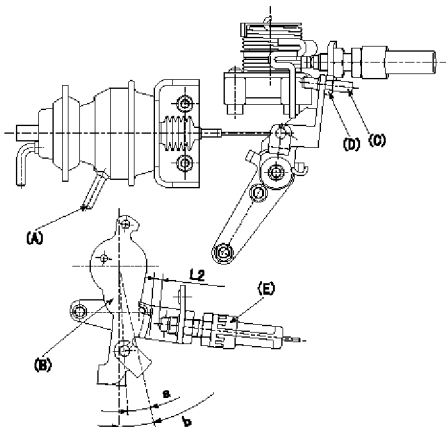
	(H)		(J)	(K)			
				(A)	(B)	(C)	(D)
(F)	L	(O)	(L)	(T)	(T)	(U)	(U)
			(M)	(T)	(U)	(U)	
		(P)	(L)	(T)	(U)	(U)	(T)
			(M)	(T)	(U)	(U)	
	M	(O)	(L)	(U)	(T)	(U)	(U)
			(M)	(U)	(U)	(U)	
		(P)	(L)	(U)	(U)	(U)	(T)
			(M)	(U)	(U)	(U)	
	N	(O)	(L)	(U)	(T)	(U)	(U)
			(M)	(U)	(U)	(U)	
		(P)	(L)	(U)	(U)	(U)	(T)
			(M)	(U)	(U)	(U)	
(G)	L	(O)	(L)	(U)	(T)	(T)	(U)
			(M)	(U)	(U)	(T)	(T)
		(P)	(L)	(U)	(U)	(T)	(T)
			(M)	(U)	(U)	(T)	(T)
	M	(O)	(L)	(U)	(T)	(U)	(U)
			(M)	(U)	(U)	(U)	
		(P)	(L)	(U)	(U)	(U)	(T)
			(M)	(U)	(U)	(U)	
	I	(O)	(L)	(U)	(T)	(U)	(U)
			(M)	(U)	(U)	(U)	
		(P)	(L)	(U)	(U)	(U)	(T)
			(M)	(U)	(U)	(U)	
			(I)	(V)	(V)	(V)	(V)

Standards for idle difference in delivery control
 After idle adjustment, measure the idle injection quantities of (A) to (D).
 Install the colored rings to the delivery valve holders (A) to (D) in accordance with the table.
 (A): A cylinder (B) :B cylinder (C) : C cylinder (D): D cylinder
 (E): Collar ring
 (F): (A) >= (C)
 (G): (C) > (A)
 (H): (A) - (C) or (C) - (A)
 (I): 0.2, 0.1(mm3/st)
 (J): (B) - (D) or (D) - (B)
 (K): Ring color
 (L): At least 0.6 mm3/st
 (M): 0.3, 0.4, 0.5 (mm3/st)
 (N): 0.2, 0.1, 0.0 (mm3/st)
 (O): (B) >= (D)
 (P): (D) > (B)
 (T): Yellow
 (U): White
 (V): Red

