REDISCOVER UPGRADES

ULTIMATE
Upgrade Series

Spring, M150

Gearbox shell, Version 2

Gearbox, M15/M4

actionsportgames.com

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ActionSportGames A/S®


This is Airsoft . . .

REDISCOVER UPGRADES

Airsoft gamers have always sought new ways in which to improve their AEG's. The launch of the ULTIMATE® Upgrade Series from ActionSportGames® gives Airsoft enthusiasts an opportunity to gain access to a series of unique upgrade parts in terms of both superior technology and solid upgrade solutions.

Years of experience with tuning and upgrading electrical Airsoft guns and explicit know-how of production processes from the automobile industry come together in the ULTIMATE® Upgrade Series to give Airsoft gamers and enthusiasts the thrill and satisfaction of upgrading their preferred AEG and the enjoyment of seeing it outperform other AEG's in all aspects of an airsoftgame.

The range of products in the series cover all types of upgrades – from small add-on parts to complete tunings and upgrades – to both Sportline and Proline series of AEG's.

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Gearbox, SR16

ULTIMATE
Upgrade Series

Contents

Upgrade basics

Choosing model
In order to choose the correct ULTIMATE® parts for an upgrade, you must first choose which model of AEG you want to upgrade. After this, determine the gearbox version – then the spring and motortype. As a guide to these choices refer to the below table, showing the most popular model/version combinations*

AEG model series	Gearbox version	Spring length	Motor type/shaft
Fa mas	Version 1	standard	Short axle
G3/SAR	Version 2	standard	Long axle
M4/M15/M16 Defender4	Version 2	standard	Long axle
MP5	Version 2	standard	Long axle
SIG	Version 3	standard	Medium axle
Steyr AUG	Version 3	standard	Short axle
AK/Arsenal	Version 3	standard	Short axle
CA36/CA8-2/ G36	Version 3	standard	Short axle
MP5/MP5 PDW&K	Version 3	standard	Short axle
PSG-1	Version 4	Long	Medium aksel
UZI type	Version 5	standard	Short axle
P90/CA90	Version 6	standard	Long axle
M14	Version 7	standard	Short axle
LMG CA249	Version 8	standard	Short axle
CA25/Scar H	Version 9	Long	Long axle
LMG M60	Version 10	Long	Short axle
others	mixed	mixed	mixed

** In the 1990's the Japanese company Tokyo MARUI created the foundation for most of the gearbox versions used in AEG's today. A combination of design adapted to specific AEG's and product development has made it possible today to have more gearbox versions to cover a wide range of AEG models. Basically the technique is the same, but the individual components may vary in dimensions or designs depending on the gearbox version.*

Solution
After choosing the make and model of your AEG, the next step is to determine which type of upgrade solution you want. Basically there are three types of upgrade solutions, all coming from rate of fire (shots per minute) and power (energy in joule.)

- **Low power solutions**
  (high rate of fire is chosen over power)
- **Medium power solutions**
  (a compromise between rate of fire and power)
- **High power solutions**
  (power is chosen over rate of fire)

In order to chose the right ULTIMATE® part for one of the above upgrade solutions, follow the five steps below to achieve a successful ULTIMATE® upgrade:

1. Spring
determines the solution – low- medium- or high power

2. Gears
is partly controlled by spring, but the choice also determines durability

3. Motor
is chosen after selecting spring and gear. The motor has a great influence on power usage and in turn the strain on conductive parts and the battery

4. Battery
The battery's ability to deliver amperes without loosing voltage is crucial to how the final upgrade will work

5. Mechanical parts
mechanical parts are chosen to ensure that the parts in a gearbox can withstand the increased stress applied to the gearbox when the rate of fire and/or power is increased through an upgrade

Part selection table

To give a better overview and to help choosing the right combination for each ULTIMATE® upgrade solution according to steps 1–5 we've made the following upgrade matrix. By following the recommendations given in the matrix, you're ensured an optimal as well as durable upgrade.

Of course, upgrade solutions that deviate from the recommendations given in the matrix can be made – even successfully. However, be aware of the fact that extreme upgrades lower the durability of the parts and demand service more often.

Step 1: Springs

	M100 (100 m/s or 328 fps)	M110 (110 m/s or 360 fps)	M120 (120 m/s or 393 fps)	M130 (130 m/s or 426 fps)	M140 (140 m/s or 459 fps)	M150 (150 m/s or 492 fps)	M170 (170 m/s or 557 fps)
Increase velocity	(✓)	✓	✓	✓	✓	✓	✓
Increase durability							
Increase precision	✓	✓	✓	✓	✓	✓	✓

Step 5: Mechanical parts

	Nozzle	Cylinderhead	cylinder	pistonhead	piston	Springguide	Gears	Metal/ball bearings	Nozzleguide	Reversal prevention latch	Switch/wire/selectorplate	Hop up chamber / rubber	Precisionbarrel	Gearbox	Other parts
Increase velocity	✓	✓	✓	✓		✓							✓		
Increase durability	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Increase precision						✓						✓	✓		

Step 3: Motor

High speed/low torque	✓	✓					
Standard speed/normal torque		✓	✓				
Low speed/high torque				✓	✓	✓	✓

•	•	•	•	○	•	○	○	○	○	○	○	○	○	○
•	•	•	•	•	•	•	•	•	○	○	○	○	○	○
•	•	•	•	•	•	•	•	•	•	•	•	○	•	•

