NEW HOLLAND

COMPACT CRAWLER EXCAVATOR

E27BSR TIER 4

SERVICE MANUAL

S5PV0020E01 EN-US

Issued 01Sep 08

NEW HOLLAND CONSTRUCTION

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E27BSR

COMPACT CRAWLER EXCAVATOR

TIER 4

Service Manual Number S5PV0020E01 EN-US
Issued 09-2008

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Revision History			
Issue	Issue Date	Applicable Machine	Remarks
First Edition	Issued 09-2008	E27BSR	COMPACT CRAWLER EXCAVATOR

Issued 09-2008
Book/Form Number 5-16520 EN-US

Printed in U.S.A. • Bur
Source Code No. S5PV0020E01

E27BSR SERVICE MANUAL

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GENERAL SAFETY INFORMATION

⚠ WARNING ⚠

Do not operate or perform any maintenance on this machine until all instructions found in the OPERATOR'S MANUAL and this MANUAL have been thoroughly read and understood.
Improper operation or maintenance of this machine may cause accidents and could result in serious injury or death.
Always keep the manual in storage.
If it is missing or damaged, place an order with an authorized our Distributor for a replacement.
If you have any questions, please consult an authorized our Distributor.

1. Most accidents, which occur during operation, are due to neglect of precautionary measures and safety rules. Sufficient care should be taken to avoid these accidents. Erroneous operation, lubrication or maintenance services are very dangerous and may cause injury or death of personnel. Therefore all precautionary measures, NOTES, DANGERS, WARNINGS and CAUTIONS contained in the manual and on the machine should be read and understood by all personnel before starting any work with or on the machine.
2. Operation, inspection, and maintenance should be carefully carried out, and safety must be given the first priority. Messages of safety are indicated with marks. The safety information contained in the manual is intended only to supplement safety codes, insurance requirements, local laws, rules and regulations.
3. Messages of safety appear in the manual and on the machine : All messages of safety are identified by either word of DANGER, WARNING and CAUTION.

   DANGER- Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury and is represented as follows:

⚠ DANGER ⚠

   WARNING- Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury and is represented as follows:

⚠ WARNING ⚠

   CAUTION- Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against possible damage to the machine and its components and is represented as follows:

⚠ CAUTION ⚠

4. It is very difficult to forecast every danger that may occur during operation. However, safety can be ensured by fully understanding proper operating procedures for this machine according to methods recommended by Manufacturer.
5. While operating the machine, be sure to perform work with great care, so as not to damage the machine, or allow accidents to occur.
6. Continue studying the manual until all Safety, Operation and Maintenance procedures are completely understood by all persons working with the machine.

SAFETY PRECAUTIONS

⚠ WARNING ⚠

The proper and safe lubrication and maintenance for this machine, recommended by Manufacturer, are outlined in the OPERATOR'S MANUAL for the machine.
Improper performance of lubrication or maintenance procedures are dangerous and could result in injury or death. Read and understand the MANUAL before performing any lubrication or maintenance.

The serviceman or mechanic may be unfamiliar with many of the systems on this machine. This makes it important to use caution when performing service work. A knowledge of the system and or components is important before the removal or disassembly of any component.
Because of the size of some of the machine components, the serviceman or mechanic should check the weights noted in this manual. Use proper lifting procedures when removing any components. Weight of components table is shown in the section ; SPECIFICATIONS.

The following is a list of basic precautions that must always be observed.

1. Read and understand all Warning plates and decal on the machine before Operating, Maintaining or Repairing this machine.
2. Always wear protective glasses and protective shoes when working around machines. In particular, wear protective glasses when using hammers, punches or drifts on any part of the machine or attachments. Use welders gloves, hood/goggles, apron and the protective clothing appropriate to the welding job being performed. Do not wear loose fitting or torn clothing. Remove all rings from fingers, loose jewelry, confine long hair and loose clothing before working on this machinery.
3. Disconnect the battery and hang a **Do Not Operate** tag in the Operators Compartment. Remove ignition keys.
4. If possible, make all repairs with the machine parked on a firm level surface. Block the machine so it does not roll while working on or under the machine. Hang a **Do Not Operate** tag in the Operators Compartment.
5. Do not work on any machine that is supported only by lift, jacks or a hoist. Always use blocks or jack stands, capable of supporting the machine, before performing any disassembly.

⚠ WARNING ⚠

Do not operate this machine unless you have read and understand the instructions in the OPERATOR'S MANUAL. Improper machine operation is dangerous and could result in injury or death.

