

ELECTRONIC TECHNICAL SERVICE INFORMATION

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PARTS LIST

EXPLODED VIEW

Part Number : 098000-0010

Part Name : (PUMP ASSY, INJECTI)

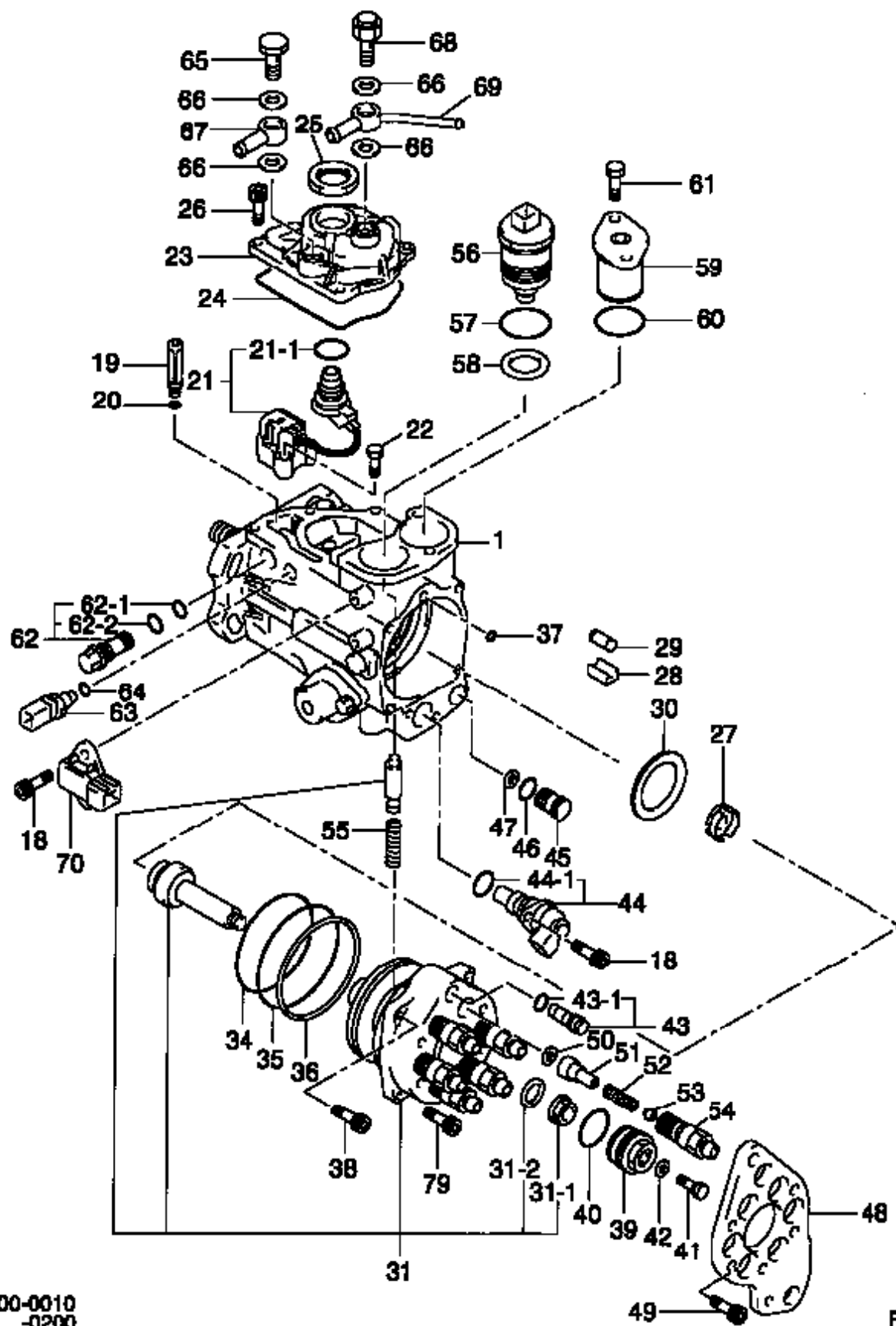
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Indication

All

Part Name	Compo.P/N	Manufacturer	Vehicle Name	Engine	Start	End
PUMP ASSY, INJECTI	098000-0010 A	TOYOTA	LAND CRUISER 100	1HD-FTE	9804	0107

098000-0010
-0200

PU0452

Parts List

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Compo. P/N: 098000-0010

Assy P/N: 098000-0010

S	M	Illust.No.	Part Name	DENSO P/N	Manu. P/N	QTY	I/C	Start	End	Remarks
		0	PUMP ASSY, INJECTI	098000-0010	22100-1C170	01				ECD-V4
		1	OVER-HAUL ASSY, W/	098011-0010		01				W/72
		1-1	SEAL, OIL, HOUSING	098067-0020		01				ID25OD38
		18	BOLT, SOCKET	096449-0110	22395-56351	04				M6,L16
		19	FILTER SUB-ASSY	098050-0011		01				
		20	O-RING	096049-0460	22193-5B320	01				ID6.5
		21	SENSOR ASSY, CRANK	029600-0810	89284-60020	01				NE SENSOR
		21-1	O-RING	029475-0170		01				ID20
		22	BOLT, DISTRIBUTIVE	098076-0040		02				M5,L22
		23	COVER, HOUSING	098111-0010		01				
		24	O-RING, DISTRIBUTI	098066-0010		01				
		25	NUT, HEXAGON	949050-4840		01			9901	M24
		25	NUT, HEXAGON	949050-6230		01	A	9901		M24
		26	BOLT, SOCKET	096449-0050	22395-54270	05				M6,L20
		27	COUPLING	098255-0010		01			9902	
		27	COUPLING	098255-0020		01	B	9902		
		28	SHOE	098180-0010		04				
		29	ROLLER	098185-0010		04				
		30	WASHER, SHOE GUIDE	098153-0010		1C				T2.45
		30	WASHER, SHOE GUIDE	098153-0020		1C				T2.55
		30	WASHER, SHOE GUIDE	098153-0030		1C				T2.65
		30	WASHER, SHOE GUIDE	098153-0040		1C				T2.50
		31	HEAD SUB-ASSY, DIS	098400-0014		01				
		31-1	NUT, DISTRIBUTIVE	098424-0010		01				
		31-2	WASHER, DISTRIBUTI	098423-0010		01				ID16,T2
		34	O-RING, DISTRIBUTI	098066-0080		01				ID78.7
		35	O-RING, DISTRIBUTI	098066-0090		01				ID78.0
		36	RING, BACKUP	098069-0010		01				ID80T1.9
		37	O-RING, DISTRIBUTI	098066-0050		01				ID4.8
		38	BOLT, DISTRIBUTIVE	098076-0031		01				M6,L33
		39	PLUG, DISTRIBUTIVE	098416-0010		01				
		40	O-RING, DISTRIBUTI	098066-0100		01				ID26.5
		41	BOLT, DISTRIBUTIVE	096418-0020	22128-54010	01				M8,L19.7
		42	GASKET, DELIVERY V	096426-0030	22149-56200	01				ID8.2,T1
		43	SCREW SUB-ASSY, GA	098090-0011		01				
		43-1	O-RING, DISTRIBUTI	098066-0030	22193-1C170	01				ID9.8
		44	VALVE ASSY, TIMING	096360-0313		01			0107	TCV
		44	VALVE ASSY, TIMING	096360-0580		01	B	0108		TCV 12V
		44-1	O-RING	096049-0530		01				ID16.7
		45	VALVE SUB-ASSY, TI	098210-0010		01				
		46	O-RING, DISTRIBUTI	098066-0070		01				ID13
		47	GASKET	098065-0010		01				ID5,T1.2
		48	BRACKET	098071-0012	22601-1C170	01				
		49	BOLT, DISTRIBUTIVE	098076-0060	22395-1C170	05				M8,L22
		50	GASKET, DELIVERY V	098466-0011		06				ID8.8
*		51	VALVE SUB-ASSY, DE	098450-0012		06			9803	NO SUPPLY

