



Service Manual

02

Rough Terrain Crane

GR-700EX-1

Model

GR-700EXL-1

Applicable Serial No. 545870 --

TADANO LTD.

Safety

Most accidents that occur during machine operation and maintenance are caused by failure to observe basic safety rules and precautions. Before operating your machine or performing maintenance, read and become familiar with all the safety precautions and recommendations given in this section.


Remember that failure to observe even a single precaution could involve you and the people around the machine in a serious accident.

Foreseeing potential dangers is vital for preventing accidents. All personnel working with the machine, including the supervisor, machine operator and oiler, should be sensitive to potentially dangerous situations and take the necessary measures to prevent accidents.


Safety precautions and recommendations are outlined in this section and are also included in the operation and maintenance instructions given in subsequent sections. Warning labels are also provided on the machine.

The cautionary instructions in this manual are identified as "DANGER", "WARNING", "CAUTION" or "NOTICE". These terms are defined as follows:


DANGER

 DANGER indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

WARNING

 WARNING indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

CAUTION

 CAUTION indicates a potentially hazardous situation, which, if not avoided, may result in a minor or moderate injury.

[NOTICE]

◆[NOTICE] indicates an important operational or maintenance procedure or condition, which, if not strictly observed, can result in damage to machine components or deteriorated machine performance.

It is virtually impossible to anticipate every situation that might present a hazard. The safety precautions given in this manual and on the machine labels are not exhaustive.

It is important, therefore, to strictly follow the instructions in this manual and be sensitive to potential dangers in order to prevent bodily injury and damage to the machine.

Remember that your most important duty is to ensure the safety of you, your co-workers and any other people in the area.

1. Fundamental cautions

Servicemen inexperienced in the units of this machine should be cautious about safety operations. They must acquire sufficient knowledge about the equipment before dismounting and disassembling it. Before dismounting each component, a serviceman should read this service manual thoroughly and find out the weight of the component, then lift it by proper means.

The following are cautions to be observed all the time.

1. Before starting repairs, find out the origin of the problem. When it becomes clear that disassembly and maintenance are necessary, first of all read this manual and parts catalog and thoroughly understand the principle of operation and construction. Then carefully check and examine each portion. Don't disassemble portions unrelated to the problem. Unless taking all possible measures before starting disassembly, new troubles or decline in performance may be induced.
2. Before operating the machine, oiling or repairing, read warning labels and instructions on the machine and understand the contents.
3. Wear a safety helmet and safety shoes whenever you carry out maintenance operation around the machine. Be sure to wear safety goggles when you hit the machine or its attachments with a hammer. In welding operation, wear safety gears such as leather gloves, helmet, goggles, apron and proper working clothes, but don't wear loose or torn clothes. Take a ring and so on off your finger when you conduct maintenance or repair.
4. Park the machine on as level and hard ground as possible. Place chocks under wheels to prevent the vehicle from moving when doing maintenance on or below the machine.
5. Before starting maintenance, remove cables to the battery and allow the capacitors to discharge. Pull out the ignition key and hang a tag saying, "Don't start the engine." in the cab.
6. Don't carry out maintenance while lifting the vehicle with only a jack or a hoist. Sustain the vehicle positively with blocks and so on to prevent

fatal accidents, as there is a possibility that the vehicle loses its balance and falls down on a worker in a dismounting process of certain units.

7. When the working is done on a team of more than one person, make arrangements about co-operation and communication between workers beforehand. Give a sign without fault and make sure that the sign has been transmitted to other workers before starting the next operation.
8. When it is inevitable to measure oil pressure, rotational speed, and temperature for machine inspection without stopping the engine, be careful not to be caught or pinched in rotating or moving parts such as a fan, fan belt. Make sure that there is no obstruction or no person around the machine before operating it.

2. Cautions in working

2.1 General

1. When hoisting up components weighing more than 20 kg, use hoist or the like to prevent injury to your lumbar or spine. For specific components, their weights are listed on the chapter for "service data" in this manual.
2. When using eyebolts, lift parts vertically so that only tension is applied to them.
3. Protect wire ropes and plastic lifting slings by covering corners with pads so that they are not bent sharply by directly contacting corners. Keep the sling angle of wire ropes within 60° and as vertical as possible.
4. Be careful about hot or heated portions when conducting repair or maintenance just after the vehicle has stopped or the machine operation has been finished or interrupted.
5. When hitting parts, be sure to either hit on a pad placed on the parts or use a plastic hammer.
6. Put units, especially similar parts, in order. Mark them with tags or marker if necessary.

