Operation Manual

Accelerated weight drop AWD – 33(40)

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INTRODUCTION

This Operation Manual (hereinafter referred to as Manual) is intended for studying the design, operation principle, and correct application of Accelerated weight drop AWD – 33(40) by operating personnel.

The present Manual contains the information on equipment packaging, construction, functional principle, technical characteristics, operational limitations; instructions for preparation for work, use, transportation, and storage; safety information; instructions for utilization and other information related to the equipment used for seismic surveys (hereinafter - the equipment), necessary for their correct execution, for maintenance of operational reliability and safety of the equipment and personnel.

ATTENTION: EQUIPMENT REPAIRS ARE EXCLUSIVELY PERFORMED BY THE MANUFACTURER – GEODEVICE or by the specialized services and specialists who have been trained and are certified to perform repairs by GEODEVICE.

That is why the repair processes are not described in this Manual.

The requirements of this manual are mandatory for all persons involved in the operation, storage, transportation, disposal, and other manipulations with the equipment.

This manual must always be kept within reach of the operating personnel and the place of operation of the device.

ATTENTION: THE EQUIPMENT IS A SOURCE OF INCREASED DANGER AND REQUIRES SPECIAL SAFETY MEASURES AND APPROPRIATE TRAINING OF OPERATING PERSONNEL.

The personnel operating the equipment must meet the following requirements:

- have a technical education
- undergo training and testing of labor protection requirements
- have experience with geophysical equipment for at least 1 year (an employee without work experience is not allowed for independent work with the equipment, only allowed to work under the guidance of an experienced worker)
- follow the guidelines required by law, including those on work in the areas where the device will be used
- must be previously (before operation) trained in working with the equipment set, study this Manual
- must be familiar with the safety rules for geological exploration
- must be trained to recognize injuries, and how to conduct first aid.

In addition, the personnel operating the equipment must not have any health conditions preventing from work performance (must undergo a mandatory medical examination and a psychiatric examination in accordance with the procedure established by law in order to be recognized as fit for the work performance).

Operational reliability and safety of the equipment are guaranteed only if all of the following conditions are met simultaneously:

- use of the equipment strictly for its intended purpose
- operation of the equipment in the environment and under the conditions permitted by the operating manual
- compliance of the personnel the requirements above
- compliance with the instructions for use, safety precautions, and all other recommendations and requirements in this operating manual.

IT IS PROHIBITED TO OPEN/DISSASSEMBLE THE EQUIPMENT, AS WELL AS TO MAKE CHANGES IN ITS CONSTRUCTION, AND REFINE IT WITHOUT THE CONSENT OF THE MANUFACTURER.

In case of violation (non-compliance) of the requirements of this manual, the manufacturer GEODEVICE is not responsible for any consequences (accidents, property damage, injuries, etc.) arising from it.

GEODEVICE is constantly improving its equipment and reserves the right to make changes to design, technical characteristics, and delivery set of equipment and software. In this regard, there may be insignificant differences between the procedures described in this manual and the supplied one, which do not affect the conditions of its operation.

DESCRIPTION AND WORK PRINCIPLES

Purpose of use

Accelerated weight drop (hereinafter referred to as AWD) is designed to produce seismic pulses using a hammer driven by a winch. It can be applied in geophysical surveying that uses seismics.

Specification

Table 1. Specification and dimensions

Specification	Value
Type of waves	pressure (and shear)
Minimum response time	3 s
Weight	100 -140 kg
The energy of a single impact	Up to 1000 J
Weight of hammer	10/20/33/40 kg
Frame material	steel