Step 2: Gear ratio

High speed/low torque	✓	✓					
Standard speed/normal Torgue	✓	✓	✓	✓			
Low speed/high torque				✓	✓	✓	✓

Step 4: Batteries

8,4V-9,6V NiMh or 7,4V Lipo
8,4V-12V NiMh or 7,4V-11,1V Lipo
10,8V-12V NiMh or 11,1V Lipo

Stress to gears depending on spring

High speed/low torque	M100	M110	M120	M130	M140	M150	M170
Standard speed/normal Torgue	M100	M110	M120	M130	M140	M150	M170
Low speed/high torque	M100	M110	M120	M130	M140	M150	M170

- • Important parts needed for the selected upgrade
- ○ Optional parts for the selected upgrade
- ✓ The effect provided by the particular part

Insights on upgrades

Before beginning your upgrades, take time to look through these tips, which can help you get the most out of your upgrade solution.

The technique behind upgrades
The basic principles behind the development of the ULTIMATE® Upgrade Series are all based on simple physics, mechanical engineering and the study of materials science. If a deeper insight of the interaction between springs, gears, motor, battery and mechanical parts is wanted, we suggest reading up on the topics on your own. However, specific points of interest and relevance are topics such as spring characteristica, gear ratios, DC-motors, batteries, etc. With this acquired knowledge the base is set for creating upgrade solutions performing second to none.

On www.actionsportgames.com we strive to keep you updated on our own experiences with ULTIMATE® Upgrade Series. We will post various articles explaining the different upgrade solutions – the AEGs used and the ULTIMATE® parts used.

Solutions

Low power solutions (high rate of fire over power)
The challenge in this solution is to combine the parts in steps 1–5 in such a way that the spring has time to bring the piston into starting position before the gear has rotated ½ turn and catches the piston again. It is possible to overdo the positioning and when that happens, at best only the piston will be damageed.

Medium power solutions (a compromise between rate of fire and power)
These solutions are typically the easiest solutions to make. There is only a moderate increase in the stress on the mechanical parts, making these solutions very durable and at the same time achieving a good balance between rate of fire and power.

High power solutions (power over rate of fire)
This is the solution for many pros and gamers who play in areas with long distances. These high-power upgrades put a lot of stress on all mechanical parts including the battery. High power solutions require more frequent service of the gearbox and the gears, piston and motor – parts needs to be changed more often. High power solutions require superb craftmanship and technical skill to be made successfully.

Choice of spring
For gearboxes using a long spring, with the right ULTIMATE® parts, a short spring can do the job just as well. If a M120 solution with a long spring is wanted, use a short M140 spring with matching gears to give a more durable M120 solution.

Note that the end result of an upgrade solution might deviate +/- 10%. If a M110 solution is wanted, it might in some cases be necesssary to use a M120 spring to obtain 110m/s in the final upgrade.

Choice of battery
The battery's ability to supply effect is essential for a good upgrade. Note that the mAh written on a battery is no indication of the quality of the battery or its ability to supply the effect. The battery's ability to supply effect shows when the battery can supply a lot of amps. without the voltage (V) dropping – and this ability is important when choosing battery for an upgrade. LiPo batteries are generally well suited for upgrades as they have a greater ability to give effect compared to NiMH batteries – this is especially evident when low voltage battery packs are chosen.

For batteries used for upgrades, the capability of the battery to perform high amps without dropping in voltage (V) is required over high mAh.

Remember:

- A battery with a high indication of mAh, eg. 8,4V 3800mAh might be less suited to drive an upgrade than an 8,4V 3000mAh battery.
- The battery has an effect on the rate of fire but no effect on the power/energy (joule) of the upgrade.

Combining parts
Before combining ULTIMATE® upgrade parts with other upgrade parts, be aware of the specifications of each individual part, so you don't risk damaging the parts.

The basic design of a gearbox and its function derives from the Tokyo MARUI versions made in the 1990's. Since then, the design has been copied in part or in full by many producers of Airsoft AEG's. As there are no real benchmarks in the Airsoft business for dimensions and tolerances for the different internal AEG parts, it can at times be very challenging to upgrade an AEG using parts from different manufacturers or brands. For this reason we recommend using only ULTIMATE® parts when upgrading your AEG, thus ensuring optimal functionality, durability, and performance*

** In certain AEG's, where the gearbox does not follow the basic MARUI concept with regards to design and tolerance, ULTIMATE® parts might not work optimally – in which case you should expect adjustment of tolerances or combi-solutions with different parts in order to achieve asatisfactory upgrade.*

Photo: courtesy of Lewis Machine & Tool Company (LMT), USA – www.lewismachine.net

Complete gearboxes

The ULTIMATE® Upgrade Series complete gearboxes come standard with a M120 spring (400 fps) and standard speed gearset with normal torque ratio of 18.72:1. They come in 4 standard configurations and all gearboxes come with unique serial number.