6. Relieve all pressure in air, oil or water systems before any lines, fittings or related items are disconnected or removed. Always make sure all raised components are blocked correctly and be alert for possible pressure when disconnecting any device from a system that utilizes pressure.
7. Lower the bucket, dozer, or other attachments to the ground before performing any work on the machine. If this cannot be done, make sure the bucket, dozer, ripper or other attachment is blocked correctly to prevent it from dropping unexpectedly.
8. Use steps and grab handles when mounting or dismounting a machine. Clean any mud or debris from steps, walkways or work platforms before using. Always face to the machine when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work platforms to perform safe repair operations.
9. To avoid back injury, use a hoist when lifting components which weigh 20kg (45lbs) or more. Make sure all chains, hooks, slings, etc., are in good condition and are the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.
10. To avoid burns, be alert for hot parts on machines which have just been stopped and hot fluids in lines, tubes and compartments.
11. Be careful when removing cover plates. Gradually back off the last two capscrews or nuts located at opposite ends of the cover or device and carefully pry cover loose to relieve any spring or other pressure, before removing the last two capscrews or nuts completely.
12. Be careful when removing filler caps, breathers and plugs on the machine. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. The danger is even greater if the machine has just been stopped because fluids can be hot.

13. Always use the proper tools that are in good condition and that are suited for the job at hand. Be sure you understand how to use them before performing any service work.
14. Install all fasteners with the same part number. Do not use a lesser quality fastener if replacements are necessary.
15. Repairs which require welding should be performed only with the benefit of the appropriate reference information and by personnel adequately trained and knowledgeable in welding procedures. Determine type of metal being welded and select correct welding procedure and electrodes, rods or wire to provide a weld metal strength equivalent at least to that of the parent metal. Make sure to disconnect battery before any welding procedures are attempted.
16. Do not damage wiring during removal operations. Reinstall the wiring so it is not damaged nor will be damaged in operation of the machine by contacting sharp corners, or by rubbing against some object or hot surface. Do not connect wiring to a line containing fluid.
17. Be sure all protective devices including guards and shields are properly installed and functioning correctly before starting a repair. If a guard or shield must be removed to perform the repair work, use extra caution and replace the guard or shield after repair is completed.
18. The maintenance and repair work while holding the bucket raised is dangerous due to the possibility of a falling attachment. Don't fail to lower the attachment and place the bucket to the ground before starting the work.
19. Loose or damaged fuel, lubricant and hydraulic lines, tubes and hoses can cause fires. Do not bend or strike high pressure lines or install ones which have been bent or damaged. Inspect lines, tubes and hoses carefully. Do not check for leaks with your hands. Very small (pinhole) leaks can result in a high velocity oil stream that will be invisible close to the hose. This oil can penetrate the skin and cause personal injury. Use cardboard or paper to locate pinhole leaks.
20. Tighten connections to the correct torque. Make sure that all heat shields, clamps and guards are installed correctly to avoid excessive heat, vibration or rubbing against other parts during operation. Shields that protect against oil spray onto hot exhaust components in event of a line, tube or seal failure must be installed correctly.
21. Do not operate a machine if any rotating part is damaged or contacts any other part during operation. Any high speed rotating component that has been damaged or altered should be checked for balance before reusing.
22. Be careful when servicing or separating the tracks (crawlers). Chips can fly when removing or installing a track (crawlers) pin. Wear safety glasses and long sleeve protective clothing. Tracks (crawlers) can unroll very quickly when separated. Keep away from front and rear of machine. The machine can move unexpectedly when both tracks (crawlers) are disengaged from the sprockets. Block the machine to prevent it from moving.

NOTE:

This Manual is prepared as a technical material in which the information necessary for the maintenance and repairing services of our hydraulic excavators are collected, and is categorized into 6 Sections, Safety and General Information, Maintenance, System, Disassembly, Troubleshooting, and Engine.

The Section Safety and General information describes the specifications for entire machine and material, which are instructive for replacement and repairing of attachments.

The Section Maintenance describes the material, which is helpful for maintenance service and adjustments for entire machine.

The Section System describes the operating system like hydraulic system, electric system, components, and so on.

The Section Disassembly describes the removal and installing of assembly mounted on the upper structure and undercarriage, and the assembling and disassembling of the associated hydraulic equipment.

The Section Troubleshooting describes how to find the fault equipment.

The Section Engine describes the engines making use of the "Service Manual" provided by the suppliers.

This Manual may be properly revised due to the improvement of products, modification of specifications, etc. And there are cases where the system on actual machine and a part of the contents of this manual may differ due to the variations of specification by countries. For the section in which the description is hardly understood, contact our distributor.

The number is assigned to every part handled in this Manual on account of the description, but the parts, which cannot be supplied as service parts are contained. Therefore, the order must be placed with respective formal number with due confirmation on the Parts Manual for applicable machine.

