

Ferguson Furrows

Issue 56 June 2012



FERGUSON'S, SNO-CATS, WEASELS, AND A MUSKEG

Part 1 - Preparations

Vehicles of the 1955-58 Commonwealth Trans-Antarctic Expedition (CTAE)

FENA: the interest group of choice for North America's Ferguson owners, collectors, restorers and enthusiasts.

The Almost Forgotten Fergie

We are especially excited about this and our next issue in being able to obtain so much good information and great photos to bring you an in-depth report on the Hillary Trans-Antarctic Expedition. It all started when David Lory sent us a list of tractors that had been ordered from Universal Hobbies promotion last fall. On the list was a "Sue." "What's a Sue?" we all asked him and were reminded that it was one of the first Ferguson tractors to go with Hillary to the South Pole. David knew UH had made the model a few years ago so had ordered one as part of the promotion.

This gave me the idea, that I passed by him and Nigel Breach of Universal Hobbies. How about an in-depth article on the expedition and have UH feature the "Sue" model in their ad with us this issue? Nigel agreed and David warmed to the idea and was soon sending me all sorts of photos and correspondence he was receiving in his pursuit of information for an article. We began discussing space and layout and decided to give the photos and information the best presentation possible. We would make it a two part article.

I have tried over the last few issues to keep the back cover for old advertisements. So I asked him to see what he could find on the expedition. He found and purchased the ad on our back cover of this issue. But right off we knew something was wrong with the dates. Then we realized that this was talking about a different Fergie and a different expedition. One that had come before Hillary's.

So while David continued working on his article, I went in pursuit of information on this little Fergie.

This little Fergie didn't make it to the South Pole, but it did get to Antarctica before the other Fergusons. It was purchased for the Australian Antarctic Expedition to Mac Robertson Land, led by Phillip Law, in 1954. After quite a harrowing trip on the Kista Dan, they finally reached their destination and established Mawson station in honor of Sir Douglas Mawson, an Australian Antarctic pioneer.

Now if one of us had been making this expedition, I'm sure our little Fergie would have gotten a lot of coverage. But to this expedition it seems to have been brought along as just another tool. In fact the 3 Weasels that were brought along to transport their supplies, etc., got more coverage. The tractor is only mentioned twice in Phillip Law's journal. First, in the list of items brought on the expedition, as a light Ferguson tractor fitted with special tracks. Later in the journal, it mentions the tractor being returned to Australia, its work finished.

Still, this little Fergie did the job he was brought for. Leveling the rocky terrain and doing the work of building their prefab huts. The design of the first



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Lowe, George, 1924-

One of the huts demounted and being packed for transport to Mawson station, Heard Island, Antarctica, 1955

huts being such that they needed the land as level as possible. Toward the end of the first year, they brought in a differently designed hut that didn't need such a level surface, and the tractor was returned to Australia. But as you can see from the report by John Russell, the A.N.A.R.E. Engineer on the project, it "worked for 565 hours," "outside without any weather protection," "giving no trouble at all," as it helped with almost every job on the station - hauling, stacking, leveling, lifting, providing light and winching. It even helped in hauling upright the 90ft.



Landing stores at Mawson

Tractor winching up sledge carrying 15KVA engine. Mawson, Antarctica/in Australia in the Antarctic

Digital order no. [a1864012]



Tractor fork-lift hoists roof onto aluminum hut. Mawson, Antarctica/in Australia in the Antarctic

Digital order no. [a1864013]

sectional steel radio mast. Wow, what a recommendation for the local Australia Ferguson dealers at that time, to help them sell Fergies!

A lot of very interesting information, photos, and even film have come out of the research into this story and David's article on the Hillary expedition. So much so, that we have put his into two issues. We hope you will enjoy these articles as much as we have enjoyed researching them.

One of David's sources, Joseph MacDowall, has even contributed his book *On Floating Ice - Two Years on an Antarctic Ice-shelf South of 75°S*, for our EXPO Auction.

