

LOOKING BACK
- MOVING FORWARD
1954-2004

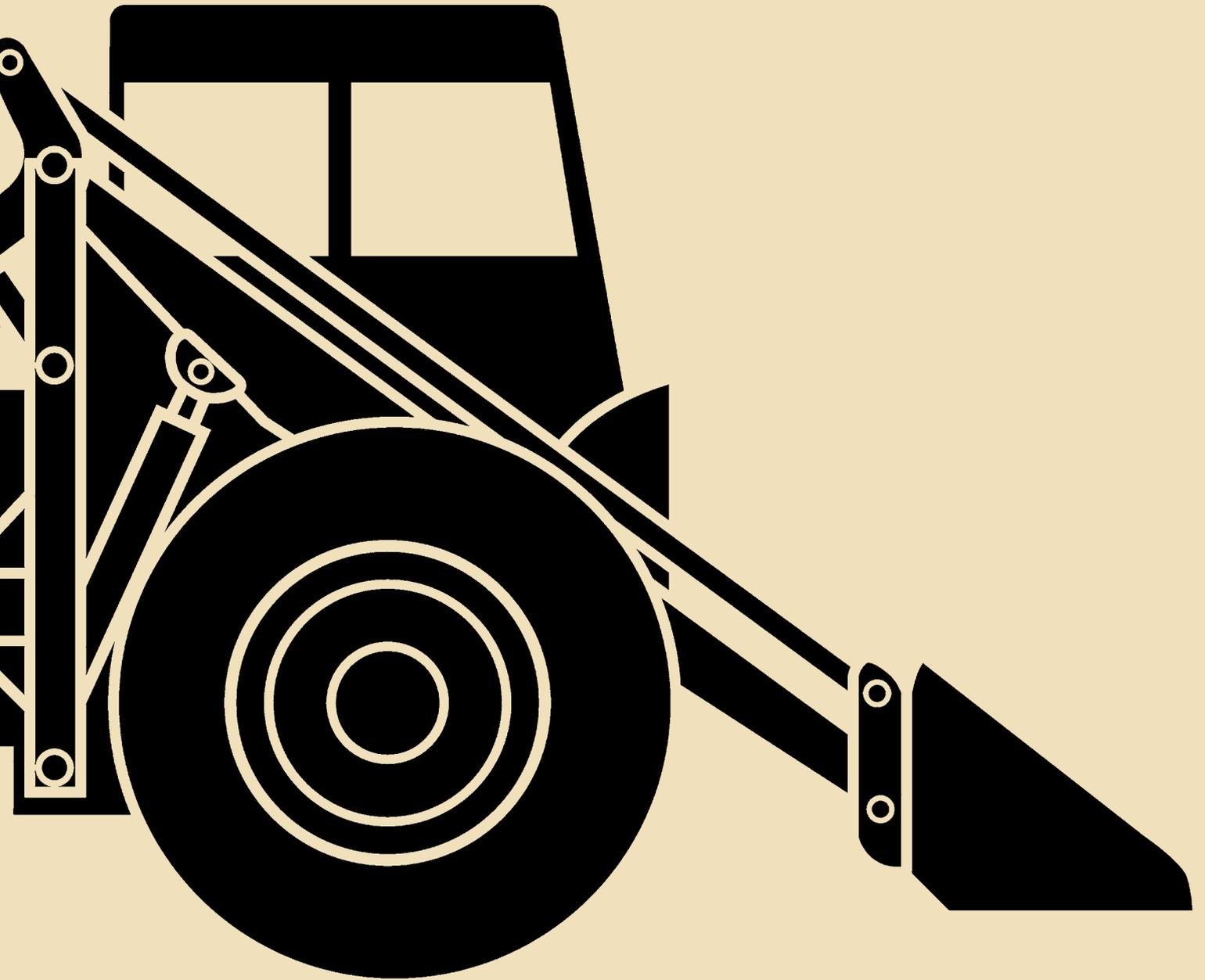
VOLVO

1954 - 2004

50 *years*



VOLVO WHEEL LOADERS



LOOKING BACK – MOVING FORWARD

In 2004, Volvo celebrates 50 years of manufacturing wheel loaders. Over the past 50 years, technological development has been so rapid that things taken for granted today were pure science fiction back then. As late as 1943, IBM's board chairman Thomas Watson said, "I think there is a world market for maybe five computers". Six years later, the magazine *Popular Mechanics* wrote, "in the future, computers do not have to weigh more than 1.5 tons".

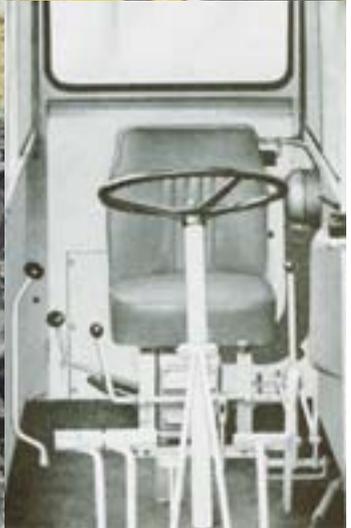
The development of Volvo's wheel loaders may not be quite as sensational

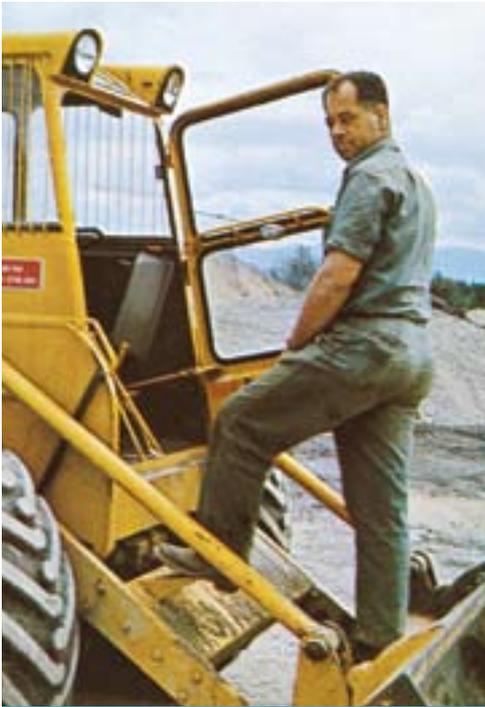
as the computer, but it still contains a long line of pioneering technical innovations that were absolutely impossible to predict in the mid-50s.

It's not only the technological development that has forged ahead in dramatic advances, but also improvements in safety, environment and operator comfort. At Volvo, technological development has always taken place on human terms.

This is the story of how Volvo wheel loaders have developed during their first 50 years.















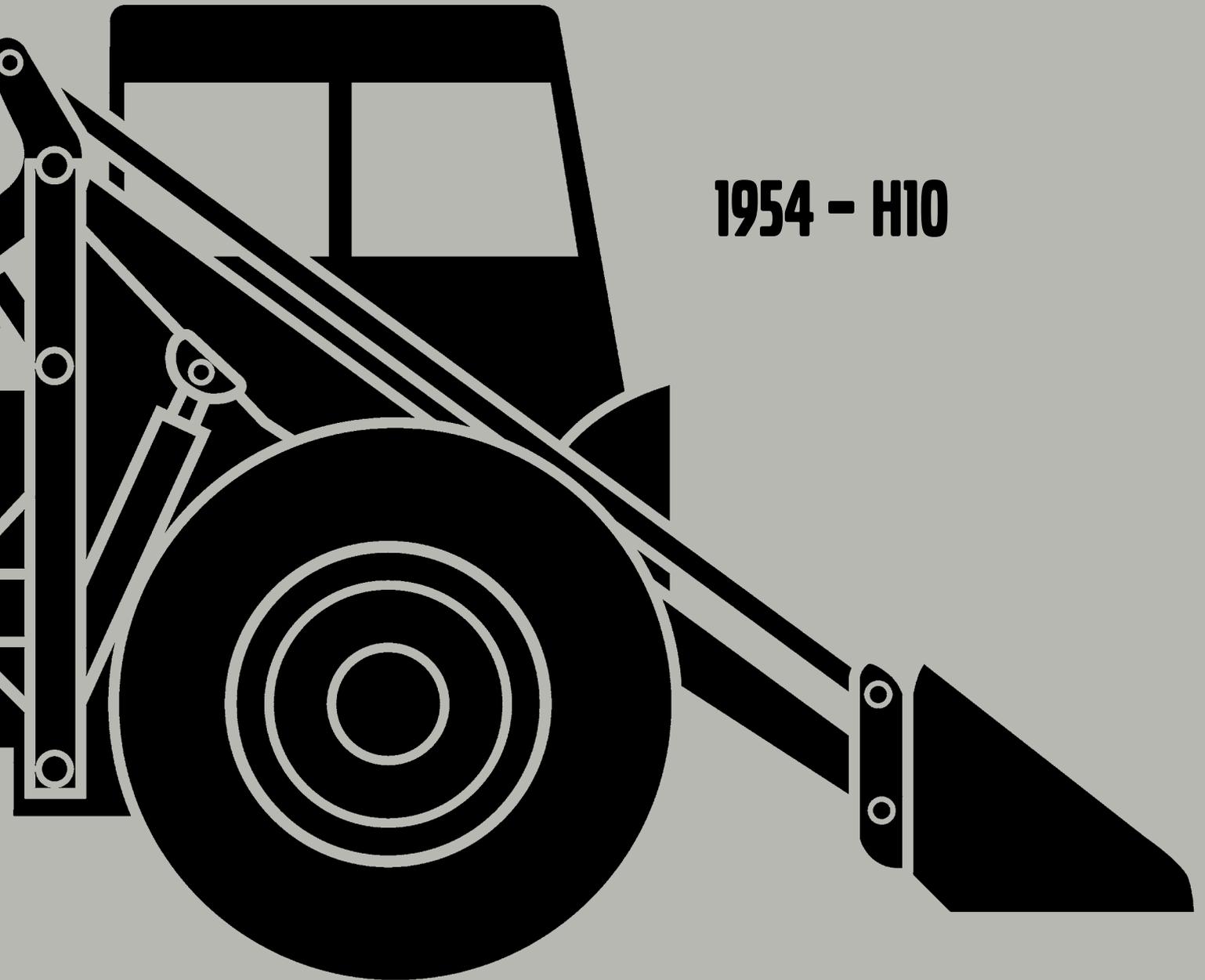
LOOKING BACK

A back-to-front tractor

Development is often about seeing things in different ways, to change perspective instead of heading down already trodden paths or running in old tracks. Sometimes you literally have to turn things back-to-front in order to move forward.