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Compo. P/N: 098000-0010

Assy P/N: 098000-0010

S	M	Illust.No.	Part Name	DENSO P/N	Manu. P/N	QTY	I/C	Start	End	Remarks
		51	VALVE SUB-ASSY, DE	098450-0021		06	D	9804		*1
		52	SPRING, DELIVERY V	098467-0011		06				L9.1
		53	SEAT, DELIVERY VAL	098468-0051		06				
*		54	HOLDER, DELIVERY V	098465-0013		06			9803	NO SUPPLY
		54	HOLDER, DELIVERY V	098465-0030		06	D	9804		*1
		55	SPRING, VALVE	098395-0021		01				L12.0
		56	VALVE ASSY, INJECT	098300-0132		01				SPV
		57	O-RING, DISTRIBUTI	098066-0110		01				ID35.0
		58	SHIM, LIFT ADJUSTI	098383-0011		1C				T1.40
		58	SHIM, LIFT ADJUSTI	098383-0021		1C				T1.41
		58	SHIM, LIFT ADJUSTI	098383-0031		1C				T1.42
		58	SHIM, LIFT ADJUSTI	098383-0041		1C				T1.43
		58	SHIM, LIFT ADJUSTI	098383-0051		1C				T1.44
		58	SHIM, LIFT ADJUSTI	098383-0061		1C				T1.45
		58	SHIM, LIFT ADJUSTI	098383-0071		1C				T1.46
		58	SHIM, LIFT ADJUSTI	098383-0081		1C				T1.47
		58	SHIM, LIFT ADJUSTI	098383-0091		1C				T1.48
		58	SHIM, LIFT ADJUSTI	098383-0101		1C				T1.49
		58	SHIM, LIFT ADJUSTI	098383-0111		1C				T1.50
		58	SHIM, LIFT ADJUSTI	098383-0121		1C				T1.51
		58	SHIM, LIFT ADJUSTI	098383-0131		1C				T1.52
		58	SHIM, LIFT ADJUSTI	098383-0141		1C				T1.53
		58	SHIM, LIFT ADJUSTI	098383-0151		1C				T1.54
		58	SHIM, LIFT ADJUSTI	098383-0161		1C				T1.55
		58	SHIM, LIFT ADJUSTI	098383-0171		1C				T1.56
		58	SHIM, LIFT ADJUSTI	098383-0181		1C				T1.57
		58	SHIM, LIFT ADJUSTI	098383-0191		1C				T1.58
		58	SHIM, LIFT ADJUSTI	098383-0201		1C				T1.59
		58	SHIM, LIFT ADJUSTI	098383-0211		1C				T1.60
		58	SHIM, LIFT ADJUSTI	098383-0221		1C				T1.61
		58	SHIM, LIFT ADJUSTI	098383-0231		1C				T1.62
		58	SHIM, LIFT ADJUSTI	098383-0241		1C				T1.63
		58	SHIM, LIFT ADJUSTI	098383-0251		1C				T1.64
		58	SHIM, LIFT ADJUSTI	098383-0261		1C				T1.65
		58	SHIM, LIFT ADJUSTI	098383-0271		1C				T1.66
		58	SHIM, LIFT ADJUSTI	098383-0281		1C				T1.67
		58	SHIM, LIFT ADJUSTI	098383-0291		1C				T1.68
		58	SHIM, LIFT ADJUSTI	098383-0301		1C				T1.69
		58	SHIM, LIFT ADJUSTI	098383-0311		1C				T1.70
		58	SHIM, LIFT ADJUSTI	098383-0321		1C				T1.71
		58	SHIM, LIFT ADJUSTI	098383-0331		1C				T1.72
		58	SHIM, LIFT ADJUSTI	098383-0341		1C				T1.73
		58	SHIM, LIFT ADJUSTI	098383-0351		1C				T1.74
		58	SHIM, LIFT ADJUSTI	098383-0361		1C				T1.75
		58	SHIM, LIFT ADJUSTI	098383-0371		1C				T1.76
		58	SHIM, LIFT ADJUSTI	098383-0381		1C				T1.77

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S	M	Illust.No.	Part Name	DENSO P/N	Manu. P/N	QTY	I/C	Start	End	Remarks
		58	SHIM, LIFT ADJUSTI	098383-0391		1C				T1.78
		58	SHIM, LIFT ADJUSTI	098383-0401		1C				T1.79
		58	SHIM, LIFT ADJUSTI	098383-0411		1C				T1.80
		58	SHIM, LIFT ADJUSTI	098383-0420		1C		9901		T1.405
		58	SHIM, LIFT ADJUSTI	098383-0430		1C		9901		T1.415
		58	SHIM, LIFT ADJUSTI	098383-0440		1C		9901		T1.425
		58	SHIM, LIFT ADJUSTI	098383-0450		1C		9901		T1.435
		58	SHIM, LIFT ADJUSTI	098383-0460		1C		9901		T1.445
		58	SHIM, LIFT ADJUSTI	098383-0470		1C		9901		T1.455
		58	SHIM, LIFT ADJUSTI	098383-0480		1C		9901		T1.465
		58	SHIM, LIFT ADJUSTI	098383-0490		1C		9901		T1.475
		58	SHIM, LIFT ADJUSTI	098383-0500		1C		9901		T1.485
		58	SHIM, LIFT ADJUSTI	098383-0510		1C		9901		T1.495
		58	SHIM, LIFT ADJUSTI	098383-0520		1C		9901		T1.505
		58	SHIM, LIFT ADJUSTI	098383-0530		1C		9901		T1.515
		58	SHIM, LIFT ADJUSTI	098383-0540		1C		9901		T1.525
		58	SHIM, LIFT ADJUSTI	098383-0550		1C		9901		T1.535
		58	SHIM, LIFT ADJUSTI	098383-0560		1C		9901		T1.545
		58	SHIM, LIFT ADJUSTI	098383-0570		1C		9901		T1.555
		58	SHIM, LIFT ADJUSTI	098383-0580		1C		9901		T1.565
		58	SHIM, LIFT ADJUSTI	098383-0590		1C		9901		T1.575
		58	SHIM, LIFT ADJUSTI	098383-0600		1C		9901		T1.585
		58	SHIM, LIFT ADJUSTI	098383-0610		1C		9901		T1.595
		58	SHIM, LIFT ADJUSTI	098383-0620		1C		9901		T1.605
		58	SHIM, LIFT ADJUSTI	098383-0630		1C		9901		T1.615
		58	SHIM, LIFT ADJUSTI	098383-0640		1C		9901		T1.625
		58	SHIM, LIFT ADJUSTI	098383-0650		1C		9901		T1.635
		58	SHIM, LIFT ADJUSTI	098383-0660		1C		9901		T1.645
		58	SHIM, LIFT ADJUSTI	098383-0670		1C		9901		T1.655
		58	SHIM, LIFT ADJUSTI	098383-0680		1C		9901		T1.665
		58	SHIM, LIFT ADJUSTI	098383-0690		1C		9901		T1.675
		58	SHIM, LIFT ADJUSTI	098383-0700		1C		9901		T1.685
		58	SHIM, LIFT ADJUSTI	098383-0710		1C		9901		T1.695
		58	SHIM, LIFT ADJUSTI	098383-0720		1C		9901		T1.705
		58	SHIM, LIFT ADJUSTI	098383-0730		1C		9901		T1.715
		58	SHIM, LIFT ADJUSTI	098383-0740		1C		9901		T1.725
		58	SHIM, LIFT ADJUSTI	098383-0750		1C		9901		T1.735
		58	SHIM, LIFT ADJUSTI	098383-0760		1C		9901		T1.745
		58	SHIM, LIFT ADJUSTI	098383-0770		1C		9901		T1.755
		58	SHIM, LIFT ADJUSTI	098383-0780		1C		9901		T1.765
		58	SHIM, LIFT ADJUSTI	098383-0790		1C		9901		T1.775
		58	SHIM, LIFT ADJUSTI	098383-0800		1C		9901		T1.785
		58	SHIM, LIFT ADJUSTI	098383-0810		1C		9901		T1.795
		59	ACCUMULATOR SUB-AS	098190-0011		01				
		60	O-RING, DISTRIBUTI	098066-0040		01				ID33.2
		61	BOLT, DISTRIBUTIVE	098076-0021		02				M8,L18.5

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Compo. P/N: 098000-0010

Assy P/N: 098000-0010

S	M	Illust.No.	Part Name	DENSO P/N	Manu. P/N	QTY	I/C	Start	End	Remarks
		62	VALVE SUB-ASSY, RE	098160-0010		01				
		62-1	O-RING, DISTRIBUTI	098066-0030	22193-1C170	01				ID9.8
		62-2	O-RING, DISTRIBUTI	098066-0020		01				ID12.8
S		63	SENSOR, FUEL TEMPE	179730-0020	89454-60010	01				FUEL TEMP.SENSO
		64	O-RING, DISTRIBUTI	098066-0030	22193-1C170	01				ID9.8
		65	SCREW, INLET	098041-0010	22569-1C170	01			0109	M12,L30
		65	SCREW, INLET	098041-0020	22569-1C400	01	B	0110		M12,L30
		66	GASKET, DELIVERY V	096426-0120	22149-54800	04				ID12.2
		67	NIPPLE SUB-ASSY, S	092218-0160	22548-17140	01			9808	D12
		67	NIPPLE SUB-ASSY, S	098060-0080	22548-1C100	01	A	9809		
		68	SCREW SUB-ASSY, OV	098020-0010	22160-1C170	01				
		69	NIPPLE SUB-ASSY, S	098060-0010	22548-1C170	01				OVERFLOW
		70	IC, CUSTOM	131700-0011	89840-20010	01				P-ROM
		72	KEY, DRIVE SHAFT	098013-0031		01				T5.013
		79	BOLT, DISTRIBUTIVE	098076-0070		03				M6,L23
		100	OVER-HAUL KIT, DIS	098010-0010		01				



INJECTION PUMP TEST SPECIFICATIONS with DST-1

098000-001#

INJECTION PUMP	098000-001#	INJECTION ORDER	A - B - C - D - E - F
		INJECTION INTERVAL	60° ± 30'
MANUFACTURER	TOYOTA	RATED VOLTAGE	14 ± 0.1 V
ENGINE TYPE	1HD-FTE	SPV AIR GAP	0.067 ± 0.005 mm
VEHICLE MODEL	LAND CRUISER	ROTATION	Clockwise viewed from drive side
TEST BENCH	AVM 20		

NOTE : Using the check harness and apply exact 12 V / 1 A for SPV AIR GAP Measurement.

1 . SETUP CONDITION

1) Nozzle	093400-7420	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)
3) Test Oil	SAE J967 (ISO4113)	7) Power Voltage	14 V
4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)	8) EDU Voltage Spec.	12 V

2 . RUNNING

Pump Speed (rpm)	Condition	Remarks
200	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	Drive more than 2 minutes.
1200		Drive more than 5 minutes.