For my story I wish to thank the following for their cooperation in allowing us to use this material.

•Jessica Fitzpatrick, Media Production, and Jonathan Davis, Image Library Coordinator Australian Antarctic Division.



1A26058 Ferguson tractor towing sledge on fast ice of Horseshoe Harbor, Mawson, 1955

Photograph by Patrick Albion, Australian Antarctic Division, Copy-

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3978D3 Erecting Cosray hut, Mawson, February 1955

Photograph by Phillip Law, Australian Antarctic Division, Copyright

- Damian Cole, Reference Librarian, Pictures and Manuscripts Branch, National Library of Australia
- Kevin Leamon, Copyright & Permissions, State Library of New South Wales

For those of you with computers, more information on the station at Mawson and our little Fergie can be found at:

- www.fofh.co.uk/articles/pole.htm - The Worst Journey in the World
- <http://www.jstor.org/discover/10.2307/1791058> The Australian Antarctic Expedition to Mac-Robertson Land, 1954, Phillip Law's Journal
- www.antarctica.gov.au/about-antarctica/history/stations/mawson/biscoe-hut-1954/architecture-construction-uses The Australian National Antarctic Research Expeditions
- <http://aso.gov.au/titles/documentaries/antarctic-voyage/notes/> Australia's National Sound and Film Archive - Curator's Notes by Paul Byrnes. Be sure to check out the film **Blue Ice**.



4376B5 Crate stamped Lister. This would contain a Lister engine for generator use, Mawson, 1956

Photograph by Phillip Law, Australian Antarctic Division, Copyright

FERGUSON'S, SNO-CATS, WEASELS, AND A MUSKEG Part 1 - Preparations

Vehicles of the 1955-58 Commonwealth Trans-Antarctic Expedition (CTAE)

By David Lory Edited by Brice Lory

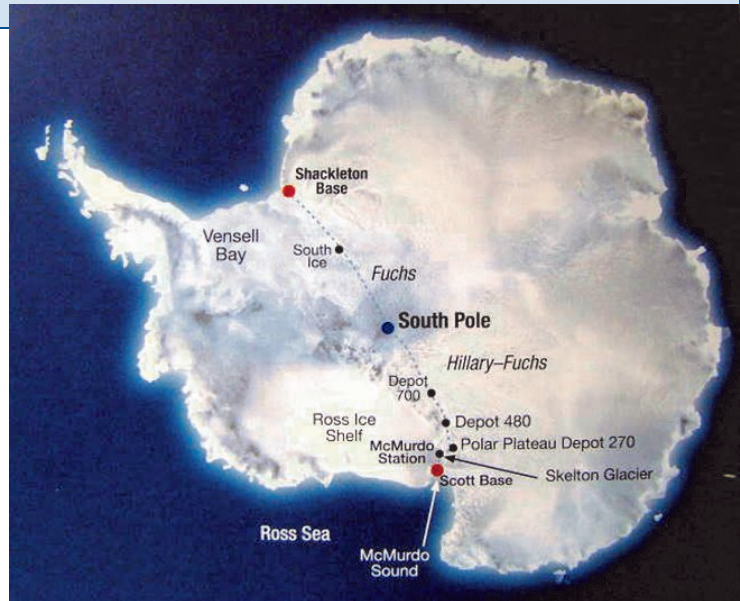
Antarctica's extremely inhospitable weather is well-known, and the purpose of this article is to discuss the vehicles involved in the 1955-58 Commonwealth Trans-Antarctic Expedition (CTAE) rather than the particulars of the dangers of Antarctica. Because the role of the Ferguson tractors changed during the expedition, it is wise to give a brief history of the earlier exploration of Antarctica, as well as a short account of Dr Fuchs' role and experiences. For if the original plans and timetable were kept, the Ferguson tractors would not have had such a revered role in the history of exploration.