2.12.2 Additional device 2

Name	POTENTIOMETER ADJUSTMENT																																											
V1=8.16+0.03V V2=2.33+0.87V N1=1000r/min Q1=24.8+1.0mm ³ /st D1=(13.0deg) V3=3.85~3.97V V4=3.97~4.09V V5=4.09~4.21V V6=4.21~4.35V V7=4.33~4.45V V8=4.45~4.57V V9=4.57~4.69V V10=4.69~4.81V V11=4.81~4.93V V12=4.93~5.05V V13=5.05~5.17V V14=5.17~5.29V V15=5.29~5.41V R1=No.1,0.18kohm R2=No.2,0.30kohm R3=No.3,0.43kohm R4=No.4,0.62kohm R5=No.5,0.82kohm R6=No.6,1.10kohm R7=No.7,1.50kohm R8=No.8,2.00kohm R9=No.9,2.70kohm R10=No.10,3.90kohm R11=No.11,5.60kohm R12=No.12,8.20kohm R13=No.13,15.00kohm	<p>(1)</p> <table border="1" data-bbox="464 203 983 376"> <thead> <tr> <th>(C)</th> <th>(V)</th> <th></th> </tr> </thead> <tbody> <tr> <td>C1</td> <td>V1</td> <td>(A)</td> </tr> <tr> <td>C2</td> <td>V2</td> <td>(B)</td> </tr> </tbody> </table> <p>(2)</p> <table border="1" data-bbox="464 472 991 600"> <thead> <tr> <th>(N)</th> <th>(Q)</th> <th>(D)</th> </tr> </thead> <tbody> <tr> <td>N1</td> <td>Q1</td> <td>D1</td> </tr> </tbody> </table> <p>(3)</p> <table border="1" data-bbox="464 663 991 1305"> <thead> <tr> <th>(V)</th> <th>(R)</th> </tr> </thead> <tbody> <tr><td>V3</td><td>R1</td></tr> <tr><td>V4</td><td>R2</td></tr> <tr><td>V5</td><td>R3</td></tr> <tr><td>V6</td><td>R4</td></tr> <tr><td>V7</td><td>R5</td></tr> <tr><td>V8</td><td>R6</td></tr> <tr><td>V9</td><td>R7</td></tr> <tr><td>V10</td><td>R8</td></tr> <tr><td>V11</td><td>R9</td></tr> <tr><td>V12</td><td>R10</td></tr> <tr><td>V13</td><td>R11</td></tr> <tr><td>V14</td><td>R12</td></tr> <tr><td>V15</td><td>R13</td></tr> </tbody> </table>	(C)	(V)		C1	V1	(A)	C2	V2	(B)	(N)	(Q)	(D)	N1	Q1	D1	(V)	(R)	V3	R1	V4	R2	V5	R3	V6	R4	V7	R5	V8	R6	V9	R7	V10	R8	V11	R9	V12	R10	V13	R11	V14	R12	V15	R13
(C)	(V)																																											
C1	V1	(A)																																										
C2	V2	(B)																																										
(N)	(Q)	(D)																																										
N1	Q1	D1																																										
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V14	R12																																											
V15	R13																																											
N1=1000r/min	<p>Adjustment of the potentiometer</p> <p>(1) Potentiometer setting: (A): Adjusting point (B): Checking point (C): Control lever opening (V): P/N output voltage C1: Full speed position C2: Idling position</p> <p>(2) Dummy bolt setting: Fix the control lever with the dummy bolt so that the injection quantity is as shown in the following table at the pump speed = N1. (N): Speed of the pump (Q): Injection quantity (D): Targeted lever angle</p> <p>(3) Read the output voltage (V) of the potentiometer in the state indicated in (2) above. Then, select the compensation resistor from the following table and replace. (R): Compensation resistance</p> <p>Note: After changing the compensation resistance, it is not necessary to check it as the output voltage is compensated inside the control unit.</p>																																											

2.12.3 Additional device 3

Name	WIRE	
<p>a=9deg b=12.5+-4deg L2=(3.8mm)</p>		<p>L1=30.1+-4.0mm L2=3.8mm P1=-66.6kPa(-500mmHg) T=6~9N-m(0.6~0.9kgf-m) a=9deg b=12.5+-4deg</p> <p>(1)Confirmation of the wire length: Accelerator wire: Idle-full stroke: L1 (2)Confirmation on the idle SW Confirm that the switch is ON at the idle lever position. (3)Adjustment of the double stage actuator: 1. Apply negative pressure P1 to the actuator through the negative pressure suction inlet. 2. Under the conditions in 1. above, adjust using screw (C) so that the control lever () position is a ngle a [clearance L2+-0.5mm from idle switch (E)], and fix using the nut (D). (Tightening torque T) b:Angle alpha</p>

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	6.01	5.91	6.11		
S	MS dimension	mm	0.9	0.8	1		
S	BCS stroke	mm	6.8	6.6	7		
S	Pre-stroke	mm	0.03	0.01	0.05		
S	Control lever angle alpha	deg.	12.5	8.5	16.5		
S	Control lever angle beta	deg.	35	31	39		