DELIVERY SET

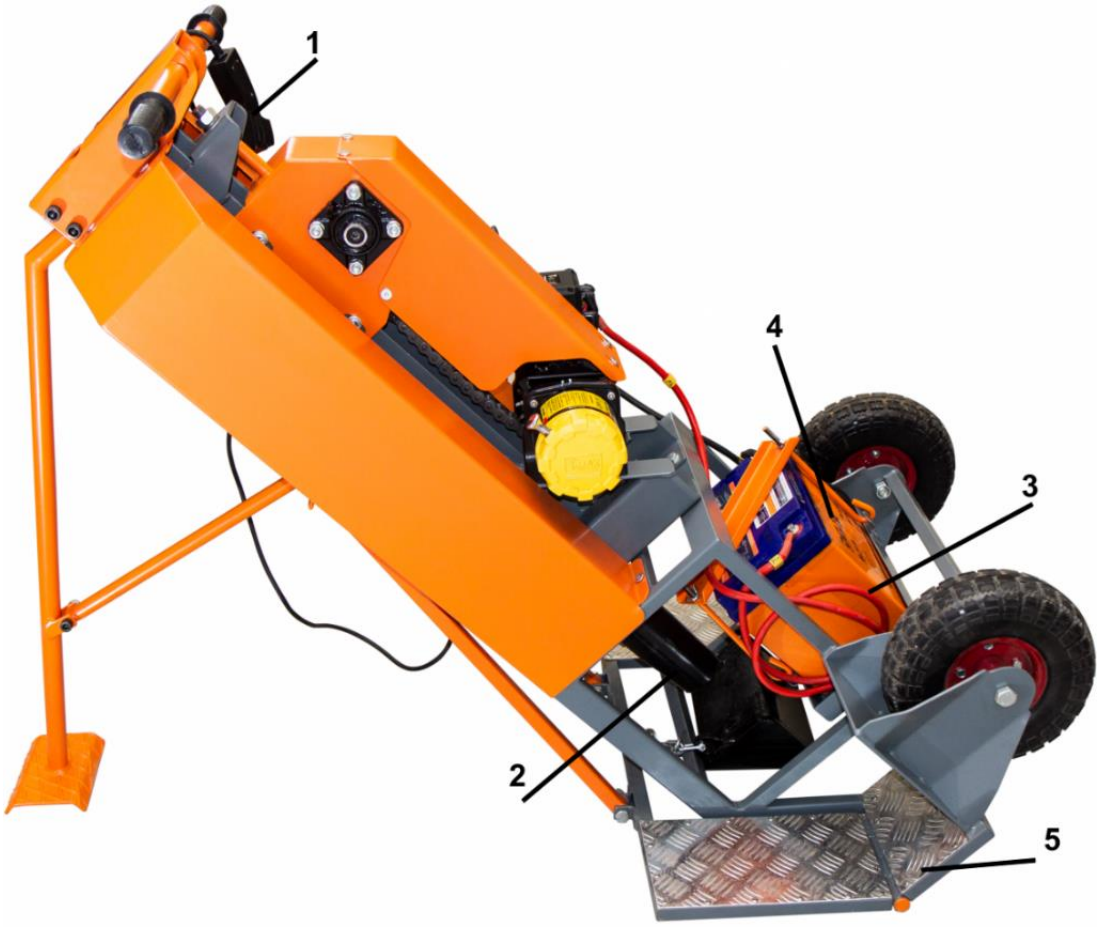

Figure 1. Accelerated weight drop AWD – 33(40) overview.

1 – remote control
2 – hammer
3 – connecting wires
4 – battery
5 – tilt base (for PS option)

Basic set and options

Table 2. Delivery set of equipment

Specification	Value
Accelerated weight drop	1 pc
Remote control	1 pc
Connecting cables	1 pc
Impact pad (for P/S versions)	1 pc
Battery mount kit	1 pc
Additional hammer	-
Gel battery 90 Ah	-
Battery charger	-

Overview

AWD-33 (40) is a type of seismic source of the "weight drop" type. The hammer is driven with powerful springs, attached to an electric winch powered by a battery (65-180 Ah).

The hammer is mounted on a compact lightweight frame equipped with durable wheels and handles for ease of transportation around survey area.

For P/S modifications, there are 2 options for installing the hammer: in a vertical and in an inclined position. The AWD is equipped with an inclined platform that allows it to be fixed at an angle of 45 degrees, and a special supporting leg.

AWD interaction with other equipment:

– It is recommended to install a sealed (gel) battery 90Ah on the hammer.

– It is recommended to use plate for hammering manufactured by GEODEVICE.

Packaging

The device is supplied in a packaging, that complies with safety requirements and ensures the device is water- and dust-protected.

Description of system components

Control panel

The control panel is designed for controlling operation of the hammer.

Control panel (Figure 2) can be located on the protective casing above the electric winch control unit (For models 2022 year and up). The button ⇧ ("up") is used to control the operation of the hammer. The ⇩ ("down") button is auxiliary and serves to adjust the position of the hammer (lowering within the working stroke). It is allowed to hold the button "down" only if the hammer moves down at the same time. Otherwise, if the button is held for a long time, the lifting mechanism will jam.