3 . FUEL TEMP

Pump Speed (rpm)	Sensor Resistance (k Ω)	Remarks (Outlet Fuel Temp. : 40 ± 5 °C)
200	1.2 ± 0.7	

4 . NE SENSOR

Pump Speed (rpm)	Sensor Output Voltage (V)	Remarks
50	0.1 or more	

5 . INTERNAL PRESSURE

Pump Speed (rpm)	Feed Pressure (kg/cm ²)	Remarks
1800	15.8 - 16.8 (1.55 - 1.65 MPa)	

6 . OVER FLOW

Pump Speed (rpm)	Overflow Quantity (L/min)	Remarks
600	1.6 or less	The sub overflow valve belonging to the pump should be used for checking.
2250	2.1 - 2.5	

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7 . CAM ANGLE - 1 (PRESET)

Pump Speed (rpm)	Target Quantity (mm ³ /st-cyl.)	Remarks (Outlet Fuel Temp. : 43 ± 2 °C)
500	16.3 ± 1.0	

NOTE : When the correction value is raised by 1 level, the injection quantity is increased approx. 0.04 - 0.06 mm³/st-cyl.

8 . CAM ANGLE - 2 (AUTO)

Pump Speed (rpm)	Judging Standard	Remarks
500	To display "OK"	Input 2.56 ± 0.25 (°PA) when it is input the offset data.

NOTE : Never forget removing pressure sensor from piping.

9 . Q ADJUST

Pump Speed (rpm)	Target Quantity (mm ³ /st-cyl.)	Max. Spread In Delivery (mm ³ /st-cyl.)	Outlet Fuel Temp. (°C)	Remarks
100	66.8 ± 1.8	—	41.0 ± 1.5	
100	158.1 ± 2.4	—	41.0 ± 1.5	
300	9.8 ± 1.0	3.5	41.0 ± 1.5	
300	95.1 ± 1.6	—	41.0 ± 1.5	
500	14.5 ± 1.0	2.0	43.0 ± 1.5	
500	96.2 ± 1.6	—	43.0 ± 1.5	
1050	17.2 ± 0.8	—	48.0 ± 1.5	
1050	102.9 ± 1.2	5.0	51.0 ± 1.5	
775	98.4 ± 1.4	—	47.0 ± 1.5	
1375	22.7 ± 0.7	—	54.0 ± 1.5	
1375	105.4 ± 1.2	4.5	55.0 ± 1.5	
1700	28.1 ± 0.8	—	59.0 ± 1.5	
1700	116.0 ± 1.3	5.5	59.0 ± 1.5	
2150	21.4 ± 2.5	—	63.0 ± 4.0	Check point
2250	7.0 or less	—	67.0 or less	Check point

10 . TIMER ADJUST

Timing Control Valve (TCV) resistance : 11.3 ± 0.4 Ω

Pump Speed (rpm)	Target Timer Angle (°PA)	Remarks
1800	18.0 or more	Check point
1800	7.0 or more	Check point
1000	7.9 ± 4.3	Check point
500	18.0 or more	Check point
500	0.1 or less	Check point
200	8.0	Set point
200	10.0 or more	Check point
100	2.5 or more	Check point

For AVM20

ECD**INJECTION PUMP TEST SPECIFICATIONS**

098000-001#

INJECTION PUMP	098000-001#	Rotation	Clockwise viewed from drive side
		Injection Order	A - B - C - D - E - F
MANUFACTURER	TOYOTA	Injection Interval	60° ± 30'
ENGINE TYPE	1HD-FTE	Rated Voltage	14 ± 0.1 V
VEHICLE MODEL	LAND CRUISER	Air gap	0.067 ± 0.005 mm
Pump Select Switch No. (ECD Controller)		REC OFF / REC ON	

1. TEST CONDITIONS

1) Nozzle	093400-7420	4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
3) Test Oil	SAE J967 (ISO4113)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)

2. BREAK-IN DRIVE

Pump Speed (rpm)	ECD CONTROLLER SETTING				Condition	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
0	SPV ON	180	0	REC OFF	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	
0	SPV OFF	660	0	REC OFF		
200	SPL	660	0	REC OFF		Drive more than 2 minutes.
1200	SPL	660	0	REC OFF		Drive more than 5 minutes.

3. INSPECTION OF FUEL TEMPERATURE SENSOR

Pump Speed (rpm)	ECD CONTROLLER SETTING				Sensor Resistance (kΩ)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
50	SPV OFF	000	0	REC OFF	—	No injection setting
200	Fuel Temperature	000	0	REC OFF	1.2 ± 0.7	

4. INSPECTION OF Ne SENSOR

Pump Speed (rpm)	ECD CONTROLLER SETTING				Sensor Output Voltage (V)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
50	Np	000	0	REC OFF	0.1 or more	

5. FEED PRESSURE CONFIRMATION

Pump Speed (rpm)	ECD CONTROLLER SETTING				Feed Pressure (kg/cm ²)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
1800	Np	000	0	REC OFF	15.8 - 16.8 (1.55 - 1.65 MPa)	

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6. OVERFLOW QUANTITY CHECK

Pump Speed (rpm)	ECD CONTROLLER SETTING				Overflow Quantity (L/min)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
600	Np	000	0	REC OFF	1.6 or less	The overflow valve belonging to the pump should be used for checking.
2250	Np	000	0	REC OFF	2.1 - 2.5	

7. PRESETTING FOR CAM ANGLE ADJUSTMENT

Pump Speed (rpm)	ECD CONTROLLER SETTING						Target Quantity (mm ³ /st-cyl.)	Remarks (Outlet Fuel Temp. 43 ± 2°C)	
	Display Selector	Injection Quantity Command			Duty Ratio Command	Pump Select Switch		Activity	
		First digit	Second digit	Third digit					
0	SPV ON	2	E	0	100	REC OFF	—	Set ON	
0	SPV OFF	6	3	8	100	REC OFF	16.3 ± 1.0	Set OFF	If Measured fuel quantity is within target, go to the step of Record. Otherwise, got to the step below.
500	SPL	6	3	8	100	REC OFF		Measure	
500	SPV OFF	6	3	8	100	REC ↓ REC ON		Record	
500	SPV OFF	6	☐	☐	100	REC OFF	16.3 ± 1.0	Set OFF	Adjust 2nd & 3rd digits to get "Target Quantity" and go to "Record" step.
500	SPL	6	☐	☐	100	REC OFF		Measure	
500	SPV OFF	6	☐	☐	100	REC ↓ REC ON		Record	

NOTE : Select "REC ON" position every time when recording the final correction value.

- When the correction value is raised by 1 level, the injection quantity is increased approx. 0.04 - 0.06 mm³/st-cyl.

8. ADJUSTMENT OF CAM ANGLE

Pump Speed (rpm)	ECD CONTROLLER SETTING						Target Angle (°CA)	Remarks
	Display Selector	Injection Quantity Command			Duty Ratio Command	Pump Select Switch		
		First digit	Second digit	Third digit				
500	Cam Angle	0	0	0	100	REC OFF	—	Adjust 2nd. and 3rd. digits to get "Target Angle"
500	Cam Angle	0	☐	☐	100	REC OFF	5.11 ± 0.50	Record the final correction value "REC ON"

NOTE :

Cam angle value is slightly different under the following condition. Pay attention them when adjusting.

- 1) Before adjust the cam angle, pump should be warmed up.
 - 2) After install the pressure sensor between high pressure pipe and test nozzle holder, pump should be run 1 minute or more on test bench. Cam angle should be read out after such a stable condition.
 - 3) No test oil leakage from pressure sensor and piping.
 - 4) Pay attention to set opening pressure of test nozzles accuracy.
- Never forget removing pressure sensor from piping.

9. ADJUSTMENT OF FUEL DELIVERY (TCV connector must be disconnected before Q adjustment)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Fuel Delivery (mm ³ /st.cyl.)	Max. Spread In Delivery (mm ³ /st)	Reference	Outlet Fuel Temp (°C)
	Display Selector	First Digit	Duty Ratio Command	Pump Select Switch				
100	Q Adjust	0	0	REC OFF	66.8 ± 1.8	—	6E8 - 710	41.0 ± 1.5
100	Q Adjust	1	0	REC OFF	158.1 ± 2.4	—	7AF - 7F9	41.0 ± 1.5
300	Q Adjust	2	0	REC OFF	9.8 ± 1.0	3.5	648 - 668	41.0 ± 1.5
300	Q Adjust	3	0	REC OFF	95.1 ± 1.6	—	731 - 770	41.0 ± 1.5
500	Q Adjust	4	0	REC OFF	14.5 ± 1.0	2.0	625 - 646	43.0 ± 1.5
500	Q Adjust	5	0	REC OFF	96.2 ± 1.6	—	756 - 780	43.0 ± 1.5
1050	Q Adjust	6	0	REC OFF	17.2 ± 0.8	—	5F0 - 61B	48.0 ± 1.5
1050	Q Adjust	7	0	REC OFF	102.9 ± 1.2	5.0	7CC - 802	51.0 ± 1.5
775	Q Adjust	8	0	REC OFF	98.4 ± 1.4	—	79B - 7AC	47.0 ± 1.5
1375	Q Adjust	9	0	REC OFF	22.7 ± 0.7	—	5F8 - 631	54.0 ± 1.5
1375	Q Adjust	A	0	REC OFF	105.4 ± 1.2	4.5	82E - 861	55.0 ± 1.5
1700	Q Adjust	B	0	REC OFF	28.1 ± 0.8	—	618 - 651	59.0 ± 1.5
1700	Q Adjust	C	0	REC OFF	116.0 ± 1.3	5.5	8F2 - 95B	59.0 ± 1.5

NOTE : Select "REC ON" position every time when recording the final correction value.