Robert Scott from England reached the South Pole on Jan 17th, 1912, only to find that a Norwegian, Roald Amundsen, had already been there 33 days earlier. Scott Base, where Sir Edmund Hillary's party later set up base on the west side (the New Zealand side) of Antarctica, is named after him. The Irish explorer Ernest Shackleton set out in an attempt to cross Antarctica in 1914, but his ship was crushed in an ice pack and never reached the continent. The base on the eastern side of Antarctica is named after him and is where Dr Fuchs set up his base. Also, in the International Geophysical Year (IGY) July, 1957, through December 1958, eleven countries went on a cooperative mission exploring Antarctica. Of the several US bases on Antarctica, the South Pole base was called Scott-Amundsen Base.

Although plans for crossing Antarctica had begun years earlier, the official plans for the CTAE did not begin until Feb. 17th, 1955, when Sir Winston Churchill awarded, on the behalf of Her Majesty's Government, a grant of 100,000 UK Pounds (\$280,000) to the expedition. This was followed by financial support from other commonwealth governments, 87,000 UK Pounds (\$244,000). Other sources, such as trusts, societies, and business investments were left to fund the remaining required funds, which totaled around 300,000 UK Pounds (\$840,000). Two of the businesses that contributed were Massey Harris Ferguson LTD, of the UK, their agents C.B. Norwood LTD, of New Zealand, who loaned 5 Ferguson tractors to the New Zealand party of the expedition, and the British Petroleum Company, who supplied all fuels and lubricants to the expedition vehicles and the ship *Endeavour* that carried the New Zealand party to Antarctica.

Dr. Vivian Fuchs, an English explorer and geologist, was in charge of the Trans-Antarctic Expedition (TAE), which was to leave from the east side of Antarctica towards the South Pole and then on to Scott Base on the west side. He planned to do seismic and geological tests every 30 to 60 miles to

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A satellite's view of the Antarctic, showing the route of the Commonwealth Trans-Antarctic Expedition, the bases and depots.
Photo credit Geoffrey Lee Martin

determine the thickness of the polar ice. Sir Edmund Hillary was in charge of the New Zealand party at Scott Base. Their main objective was to find a route from the Polar Plateau down to their base and set up a series of supply depots of food and fuel for the Fuchs party, roughly the last 700 miles of the journey. The original plans only called for the Ferguson tractors to move supplies from the ship to Scott Base and do work for the base while the Beaver airplane and dog sledges would build the supply depots. This plan changed as Sir Edmund Hillary's experience and confidence in the reliability of



Two Ferguson TE-F 20 diesel model tractor were aboard the 'Theron', and were planned to be used to take supplies to Shackleton Base. They were fitted with half tracks had a tendency to bog down in the soft snow. In spite of this Hillary was impressed with the tractors reliability and ease of maintenance.

Photographer David Pratt
Royal Geographical Society, London

the Ferguson tractor increased.

Before the TAE could begin, an advance party along with Dr Fuchs left London in Nov., 1955, and picked up Sir Edmund Hillary along the way to Antarctica. The purpose of this trip was to take along supplies for setting up Shackleton Base. Along with the supplies they brought two Ferguson TEF-20 (diesel tractors) with half tracks, one Sno-cat, and two Weasels tractors. (See Appendix for comparison of these tractors.) The ship *Theron* was delayed three weeks because of very heavy pack ice. The ship finally reached the Filchner Ice Shelf on Jan 30th.. In order to save time, they decided to leave the supplies at the foot of the ice shelf a mile away. By Feb 6th, unloading was complete.

Because of the late arrival, they did not have time to build any permanent huts. A 21 ft. by 8 ft. by 9 ft. Sno-cat crate was assembled as an emergency shelter for the eight men who were to spend the winter at Shackleton Base on top of the ice shelf. They slept in two-man tents. They had 300 tons of supplies that were still stored at the foot of the ice shelf, 25 tons of coal, 350 barrels of fuel, sledging rations for men and dogs, as well as other miscellaneous supplies that had to be transported to Shackleton Base two miles away. They had moved about 100 tons when a blizzard on March 26th hit them with temperatures as low as -45 degrees Fahrenheit.