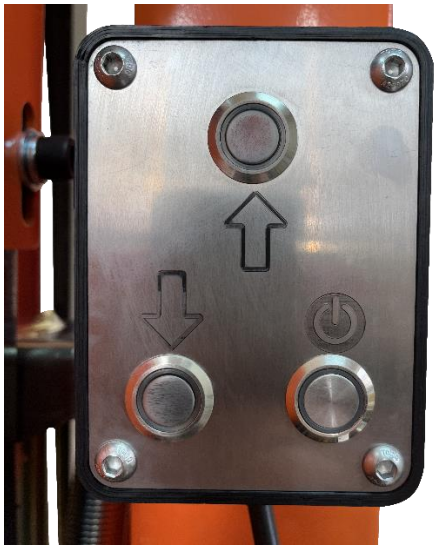

Figure 2. Control unit

Remote control

For models 2021 year and before the remote control acts as only control panel of the hammer. On the handle there is a switch without fixing the position (hereinafter referred to as the switch). When the switch is pressed and held, the hammer works. When the switch is released, the hammer stops.

Figure 3. Remote control

Additional hammer

The source is supplied with one hammer: 10, 20, 33 or 40 kg. Hammers of a custom weight are supplied separately. The design of the AWD allows quickly replacing the hammers in the field.

Battery

Designed to power an electric winch. Attaches to the winch with connecting wires. Mounted on a special platform using fasteners. The battery is not included in the package.

It is recommended to use a Deep Cycle GEL or Deep Cycle AGM battery.

Plate for hammering

Titanium alloy plate is used when hammering during engineering surveys. The plate is equipped with carrying handle. It is applied at vertical working position of AWD.

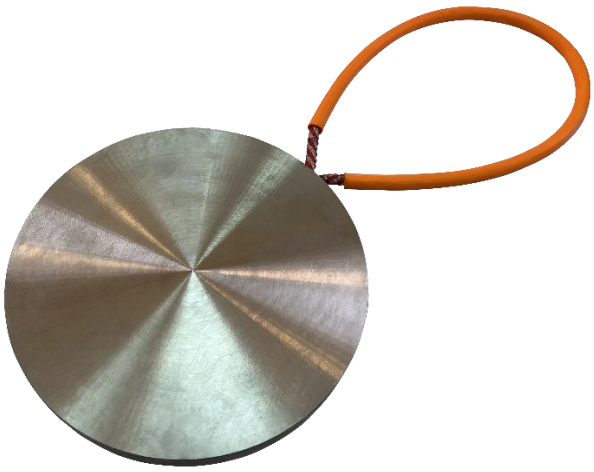

Figure 4. Plate for hammering

Impact pad

The impact pad is intended for P/S strikes during seismic surveying. It is used with an inclined working position of AWD (at an angle of 45 degrees).

Figure 5. Impact pad

Operation principle

Press and hold switch button on the remote control (12 Figure 6), to power the electric winch (4 Figure 6).

The electric winch drives the chain (2 Figure 6) with pins (covered for user protection). The hammer is equipped with a hook. When the pin on the chain reaches the hook, the chain lifts the hook. That leads to uplift of the hammer (8 Figure 6).

Tension springs (9 Figure 6) connect the hammer with AWD frame. When the hammer moves, the springs (covered for user protection) stretch.

When the pin detaches from the hook, the hammer is lowered. Because of the stretching of the springs, the hammer acquires additional acceleration and drops on the plate for hammering at high speed, thereby producing an impact of the required power.

Figure 6. Accelerated weight drop AWD – 33(40)

1 – supporting leg
2 – electric winch chain in protective casing
3 – electric winch control unit
4 – electric winch
5 – battery platform with a mount kit
6 – base of supporting leg
7 – handle
8 – hammer
9 – tension spring in protective casing
10 – tilt base
11 – connecting wires
12 – remote control

CORRECT USE

The hammer can be used in rugged terrain.

Operating restrictions

Do not operate the hammer in rain, snow or fog, or if the hammer and/or battery is damp or wet.

Preparing the instrument for use

Check the hammer and make sure that:

- there is no mechanical damage to the device,

- there is reliable fastening of all parts of the hammer,

- there is no severe pollution and wetting.

Check and, if necessary, adjust the tension of the electric winch chain. When pressing the chain with a force of 2 - 4 kg, the chain should sag by 1 - 2 cm.

