

BRAND MODEL ²⁹⁵SD2100 DIESEL ENGINE

OPERATION AND MAINTENANCE MANUAL

TO USERS

Thank you for buying and using brand Model 295 and SD 2100 diesel engines made by our plant, and please keep in contact with us.

To buy a good diesel engine is a wish of all users, Accumulating much experience making engines for about 30 years, the products can fulfil your requests in all respects such as reliability, dynamic characteristics, economy index and post-sale service. You can rest assured that all engines are very good.

Before using the products, it is essential to read the Manual for extending the service life of the engine and improving economic efficiency. Please engage in operation and maintenance according to the Manual.

The engine will be improved from time to time. Therefore it is possible that the engine supplied may be slightly different from what is given in this manual before getting the revised Manual, of which please take note.

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Chapter 1 Technical Specifications of Diesel Engine and its Accessories

1-1 Main Technical Specifications and Applications of Model 295 Diesel Engines

Model		295T	295G	295GA	295GB	295GJ	295G-2
Type		Vertical, water cooling, four stroke, swirl chamber					
Number of Cylinder		2					
Cylinder bore (mm)		95					
Piston stroke(mm)		115					
Total displacement(L)		1.63					
Compression ratio		18~20					
Rated power/speed kW/rpm		12 hr power					
		17.5/2000	18/2000	17.6/2000		18/2000	
Fuel specific consumption at rated output g/kW · hr	Qualified product	≤265.2	≤258.4	≤265.2		≤258.3	
	First rate	≤258.4	≤253	≤258.4		≤253	
	High class						
Max torque (N · m)		≥96.9					
Max torque/speed(rpm)		≤1400					
Max no-load speed (rpm)		≤2160					
Idling speed(rpm)		≤600					
Direction of rotation(face on end of power output)		Counterclockwise					
Cooling manner		Forced water cooling					
Lubricating manner		Pressure and splash combined					
Starting manner		Elec.	Elec. and Hand	Elec.		Hand	
Net mass(kg)		≤280	≤380	≤395	≤355	≤310	≤365
Main applications		Tractor	Farm products processing, agriculture irrigation, Engineering machinery				

295GY	295GY-1	295B	295QB	295C	295C ₁	295D	295D ₁	295D ₂
Vertical, water cooling, four stroke, swirl chamber								
2								
95								
115								
1.63								
18~20								
12hr power			1hr power	Continuous power		12hr power		
17.6/2000			17.6/2000	15.6/2000	16.5/2000	13.5/1500	16/1800	17.6/2000
≤258.4		≤265.2			≤258.4	≤265.2		
≤253		≤258.4			≤253	≤258.4		
			≥96.9					
			≤1400					
≤2160				≤2220		≤1575	≤1890	≤2100
≤600								
Counterclockwise								
Forced water cooling								
Pressure and splash combined								
Elec. and Hand		Elec.		Elec. and Hand		Elec.		
≤300	≤295	≤340	≤280	≤350	≤295	≤340	≤340	≤340
Inland river dredgers		Air pump unit	Farm trucks	Marine engine unit		Generating sets		Recor accord with SAE standard of USA

1-2 Main Technical Specifications and Applications of Model SD2100 Diesel Engines

Model	SD2100T	SD2100G	SD2100GA	SD2100GB	SD2100GJ	SD2100G-2
Type	Vertical, water cooling, four stroke, swirl chamber					
Number of cylinder	2					
Cylinder bore(mm)	100					
Piston stroke(mm)	115					
Total displacement(L)	1.81					
Compression ratio	18~20					
Rated power/speed (kW/rpm)	12 hr power					
	22/2200					
Fuel specific consumption at rated output (g/kW · h)	Qualified product	≤263.8	≤257	≤263.8		≤257
	First rate	≤257	≤250.2	≤257		≤250.2
	High class					
Max. Torque(N · m)	≥110					
Max. Torque speed (rpm)	≤1540					
Max. No-load speed(rpm)	≤2376					
Idling speed(rpm)	≤700					
Direction of rotation(face on end of power output)	Counterclockwise					
Cooling manner	Forced water cooling					
Lubricating manner	Pressure and splash combined					
Starting manner	Elec.	Elec. and Hand	Elec.		Hand	
Net mass(Kg)	≤285	≤385	≤400	≤360	≤315	≤370
Main applications	Tractor	Farm products processing、Agriculture irrigation、Engineering machinery				

SD2100GY	SD2100GY-1	SD2100B	SD2100QB	SD2100C	SD2100D	SD2100D ₁
Vertical, water cooling, four stroke, swirl chamber						
2						
100						
115						
1.81						
18~20						
12hr power		1 hr power		Continuous power	12hr power	
22/2200		22/2200		16.5/1800	15/1500	18/1800
≤257	≤263.8		≤257	≤263.8		
≤250.2	≤257		≤250.2	≤257		
		≥109.8				
		≤1540				
≤2376				≤2000	≤1575	≤1890
≤700						
Counterclockwise						
Forced water cooling						
Pressure and splash combined						
Elec. and Hand		Elec.		Elec. and Hand	Elec.	
≤305	≤300	≤345	≤285	≤300	≤345	≤345
Inland river dredgers		Air pump unit	Farm trucks	Marine engine Unit	Generating sets	

1-3 Main Technical Specifications and Applications of Model 295A Diesel Engines

Model		295TA	295A	295A-1	295A-2	295A-3	295A-4
Type		Vertical, water cooling, four stroke, direct injection chamber					
Number of cylinder		2					
Cylinder bore(mm)		95					
Piston stroke(mm)		115					
Total displacement(L)		1.63					
Compression ratio		17					
Rated power /speed (kW/rpm)		12hr power					
		20/2200					
Fuel specific consumption at rated output (g/kW · h)	Qualified product	≤250	≤243.2		≤250	≤243.2	
	First rate	≤243.2	≤236.4		≤243.2	≤236.4	
	High class						
Max. Torque(N · m)		≥99.8					
Max torque speed (rpm)		≤1540					
Max no-load speed(rpm)		≤2376					
Idling speed (rpm)		≤700					
Direction of rotation(face on end of power output)		Counterclockwise					
Cooling manner		Forced water cooling					
Lubricating manner		Pressure and splash combined					
Starting manner		Elec.	Elec. and Hand	Hand	Elec.		Hand
Net mass(kg)		≤280	≤380	≤310	≤395	≤355	≤365
Main applications		Tractor	Farm products processing, Agriculture irrigation, Engineering machinery				

295A-5	295A-6	295BA	295CA	295C ₁ A	295DA	295D ₁ A	295D ₂ A	295YA
Vertical, water cooling, four stroke, direct injection chamber								
2								
95								
115								
1.63								
17								
12 hr power			Continuous power		12hr power			1hr power
20/2200			15.6/2000	16.5/2000	13.5/1500	16/1800	18/2000	20/2200
≤243.2	≤250		≤243.2	≤250				
≤236.4	≤243.2		≤236.4	≤243.2				
								≥99.8
								≤1540
≤2376		≤2220		≤1575	≤1890	≤2100	≤2376	
≤700								
Counterclockwise								
Forced water cooling								
Pressure and splash combined								
Elec. and Hand		Elec.	Elec. and Hand		Elec.			
≤300	≤295	≤340	≤350	≤295	≤340	≤340	≤340	≤280
Inland river dredgers		Air pump unit	Marine engine unit		Generating sets		Rear accord with SAE standard of USA	Farm trucks

1-4 Main Technical Specifications and Applications of Model SD2100A Diesel Engines

Model		SD2100TA	SD2100A	SD2100A-1	SD2100A-2	SD2100A-3	SD2100A-4
Type		Vertical, water cooling, four stroke, direct injection chamber					
Number of cylinder		2					
Cylinder bore (mm)		100					
Piston stroke (mm)		115					
Total displacement(L)		1.81					
Compression ratio		17					
Rated power/speed (kW/rpm)		12hr power					
		22/2200					
Fuel specific consumption at rated output (g/kW·h)	Qualified product	≤250	≤243.2	≤250	≤243.2	≤250	≤243.2
	First rate	≤243.2	≤236.4	≤243.2	≤236.4	≤243.2	≤236.4
	High class	≤243.2	≤236.4	≤243.2	≤236.4	≤243.2	≤236.4
Max. Torque(N·m)		≥110					
Max torque speed (rpm)		≤1540					
Max no-load speed(rpm)					≤2376		
Idling speed (rpm)					≤700		
Direction of rotation(face on end of power output)					Counterclockwise		
Cooling manner					Forced water cooling		
Lubricating manner					Pressure and splash combined		
Starting manner		Elec.	Elec. and Hand	Hand	Elec.	Hand	
Net mass(kg)		≤285	≤385	≤315	≤400	≤360	≤370
Main applications		Tractor	Farm products processing, Agriculture irrigation, Engineering machinery				

SD2100A-5	SD2100A-6	SD2100BA	SD2100C,A	SD2100DA	SD2100D,A	SD2100YA
Vertical, water cooling, four stroke, direct injection chamber						
2						
100						
115						
1.81						
17						
12hr power		Continuous power		12 hr power		1hr power
22/2200		16.5/1800		15/1500	18/1800	22/2200
≤243.2	≤250	≤243.2	≤250			
≤236.4	≤243.2	≤236.4	≤243.2			
						≥110
						≤1540
≤2376		≤2000	≤1575	≤1890	≤2376	
≤700						
Counterclockwise						
Forced water cooling						
Pressure and splash combined						
Elec. and Hand		Elec.	Elec. and Hand	Elec.		
≤305	≤300	≤345	≤300	≤345	≤345	≤285
Inland river dredgers		Air pump unit	Marine engine unit	Generating sets		Farm trucks

1-5 Technical Specifications of Main Accessories of Model 295 Diesel Engines

Model		295T	295G	295GA	295GB	295GJ	295G-2	295GY
No. I Fuel injection pump	Model	BF2 I 80ZR						
	Type	Hypotenuse fuel cut-off, regulating arm adjust						
	Plunger diameter(mm)	8						
Fuel pump	Model							
	Type							
Governor	Model	TIF250-1000TX	TIF250-1000ZX					
	Type	All-speed centrifugal						
	Steady governing rate(%)	≤ 8						
Fuel injector	Model	ZS4S I						
	Type	Single-hole pintle type						
Oil pump	Model	JZX1018						
	Type	Single stage, radial, gear-within-gear rotary pump						
	Speed(rpm)	1905						
	Pressure(Kpa)	294						
	Displacement (L/min)	10.98~13.02						
Cooling water pump	Type	Centrifugal, volute, single stage						
	Speed (rpm)	2790						
	Delivery lift(m)	5						
	Displacement (L/min)	55.8						
Thermostat	Model	155D		155D				
	Initial open temperature(°C)	70±2		70±2				
	Full open temperature(°C)	82±2		82±2				
Oil filter	Type	Single stage paper filter cartridge						
	Model	J0810 II						
Fuel filter	Type	Single stage paper filter cartridge						
	Model	C0708						
Air filter	Type	3-stage net cartridge oil-bath	Single stage ,dry					3-stage net cartridge oil-bath
	Model		K1706					

295GY-1	295B	295QB	295C	295C ₁	295D	295D ₁	295D ₂
BF2 I 80ZR							
Hypotenuse fuel cut-off regulating arm adjust							
8							
SI/H2204							
Single-action piston type							
TIF250-1000ZX	TIF250-1000QX	TIF250-1030CX	TIF250-1030CX	TIF250-750D	TIF250-900D	TIF250-1000D	
All-speed centrifugal							
≤8				≤5			
ZS4S I							
Single-hole pintle type							
JZX1018							
Single stage, radial, gear-within-gear rotary pump							
1905				1430	1715	1905	
294							
10.98~13.02				8.22~9.78	9.90~11.70	10.98~13.02	
Centrifugal, volute, single stage							
2790				2093	2511	2790	
5				3	4	5	
55.8				42.0	50.4	55.8	
155D							
70±2							
82±2							
Single stage paper filter cartridge							
J0810 II							
Single stage paper filter cartridge							
C0708							
3-Stage net cartridge oil-bath	Single stage, dry						
K1706							

Continuation (1-5)

Model		295T	295G	295GA	295GB	295GJ	295G-2	295GY	
Generator	Model	JF01C							JF01C
	Output power(W)	180							180
	Operating voltage(V)	14							14
	Output current(A)	13							13
	Grounding type	Negative ground							Negative ground
Starting motor	Model	QD12							QD12
	Voltage(v)	12							12
	Rated power(kW)	1.47							1.47
Battery	Model	3-Q-120							3-Q-120
	Capacity(A · h)	120							120
Regulator	Model	FT70							FT70
	Low load, V is	14.2-14.8							14.2-14.8
	70% load, V is	Lower0~0.5							Lower 0-0.5
Radiator	Type	Gilled tube			Gilled tube				
	Heat-sinking area(m ²)	6			6				
Heat exchanger	Type								
	Heat-sinking area(m ²)								
Seawater pump	Type								
	Speed(rpm)								
	Displacement (L/min)								
	Pressure head(m)								
	Suction head(m)								

Note: It can match Model 2JF200 generator according to the requirement of the user. Output power is 200W.

295GY-1	295B	295QB	295C	295C ₁	295D	295D ₁	295D ₂
JF01C			JF11N		JF01C		
180			350		180		
14							
13			25		13		
Negative ground							
QD12							
12							
1.47							
3-Q-120			6-JC-195		3-Q-120		
120			195		120		
FT70							
14.2~14.8							
Lower 0-0.5							
	Gilled tube					Gilled tube	
	6					6	
			Gilled tube				
			0.368				
			Z6135				
			2800				
			91.8				
			8.5				
			4.5				

1-6 Technical Specifications of Main Accessories of Model SD 2100 Diesel Engines

Model		SD2100T	SD2100G	SD2100GA	SD2100GB	SD2100GJ	SD2100G-2
No. 1 Fuel injection pump	Model	BF2 I 85ZR					
	Type	Hypotenuse fuel cut-off, regulating arm adjust					
	Plunger diameter(mm)	8.5					
Fuel pump	Model						
	Type						
Governor	Model	TIF250-1100TX	TIF250-1100ZX				
	Type	All-speed centrifugal					
	Steady governing rate(%)	≤8					
Fuel injector	Model	ZS4S I					
	Type	Single-hole Pintle type					
Oil pump	Model	JZX1018					
	Type	Single stage, radial, gear-within-gear rotary pump					
	Speed(rpm)	2095					
	Pressure(Kpa)	294					
	Displacement (L/min)	12.06-14.34					
Cooling water pump	Type	Centrifugal, volute, single stage					
	Speed (rpm)	3070					
	Delivery lift(m)	6					
	Displacement (L/min)	61.2					
Thermostat	Model	155D		155D			
	Initial open temperature(°C)	70±2		70±2			
	Full open temperature(°C)	82±2		82±2			
Oil filter	Type	Single stage paper filter cartridge					
	Model	J0810 II					
Fuel filter	Type	Single stage paper filter cartridge					
	Model	C0708					
Air filter	Type	3-stage net cartridge oil-bath	Single stage ,dry				
	Model	K1706					

SD2100GY	SD2100GY-1	SD2100B	SD2100QB	SD2100C,	SD2100D	SD2100D,
BF2 I 85ZR						
Hypotenuse fuel cut-off, regulating arm adjust						
8.5						
SI/H2204						
Single-action piston type						
TIF250-1100ZX	TIF250-1100QX	TIF250-925CX	TIF250-750D	TIF250-900D		
All-speed centrifugal						
≤8				≤5		
ZS4S I						
Single-hole pintle type						
JZX1018						
Single stage, radial, gear-within-gear rotary pump						
2095			1715	1430	1715	
294						
12.06-14.34			9.90-11.70	8.22-9.78	9.90-11.70	
Centrifugal, volute, single stage						
3070			2510	2090	2510	
6			4	3	4	
61.2			50.4	42.0	50.4	
155D						
70±2						
82±2						
Single stage paper filter cartridge						
J0810 II						
Single stage paper filter cartridge						
C0708						
3-stage net cartridge oil-bath	Single stage, dry					
	K1706					

Continuation (1-6)

Model		SD2100T	SD2100G	SD2100GA	SD2100GB	SD2100GJ	SD2100G-2
Generator	Model	JF01C					
	Output power(W)	180					
	Operating voltage(V)	14					
	Output current(A)	13					
	Grounding type	Negative ground					
Starting motor	Model	QD12					
	Voltage(v)	12					
	Rated power(kW)	1.47					
Battery	Model	3-Q-120					
	Capacity (A h)	120					
regulator	Model	FT70					
	Low load, V is	14.2-14.8					
	70% load, V is	Lower0-0.5					
radiator	Type	Gilled tube			Gilled tube		
	Heat-sinking	7			7		

Note: It can match Model 2JF200 generator according to the requirement of the user.

Output power is 200W.