- First Digit : First digit (The leftest of 3 digits) of "Injection Quantity Command Value" input switch.

10. ADJUSTMENT OF TIMER (TCV connector must be connected before timer adjustment)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Target Timer Angle (°CA)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
1800	Timer Adjust	000	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
1800	Timer Adjust	100	0	REC OFF	18.0 or more	
1800	Timer Adjust	200	0	REC OFF	7.0 or more	
1000	Timer Adjust	300	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
1000	Timer Adjust	400	0	REC OFF	7.9 ± 4.3	
500	Timer Adjust	500	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
500	Timer Adjust	600	0	REC OFF	18.0 or more	
500	Timer Adjust	700	0	REC OFF	0.1 or less	
200	Timer Adjust	800	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
200	Timer Adjust	9 □ □	0	REC OFF REC ON REC OFF	8.0	After getting target value, turn to "REC ON" position
200	Timer Adjust	A00	0	REC OFF	10.0 or more	
100	Timer Adjust	B00	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
100	Timer Adjust	C00	0	REC OFF	2.5 or more	

11. CONFIRMATION OF FUEL DELIVERY (TCV connector must be disconnected before Q confirmation)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Fuel Delivery (mm ³ /st.cyl.)	Max. Spread In Delivery (mm ³ /st.cyl.)	Reference	Outlet Fuel Temp (°C)
	Display Selector	First Digit	Duty Ratio Command	Pump Select Switch				
100	Confirm	0	0	REC OFF	66.8 ± 1.8	—	6E8 - 710	41.0 ± 1.5
100	Confirm	1	0	REC OFF	158.1 ± 2.4	—	7AF - 7F9	41.0 ± 1.5
300	Confirm	2	0	REC OFF	9.8 ± 1.0	3.5	648 - 668	41.0 ± 1.5
300	Confirm	3	0	REC OFF	95.1 ± 1.6	—	731 - 770	41.0 ± 1.5
500	Confirm	4	0	REC OFF	14.5 ± 1.0	2.0	625 - 646	43.0 ± 1.5
500	Confirm	5	0	REC OFF	96.2 ± 1.6	—	756 - 780	43.0 ± 1.5
1050	Confirm	6	0	REC OFF	17.2 ± 0.8	—	5F0 - 61B	48.0 ± 1.5
1050	Confirm	7	0	REC OFF	102.9 ± 1.2	5.0	7CC - 802	51.0 ± 1.5
775	Confirm	8	0	REC OFF	98.4 ± 1.4	—	79B - 7AC	47.0 ± 1.5
1375	Confirm	9	0	REC OFF	22.7 ± 0.7	—	5F8 - 631	54.0 ± 1.5
1375	Confirm	A	0	REC OFF	105.4 ± 1.2	4.5	82E - 861	55.0 ± 1.5
1700	Confirm	B	0	REC OFF	28.1 ± 0.8	—	618 - 651	59.0 ± 1.5
1700	Confirm	C	0	REC OFF	116.0 ± 1.3	5.5	8F2 - 95B	59.0 ± 1.5
2150	Confirm	D	0	REC OFF	21.4 ± 2.5	—	Check point	63.0 ± 4.0
2250	Confirm	E	0	REC OFF	7.0 or less	—	Check point	67.0 or less



INJECTION PUMP TEST SPECIFICATIONS with DST-1

098000-001#

INJECTION PUMP	098000-001#	INJECTION ORDER	A - B - C - D - E - F
		INJECTION INTERVAL	60° ± 30'
MANUFACTURER	TOYOTA	RATED VOLTAGE	14 ± 0.1 V
ENGINE TYPE	1HD-FTE	SPV AIR GAP	0.067 ± 0.005 mm
VEHICLE MODEL	LAND CRUISER	ROTATION	Clockwise viewed from drive side
TEST BENCH	AVM2PC (10HP)		

NOTE : Using the check harness and apply exact 12 V / 1 A for SPV AIR GAP Measurement.

1 . SETUP CONDITION

1) Nozzle	093400-7420	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)
3) Test Oil	SAE J967 (ISO4113)	7) Power Voltage	14 V
4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)	8) EDU Voltage Spec.	12 V

2 . RUNNING

Pump Speed (rpm)	Condition	Remarks
200	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	Drive more than 2 minutes.
1200		Drive more than 5 minutes.

3 . FUEL TEMP

Pump Speed (rpm)	Sensor Resistance (k Ω)	Remarks (Outlet Fuel Temp. : 40 ± 5 °C)
200	1.2 ± 0.7	

4 . NE SENSOR

Pump Speed (rpm)	Sensor Output Voltage (V)	Remarks
50	0.1 or more	

5 . INTERNAL PRESSURE

Pump Speed (rpm)	Feed Pressure (kg/cm ²)	Remarks
1800	15.8 - 16.8 (1.55 - 1.65 MPa)	

6 . OVER FLOW

Pump Speed (rpm)	Overflow Quantity (L/min)	Remarks
600	1.6 or less	The sub overflow valve belonging to the pump should be used for checking.
2250	2.1 - 2.5	

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7 . CAM ANGLE - 1 (PRESET)

Pump Speed (rpm)	Target Quantity (mm ³ /st-cyl.)	Remarks (Outlet Fuel Temp. : 43 ± 2 °C)
500	16.3 ± 1.0	

NOTE : When the correction value is raised by 1 level, the injection quantity is increased approx. 0.04 - 0.06 mm³/st-cyl.

8 . CAM ANGLE - 2 (AUTO)

Pump Speed (rpm)	Judging Standard	Remarks
500	To display "OK"	Input 2.56 ± 0.25 (°PA) when it is input the offset data.

NOTE : Never forget removing pressure sensor from piping.

9 . Q ADJUST

Pump Speed (rpm)	Target Quantity (mm ³ /st-cyl.)	Max. Spread In Delivery (mm ³ /st-cyl.)	Outlet Fuel Temp. (°C)	Remarks
100	66.0 ± 2.0	—	41.0 ± 1.5	
100	153.0 ± 2.5	—	41.0 ± 1.5	
300	10.0 ± 1.0	3.5	41.0 ± 1.5	
300	96.0 ± 1.5	—	41.0 ± 1.5	
500	15.0 ± 1.0	2.0	43.0 ± 1.5	
500	95.5 ± 1.5	—	43.0 ± 1.5	
1050	18.0 ± 1.0	—	48.0 ± 1.5	
1050	101.5 ± 1.0	5.0	51.0 ± 1.5	
775	98.5 ± 1.5	—	47.0 ± 1.5	
1375	23.0 ± 0.5	—	54.0 ± 1.5	
1375	105.5 ± 1.0	4.5	55.0 ± 1.5	
1700	28.5 ± 1.0	—	59.0 ± 1.5	
1700	116.0 ± 1.5	5.5	59.0 ± 1.5	
2150	21.0 ± 2.5	—	63.0 ± 4.0	Check point
2250	7.0 or less	—	67.0 or less	Check point

10 . TIMER ADJUST

Timing Control Valve (TCV) resistance : 11.3 ± 0.4 Ω

Pump Speed (rpm)	Target Timer Angle (°PA)	Remarks
1800	18.0 or more	Check point
1800	7.0 or more	Check point
1000	7.9 ± 4.3	Check point
500	18.0 or more	Check point
500	0.1 or less	Check point
200	8.0	Set point
200	10.0 or more	Check point
100	2.5 or more	Check point

For AVM2PC (10HP)

ECD

INJECTION PUMP TEST SPECIFICATIONS

098000-001#

INJECTION PUMP	098000-001#	Rotation	Clockwise viewed from drive side
		Injection Order	A - B - C - D - E - F
MANUFACTURER	TOYOTA	Injection Interval	60° ± 30'
ENGINE TYPE	1HD-FTE	Rated Voltage	14 ± 0.1 V
VEHICLE MODEL	LAND CRUISER	Air gap	0.067 ± 0.005 mm
Pump Select Switch No. (ECD Controller)		REC OFF / REC ON	

1. TEST CONDITIONS

1) Nozzle	093400-7420	4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
3) Test Oil	SAE J967 (ISO4113)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)

2. BREAK-IN DRIVE

Pump Speed (rpm)	ECD CONTROLLER SETTING				Condition	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
0	SPV ON	180	0	REC OFF	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	
0	SPV OFF	660	0	REC OFF		
200	SPL	660	0	REC OFF		Drive more than 2 minutes.
1200	SPL	660	0	REC OFF		Drive more than 5 minutes.