When the blizzard ended, the men went down to the sea ice to collect more dog food and found that a large piece of the ice had broken away through the middle of their supplies. Three hundred drums of fuel, a Ferguson tractor, all the coal, and timber for their workshop, boat and gear, as well as most of the food for the dogs were lost. They determined that if they conserved what supplies they had at the base, they would have been able to survive for three years if necessary. This was the original plan in case Dr Fuchs' party would not be able to return later in the year. With these heavy losses in supplies, the eight men of the advanced party began to prepare themselves for the long Antarctic winter.

SIR EDMUND HILLARY RETURNS FROM ANTARCTICA AND PREPARES FOR RETURN

After returning from Antarctica with Dr Fuchs, Hillary began preparations for the return trip later in the year with the New Zealand party. He had learned from establishing Shackleton Base the importance of pre-expedition training. He had also seen firsthand the reliability of the Ferguson tractors, as well as their shortcomings in soft snow. Hillary then heard of a Norwegian company, Eikmaskin A/S, that modified Ferguson tractors with full tracks and steering by using the brakes. After testing these vehicles, he decided to take this setup south to Antarctica.

In July of 1956, Hillary took the members of his



Sir Edmund Hillary practicing on a Ferguson at the Hermitage in the Southern Alps of New Zealand.
Photo credit Sir Edmund Hillary Alpine Center Collection

expedition to the Tasman Glacier, on the Southern Alps in New Zealand, on a training mission with the equipment. The full tracks had not arrived yet, so they used the tractors with normal tires. Each member spent several hours on the tractors practicing grading roads, leveling snow, and driving over rough river beds and soft snow. By the end of the training, each member considered himself somewhat of an expert with the tractors. Before leaving New Zealand, the Ferguson tractors were fitted with Lucas heavy duty starters, heavy duty generators, silicon covered wiring harnesses which would not freeze or crack, and 110 amp batteries. These batteries were larger than the original, so they were placed along the side of the differential. Three of the tractors were fitted with track kits, but the tracks were late arriving and they didn't have time to try them out. They also fitted the tractors with the Ferguson epicyclic reduction gear box located in front of the regular transmission. This extended the wheel base of the tractor 4 ¾ inches, which allowed space for the 21 inch front wheels and the center track idler wheels. This also gave the tractors another set of lower gears, although they were seldom used. All of the tractors were painted red to be easier seen in the snow. The tires of the tractors were made of a special silicon rubber that was supposed to withstand cold temperatures better. They were all fitted with an automatic pick up hitch to keep the hitching point low and help reduce the risk of rearing up if the sledge struck an obstacle.

The following equipment was also taken along: a 200 amp DC welder driven by the PTO of one of the Ferguson tractors, a Hydrovane 60 CFM air compressor, Ferguson D-FE-20 post hole digger, Ferguson B-FE-20 Blade Terracer, and the Ferguson tractor with the half tracks was fitted with the Ferguson M-UE-20 High lift loader. They also had an oxy-acetylene torch, and a sewing machine was important in some of the tractors' modifications.

The five Ferguson tractors were loaded on *Endeavour the* and set sail from New Zealand on



The Endeavour was not large enough to carry all the supplies for the New Zealand party. *The Private John R Towle* was part of the US involvement with International Geophysical Year (IGY) and the US Navy's Deep Freeze 1 operation carried supplies for the New Zealand party. Photo compliment of the Antarctica New Zealand.