NEW HOLLAND CONSTRUCTION

SERVICE MANUAL - SECTION 1

E27BSR
COMPACT CRAWLER EXCAVATOR
TIER 4

SAFETY AND GENERAL INFORMATION

Issued 09-2008
Book/Form Number 5-16540 EN-US

Printed in U.S.A. • Bur
Source Code No. S5PV0020E01

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Revision History				
Issue	Issue Date	Applicable Machines	Form Number	Remarks
First Edition	09-2008	E27BSR	5-16540	

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CHAPTER 1

E27BSR
COMPACT CRAWLER EXCAVATOR
TIER 4

GENERAL PRECAUTIONS FOR MAKING REPAIRS

Issued 09-2008
Book/Form Number 5-16550 EN-US

Printed in U.S.A. • Bur
Source Code No. S5PV0020E01

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Revision History				
Issue	Issue Date	Applicable Machines	Form Number	Remarks
First Edition	09-2008	E27BSR	5-16550	

CHAPTER 1

GENERAL PRECAUTIONS FOR MAKING REPAIRS

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GENERAL PRECAUTIONS FOR MAKING REPAIRS

PREPARATION BEFORE DISASSEMBLING

1. Understanding operating procedure
   Read OPERATOR'S MANUAL carefully to understand the operating procedure.
2. Cleaning machines
   Remove soil, mud, and dust from the machine before carrying it into the service shop to prevent loss of work efficiency, damage of parts, and difficulty in rust prevention and dust protection while reassembling.
3. Inspecting machines
   Identify the parts to be disassembled before starting work, determine the disassembling procedure by yourself considering the workshop situations etc., and request procurement of necessary parts in advance.
4. Recording
   Record the following items for communication and prevention of recurring malfunction.
   1) Inspection date and place
   2) Model name, applicable machine number, and hour meter read
   3) Trouble condition, place and cause.
   4) Visible oil leakage, water leakage and damage
   5) Clogging of filters, oil level, oil quality, oil contamination and loosening of connections
   6) Result of consideration if any problem exists based on the operation rate per month calculated from hour meter indication after the last inspection date.
5. Arrangement and cleaning in service shop
   1) Tools required for repair work.
   2) Prepare space to place the disassembled parts.
   3) Prepare oil containers for draining oil etc.

SAFETY WHEN DISASSEMBLING AND ASSEMBLING

Safety

1. Wear appropriate clothing, safety shoes, safety helmet, goggles, and clothes with long sleeves.
2. Attach "Don't operate" tag to control lever, and begin a meeting before starting the work.
3. Before starting inspection and maintenance stop the engine to prevent operator from being caught in machine.
4. Confirm the position of first-aid kit and fire extinguisher, and also where to make contact for emergency measure and ambulance to prepare for accidents and fire.
5. Choose a hard, level and safe place, and put attachment on the ground securely.
6. Use hoist, etc. to remove parts of heavy weight (20kg [45 pounds] or more).
7. Use proper tools, and replace or repair defective tools.
8. Support the machine and attachment with supports or blocks if the work is prtformed in the lifted condition.

DISASSEMBLING AND ASSEMBLING HYDRAULIC EQUIPMENT

Removing Hydraulic Equipment Assembly

1. Before disconnecting pipes, release the pressure of hydraulic oil tank, or open the cover on the return side to tank, and take out the filter.
2. Drain the oil in the removed pipes into containers to prevent the oil from spilling on the ground.
3. Appy plugs or caps to pipe ends to prevent oil leaking, entry of dust, etc.
4. Clean the outside surface of equipment, etc. before disassembling, and drain hydraulic oil and gear oil before placing them on working bench.

Disassembling Hydraulic Equipment

1. Do not disassemble , assemble or modify the hydraulic equipment without the permission of the manufacturer, who is not responsible for the performance and functon of the product after modification.
2. If it is unavoidably necessary to disassemble and modify, it should be carried out by experts or personnel qualified through service training.
3. Make match mark on parts for reassembling.
4. Before disassembling, read Disassembling Instruction in advance, and determine if the disassembly and assembly are permitted or not.
5. For parts which are required to use jig and tools, don't fail to use the specified jig and tools.
6. For parts which can not be removed in the specified procedure, never force removal. First check for the cause.
7. The removed parts should be put in order and tagged so as to install on proper places without confusion.

8. For common parts, pay attention to the quantity and places.

Inspecting Parts

1. Check that the disassembled parts are free from adherence, interference and uneven working face.
2. Measure the wear of parts and clearance, and record the measured values.
3. If an problem is detected, repair or replace the parts.