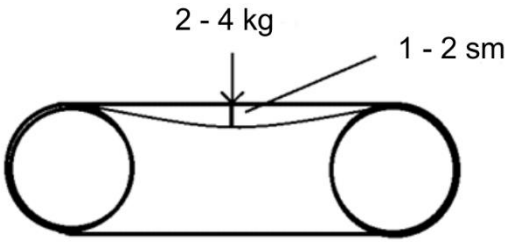

Figure 7. Checking the right tension of the electric winch chain

Make sure the battery is suitable for this device. It is recommended to use a Deep Cycle GEL or Deep Cycle AGM battery.

Make sure that the plate for hammering meets the requirements of the manufacturer.

DO **NOT** OPERATE THE DEVICE WHEN THERE IS DAMAGE, STRONG POLLUTION, WET.

Service personnel procedure

Make sure that the hammer of the required mass is installed. If necessary, replace the hammer.

Install the battery on a platform specially designed for this purpose and fix the battery with a special mount kit.

Figure 8. Platform for battery mount

Using the connecting cables, connect the battery to the electric winch, with the right polarity.

Figure 9. Coonecting cables connection

Place the Accelerated weight drop on a stable, flat solid surface; for an inclined working position, securely fix it with the supporting leg.

A *B*

Figure 10. Accelerated weight drop AWD – 33(40)
A – in vertical working position, B – in an inclined working position

If using Control panel: Connect the Control panel cable to the electric winch control unit and securely fix it (tighten the connector ring).

Figure 11.Connecting control panel

If using Remote control: Connect the Remote control cable to the electric winch control unit and securely fix it (tighten the connector ring).

Figure 12. Connecting remote control

When installing AWD in a vertical working position, place the plate for hammering under the hammer. It is recommended to use a specially designed titanium plate manufactured by GEODEVICE.

It is PROHIBITED to use plates with inappropriate parameters and characteristics.

Figure 13. Plate for hammering, used when AWD is working in a vertical position

When installing AWD in an inclined working position, install and secure the impact pad by attaching it to the frame using springs (use hooks to attach springs to the brackets located on the frame as shown in Figure 14).

Figure 14. Attaching the impact pad to AWD frame

To give the Accelerated weight drop additional stability so that it does not bounce or tip over, put one foot on the base of the AWD.

Figure 15 Location of the operator's foot on the base of the Accelerated weight drop

ATTENTION! RISK OF INJURY: TO AVOID INJURY, NEVER PUT FOOT IN HAMMER OPERATION ZONE, ALWAYS MAKE SURE FOOT IS LOCATED ON TILT BASE ONLY!

IT IS FORBIDDEN to lean against the device and come very close to the operation area of the moving parts of the AWD (hammer, winch chains).

The device is controlled by Control panel or Remote control. Press the switch on remote control or the button ⇧ ("up") on the control panel and hold it for the time required to hammer.

If it is necessary to stop the AWD, release the switch / ⇧ ("up") button.

Procedure after finishing work with the device

After finishing work with the device, perform the following actions, STRICTLY FOLLOWING THE SEQUENCE OF ACTIONS, as well as the safety requirements prescribed earlier in this Manual:

- disconnect the control panel / remote control,

- disconnect the cables connecting the battery to the electric winch,

- remove the battery,

- inspect AWD and detachable components for damage. If damage is found, take appropriate action,

- put AWD and detachable components in storage.

MAINTENANCE

Security measures

General safety requirements (labor protection)

ATTENTION: THE ACCELERATED WEIGHT DROP IS A SOURCE OF INCREASED DANGER AND REQUIRES SPECIAL SAFETY MEASURES AND APPROPRIATE TRAINING OF OPERATING PERSONNEL.

Requirements for personnel are specified in the introduction to this Operation Manual (page 3-4).

IT IS PROHIBITED TO ALLOW PERSONNEL THAT DO NOT CONFORM TO THE SPECIFIED REQUIREMENTS TO OPERATE THE DEVICE.

IT IS PROHIBITED TO USE THE ACCELERATED WEIGHT DROP FOR ANY PURPOSE OTHER THAN THE ONES IT WAS DESIGNED FOR, IN INAPPROPRIATE CONDITIONS AND/OR ENVIRONMENT.

Handle the device with care, do not allow falls from height, shocks or external interference that may damage the device.

IT IS PROHIBITED TO OPERATE THE DEVICE IF IT IS DAMAGED, SIGNIFICANTLY WET OR DIRTY.

Before starting work with the device, fasten coveralls (including fasteners on the sleeves, if any), make sure that there are no dangling parts of clothing and/or any foreign objects. Cover long hair.

It is recommended to use special safety shoes with a reinforced protective toe cap (metal or polyurethane).