This is exactly what the pioneers at Bröderna Lundbergs Mekaniska and AB Bolinder-Munktell did when they introduced their innovative back-

end loader in 1954. They simply turned an ordinary tractor back-to-front. By placing the loader unit over the bigger wheels, they created possibilities for heavier loads and higher breakout forces than with a front-end tractor-loader. With the ground wheels for steering at the rear, they also got an easy to maneuver machine. The first wheel loader was given the designation H10.



1954 - H10

● Operating weight: 5,1 t (11,245 lb)

● Bucket size: 0,4 m³ (0.5 yd³)

● Engine, rated output: 32 kW (43 hp)

First in the world with attachment bracket and parallel movement

The H10 wheel loader was based on four different agricultural tractors from Bolinder-Munktell (later to become Volvo BM). First out was the BM 35, which later was replaced by the BM 350 Boxer. A larger version was based on the BM 55, which was eventually replaced by the BM 470 Bison. The H10 was a great success. It was the first wheel loader in the world with an attachment bracket and parallel linkage with double-acting lift cylinders. It became the starting point for Volvo Wheel Loaders, the company that has been instrumental in giving Volvo a leading position in the industry today.

A revolution in mechanized loading

Even if the H10 was a simple machine compared to today's wheel loaders, it was somewhat of a revolution when it was launched. With an attachment bracket and parallel linkage, it offered a solution for all applications in a way that is still satisfactory today.

On Fäboda Gärd, a farm located



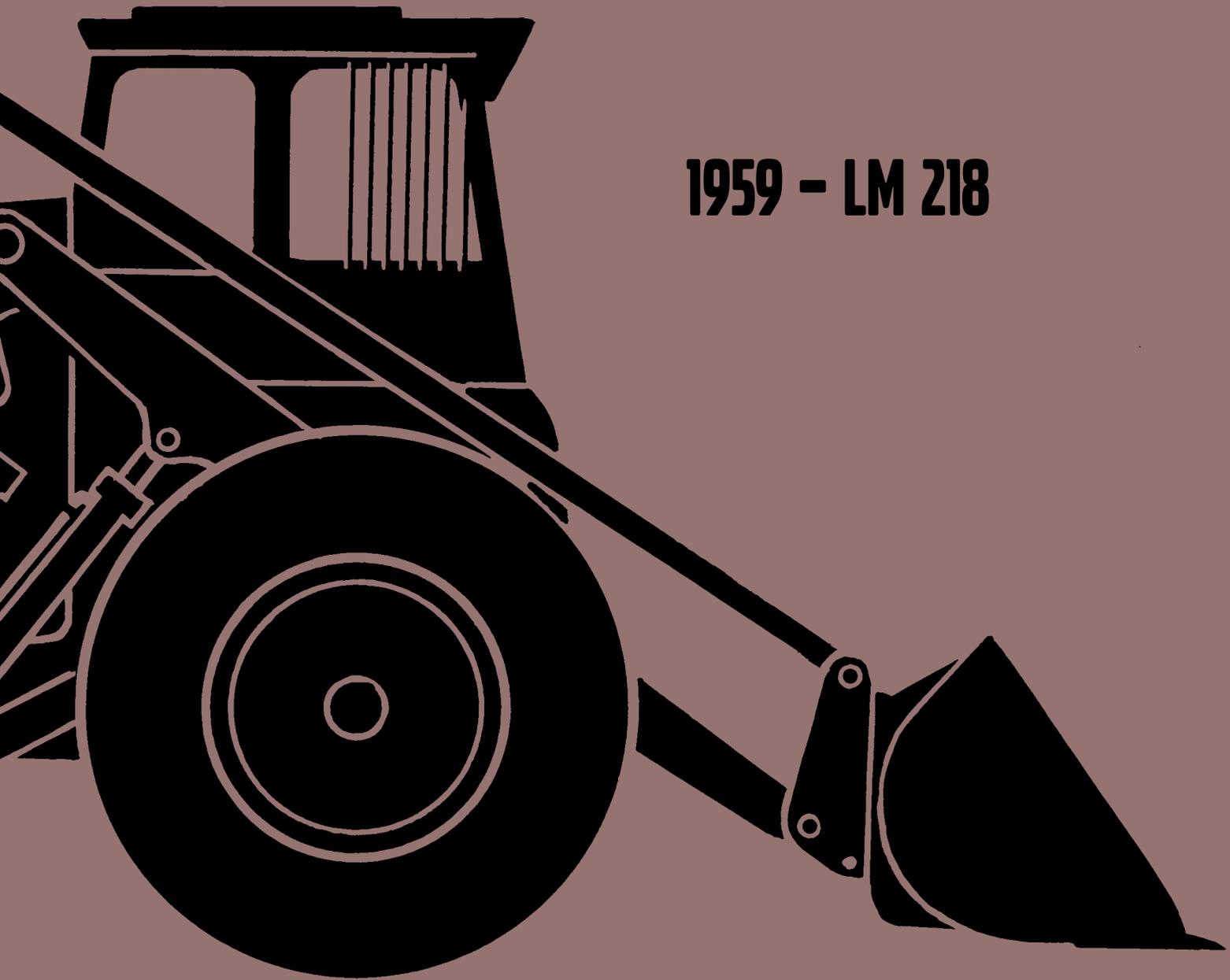
30 kilometres outside of Eskilstuna, Sweden, Arne Larsson still operates an H10, model year 1956.

“It works just perfect”, he says. “It’s great out in the fields because it’s so maneuverable and light. It doesn’t pack the soil. Also, it’s fuel-efficient compared to the heavier machines.”

Arne is the second owner of his H10, which he has used to supplement his larger, modern wheel loader for fifteen years.

“It’s a fantastically safe and reliable machine, not the least when you consider its age.”





1959 - LM 218

● Operating weight: 5,4 t (11,905 lb)

● Bucket size: 0,6 m³ (0.8 yd³)

● Engine, rated output: 42 kW (57 hp)

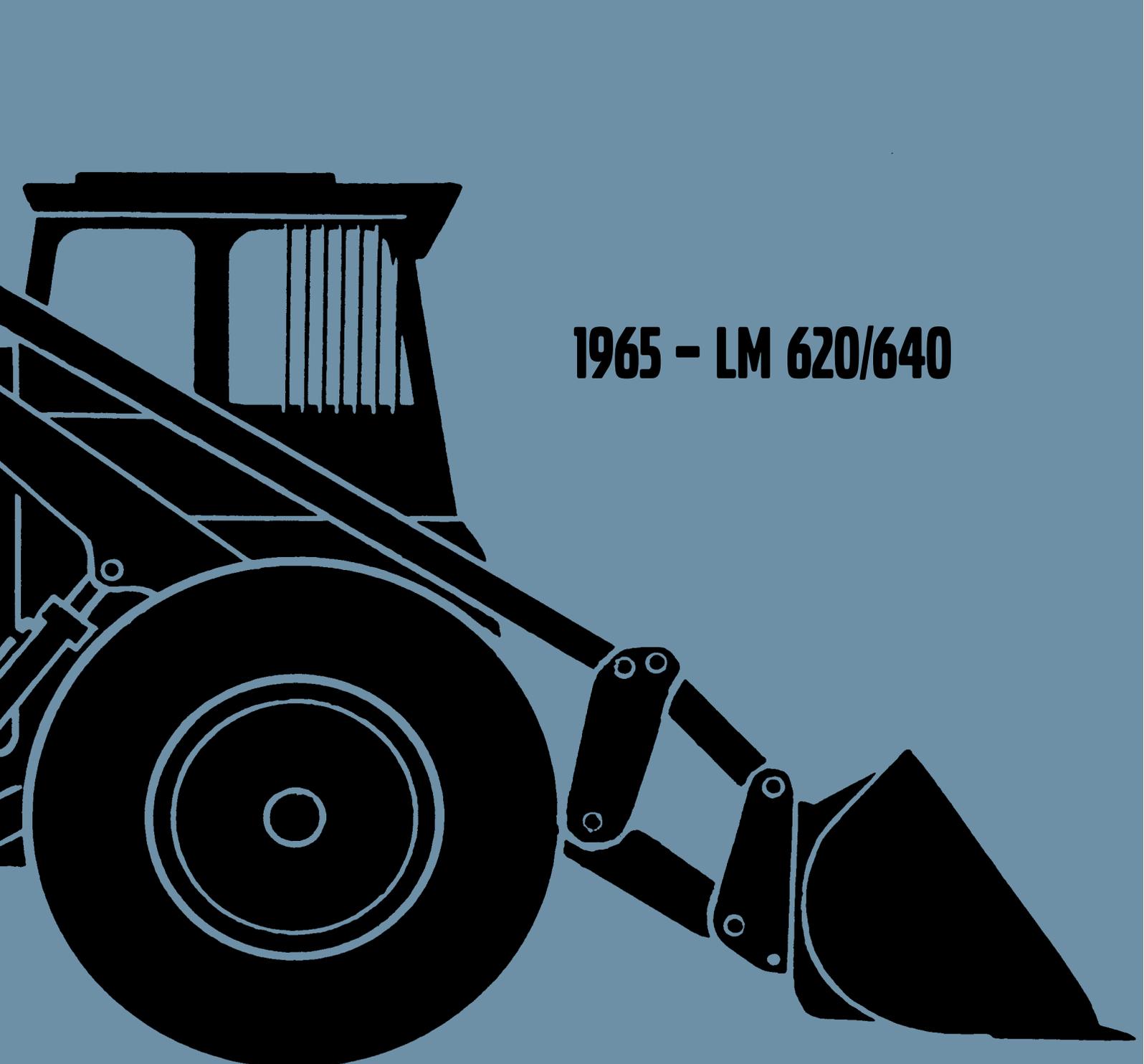
A big step ahead

In 1959, wheel loader history was changed forever. With the introduction of the LM 218, Volvo definitely left the tractor stage once and for all. It was built and designed as a wheel loader from the beginning with a smoother shape, sloping engine hood, bigger counterweight and purpose-built axles and wheels. At the same time, Volvo machines were painted their characteristic yellow color, just like you see today.