3. INSPECTION OF FUEL TEMPERATURE SENSOR

Pump Speed (rpm)	ECD CONTROLLER SETTING				Sensor Resistance (kΩ)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
50	SPV OFF	000	0	REC OFF	—	No injection setting
200	Fuel Temperature	000	0	REC OFF	1.2 ± 0.7	

4. INSPECTION OF Ne SENSOR

Pump Speed (rpm)	ECD CONTROLLER SETTING				Sensor Output Voltage (V)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
50	Np	000	0	REC OFF	0.1 or more	

5. FEED PRESSURE CONFIRMATION

Pump Speed (rpm)	ECD CONTROLLER SETTING				Feed Pressure (kg/cm ²)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
1800	Np	000	0	REC OFF	15.8 - 16.8 (1.55 - 1.65 MPa)	

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6. OVERFLOW QUANTITY CHECK

Pump Speed (rpm)	ECD CONTROLLER SETTING				Overflow Quantity (L/min)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
600	Np	000	0	REC OFF	1.6 or less	The overflow valve belonging to the pump should be used for checking.
2250	Np	000	0	REC OFF	2.1 - 2.5	

7. PRESETTING FOR CAM ANGLE ADJUSTMENT

Pump Speed (rpm)	ECD CONTROLLER SETTING						Target Quantity (mm³/st.cyl.)	Remarks (Outlet Fuel Temp. 43 ± 2°C)	
	Display Selector	Injection Quantity Command			Duty Ratio Command	Pump Select Switch		Activity	
		First digit	Second digit	Third digit					
0	SPV ON	2	E	0	100	REC OFF	—	Set ON	
0	SPV OFF	6	3	8	100	REC OFF	16.3 ± 1.0	Set OFF	If Measured fuel quantity is within target, go to the step of Record. Otherwise, got to the step below.
500	SPL	6	3	8	100	REC OFF		Measure	
500	SPV OFF	6	3	8	100	REC ↓ REC ON		Record	
500	SPV OFF	6	☐	☐	100	REC OFF	16.3 ± 1.0	Set OFF	Adjust 2nd & 3rd digits to get "Target Quantity" and go to "Record" step.
500	SPL	6	☐	☐	100	REC OFF		Measure	
500	SPV OFF	6	☐	☐	100	REC ↓ REC ON		Record	

NOTE : Select "REC ON" position every time when recording the final correction value.

- When the correction value is raised by 1 level, the injection quantity is increased approx. 0.04 - 0.06 mm³/st.cyl.

8. ADJUSTMENT OF CAM ANGLE

Pump Speed (rpm)	ECD CONTROLLER SETTING						Target Angle (°CA)	Remarks
	Display Selector	Injection Quantity Command			Duty Ratio Command	Pump Select Switch		
		First digit	Second digit	Third digit				
500	Cam Angle	0	0	0	100	REC OFF	—	Adjust 2nd. and 3rd. digits to get "Target Angle"
500	Cam Angle	0	☐	☐	100	REC OFF	5.11 ± 0.50	Record the final correction value "REC ON"

NOTE :

Cam angle value is slightly different under the following condition. Pay attention them when adjusting.

- 1) Before adjust the cam angle, pump should be warmed up.
 - 2) After install the pressure sensor between high pressure pipe and test nozzle holder, pump should be run 1 minute or more on test bench. Cam angle should be read out after such a stable condition.
 - 3) No test oil leakage from pressure sensor and piping.
 - 4) Pay attention to set opening pressure of test nozzles accuracy.
- Never forget removing pressure sensor from piping.

9. ADJUSTMENT OF FUEL DELIVERY (TCV connector must be disconnected before Q adjustment)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Fuel Delivery (mm ³ /st.cyl.)	Max. Spread In Delivery (mm ³ /st.cyl.)	Reference	Outlet Fuel Temp (°C)
	Display Selector	First Digit	Duty Ratio Command	Pump Select Switch				
100	Q Adjust	0	0	REC OFF	66.0 ± 2.0	—	6E8 - 710	41.0 ± 1.5
100	Q Adjust	1	0	REC OFF	153.0 ± 2.5	—	7AF - 7F9	41.0 ± 1.5
300	Q Adjust	2	0	REC OFF	10.0 ± 1.0	3.5	648 - 668	41.0 ± 1.5
300	Q Adjust	3	0	REC OFF	96.0 ± 1.5	—	731 - 770	41.0 ± 1.5
500	Q Adjust	4	0	REC OFF	15.0 ± 1.0	2.0	625 - 646	43.0 ± 1.5
500	Q Adjust	5	0	REC OFF	95.5 ± 1.5	—	756 - 780	43.0 ± 1.5
1050	Q Adjust	6	0	REC OFF	18.0 ± 1.0	—	5F0 - 61B	48.0 ± 1.5
1050	Q Adjust	7	0	REC OFF	101.5 ± 1.0	5.0	7CC - 802	51.0 ± 1.5
775	Q Adjust	8	0	REC OFF	98.5 ± 1.5	—	79B - 7AC	47.0 ± 1.5
1375	Q Adjust	9	0	REC OFF	23.0 ± 0.5	—	5F8 - 631	54.0 ± 1.5
1375	Q Adjust	A	0	REC OFF	105.5 ± 1.0	4.5	82E - 861	55.0 ± 1.5
1700	Q Adjust	B	0	REC OFF	28.5 ± 1.0	—	618 - 651	59.0 ± 1.5
1700	Q Adjust	C	0	REC OFF	116.0 ± 1.5	5.5	8F2 - 95B	59.0 ± 1.5

NOTE : Select "REC ON" position every time when recording the final correction value.

• First Digit : First digit (The leftest of 3 digits) of "Injection Quantity Command Value" input switch.

10. ADJUSTMENT OF TIMER (TCV connector must be connected before timer adjustment)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Target Timer Angle (°CA)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
1800	Timer Adjust	000	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
1800	Timer Adjust	100	0	REC OFF	18.0 or more	
1800	Timer Adjust	200	0	REC OFF	7.0 or more	
1000	Timer Adjust	300	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
1000	Timer Adjust	400	0	REC OFF	7.9 ± 4.3	
500	Timer Adjust	500	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
500	Timer Adjust	600	0	REC OFF	18.0 or more	
500	Timer Adjust	700	0	REC OFF	0.1 or less	
200	Timer Adjust	800	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
200	Timer Adjust	9 ☐ ☐	0	REC OFF REC ON REC OFF	8.0	After getting target value, turn to "REC ON" position
200	Timer Adjust	A00	0	REC OFF	10.0 or more	
100	Timer Adjust	B00	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
100	Timer Adjust	C00	0	REC OFF	2.5 or more	

For AVM2PC (10HP)

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11. CONFIRMATION OF FUEL DELIVERY (TCV connector must be disconnected before Q confirmation)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Fuel Delivery (mm ³ /st·cyl.)	Max. Spread In Delivery (mm ³ /st·cyl.)	Reference	Outlet Fuel Temp (°C)
	Display Selector	First Digit	Duty Ratio Command	Pump Select Switch				
100	Confirm	0	0	REC OFF	66.0 ± 2.0	—	6E8 - 710	41.0 ± 1.5
100	Confirm	1	0	REC OFF	153.0 ± 2.5	—	7AF - 7F9	41.0 ± 1.5
300	Confirm	2	0	REC OFF	10.0 ± 1.0	3.5	648 - 668	41.0 ± 1.5
300	Confirm	3	0	REC OFF	96.0 ± 1.5	—	731 - 770	41.0 ± 1.5
500	Confirm	4	0	REC OFF	15.0 ± 1.0	2.0	625 - 646	43.0 ± 1.5
500	Confirm	5	0	REC OFF	95.5 ± 1.5	—	756 - 780	43.0 ± 1.5
1050	Confirm	6	0	REC OFF	18.0 ± 1.0	—	5F0 - 61B	48.0 ± 1.5
1050	Confirm	7	0	REC OFF	101.5 ± 1.0	5.0	7CC - 802	51.0 ± 1.5
775	Confirm	8	0	REC OFF	98.5 ± 1.5	—	79B - 7AC	47.0 ± 1.5
1375	Confirm	9	0	REC OFF	23.0 ± 0.5	—	5F8 - 631	54.0 ± 1.5
1375	Confirm	A	0	REC OFF	105.5 ± 1.0	4.5	82E - 861	55.0 ± 1.5
1700	Confirm	B	0	REC OFF	28.5 ± 1.0	—	618 - 651	59.0 ± 1.5
1700	Confirm	C	0	REC OFF	116.0 ± 1.5	5.5	8F2 - 95B	59.0 ± 1.5
2150	Confirm	D	0	REC OFF	21.0 ± 2.5	—	Check point	63.0 ± 4.0
2250	Confirm	E	0	REC OFF	7.0 or less	—	Check point	67.0 or less



INJECTION PUMP TEST SPECIFICATIONS with DST-1

098000-001#

INJECTION PUMP	098000-001#	INJECTION ORDER	A - B - C - D - E - F
		INJECTION INTERVAL	60° ± 30'
MANUFACTURER	TOYOTA	RATED VOLTAGE	14 ± 0.1 V
ENGINE TYPE	1HD-FTE	SPV AIR GAP	0.067 ± 0.005 mm
VEHICLE MODEL	LAND CRUISER	ROTATION	Clockwise viewed from drive side
TEST BENCH	AVM2PC (20HP)		

NOTE : Using the check harness and apply exact 12 V / 1 A for SPV AIR GAP Measurement.

1 . SETUP CONDITION

1) Nozzle	093400-7420	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)
3) Test Oil	SAE J967 (ISO4113)	7) Power Voltage	14 V
4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)	8) EDU Voltage Spec.	12 V

2 . RUNNING

Pump Speed (rpm)	Condition	Remarks
200	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	Drive more than 2 minutes.
1200		Drive more than 5 minutes.