With an ULITMATE® complete gearbox you can make a perfect upgrade by doing a simple gearbox-exchange so you can spend your time gaming and not building gearboxes from scratch. The gearboxes can also be reconfigured by the numerous alternative ULTIMATE® upgrade parts and/or be adapted to other AEG models.*

A standard AEG gearbox is produced with standard shimming of the gears and is made in large numbers with basic components to keep production costs down. This means that a standard AEG gearbox sounds more metallic and strained when used. The ULTIMATE® Upgrade Series complete gearboxes however are assembled by skilled technicians to ensure that the tolerance of the mechanical parts is balanced to minimize friction. Each technician even makes sure that every complete ULTIMATE® gearbox performs and sound like a well-oiled piece of machinery.

**Typically an exchange of a few parts like cylinder, nozzle or trigger will be sufficient for the 4 standard gearboxes from ULTIMATE® to cover the AEG's that use version 2 gearboxes.*

Gearbox, M15/M4/Defender4

Ref. 16588

Gearbox, SR16

Ref. 16589

Gearbox, MP5 series

Ref. 16590

Gearbox, G3 series

Ref. 16591

All gearboxes
have unique serial numbers

Gearbox shell & mechanical parts

The ULTIMATE® Upgrade Series gearbox shell (ref. 16592) is cast in high-strength casting materials to ensure the box is able to endure the extra stress an upgrade will put on the box. The gearboxes are equipped with taps controlling the lining of the case preventing the box from twisting under the stress. After casting the gearbox go through a number of procedures and finishes of with a chromium plating with silver finish. The silver finish is not only a visual feature but the chromium finish primarily gives the gearbox a lower friction on the surface.

The gearbox casing comes standard with high performance pre-mounted 8mm Japanese manufactured steel bearings and ULTIMATE® selector plate. Besides that a set of high strength hex-screws is supplied with the gearbox. All gearboxes come with unique serial numbers.

All other parts in this group are made of reinforced material to secure the best performance and durability.

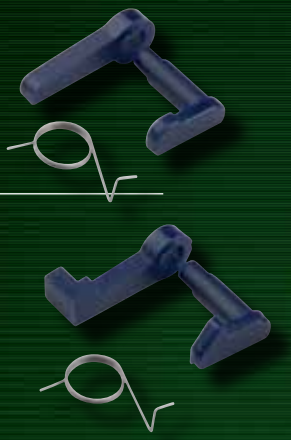
Gearbox, shell incl. bearings, version 2

Ref. 16592

Safety cover

M16 series
Ref. 16625

MP5/G3 series
Ref. 16626



Trigger, steel

M16 series
Ref. 16641

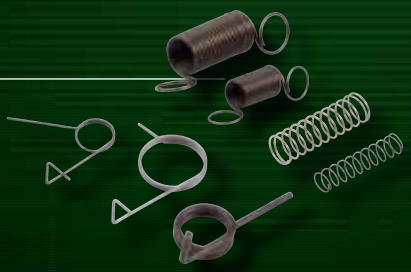
MP5 series
Ref. 16642

G3 series
Ref. 16643

AK series
Ref. 16644

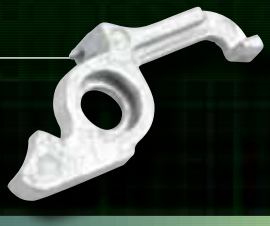
Spring set

version 2/3 gearbox
Ref. 16638



Cut off lever

version 2 gearbox
Ref. 16627



Springs & spring guides

The ULTIMATE® Upgrade Series doubled progressive springs make sure the torque of the motor is used to its full extent giving a higher rate of fire. All springs, with exception of the M100 spring (ref. 16669) are chromium plated which minimizes the friction on the piston and serves as easy recognition based on the plating; white/black and nickel/chromium. Unlike other springs that use paint or other alternative treatment, chromium plating does not wear off leaving unwanted debris in the gearbox.

The ULTIMATE® springs are named M100, M110 etc. according to their expected tension in meters per second – measured when using a 0.20gr BB and a 300mm long barrel. In turn, a M110 spring would give 110 m/s. To convert to feet per second (fps) simply multiply by 3,28, eg.: ref. 16671 – M120 – 120ms/394fps.

ULTIMATE® spring guides has steel bearings and rotatable guide. This minimizes friction when the spring is compressed, primarily effecting the rate of fire.