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7. Put disassembled parts in order so that parts such as bolts are not left behind in the machine. And check that no parts run short at assembly.

8. Watch your step in the following cases:

When stepping up to or stepping down from the upper surface of a boom for replacing wire ropes and applying grease. Be careful not to stumble on protrusions on the upper surface of a boom.

When greasing at the root of a elevating cylinder
When checking engine oil, radiator coolant, or battery fluid.

When replacing a filter of air cleaner
When getting on and off the cab

Be careful not to slip in the above operations in winter as snow and ice may attach to the exterior of boom and it becomes very slippery.

2.2 Dismounting and disassembling

1. Before dismounting and disassembling, make sure of the construction and part sales unit by reading this manual and the separate parts catalog, then understand the procedures of dismounting and remounting and disassembling and reassembling.

2. When dismounting piping or equipment that may contain pressurized oil or air, be extremely cautious and dismount them only after discharging the confined pressure.

3. Before removing, clean the part to be dismantled and the area surround it. Seal the opening with a plug or tape, etc. to prevent foreign material from entering it.

4. Measure and record the data such as shim thickness adjustment and pre-load at disassembly that will be required at reassembly.

5. If required, before disassembling clearly put marks to avoid errors at reassembling.

6. If a part cannot be removed after removing bolts or nuts fixing it, don't apply too much force to it but check the part for the cause. Only after relieving the cause, proceed disassembling.

7. Use lifting slings appropriate for the weight and characteristics of a part. Lift up it in balanced condition.

In case that the position of the center of gravity is not clear and there is a possibility of swing of load after removing, use two hoists.

8. If a part cannot be lifted smoothly, make sure that all the fasteners are removed and other parts don't hinder removing.

2.3 Remounting and assembling

1. Before assembling, clean all the parts and repair or replace defective parts.

2. As dirt and soil adversely affect sliding portions and they may decrease the life of the machine, pay special attention to avoid intrusion of dirt and soil.

3. Use special tools for parts when specified to do so.

4. Remove dirt, soil, water, and resin completely from surfaces where liquid gasket will be applied.

5. After remounting, be sure to inspect the machine and verify that there is no error by oversight. If adjustment or air bleeding is required, conduct it according to instructions. Conduct function and performance test to verify its integrity.

3. Cautions in operation

3.1 Brake fluid replenishment

1. When the brake-warning lamp (for fluid level) is lighted, replenish brake fluid and check and make sure of the thickness of disk brake pads. (Refer to Chapter Y for periodical inspection periods.)

2. Check the thickness of disk brake pads whenever brake fluid is replenished.

3.2 Handling of battery

1. Erroneous handling of a battery may cause it to catch fire and explode.

Be extremely sure to avoid short circuits, sparks and fire of cigarettes and the like when using a jumper cable. They are very dangerous.

Charge up batteries and use them only in well ventilated places.

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2. Battery fluid (dilute sulfuric acid) may cause loss of sight or burn injury.

If battery fluid stains an eye, skin, or clothes, immediately wash down them with a great deal of water.

If battery fluid enters into an eye, immediately wash it down with water and see a doctor for medical aid.

3. When removing terminals, remove the minus (–) terminal first. When connecting terminals, connect minus (–) terminal last.

3.3 Handling of radiator

1. Don't open the radiator cap while the coolant is still hot.

2. Check the coolant at the reservoir tank.

3. If high-pressure water is used for radiator cleaning, fins may be damaged.

3.4 Cooling fan

1. Stop the engine completely before checking the tension of the engine fan belt.

2. The oil cooler fan may rotate the moment the engine is started. Be sure to pull out the ignition key before accessing the cooling fan.

4. About waste disposal

1. Waste oils, used filters, and other such petrochemical-related products, if disposed of thoughtlessly, will cause environmental contamination.

2. Obtain a proper-sized vessel before releasing waste oils from the machine. Never discharge waste oils on the ground or into rivers, lakes or marshes.

3. Follow all governing environmental rules and regulations when disposing of oils, fuels, cooling water, brake fluid, solvents, filters, batteries or any other damaging substances.

4.1 Gasoline

1. Spill or leak: Review fire and explosion hazards before proceeding with clean up. Use appropriate personal protective equipment during clean up. Dike spill. Prevent liquid from entering sewers, waterways, or low areas. Soak up with sawdust, sand, oil dry or other absorbent material. Shovel or sweep up.

2. Remove source of heat, sparks, flame, impact, friction or electricity including internal combustion engines and power tools. If equipment is used for spill cleanup, it must be explosion proof and suitable for flammable liquid and vapor.