Dec. 22nd, 1956. The *Endeavour* was a small 850 ton ship and could not carry all the supplies of the New Zealand team. The remainder of the supplies was brought down on the US Navy ship the *Private John R Towle* as part of the US involvement with International Geophysical Year (IGY) and the US Navy's Deep Freeze 1 operation. The tractors were named by Jim Bates, a diesel mechanic on Hillary's team. Liz, Aggie and Gert were on the deck of the *Endeavour*, Sue and Daisy were in the hold. Sue and Daisy had the tracks installed when they were unloaded.

By Jan 6th, 1957, the tractors were ready to use. The first tracks had chain links. Originally, the brake handles were attached to the brake pedal by a U-bolt and were outside the canvas windbreak. The expedition soon found two main problems with the tractors: pulling heavy sledges and braking at the same time took a lot of power, and at first the



Some of the Fergusons still needed tracks fitted when they where unloaded from the Endeavour. Photo credit Geoffrey Lee Martin

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brakes were inefficient. This was in part due to the fact that there was oil leaking from the rear axles on the tractors. Though the oil leak was repaired, dirt, ice, and snow continued to get into the brake drums. However, they had planned for problems with the brakes and brought about 14 pounds of resin on the expedition. A tablespoon of the powdered resin was blown into each brake drum many times during their use. This solved the problem but caused unique side effects for each tractor. Some grabbed, some squealed, and some worked well. Sometimes the ice would freeze in the brakes, and they would have to heat the drums so the tractor could move.

Unloading the supplies 9 miles from the ships to Scott Base was a 2 ½ hour trip when things went well, which seldom happened. The chain tracks kept coming off, not because of bad driving, but because the front wheels were not aligned correctly. They decided to correct this out in the field with three hand-held hacksaws by cutting a deeper notch in the ¾ plate that was welded from the spindle arm to the front axle extension. The US Navy loaned the New Zealand party two US WW II Weasels which allowed two of the Ferguson tractors to stay for work at



The area in black was the piece that was welded on to keep the front wheels from turning, but the front wheels were not aligned correctly. To adjust this a deeper notch was cut in the plate on top of the spindle arm. This allowed the front wheels to run true. The A frame tow bar has been cut off by a gas torch as it was no longer needed by the time the tractors left the South Pole. Photo credit Sir Edmund Hillary Alpine Center

Scott Base. Everyone took turns driving the tractors and drove the tractors around the clock in two 12 hour shifts.

After three weeks, the expedition had unloaded the 500 tons of supplies from the *Endeavour*. The chain tracks on the Fergusons wore out especially fast when in contact with the rock grit at the base. The links had to be replaced one link at a time. Some of the drivers were members of the *Endeavour* crew or carpenters for the base and were not trained



Unloading of the Endeavour continued for three weeks without stop, over slushy melting sea ice that they hoped was a least three feet thick.
Photo credit Geoffrey Lee Martin

in tractor driving. Part of the trail to Scott Base was shared with the American's to their Hut Point Base. The American's had a larger Caterpillar D8 that sometimes dug up holes in the ice that filled up with water. These were called cold melt pots. Some of the melt pots were two feet deep. Bernard Gunn, a geologist on Hillary's team who worked with Bates to keep the tractors running, once reported that one night he gave his tractor Liz to another worker, only to have the driver throw the keys back to him several hours later saying that the tractor needed attention. He found that Liz was almost destroyed. The tracks were on the first sledge, front wheels



Sir Edmund Hillary drives a tractor and supplies away from the 'Endeavour' while Trevor Hatherton rides the sledge. It took three weeks of continuous 12 hour shifts, (at that time of year there is 24 hours of daylight,) to unload 500 ton of supplies from the Endeavour. Photo credit Transantarctic Expedition Images' Antarctica New Zealand. TAE #352

bent out of line, the radiator was damaged and the hood was torn off. The Ferguson tractor was stuck in a melt pot. Instead of taking the time to work the



Unloading supplies at Scott Base. The first tracks had chain links that wore out fast with the rock grit at the base. Notice the red cab of the Weasel in the back ground. It was removed incase the vehicle fell through the ice and those inside had to make a fast escape.
Photo credit Geoffrey Lee Martin

tractor out himself the driver had asked one of the US drivers on a Caterpillar D8 to pull him out causing all the damage to the Ferguson.