Springs

M100, black
Ref. 16669

M110, white nickel
Ref. 16670

M120, black nickel
Ref. 16671

M130, black chromium
Ref. 16796

M150, white chromium
Ref. 16672

M170, black chromium
Ref. 16673

Spring guides

Version 2 gearbox
Ref. 16612

Version 3 gearbox
Ref. 16613

Version 6/7 gearbox
Ref. 16614

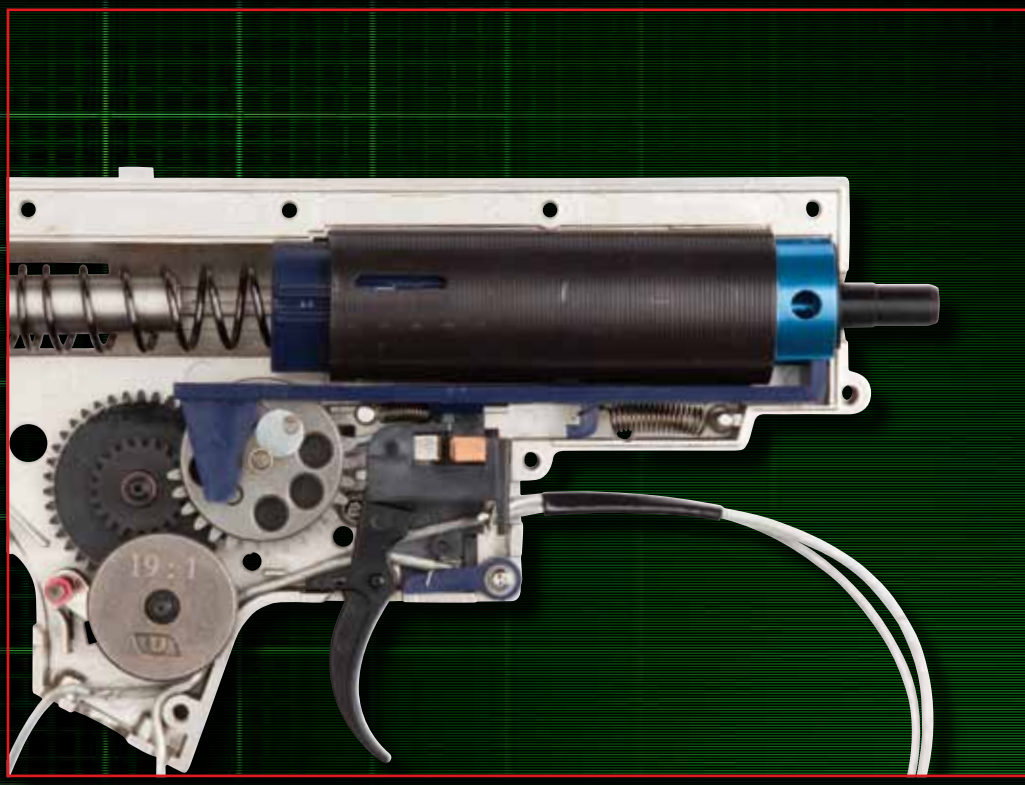
Gear sets, pistons & parts

30 years of knowledge from the automobile industry becomes visible in the ULTIMATE® gears. Major focus has been given to cover 3 critical points when producing and selecting gears for the ULTIMATE® Upgrade Series:

- Material of the highest quality. Unique mixture formulas are used to increase gear durability with as much as 35%.
- Specialized molding process used for molded parts.
- The design and construction of each gear is engineered to highest performance.

These key points allow the ULTIMATE® Upgrade Series to use only three gear ratios to power upgrade solutions between M90 and M170 springs.

Gear sector clips (ref. 16645) are used to prevent "empty shooting" and is primarily used with high-speed tunings (25+ rounds/sec.). The gear sector clip is mounted on the sector gear and delays the tappet plate (and thereby the nozzle) in its releasing time during the rotation.



Gear sets

Original, 90-130 m/s
Ref. 16594

High speed, 100-130 m/s
Ref. 16595

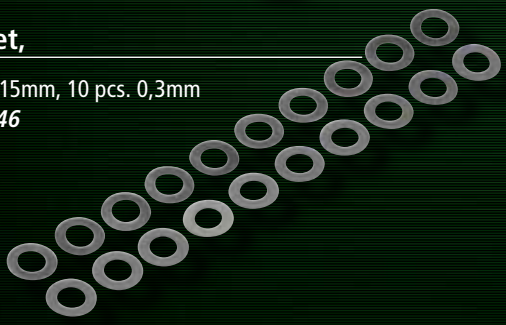
Helical, ultra torque up, 110-170 m/s
Ref. 16596

Gear sector clip, 6 pcs.

Ref. 16645

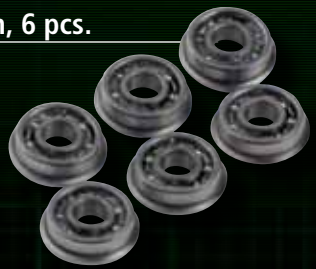
Shim set,

10 pcs. 0,15mm, 10 pcs. 0,3mm
Ref. 16646



Ball bearings, 8mm, 6 pcs.

Ref. 16639



ULTIMATE® 8mm ball bearings (ref. 16639) are Japanese manufactured high performance steel bearings – set of 6 pcs.

The ULTIMATE® 6mm bushings (ref. 16786) are perfectly suited for upgrading all TM-compatible gear boxes that use nylon bushings as standard. Nylon bushings are not built to withstand the increased stress from an upgrade, so it is a must that these are replaced with metal bushings or ball bearings when upgrading. As with the ULTIMATE® 8mm ball bearings, the ULTIMATE® 6mm metal bushings can be used for all types of upgrades.

ref. 16615, 16616 and 16617 – Best quality reversal/anti prevention latch that ensure the gears in the gearbox do not rotate backwards causing the AEG to double-fire unintentionally. Especially if a very powerful upgrade is selected this part needs to be looked after and changed regularly to secure optimal performance.

The ULTIMATE® high performance piston (ref. 16611) is made of polycarbonate and is TM-compatible. To get the best possible strength in the piston the teeth have been upgraded with 10 heat-treated steel teeth in extension of the piston's embedded polycarbonated teething. Furthermore the piston's embedded teeth have a longitudinal bar where the teeth have been cast in to give them the best possible strength against breakage. The sectional view of the piston is teardrop-shaped, adding strength to the areas most vulnureble to mechanical fractures.

