COMPACT EXCAVATOR

TB070

WORKSHOP MANUAL

SERIAL NUMBER
TB070 : 1703004～

TAKEUCHI MFG.CO.,LTD.

02. 2000
13935

FOREWORD

This manual is intended for persons who engage in maintenance operations, and explains procedures for disassembly and reassembly of the machine, check and maintenance procedures, maintenance reference values, troubleshooting and outline specifications, etc. Please use this manual as a reference in service activities to improve maintenance techniques.
Further, please be adviced that items contained in this manual are subject to change without notice due to design modifications, etc.

MACHINE FRONT AND REAR, LEFT AND RIGHT

The end where the dozer blade is mounted is the front and the end with the travel motors is the rear. Also the right and left sides of the operator when he is seated in the driver's seat are the right and left sides of the machine.

MACHINE SERIAL NUMBER

The machine serial number is stamped on the identification plate. When sending reports and inquiries, and when ordering parts, etc., be sure to include this number.

MANUAL CONTROL

Information on those to whom this manual is distributed is recorded in the ledger in the section in charge at this company, so please decide on a person to be in charge of it and control it. When there are updates or additions, etc., we will notify the person in charge.

I . GENERAL

II . SPECIFICATIONS

III. MACHINE CONFIGURATION

IV. HYDRAULIC UNITS

V . TROUBLESHOOTING

VI. ENGINE

I . GENERAL

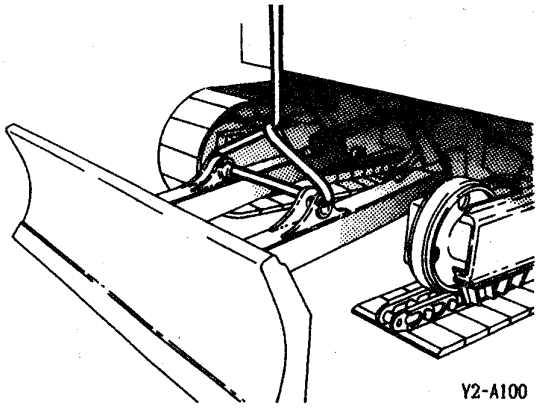
FOREWORD

This section, GENERAL, summarizes the basic items which persons servicing the machine should be cautious about, and includes only those items which are essential for safe and correct operation. Please read this section thoroughly and apply it in maintenance operations.
Further, since the contents of this manual may change due to future revisions, if you have any opinions or observations concerning this manual, please notify the person responsible.

CONTENTS

GENERAL CAUTIONS

1. Wear a helmet, safety shoes and work clothes.
2. Be sure to check equipment and tools, particularly equipment used for hoisting.
3. If more than one person is working together, decide the job and call sign and maintain good communications during operations.
4. Crane operation and hoisting should be done by persons with the proper qualifications.
5. Keep all persons from getting underneath a suspended load.
6. Before removing the installation bolts of heavy parts, support the parts by temporary hoisting a crane.



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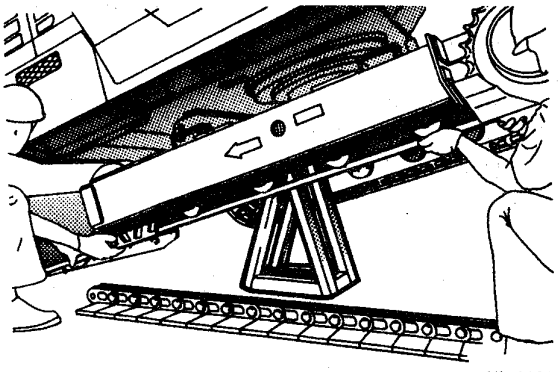
7. If lifting a machine with a hoe attachment, etc. and going underneath it, be sure to supprt it with stands etc.



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8. When repairing the electrical system, disconnect the cables from the battery before beginning the operation.
9. When welding the machine, disconnect the battery and the control connector first.
10. Maintain the standard tightening torques for piping and bolts, etc.
11. After completing repairs, run the engine at low speed, and conduct trial operation after filling it full with operating oil.

CAUTIONS DURING DISASSEMBLY AND ASSEMBLY

1. Clean the machine before disassembly operation.

2. Before disassembly, check the machine conditions and record them.
   - Model, Machine Serial Number, Hourmeter
   - Reason for Repairs, Repairs History
   - Dirtiness of Filters
   - Fuel and Oil Conditions
   - Damage to each parts, etc.

3. To make reassembly operations easy, make matching marks at the necessary points.

4. Clean all disassembled parts and new parts, then arrange them in the proper sequence.

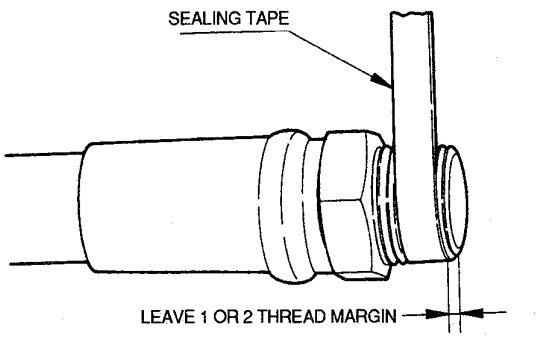
5. Be sure to replace all seals and cotter pins, etc. with new parts.

6. Keep parts which should not come in contact with oil and water separate from parts with oil on them.
   - Electrical Parts, Rubber, V-Belts, etc.

7. When installing bearings, bushings and oil seals, as a rule, use a press. When a hammer, etc. is used, it leaves bruises.