SD2100GY	SD2100GY-1	SD2100B	SD2100QB	SD2100C,	SD2100D	SD2100D,
JF01C				JF11N	JF01C	
180				350	180	
14						
13				25	13	
Negative ground						
QD12						
12						
1.47						
3-Q-120				6-JC-195	3-Q-120	
120				195	120	
FT70						
14.2~14.8						
Lower 0-0.5						
	Gilled tube				Gilled tube	
	7				7	

1-7 Technical Specifications of Main Accessories of Model 295A and SD2100A diesel engines

Model		295TA SD2100TA	295A SD2100A	295A-1 SD2100A-1	295A-2 SD2100A-2	295A-3 SD2100A-3	295A-4 SD2100A-4	295A-5 SD2100A-5
No. I Reinforced Fuel injection pump	Model	BF2 I 85ZR						
	Type	Hypotenuse fuel cut-off, regulating arm adjust						
	Plunger diameter (mm)	8.5						
Fuel pump	Model							
	Type							
Governor	Model	TIF250- 1100TX	TIF250-1100ZX					
	Type	All-speed centrifugal						
	Steady governing rate(%)	≤8						
Fuel injector	Model	PF68S5						
	Type	Multihole length type						
Oil pump	Model	JZX1018						
	Type	Single stage, radial ,gear-within-gear rotary pump						
	Speed(rpm)	2095						
	Displacement (L/min)	12.06~14.34						
	Pressure(Kpa)	294						
Cooling water pump	Type	Centrifugal, volute, single stage						
	Speed (rpm)	3070						
	Displacement (L/min)	61.2						
	Delivery lift (m)	6						
Thermostat	Model	155D				155D		
	Initial open temperature(°C)	70±2				70±2		
	Full open temperature(°C)	82±2				82±2		
Oil filter	Model	J0810 II						
	Type	Single stage paper filter cartridge						
Fuel filter	Model	C0708						
	Type	Single stage paper filter cartridge						
Air filter	Model		K1706					
	Type	3-stage net cartridge oil- bath	Single stage, dry					3-stage net cartridge oil-bath

295A-6 SD2100A-6	295BA SD2100BA	295CA	295C,A SD2100 C,A	295DA SD2100DA	295D,A SD2100 D,A	295D ₂ A	295YA SD2100YA
BF2 I 85ZR							
Hypotenuse fuel cut-off, regulating arm adjust							
8.5							
SI/H2204						SI/H2204	
Single-action piston type						Single-action piston type	
TIF250-1100CX	TIF 250- 1030CX	TIF250-1030CX TIF250-925CX*	TIF250- 750D	TIF250- 900D	TIF250- 1000D	TIF250- 1100QX	
All-speed centrifugal							
≤8				≤5		≤8	
PF68S5							
Multihole length type							
JZX1018							
Single stage, radial, gear-within-gear rotary pump							
2095	1905	1905 1715*	1430	1715	1905	2095	
12.06~14.34	10.98~ 13.02	10.98~13.02 9.90~11.70*	8.22~9.78	9.90~11.70	10.98~13.02	12.06~14.34	
294							
Centrifugal, volute, single stage							
3070	2790	2790 2510*	2090	2510	2790	3070	
61.2	55.8	55.8 50.4*	42.0	50.4	55.8	61.2	
6	5	5 4*	3	4	5	6	
155D							
70±2							
82±2							
J0810 II							
Single stage paper filter cartridge							
C0708							
Single stage paper filter cartridge							
K1706							
3-stage net cartridge oil-bath	Single stage, dry						

Continuation (1-7)

Model		295TA SD2100TA	295A SD2100A	295A-1 SD2100A-1	295A-2 SD2100A-2	295A-3 SD2100A-3	295A-4 SD2100A-4	295A-5 SD2100A-5
Generator	Model	JF01C			JF01C			JF01C
	Output power(w)	180			180			180
	Operating Voltage(V)	14			14			14
	Output current(A)	13			13			13
	Grounding type	Negative ground			Negative ground			Negative ground
Starting Motor	Model	QD12			QD12			QD12
	Voltage(V)	12			12			12
	Rated power(kW)	1.47			1.47			1.47
Battery	Model	3-Q-120			3-Q-120			3-Q-120
	Capacity (A · h)	120			120			120
Regulator	Model	FT70			FT70			FT70
	Low load, V is	14.2~14.8			14.2~14.8			14.2~14.8
	70% load, V is	Lower 0-0.5			Lower 0-0.5			Lower 0-0.5
Radiator	Type	Gilled tube			Gilled tube			
	Heat-sinking area(m ²)	6 7*			6 7*			
Heat exchanger	Type							
	Heat-sinking area(m ²)							
Seawater pump	Type							
	Speed (rpm)							
	Displacement (L/min)							
	Pressure head(m)							
	Suction head (m)							

Note: (1) The data with *is data of Model SD2100A diesel engine.

(2) It can match Model 2JF200 generator according to the requirement of the user. Output power is 200 W.

295A-6 SD2100A-6	295BA SD2100BA	295CA	295C,A SD2100 C,A	295DA SD2100DA	295D,A SD2100 D,A	295D,A	295YA SD2100YA
JF01C		JF11N		JF01C			
180		350		180			
14							
13		25		13			
Negative ground							
QD12							
12							
1.47							
3-Q-120		6-JC-195		3-Q-120			
120		195		120			
FT70							
14.2~14.8							
Lower 0~0.5							
	Gilled tube			Gilled tube			
	6 7*			6 7*			
		Gilled tube					
		0.368					
		Z6135					
		2800					
		91.8					
		8.5					
		4.5					

1-8 Main Technical Data of Model 295 and SD2100 Diesel Engines

Model		295T SD2100T	295G SD2100G	295GA SD2100GA	295GB SD2100GB	295GJ SD2100GJ	295G-2 SD2100G-2
Exhaust temperature(°C)				≤470	≤490*		
Engine oil temperature(°C)				≤100			
Cooling water temperature at outlet(°C)				75~95			
Lube oil pressure Kpa(Kgf/cm ²)	At rated speed			196~392(2~4)			
	At idle speed			≥49(0.5)			
Timing phase(°) (crank angle)	Intake valve open (before T.D.C.)			12±3			
	Intake valve close (after B.D.C.)			36±3			
	Intake continuous angle			228			
	Exhaust valve open (before B.D.C.)			56±3			
	Exhaust valve close (after T.D.C.)			12±3			
	Exhaust continuous angle			248			
Valve clearance cold(mm)	Intake valve			0.25~0.35			
	Exhaust valve			0.30~0.40			
Valve Stroke (mm)				11			
Fuel supply advance angle(°) (Crank angle)	Before T.D.C.			16±2			
				17±2*			
Injecting pressure[Kpa(kgf/cm ²)]				11769 ⁺⁹⁸⁰ ₀ (120 ⁺¹⁰ ₀)			
Compression clearance height(mm)				0.51~1.25			
Decompression clearance(mm)				1~1.5			
Clutch release bearing-to release lever clearance (mm)			2-3				2-3
Lube oil capacity in lower crankcase (L)				6.5~7.5			
Fuel tank capacity(L)				21			
Tightening moment of main nuts and bolts N·m (Kgf·m)	Main bearing nuts			137-157(14~16)			
	Counterbalance bolts			88-127(9~13)			
	Connecting rod bolts			98-118(10~12)			
	Flywheel fixing bolts			98-118(10~12)			
	Cylinder-head nuts			118-137(12~14)			

Note: The data with * is data of Model SD2100 diesel engine.

295GY SD2100GY	295GY-1 SD2100GY-1	295B SD2100B	295QB SD2100QB	295C	295C ₁ SD2100 C ₁	295D SD2100D	295D ₁ SD2100D ₁	295D ₂
≤ 470 $\leq 490^*$				≤ 470	≤ 470 $\leq 490^*$		≤ 470	
≤ 100								
75~95								
196~392(2~4)								
$\geq 49(0.5)$								
12 ± 3								
36 ± 3								
228								
56 ± 3								
12 ± 3								
248								
0.25~0.35								
0.30~0.40								
11								
16 ± 2 $17 \pm 2^*$						14 ± 2		16 ± 2
$11769 \begin{matrix} +980 \\ 0 \end{matrix} (120 \begin{matrix} +10 \\ 0 \end{matrix})$								
0.51~1.25								
1~1.5								
6.5~7.5								
21						21		
137~157(14~16)								
88~127(9~13)								
98~118(10~12)								
98~118(10~12)								
118~137(12~14)								

1-9 Main Technical Data of Model 295A and SD2100A diesel engines

Model		295TA SD2100TA	295A SD2100A	295A-1 SD2100A-1	295A-2 SD2100A-2	295A-3 SD2100A-3	295A-4 SD2100A-4
Exhaust temperature(°C)		≤540					
Engine oil temperature(°C)		≤100					
Cooling water temperature at outlet(°C)		75~95					
Lube oil pressure [kpa(kg/cm ²)]	At rated speed	196~392(2~4)					
	At idle speed	≥49(0.5)					
Timing phase(°) (crank angle)	Intake valve open (before T.D.C.)	12±3					
	Intake valve close (after B.D.C)	36±3					
	Intake continuous angle	228					
	Exhaust valve open (before BDC)	56±3					
	Exhaust valve close (after T.D.C)	12±3					
	Exhaust continuous angle	248					
Valve clearance cold(mm)	Intake valve	0.25~0.35					
	Exhaust valve	0.30~0.40					
Valve stroke(mm)		11					
Fuel supply advance angle [(°)(crank angle)]Before IDC		20±2					
Injecting pressure[Kpa(kg/cm ²)]		19110 ⁺⁴⁹⁰ ₀ (195 ⁺⁵ ₀)					
Compression clearance height(mm)		0.51~1.25					
Decompression clearance(mm)		1~1.5					
Clutch release bearing to-release level clearance(mm)			2~3		2~3		2~3
Lube oil capacity in lower crankcase(L)		6.5~7.5					
Fuel tank capacity(L)		21					
Tightening moments of main nuts and bolts [N·M (kgf·m)]	Main bearing nuts	137~157(14~16)					
	Counter balance bolts	88~127(9~13)					
	Connecting rod bolts	98~118(10~12)					
	Flywheel fixing bolts	98~118(10~12)					
	Cylinder-head nuts	118~137(12~14)					

295A-5 SD2100A-5	295A-6 SD2100A-6	295BA SD2100BA	295CA	295C,A SD2100C,A	295DA SD2100DA	295D,A SD2100D,A	295D ₂ A	295YA SD2100YA
≤ 540								
≤ 100								
75~95								
196~392 (2~4)								
≥ 49 (0.5)								
12 ± 3								
36 ± 3								
228								
56 ± 3								
12 ± 3								
248								
0.25~0.35								
0.30~0.40								
11								
20 ± 2			18 ± 2				20 ± 2	
$19110_{0}^{+490 +5} (195_{0}^{+5})$								
0.51~1.25								
1~1.5								
6.5~7.5								
21			21					
137~157(14~16)								
88~127(9~13)								
98~118(10~12)								
98~118(10~12)								
118~137(12~14)								

1-10 Fitting Clearance and The limits of Wear of Main Parts of Model 295 and 295A Diesel Engines

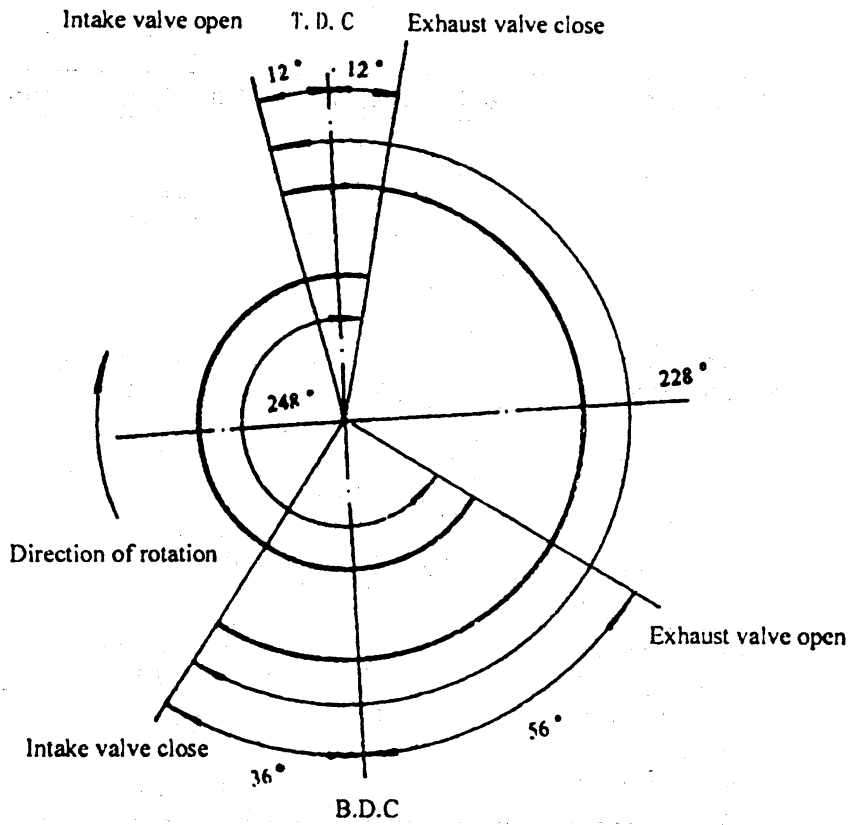
No.	Concern part	Standard size(mm)	Fitting(mm)	Limits of wear(mm)
1	Piston skirt(long shaft) Cylinder sleeve	shaft $\Phi 95$ $\begin{matrix} -0.11 \\ -0.13 \end{matrix}$ Hole $\Phi 95H7$ $\begin{pmatrix} +0.035 \\ 0 \end{pmatrix}$	Clearance 0.11~0.165	0.5
2	The first piston ring gap		Clearance 0.20~0.40	1.5
3	The 2nd and 3rd piston ring gaps		Clearance 0.15~0.35	1.2
4	Oil ring gap		Clearance 0.15~0.35	1.2
5	Piston pin Connecting rod bushing hole	shaft $\Phi 35h4$ $\begin{pmatrix} 0 \\ -0.007 \end{pmatrix}$ hole $\Phi 35$ $\begin{pmatrix} +0.045 \\ +0.020 \end{pmatrix}$	Clearance 0.02~0.052	0.15
6	Piston pin Piston pin hole	shaft $\Phi 35h4$ $\begin{pmatrix} 0 \\ -0.007 \end{pmatrix}$ Hole $\Phi 35M6$ $\begin{pmatrix} -0.005 \\ -0.016 \end{pmatrix}$	Transition clearance 0.012 Interference 0.016	
7	Crankshaft connecting rod journal Connecting rod big end bearing shells	shaft $\Phi 65h6$ $\begin{pmatrix} 0 \\ -0.019 \end{pmatrix}$ Hole $\Phi 65$ $\begin{pmatrix} +0.095 \\ +0.050 \end{pmatrix}$	Clearance 0.05~0.114	0.30
8	Main journal of crankshaft Main bearing hole	shaft $\Phi 70h6$ $\begin{pmatrix} 0 \\ -0.019 \end{pmatrix}$ Hole $\Phi 70$ $\begin{pmatrix} +0.119 \\ +0.070 \end{pmatrix}$	Clearance 0.07~0.138	0.30
9	Camshaft journal Camshaft bushing hole	shaft $\Phi 48e7$ $\begin{pmatrix} -0.050 \\ -0.075 \end{pmatrix}$ Hole $\Phi 48H7$ $\begin{pmatrix} +0.025 \\ 0 \end{pmatrix}$	Clearance 0.05~0.10	0.30
10	The axial clearance of crankshaft		Clearance 0.07~0.189	0.5
11	The axial clearance of camshaft		Clearance 0.10~0.28	0.4
12	Valve tappet Valve tappet hole of cylinder block	shaft $\Phi 16f7$ $\begin{pmatrix} -0.016 \\ -0.034 \end{pmatrix}$ Hole $\Phi 16H8$ $\begin{pmatrix} +0.027 \\ 0 \end{pmatrix}$	Clearance 0.016~0.061	0.25
13	Intake valve valve guide	shaft $\Phi 9$ $\begin{pmatrix} -0.03 \\ -0.05 \end{pmatrix}$ Hole $\Phi 9H7$ $\begin{pmatrix} +0.018 \\ 0 \end{pmatrix}$	Clearance 0.03~0.068	0.30

No.	Concern part	Standard size(mm)	Fitting(mm)	Limits of wear(mm)
14	Exhaust valve valve guide	shaft $\Phi 9 \begin{pmatrix} -0.04 \\ -0.06 \end{pmatrix}$ Hole $\Phi 9H7 \begin{pmatrix} +0.017 \\ 0 \end{pmatrix}$	Clearance 0.04~0.077	0.30
15	Rocker arm shaft Rocker arm bushing	shaft $\Phi 16f7 \begin{pmatrix} -0.016 \\ -0.034 \end{pmatrix}$ Hole $\Phi 16H7 \begin{pmatrix} +0.018 \\ 0 \end{pmatrix}$	Clearance 0.016~0.052	0.25
16	Idler shaft Idler gear bushing	shaft $\Phi 20f7 \begin{pmatrix} -0.020 \\ -0.041 \end{pmatrix}$ Hole $\Phi 20H7 \begin{pmatrix} +0.021 \\ 0 \end{pmatrix}$	Clearance 0.02~0.062	0.25
17	The axial clearance of idler gear		Clearance 0.10~0.40	
18	Sinking volume of intake valve		1.75~2.45	
19	Sinking volume of exhaust valve		1.75~2.45	

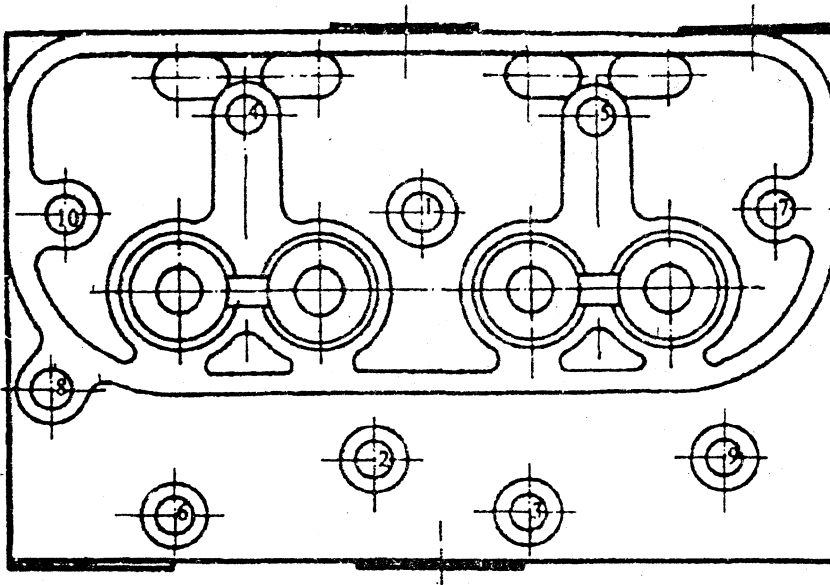
1-11 Fitting Clearance and the Limits of Wear of Main Parts of Model SD2100 and SD2100A Diesel Engines