The polycarbonated piston head (ref. 16608) or the aluminum piston head (ref. 16609) have both built-in pressure bearings to reduce friction from the spring. The piston heads are both ventilated where holes in the piston heads make sure that the o-rings are pressed against the cylinder sides when the air is compressed. This gives optimal compression of the air and minimizes wear and tear on the o-ring.

The difference between the polycarbonated and aluminum piston heads lies mainly in the sound – the aluminum piston head makes a more sharp snap compared to the polycarbonated version when fired.

The POM piston head (16610) has the same feature as the aluminium version (ref. 16609) but made in a lighter material and is intended for high-speed tunings. We do not recommend this piston for powerful tunings (m110+) as the POM material isn't able to handle the strong forces.

Metal bushing, 6mm, 6pcs

Ref. 16786

Piston, polycarbonate

Ref. 16611

Reversal prevention latch

Version 2/3
Ref. 16615

Version 6
Ref. 16616

Version 7
Ref. 16617

Piston heads

Polycarbonate
Ref. 16608

Aluminium, ventilation, hexachrome, black
Ref. 16609

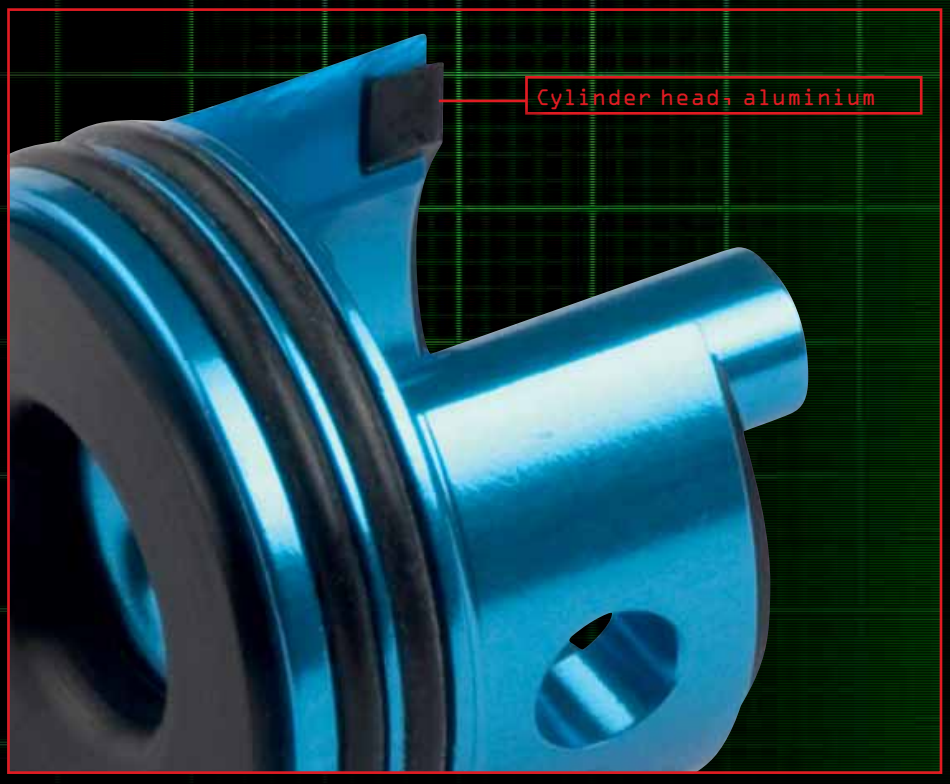
Pom, ventilation
Ref. 16610

Gear sets, pistons & parts

ULTIMATE®'s cylinder parts are designed to give the best possible air compression and durability. For this reason we recommend always using ULTIMATE® cylinder parts and not combining or mixing with other upgrade parts as this can affect the result and performance of the upgrade.

- The cylinders are made of steel and have been surface treated to ensure low friction and high durability. The placement and size of the decompression holes have been designed to help give maximum compression thus increasing the effect.
- All cylinder heads have been CNC manufactured in machine-aluminium and thereafter anodized with a colour code for easy recognition. The heads have been designed with double O-rings to minimize loss of compression from the cylinder. The special 'trumpet design' ensures optimal delivery of air to the barrel/BB. Furthermore, the cylinder heads have a powerful built-in rubber band that absorbs the shock from the piston head.

  A special feature for version 2 cylinder heads is the built-in rubber ring on the outer flange, resting against the gearbox. This design absorbes shocks and prevents unintended cracking of the geabox front.
- The ULTIMATE® air nozzles have built-in O-rings to prevent loss of compression from the nozzle. All ULTIMATE® nozzles follow TM standards.