First in the world with the all-rounder concept

Due to its expanded range of attachments, the all-rounder concept was born at this time, a concept that Volvo invented. The H10 had already attracted the interest and attention of contractors around the world, and in the early 1960s, Volvo started to penetrate the International market by demonstrating the LM 218 on-site and promoting the all-rounder concept.





1965 - LM 620/640

● Operating weight: 6,3/6,6 t (13,890/14,550 lb)

● Bucket size: 0,7 m³ (0.9 yd³)

● Engine, rated output: 51 kW (69 hp)

Power Shift and four-wheel drive

In 1965 it was time for Volvo's next big step toward the development of today's wheel loaders.

In the 1960s, there was an increased demand for comfort, efficiency and speed. Volvo responded by introducing the LM 620 and LM 640; quick, operator-friendly all-round machines with more powerful engines. They were equipped with a completely new transmission, torque converter and Power Shift gear shifting, which resulted in four speeds in both forward and reverse.

In addition, the LM 640 was Volvo's first wheel loader with four-wheel drive.

Breaking new ground

Major development changes were introduced on the LM 620 and LM 640. These loaders represented Volvo's new way of thinking. Already at this time, Volvo started to systematically work with various market segments and adapting both machines and attachments to different applications.

In 1966, the 10 ton LM 840 was the first wheel loader from Volvo to be equipped with a 6-cylinder diesel



engine. The Volvo motor was rated at 110 horsepower. The LM 642 was the last Volvo wheel loader to use rear wheel steering and it remained in production until 1983.

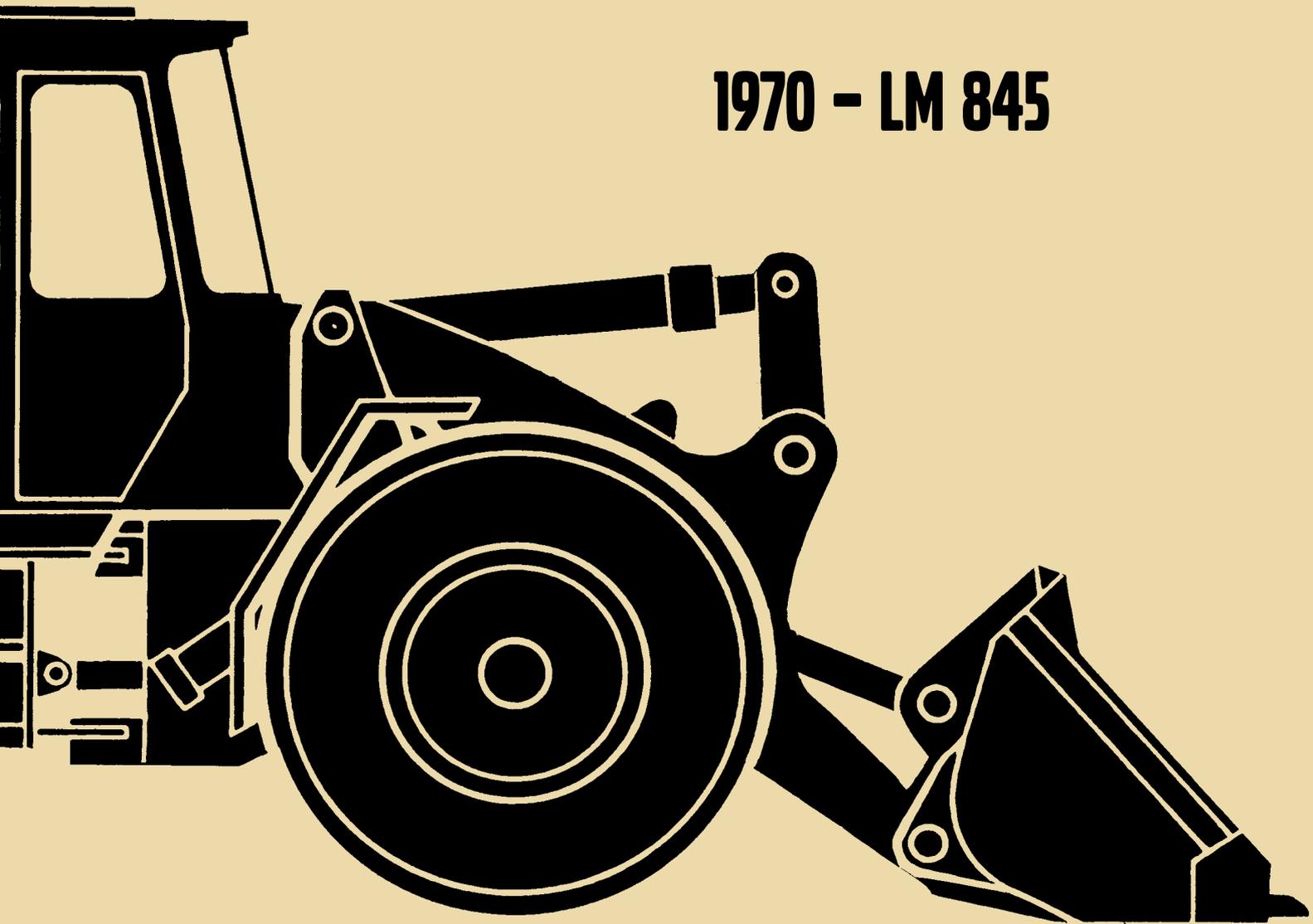
In 1966 Volvo launched their first articulated haulers, which became an important supplement to their wheel loaders. The haulers were manufactured together with Lihnell's Vagns AB, with whom Volvo had signed an agreement with in 1956. Together, the wheel loaders and articulated haulers

made a perfect team on many work sites around the world, thus giving Volvo a solid position in the construction industry.

The world's first hydraulic attachment bracket

In 1969 Volvo introduced a new feature that further solidified the company's position, that being the world's first hydraulically operated attachment bracket.

1970 - LM 845



● Operating weight: 9,4 t (20,725 lb)

● Bucket size: 1,6 m³ (2.1 yd³)

● Engine, rated output: 82 kW (112 hp)



Volvo's first wheel loader with articulated frame steering

With the LM 845, a whole new generation of wheel loaders was launched with articulated steering in the frame. The previous generation, the back-to-front loaders, had now come to an end.

One of the problems with the back-to-front loaders was that the cab door opened forward, which meant the operator could not exit the cab with a load out front. That is why Volvo began developing cabs with the door on the side, increasing both accessibility and safety. At the same time, Volvo

also started to ROPS/FOPS-test the cabs, which further increased safety.

The frame-steered wheel loader had a smaller turning radius, which made it much more effective, especially in tight areas.

A new generation of attachment brackets

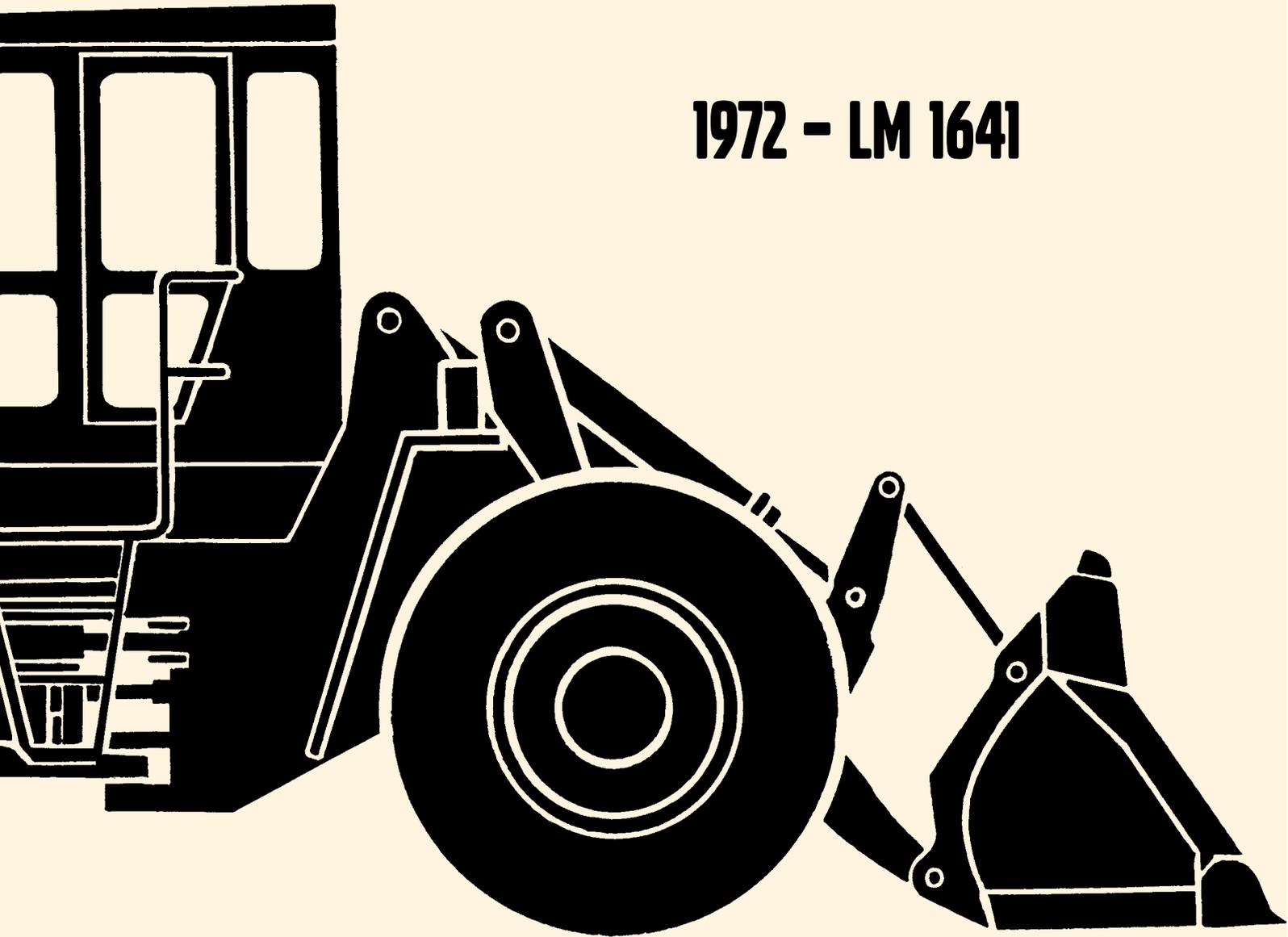
The LM 845 had different sized front and rear wheels. Just like the old back-to-front loaders, it had larger wheels on the front axle to enable lifting and handling of heavier loads. It was equipped with a Z-bar linkage and a whole new generation of attachment



brackets, further easing the operator's work.