3 . FUEL TEMP

Pump Speed (rpm)	Sensor Resistance (k Ω)	Remarks (Outlet Fuel Temp. : 40 ± 5 °C)
200	1.2 ± 0.7	

4 . NE SENSOR

Pump Speed (rpm)	Sensor Output Voltage (V)	Remarks
50	0.1 or more	

5 . INTERNAL PRESSURE

Pump Speed (rpm)	Feed Pressure (kg/cm ²)	Remarks
1800	15.8 - 16.8 (1.55 - 1.65 MPa)	

6 . OVER FLOW

Pump Speed (rpm)	Overflow Quantity (L/min)	Remarks
600	1.6 or less	The sub overflow valve belonging to the pump should be used for checking.
2250	2.1 - 2.5	

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7 . CAM ANGLE - 1 (PRESET)

Pump Speed (rpm)	Target Quantity (mm ³ /st-cyl.)	Remarks (Outlet Fuel Temp. : 43 ± 2 °C)
500	16.3 ± 1.0	

NOTE : When the correction value is raised by 1 level, the injection quantity is increased approx. 0.04 - 0.06 mm³/st-cyl.

8 . CAM ANGLE - 2 (AUTO)

Pump Speed (rpm)	Judging Standard	Remarks
500	To display "OK"	Input 2.85 ± 0.25 (°PA) when it is input the offset data.

NOTE : Never forget removing pressure sensor from piping.

9 . Q ADJUST

Pump Speed (rpm)	Target Quantity (mm ³ /st-cyl.)	Max. Spread In Delivery (mm ³ /st-cyl.)	Outlet Fuel Temp. (°C)	Remarks
100	67.8 ± 2.0	—	41.0 ± 1.5	
100	157.7 ± 2.4	—	41.0 ± 1.5	
300	11.2 ± 1.0	3.5	41.0 ± 1.5	
300	103.0 ± 1.6	—	41.0 ± 1.5	
500	16.1 ± 0.9	2.0	43.0 ± 1.5	
500	95.6 ± 1.6	—	43.0 ± 1.5	
1050	19.1 ± 0.8	—	48.0 ± 1.5	
1050	101.0 ± 1.2	5.0	51.0 ± 1.5	
775	99.4 ± 1.4	—	47.0 ± 1.5	
1375	23.4 ± 0.7	—	54.0 ± 1.5	
1375	104.2 ± 1.2	4.5	55.0 ± 1.5	
1700	29.8 ± 0.8	—	59.0 ± 1.5	
1700	114.0 ± 1.3	5.5	59.0 ± 1.5	
2150	22.7 ± 2.5	—	63.0 ± 4.0	Check point
2250	7.2 or less	—	67.0 or less	Check point

10 . TIMER ADJUST

Timing Control Valve (TCV) resistance : 11.3 ± 0.4 Ω

Pump Speed (rpm)	Target Timer Angle (°PA)	Remarks
1800	18.0 or more	Check point
1800	7.0 or more	Check point
1000	7.9 ± 4.3	Check point
500	18.0 or more	Check point
500	0.1 or less	Check point
200	8.0	Set point
200	10.0 or more	Check point
100	2.5 or more	Check point

For AVM2PC (20HP)

ECD

INJECTION PUMP TEST SPECIFICATIONS

098000-001#

INJECTION PUMP	098000-001#	Rotation	Clockwise viewed from drive side
		Injection Order	A - B - C - D - E - F
MANUFACTURER	TOYOTA	Injection Interval	60° ± 30'
ENGINE TYPE	1HD-FTE	Rated Voltage	14 ± 0.1 V
VEHICLE MODEL	LAND CRUISER	Air gap	0.067 ± 0.005 mm
Pump Select Switch No. (ECD Controller)		REC OFF / REC ON	

1. TEST CONDITIONS

1) Nozzle	093400-7420	4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
3) Test Oil	SAE J967 (ISO4113)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)

2. BREAK-IN DRIVE

Pump Speed (rpm)	ECD CONTROLLER SETTING				Condition	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
0	SPV ON	180	0	REC OFF	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	
0	SPV OFF	660	0	REC OFF		
200	SPL	660	0	REC OFF		Drive more than 2 minutes.
1200	SPL	660	0	REC OFF		Drive more than 5 minutes.

3. INSPECTION OF FUEL TEMPERATURE SENSOR

Pump Speed (rpm)	ECD CONTROLLER SETTING				Sensor Resistance (kΩ)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
50	SPV OFF	000	0	REC OFF	—	No injection setting
200	Fuel Temperature	000	0	REC OFF	1.2 ± 0.7	

4. INSPECTION OF Ne SENSOR

Pump Speed (rpm)	ECD CONTROLLER SETTING				Sensor Output Voltage (V)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
50	Np	000	0	REC OFF	0.1 or more	

5. FEED PRESSURE CONFIRMATION

Pump Speed (rpm)	ECD CONTROLLER SETTING				Feed Pressure (kg/cm ²)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
1800	Np	000	0	REC OFF	15.8 - 16.8 (1.55 - 1.65 MPa)	

2004.01.14

6. OVERFLOW QUANTITY CHECK

Pump Speed (rpm)	ECD CONTROLLER SETTING				Overflow Quantity (L/min)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
600	Np	000	0	REC OFF	1.6 or less	The overflow valve belonging to the pump should be used for checking.
2250	Np	000	0	REC OFF	2.1 - 2.5	

7. PRESETTING FOR CAM ANGLE ADJUSTMENT

Pump Speed (rpm)	ECD CONTROLLER SETTING						Target Quantity (mm³/st.cyl.)	Remarks (Outlet Fuel Temp. 43 ± 2°C)	
	Display Selector	Injection Quantity Command			Duty Ratio Command	Pump Select Switch		Activity	
		First digit	Second digit	Third digit					
0	SPV ON	2	E	0	100	REC OFF	—	Set ON	
0	SPV OFF	6	3	8	100	REC OFF	16.3 ± 1.0	Set OFF	If Measured fuel quantity is within target, go to the step of Record. Otherwise, got to the step below.
500	SPL	6	3	8	100	REC OFF		Measure	
500	SPV OFF	6	3	8	100	REC ↓ REC ON		Record	
500	SPV OFF	6	☐	☐	100	REC OFF	16.3 ± 1.0	Set OFF	Adjust 2nd & 3rd digits to get "Target Quantity" and go to "Record" step.
500	SPL	6	☐	☐	100	REC OFF		Measure	
500	SPV OFF	6	☐	☐	100	REC ↓ REC ON		Record	

NOTE : Select "REC ON" position every time when recording the final correction value.

- When the correction value is raised by 1 level, the injection quantity is increased approx. 0.04 - 0.06 mm³/st.cyl.

8. ADJUSTMENT OF CAM ANGLE

Pump Speed (rpm)	ECD CONTROLLER SETTING						Target Angle (°CA)	Remarks
	Display Selector	Injection Quantity Command			Duty Ratio Command	Pump Select Switch		
		First digit	Second digit	Third digit				
500	Cam Angle	0	0	0	100	REC OFF	—	Adjust 2nd. and 3rd. digits to get "Target Angle"
500	Cam Angle	0	☐	☐	100	REC OFF	2.85 ± 0.50	Record the final correction value "REC ON"

NOTE :

Cam angle value is slightly different under the following condition. Pay attention them when adjusting.

- 1) Before adjust the cam angle, pump should be warmed up.
 - 2) After install the pressure sensor between high pressure pipe and test nozzle holder, pump should be run 1 minute or more on test bench. Cam angle should be read out after such a stable condition.
 - 3) No test oil leakage from pressure sensor and piping.
 - 4) Pay attention to set opening pressure of test nozzles accuracy.
- Never forget removing pressure sensor from piping.

9. ADJUSTMENT OF FUEL DELIVERY (TCV connector must be disconnected before Q adjustment)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Fuel Delivery (mm ³ /st.cyl.)	Max. Spread In Delivery (mm ³ /st.cyl.)	Reference	Outlet Fuel Temp (°C)
	Display Selector	First Digit	Duty Ratio Command	Pump Select Switch				
100	Q Adjust	0	0	REC OFF	67.8 ± 2.0	—	6E8 - 710	41.0 ± 1.5
100	Q Adjust	1	0	REC OFF	157.7 ± 2.4	—	7AF - 7F9	41.0 ± 1.5
300	Q Adjust	2	0	REC OFF	11.2 ± 1.0	3.5	648 - 668	41.0 ± 1.5
300	Q Adjust	3	0	REC OFF	103.0 ± 1.6	—	731 - 770	41.0 ± 1.5
500	Q Adjust	4	0	REC OFF	16.1 ± 0.9	2.0	625 - 646	43.0 ± 1.5
500	Q Adjust	5	0	REC OFF	95.6 ± 1.6	—	756 - 780	43.0 ± 1.5
1050	Q Adjust	6	0	REC OFF	19.1 ± 0.8	—	5F0 - 61B	48.0 ± 1.5
1050	Q Adjust	7	0	REC OFF	101.0 ± 1.2	5.0	7CC - 802	51.0 ± 1.5
775	Q Adjust	8	0	REC OFF	99.4 ± 1.4	—	79B - 7AC	47.0 ± 1.5
1375	Q Adjust	9	0	REC OFF	23.4 ± 0.7	—	5F8 - 631	54.0 ± 1.5
1375	Q Adjust	A	0	REC OFF	104.2 ± 1.2	4.5	82E - 861	55.0 ± 1.5
1700	Q Adjust	B	0	REC OFF	29.8 ± 0.8	—	618 - 651	59.0 ± 1.5
1700	Q Adjust	C	0	REC OFF	114.0 ± 1.3	5.5	8F2 - 95B	59.0 ± 1.5

NOTE : Select "REC ON" position every time when recording the final correction value.