Cylinders

G3/M16A2/AK series, 451-550mm
Ref. 16597

M4A1/SR16, 401-450mm
Ref. 16598

MP5, 301-400mm
Ref. 16599

MP5K/PDW series
Ref. 16600

M14, TM type, 451-550mm
Ref. 16601

M14, TM type, 401-450mm
ref. 16602

Nozzles

Air, M16A1/XM177/CAR15 series
Ref. 16647

Air, MP5-A4/A5/SD5/SD6 series
Ref. 16648

Air, AK series
ref. 16649

Air, G3-A3/A4/SG-1/MC51 series
16650

Air, MP5-K/PDW series
Ref. 16651

Air, SIG-550/551/552 series
Ref. 16652

Air, G36C series
Ref. 16653

Air, AUG series
Ref. 16654

Air, M16A2/M4A1/RIS/SR16 series
Ref. 16655

Air, P90 series
Ref. 16656

Air, CA, M14 series
Ref. 16797

Tappet plates

Version 2 gearbox, M16/G3 series
ref. 16618

Version 2 gearbox, MP5 series
ref. 16619

Version 3 gearbox
Ref. 16620

Cylinder heads

Aluminium, version 2, blue
Ref. ***16603***

Aluminium, version 3, purple
Ref. ***16604***

Aluminium, AUG, orange
Ref. ***16605***

Aluminium, version 6, hexachrome green
Ref. ***16606***

Aluminium, version 7, red
ref. ***16607***

Aluminium, version 7, hexaxhrome black
Ref. ***16785***

Electrical parts

Any form of upgrade on an AEG places great demands on the electrical components. More amperes (more effect) is pulled out of the motor thus generating more heat in the components. To comply with these factors, the ULTIMATE® Upgrade Series offers unique components that ensures minimum electric resistance (Ω) which means less heat in the parts and optimal use of the effect from the battery. To get the most out of your upgrade we recommend changing the electric components at the same time. When making powerful upgrades, it is a must that you change the electrical components.

- All electric parts are made from a heat resisting compound.
- All ULTIMATE® wires are produced in Japan, and are made of high-quality silver-wire, to ensure low resistance in ohm (Ω).
- All electrical contact surfaces have a high-quality plating to ensure low inner resistance in ohm (Ω).