8. Wipe all joining surfaces clean so that there is no dirt or dust adhering to them.

9. Wrap seal tape from the front end, Wrapping it tight and leaving 1 or 2 threads bare, Overlap the tape by about 10mm.

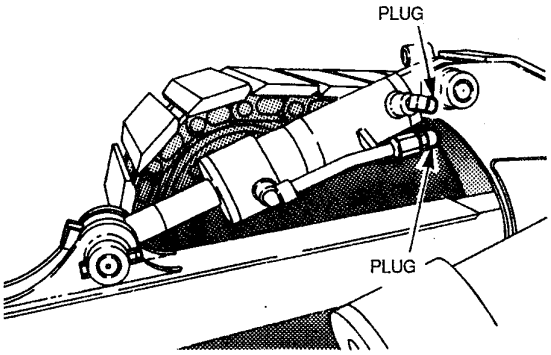


CAUTIONS DURING REMOVAL AND INSTALLATION OF THE HYDRAULIC UNITS

1. Make sure that the hydraulic oil's temperature has dropped.

2. To prevent a loss of flow of the hydraulic oil, the residual pressure in the piping and the internal pressure in the hydraulic oil tank should be bled out.

3. Be sure to install caps or plugs on all openings in the hydraulic unit to prevent dirt from getting into the unit throught the openings.



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4. It is easy to mistake hydraulic oil adhering to the hydraulic unit for an oil leak, so wipe the unit off thoroughly.

5. Be sure that no damage is done to the plating on the rod in the hydraulic cylinder.

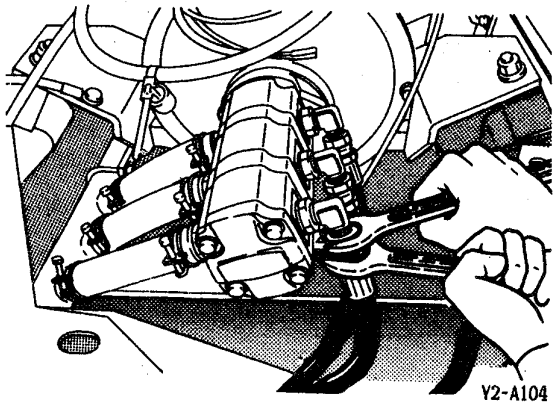
6. As a rule, removal and installation of the hydraulic cylinder should be done with the rod fully retracted.

7. Be sure to bleed the air after replacing the hydraulic oil or removing any of the hydraulic devices (hydraulic cylinder, control valve or slew motor).
   - Refer to the item "III. Machine Configuration, Hydraulic System".

CAUTIONS DURING REMOVAL AND INSTALLATION OF PIPING

1. When hydraulic hoses are installed, tighten them once to the prescribed torque, then loosen them slightly and retighten them to the prescribed torque.
   - Tighten the fittings after the installation surfaces fit snugly together.
   - Pieces wrapped with seal tape are exlcuded.

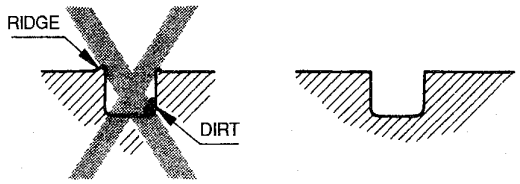
2. Use 2 spanners, each on an opposit side, to remove and tighten fittings so that the hoses or steel pipes are not twisted.



3. After installation of hydraulic hoses or steel pipes, apply the maximum working pressure 5 or 6 times and confirm that there is no leakage.

HANDLING OF SEALS

1. Clean the grooves for O-rings and if there is any ridge, etc, remove it.



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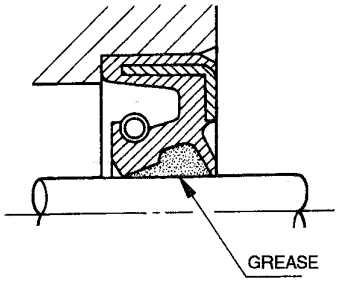
2. Be careful not to twist O-rings. If an O-ring is twisted, remove the twist with the fingertips.

3. During insertion, be careful not to damage the seal.

4. Handling of Floating Seals
   - Wipe all oil off the O-ring and housing of the floating seal.
   - When assembling, apply a thin coating of gear oil to the contact surface of the housing.
   - After assembly, turn the seal 2 or 3 times to get it to fit snugly.

5. Apply grease to the lip of the oil seal.
   - This is to prevent wear when it is first started up after assembly.



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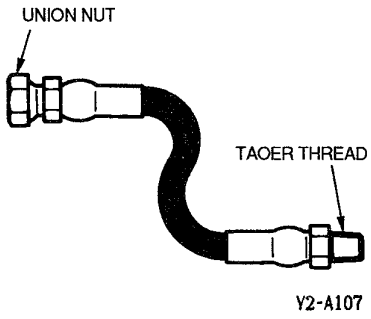
TIGHTENING TORQUES

Hydraulic Hoses

Hose Fitting Size	Torque			
	Union Nut (PF)		Taper Thread (PT)	
	kgf·m	ft-lb	kgf·m	ft-lb
1/8	$1.0^{+0.5}_{0}$	$7.3^{+3.5}_{0}$	1.2±0.12	8.7±0.8
1/4	$2.5^{+0.5}_{0}$	$18.1^{+3.5}_{0}$	3.0±0.30	21.7±2.1
3/8	$5.0^{+0.5}_{0}$	$36.2^{+3.5}_{0}$	5.5±0.55	39.8±3.9
1/2	$6.0^{+0.5}_{0}$	$43.4^{+3.5}_{0}$	9.0±0.90	65.1±6.4
3/4	$12.0^{+0.5}_{0}$	$86.8^{+3.5}_{0}$	15.0±1.50	108.5±10.7
1	$14.0^{+0.5}_{0}$	$101.3^{+3.5}_{0}$	20.0±2.00	144.7±14.3