• First Digit : First digit (The leftest of 3 digits) of "Injection Quantity Command Value" input switch.

10. ADJUSTMENT OF TIMER (TCV connector must be connected before timer adjustment)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Target Timer Angle (°CA)	Remarks
	Display Selector	Injection Quantity Command	Duty Ratio Command	Pump Select Switch		
1800	Timer Adjust	000	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
1800	Timer Adjust	100	0	REC OFF	18.0 or more	
1800	Timer Adjust	200	0	REC OFF	7.0 or more	
1000	Timer Adjust	300	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
1000	Timer Adjust	400	0	REC OFF	7.9 ± 4.3	
500	Timer Adjust	500	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
500	Timer Adjust	600	0	REC OFF	18.0 or more	
500	Timer Adjust	700	0	REC OFF	0.1 or less	
200	Timer Adjust	800	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
200	Timer Adjust	9 ☐ ☐	0	REC OFF REC ON REC OFF	8.0	After getting target value, turn to "REC ON" position
200	Timer Adjust	A00	0	REC OFF	10.0 or more	
100	Timer Adjust	B00	0	REC OFF REC ON REC OFF	—	Initialize ECD controller
100	Timer Adjust	C00	0	REC OFF	2.5 or more	

For AVM2PC (20HP)

098000-001#

11. CONFIRMATION OF FUEL DELIVERY (TCV connector must be disconnected before Q confirmation)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Fuel Delivery (mm ³ /st·cyl.)	Max. Spread In Delivery (mm ³ /st·cyl.)	Reference	Outlet Fuel Temp (°C)
	Display Selector	First Digit	Duty Ratio Command	Pump Select Switch				
100	Confirm	0	0	REC OFF	67.8 ± 2.0	—	6E8 - 710	41.0 ± 1.5
100	Confirm	1	0	REC OFF	157.7 ± 2.4	—	7AF - 7F9	41.0 ± 1.5
300	Confirm	2	0	REC OFF	11.2 ± 1.0	3.5	648 - 668	41.0 ± 1.5
300	Confirm	3	0	REC OFF	103.0 ± 1.6	—	731 - 770	41.0 ± 1.5
500	Confirm	4	0	REC OFF	16.1 ± 0.9	2.0	625 - 646	43.0 ± 1.5
500	Confirm	5	0	REC OFF	95.6 ± 1.6	—	756 - 780	43.0 ± 1.5
1050	Confirm	6	0	REC OFF	19.1 ± 0.8	—	5F0 - 61B	48.0 ± 1.5
1050	Confirm	7	0	REC OFF	101.0 ± 1.2	5.0	7CC - 802	51.0 ± 1.5
775	Confirm	8	0	REC OFF	99.4 ± 1.4	—	79B - 7AC	47.0 ± 1.5
1375	Confirm	9	0	REC OFF	23.4 ± 0.7	—	5F8 - 631	54.0 ± 1.5
1375	Confirm	A	0	REC OFF	104.2 ± 1.2	4.5	82E - 861	55.0 ± 1.5
1700	Confirm	B	0	REC OFF	29.8 ± 0.8	—	618 - 651	59.0 ± 1.5
1700	Confirm	C	0	REC OFF	114.0 ± 1.3	5.5	8F2 - 95B	59.0 ± 1.5
2150	Confirm	D	0	REC OFF	22.7 ± 2.5	—	Check point	63.0 ± 4.0
2250	Confirm	E	0	REC OFF	7.2 or less	—	Check point	67.0 or less

For Cooma**ECD****INJECTION PUMP TEST SPECIFICATIONS with DST-1**

098000-0010

INJECTION PUMP	098000-001#	INJECTION ORDER	A - B - C - D - E - F
		INJECTION INTERVAL	60°
MANUFACTURER	TOYOTA	RATED VOLTAGE	12 V
ENGINE TYPE	1HD-FTE	SPV AIR GAP	0.067 ± 0.005 mm
VEHICLE MODEL	LAND CRUISER	ROTATION	Clockwise viewed from drive side
TEST BENCH	CPS		

NOTE : Using the check harness and apply exact 12 V / 1 A for SPV AIR GAP Measurement.

1 . SETUP CONDITION

1) Nozzle	093400-3200	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)
3) Test Oil	SAE J967 (ISO4113)	7) Power Voltage	14 V
4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)	8) EDU Voltage Spec.	12 V

2 . RUNNING

Pump Speed (rpm)	Condition	Remarks
200	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	Drive more than 2 minutes.
1200		Drive more than 5 minutes.

3 . FUEL TEMP

Pump Speed (rpm)	Sensor Resistance (k Ω)	Remarks (Outlet Fuel Temp. : 40 ± 5 °C)
200	1.2 ± 0.7	

4 . NE SENSOR

Pump Speed (rpm)	Sensor Output Voltage (V)	Remarks
50	0.1 or more	

5 . INTERNAL PRESSURE

Pump Speed (rpm)	Feed Pressure (kg/cm ²)	Remarks
1800	16.6 ± 0.8 (1.6 ± 0.1 MPa)	

6 . OVER FLOW

Pump Speed (rpm)	Overflow Quantity (cc/min)	Remarks
600	1600 or less	The sub overflow valve belonging to the pump should be used for checking.
2250	2000 - 2900	

2002.07.31

7 . CAM ANGLE - 1 (PRESET)

Pump Speed (rpm)	Target Quantity (cc/200st)	Remarks (Outlet Fuel Temp. : 43 ± 2 °C)
500	3.22 ± 0.36	

NOTE : When the correction value is raised by 1 level, the injection quantity is increased approx. 0.04 - 0.06 mm³/st·cyl.

8 . CAM ANGLE - 2 (AUTO)

Pump Speed (rpm)	Judging Standard	Remarks
500	To display "OK"	Use 2.81 (°PA) when the offset data is input.

NOTE : Never forget removing pressure sensor from piping.

9 . Q ADJUST

Pump Speed (rpm)	Target Quantity (cc/200st)	Max. Spread In Delivery (cc/200st)	Outlet Fuel Temp. (°C)	Remarks
100	13.86 ± 1.40	—	41.0 ± 0.5	
100	15.58 ± 0.70 (cc/100st)	—	41.0 ± 0.5	
300	2.47 ± 0.50	0.7	41.0 ± 1.5	
300	9.97 ± 0.40 (cc/100st)	—	41.0 ± 1.5	
500	3.14 ± 0.36	0.5	43.0 ± 1.5	
500	9.99 ± 0.24 (cc/100st)	—	43.0 ± 1.5	
1050	3.81 ± 0.26	—	48.0 ± 1.5	
1050	10.16 ± 0.22 (cc/100st)	1.0	51.0 ± 1.5	
775	10.62 ± 0.22 (cc/100st)	—	47.0 ± 1.5	
1375	4.85 ± 0.30	—	54.0 ± 1.5	
1375	10.72 ± 0.21 (cc/100st)	0.9	55.0 ± 1.5	
1700	6.10 ± 0.30	—	59.0 ± 1.5	
1700	11.91 ± 0.28 (cc/100st)	1.1	59.0 ± 1.5	
2150	4.41 ± 1.50	—	63.0 ± 4.0	Check point
2250	1.36 or less	—	67.0 or less	Check point

10 . TIMER ADJUST

Pump Speed (rpm)	Target Timer Angle (°PA)	Remarks
1800	18.0 or more	Check point
1800	7.0 or more	Check point
1000	6.8 ± 3.2	Check point
1000	1.0 or less	Check point
500	18.0 or more	Check point
500	0.2 or less	Check point
200	8.0	Set point
200	15.0 or more	Check point
100	7.5 or more	Check point

INJECTION PUMP TEST SPECIFICATIONS with DST-1

098000-0010

INJECTION PUMP	098000-001#	INJECTION ORDER	A - B - C - D - E - F
		INJECTION INTERVAL	60°
MANUFACTURER	TOYOTA	RATED VOLTAGE	12 V
ENGINE TYPE	1HD-FTE	SPV AIR GAP	0.067 ± 0.005 mm
VEHICLE MODEL	LAND CRUISER	ROTATION	Clockwise viewed from drive side
TEST BENCH	CPS		

NOTE : Using the check harness and apply exact 12 V / 1 A for SPV AIR GAP Measurement.

1 . SETUP CONDITION

1) Nozzle	093400-3200	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)
3) Test Oil	SAE J967 (ISO4113)	7) Power Voltage	14 V
4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)	8) EDU Voltage Spec.	12 V

2 . RUNNING

Pump Speed (rpm)	Condition	Remarks
200	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	Drive more than 2 minutes.
1200		Drive more than 5 minutes.