Connect control panel / remote control only before starting work, after the Accelerated weight drop has been securely set in a stable position.

IT IS PROHIBITED to put any objects on the device, as well as to put objects around operation area of the device and its components.

IT IS PROHIBITED to touch moving parts of the Accelerated weight drop or come close to them during operation.

IT IS PROHIBITED to put hands, feet, and other parts of the body into the operation area of the equipment (on the pad, under the springs, etc.).

IT IS PROHIBITED to allow people who are not involved in operating Accelerated weight drop into the work area of AWD.

Only specially designed plates made of suitable materials, of appropriate thickness and size should be used as plates for hammering.

It is recommended to use a titanium alloy plate for hammering manufactured by GEODEVICE.

IT IS PROHIBITED to use objects of inappropriate shape or size and from unsuitable (brittle) material as plates for hammering.

ATTENTION: When replacing the hammer, moving AWD, or during other similar operations, disconnect control panel / remote control to prevent accidental activation of the device.

Safety requirements for installing, charging, replacing the battery

Install a battery of required size and characteristics recommended by GEODEVICE. Comply with the requirements of the operation instructions of the battery manufacturer.

ATTENTION: Always disconnect the remote control and/or control panel before installing or replacing the battery.

Charge the battery only with the charger recommended by the battery manufacturer. The battery and charger should always be clean and dry.

IT IS PROHIBITED to use defective or deformed batteries, or batteries that are not suitable for this device.

Fire safety requirements

IT IS PROHIBITED TO USE OPEN FIRE or SMOKE when operating the Accelerated weight drop.

IT IS PROHIBITED TO USE THE DEVICE IN A FLAMMABLE AND EXPLOSIVE ENVIRONMENT.

If smoke, specific smell and other signs of fire appear, immediately stop operating AWD and, if possible (if it does not threaten health and life), start extinguishing with fire-fighting equipment.

Actions in extreme situations

In case of malfunctions, if the Accelerated weight drop fails to work, contact the manufacturer GEODEVICE. Geophysical surveys should be suspended when weather conditions deteriorate: visibility drops below 20 m, wind speeds exceeds 20 m/s, heavy icing forms, and in all extreme and emergency situations.

In emergency at the site that threatens life and health of people, immediately evacuate to a safe place.

REPAIR

In the event of failure of device operation during warranty and post-warranty period, the user should contact GEODEVICE representative.

Warranty and post-warranty repairs are only carried out in manufacturer's facility or specialized geophysical service facility by specialists trained and certified by GEODEVICE.

IT IS PROHIBITED TO MAKE REPAIRS BY UNAUTHORISED PERSONELL.

IT IS PROHIBITED TO OPEN / DISASSEMBLE THE DEVICE, AS WELL AS TO MAKE CHANGES IN DESIGN OF THE DEVICE, TO IMPROVE IT WITHOUT AGREEMENT WITH THE MANUFACTURER.

Otherwise, the manufacturer does not guarantee the operational reliability and safety of the device, and the manufacturer's warranty obligations are terminated.

STORAGE

The device should be stored in in a warehouse environment that excludes direct exposure to atmospheric precipitation (rain, snow, fog, etc.).

Accelerated weight drop and the battery that is not in use should be stored separately. Battery storage should be in accordance with the battery manual.

DO NOT STORE THE DEVICE TOGETHER WITH EVAPORATING LIQUIDS, ACIDS AND OTHER SUBSTANCES THAT COULD CAUSE METAL CORROSION AND DAMAGE INSULATION.

TRANSPORTATION

The accelerated weight dpor can be transported by any mode of transport at ambient temperature from -40 to + 60 °C and relative humidity from 5 to 95%.

Transportation must be performed in closed transport in accordance with transportation rules, operating for this kind of transport.

Care must be taken during transportation. Avoid shocks and falls from heights.

After transportation, check the device for transport damage (damages caused in the transport of the device).

DO NOT OPERATE THE DEVICE IF TRANSPORT DAMAGE IS DETECTED.

If transport damage is detected, immediately inform the representative of the manufacturer in order to clarify the possibility of further operation of the device.

INFORMATION ABOUT DEVICE DISPOSAL

The buyer (user) is responsible for disposal of the device after loss of its consumer properties.

DO NOT DISPOSE THE DEVICE WITH HOUSEHOLD WASTE.

If possible, divide the device into parts depending on the materials (plastic, rubber parts, etc.) and recycle.

Materials to be disposed in special facilities should be hand over for disposal in accordance with legislation in force at the time of disposal.

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