No.	Concern part	Standard size	Fitting(mm)	Limits of wear(mm)
1	Piston skirt(long shaft) Cylinder sleeve	shaft $\Phi 100$ $\begin{matrix} -0.14 \\ -0.17 \end{matrix}$ Hole $\Phi 100H7$ $\begin{pmatrix} +0.035 \\ 0 \end{pmatrix}$	Clearance 0.11~0.205	0.5
2	The first piston ring gap		Clearance 0.35~0.50	1.5
3	The 2nd and 3rd piston ring gaps		Clearance 0.35~0.50	1.2
4	Oil ring gap		Clearance 0.30~0.45	1.2
5	Piston pin connecting rod bushing hole	shaft $\Phi 35h4$ $\begin{pmatrix} 0 \\ -0.007 \end{pmatrix}$ hole $\Phi 35$ $\begin{pmatrix} +0.045 \\ +0.020 \end{pmatrix}$	Clearance 0.02~0.052	0.15
6	Piston pin piston pin hole	shaft $\Phi 35h4$ $\begin{pmatrix} 0 \\ -0.007 \end{pmatrix}$ Hole $\Phi 35$ $\begin{pmatrix} +0.009 \\ -0.005 \end{pmatrix}$	Transition clearance 0.016 Interference 0.005	
7	Crankshaft connecting rod journal Connecting rod big end bearing shells	shaft $\Phi 65h6$ $\begin{pmatrix} 0 \\ -0.019 \end{pmatrix}$ Hole $\Phi 65$ $\begin{pmatrix} +0.095 \\ +0.050 \end{pmatrix}$	Clearance 0.05~0.114	0.30
8	Main journal of crankshaft Main bearing hole	shaft $\Phi 70h6$ $\begin{pmatrix} 0 \\ -0.019 \end{pmatrix}$ Hole $\Phi 70$ $\begin{pmatrix} +0.119 \\ +0.070 \end{pmatrix}$	Clearance 0.07~0.138	0.30
9	Camshaft journal Camshaft bushing hole	shaft $\Phi 48e7$ $\begin{pmatrix} -0.050 \\ -0.075 \end{pmatrix}$ Hole $\Phi 48H7$ $\begin{pmatrix} +0.025 \\ 0 \end{pmatrix}$	Clearance 0.05~0.10	0.30
10	The axial clearance of crankshaft		Clearance 0.07~0.189	
11	The axial clearance of camshaft		Clearance 0.10~0.28	
12	Valve tappet Valve tappet hole of cylinder block	shaft $\Phi 16f7$ $\begin{pmatrix} -0.016 \\ -0.034 \end{pmatrix}$ Hole $\Phi 16H8$ $\begin{pmatrix} +0.027 \\ 0 \end{pmatrix}$	Clearance 0.016~0.061	0.25
13	Intake valve Valve guide	shaft $\Phi 9$ $\begin{pmatrix} -0.03 \\ -0.05 \end{pmatrix}$ Hole $\Phi 9H7$ $\begin{pmatrix} +0.018 \\ 0 \end{pmatrix}$	Clearance 0.03~0.068	0.30

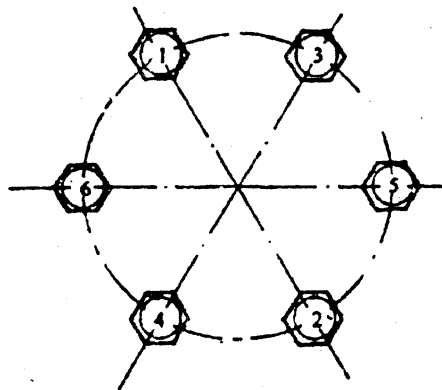
No.	Concern part	Standard size(mm)	Fitting(mm)	Limits of wear(mm)
14	Exhaust valve Valve guide	shaft $\Phi 9 \begin{pmatrix} -0.04 \\ -0.06 \end{pmatrix}$ Hole $\Phi 9H7 \begin{pmatrix} +0.018 \\ 0 \end{pmatrix}$	Clearance 0.04~0.078	0.30
15	Rocker arm shaft Rocker arm bushing	shaft $\Phi 16f7 \begin{pmatrix} -0.016 \\ -0.034 \end{pmatrix}$ Hole $\Phi 16H7 \begin{pmatrix} +0.018 \\ 0 \end{pmatrix}$	Clearance 0.016~0.052	0.25
16	Idler shaft Idler gear bushing	shaft $\Phi 20f7 \begin{pmatrix} -0.020 \\ -0.041 \end{pmatrix}$ Hole $\Phi 20H7 \begin{pmatrix} +0.021 \\ 0 \end{pmatrix}$	Clearance 0.02~0.062	0.25
17	The axial clearance of idler gear		Clearance 0.10-0.40	
18	Sinking volume of intake valve		1.75~2.45	
19	Sinking volume of exhaust valve		1.75~2.45	



Model 295、295A、SD2100 and SD2100A diesel engines
intake and exhaust phase



Model 295、295A、SD2100 and SD2100A diesel engines
Cylinder-head nuts tightening-up order



Model 295、295A、SD2100 and SD2100A diesel engines flywheel
locking bolts tightening-up order.

Chapter 2 Diesel Engine Mounting and Pulley Diameter Selection of Matching Implements

2—1 Diesel Engine Mounting

Model 295T and 295TA, SD2100 and SD2100TA diesel engine are matches for Model 250 tractor and Model 300 tractor. Their contours and mounting dimensions are shown in Fig. 1.

Model 295G, 295GA, 295GJ, 295GB, 295G-2, 295B, 295A, 295A-1, 295A-2, 295A-3, 295A-4, 295BA, SD2100G, SD2100GA, SD2100GB, SD2100GJ, SD2100G-2, SD2100B, SD2100A, SD2100A-1, SD2100A-2, SD2100A-3, SD2100A-4 and SD2100BA diesel engines are used for fixed operations. Their contours and mounting dimensions are shown in Fig. 2-7. Diesel engine should be mounted on a strong and horizontal base by means of four M16×300 holding down bolts for reliable operation and small vibration. When diesel engines match complete harvester, dumpable radiator should be added, Model 295GY, 295GY-1, 295A-5, 295A-6, SD2100GY, SD2100GY-1, SD2100A-5, and SD2100A-6 diesel engines are taken as engine of river dredgers. Its contour and mounting dimensions are shown in Fig. 8 and 9.

Model 295C and 295CA diesel engines are taken as a main engine of a small sea fishing boat. It possesses a seawater cooling system and a fresh water cooling system. Seawater pump and fresh water pump are driven by the engine crankshaft pulley through Model B triangle belts respectively. From outside the boat, the seawater is sucked into the heat exchanger to cool the fresh water, then enter it in the sandwich of the exhaust pipe to cool the exhaust pipe, finally it is drained away. The fresh water flows into the heat exchanger after cooling the diesel engine, in the heat exchanger, the fresh water is cooled by the seawater, finally it flows into the diesel engine by means of the cooling water pump again. The contour and mounting dimensions are shown in Fig. 10.

Model 295C₁, 295C₁A, SD2100C₁, SD2100C₁A diesel engines are taken as a main engine of a small sea fishing boat which possesses a seawater cooling system. The contour and mounting dimensions are shown in Fig. 11 and 12.

Model 295D, 295DA, and SD2100D, SD2100DA diesel engines are differently taken as a power of 10Kw and 12Kw alternating current generator sets of 50Hz. Model 295D₁, 295D₁A and SD2100D₁, SD2100D₁A diesel engines are differently taken as a power of 12Kw and 14Kw

alternating current generator sets of 60Hz. The contour and mounting dimensions are shown in Fig.13 and 14. Model 295D₂ and 295D₂A diesel engines are taken as a power of generator sets which rear-connecting size accord with SAE standard of USA. Its rear trestle is SAE 3", flywheel is SAE 11 $\frac{1}{2}$ ". The contour and mounting dimensions are shown in Fig.15. Model 295QB、295YA、SD2100QB and SD2100YA diesel engines are taken as a power of 1~1.5 ton agricultural vehicle. In order to swit it to the agriculture vehicle. Because the Model 203A heating plug is mounted on the intake pipe, the cold-starting ability is improved. The exhaust pipe's outlet end with a flange is inclined backwards and downwards, it can be connected with the exhaust muffler. The contour and mounting dimensions are shown in Fig.7.

Two hooks on the cylinder-head are used to hoist the engine.

2—2 Pulley Diameter selection of Matching Implement.

For the Model 295G、295GA、295GB、295GJ、295G-2、295A、295A-1、295A-2、295A-3、295A-4、SD2100G、SD2100GA、SD2100GB、SD2100GJ、SD2100G-2、SD2100A、SD2100A-1、SD2100A-2、SD2100A-3、SD2100A-4 diesel engines, the power output of engine to matching implement is completed by means of the pulleys and belts. According to the user's requirement, we can mount flat pulley and triangle pulley.

According to the following formula, we can select the pulley diameter of a matching implement.

$$D_2 = \frac{D_1 \times n_1}{n_2}$$

where D_2 —— pulley diameter of the matching implement

D_1 —— pulley diameter of the diesel engine

n_1 —— rated speed of the diesel engine

n_2 —— pulley speed of the matching implement

In general, the center distance between two pulleys should be about 1.5~2 m, it is no good being too small.

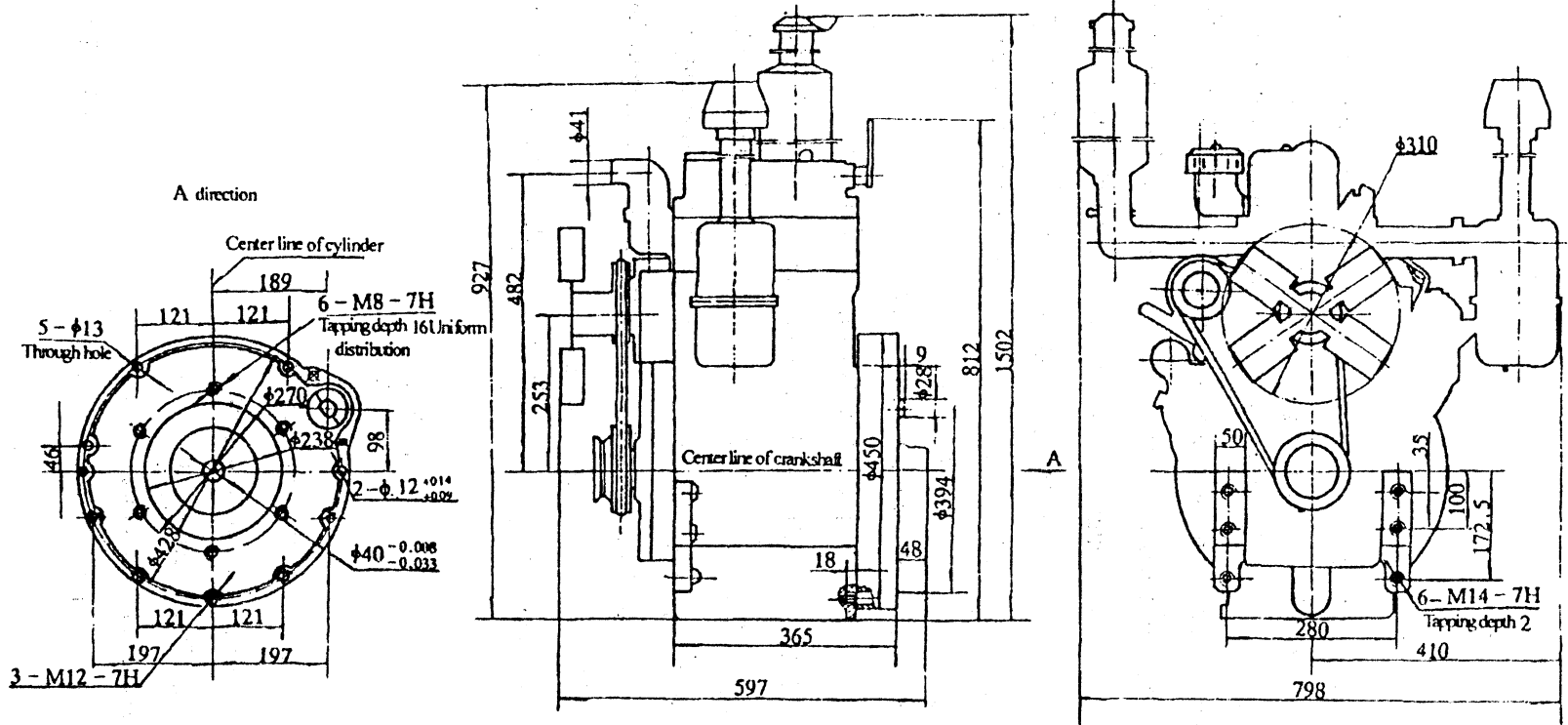
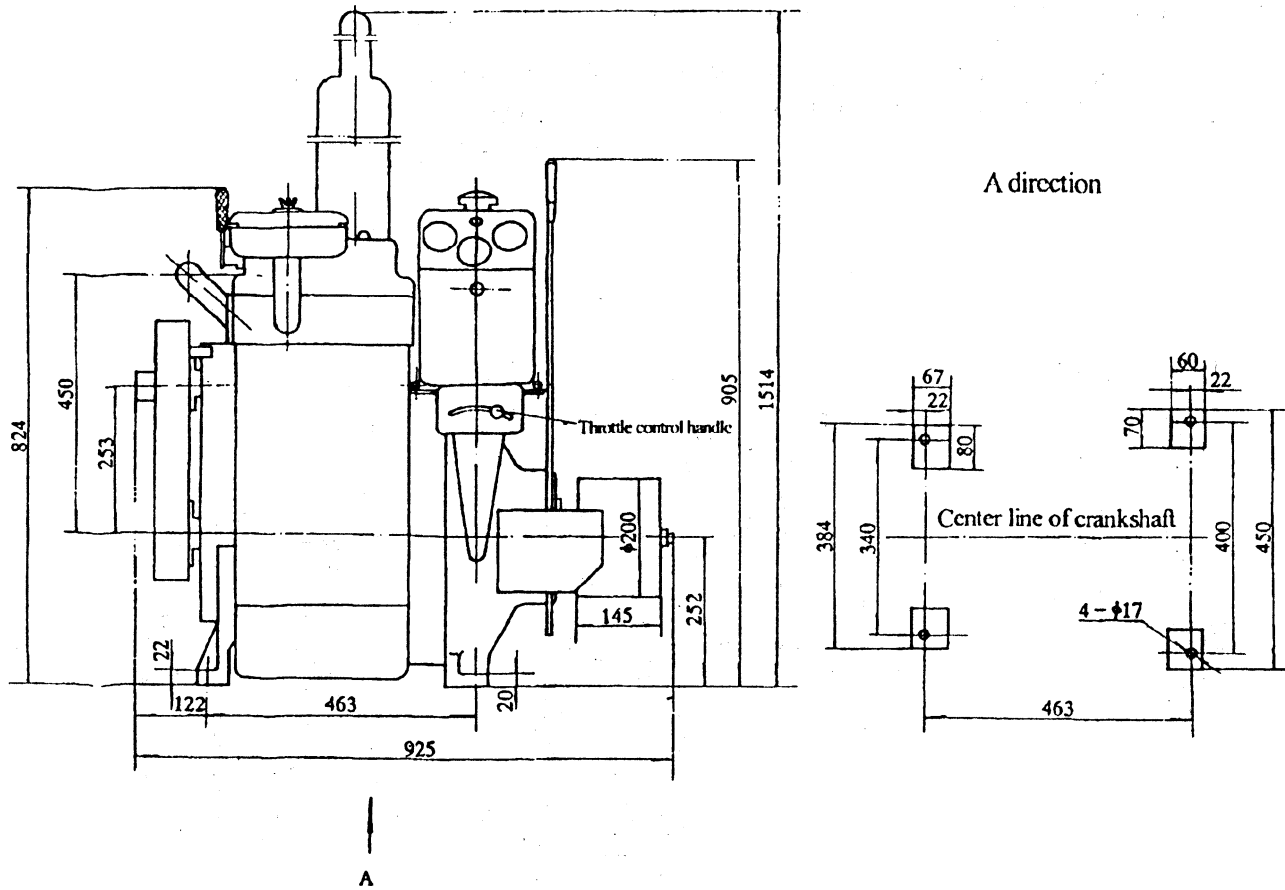


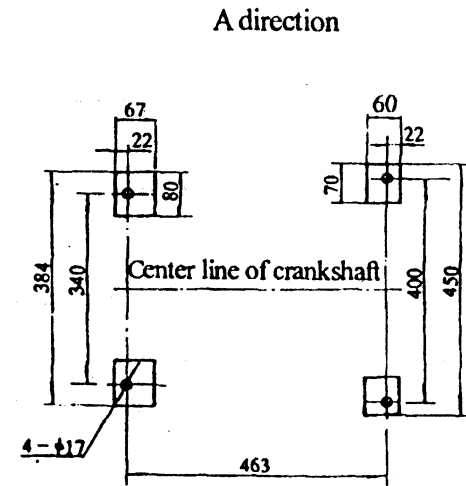
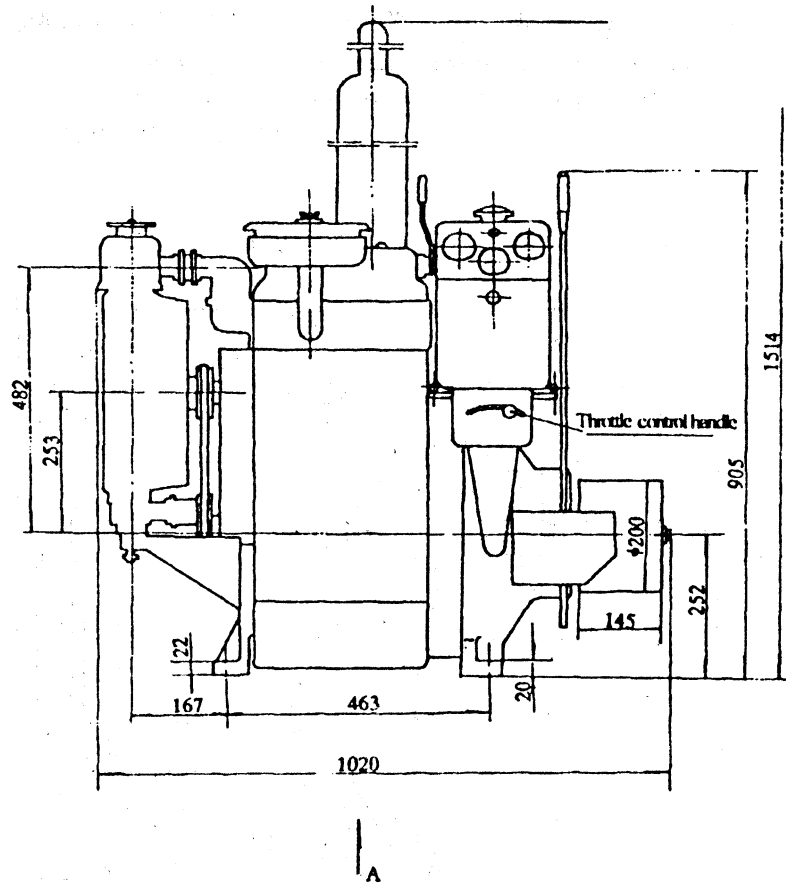
Fig.1 Contour and mounting dimensions of Model 295T、295TA、SD2100T and SD2100TA diesel engines



Note: 1. Total width is 598mm.