Assembling Hydraulic Equipment

1. During the parts cleaning, ventilate the room.
2. Before assembly, clean parts roughly first, and then completely.
3. Remove adhering oil by compressed air, and apply hydraulic oil or gear oil, and then assemble them.
4. Replace the removed O-ring, backup rings and oil seal with new ones, and apply grease oil on them before assembling.
5. Remove dirt and water on the surface on which liquid sealant are applied, degrease them, and apply liquid sealant on them.
6. Before assembling, remove rust preventives on new parts.
7. Use special tools to fit bearings, bushing and oil seal.
8. Assemble the parts utilizing the matching marks.
9. After completion, check that all the parts are completely assembled after the work.

Installing Hydraulic Equipment

1. Confirm hydraulic oil and lubrication oil.
2. Air release is required in the following cases ;
   A. Change of hydraulic oil
   B. Replacement of parts on suction pipe side
   C. Removing and attaching hydraulic pump
   D. Removing and attaching swing motor
   E. Removing and attaching travel motor
   F. Removing and attaching hydraulic cylinder

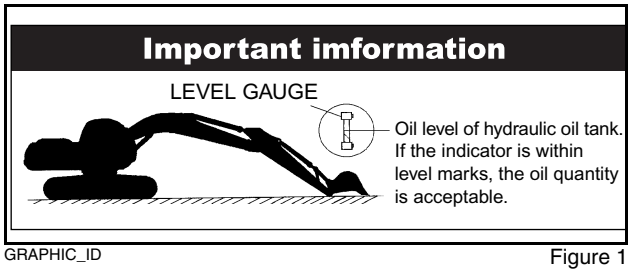
WARNING: *If hydraulic oil and lubricating oil are not filled and also air bleed is not performed, the hydraulic equipment may be damaged.*

3. For air bleed of hydraulic pump and swing motor, loosen drain plug on the upper part, start engine, and run in low idling, then bleed air until hydraulic oil is comes out. After completion, tighten plug securely.
4. For air bleed of travel motor and hydraulic cylinder, starts engine and operate it for 10 minutes or more at no-load and low speed.

NOTE: *For cylinder, don't move it to the stroke end at beginning.*

5. Air in pilot circuit can be bleed out by only operating digging, swing and traveling motions thoroughly.
6. Check hydraulic oil level.
   Move attachments to hydraulic oil check position, and check hydraulic oil level of tank. Refill oil if the oil level is lower than the specified level.

How to check oil level of hydraulic oil tank



GRAPHIC_ID Figure 1

ELECTRICAL EQUIPMENT

1. Do not disassemble the electrical equipment.
2. Handle equipment with care so as not to drop it or bump it.
3. Turn the key OFF prior to connecting and disconnecting work.
4. Disconnect the connector by holding it and pressing the lock. Do not pull the wire to apply force to the caulking portion.
5. Check that connector is connected and locked completely.
6. Engine key off before removing and connecting connector.
7. Turn the key OFF prior to touching the terminal of starter or generator.
8. Remove battery ground (earth) terminal before beginning work close to battery and battery relay with tools.
9. Wash machine with care so as not to splash water on electrical equipment and connector.
10. Check for moisture adhesion inside the waterproof connector after pulling it out, since it is hard to remove moisture from the connector.
    If moisture adhesion is found, dry it completely before the connection..

⚠ WARNING ⚠

Battery fluid is dangerous.
The battery fluid is dilute sulfuric acid, and causes scald and loss of eyesight by adhering on eyes, skin and clothes. When the fluid has adhered on them, take an emergency measure immediately and see a doctor for medical advice.

1. **When it has adhered on skin ;**
   Wash with soap and water.
2. **When it has got in eyes ;**
   Wash in water for 10 minutes or more immediately.
3. **When it has spilled out in large quantity ;**
   Use sodium bicarbonate to neutralize, or wash away with water.
4. **When it was swallowed ;**
   Drink milk or water.
5. **When it has adhered on clothes ;**
   Wash it immediately.

HYDRAULIC PARTS

O-ring

Ensure O-rings have elasticity and are not damaged before use.

Use the appropriate O-rings. O-rings are made of various kinds of materials having different hardness to apply to a variety of parts, such as the part for moving or fixed portion, subjected to high pressure, and exposed to corrosive fluid, even if the size is same.

Fit the O-rings without distortion and bend.

Always handle floating seals as a pair.

Flexible hose (F hose)

Even if the connector and length of hose are the same, the parts differ according to the withstanding pressure. Use proper parts.

Tighten it to the specified torque, and check that it is free from twist, over tension, interference, and oil leak.

WELD REPAIR

1. Refer repair welding to qualified personnel according to the appropriate procedure.
2. Disconnect the ground (earth) cable of the battery before starting the repair.
   Failure to do so will cause damage to the electrical equipment.
3. Move away the articles in advance that may cause fire if exposed to sparks.
4. Before starting the repair of the attachment, do not fail to cover the plated surface of the piston rod with flameproof sheet to prevent it from being exposed to sparks.