Note: Vapors released from the spill may create an explosive atmosphere.

3. Waste disposal method: Treatment, storage, transportation and disposal must be in accordance with applicable federal, state, provincial, and local regulations. Do not flush to surface water or sanitary sewer system.

4. By itself, the liquid is expected to be a RCRA ignitable hazardous waste.

4.2 Hydraulic oil

1. Spill or leak: Contain spill immediately in smallest area possible. Recover as much of the product itself as possible by such methods as vacuuming, followed by soaking up of residual fluids by use of absorbent materials. Remove contaminated items including contaminated soil and place in proper containers for disposal. Avoid washing, draining or directing material to storm or sanitary sewers.

2. Waste disposal method: Recycle as much of the recoverable product as possible. Dispose of nonrecyclable material as a RCRA hazardous waste by such methods as incineration, complying with federal, state, and local regulations.

4.3 Motor oil

See HYDRAULIC OIL above.

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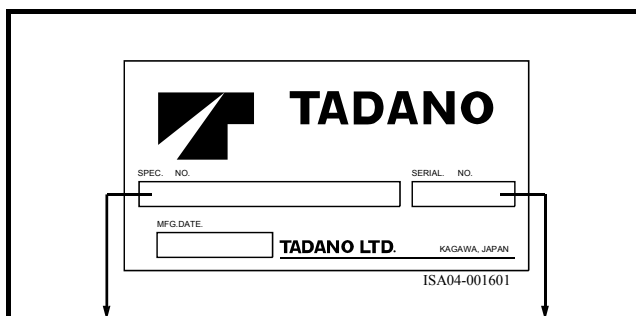
This service manual describes the composition of the Model GR-700EXL-1 and GR-700EX-1 rough terrain crane, its repair, check and adjustment methods and other relevant matters. Note that this service manual does not provide the information in the separate service manuals given below.

This service manual applies to the cranes with the specification numbers given below. Check the specification number on the nameplate of your crane.

Read the separate operation and maintenance manual and the parts catalog for repair and maintenance of the crane in conjunction with this manual. If the parts needs to be replaced, check the disassemble units and sales units in the parts catalog before replacing them.

1. Applicable spec. No. / Crane model

Crane model	Spec. No.	Applicable serial No.
GR-700EXL-1	GR-700E-1-00211	545960 -- 546189
	GR-700E-1-00212	
GR-700EX-1	GR-700E-1-00211	546199--
	GR-700E-1-00212	546190--



2. Separate service manual

Separate Service Manual	Information No.
General Cautions	SA01-01-2E
Overload Prevention Device (AML)	W301-0215E
Multiplex Data Transmitter	W303-0257E
Torque Converter	W561-0101E
Transmission	
Driving Axle	W563-0053E

Please note that, for product improvement, some changes may have been incorporated in the machine that are not covered in this manual.

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3. Outline of specifications

Item		Spec. No.	
		GR-700E-1-00211 2M2D (Europe)	GR-700E-1-00212 2M2D (General Export)
No. of boom sections		5	
No. of jib stages		2	
Single top		Option	
Winch	Main winch	Fitted	
	Auxiliary winch	Fitted	
	Winch brake	Automatic brake (Neutral brake)	
	Drum rotation indicator	Visual-type	Option
Touch-type		Option	—
Weight	Counterweight	Removable type	
Overload Prevention Device (AML)		AML-LIIB	
Auto. stop solenoid valve energizing type		Normally energized	
AML external indicator lamp		Fitted	
AML external buzzer		Fitted	—
Oil cooler		Fitted	
Emergency engine stop system		Fitted	—
Reversing steering compensator		Fitted	—
Air conditioner		Option	
Emergency steering		Fitted	Option
Steering pump warning lamp		Fitted	—
Over-unwinding prevention		Option	—
Outrigger control box (Both sides of carrier)		Option	—
Engine model		MITSUBISHI 6M60-TLA3B	
Tires		29.5 × 25 - 22PR, 29.5 × 25 - 28PR	

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4. Conversion table

Length

millimeter, mm	centimeter,	meter, m	inch, in, ”	foot, ft, ’	mile, mi	kilometer,
1	1×10^{-1}	1×10^{-3}	3.93701×10^{-2}	3.28084×10^{-3}	1	1.60934
1×10	1	1×10^{-2}	3.93701×10^{-1}	3.28084×10^{-2}	6.21373×10^{-1}	1
1×10^3	1×10^2	1	3.93701×10	3.28084		
2.54×10	2.54	2.54×10^{-2}	1	8.33333×10^{-2}		
3.048×10^2	3.048×10	3.048×10^{-1}	1.2×10	1		