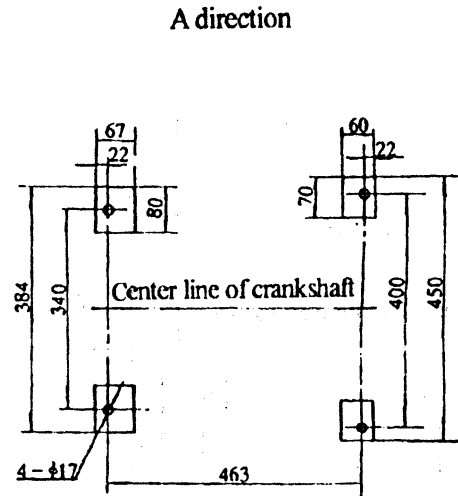
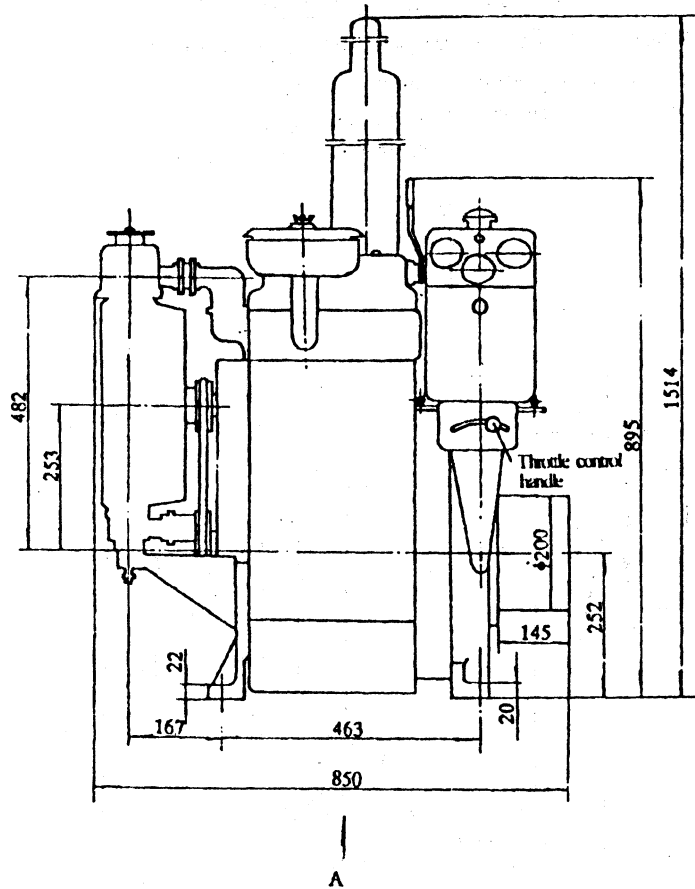
2. The widest part of controlling side is throttle control handle,
The distance between it and center line of crankshaft is 342mm.

Fig.2 Contour and mounting dimensions of Model 295G、295A、SD2100G and SD2100A diesel engines



Note : 1. Total width is 598mm.
2. The widest part of controlling side is throttle control handle.
The distance between it and center line of crankshaft is 342mm.

Fig.3 Contour and mounting dimensions of Model 295GA 、 295A-2 、 SD2100GA and SD2100A-2 diesel engines

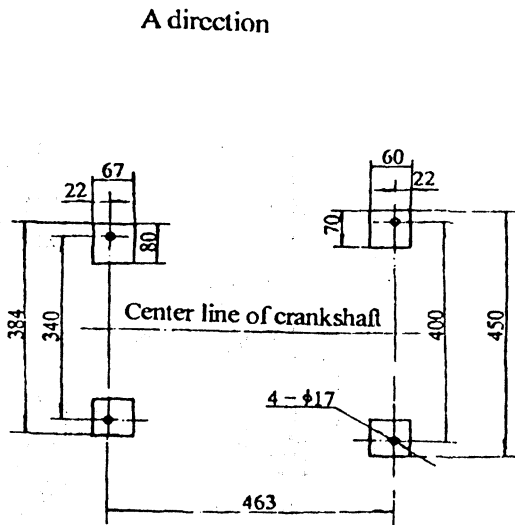
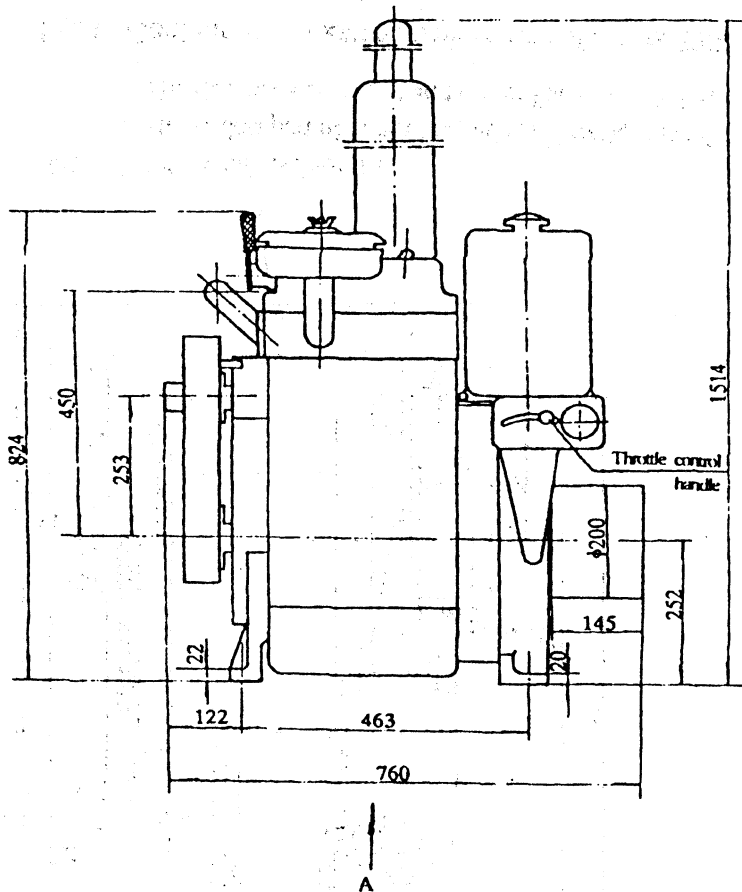


Note : 1.Total width is 598mm.

2.The widest part of controlling side is throttle control handle.

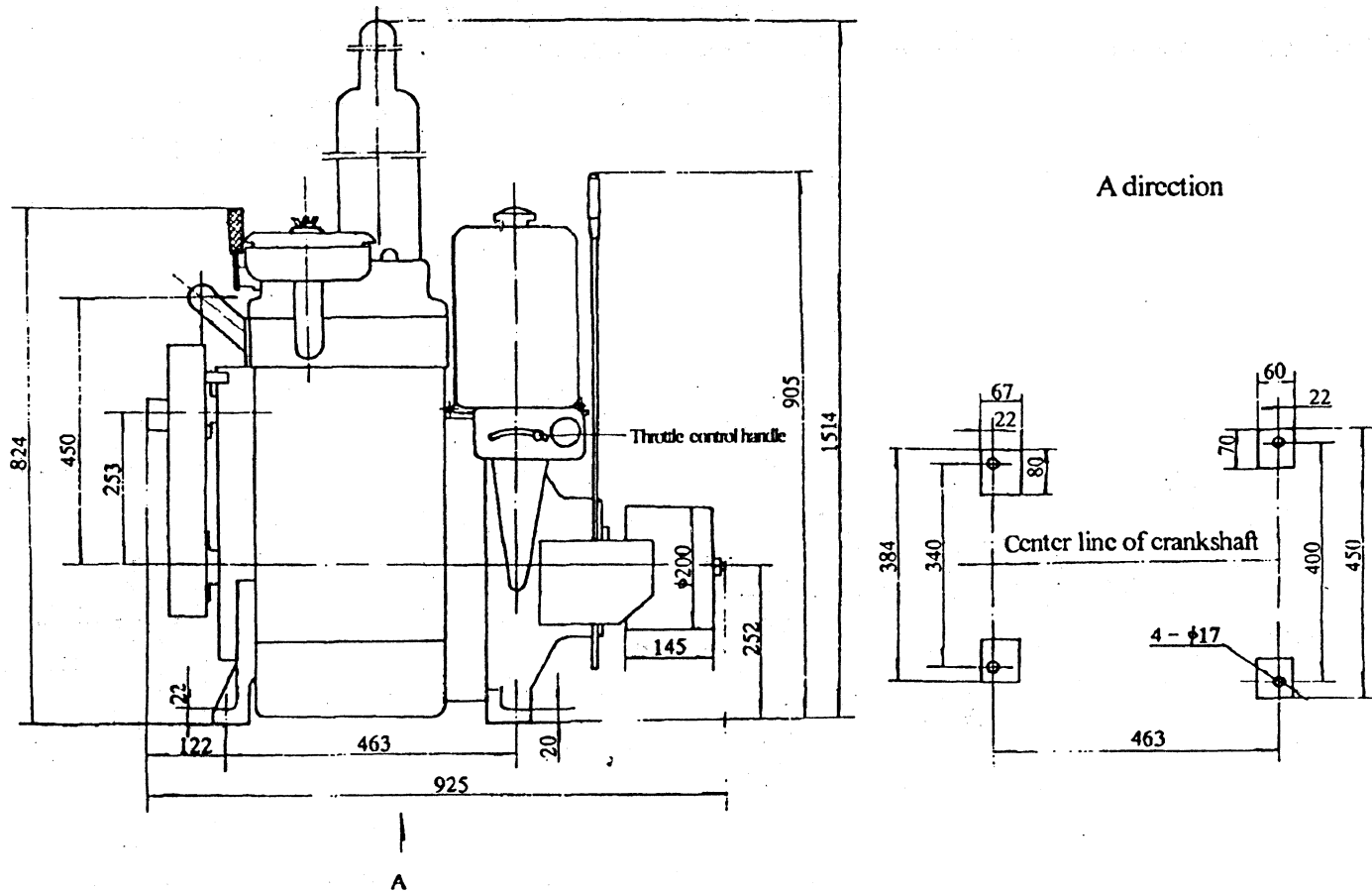
The distance between it and center line of crankshaft is 342mm.

Fig.4 Contour and mounting dimensions of Model 295GB、295A-3、SD2100GB and SD2100A-3 diesel engines



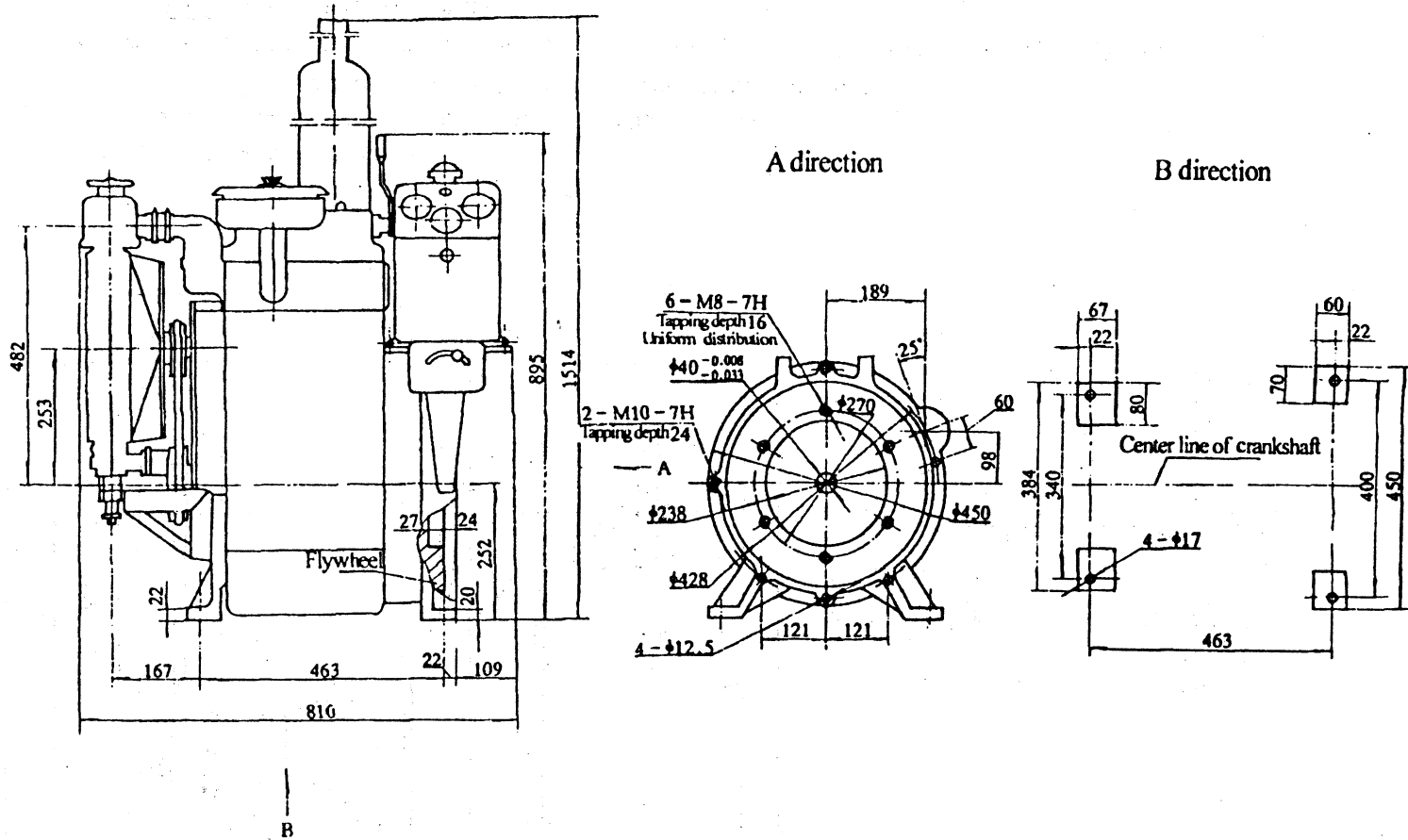
- Note :
1. Total width is 598mm.
 2. The widest part of controlling side is throttle control handle.
The distance between it and center line of crankshaft is 342mm.

Fig.5 Contour and mounting dimensions of Model 295G J、295A-1、SD2100GJ and SD2100A-1 diesel engines



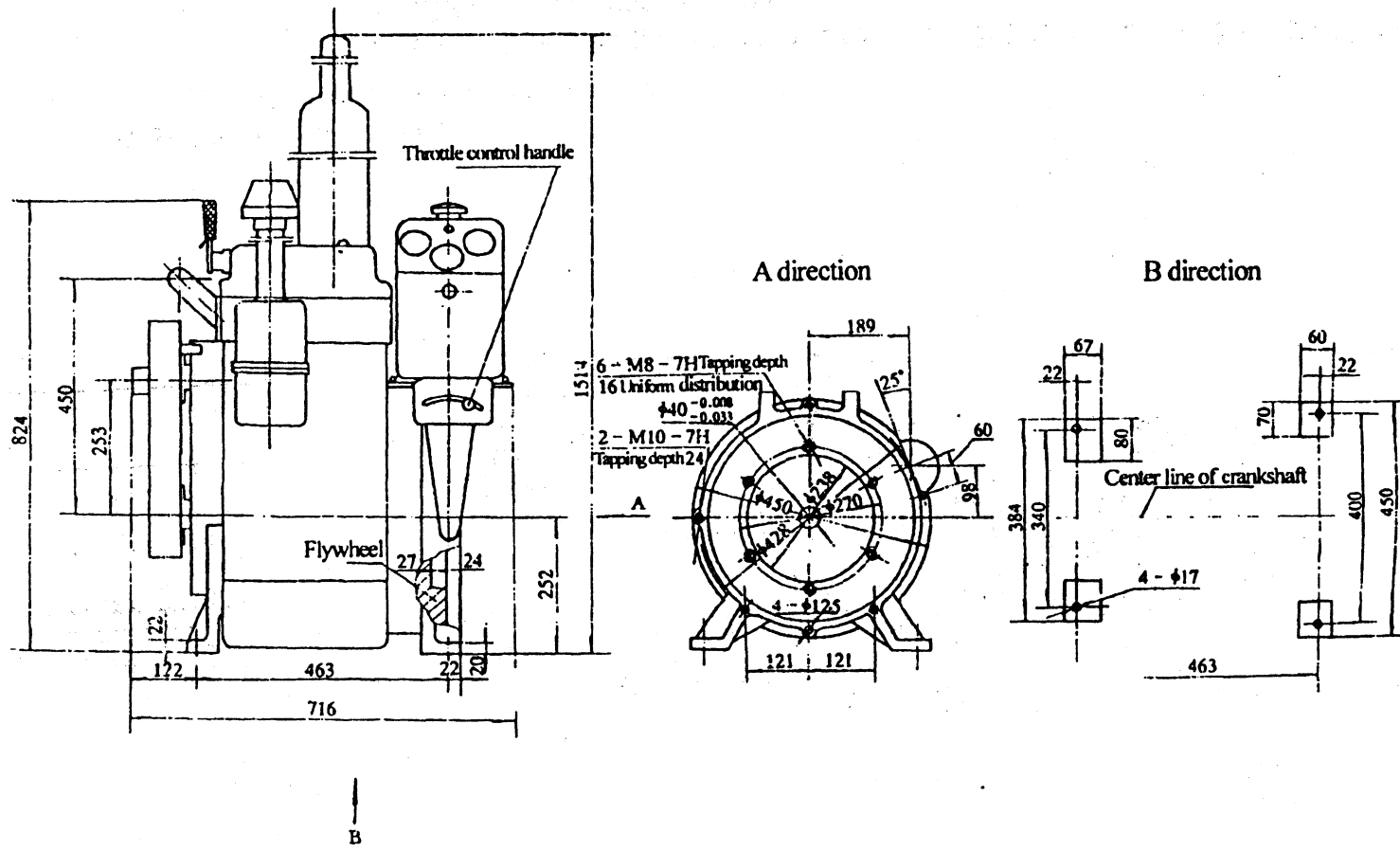
- Note: 1. Total width is 598mm.
 2. The widest part of controlling side is throttle control handle.
 The distance between it and center line of crankshaft is 342mm.