3 . FUEL TEMP

Pump Speed (rpm)	Sensor Resistance (k Ω)	Remarks (Outlet Fuel Temp. : 40 ± 5 °C)
200	1.2 ± 0.7	

4 . NE SENSOR

Pump Speed (rpm)	Sensor Output Voltage (V)	Remarks
50	0.1 or more	

5 . INTERNAL PRESSURE

Pump Speed (rpm)	Feed Pressure (kg/cm ²)	Remarks
1800	16.6 ± 0.8 (1.6 ± 0.1 MPa)	

6 . OVER FLOW

Pump Speed (rpm)	Overflow Quantity (cc/min)	Remarks
600	1600 or less	The sub overflow valve belonging to the pump should be used for checking.
2250	2000 - 2900	

2002.07.31

For Cornell Fuel

098000-0010

7 . CAM ANGLE - 1 (PRESET)

Pump Speed (rpm)	Target Quantity (cc/200st)	Remarks (Outlet Fuel Temp. : 43 ± 2 °C)
500	3.22 ± 0.36	

NOTE : When the correction value is raised by 1 level, the injection quantity is increased approx. 0.04 - 0.06 mm³/st·cyl.**8 . CAM ANGLE - 2 (AUTO)**

Pump Speed (rpm)	Judging Standard	Remarks
500	To display "OK"	Use 2.99 (°PA) when the offset data is input.

NOTE : Never forget removing pressure sensor from piping.

9 . Q ADJUST

Pump Speed (rpm)	Target Quantity (cc/200st)	Max. Spread In Delivery (cc/200st)	Outlet Fuel Temp. (°C)	Remarks
100	13.27 ± 1.40	—	41.0 ± 0.5	
100	15.08 ± 0.70 (cc/100st)	—	41.0 ± 0.5	
300	2.45 ± 0.50	0.7	41.0 ± 1.5	
300	10.20 ± 0.40 (cc/100st)	—	41.0 ± 1.5	
500	3.34 ± 0.36	0.5	43.0 ± 1.5	
500	10.05 ± 0.24 (cc/100st)	—	43.0 ± 1.5	
1050	3.85 ± 0.26	—	48.0 ± 1.5	
1050	10.22 ± 0.22 (cc/100st)	1.0	51.0 ± 1.5	
775	10.66 ± 0.22 (cc/100st)	—	47.0 ± 1.5	
1375	4.93 ± 0.30	—	54.0 ± 1.5	
1375	10.66 ± 0.21 (cc/100st)	0.9	55.0 ± 1.5	
1700	6.19 ± 0.30	—	59.0 ± 1.5	
1700	11.96 ± 0.28 (cc/100st)	1.1	59.0 ± 1.5	
2150	4.54 ± 1.50	—	63.0 ± 4.0	Check point
2250	1.36 or less	—	67.0 or less	Check point

10 . TIMER ADJUST

Pump Speed (rpm)	Target Timer Angle (°PA)	Remarks
1800	18.0 or more	Check point
1800	7.0 or more	Check point
1000	6.8 ± 3.2	Check point
1000	1.0 or less	Check point
500	18.0 or more	Check point
500	0.2 or less	Check point
200	8.0	Set point
200	15.0 or more	Check point
100	7.5 or more	Check point

For DIAU**ECD****INJECTION PUMP TEST SPECIFICATIONS with DST-1**

098000-0010

INJECTION PUMP	098000-001#	INJECTION ORDER	A - B - C - D - E - F
		INJECTION INTERVAL	60°
MANUFACTURER	TOYOTA	RATED VOLTAGE	12 V
ENGINE TYPE	1HD-FTE	SPV AIR GAP	0.067 ± 0.005 mm
VEHICLE MODEL	LAND CRUISER	ROTATION	Clockwise viewed from drive side
TEST BENCH	CPS		

NOTE : Using the check harness and apply exact 12 V / 1 A for SPV AIR GAP Measurement.

1 . SETUP CONDITION

1) Nozzle	093400-3200	5) High Pressure Pipe	Ø2 × Ø6 × 840 mm
2) Nozzle Opening Pressure	17.7 ± 0.2 MPa (180 ± 2 kg/cm ²)	6) Fuel Temperature	41 - 43 °C (105.8 - 109.4 °F)
3) Test Oil	SAE J967 (ISO4113)	7) Power Voltage	14 V
4) Feed Pressure	19.6 kPa (0.2 kg/cm ²)	8) EDU Voltage Spec.	12 V

2 . RUNNING

Pump Speed (rpm)	Condition	Remarks
200	No fuel leaks, no abnormal noise, and no abnormal temperature rising.	Drive more than 2 minutes.
1200		Drive more than 5 minutes.

3 . FUEL TEMP

Pump Speed (rpm)	Sensor Resistance (k Ω)	Remarks (Outlet Fuel Temp. : 40 ± 5 °C)
200	1.2 ± 0.7	

4 . NE SENSOR

Pump Speed (rpm)	Sensor Output Voltage (V)	Remarks
50	0.1 or more	

5 . INTERNAL PRESSURE

Pump Speed (rpm)	Feed Pressure (kg/cm ²)	Remarks
1800	16.6 ± 0.8 (1.6 ± 0.1 MPa)	

6 . OVER FLOW

Pump Speed (rpm)	Overflow Quantity (cc/min)	Remarks
600	1600 or less	The sub overflow valve belonging to the pump should be used for checking.
2250	2000 - 2900	

2002.07.31

For EPS-715

098000-001#

11. CONFIRMATION OF FUEL DELIVERY (TCV connector must be disconnected before Q confirmation)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Fuel Delivery (mm ³ /st·cyl.)	Max. Spread In Delivery (mm ³ /st·cyl.)	Reference	Outlet Fuel Temp (°C)
	Display Selector	First Digit	Duty Ratio Command	Pump Select Switch				
100	Confirm	0	0	REC OFF	70.1 ± 1.8	—	6E8 - 710	41.0 ± 1.5
100	Confirm	1	0	REC OFF	159.2 ± 2.4	—	7AF - 7F9	41.0 ± 1.5
300	Confirm	2	0	REC OFF	11.6 ± 1.0	3.5	648 - 668	41.0 ± 1.5
300	Confirm	3	0	REC OFF	99.7 ± 1.6	—	731 - 770	41.0 ± 1.5
500	Confirm	4	0	REC OFF	15.4 ± 0.9	2.0	625 - 646	43.0 ± 1.5
500	Confirm	5	0	REC OFF	100.3 ± 1.6	—	756 - 780	43.0 ± 1.5
1050	Confirm	6	0	REC OFF	19.2 ± 0.8	—	5F0 - 61B	48.0 ± 1.5
1050	Confirm	7	0	REC OFF	106.5 ± 1.2	5.0	7CC - 802	51.0 ± 1.5
775	Confirm	8	0	REC OFF	102.6 ± 1.4	—	79B - 7AC	47.0 ± 1.5
1375	Confirm	9	0	REC OFF	24.7 ± 0.7	—	5F8 - 631	54.0 ± 1.5
1375	Confirm	A	0	REC OFF	111.2 ± 1.2	4.5	82E - 861	55.0 ± 1.5
1700	Confirm	B	0	REC OFF	31.8 ± 0.8	—	618 - 651	59.0 ± 1.5
1700	Confirm	C	0	REC OFF	124.3 ± 1.3	5.5	8F2 - 95B	59.0 ± 1.5
2150	Confirm	D	0	REC OFF	26.2 ± 2.5	—	Check point	63.0 ± 4.0
2250	Confirm	E	0	REC OFF	7.0 or less	—	Check point	67.0 or less

11. CONFIRMATION OF FUEL DELIVERY (TCV connector must be disconnected before Q confirmation)

Pump Speed (rpm)	ECD CONTROLLER SETTING				Fuel Delivery (mm ³ /st·cyl.)	Max. Spread In Delivery (mm ³ /st·cyl.)	Reference	Outlet Fuel Temp (°C)
	Display Selector	First Digit	Duty Ratio Command	Pump Select Switch				
100	Confirm	0	0	REC OFF	68.5 ± 1.8	—	6E8 - 710	41.0 ± 1.5
100	Confirm	1	0	REC OFF	155.3 ± 2.4	—	7AF - 7F9	41.0 ± 1.5
300	Confirm	2	0	REC OFF	11.4 ± 1.0	3.5	648 - 668	41.0 ± 1.5
300	Confirm	3	0	REC OFF	98.2 ± 1.6	—	731 - 770	41.0 ± 1.5
500	Confirm	4	0	REC OFF	15.0 ± 0.9	2.0	625 - 646	43.0 ± 1.5
500	Confirm	5	0	REC OFF	101.4 ± 1.6	—	756 - 780	43.0 ± 1.5
1050	Confirm	6	0	REC OFF	17.6 ± 0.8	—	5F0 - 61B	48.0 ± 1.5
1050	Confirm	7	0	REC OFF	106.5 ± 1.2	5.0	7CC - 802	51.0 ± 1.5
775	Confirm	8	0	REC OFF	102.5 ± 1.4	—	79B - 7AC	47.0 ± 1.5
1375	Confirm	9	0	REC OFF	24.1 ± 0.7	—	5F8 - 631	54.0 ± 1.5
1375	Confirm	A	0	REC OFF	108.0 ± 1.2	4.5	82E - 861	55.0 ± 1.5
1700	Confirm	B	0	REC OFF	31.1 ± 0.8	—	618 - 651	59.0 ± 1.5
1700	Confirm	C	0	REC OFF	122.7 ± 1.3	5.5	8F2 - 95B	59.0 ± 1.5
2150	Confirm	D	0	REC OFF	24.2 ± 2.5	—	Check point	63.0 ± 4.0
2250	Confirm	E	0	REC OFF	7.0 or less	—	Check point	67.0 or less