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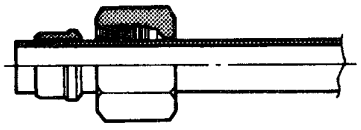
Bite Type Pipe Fitting for Steel Pipe

Pipe Outer Diameter (mm)	Torque	
	kgf·m	ft-lb
8	3.5±0.5	25.3±3.5
10	4.25±0.25	30.7±1.7
12	6.0±0.5	43.4±3.5
15	9.0±0.5	65.1±3.5
16	9.5±0.5	68.7±3.5
18	13.5±0.5	97.6±3.5
22	21.0±1.0	151.8±7.2
27.2	25.0±1.0	181.0±7.2
28	32.0±2.0	231.4±14.3
32	32.0±2.0	231.4±14.3
35	42.0±2.0	303.7±14.3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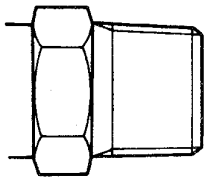
Joints for Piping

Thread Nominal Diameter (PT)	Torque			
	Steel		Cast Steel	
	kgf·m	ft-lb	kgf·m	ft-lb
1/8	1.2±0.12	8.7±0.8	1.1±0.11	8.0±0.7
1/4	3.0±0.30	21.7±2.1	2.5±0.25	18.1±1.7
3/8	5.5±0.55	39.8±3.9	5.0±0.50	36.2±3.5
1/2	9.0±0.90	65.1±6.4	7.5±0.75	54.3±5.3
3/4	15.0±1.50	108.5±10.7	13.0±1.30	94.1±9.3
1	20.0±2.00	144.7±14.3	17.5±1.75	126.6±12.5



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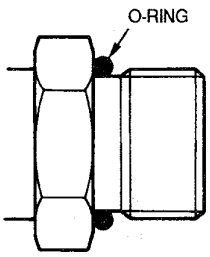
Joints for Piping (O-ring Seal Type)

Thread Nominal Diameter (PT)	Torque	
	kgf·m	ft-lb
1/8	2.0±0.2	14.5±1.4
1/4	3.5±0.5	25.3±3.5
3/8	5.5±0.5	39.8±3.5
1/2	6.5±0.5	47.0±3.5
3/4	9.5±0.5	68.7±3.5
1	11.0±1.0	79.5±7.2
1-1/4	12.0±1.0	86.8±7.2
1-1/2	14.0±1.0	101.2±7.2



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Thread Nominal Diameter (UNF)	Torque	
	kgf·m	ft-lb
7/16—20	1.7±0.2	12.3±1.4
1/2—20	2.3±0.2	16.6±1.4
9/16—18	3.2±0.3	23.1±2.1
3/4—16	6.1±0.5	44.1±3.5
1-1/16—12	10.4±0.6	75.2±4.4
1-5/16—12	13.8±0.8	99.8±5.8
1-5/8—12	18.5±1.0	133.8±7.2

Bolts and Nuts (for ISO Strength Category 10.9)

Thread	Size × Pitch mm	Torque					
		General Tightening Points			Special Tightening Points		
		N·m	kgf·m	ft-lb	N·m	kgf·m	ft-lb
Coarse	M6 × 1.0	9.8 ±0.5	1.0 ±0.05	7.2 ±0.4	11.8 ±0.6	1.2 ±0.06	8.7 ±0.4
	M8 × 1.25	22.6 ±1.1	2.3 ±0.11	16.6 ±0.8	26.5 ±1.3	2.7 ±0.13	19.5 ±0.9
	M10 × 1.5	47.1 ±2.4	4.8 ±0.24	34.7 ±1.7	54.9 ±2.7	5.6 ±0.28	40.5 ±2.0
	M12 × 1.75	83.4 ±4.1	8.5 ±0.42	61.5 ±3.0	97.1 ±4.8	9.9 ±0.49	71.6 ±3.5
	M14 × 2.0	134.4 ±6.7	13.7 ±0.68	99.1 ±4.9	155.9 ±7.7	15.9 ±0.79	115.0 ±5.7
	M16 × 2.0	207.9 ±10.4	21.2 ±1.06	153.3 ±7.7	241.2 ±12.1	24.6 ±1.23	177.9 ±8.9
	M20 × 2.5	410.9 ±20.5	41.9 ±2.09	303.1 ±15.1	475.6 ±23.7	48.5 ±2.42	350.8 ±17.5
Fine	M8 × 1.0	24.5 ±1.2	2.5 ±0.12	18.1 ±0.9	28.4 ±1.4	2.9 ±0.14	21.0 ±1.0
	M10 × 1.25	50.0 ±2.5	5.1 ±0.25	36.9 ±1.8	58.8 ±2.9	6.0 ±0.30	43.4 ±2.2
	M12 × 1.5	87.3 ±4.3	8.9 ±0.44	64.4 ±3.2	102.0 ±5.1	10.4 ±0.52	75.2 ±3.8
	M14 × 1.5	135.3 ±6.8	13.8 ±0.69	99.8 ±5.0	157.9 ±7.8	16.1 ±0.80	116.5 ±5.8
	M16 × 1.5	220.6 ±11.0	22.5 ±1.12	162.7 ±8.1	256.0 ±12.7	26.1 ±1.30	188.8 ±9.4
	M20 × 1.5	452.1 ±22.6	46.1 ±2.30	333.4 ±16.6	524.7 ±26.1	53.5 ±2.66	387.0 ±19.2

1. General Tightening Points (Non-lubricated)
   - All securing points other than the special tightening points.

2. Special Tightening Points (Grease with molybdenum disulfide applied.)
   - Points where particularly necessary due to function.
   a. Other parts where it is deemed particularly necessary due to the design.