In other words, Volvo continued to introduce innovative solutions that benefited both operators and owners.

1972 - LM 1641



● Operating weight: 17,0 t (37,480 lb)

● Bucket size: 3,2 m³ (4.2 yd³)

● Engine, rated output: 177 kW (240 hp)

Increased efficiency and less environmental impact

AB Bolinder-Munktell had been a member of the Volvo group since 1950, and in 1973 the name was changed to the shorter Volvo BM. One year prior was the launch of the LM 1641, the first wheel loader with a direct-injected turbo engine. It made it faster and more powerful, naturally increasing the efficiency of the entire production chain.

Environmental care is and always has been one of Volvo's core values. That is why Volvo's wheel loaders are designed for minimal environmental impact. In 1974, the LM 1641 was equipped with Volvo's low-emission engine, which led to dramatically reduced exhaust emissions.

Shortly after the launch of the LM 1641, its 'little brother', the LM 1240 was introduced on the market. The LM 845 was replaced with the LM 846, now with equal size front and rear wheels.



A boost for log handling

The LM 1641 was also designed as a high-lift version. The possibility to lift heavy loads higher gave productivity a significant boost in log handling, a segment in which Volvo specialized in early on.

Another version of the LM 1641 was specially designed for compacting garbage.

The range of genuine attachments continued to expand, with more and more specially adapted attachments

for different applications. Already at an early stage, Volvo realized the benefits of a machine that could change quickly between various applications.

In 1969 Volvo BM bought the company ASJ Parcas' manufacturing of wheel loaders. Three models were included in the deal, all of which were phased out in 1972. A new project, P16, was also part of the deal, the predecessor to the LM 1641.

“Good experience with Swedish quality machines”

Previously, all three had operated small gravel and rock quarries. They decided to pool their resources to establish a common and larger gravel and rock quarry, managed by Reinhold Wurzer.

The base for all roads

In 1972, about 150 hectares (370 acres) was an impressive area for a rock quarry. Franken-Schotter literally established the “base for all roads”. The Dietfurter limestone has become a well-known product for all categories of contractors and architects. With the most modern equipment, the blocks are carefully handled and further processed in both the company’s own plants in Dietfurt and Petersbuch, Germany, and also in their customers’ plants.

Ten effective wheel loaders

A key part of the operation is Volvo wheel loaders, which are used to load and transport up to 20 ton blocks

from the face to different storage and processing sites. Here you primarily see machines in the 30 to 50 ton size classes. Volvo articulated haulers have been modified for hauling blocks and contribute to trouble-free transport cycles. Powerful and reliable are characteristics used to describe a Volvo L120C operating in the company’s own asphalt mixing plant, dozing mineral substances and loading various sorting hoppers.

Volvo from the beginning

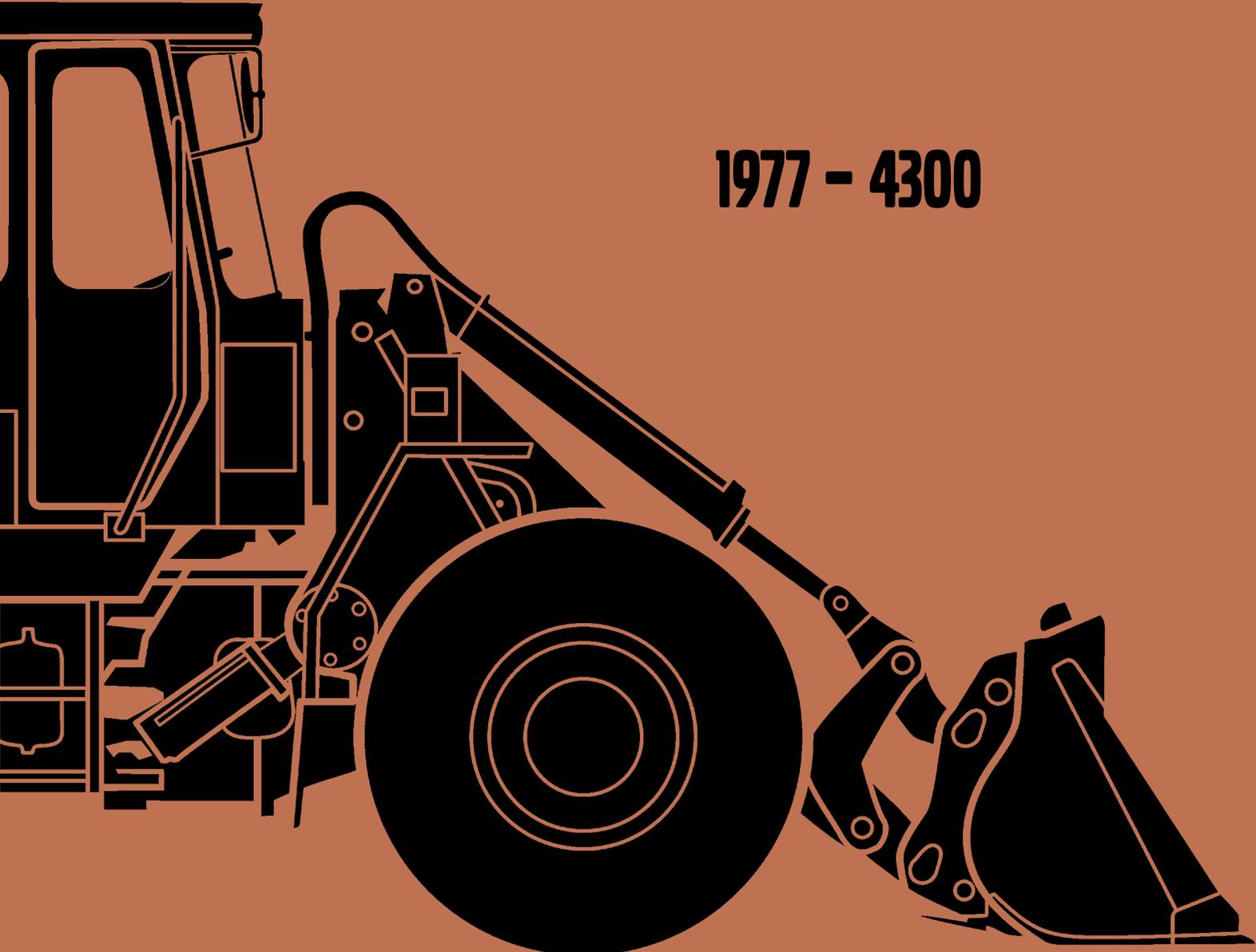
“We have used wheel loaders from Volvo since our start in 1972, and we have had very good experiences with the Swedish quality machines”, emphasizes the factory manager Adolf Kohler. For him it has been completely natural to organize a common event, together with Volvo Construction Equipment Europe GmbH and his local Volvo dealer Robert Aebi GmbH. With the motto “stone and machines”,





invited guests have become convinced of Volvo's quality, performance and functionality.

Visitors have been able to thoroughly inspect wheel loaders, compact machines and Volvo excavators. Members of Volvo's Operators' Club, like Franken-Schotter GmbH, have also been able to show their skills as operators.



1977 - 4300

● Operating weight: 8,6 t (18,960 lb)

● Bucket size: 1,3 m³ (1.7 yd³)

● Engine, rated output: 79 kW (107 hp)