Fig.6 Contour and mounting dimensions of Model 295G-2、295A-4、SD2100G-2 and SD2100A-4 diesel engines



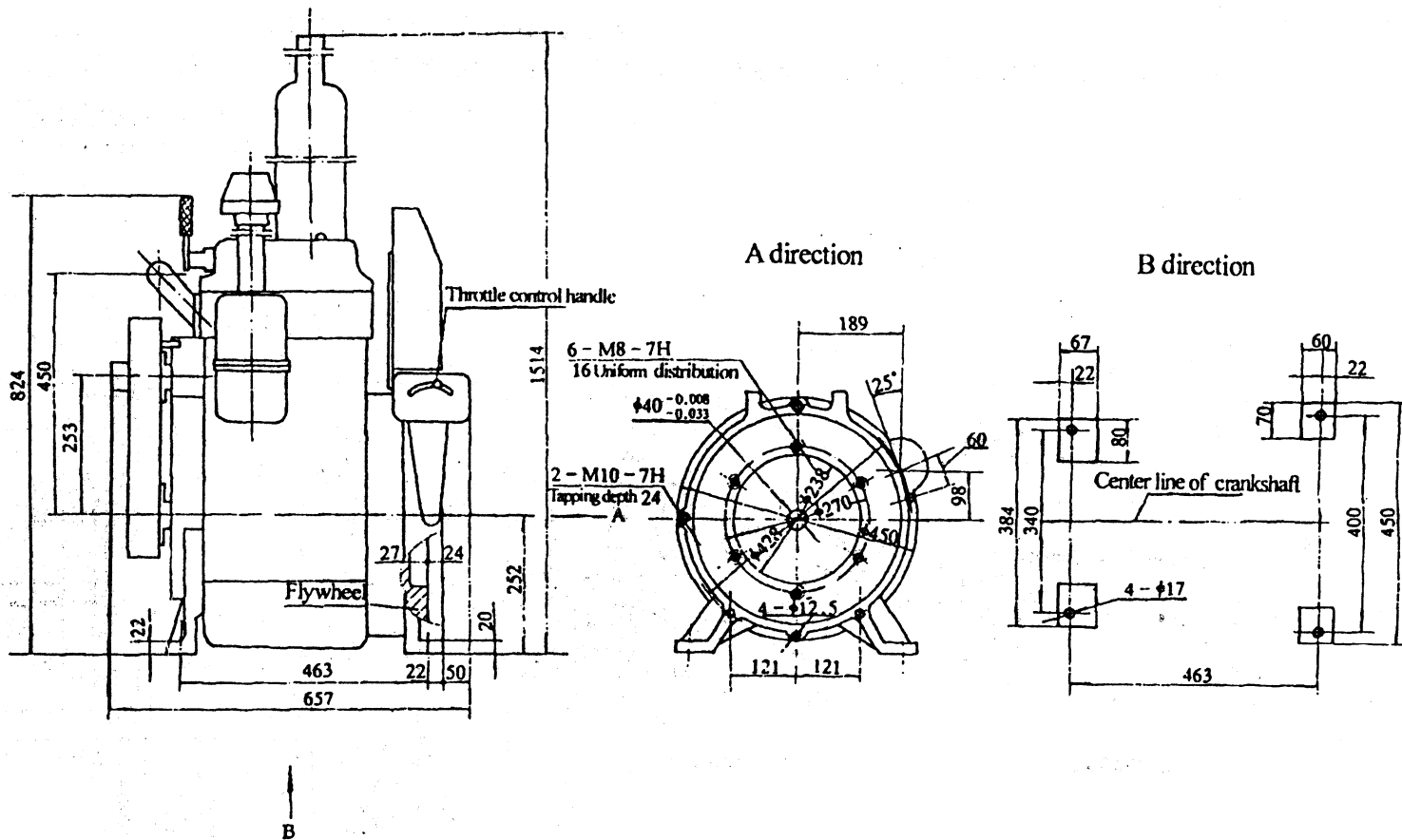
- Note: 1. Total width is 598mm.
 2. Flywheel cave-in rear face of rear bracket seat is 24mm.

Fig.7 Contour and mounting dimensions of Model 295B、295BA、SD2100B and SD2100BA diesel engines



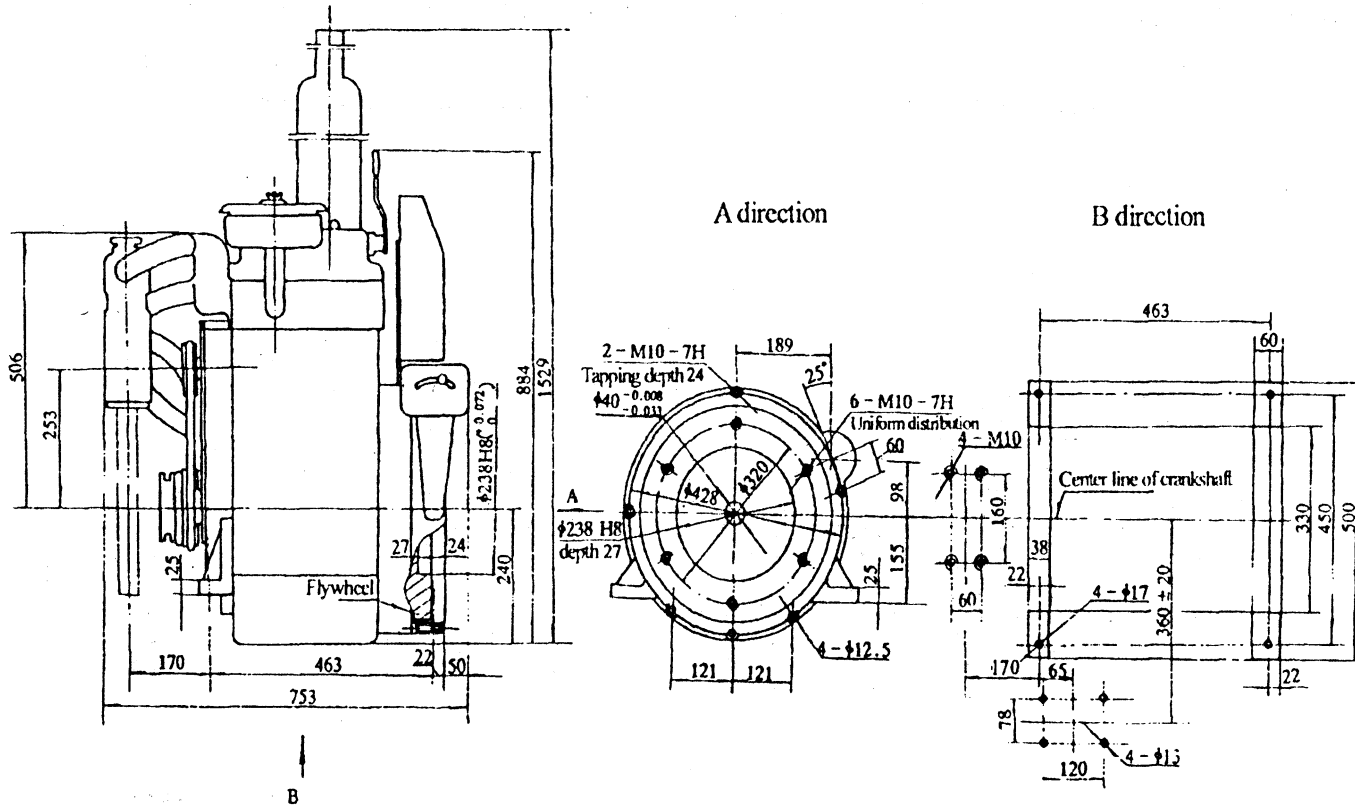
- Note: 1. Total width is 598mm.
2. Flywheel cave-in rear face of rear bracket seat is 24mm.

Fig.8 Contour and mounting dimensions of Model 295GY, 295 A-5, SD2100GY and SD2100 A-5 diesel engines



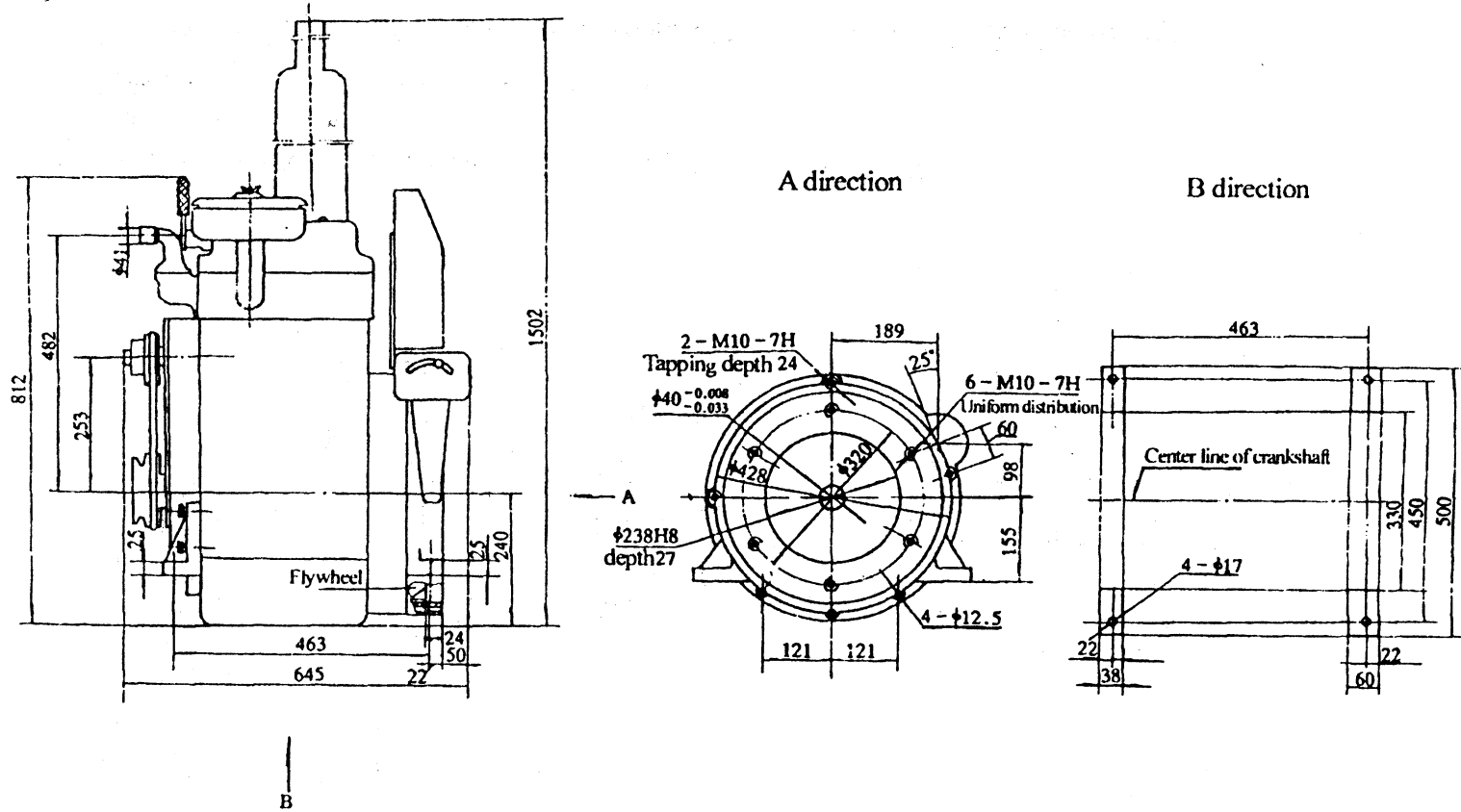
- Note: 1. Total width is 598mm.
 2. Flywheel cave-in rear face of rear bracket seat is 24mm.

Fig.9 Contour and mounting dimensions of Model 295GY-1, 295A-6, SD2100GY-1 and SD2100A-6 diesel engines



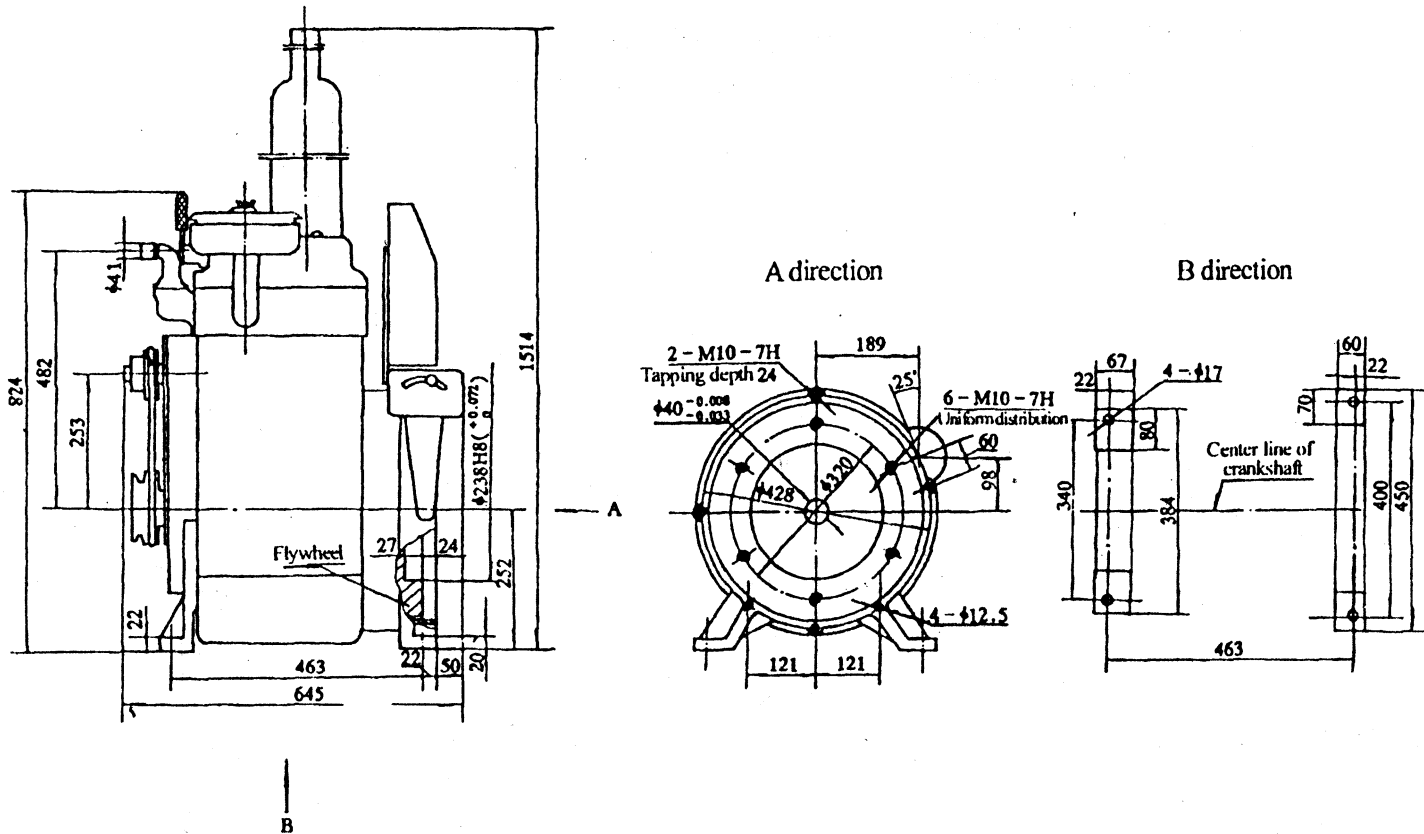
- Note: 1. Distributed circumference diameter size of fixing bolt hole of timing gear case is $\phi 320$.
 2. Total width is 800mm.
 3. Flywheel cave-in rear face of rear bracket seat is 24mm.

Fig.10 Contour and mounting dimensions of Model 295C and 295CA diesel engines



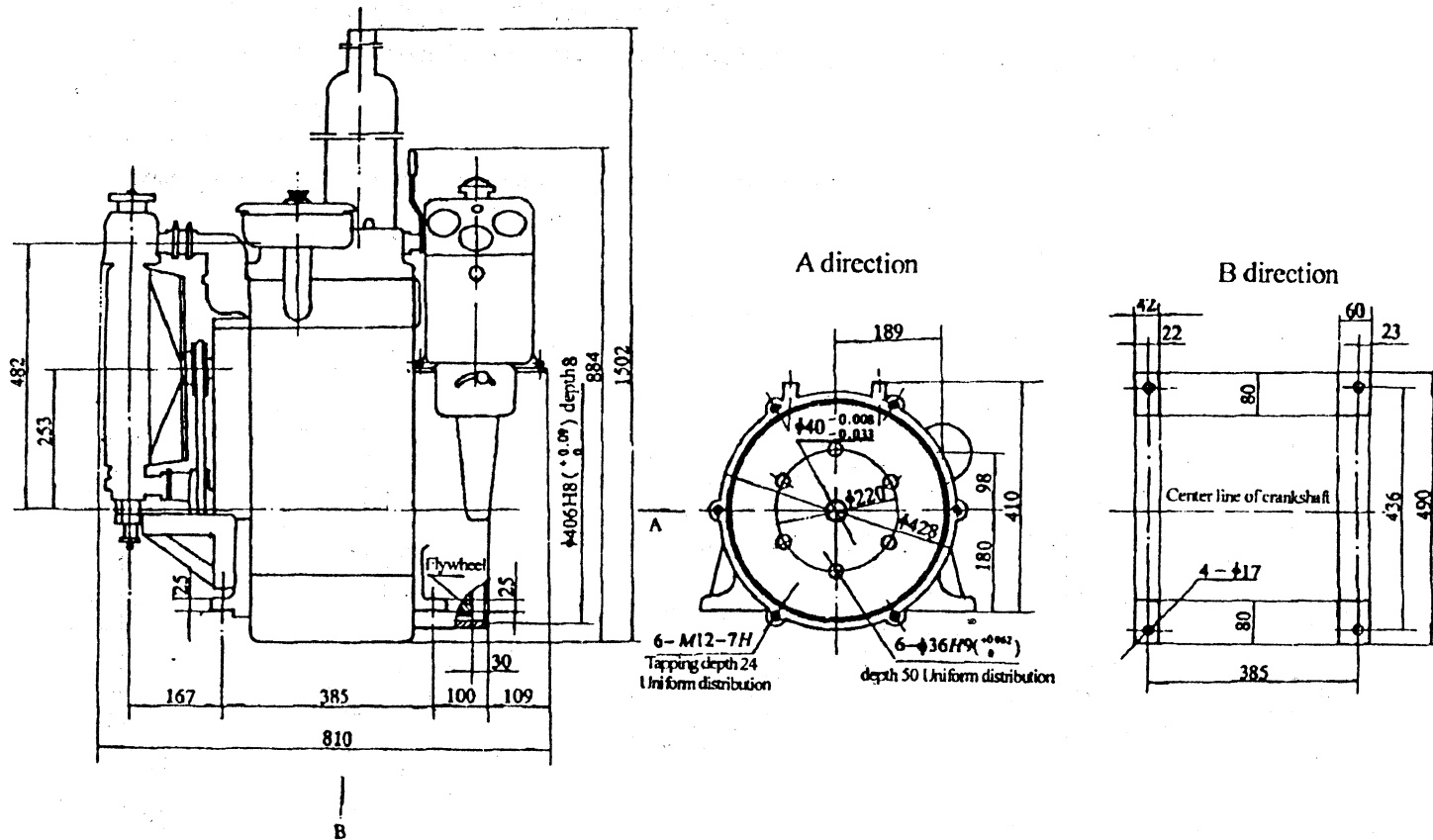
Note : 1. Distributed circumference diameter size of fixing bolt hole of timing gear case is $\phi 320$.
 2. Total width is 598mm.