ENVIRONMENTAL ISSUES

1. Engine should be started and operated in the place where air can be sufficiently ventilated.
2. Waste disposal
   The following parts follows the regulation.
   Waste oil, waste container and battery
3. Precautions for handling hydraulic oil
   Hydraulic oil may cause inflammation of eyes.
   Wear goggles to protect eyes on handling it.

   When it has got in eyes ;
   Wash eyes with water until the stimulus is gone.

   When it was swallowed ;
   Don't force him to vomit it, but immediately receive medical treatment.

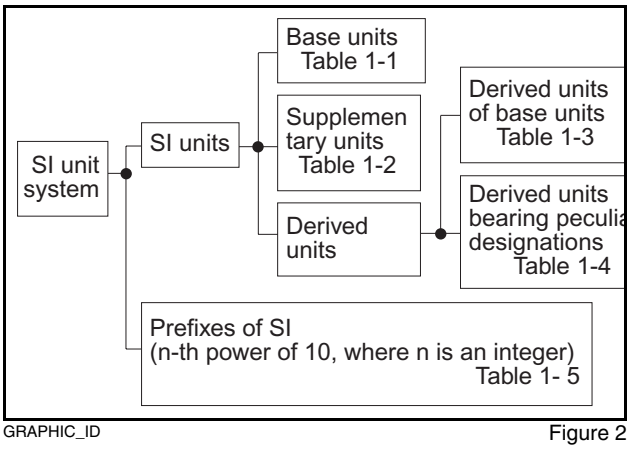
   When it has adhered on skin ;
   Wash with soap and water.
4. Others
   For spare parts, grease and oil, use manufacturer's genuine parts and lubricants.

INTERNATIONAL UNIT SYSTEM

INTRODUCTION

Although this manual uses the SI units system. Outline of SI units system is described here.
Given below are an excerpt of the units that are related to this manual :

1. Etymology of SI Units
   English : International System of units
2. Construction of SI Unit System



GRAPHIC_ID Figure 2

1. Basic Units

Table 1		
QUANTITIES	**DESIGNATION**	**SIGN**
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Current	Ampere	A
Thermodynamic temperature	Kelvin	K
Gram molecule	Mol	mol
Luminous intensity	Candela	cd

2. Supplementary Units

Table 2		
QUANTITIES	**DESIGNATION**	**SIGN**
Plain angle	Radian	rad
Solid angle	Steradian	sr

3. Derived Units of Basic Units

Table 3		
QUANTITIES	**DESIGNATION**	**SIGN**
Area	Square meter	m^2
Volume	Cubic meter	m^3
Velocity	Meter per second	m/s
Acceleration	Meter per second / second	m/s^2
Density	Kilogram per cubic meter	kg/m^3

4. Derived Units bearing Peculiar Designations

Table 4			
QUANTITY	**UNIT**	**SYMBOL**	**FORMULA**
Frequency	hertz	Hz	1Hz=1/s
Force	newton	N	$kg \bullet m/s^2$
Pressure and Stress	pascal	Pa	N/m^2
Energy, Work and Quantity of heat	joule	J	Nm
Power	watt	W	J/s
Quantity of electricity	coulomb	C	A•s
Electric potential difference, Voltage, and Electromotive force	volt	V	W/A
Quantity of static electricity and Electric capacitance	farad	F	C/V
Electric resistance	ohm	Ω	V/A
Celcius temperature	celcius degree or degree	°C	(t+273.15)K
Illuminance	lux	lx	$l\ m/m^2$

5. Prefixes of SI

Table 5		
PREFIX		**POWER**
DESIGNATION	SIGN	
Giga	G	10^9
Mega	M	10^6
Kilo	k	10^3
Hecto	h	10^2
Deca	da	10
Deci	d	10^{-1}
Centi	c	10^{-2}
Milli	m	10^{-3}
Micro	m	10^{-6}
Nano	n	10^{-9}
Pico	p	10^{-12}

6. Unit Conversion Table

Table 6

QUANTITIES	JIS	SI	REMARKS
Mass	kg	kg	
Force	kgf	N	1kgf=9.807N
Torque	kgf/m	N/m	1kgf/m=9.807N/m
Pressure	kgf/cm^2	MPa	1kgf/ cm^2=0.098MPa
Motive power	PS	kW	1PS=0.7355kW
Revolution	rpm	min^{-1}	1rpm=1min^{-1}

NOTES

CHAPTER 2

E27BSR
COMPACT CRAWLER EXCAVATOR
TIER 4
SPECIFICATIONS

Issued 09-2008
Book/Form Number 5-16560 EN-US

Printed in U.S.A. • Bur
Source Code No. S5PV0020E01

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Revision History				
Issue	Issue Date	Applicable Machines	Form Number	Remarks
First Edition	09-2008	E27BSR	5-16560	