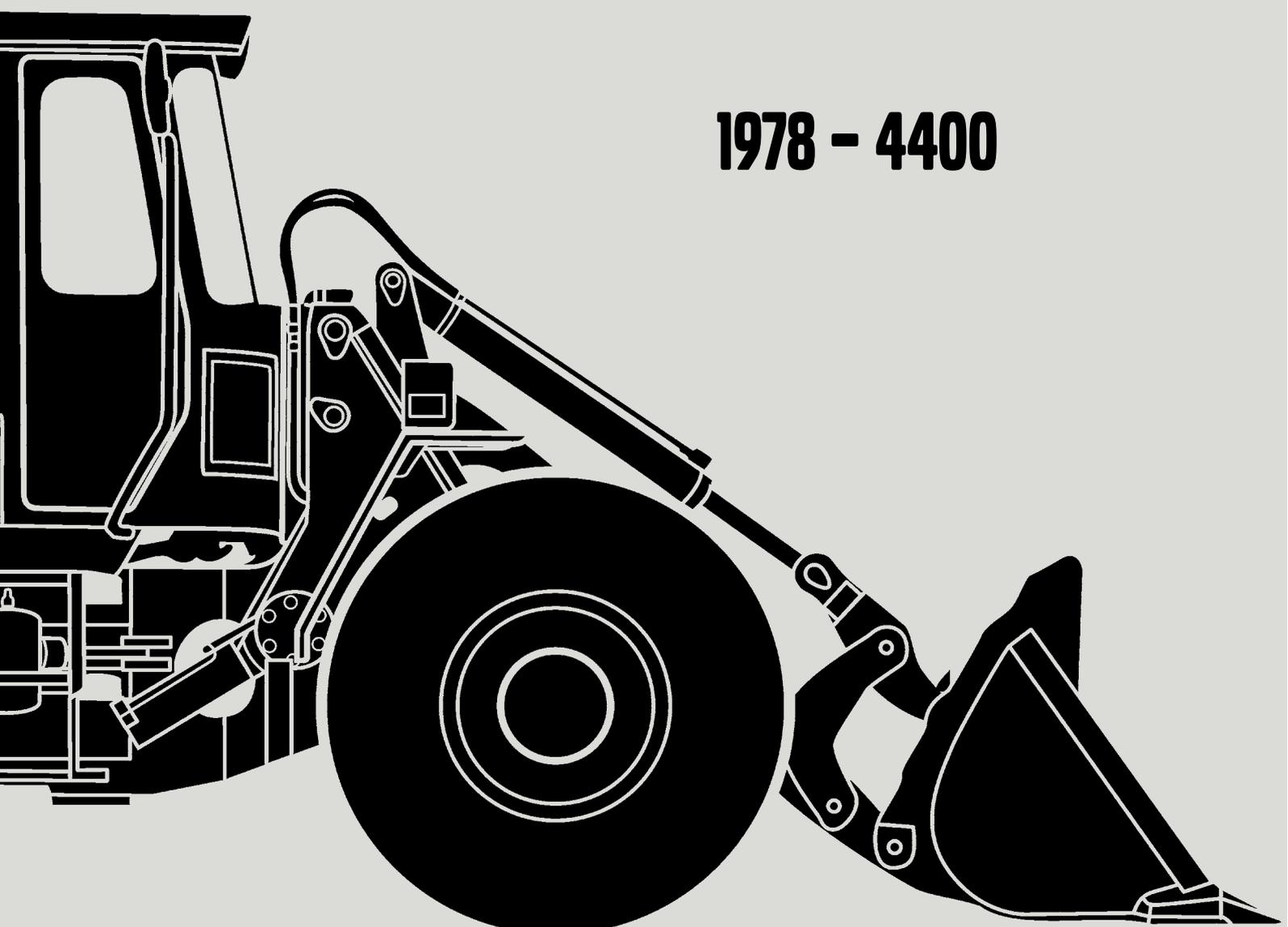


A new generation of wheel loaders - with a completely new lift arm system

With the 4300, Volvo BM introduced a new generation of wheel loaders, the 4000-series. The new wheel loaders included more genuine components from Volvo, for example, the transmission, axles and a completely new lift arm system with parallel movement. This resulted in machines with even higher efficiency because the genuine components worked in perfect harmony together.

A better workplace

With the launch of the 4300, the operator was the winner. Operator comfort was improved considerably and it was at this stage that Volvo established itself as the leader in operator environments. The Volvo 4300 had, among other things, a pressurized cab and integrated air conditioning. Volvo realized that a good workplace was a prerequisite for a satisfied and productive operator.



1978 - 4400

● Operating weight: 11,2 t (24,690 lb)

● Bucket size: 1,9 m³ (2.5 yd³)

● Engine, rated output: 105 kW (143 hp)

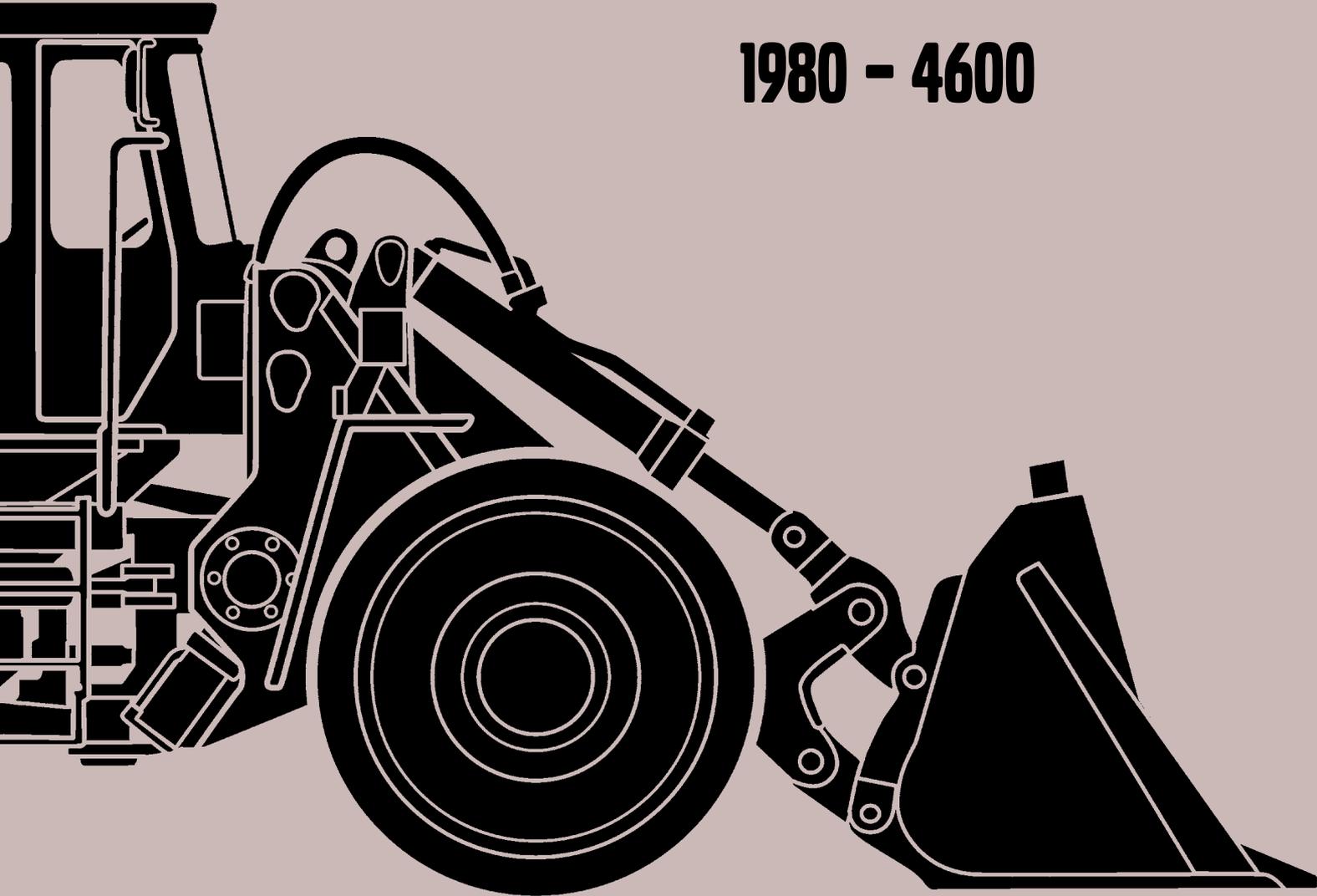
The first wheel loader with a load-sensing steering system

The Volvo 4400 meant another big breakthrough for wheel loader development by both improving the operating experience and increasing productivity. It was the first wheel loader equipped with a load-sensing steering system. With the load-sensing technology, good steering speed was achieved already at low engine speeds. In addition, the new system was a step forward in Volvo's ambition to reduce fuel consumption.

Perfect coordination between the new in-house developed components and the load-sensing steering system made the 4400 one of the most productive wheel loaders on the market. And it's not much of a surprise that it also became the 4000-series' biggest seller.



1980 - 4600



● Operating weight: 21,1 t (46,520 lb)

● Bucket size: 3,8 m³ (5.0 yd³)

● Engine, rated output: 186 kW (252 hp)

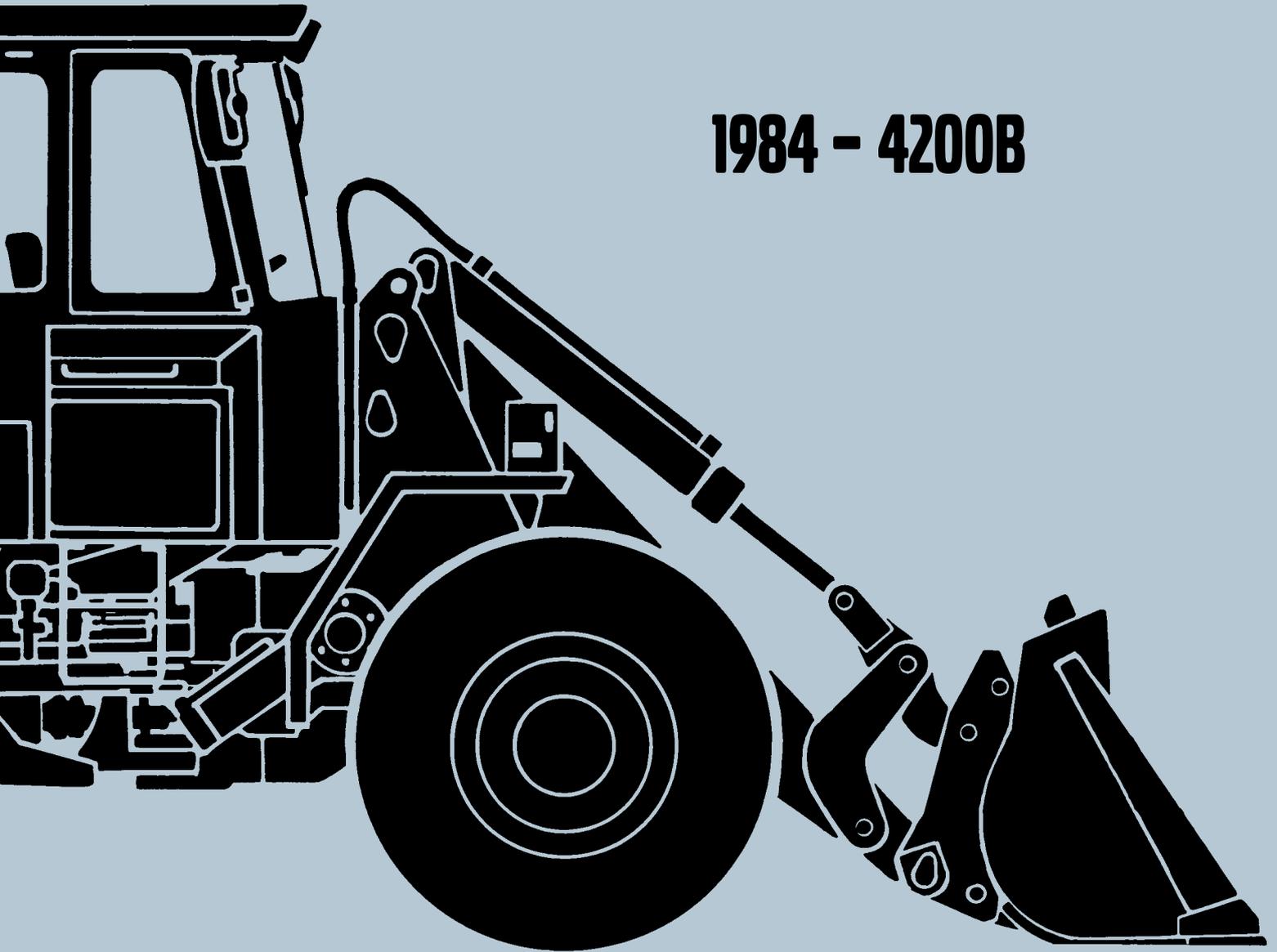
Optimal productivity in all operating conditions