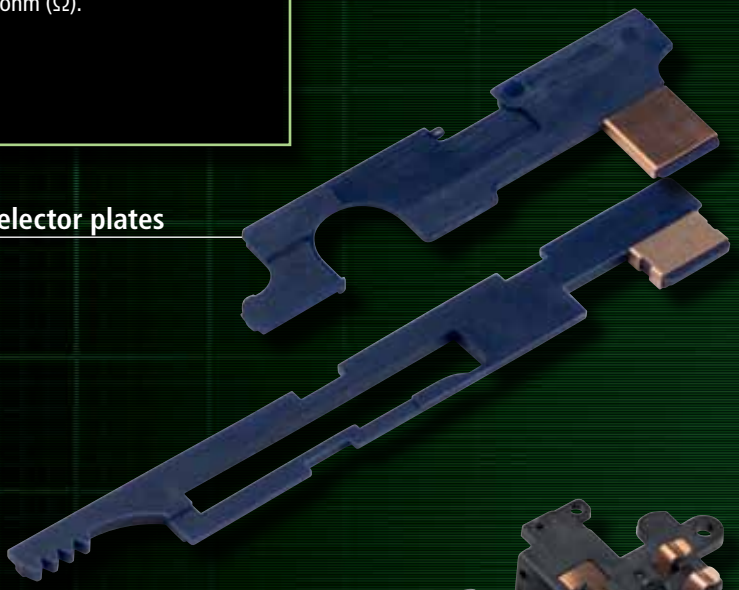
Anti-heat selector plates

M16 series
Ref. 16621

MP5 series
Ref. 16622

G3 series
Ref. 16623

AK series
Ref. 16624



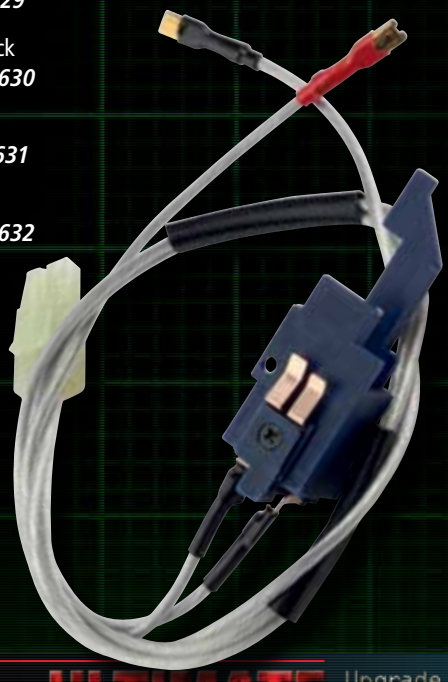
Switch assemblies

handguard
ref. ***16629***

buttstock
Ref. 16630

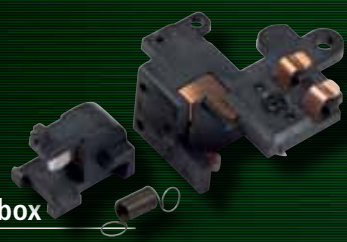
AK-47S
ref. 16631

AK-47
Ref. 16632



Switch, version 2 gearbox

Ref. 16633

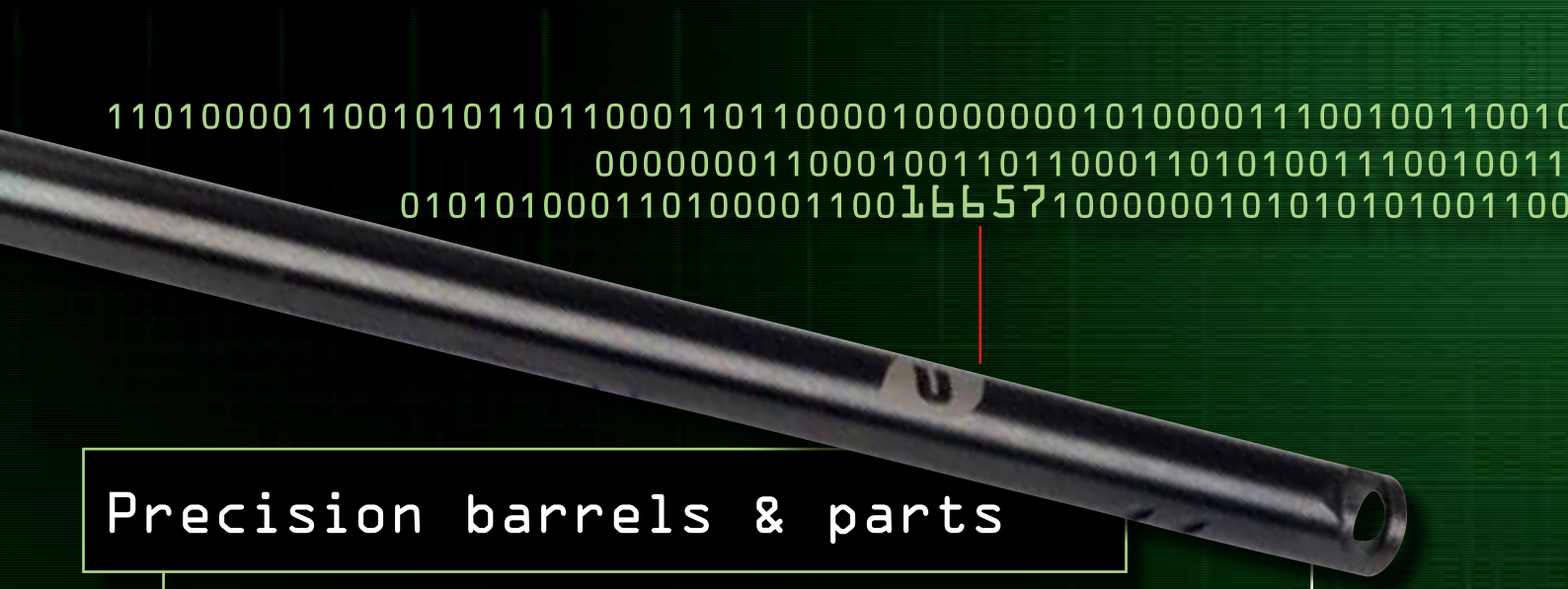


Switch, version 3 gearbox

Ref. 16634

Wire, silver plated, 2 meters

ref. 16640



Precision barrels & parts

ULTIMATE® barrels are built to give optimal target grouping and shooting performance. The barrels are made to withstand both the tough conditions in gaming environments and to ease maintenance, making them an excellent choice in precision barrels.

- The barrels are made of stainless steel (ss), providing near perfect roundness throughout the barrel length – stable straightness (no bending) and a minimum of sentivity to temperature.
- The barrels have undergone special surface treatment to minimize the need for maintenance. The treatment prevents the barrel from corroding and the gathering of dirt inside the barrel.

Precision barrels

All barrels are made of stainless steel (SS)

6,03x229mm, MP5 series	***Ref. 16657***
6,03x247mm, CA36C/G36C/P90/552	***Ref. 16658***
6,03x285mm, Offizier M41/MC51/M6A2	***Ref. 16659***
6,03x300mm, DSA-58 Carbine/M15A4 URX	***Ref. 16660***
6,03x363mm, M15A4/A2/RIS/ Defender4 Carbine SCAR/CA36K,	***Ref. 16661***
6,03x407mm, SAW	***Ref. 16662***
6,03x433mm, DSA-58 Rifle	***Ref. 16663***
6,03x455mm, AK47/AK47S	***Ref. 16664***
6,03x469mm, Sportmatch/M14 Scout	***Ref. 16665***
6,03x509mm, M15/M14/AUG/CA36/G36	***Ref. 16666***
6,03x550mm, M60/L86A2/FNFAL/RPK7/PSG1	***Ref. 16667***
6,03x650mm, SVD	***Ref. 16668***