One of the Weasels had a broken track and badly worn sprockets. The Weasel had 40 grease nipples which were usually never greased. Ultimately, they decided to make one good Weasel out of the two. While the ships were being unloaded, Bates built a garage for repair work in the winter. He also crafted a canvas cab on two of the tractors while they were finishing unloading the ship. On Jan 14th, Hillary's party heard that one of the US Weasels had fallen through the ice, and one man drowned. For safety, all tractors were to keep in marked routes and travel in pairs. As an additional protection, the cab was removed from their Weasel in case the driver had to make a fast escape. This proved to be the right decision, as one time the Weasel that Hillary was riding broke through the ice. The only thing that kept it from going deeper in the water was that the sledge that it was towing wedged in behind the Weasel. Removing the cab allowed Hillary to escape more easily.

On Feb 22nd, the *Endeavour* left for New Zealand taking the construction party with it.

As mentioned before it was never part of the plan, but Hillary had hoped to take some vehicles south on the trail with them. The excellent performance of the Ferguson tractors while unloading the ships had made this idea seem more realistic. Jim Bates and Murray Ellis had made several modifications on two of the tractors while the ship was unloading and work on the base was being completed. Hillary was anxious to give the tractors a thorough tryout in conditions similar to those in a journey south. He decided to repeat a route covered by foot by Wilson, Bowers, and Cherry-Garrard in their amazing *Worst Journey in the World* with the tractors. This was a 100 mile round trip, from Scott Base to Cape Crozier. A satisfactory performance by the Fergusons would remove any doubt from Hillary's mind about taking them south, and would provide a secondary means of stocking the depots if their Beaver airplane was unable to do so.

On March 19th, Hillary, Ellis, Bates, and Peter Mulgrew left Scott base on two Ferguson tractors pulling 4 loaded sledges. After the first two days they had traveled 25 miles through deep snow. As they went, they carried out experiments on the sledges and repaired and modified the track mechanisms on the Fergusons that kept them from getting bogged down in the snow. On March 24th, they set off for home base hoping to travel the remaining 50 miles in one day. But heavy winds left snow drifts around their tents and tractors, and it was a long hard process to dig them out. They were able to set off at 1:30 pm.

The farther they went the colder it got. At one



Tractors bound for Cape Crozier with Sir Edmund Hillary on top. You will notice the better canvas cab. If you look closely you can see the extra brace for the front axle. The tracks are still made of chain links. The frame of the front of the cab was made out of dexion shelving that they had on hand. Photo credit Transantarctic Expedition Images' Antarctica New Zealand. TAE #789

point it reached -46 degrees Fahrenheit. The lights on one of the tractors failed, and those on the other were causing problems. Ground fog came up, causing ice to form in a carburetor and a fuel line to freeze. In spite of this, Hillary and the others were able to travel 47 ½ miles in 14 hours including a two hour hold up. The trip had been successful in more ways than one: it proved that the tractors were now in better operating conditions than when they arrived, they had better flotation in soft snow, better protection for the driver, and the test produced more confidence in the tractors' ability to travel south. During the winter months more improvements were implemented and in the spring another test would be given before leaving to the South Pole.

Besides the ground vehicles, the New Zealand party had two aircraft. The Canadian-built Beaver, which had a limited load capacity of around 1/2 a ton, and the English built Auster which was suitable only for short range flights and small loads. The expedition relied mostly on the Beaver for the majority of supplying the depots. The Auster and dog teams were used for reconnaissance trips, setting up locations for the first base at the foot of Skelton Glacier and the next base on the top of the glacier called the Polar Plateau Depot. With the Beaver flying twenty four hours a day when the weather permitted, they were able to have both of

these depots fully stocked before winter.