With the launch of the Volvo 4600 in 1980, Volvo BM had introduced a complete family of wheel loaders in the new generation from 8,5 to 21,5 tons.

In 1981, Volvo was the first in the world with the Automatic Power Shift (APS) gear shifting system in its 4300, 4400, and 4500 wheel loaders. The automatic shifting system made the operator's job easier because the loader always worked in the correct gear. This gave Volvo's wheel loaders optimal productivity during all operating conditions.



1984 - 4200B





New cab and hydraulic brakes

The 4200B came with a new cab to improve the operator's environment and safety in several ways. All-round visibility improved, the noise level was reduced, instruments were easier to read and controls were easier to operate. The 4200B provided the operator with a safe and comfortable workplace.

The new cab also had an entry door that hinged at the front. This made it even easier and safer to enter and exit the machine.

Another new important feature on the 4200B was fully hydraulic brakes, which improved stopping forces for increased safety.

Service-friendly

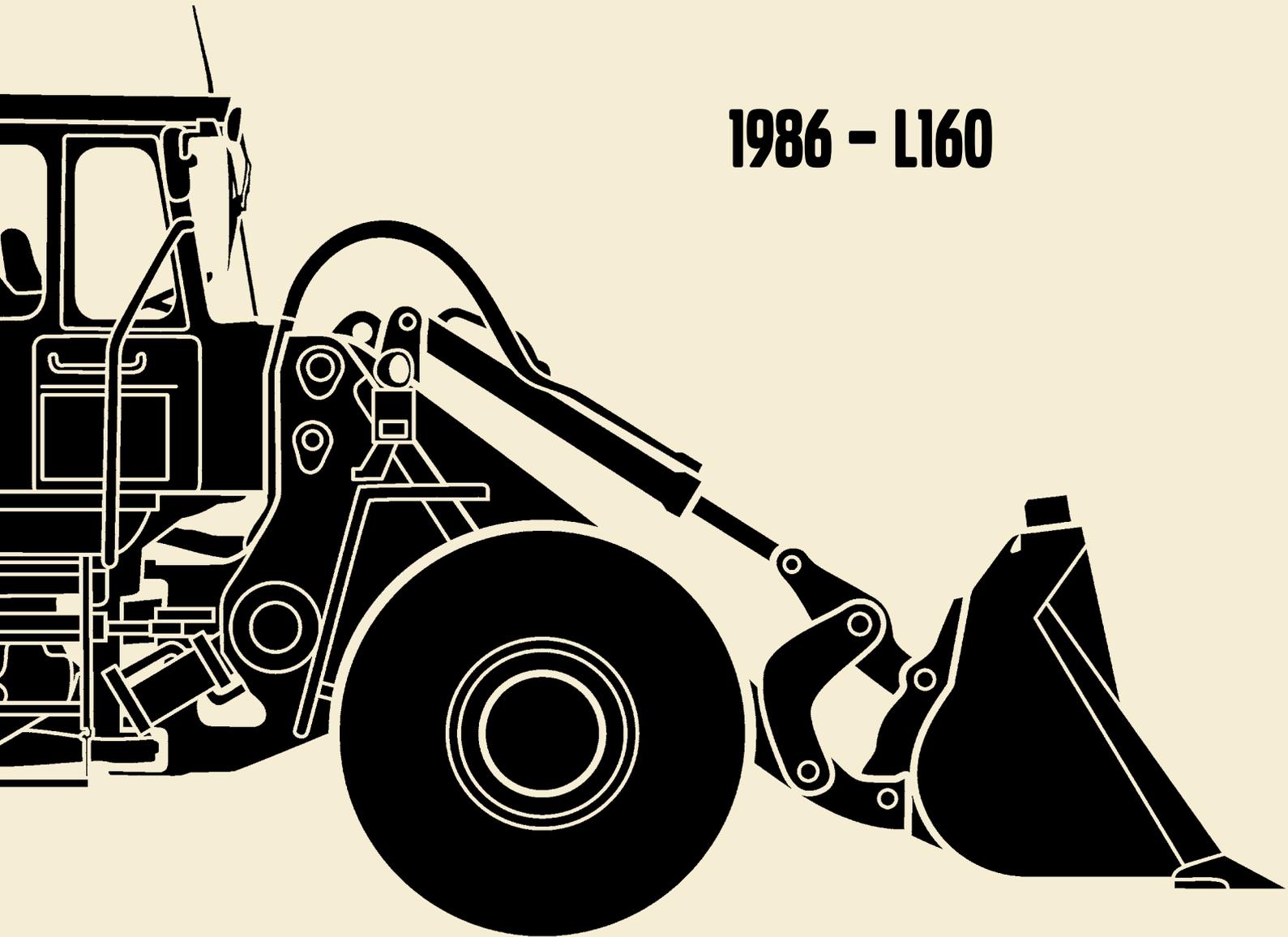
With every model, Volvo strives toward improving serviceability. Few machines work as hard and in such tough operating conditions as wheel loaders. The machine has to be able to handle all demands put on it, day in and day out, without any unplanned downtime. This requires certain daily

inspections and service, and the simpler the work, the more likely it will get done.

For example, on the 4200B, Volvo introduced the swing-out radiator, increasing accessibility and facilitating daily service.

This year the 4600B got a completely new transmission, HT200, with increased shifting comfort. At this point, all Volvo loaders were equipped with in-house manufactured drivetrains.

1986 - L160



● Operating weight: 21,9 t (48,280 lb)

● Bucket size: 3,8–12,0 m³ (5.0–15.7 yd³)

● Engine, rated output: 194 kW (264 hp)

Important changes

By the end of the 1970s, Volvo started to focus more heavily on its core business. Tractor manufacturing ended and the business was concentrated on construction equipment. In 1985, Volvo BM became part owner of the VME Group, which was divided equally between Volvo and Clark. With this joint venture, the American market opened up for Volvo in a whole new way.

In 1986, Volvo launched the first wheel loader with the “L” designation type that still remains today – the L160. “L” simply means loader and the number indicates the approximate full turn tip load, in this case 16 tons. The same year also saw the introduction of the L120, L90, L70 and L50. In 1987, the series was supplemented with the L30, Volvo’s smallest wheel loader, which was in production until 1995.

Volvo wheel loaders entered a new age, which with a number of pioneering innovations, gave us the modern wheel loader.

Comfort Drive Control spares the operator

Volvo has always developed its wheel loaders on human terms, and the most important thing in the machine has always been the operator. Already in the 1970s, Volvo was a leader in operator environment and comfort – a position that we still maintain even today.

From 1988, Volvo wheel loaders introduced the optional equipment, Comfort Drive Control (CDC) lever steering. CDC significantly reduces repeated steering wheel movements that fatigue operators and strain the shoulders and neck. With CDC, the operator can quickly and comfortably operate the machine with integrated controls in the left armrest.

Boom Suspension System for increased productivity

1990 saw the next new feature that made it possible to operate faster, more efficiently and with greater comfort, Boom Suspension System (BSS). It was designed to dampen shocks and



eliminate rocking, both of which occur when operating on uneven ground. The Boom Suspension System gives faster cycle times, less spillage and improved operator comfort.

“No trouble with Volvo”

Johnny Odell knows equipment. For over 20 years, he worked at a Cat dealership in product support. Then he worked for several contractors, finally joining J.C. Evans Construction Company of Austin, Texas in 1993 as its Equipment Manager. Today, he is the Vice President of Equipment, overseeing a fleet of over 200 pieces of iron worth in excess of \$15 million.

Begun in 1955 by J.C. Evans, today the company is a full-service construction firm, ranked among the nation's 400 largest construction companies. In 1989, Blake Kuhlman, the chief financial officer, took over management and successfully transitioned the company from family to employee ownership, while modernizing and expanding the business. The corporate commitment to be the “Company of Choice” for their customers, suppliers, subcontractors, designers, and

employees means everyone has a real stake in both the quality of the work and the financial well-being of the company.

100 percent Volvo

“We had both Volvo wheel loaders and a competitor brand when I first came”, says Odell. “We started keeping records on operating costs. The Volvos consistently cost less to operate. So now, we are 100 percent Volvo when it comes to wheel loaders.”

One hundred percent means 28 of them, ranging from the L70 up to the L120.