3. Points where thread lock is used (Three Bond #1324 is applied.)
   a. Conections between the slew bearing and lower frame.
   b. Engine foot connections.
   c. Pump coupling connections.
   d. Counterweight tightening position.
   e. Other parts where it is deemed particularly necessary due to the design.

4. If tightening torque values are provided in this manual, then tightening should be done according to those values.
   (This indicates that the tightening torque differs from the values given in this table.)
5. In order to tighten bolts and nuts evenly, they should be tightened alternately top, bottom, left, right.

II. SPECIFICATIONS

FOREWORD

This section, SPECIFICATIONS, includes brief specifications and maintenance standards for this machine, and is organized around the data required for service operations. Please use this manual in checks of the machine before servicing, checks after servicing and when replacing parts.
We want, through future revisions of this manual, to improve it and make it as complete as we possibly can. We welcome any opinions or suggestions, which you may have that would help us. Please address all comments to the person in charge.

In regard to Standard Values and Allowable Values

The terms used in the items "Servicing Standards" and " Standards for Judging Performance" have the following meanings.

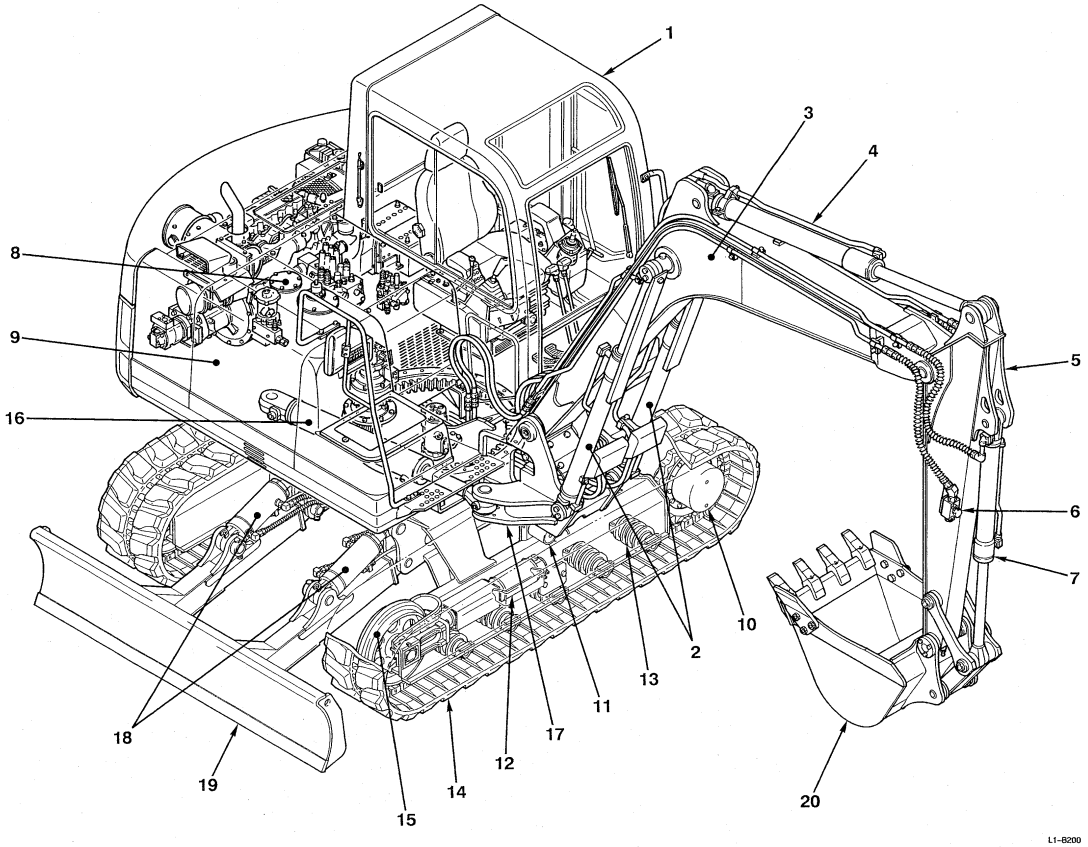
Standard Value ..... This indicates the standard value for the new machine at the time of shipping from the factory. It should be used as the target value for maintenance work after operation.

Allowable Value ..... The dimensions of parts change during use because of wear and deformation. Also, the performance of pumps, motors, and other hydraulic equipment drops, and this is the estimated value indicating the use limit for the respective part. It is decided under reference to the standard at the time of shipping, the results of various tests, etc. As the use conditions, the degree of repairs, etc. differ for each machine, these should be combined and used as reference for servicing standards and standards for judging performance.

*Do not use the standard values and the allowable values as standards for customer claims.