Fig.11 Contour and mounting dimensions of Model 295C₁、295C₁A、SD2100C₁ and SD2100C₁A diesel engines (I)



- Note: 1. Distributed circumference diameter size of fixing bolt hole of timing gear case is $\phi 320$.
 2. Total width is 598mm.
 3. For high support frame.

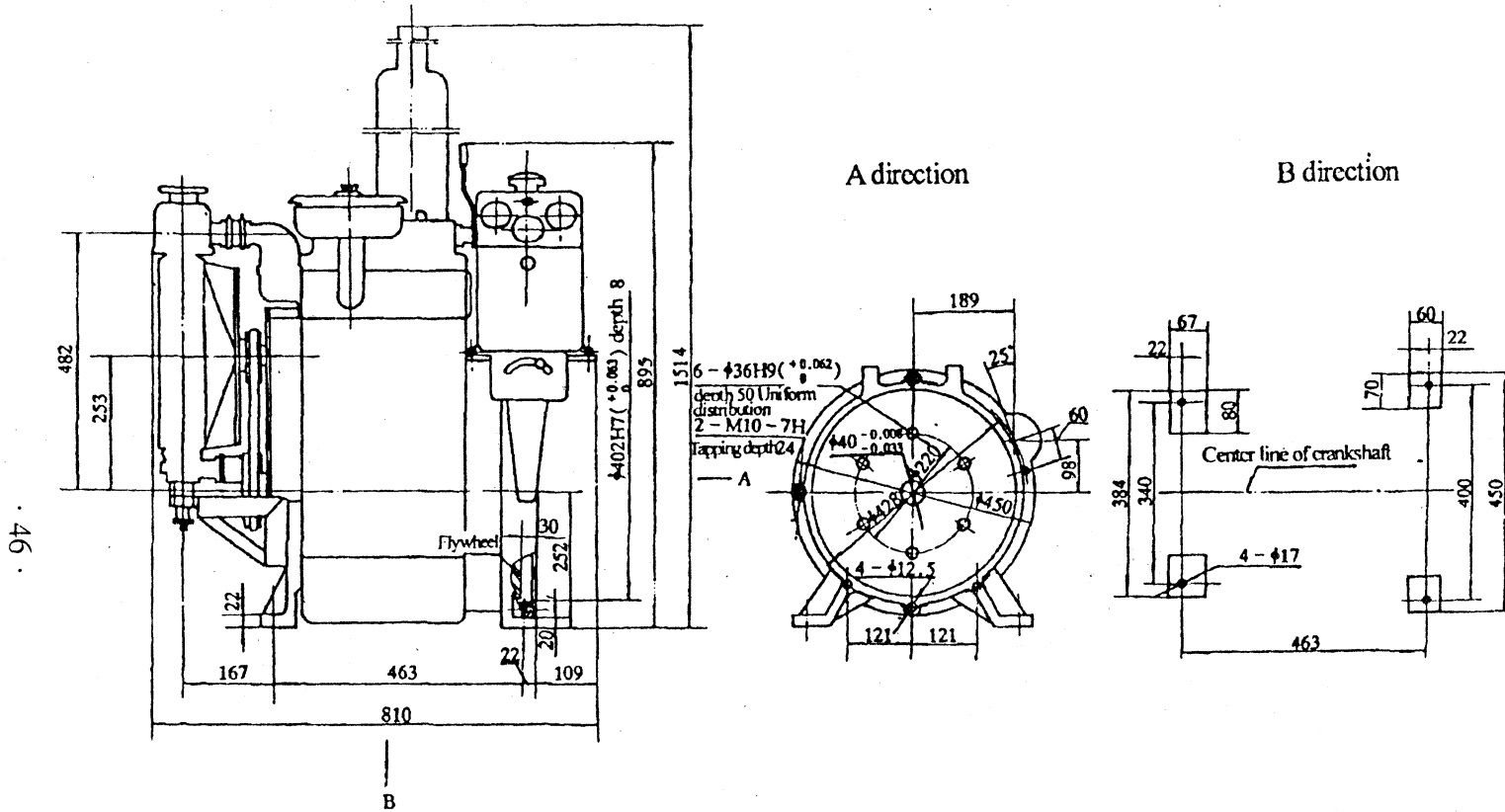
Fig.12 Contour and mounting dimensions of Model 295C₁、295C₁A、SD2100C₁ and SD2100C₁A diesel engines (II)



Note : 1. Flywheel cave-in rear face of rear bracket seat is 30mm.

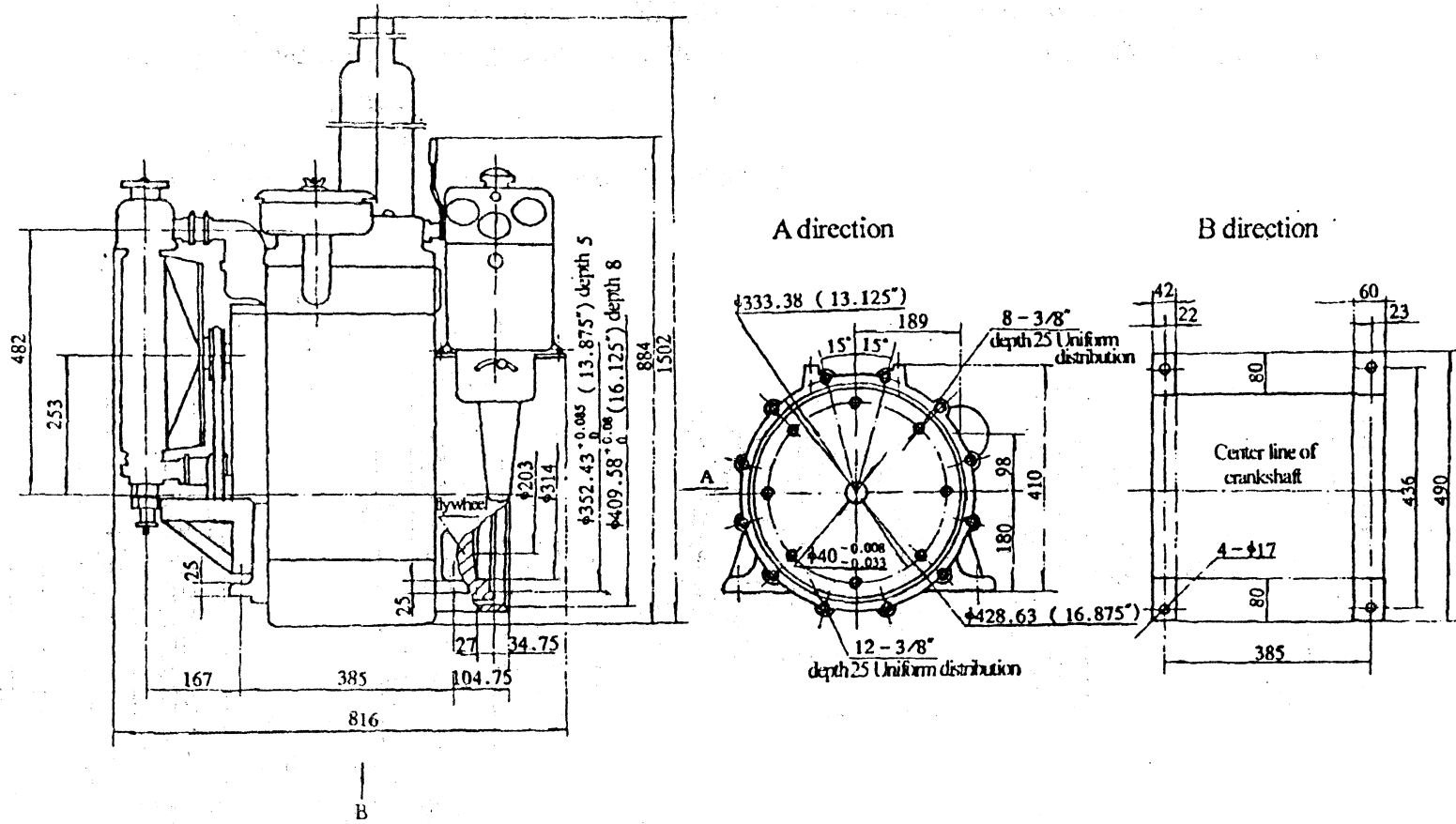
2. Total width is 598 mm.

Fig.13 Contour and mounting dimensions of Model 295D、295DA、295D₁A、SD2100D、SD2100DA、SD2100D₁ and SD2100D₁A diesel engines(1)



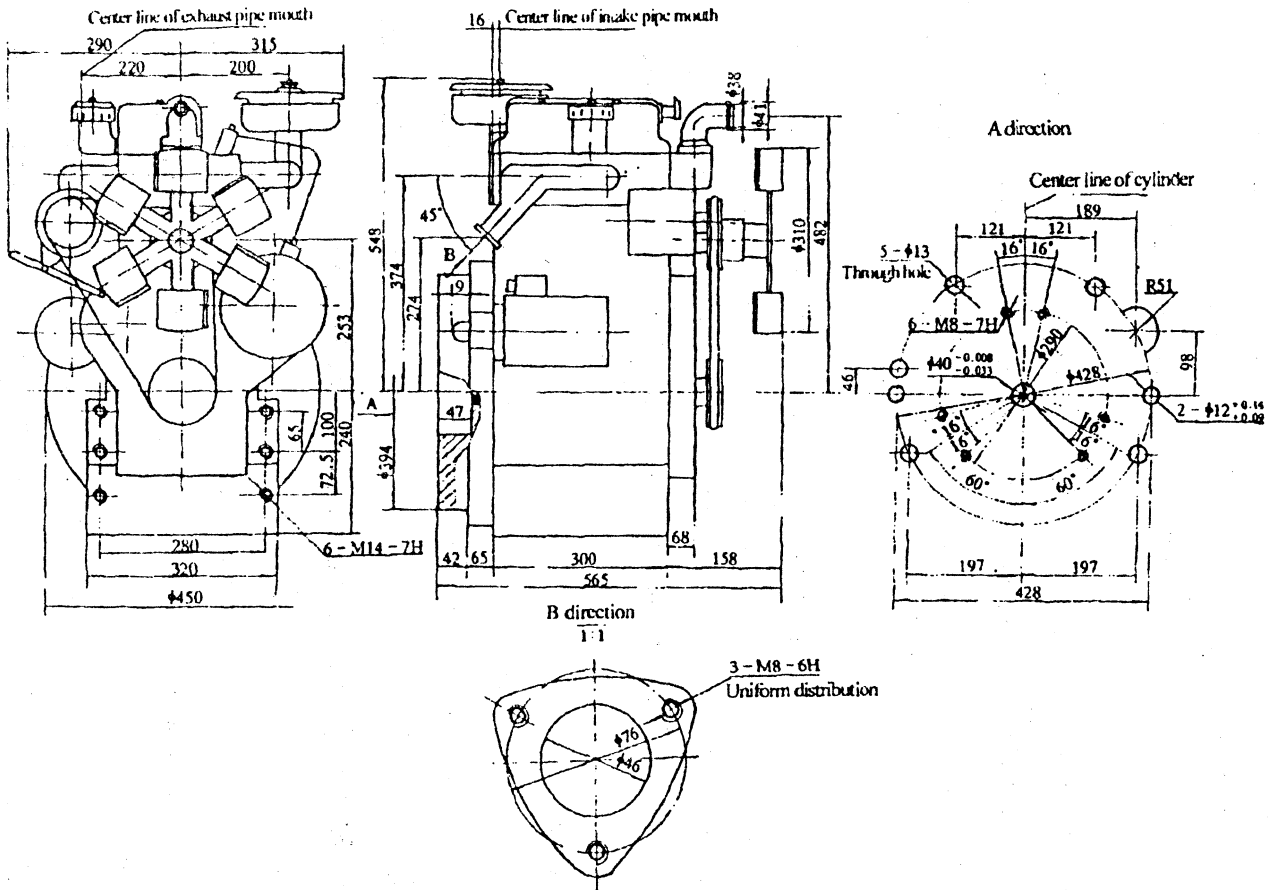
- Note : 1. Flywheel cave-in rear face of rear bracket seat is 30mm.
 2. Total width is 598 mm.
 3. For high support frame.

Fig.14 Contour and mounting dimensions of Model 295D、295DA、295D₁、295D₁A、SD2100D、SD2100DA、SD2100D₁ and SD2100D₁A diesel engines (II)



- Note: 1. Flywheel cave-in rear face of rear bracket seat is 34.75mm.
 2. Total width is 598 mm.
 3. Flywheel is SAE 11 1/2", rear bracket seat is SAE3*.

Fig.15 Contour and mounting dimensions of Model 295D₂ and 295D₂A diesel engines



- Note: 1. Distributed circumference diameter size of fixing bolt hole of clutch is $\phi 290$.
 2. Distributed circumference diameter size of conn'hole of flywheel housing is $\phi 428$.
 3. Motor hole wall outside diameter is R51.

Fig.16 Contour and mounting dimensions of Model 295QB、295YA、SD2100QB and SD2100YA diesel engines

Chapter 3 Operation and Maintenance of Diesel Engine

3—1 Diesel Fuel, Lube Oil and Cooling Water

1. Diesel Fuel

Used diesel fuel should be light diesel fuel stipulated by the national standard GB252-81. Selection of trademark of diesel fuel should make its freezing point be 10°C lower than air temperature. In general, it uses 0[#] or 10[#] light diesel fuel in summer, -10[#] or -20[#] in winter.

The diesel fuel must be clean and filtered. Before using, it should precipitate for 48 hours, there is no water and impurity in the diesel fuel, transportation and storage with an ammonia water container are strictly prohibited. Using poor diesel fuel is strictly prohibited.

2. Lube oil

Used lube oil should be the high-speed diesel engine lubricating oil stipulated by the national standard GB5323-85. It is CA40 in summer, CA30 or CA20 in winter. The lubricating oil must be filtered strictly, there is no water and impurity in the oil. The oil level should be controlled in between two lines of the dipstick. Using poor lube oil is strictly prohibited.

3. Cooling water

The cooling water should be clean soft water (rainwater or river water). For the hard water (well water or spring water), it must be softened. Softening method: ① the water is boiled, then precipitate it, ② the caustic soda is put into the hard water, 1.5g per kg water.

3—2 Starting, Running and Stopping of Diesel Engine

1. Check and preparation before starting

(1) Check all parts, connection parts, fasten the loose parts if necessary. Check all control handle (such as speed-adjusting lever, stopping lever, and clutch operating lever) to make their operation flexible.

(2) Turn the crankshaft several revolutions to see if the engine operates normally.

(3) Check the cooling system to see if the cooling water is sufficient and if the water pipe joints leak water.

(4) Check the fuel system to see if the fuel is sufficient and if the fuel ways are clear.

(5) Check the sump and the governor to see if the lubricating oil level are in between two lines of the dipstick.

(6) Check the electrical system to see if the joints are correct and firm, and if the electrical energy of battery is sufficient.

(7) Open the cock of fuel tank to vent the air in fuel passage out.

(8) In a cold winter, fill hot machine oil(60~70°C) and hot cooling water(80~90°C) in the sump and cooling system respectively.

2.Starting

(1)Electrical starting

①Place the speed-adjusting lever to the"center"position.

②Insert the electrical source key into the electric lock,(retrofire starting switch),turn the key clockwise to make the electrocircuit on.(The light shining)

③Place the decompression handle to the pressure release position.

④Turn the electric resource key clockwise to the "starting" position(It can be restored). Under this condition the starter drives the engine for several seconds. Finally return quickly the decompression handle to the non-decompression position, so the engine can be started.

If the engine cannot be started, can start it again after about 2 minutes. If the engine is continuously started three times and all are failing, you must find out reasons for the failure and remove it.

⑤After starting, should turn the electric resource key to the end counterclockwise.

(2)Hand starting

①Place the speed-adjusting lever to the center position.

②Turn the decompression handle to the decompression position.

③Insert the starting handle into the starting hole, and mesh with the starting-claw, then turn camshaft slowly. After heard the fuel spraying sound of the injector, quickly turn it with an effort, then place the decompression handle to the non-decompression position, continuously turn it until the engine has been started.

3.Running

(1) After started, observe the oil pressure gauge and the water outflow state, should adjust or run-out and check at once if necessary.

(2) After started, should run for 2-5 minutes at a middle speed. Then, gradually increase the speed to rated speed, preheat and observe. When the temperature of cooling water rises to above 50°C, increase the load uniformly, and change the speed as rated speed. In process of running, should avoid a sudden change of the load as fully as possible.

(3) In process of running, must frequently observe that the gauge reading, exhaust color, and running sound are normal or not. Remove all found faults and other abnormal phenomena.

4. Stopping

(1) Before stopping, should decrease the load gradually, and make the engine run at middle and idle speed for several minutes. After the temperature of cooling water is lower than 70°C, pull the stopping handle to make the engine stop.

(2) After stopped, close the cock of fuel tank.

(3) When atmosphere temperature is lower than 0°C or approaches to 0°C, after stopped for several minutes, should open both the water drain cock of body and water drain cock of radiator to drain out all of cooling water. At this time, must open the cover of water inlet of the radiator, otherwise, the water cannot completely be drained away.

(4) After stopped, should at once turn the electric source key to the center position, and pull out the key.

(5) If you need replace the machine oil or fill hot machine oil at starting, should at once drain out the oil in the sump after stopped.

(6) Directly pull the stopping handle at an emergency stop. After pulling the stopping handle, if the engine runs as usual or takes place the running-away, should at once take following emergency measures:

① Loosen two connecting nuts of the fuel injection pipe to cut off the fuel supply.

② Pull out the cover of air filter. and stop up the air inlet to make the air do not enter the cylinder.

③ Tractor can gear up to complete sudden stop, so the engine can be stalled forcibly.