WORK ON THE FERGUSON TRACTORS BEFORE THE TRIP SOUTH IN THE SPRING OF 1957

The new plan was to take three Ferguson tractors and a Weasel south to set up the depots for Dr Fuchs' party as they crossed Antarctica. The plan called for two more depots at 480 miles and 700 miles from Scott base. If all went well with the Fuchs' party, they would meet up somewhere near Depot 700, and Hillary would help guide them back to Scott Base.

During the winter months, work was done on the three Ferguson tractors. By the end of the winter, all of the tractors had done about 300 hours and had received a valve grind. There was trouble with the rotating valve springs, probably due to the cold. This was not surprising because the winter temperatures were down to -40 to -50 Fahrenheit, and the tractors were usually left outside. The tractors were never given time to warm up properly, usually running at full speed as soon as they were able to move. The sleeves, rings, and oil consumption were in specs, so no further work was done on the engine. The hood was cut off three inches in front of the gas tank. This allowed the larger battery to be installed behind the gas tank which was a warmer location for it. This allowed the battery to charge faster. Also, this made filling the gas tank and checking the radiator easier.

Roll bars were fitted on the three tractors going south. There were two variations of the roll bars, one was made of 2 1/2 inch pipe and the other was made of 2 1/2 inch angle iron. This was braced forward to the epicyclic gear box. This frame was also part of the canvas cab, which was made of dexion shelving material attached to the roll bar, with a window in front and a small one on each side. The whole cab was covered in canvas except the back and top which could be rolled up. These were not covered in case the driver had to escape in a hurry. The whole system gave the driver protection in case of a roll-over or falling into a crevasse, as well as extra protection against the elements. Originally, the steering brake levers were outside the small canvas protection, but the modifications moved the levers to the inside. If it were necessary to look out over the cab, the driver could stand on the seat and steer with his feet, or the brake handles were the right height for setting.

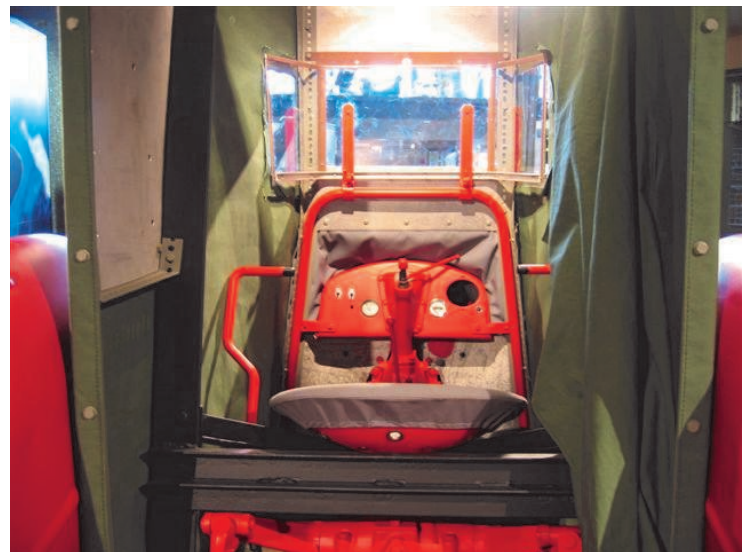
During the winter months, the Ferguson with the half-tracks and high lift loader was used to bring the seals killed earlier in the year up to the base to be cut up for dog food. Until it became too dangerous, this tractor was also used to bring snow up to the meltors for water. Later, one of the tractors with the full set of tracks was used with a tray built on front.