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SPECIFICATIONS
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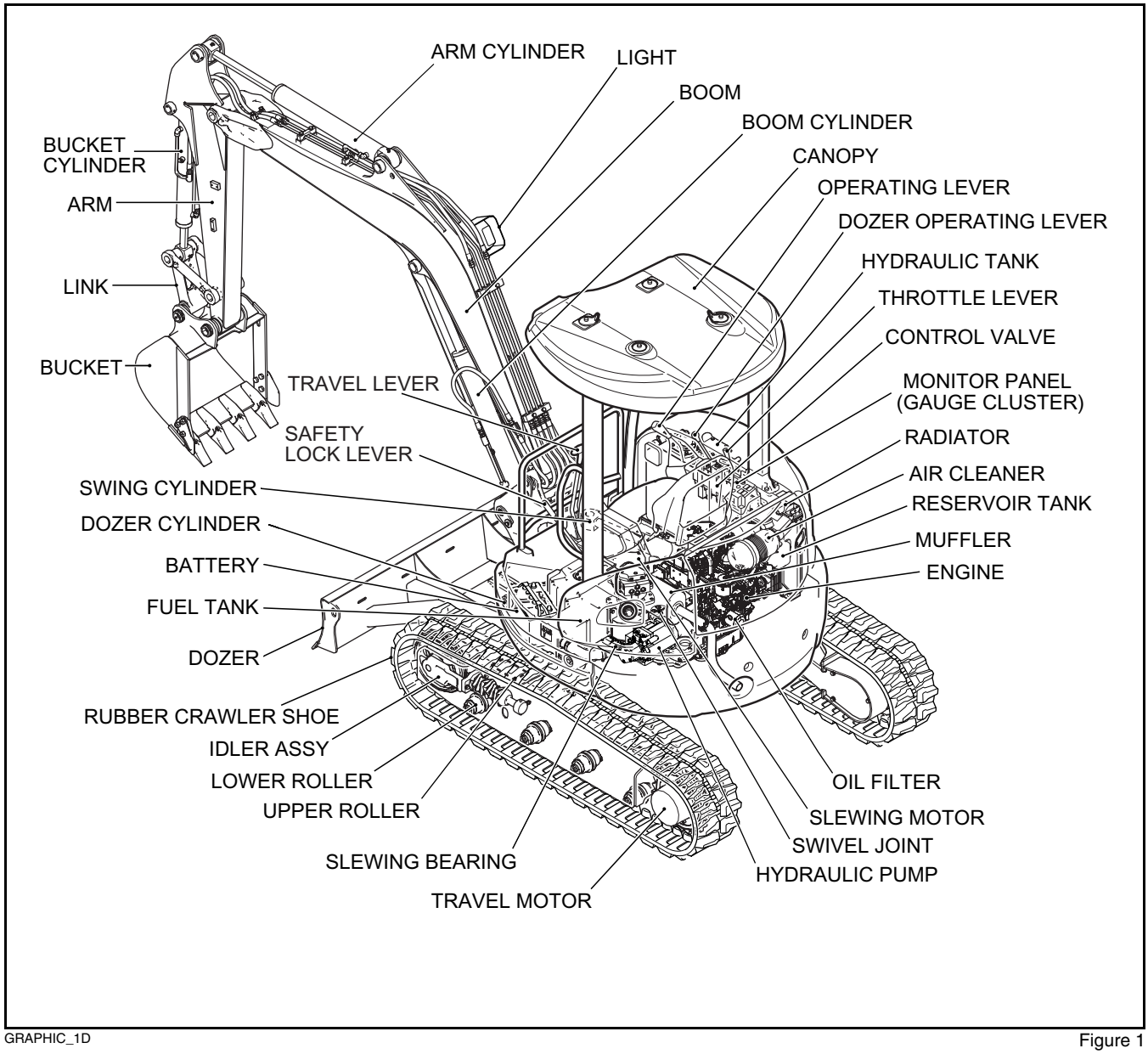
SPECIFICATIONS