Actually, the company owns a total of 40 Volvos – including nine articulated dump trucks and three excavators. This makes their articulated fleet 100 percent Volvo, and it is possible the excavator fleet could go the same way. The three excavators were purchased at the beginning of 2003.

Should they continue to perform as well as they have to date, Odell will probably purchase more Volvo excavators in the future.

No reason to change

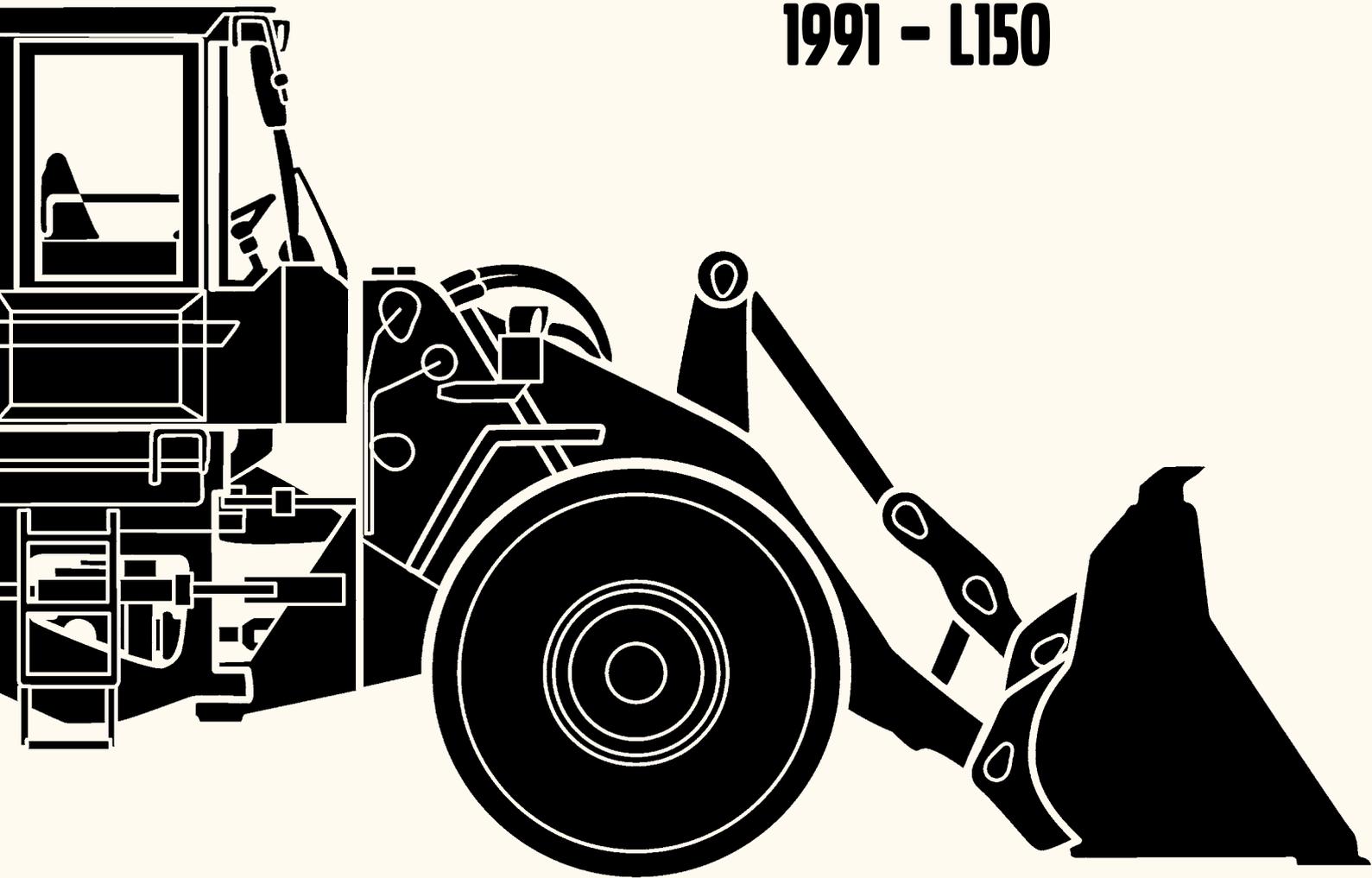
The irony of a former Cat man switching to Volvo is not lost on Odell. But the service records, combined with the obvious preference of the operators for Volvo, and the support that ROMCO Equipment, their local Volvo dealer has given them, provide compelling reasons for the switch.

“Every time we buy new wheel loaders, we'll have other dealers come out and demo their latest. But Volvo operating costs are lower, fuel consumption is lower, and I cannot think of a single major component failure. They are very dependable. The operators really like them. They have good visibility, they are smooth and power-

ful, and seem to be better balanced than most. And their resale value is good. We have no trouble with Volvo and, everyone is happy with them. I see no reason to change.”



1991 - L150



● Operating weight: 20,6–25,4 t (45,415–56,000 lb)

● Bucket size: 3,5–12 m³ (4.6–15.7 yd³)

● Engine, rated output: 187 kW (231 hp)

Nothing less than a revolution

The L150 was a breakthrough for Volvo Wheel Loaders and cannot be considered as anything but a revolution. Many of the features that are characteristic for Volvo today were launched on the L150, for example, the lift arm system Torque Parallel (TP) linkage and the Volvo Care Cab. The L150 had new frames, new transmission and new Volvo axles with outboard mounted, fully hydraulically operated disc brakes with circulation oil cooling, designed for long life and effective, smooth and comfortable braking.

Man and machine in perfect harmony

During the 1990s, Volvo put a lot of work and development into creating perfect harmony between operator and machine because a comfortable operator means a cost-effective and productive wheel loader. All machine systems were perfectly matched to each other, resulting in a perfect combination of performance and operating pleasure.

Superior breakout torque with TP-linkage - two machines in one

Already in 1991 Volvo introduced its patented, unique and innovative lift

arm system TP-linkage. Where other manufacturers need two different lift arm systems, Volvo only needs one system. The TP-linkage combines the advantages of the Z-bar linkage with those of the parallel linkage, resulting in a very flexible loader. The TP-linkage has a high breakout torque throughout the entire lifting range and superior control of the attachment in all positions. The operator can simply and effectively handle heavy materials with full power in the whole working range. It is no exaggeration to say that there is still no other lift arm system on the market today with the same even and high breakout torque.

Care Cab and Contronic monitoring system

With the L150 Volvo launched the new Care Cab. With improved cab climate, effective air conditioning, highly visible instruments, easy to operate controls and a wide range of operator seats with individual adjustment possibilities, Care Cab further solidified Volvo's leading position in operator environment and cab comfort. At this time, Volvo also introduced the first version of the electronic monitoring system Contronic, giving the operator a complete view over the machine's



various operating conditions, including temperatures, pressures and service information.

Compact loaders since the 1950s

1991 was also the year that Volvo bought the German company Zettelmeyer, which had already been manufacturing compact wheel loaders since the early 1950s. Their long history and experience in the European market proved key to the continued development of Volvo's product offering.

Load-sensing hydraulics

In 1992 the L50B was launched as the first Volvo wheel loader with load-sensing hydraulics. The LS-hydraulic system delivers the exact amount of oil required for each function. This gave the operator precise control over the attachment and load, even at low engine rpm's. The state-of-the-art system was a natural progression toward achieving Volvo's ambition to further reduce fuel consumption.

1995 - L330C



● Operating weight: 46,9–51,4 t (103,320–113,320 lb) ● Bucket size: 6,1–12,7 m³ (8.0–16.6 yd³) ● Engine, rated output: 366 kW (498 hp)

Volvo Construction Equipment is founded

In 1995 Volvo purchased Clark's shares in VME and founded Volvo Construction Equipment.

That same year saw the launch of the wheel loaders' C-series, which among other things included the first L330.