Above measures may also be combined operation.

3—3 Running-in of Diesel Engine

1. New diesel engine or engines after overhaul, before putting into practice, must do running-in for 8 hours according to following steps:

Zero load running

Middle speed	0.5 hrs
Rated speed	0.5 hrs
Light load running	2 hrs
Middle load running	3.5 hrs
Full load running	1.5 hrs

2. After minor repair (one of replacing cylinder liner, piston ring, main bearing bush, and connecting rod bearing bush), the engine must do running-in for 4 hours according to following steps:

Zero load running:

Middle speed	0.2 hrs
Rated speed	0.3 hrs
Light load running	1 hrs
Middle load running	1.5 hrs
Full load running	1 hrs

3. Checking after running-in

(1) Drain out all of lube oil in the sump at once after stopping, and clean the sump and oil filter with diesel fuel.

(2) Check connecting rod bolts, fasten the loose parts if necessary, tighten up the cylinder-head nuts again according to stipulated torque, check and tighten up all of fastening bolts and nuts.

(3) Check and adjust the valve clearance.

(4) Check and eliminate other abnormal phenomena.

(5) The diesel engine can be put into practice only after checking and adjusting.

3—4 Technical Maintenance of Diesel Engine

The diesel engine must strictly complete technical maintenance except for correct operation and use. The maintenance stipulated by the Manual means an ordinary circumstances, the users may adjust it according to concrete conditions. Technical maintenance is classified into four stages:

1. Everyday maintenance.

2. Class 1 maintenance (conduct after cumulative fuel consumption 500kg).

3. Class 2 maintenance (conduct after cumulative fuel consumption 1000kg).

4. Class 3 maintenance (conduct after cumulative fuel consumption 3000kg).

I .Everyday Maintenance

- 1.Clean off dust and mud on the diesel engine, and keep it. Especially should pay attention to cleanness of electric equipments.
- 2.Check all anchor bolts of the diesel engine, and tighten them if they are loose.
3. Check the oil level of fuel tank, the sump and injection pump, add some oil if the oil level is lower than oil indicator. Check the cooling water level of the radiator or the water tank made by the users.
- 4.Check diesel fuel, lube oil and cooling water, after starting eliminate them if there is leakage of the oil and water.

II. Class 1 Maintenance

- 1.Complete everyday maintenance.
2. Fill the calcium base grease of appropriate amount in the seawater pump bearing with a grease gun.
3. Dismantle the side cover plate to check the connecting rod bolts and lock wire.
- 4.Check the battery's voltage and specific weight of battery liquid. Should charge the battery if a cell voltage is lower than 1.7V, and specific weight is lower than 1.2.Check and tighten up all of conductor joints of electric equipment.
- 5.Rinse the air filter screen. and replace lube oil in the oil storage tank or clean dust on the paper cartridge.
6. Rinse internal cavity of the oil filter, drain out sedimentation oil, and replace filter cartridge.
- 7.Drain out sedimentation oil of fuel filter, and replace filter cartridge.
- 8.Check valve clearance, and adjust it.

III.Class 2 Maintenance

- 1.Complete class 1 maintenance.
- 2.Check the injector's fuel-injection pressure and atomization, adjust and clean it if necessary.
- 3.Check the water pump to see if the water drain hole drains water, should dismantle and check water pump or replace the water pump seal if it drains water seriously.
- 4.Check and adjust fuel supply advance angle, clean the fuel tank and fuel pipes.
- 5.Check cylinder-head nuts and flywheel tightening bolts.
- 6.Rinse the sump and the preliminary filter, and replace lube oil.
7. Replace the lube oil in the governor.
- 8.Check the clearance between clutch's release lever and release bearing, adjust it if necessary.
- 9.Check the heat exchanger to see if it drains water.

10. Check the state of sealing water of seawater pump, replace the ring for sealing water if necessary.

IV. Class 3 Maintenance

1. Complete class 2 maintenance.

2. Clean the scale in the cooling system.

3. Fill the calcium base grease in the water pump bearing, PTO bearing and idler wheel bearing.

4. Clean the carbon in the exhaust muffler.

5. Check lead bonding state of the generator diode, stator, and rotor to see if they are reliable or broken. Check the lubricating state of the generator bearing, and fill appropriate synthetic calcium base grease in it. Check the carbon brush wear state of the starting motor, replace it if necessary.

6. Check the thermostat.

7. Check and measure the wear state of piston ring, cylinder liner, and connecting rod bearing shell. Clean the carbon on the cylinder-head, piston, piston ring and cylinder liner.

3—5 Storage of Diesel Engine

1. If the diesel engine is not used for a long period, should drain off lube oil, cooling water and fuel at once, and rinse the sump filter and oil filter with diesel fuel.

2. Drain off the lube oil in the governor and air filter.

3. Wipe off the grease dirt, water and dust outside the diesel engine. For external parts without paint, should paint the rust-preventing paint.

4. Dismantle the intake and exhaust pipes, and fill the clean dewatered machine oil 200g (heat the machine oil to 110~120°C until bubbles disappear completely) into every cylinder, then, turn the crankshaft to make oil uniformly adhere on surfaces of valves, cylinder liners and pistons. Make intake valve and exhaust valve closed.

5. Should block up the inlet and outlet of the air filter, muffler and cooling water to prevent foreign matter and dust from entering.

6. Prohibit from painting oil on the rubber and plastic products.

7. The diesel engine should be put in a room where it is good in ventilation, dry, and clean. Strictly forbid chemicals and goods having corrosive action to be put nearby the diesel engine. Using above method, the engine can be stored for 3 months. Should newly storage if more than 3 months.

Chapter 4 Check and Adjustment of Diesel Engine

4—1 Check and Adjustment of Valve Clearance

To check and adjust the valve clearance should be under a cold state. The method of checking and adjusting valve clearance is as following.

1. Turn the decompression shaft to a pressure release position, and take down the cylinder-head cover.
2. Turn the crankshaft to make the first cylinder be at compression T.D.C., in such a case, 0 I line on the flywheel aims at the line of watch window on the flywheel housing
3. Return the decompression shaft to the non-decompression position, then, adjust the valve clearance of the first cylinder.
4. Check the valve clearance with a thickness gauge inserting respectively in between the rocker head and the valve lifter. If the valve clearances are different from the prescribed value, screw off a nut on the adjusting screw, and turn the adjusting screw of the valve clearance with a screwdriver, inserting the thickness gauge to feel unsmoothed but can slip away smoothly, then screw up the lock nut.
5. According to the direction of rotation of a diesel engine, turn the crankshaft half revolution to adjust the valve clearance of the second cylinder with the same method.

Having been adjusted, repeatedly check it.

4—2 Adjustment of Decompressor

After adjusting the valve clearance, adjust the decompressor.

1. Turn the crankshaft and observe the line on the flywheel from a watch window on the flywheel housing, to make the first cylinder is at the compression T.D.C.
2. Make the decompressor be at a pressure release position, screw off a lock nut on the decompression screw with a spanner, and turn the decompression screw with a screwdriver until the screw contacts the rocker arm, screw up the screw 1~1.5 revolutions again and tighten up the lock nut, to guarantee the open amount of the intake valve under decompression state is not less than 1 mm.
3. According to the direction of rotation of a diesel engine, turn the crankshaft half revolution to adjust the decompressor of the second cylinder with the same method.

4—3 Check and Adjustment of Fuel Supply Advance Angle

1. Dismantle the fuel-injection pipe of the first cylinder, install a timing tube as Fig.17

on a joint of the fuel-injection pipe of the first cylinder of the fuel-injection pump.

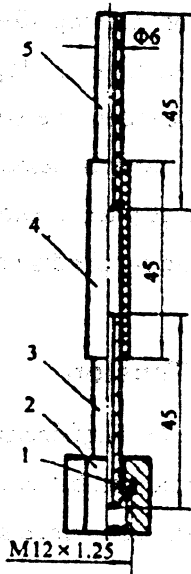


Fig.17 Timing tube

1. plate washer
2. pipe joint nut
3. fuel pipe
4. plastic tube
5. glass tube

Note: Pipe joint nut of direct injection diesel engine is M12 × 1.5.

2. Place the speed-adjusting lever to the maximum speed position, turn the flywheel until there is no bubble on fuel face in the timing tube.

3. Turn the flywheel slowly, and pay attention to the fuel face in the timing tube. At the instant when the fuel face begin to rise, stop turning the flywheel at once, and observe readings on the flywheel to which the nick on watch window of the flywheel housing points. If the reading is not within the scope of prescribed fuel supply advance angle, should adjust it.

4. As adjusting, loosen three lock bolts on a fuel-injection pump flange in advance. When the fuel supply advance angle need increase, the upper body of the fuel-injection pump is turned to the direction of the cylinder block of the diesel engine. When the fuel supply advance angle need decrease, the upper body of the fuel injection pump is turned to the direction of far away from the cylinder block of the diesel engine. Tighten up three bolts after amounting to the prescribed value.

4—4 Check and Adjustment of Fuel Injector

To check and adjust an injector should complete on a fuel injector test stand.

After the injector has been stalled on the test stand, continuously press a handle for pumping fuel, and read out fuel-injection pressure from a fuel pressure gauge. If the

pressure is different from prescribed value, dismantle a protective cap on upper part of the injector, and turn a pressure-adjusting screw with a screwdriver to make it accord with the demands. The injector having been adjusted, tighten up the protective cap and repeatedly test the fuel-injection pressure once again. In an atomization test for spraying 40~80 times per minute, observe atomization quality. The fuel sprayed out should look like fog completely. Do not have obvious fuel particles, fuel column and local denseness-rareness. The start and the end of spraying fuel, should be obvious there is clear and melodious sound. Before the start and after the end should not have fuel leakage phenomenon. If it does not accord with the demands, rinse, grind or replace the nozzle couple dismantled. Then test again.

4—5 Check and Adjustment of Fan Belt's Degree of Tension

The engine having been stopped, if we apply a force [29~49N(3~5kgf)] perpendicular to the belts in between the water pump and the pulley of the generator, an offset distance of the belts should be within the scope of 10~12mm. When the adjustment is necessary, screw off two bolts for fixing adjusting frame and the generator to move a position of the generator, so the belt's degree of tension may be adjusted to make it accord with the demands.

4—6 Adjustment of Lube Oil Pressure

When the engine has run after a time (temperature of oil is about 80°C), the lube oil pressure may be adjusted. Loosen fixing nuts by the side of the oil filter, turn a pressure-adjusting screw to make the pressure accord with the demands. Having been adjusted, tighten up the fixing nuts.

4—7 Check and Adjustment of Governor

Fuel-injection pump governor had checked and adjusted before ex-factory, and had lead-sealed it, do not adjust it arbitrarily. Otherwise, the factory will not bear the tripartite guarantee service. If the adjustment is necessary, should complete on a special fuel-injection pump test stand with a standard injector and standard fuel-injection pipe according to the fuel-injection pump governor manual.

Chapter 5 Diesel Engine Malfunctions and Their Remedies

5-1 Failure or Difficulty in Starting the Engine

Causes	Remedies
<p>1. Faults in fuel system:</p> <p>(1) No fuel in fuel tank.</p> <p>(2) Sediment cup cock not open.</p> <p>(3) Air trapped in fuel system and fuel supply not fluent.</p> <p>(4) fuel tube or filter clogged.</p> <p>(5) fuel injector fails to inject fuel or injects fuel irregularly.</p> <p>(6) Poor fuel spray of injector.</p> <p>(7) Delivery valve leaks, plunger and plunger cylinder worn out excessively, delivery valve spring or plunger spring broke.</p> <p>2. temperature of engine itself too low and lubricating oil too viscous</p> <p>3. Troubles in electric system</p> <p>(1) wires not correctly and finny connected or in poor contact.</p> <p>(2) Battery insufficiently charged, power of starting motor insufficient, starting speed too low, generator not generating electricity.</p> <p>4. Insufficient compression pressure</p> <p>(1) Liner, piston and piston rings worn out excessively. Piston rings gaps align each other.</p> <p>(2) Valve leaks.</p> <p>(3) No valve clearance.</p> <p>(4) Valve spring broke or deformed.</p> <p>(5) Cylinder head gasket leaks or cylinder head nuts get loosen.</p> <p>(6) Cylinder head hole installing fuel injector leaks.</p> <p>5. Air inlet manifold and exhaust manifold blocked.</p> <p>6. Starting hole of swirl chamber insert blocked.</p>	<p>1.</p> <p>(1) Fill up the tank with clean fuel.</p> <p>(2) Open the sediment cup cock..</p> <p>(3) Inspect and tighten all piping connections Remove air in all fuel tubes.</p> <p>(4) Clean fuel tube and filter, remove obstruction.</p> <p>(5) Check and remedy injector or fuel pump.</p> <p>(6) Clean nozzle assembly, adjust its injector pressure to standard value according to Manual.</p> <p>(7) Lap, remedy or replace them.</p> <p>2. Heat lubricating oil, fill cooling system with hot water, use standard grade lubricating oil.</p> <p>3.</p> <p>(1) Check and correct it.</p> <p>(2) Check and remedy starting motor , generator, relay governor (JFT/49-II). Charge battery.</p> <p>4.</p> <p>(1) Replace them.</p> <p>(2) Reaming and lapping valve and valve seat.</p> <p>(3) Check and readjust it.</p> <p>(4) Replace it.</p> <p>(5) Replace gasket, tighten cylinder head nuts.</p> <p>(6) Remove carbon deposit on cylinder head.</p> <p>5. Remove obstruction.</p> <p>6. Remove obstruction.</p>

5-2 Insufficient Engine Output or Power Drops

Causes	Remedies
<ol style="list-style-type: none"> 1. Air cleaner or inlet manifold blocked, resulting in insufficient air intake. 2. Exhaust manifold or port blocked. 3. Air trapped in fuel system. 4. Diesel fuel contaminated by water. 5. Insufficient fuel supply, fuel injection pump or injector gets trouble. 6. Insufficient compression pressure in cylinder. 7. Too much carbon deposit. 8. Fuel tube or filter blocked. 9. Incorrect fuel delivery advance. 10. Incorrect valve clearance. 11. Incorrect fuel grade. 12. Poor fuel spray of injector. 	<ol style="list-style-type: none"> 1. Clean air cleaner and inlet manifold. 2. Remove obstruction. 3. Inspect and tighten all tube connections, remove air in all fuel tubes. 4. Drain off deposited water, renew diesel fuel. 5. Repair or replace pumping element, delivery valve or nozzle assembly. 6. See section "5-1.4". 7. Remove carbon deposit on cylinder head. 8. Clean fuel tube or filter element. Replace it if necessary. 9. Readjust it. 10. Readjust it. 11. Use specified fuel. 12. See section "5-1.1(6)".

5-3 Engine Stalls

Causes	Remedies
<ol style="list-style-type: none"> 1. Diesel fuel in fuel tank used up. 2. Air trapped in the fuel system. 3. Diesel fuel contaminated by water. 4. Fuel filter blocked. 5. Insufficient water in cooling system, piston seized in liner. 6. Piston ring gets stuck. 7. Air cleaner blocked or damaged. 8. Main bearing(upper), main bearing(lower) or connecting rod bearing damaged. 	<ol style="list-style-type: none"> 1. Fill up fuel tank with clean diesel fuel. 2. Check and fix fuel system up, then vent it. 3. Drain and clean fuel tank, refill it with clear diesel fuel. 4. Clean filter or replace filter element. 5. Fill up water sufficiently in cooling assembly, check and repair or replace piston, piston ring and liner. 6. Check and repair or replace it. 7. Remove obstruction or replace it. 8. Check and repair or replace it.

5-4 Engine Over-speeding (Running Away)

Causes	Remedies
<ol style="list-style-type: none"> 1. Governor works abnormally, governor spring broke. 2. Too much oil in air cleaner. 3. Injection pump rack gets stuck. 	<ol style="list-style-type: none"> 1. Stop engine immediately, check and repair governor or replace it if necessary. 2. Stop engine immediately, keep oil at specified level. 3. Stop engine immediately, check and repair injection pump.

5-5 Unordinary Noise in Operation

Causes	Remedies
<ol style="list-style-type: none"> 1. Injection time too early. 2. Valve clearance too large. 3. Clearance between piston and cylinder liner too great. 4. Clearance between piston pin and connection rod small end bushing too large. 5. Clearance of connecting rod bearing or main bearing too large. 6. Noise due to valve pounds piston top 7. Fuel dropped from fuel injector. 	<ol style="list-style-type: none"> 1. Check and readjust injection time. 2. Check and readjust it. 3. Replace worn out part. 4. Replace worn out part. 5. Replace worn out part. 6. Check and readjust valve clearance. 7. Clean, repair or replace needle valve body and needle valve.

5-6 Insufficient Lubricating Oil Pressure or No Oil Pressure at All

Causes	Remedies
<ol style="list-style-type: none"> 1. Too less or no lubricating oil in oil sump. 2. Lubricating oil pipe, oil filter element blocked, or oil pressure gauge damaged. 3. Improper grade or unqualified property of lubricating oil. 4. Lubricating oil contaminated by water due to damage of cylinder head gasket or water seal ring on liner. 	<ol style="list-style-type: none"> 1. Replenish lubricating oil to specified level. 2. Clean oil pipe, oil strainer and oil filter element, or replace damaged oil pressure gauge. 3. Renew lubricating oil with qualified one. 4. Check or replace new parts.

5. Lubricating oil pipe or connector leaks.	5. Check and tighten connector.
6. Rotors of oil pump worn out excessively, and their end clearance with rotor housing too large.	6. Replace rotor and adjust their end clearance with rotor housing.
7. Pressure regulating valve spring of oil filter damaged or poor sealing of valve seat.	7. Replace valve spring or lap valve seat.
8. Too large clearance of engine relative moving parts due to their wear.	8. Replace the worn out parts.
9. Coarse filter clogged.	9. Clean it.

5-7 Engine overheating

Causes	Remedies
1. Inefficiency of cooling system: (1) Insufficiency of cooling water: (2) Too much scale in cooling system. (3) Water pumping capacity insufficient, pump impeller damaged or driving belt too loose. (4) Rubber hose collapsed causing water flow not fluent.	1. Add water. (1) Add water. (2) Remove scale in cooling system. (3) Change water pump, replace pump impeller, tighten belt. (4) Replace or repair it.
2. Fuel injected too late, or injector drops due to nozzle leaking.	2. Readjust fuel injection time, repair or replace injector.
3. Oil temperature too high due to insufficiency of lubricating oil or too much lubricating oil.	3. Replenish lubricating oil to its specific level.
4. Incorrect valve timing.	4. Check and adjust it.
5. Thermostat can't open fully.	5. Repair or replace it.
6. Engine overloaded too long.	6. Reduce engine load.