COMPONENTS NAME



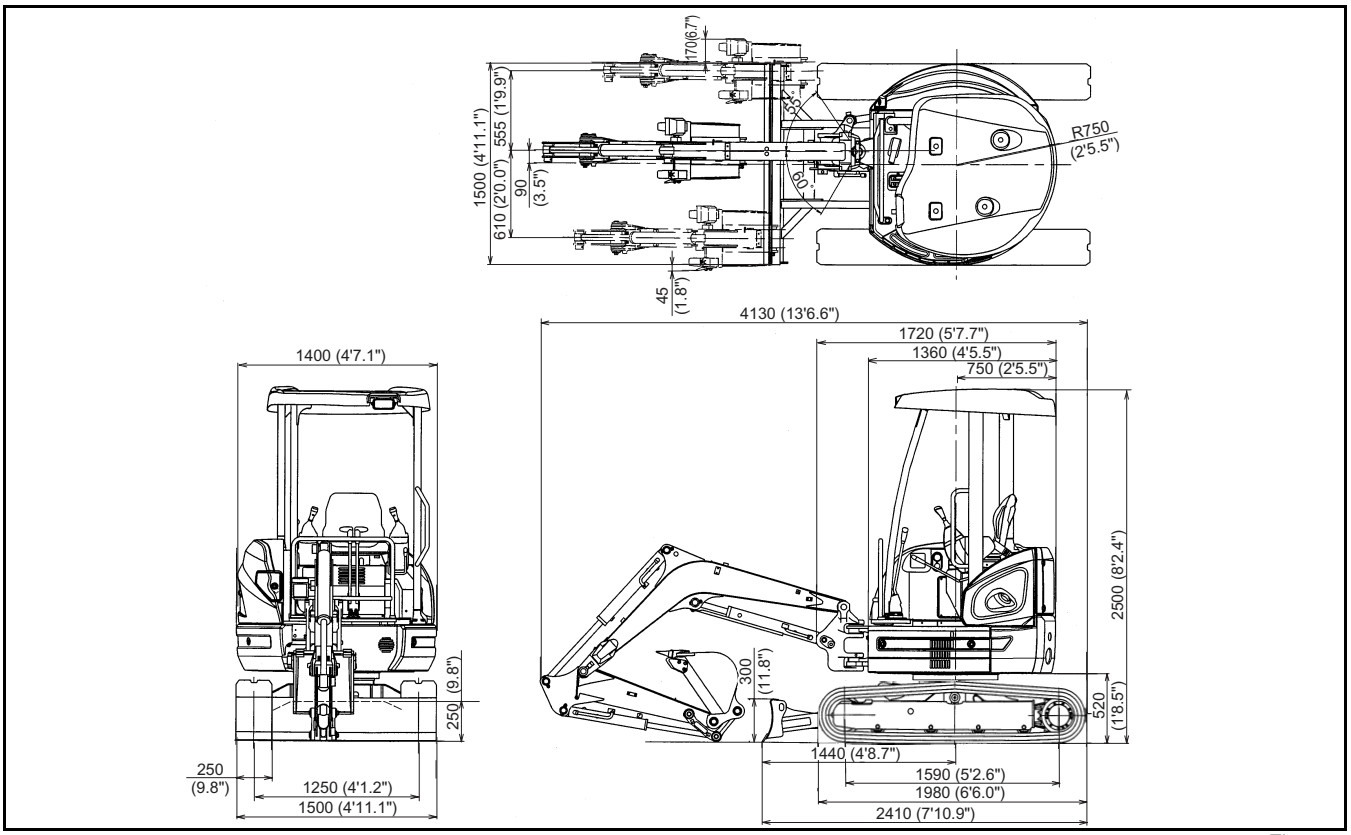
GRAPHIC_1D

Figure 1

MACHINE DIMENSIONS

E27BSR (Canopy)

Unit: mm (ft-in)