Hop-up chamber, M15/M16 series

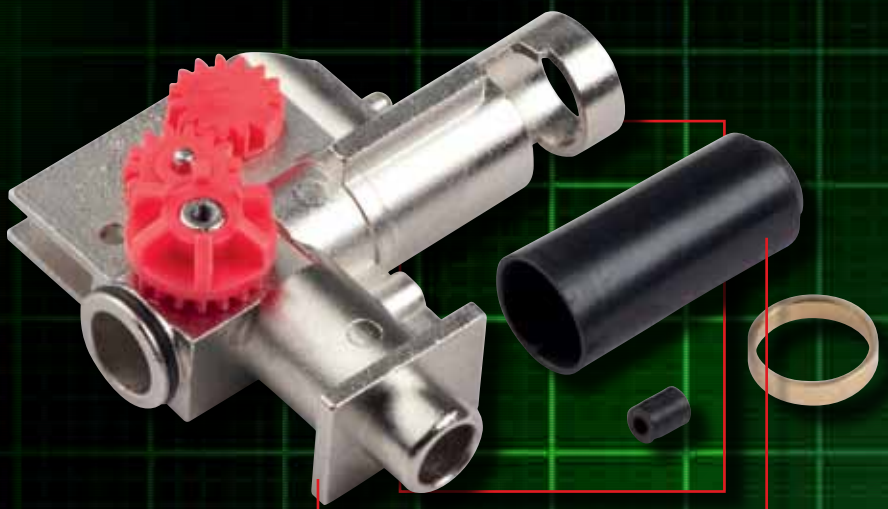
Ref. 16635

Hop-up rubber, 50 degrees

Ref. 16636

Hop-up rubber, 70 degrees

Ref. 16637



ActionSportGames® A/S is a worldwide leader in the business of replica firearms and accessories manufacturing – including Airsoft guns, Airguns, Co2 guns, Paintball markers, toyguns and firearms replicas. We specialize in 1:1 scale replica guns and accessories for fun, action, sports, entertainment and collection. The assortment consists mainly of licensed models and exclusive subbrands of ActionSportGames® A/S. ActionSportGames® A/S was founded in April 2003 as a merger of the two largest Danish distributors of Airsoft Guns and accessories, Pedersen & Grobelnik A/S (founded 1992) and Vestergaard ApS (founded 1960). One of our goals is to become the preferred supplier in the firearms replica business through worldwide license agreements, quality brands and premium service – before, during and after sales.

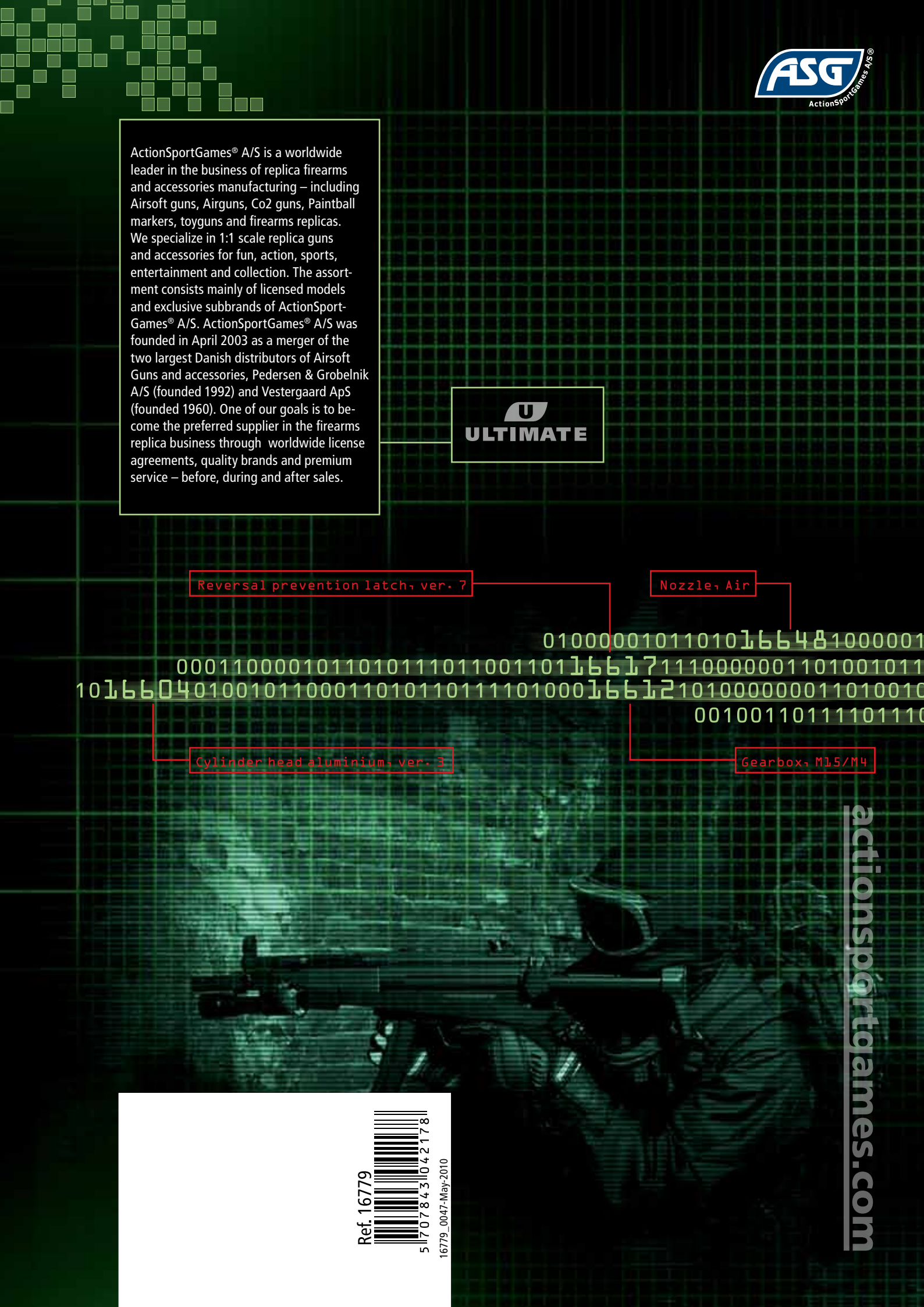
ULTIMATE

Reversal prevention latch, ver. 7

Nozzle, Air

Cylinder head aluminium, ver. 3

Gearbox, M15/M4



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