Note: Remove Scale in Cooling System as Follows

1. Drain the water in the cooling system completely and take out the thermostat if engine has thermostat.
2. Fill the cooling system with same capacity of the descale solution, which is composed of 100 grams of caustic soda and 50 grams of kerosene per kilogram of water.
3. After running the engine idle for 5-10 minutes, stop the engine and remain the solution in the cooling system for 8-10 hrs. Then start the unloaded engine again at medium speed for another 5-10 minutes, lastly stop the engine and drain the solution in the cooling system.
4. Fill the cooling system with clean water and run the unloaded engine again at medium speed for several minutes, then drain the water completely. Repeat this step for 2-3 times.

5-8 Abnormal Exhaust Smoke

Troubles and Causes	Remedies
<p>1. White smoke occurs sometimes at engine starting or low load, fuel burns incompletely.</p> <p>(1) Too much fuel supply.</p> <p>(2) Poor fuel atomization, fuel injection pressure too low or nozzle assembly damaged.</p> <p>(3) Fuel injected too late.</p> <p>(4) Fuel contains water.</p> <p>(5) Insufficient compression pressure.</p>	<p>1.</p> <p>(1) Adjust amount of fuel delivery by fuel injection pump.</p> <p>(1) Clean nozzle, adjust fuel injection pressure, check and repair or replace damaged nozzle assembly.</p> <p>(2) Adjust fuel delivery advance to its optimum value.</p> <p>(4) Drain off spoiled fuel and wash fuel tank, then replace fuel with clean fresh one.</p> <p>(5) See section "5-1.4"</p>
<p>2. Blue smoke due to lubricating oil getting into cylinder.</p> <p>(1) Oil level in oil sump too high.</p> <p>(2) Valve guide worn out badly.</p> <p>(3) Piston ring and/or liner worn out excessively. Rings get stuck or their gaps align each other.</p>	<p>2.</p> <p>(1) Drain excessive lubricating oil.</p> <p>(2) Replace it.</p> <p>(3) Replace worn out parts or reset rings.</p>
<p>3. Black smoke occurs sometimes at heavy load. Fuel supplied too much, and burns incompletely.</p> <p>(1) Engine overload or its output drops due to faults.</p> <p>(2) Poor fuel atomization.</p> <p>(3) Fuel injected too late.</p> <p>(4) Insufficient air supply.</p> <p>(5) Too much fuel supply.</p>	<p>3.</p> <p>(1) Reduce engine load or remedy engine faults.</p> <p>(2) Check, repair or replace nozzle assembly.</p> <p>(3) Adjust fuel delivery advance to its optimum value.</p> <p>(4) Check and clean air cleaner and inlet port.</p> <p>(5) Reduce fuel supply to its specified level.</p>

5-9 Injection Pump Failures

Troubles and Causes	Remedies
<p>1. Insufficient or no fuel injection</p> <p>(1)Plunger assembly worn out badly.</p> <p>(2)Delivery valve sealing not well.</p> <p>(3)Delivery valve spring or plunger spring deformed permanently or broke.</p> <p>(4)Cam worn out so badly that lift of plunger reduced.</p>	<p>1.</p> <p>(1)Replace it.</p> <p>(2)Check and replace it.</p> <p>(3) Check and replace it .</p> <p>(4)Check and replace the camshaft.</p>
<p>2. Uneven fuel distribution</p> <p>(1)Any one of causes listed in " 1 " of this section.</p> <p>(2)Incorrect installation of forks on rack.</p> <p>(3)Plunger assembly stuck due to imparities in fuel.</p> <p>(4)Fuel feed pressure too low.</p>	<p>2.</p> <p>(1) Remedy it as"1" of this section mentioned.</p> <p>(2)Adjust it.</p> <p>(3)Clean or replace it.</p> <p>(4)Check and clean fuel feed pump and fue filter or replace filter element.</p>
<p>(5)Plunger spring broke.</p> <p>(6)Delivery valve spring broke.</p> <p>3. Unstable engine speed.</p> <p>(1)Uneven fuel distribution.</p> <p>(2)Governor spring deformed permanently.</p> <p>(3)Gap of governor rocker arm and rack pin too loose or worn out excessively.</p> <p>(4)Too much lubricating oil in governor.</p>	<p>(5)Replace it.</p> <p>(6)Replace it.</p> <p>3.</p> <p>(1) Remedy it as"2" of this section mentioned.</p> <p>(2) Replace it.</p> <p>(3)Repair or replace it .</p> <p>(4)Stop engine, drain excessive lubricating oi to specified level.</p>
<p>4.Engine minimum stable speed or maximum speed too low or high.</p> <p>(1)Governor spring deformed permanently.</p> <p>(2)Position of idling or maximum speed limiting screw unpropr.</p>	<p>4.</p> <p>(1)Replace it.</p> <p>(2)Adjust it.</p>
<p>5.Engine running away(Speed of engine too high due to adjusting, but not engine running away)</p> <p>(1)Governor spring broke.</p> <p>(2)Pin of fuel control rack drops or breaks.</p> <p>(3)Fuel control rod gets stuck.</p> <p>(4)Sliding sleeve gets stuck.</p>	<p>5.Stop engine immediately for repair.</p> <p>(1)Replace it.</p> <p>(2) Repair or replace it.</p> <p>(3)Check and repair it.</p> <p>(4)Check and repair it.</p>

5-10 Fuel Injector Failures

Troubles and Causes	Remedies
<p>1. Too less or no fuel injected by pump.</p> <p>(1) Air trapped in fuel system.</p> <p>(2) Needle valve gets stuck.</p> <p>(3) Nozzle body too loose to needle valve.</p> <p>(4) Fuel supplied by injection pump abnormally.</p> <p>(5) Fuel system leaks seriously.</p> <p>2. Injection pressure too low.</p> <p>(1) Pressure adjusting screw gets loosen.</p> <p>(2) Injector spring damaged.</p> <p>3. Injection pressure too high.</p> <p>(1) Injection spring pressure too high.</p> <p>(2) Needle valve jammed.</p> <p>(3) Spary holes blocked.</p> <p>4. Injector leaks badly.</p> <p>(1) Injector spring broke.</p> <p>(2) Needle valve or nozzle body sealing surface gets damaged.</p> <p>(3) Cap-nut deformed.</p> <p>5. Fuel spray not well atomized.</p> <p>(1) Spray holes blocked.</p> <p>(2) Sealing surface of needle valve or nozzle body worn out badly.</p> <p>6. Engine overheated and nozzle surface burned.</p>	<p>1.</p> <p>(1) See section "5-1.1(3)"</p> <p>(2) Repair or replace it.</p> <p>(3) Repair nozzle assembly.</p> <p>(4) Check and repair or adjust it.</p> <p>(5) Check and tighten or replace related parts.</p> <p>2.</p> <p>(1) Adjust it until injection pressure reaches its specified level.</p> <p>(2) Replace it.</p> <p>3.</p> <p>(1) Readjust or replace it.</p> <p>(2) Clean it.</p> <p>(3) Clean and repair it.</p> <p>4.</p> <p>(1) Replace it.</p> <p>(2) Replace nozzle assembly.</p> <p>(3) Replace it.</p> <p>5.</p> <p>(1) Clean and repair it.</p> <p>(2) Replace nozzle assembly.</p> <p>6. Check and repair cooling system.</p> <p>Repair or replace nozzle assembly.</p>

Chapter 6 Throttle Control, Instrument and Power Output of Clutch

6—1 Throttle Control Mechanism and Instruments

Model 295G、295GA、295GB、295GJ、295G-2、295GY、295GY-1、295B、295C、295C₁、295D、295D₁、295D₂、295A、295A-1、295A-2、295A-3、295A-4、295A-5、295A-6、295BA、295CA、295C₁A、295DA、295D₁A、295D₂A、SD2100G、SD2100GA、SD2100GB、SD2100GJ、SD2100G-2、SD2100GY、SD2100GY-1、SD2100B、SD2100C₁、SD2100D、SD2100D₁、SD2100A、SD2100A-1、SD2100A-2、SD2100A-3、SD2100A-4、SD2100A-5、SD2100A-6、SD2100BA、SD2100C₁A、SD2100DA、SD2100D₁A diesel engines are equipped with throttle control mechanism. When to change speed, loosen a tightening cap with figures first, then turn a throttle handle. In such a case, a throttle pull-rod makes the speed-adjusting lever of fuel-injection pump governor turn. At the approach of required speed, tighten up the tightening cap with figures. If the throttle handle moves in the direction of label arrow, the speed of the diesel engine increases. On the contrary, the speed decreases.

Model 295G、295GA、295GB、295GY、295GY-1、295B、295C、295C₁、295D、295D₁、295D₂、295A、295A-2、295A-3、295A-5、295A-6、295BA、295CA、295C₁A、295DA、295D₁A、295D₂A、SD2100G、SD2100GA、SD2100GB、SD2100GY、SD2100GY-1、SD2100B、SD2100C₁、SD2100D、SD2100D₁、SD2100A、SD2100A-2、SD2100A-3、SD2100A-5、SD2100A-6、SD2100BA、SD2100C₁A、SD2100DA、SD2100D₁A diesel engines are equipped with a instrument board, on which is equipped with an electrical lock, a preheating start switch, an instrument lamp, an oil pressure gauge, a temperature gauge and a galvanometer, in which is equipped with a fuse box and voltage regulator. The model of the electrical lock is JK 424. The model of the galvanometer is 307-C-20, which indicates a working state of a battery: for example, in the case of normal work, when the pointer points to “+”direction, the engine charge the battery, when the pointer points to “0”, the quantity of electricity of the battery is sufficient, when the pointer points to “-”direction, the battery is discharges. The model of oil pressure gauge is YT-120. The model of the temperature gauge is WT-120.

The Model 295QB、295YA、SD2100QB、SD2100YA diesel engines use a Model 308 electrothermal lube oil pressure gauge whose sensor is a Model 303 oil pressure sensor. It uses a Model 302 electrothermal lube oil thermometer whose sensor is Model 306 temperature-sensing plug. The engine is only provided with the oil pressure sensor and the temperature-sensing plug, user itself must be provided with an oil pressure gauge and a temperature gauge.

6—2 Power Output of Clutch

Model 295G、295GA、295G-2、295A、295A-2、295A-4、SD2100G、SD2100GA、SD2100G-2、SD2100A、SD2100A-2、SD2100A-4 diesel engines transmit its power to a matching implement through a power output part of a clutch.

In operation, clutch driven disk rotates together with the flywheel and a driving part by means of friction force. and transmit the power to an output belt pulley through a clutch shaft (splined connection).

If we depress and move backwards a control handle, the clutch is in a disengaged state, and the power is cut off. If we move the control handle forward, the clutch is in an engaged state.

1. Adjustment of clutch

To ensure that the clutch can be disengaged thoroughly and friction disk wears uniformly, and keeps a definite pressure, the clearance between the release bearing and the release lever should be in between 2~3mm, and the end face of three release lever should be in the same plane(the difference among them should be within 0.15mm).If the difference among them is too big, can open a watch window, loosen the lock nuts and adjust the adjusting nuts of the release lever to satisfy above demands. After adjusting, tighten up the lock nuts. As adjusting, the clutch should be in the engaged state. For a new clutch facing, the distance between the release lever and the end face of clutch pressure plate is 43.5mm.

2. Correct use of clutch

(1) When the engine starts, first should depress the clutch control handle and move backwards it to make the clutch be in a "disengaged" position.

(2) When the clutch engages, the speed of the diesel engine should be lower than 1500rpm.

(3) When the clutch disengages, its action should be quick, disengagement should be thorough, and should not apply an impact force.

(4) When the clutch engages, the action should be soft to avoid that parts are shocked strongly.

(5) Strictly forbid controlling the speed of the power output with the clutch to prevent the clutch facing and the clutch pressure plate from burning.

(6) Should not make the clutch be in the disengaged state for a long time to prevent the clutch hold-down spring from pressure drop because of producing permanent deformation.

(7)Clutch rinsing

An oil drain screw is at bottom of the flywheel housing, should regularly check oil leakage state of rear oil seal of the crankshaft. If there is cumulative oil in the flywheel housing, can dismantle the clutch except for changing the rear oil seal of the crankshaft, rinse the working surface of the clutch facing and clutch pressure plate with gasoline to prevent the clutch from slip.

Chapter 7 Additional Remarks

7—1 Model SD2100T and modified diesel engines

The Model SD2100T diesel engine has changed the cylinder bore of the Model 295T diesel engine from 95mm to 100mm, its speed reaches 2200rpm, and its fuel system has done proper change, the power has increased 4.4kW, therefore, it is very good power of the Model 300 tractor.

In order to ensure the reliability and durability of the Model SD2100T diesel engine, the reinforced ribs are arranged on the inwall of the cylinder block in the direction of force applying to the cylinder-head bolts, which run through a positions of connecting the cylinder-head bolts, lower support of the cylinder liner and main bearing seat, so that the cylinder block becomes a space rigid-framed structure, and the thickness of main bearing cover increases. In order to ensure the seal, there are recess holes at the cylinder-head bolts holes of top plane of the cylinder block. It has eliminated the local deformation caused by tightening up the cylinder-head bolts.

The material of the cylinder-head is semisteel, which has increased the tensile strength and bending strength. And a nose bridge section between the intake and exhaust valve has adopted the structure of local milling and thinning, so the thermal stress is decreased.

Blind type radiator-fan has risen the heat-transfer efficiency of the radiator, makes the heat dissipating capacity increase, therefore, the needs of the dissipating heat of the Model SD2100T diesel engine are met.

The overall dimensions and the connecting dimensions of the Model SD2100T are the same as the Model 295T diesel engine, two kinds of models possess higher versatility.

Model SD2100G、SD2100GA、SD2100GB、SD2100GJ、SD2100G-2、SD2100GY、SD2100GY-1、SD2100B、SD2100QB、SD2100C₁、SD2100D、SD2100D₁ diesel engine is a modification based on Model SD2100T diesel engine, according to different usage and marketing requirement. It is taken as an excellent power of farm transportation vehicles, small size engineering machinery, generating sets, small size boats and fixed operation machinery.

7—2 Model 295A and modified diesel engines

The Model 295A diesel engine is direct injection chamber diesel engine which is developed on the basis of Model 295G swirl chamber diesel engine. The power is 20kW.

The speed is 2200 rpm. It possesses more excellent reliability, fuel economical thrifty and starting performance.

Model 295A diesel engine possesses reinforced I # injection pump. Its fuel supply rate has risen, therefore, the needs of the fuel supply rate of direct injection diesel engine are met, and it allocates serial long needle oil injection nozzle with five holes. Its air inlet manifold and shallow ω type chamber which is dead to air inlet swirl.

Except cylinder head, piston, injection pump, injection nozzle, high pressure fuel tube and connecting rod bearing etc, the other parts of Model 295A diesel engine possess higher versatility with Model 295G diesel engine.

Model 295TA, 295A-1, 295A-2, 295A-3, 295A-4, 295A-5, 295A-6, 295BA, 295CA, 295C₁A, 295DA, 295D₁A, 295D₂A and 295YA diesel engine are modifications based on Model 295A diesel engine, according to different usage and marketing requirement. It is taken as an excellent power of tractor, farm transportation vehicles, small size engineering machinery, generating sets, small size boats and fixed operation machinery.

7—3 Model SD2100A and modified diesel engines

The Model SD2100A diesel engine is direct injection chamber diesel engine which is developed on the basis of Model SD2100G Swirl chamber diesel engine. It possesses more excellent reliability, fuel economical thrifty and starting performance.

Model SD2100A diesel engine possess reinforced I # injection pump. Its supply rate has risen, therefore, the needs of the fuel supply rate of direct injection diesel engine are met, and it allocates serial long needle oil injection nozzle with five holes. Its air inlet manifold and shallow ω type chamber which is dead to air inlet swirl.

Except cylinder head, piston, injection pump, injection nozzle, high pressure fuel tube and connecting rod bearing etc, the other parts of Model SD2100A diesel engine possess higher versatility with Model SD2100G diesel engine.

Model SD2100A diesel engine possesses higher versatility with the cylinder head, injection pump, injection nozzle, high pressure fuel tube and connecting rod bearing of Model 295A diesel engine.

Model SD2100TA, SD2100A-1, SD2100A-2, SD2100A-3, SD2100A-4, SD2100A-5, SD2100A-6, SD2100BA, SD2100C₁A, SD2100DA, SD2100D₁A and SD2100YA diesel engines are modifications based on Model SD2100A diesel engine, according to different usage and marketing requirement. It is taken as an excellent power of tractor, farm transportation vehicles, small size engineering machinery, generating sets, small size boats and fixed operation machinery.

Notice to Users

Dear Users:

In order to strengthen the contact with the users, improve the quality of our products, achieve safety and reliability and durability, do our best at service work for users without delay. According to the requirement of Agriculture Equipment Department of National Machinery Ministry, we make the First Malfunction Table following FEIDONG brand Model 295 and SD2100 diesel engines for you. Please fill in this form according to the notes in time. And after the first engine stall malfunction appears, please post this form to Shandong Tractor Works Engine Division so that we can serve for you in time.

1、 The users should fill in the form in time after the product arrives. And after the first engine stall malfunction appears, please post this form to Shandong Tractor Works Engine Division.

2、 Whatever unusual is looked on as malfunction, e.g, water leakage or oil leakage is looked on as malfunction, too. Although they can be removed by way of tightening a screw. Engine stall malfunction is that the engine itself (Don't include operating duty) causes engine stall accident.

3、 Average load is general load level. It can fall roughly into three categories-100%, 75% and 50%.

4. For Concerning working usage, please write clearly that this engine is used in tractor, fixed irrigation, farm products processing, small size boat, farm transportation, engineering machinery, generating sets or the other usage. If the tractor is used in transportation, please tell us the road condition. If the tractor is used in plough, Please tell us the earth surface condition.

5. Finishing filling in this form, please cut it off along the side line, fold, put in envelope, write P.C. and Address clearly.

The First Malfunction Table



Model		Ex-factory No.	
Ex-factory Date		Use Date	
Address			
User's name		Sex	Age
Cultural Level		Operating time	
Use situation	Application		Average load
	Condition		Average working time every day
The first fault	character		Date
	Fault situation and damaged parts		
	Total Working time before the 1st. fault		
The first engine stall	Character		Date
	Fault situation and damaged Parts		
	Total working time before the 1st stall fault		
Causes			
Suggestions			
Handling		Total No.	