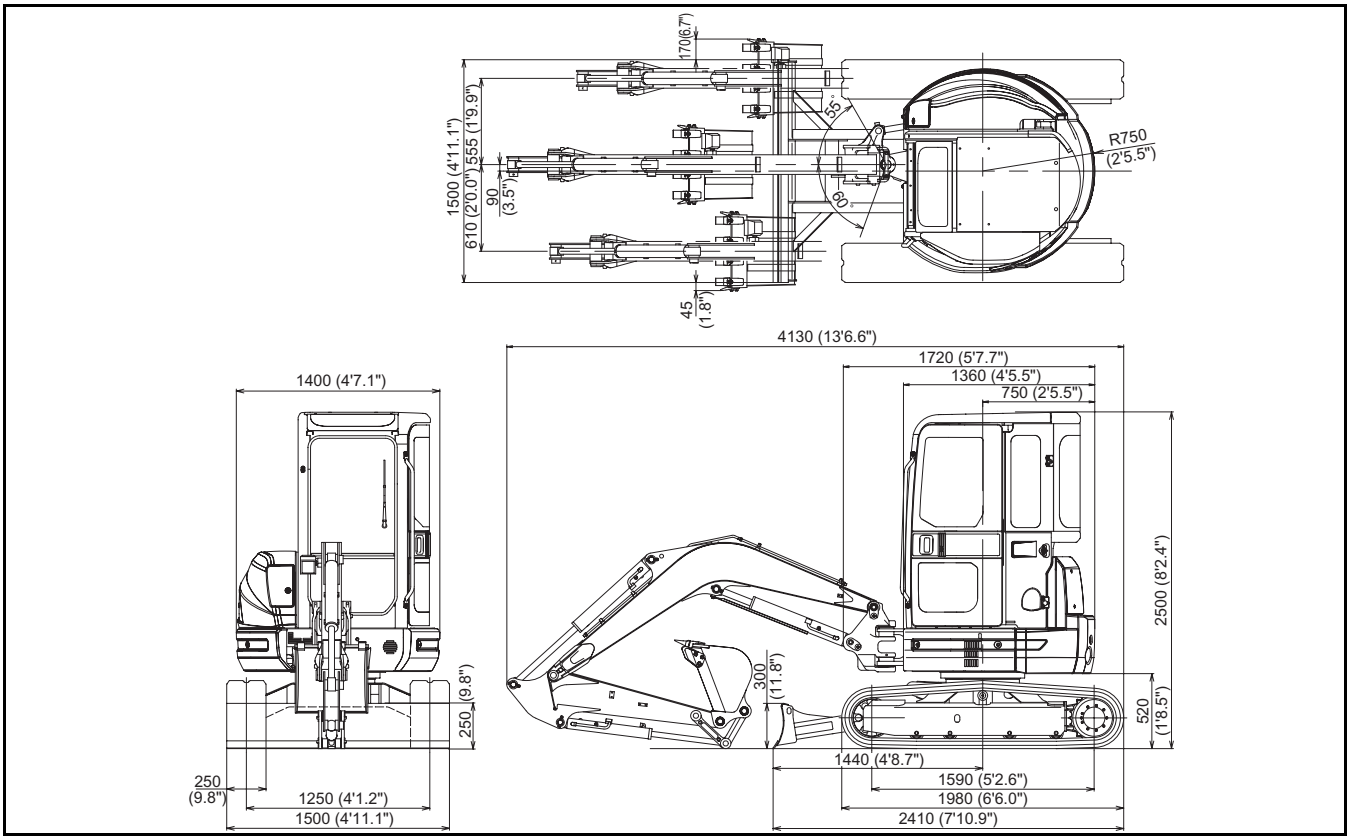


GRAPHIC_1D

Figure 2

E27BSR (Cab)

Unit: mm (ft-in)



GRAPHIC_1D

Figure 3

SPECIFICATIONS AND PERFORMANCE

Speed and Gradeability

Model		E27BSR			
Applicable Machines		PV13-33292~			
Shoe Type		Rubber shoe		Iron shoe (OPT)	
Slewing Speed	min^{-1} {rpm}	8.7 (8.7)			
Travel Speed	km/h (mph)	Low (1st)	High (2nd)	Low (1st)	High (2nd)
		2.3	4.0	2.3	4.0
Gradeability	% (degree)	58(30)			

Engine

Model (YANMAR)		3TNV82A-SYB
Type		Water-cooled, 4-cycle type Swirl chamber type diesel engine
Number of cylinders-Bore × Stroke		3 - ø82 mm × 84mm (3.23 in × 3.31 in)
Total Displacement	L	1.330 (81.2 cu•in)
Output Rating	kW/min^{-1} {PS/rpm}	15.9 / 2,200 (21.6 / 2,200)
Intermediate Torque (Net)	Nm/min^{-1} (pound-pound-ft/ rpm)	79.0~86.0/1,320±100 (58.3~63.4/1,320±100)
Starting Motor	V × kW	12 × 1.7
Generator	V × A	12 × 40

Hydraulic Components

Hydraulic Pump	Variable displacement axial piston + gear pump
Hydraulic Motor	Axial piston
Hydraulic Motor w/Reducer (Travel)	2-Axial piston, 2-Speed motor
Control Valve	10-spool multiple control valve
Cylinder (Boom, Arm, Swing, Bucket, Dozer)	Double action cylinder
Return Filter	Safety valve containing/Filter Type (30μ)

Side Digging and Dozer

Type		Boom swing by hydraulic cylinder
Boom Swing Angle	Right	55°
	Left	60°
Stroke of Dozer (above/below)	mm (in)	445 / 335(17.5/13.2)

Weight

Machine Weight	kg (lb)	Rubber shoe	Iron shoe
		2,490 (5490)	2,620 (5780)
Upper slewing body	kg (lb)	1,310 (2890)	"
Travel system	kg (lb)	830 (1830)	960 (2120)
Attachment (Boom+STD Arm+STD Bucket)	kg (lb)	300 (660)	
Oil & Water	kg (lb)	50 (110)	

NOTE: *This figure is calculated with Japanese standard bucket.*