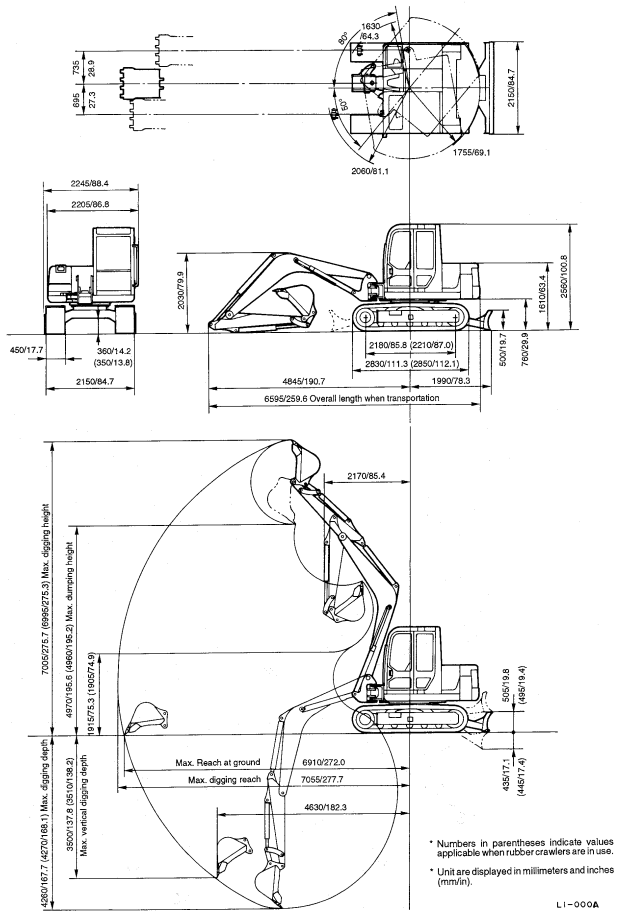
CONTENTS

NAMES OF COMPONENTS



1. Cab
2. Boom Cylinder
3. Boom
4. Arm Cylinder
5. Arm
6. Auxiliary Port
7. Bucket Cylinder
8. Hydraulic Tank
9. Fuel Tank
10. Travel Motor
11. Carrier Roller
12. Tensioning Cylinder
13. Track Roller
14. Crawler Belt
15. Idler
16. Swing Cylinder
17. Swing Bracket
18. Dozer Blade Cylinder
19. Dozer Blade
20. Bucket

SPECIFICATION DIAGRAMS



LIFTING CAPACITIES

Rated lift capacity chart

- The numerical values in the charts indicate either 87% of the hydraulic lift capacity or 75% of the tipping load, whichever value is smaller. (*Marks indicate values limited by the hydraulic lift capacity.)
- The mass of slings and any auxiliary lifting devices shall be deducted from the rated load to determine the net load that may be lifted.
- The load point is the bucket hinge pin, and the bucket posture is with the standard bucket completely retracted under the arm.
- Units: kg (lbs.)

Load hooking system

A load hooking system with all of the following capacities must be provided and used.

① A system which can withstand a weight of two times the rated lift capacity no matter at what position the load is applied.

② A system in which there is no risk of the lifted load falling from the hooking device, for example one equipped with a hook slippage prevention device.

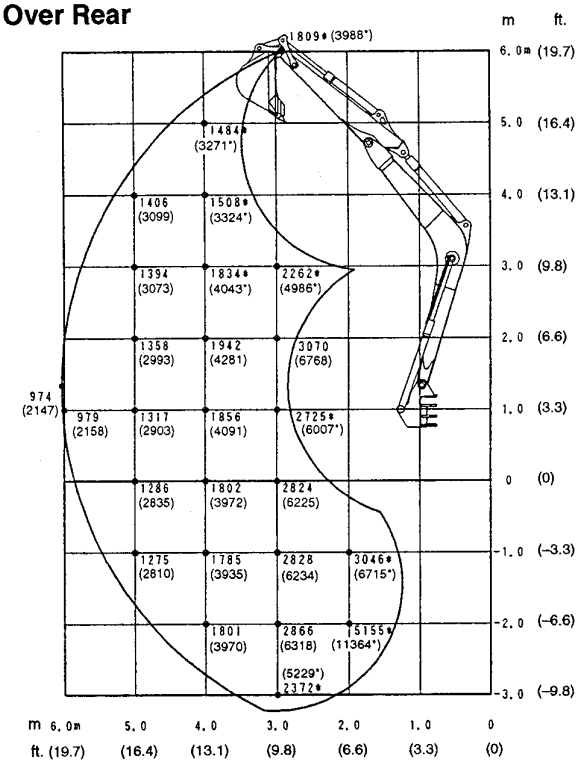
③ A system in which there is no risk of the hooking system slipping from the hoe attachment.

⚠ WARNING

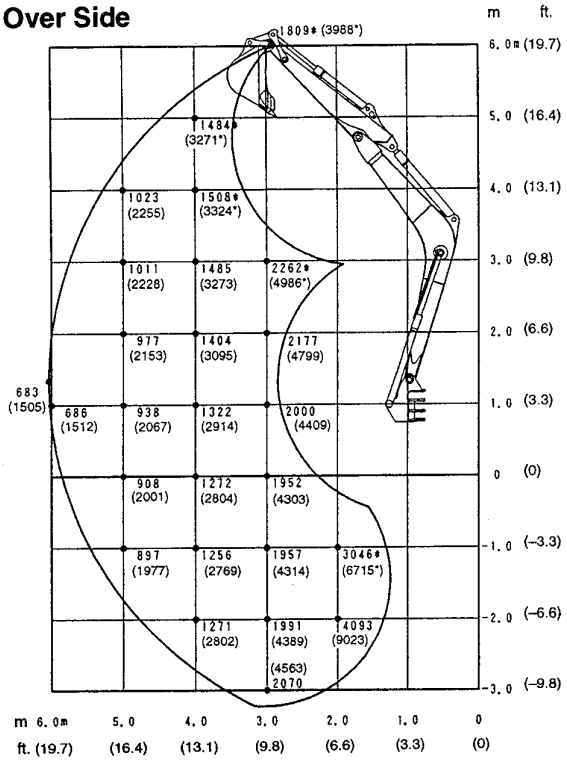
- **DO NOT attempt to lift or hold any load that is greater than these rated values at their specified load radii and height.**
- **All rated lift capacities are based on the machine being level and on a firm supporting surface. For safe working loads, the user is expected to make due allowance for the particular job conditions such as soft or uneven ground, non-level conditions, side loads, hazardous conditions, experience of personnel, etc. The operator and other personnel should fully acquaint themselves with the operator's manual furnished by the manufacturer before operating this machine, and rules for safe operation of equipment shall be adhered to at all times.**