Area

square millimeter, mm ²	square centimeter, cm ²	square meter, m ²	square inch, in ²	square foot, ft ²
1	1×10^{-2}	1×10^{-6}	1.55×10^{-3}	1.07639×10^{-5}
1×10^2	1	1×10^{-4}	1.55×10^{-1}	1.07639×10^{-3}
1×10^6	1×10^4	1	1.55×10^3	1.07639×10
6.4516×10^2	6.4516	6.4516×10^{-4}	1	6.94444×10^{-3}
9.2903×10^4	9.2903×10^2	9.2903×10^{-2}	1.44×10^2	1

Volume

cubic centimeter, cm ³ , cc	cubic meter, m ³	cubic inch, in ³	cubic foot, ft ³	gallon, gal	cubic inch, in ³	liter, lit, L
1	1×10^{-6}	6.10237×10^{-2}	3.53147×10^{-5}	1	2.31×10^2	3.78541
1×10^6	1	6.10237×10^4	3.53147×10	4.329×10^{-3}	1	1.63871×10^{-2}
1.63871×10	1.63871×10^{-5}	1	5.78704×10^{-4}	2.64172×10^{-1}	6.10237×10	1
2.83168×10^4	2.83168×10^{-2}	1.728×10^3	1			

Mass

gram, g	kilogram, kg	ounce, oz	pound, lb	metric ton, ton, t	short ton, s. t
1	1×10^{-3}	3.5274×10^{-2}	2.20462×10^{-3}	1×10^{-6}	1.10231×10^{-6}
1×10^3	1	3.5274×10	2.20462	1×10^{-3}	1.10231×10^{-3}
2.83495×10	2.8349×10^{-2}	1	6.25×10^{-2}	2.83495×10^{-5}	3.12494×10^{-5}
4.53592×10^2	4.53592×10^{-1}	1.6×10	1	4.53592×10^{-4}	5×10^{-4}
1×10^6	1×10^3	3.5274×10^4	2.20462×10^3	1	1.10231
9.07185×10^5	9.07185×10^2	3.2×10^4	2×10^3	9.07185×10^{-1}	1

Pressure

Pa	kPa	MPa	kgf/cm ²	lbf/in ² , psi
1	1×10^{-3}	1×10^{-6}	1.01972×10^{-5}	1.45038×10^{-4}
1×10^3	1	1×10^{-3}	1.01972×10^{-2}	1.45038×10^{-1}
1×10^6	1×10^3	1	1.01972×10	1.45038×10^2
9.80665×10^4	9.80665×10	9.80665×10^{-2}	1	1.42233×10
6.89476×10^3	6.89476	6.89476×10^{-3}	7.03072×10^{-2}	1

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Work, energy

N-cm	N-m	kgf-cm	kgf-m	foot-pound, ft-lbf	inch-pound, in-lbf
1	1×10^{-2}	1.01972×10^{-1}	1.01972×10^{-3}	7.37562×10^{-3}	8.85074×10^{-2}
1×10^2	1	1.01972×10	1.01972×10^{-1}	7.37562×10^{-1}	8.85074
9.80665	9.80665×10^{-2}	1	1×10^{-2}	7.23301×10^{-2}	8.67961×10^{-1}
9.80665×10^2	9.80665	1×10^2	1	7.23301	8.67961×10
1.355818×10^2	1.355818	1.38255×10	1.38255×10^{-1}	1	1.2×10
1.12985×10	1.12985×10^{-1}	1.152513	1.15213×10^{-2}	8.33333×10^{-2}	1

Centigrade-Fahrenheit

°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C
-90	-67.78	-40	-40	10	-12.22	60	15.56	110	43.33	160	71.11
-80	-62.22	-30	-34.44	20	-6.67	70	21.11	120	48.89	170	76.67
-70	-56.67	-20	-28.89	30	-1.11	80	26.67	130	54.44	180	82.22
-60	-51.11	-10	-23.33	40	4.44	90	32.22	140	60	190	87.78
-50	-45.56	0	-17.78	50	10	100	37.78	150	65.56	200	93.33

Conversion equation: $t^{\circ}\text{C} = 5(\text{T}^{\circ}\text{F} - 32)/9$, $\text{T}^{\circ}\text{F} = (9 \times t^{\circ}\text{C} + 160)/5$

Force

N	kgf	lbf
1	1.01972×10^{-1}	2.24809×10^{-1}
9.80665	1	2.20462
4.44822	4.53592×10^{-1}	1

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Hydraulic Power Generating System

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