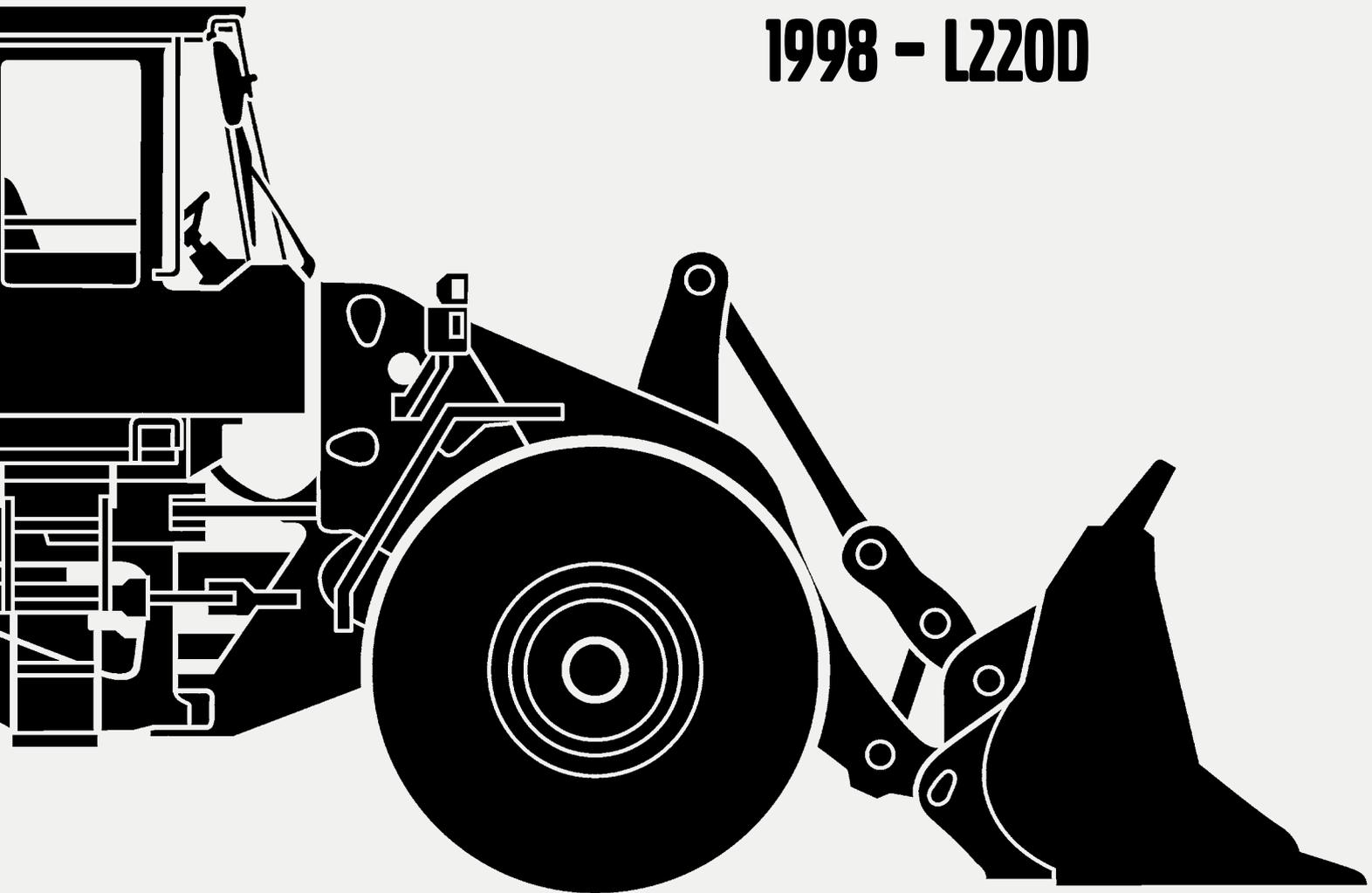
APS reduces fuel consumption

In 1995 Volvo also introduced the second generation automatic power shift gear shifting system, making it is possible for the operator to select four different operating modes for optimal performance and minimal fuel consumption.

Volvo's in-house developed counter shaft transmissions provided the smoothest shifting possible. The operator only has to select forward, reverse or kick-down. APS will always select the right gear depending on engine rpm, machine speed and selected operating mode. This allows the machine to achieve high performance while consuming less fuel in a wide range of operating conditions.



1998 - L220D



● Operating weight: 29,5-33 t (65,040-72,750 lb) ● Bucket size: 4,5-14 m³ (5.9-18.3 yd³) ● Engine, rated output: 257 kW (349 hp)

The first 30-ton loader

The D-series was launched in 1998, a series that in many ways was a natural development and improvement over the C-series. Operator environment and cab comfort were further enhanced with the second generation Care Cab and Contronic monitoring system.

With the L220D – the first machine in the D-series – Volvo also entered a new size class. Two years later the D-series was complete.

A clean, safe and quiet workplace

Care Cab is an ergonomically designed operator's station where everyone can sit comfortably, regardless of size and weight.

It is one of the quietest cabs on the market due to its innovative rubber mounting and effective sound insulation.

All incoming air is filtered through two filters, making it cleanest cab environment on the market. The air first passes through a pre-filter and is then continuously cleaned by repeated circulation through the main filter.

It is an industry unique design solution that gives the cab extremely clean air. Add to this the effective air conditioning, and the cab temperature is comfortable throughout the year, regardless of the temperature outside. With a good cab climate, the operator can stay sharp and work effectively from early morning to late night.

In the same time period, a hydrostatically driven, electronically-controlled cooling fan was also introduced, only working on demand and resulting in significant fuel savings.

The operator has complete control

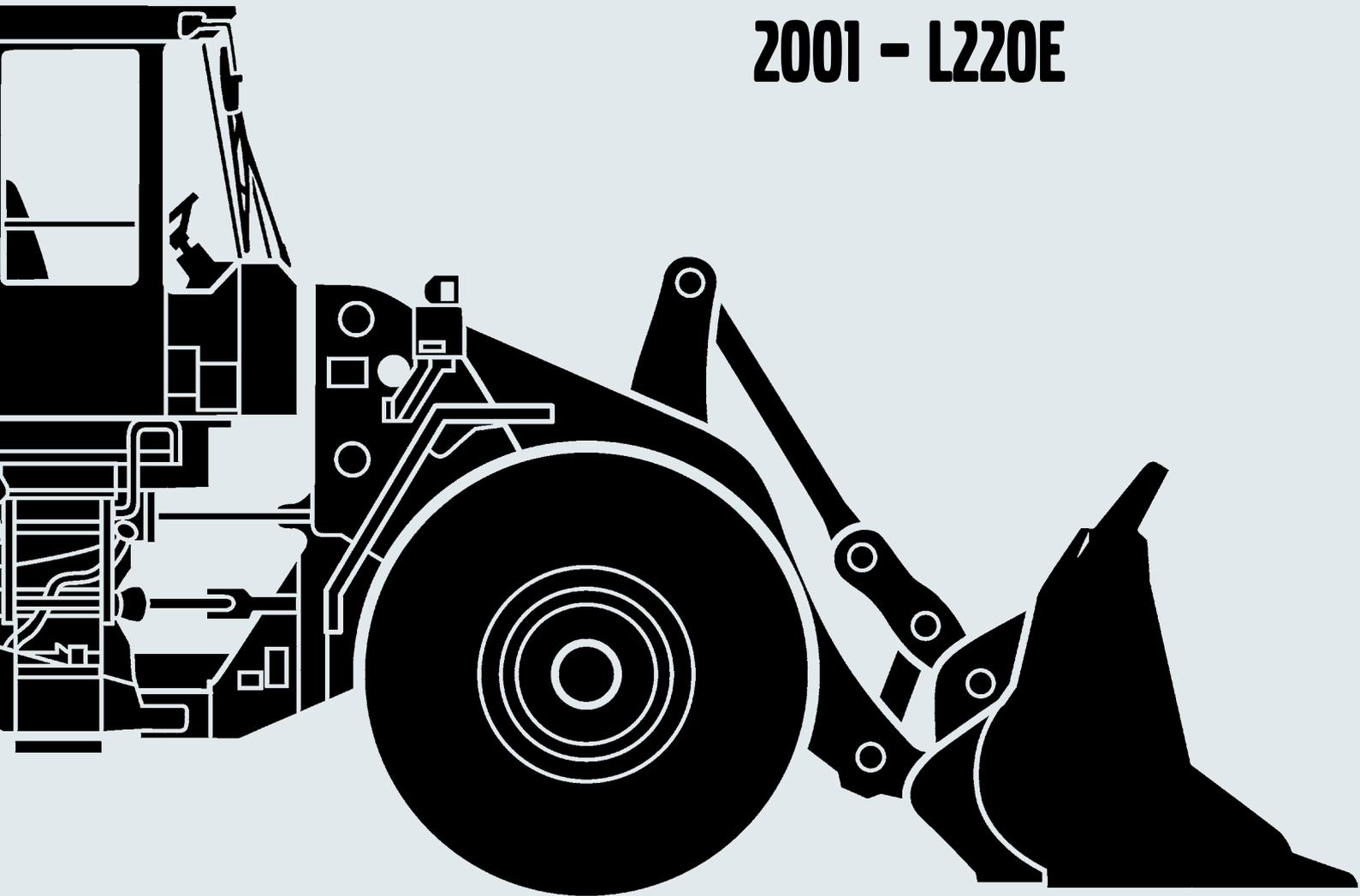
Contronic is a superior monitoring system, which increases operating reliability and productivity, while at the same time, increasing the operator's peace of mind and safety. With Contronic, the operator has complete control of the machine in real-time.

All operating data is stored and can be used to analyze how the machine is working. The information can be presented with the MATRIS analysis program, which gives valuable



information for troubleshooting and service actions. And with the programming tool VCADSPRO, it is also possible to check and adjust engine functions and performance.

2001 - L220E



● Operating weight: 31–33 t (68,340–72,750 lb)

● Bucket size: 4,5–14 m³ (5.9–18.3 yd³)

● Engine, rated output: 259 kW (352 hp)

Relax and produce more

Only a year into the new millennium, Volvo launched the E-series wheel loaders that combined high productivity with pure operating joy.

Volvo wheel loaders were already known for high productivity and low fuel consumption, and with the E-series, Volvo took another step toward solidifying this reputation. The perfect coordination between the in-house developed engines, drivetrains, hydraulic system and patented lift arm system, make it possible to both relax and produce more, a philosophy that helped establish the E-series as the market's most productive wheel loaders for the lowest possible cost.

The E-series offers both effective production loaders that can handle the toughest applications like rock loading and flexible all-rounders that can quickly and easily adapt to all types of job conditions utilizing the hydraulic attachment bracket and Volvo's wide range of diverse attachments.



Minimal environmental impact

Environmental care has always been one of Volvo's core values, and a natural part of the business. Volvo wheel loaders are designed, down to the last detail, for minimal environmental impact. With the E-series, Volvo also launched their in-house developed electronically controlled diesel engines, developed for high performance and low emissions, fulfilling all current emission standards in the US and Europe. Furthermore, up to 95 percent of all materials used in the E-series' wheel loaders can be recycled.

E-series complete

2003 saw the introduction of two new Volvo loader models, the L60E and L110E, to fill the gaps. And this year, the E-series becomes complete with the release of the L50E.

Naturally, development will continue in 2004. One example is Volvo's third generation automatic power shift gear shifting system with further enhancements for better comfort and increased performance.





MOVING FORWARD

In the introduction of this book, we noted that technological development is constantly evolving, making it impossible to imagine 50 years ago what a wheel loader would look like today. That is why it is incredibly interesting to imagine what wheel loaders will look like in 2054.

Can the improvements really be just as profound? For example, can the differences be as great between the machines of today and the future

as they are between the H10 and L180E?

We at Volvo Wheel Loaders believe it will be so. Even if we are extremely proud of our machines, we constantly strive toward improvement, making them even more effective, more environmentally friendly and safer. That is why we continue to move forward, learning from our past and looking toward the future.



If you want to know more about our history, visit www.volvoce.com.

VOLVO

Construction Equipment

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