Rubber Crawler, Cab, Standard Bucket, Standard Arm

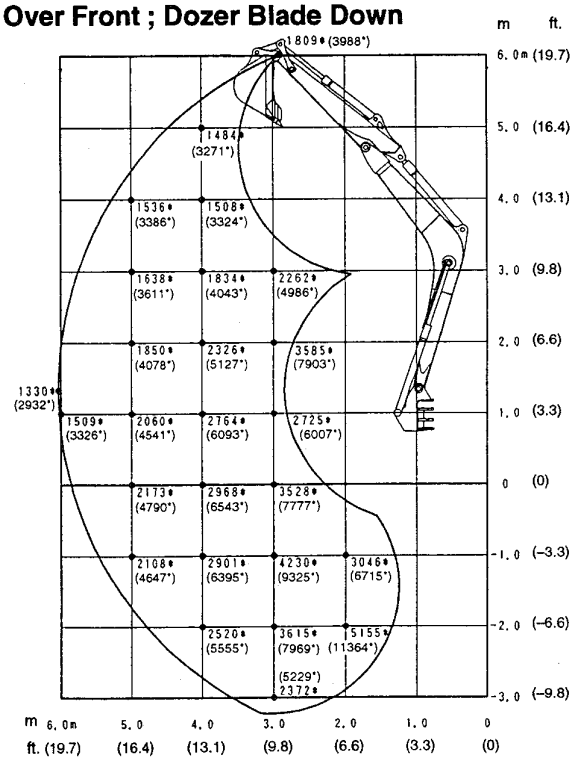
Over Rear



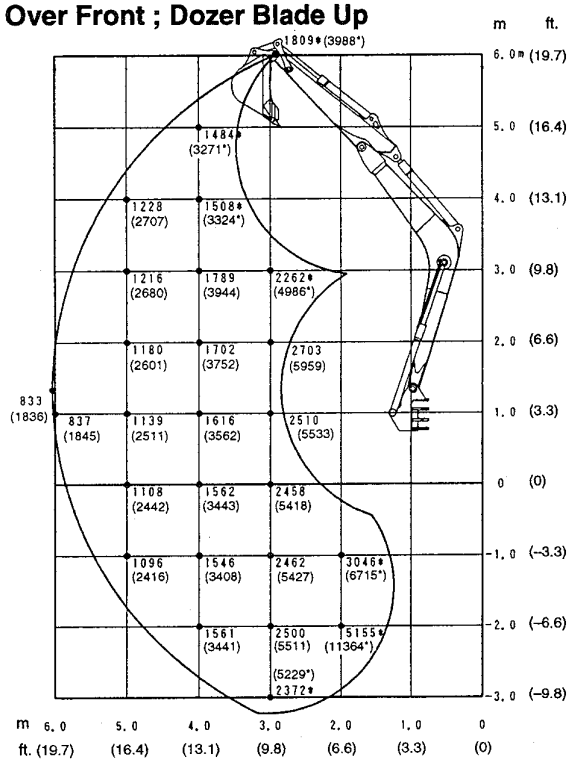
Over Side



Over Front ; Dozer Blade Down

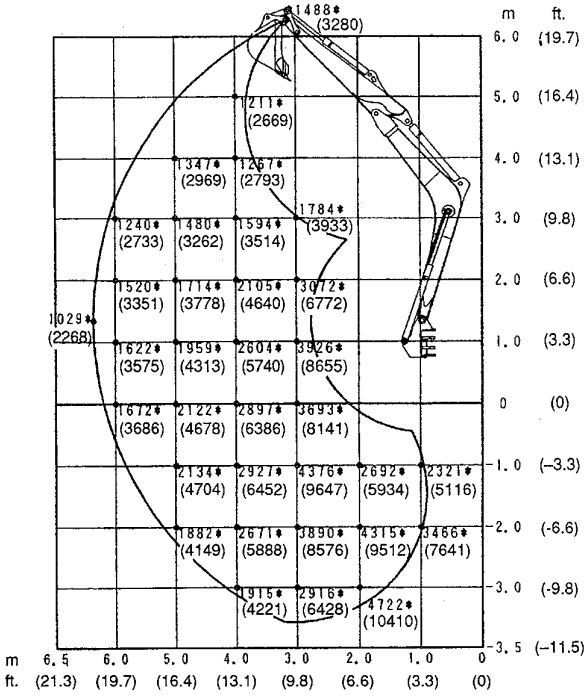


Over Front ; Dozer Blade Up

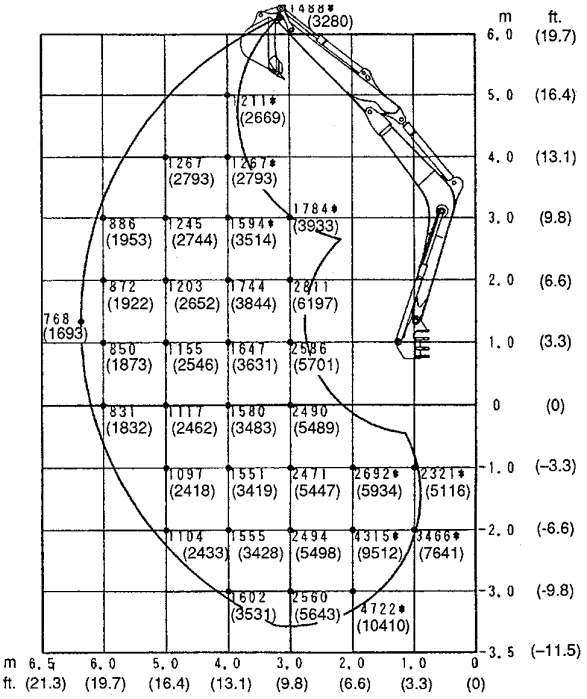


Steel Crawler (plate width: 550mm), Cab, Standard bucket, Long Arm

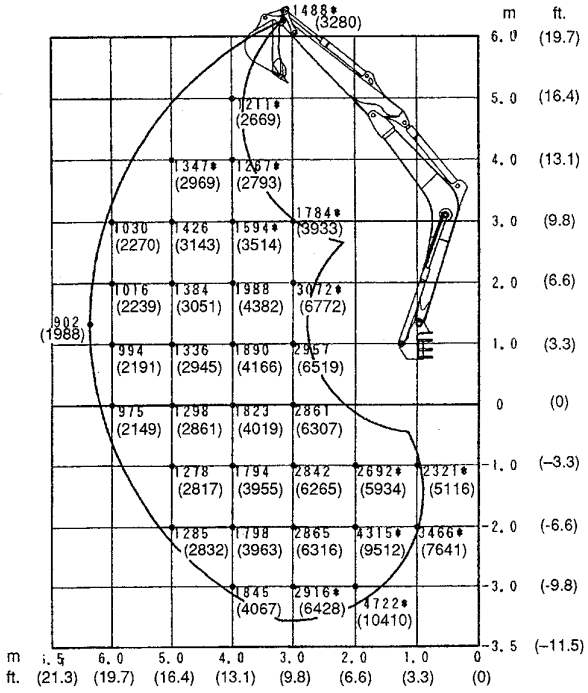
Over Front ; Dozer Blade Down



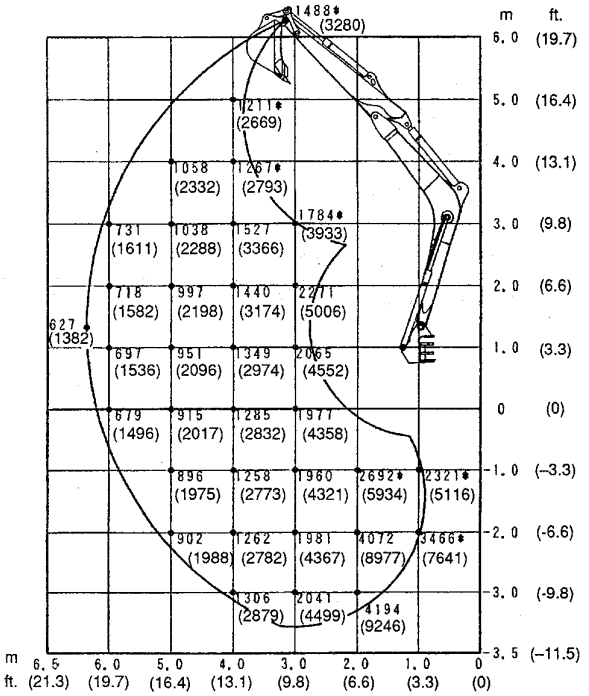
Over Front ; Dozer Blade Up



Over Rear



Over Side



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SPECIFICATION TABLES

SPECIFICATIONS

Serial Number		1703004~
Type		Cab
Standard Bucket Capacity(SAE Rated)	(m^3)	0.25
Weight in Transport Condition	(kg)	7160(7030)
Dimensions	(mm)	
Overall Length (in Transport Position)		6595
Overall Width (in Transport Position)		2245
Overall Height (in Transport Position)		2560
Minimum Ground Clearance		360(350)
Minimum Height of Upper Machinery		760
Overall Width of Upper Machinery		2110
Overall Width of Crawler		2150
Overall Length of Crawler		2830(2850)
Minimum Slew Radius		2170
Tail Swing Radius		1755
Dozer Blade Width		2150
Dozer Blade Height		500
Working Range	(mm)	
Maximum Digging Height		7005(6995)
Maximum Digging Depth		4260(4270)
Vertical Digging Depth		3500(3510)
Maximum Digging Reach		7055
Maximum Reach at Ground Level		6910
Maximum Dumping Height		4970(4960)
Bucket Offset: Right/Left		735 / 695
Dozer Blade Lift: Above/Below Ground		505(495) / 435(445)
Performance		
Digging Force: Arm/Bucket	(kgf)	3600 / 4800
Slew Speed	(rpm)	5.5 / 10.5
Travel Speed	(km/h)	3.0(3.1) / 5.5(5.8)
Traction Force	(kgf)	8030(7640)
Gradeability	(degree)	35
Ground Pressure (JIS)	(kgf/cm^2)	0.335(0.325)

* Values in ( ) are for models with rubber crawler specifications.

SPECIFICATIONS OF DEVICES

Serial Number		1703004~1703303	1703304~
Engine			
Model		Nissan BD3004	←
Type		4-Cycle Water Cooled Diesel	←
Number of Cylinders–Bore×Stroke	(mm)	4–96×102	←
Total Displacement	(cc)	2953	←
Compression Ratio		18.5	←
Dry Weight	(kg)	280	←
Performance			
Rated Output	(PS/rpm)	56 / 2300	←
Maximum Torque	(kgf·m/rpm)	19 / 1600	←
Maximum No-load R.P.M.	(rpm)	2485	←
Minimum No-load R.P.M.	(rpm)	950 ~ 1000	←
Starter	(V–kW)	24–3.5	←
Generator	(V–A)	24–25	←
Battery	(V–A·h)	12–55(5HR)	←
Hydraulic Pump			
Model		AP2D36SR1RS6-990-0	AP2D36SR1RS6-990-1
Type		Variable Piston + Gear	←
Displacement	(cc/rev)	30×2 + 18.8 + 5.1	←
Delivery	(*l* /min)	69×2 + 43.2 + 11.73	←
Rated Pressure	(kgf/cm²)	280 + 250 + 40	←
Weight	(kg)	49	←
Control Valve			
Model		KVMM-80T	←
Number of Circuits		Mono-Block	←
Main Relief Valve Set Pressure	(kgf/cm²@*l* /min)	280@100	←
Port Relief Valve Set Pressure	(kgf/cm²@*l* /min)	340@69	←
Weight	(kg)	65	←
Control Valve			
Model		KVS-31-3	←
Number of Circuits		3	←
Main Relief Valve Set Pressure	(kgf/cm²@*l* /min)	250@43	←
Port Relief Valve Set Pressure	(kgf/cm²@*l* /min)	275@5	←
Weight	(kg)	8.5	←
Pilot Valve			
Model		TH40K1135A	←
Secondary Side Pressure (Ports 1, 3)	(kgf/cm²)	5.5 ~ 21(Short)	←
(Ports 2, 4)	(kgf/cm²)	6.5 ~ 19(Short)	←
Operating Angle : Single (Ports 1, 3)	(deg)	19	←
: Single (Ports 2, 4)	(deg)	25	←
Weight	(kg)	4.6	←

Serial Number		1703004~
Solenoid Valve		
Model		3K3LNF5G/G24N-316
Flow during Use	(*l* /min)	12
Reilief Valve Set Pressure	(kgf/cm^2@*l* /min)	40@12
Weight	(kg)	4.5
Cylinders		
Boom		
Bore DiameterXRod Diameter	(mm)	80X55
Stroke	(mm)	815
Fully Retracted Length (Pitch)	(mm)	1410
Cushion Mechanism		Rod Side
Weight	(kg)	54
Arm		
Bore DiameterXRod Diameter	(mm)	95X65
Stroke	(mm)	930
Fully Retracted Length (Pitch)	(mm)	1340
Cushion Mechanism		Both Side
Weight	(kg)	74
Bucket		
Bore DiameterXRod Diameter	(mm)	85X55
Stroke	(mm)	660
Fully Retracted Length (Pitch)	(mm)	1035
Cushion Mechanism		----
Weight	(kg)	46
Swing		
Bore DiameterXRod Diameter	(mm)	120X75
Stroke	(mm)	690
Fully Retracted Length (Pitch)	(mm)	1180
Cushion Mechanism		Both Side
Weight	(kg)	96
Dozer Blade		
Bore DiameterXRod Diameter	(mm)	100X60
Stroke	(mm)	165
Fully Retracted Length (Pitch)	(mm)	570
Cushion Mechanism		----
Weight	(kg)	43

Serial Number		1703004~
Tensioning		
Bore DiameterXRod Diameter	(mm)	110X60
Stroke	(mm)	115
Fully Retracted Length (Pitch)	(mm)	360
Cushion Mechanism		——
Weight	(kg)	30
Travel Motor		
Model		GM09VL-B-21/40-1
Type		2-Speed Piston Motor
Total Displacement: 1st / 2nd	(cc/rev)	1212.64/2320.34
Motor Displacement: 1st / 2nd	(cc/rev)	20.8/39.8
Reduction Gear Ratio		58.3
Spool Switching Pressure	(kgf/cm^2)	9.5~12
Relief Valve Set Pressure	(kgf/cm^2@l /min)	300@1
2-Speed Control Pressure	(kgf/cm^2)	20~70
Parking Brake Torque	(kgf·m)	8.4
Parking Brake Releace Pressure	(kgf/cm^2)	9
Amount of Reduction Gear Lubricant	(l)	1.7
Weight	(kg)	90
Slew Motor		
Model		SG025E-057
Type		Piston Motor
Total Displacement	(cc/rev)	596.84
Motor Displancement	(cc/rev)	43
Reduction Gear Ratio		13.88
Relief Valve Set Pressure	(kgf/cm^2@l /min)	250@42.55
Parking Brake Torque	(kgf·m)	23
Parking Brake Releace Pressure	(kgf/cm^2)	25
Weight	(kg)	67
Swivel Joint		
Model		YV-7127
Weight	(kg)	22.5

WEIGHT TABLES

UNIT WEIGHT (Dry Weight)

Units: kg

Serial Number	1703004~
Type	Cab
Upperstructure	3090
Engine	280
Radiator	35
Hydraulic Pump	49
Hydraulic Tank	58
Fuel Tank	54
Control Valve (Mono-Block)	65
Control Valve	8.5
Pilot Valve	4.6×2
Solenoid Valve	4.5
Slew Motor	67
Cab	230
Counter Weight	535
Swing Bracket	170
Swing Cylinder	96
Undercarriage	2830
Swivel Joint	22.5
Slew Bearing	99
Tensioning Cylinder	30×2
Crawler Belt	470×2 (440×2)
Travel Motor	90×2
Carrire Roller	6.7×2
Track Roller	17×10
Idler	86×2
Sprocket	34×2
Track Spring	48×2
Dozer Blade	260
Dozer Blade Cylinder	43×2
Hoe Attachments	970
Boom	310
Arm	125
Bucket: Standard 750mm	180
Boom Cylinder	54×2
Arm Cylinder	74
Bucket Cylinder	46

* Values in ( ) are for models with rubber crawler specifications.