At first, the tractors were started by placing a type of a gas heater under the tractor and throwing a tarp over the tractor to keep in some of the heat. This worked well until one of the members on mess duty did this and went away to do some other jobs while



Although we don't know why the front wheels were removed, this photo does show the hood that was cut off three inches in front of the gas cap that allowed the tank to be filled without raising the hood. Also notice the larger battery is now placed in its original position, and the extra braces on the front axle assembly. This was needed because of the extra pressure of the full tracks on the front axle causing the radius rods to bend and caused damage to the front axle support. Photo credit Antarctica New Zealand.

the tractor was warming up. Luckily someone noticed the fire in time, and it was put out with little damage to the tractor. The workers developed a new means of warming the tractors by placing a 1000 watt immersion heater in the radiator. This worked well as long as the tractors were near electricity, though very often they were not. Then they used the Ki-Gas system which had been specifically installed



The view of the modified tractor with a canvas cab, roll bar, and the steering brakes moved inside the cab. The back and the top of the cab was left open incase the tractor fell into a crevasse and the drive had to make a fast escape. There was a canvas that could be unrolled when the tractor was not moving. Photographer Belinda Weir, credit Sir Edmund Hillary Alpine Centre



Miller testing depth of the sea ice with a Ferguson D-FE-20 Post Hole Digger. Photo credit Transantarctic Expedition Images' Antarctica New Zealand # TAE 693

for the cold conditions. This was a starting aid, that was installed at the factory for the Ferguson diesel tractors. On the gas tractors it was used to inject ether into the fuel mixture. Without it, great difficulty would have been experienced in starting in the colder weather, as from -10 and lower, the rubber seal was inclined to harden in the cold and needed much adjustment to work. Also, the Weasels had gas burning personnel heaters, and with only one going on the trip the other would be available. With some modifications, it became a portable way of warming up the tractors. A 1/2 gallon drip tank was used with a metering valve to the tank. The fan was either powered by the tractor's battery or with two auxiliary batteries that could be carried by two people.

The air cleaners were removed since the air was so clean in Antarctica that it was not necessary. This allowed more air to be drawn into the carburetor, which was especially important at the higher altitudes at the South Pole.

An A-frame tow bar was attached to the front axle of each of the tractors. The tractors were originally fitted with radiator shutters which caused problems. These were removed and replaced with a simple canvas cover, requiring only the simple adjustment of welding three 5/16 inch washers on each side of the hood, slotting the canvas and holding it in place with #8 fencing wire..

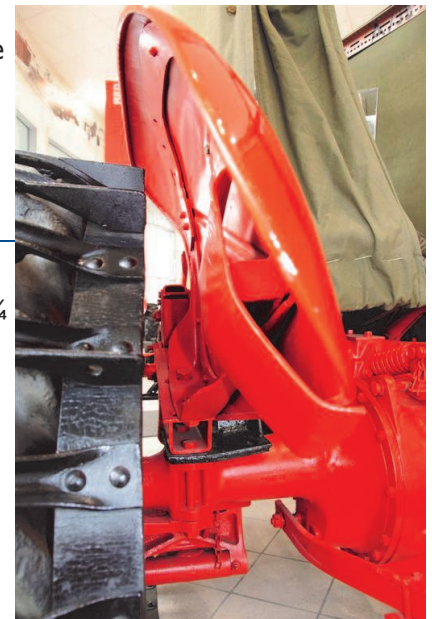
All of the tractors heading south had rubber belting holding the cleats on the tracks. One had a special ordered experimental wide set of tracks, one had extra lower lugs to stop slipping around the rear



Photo of original track on "Sue" showing the extra lower lugs welded under the cleats to stop slipping around the rear tire treads, and angled steel cleats welded to every second track for extra gripping in the soft snow. The three rib tire was not the original style used in the TAE. Photo credit: John Kennedy of the UK

tire treads and triangular pieces welded to every other cleat for extra gripping, and the third just had extra lugs welded under the tracks. The first two types of tracks were excellent in average conditions, with the wider set better in soft snow. The third set with just the knobs welded on was just as good in the harder surfaces as the others but not very efficient in the soft snow. On the tractor with the extra steel cleats, a 1/4 inch plate was welded onto a piece of channel iron and attached to the inside of the fenders to stop the track cleats from hitting and jamming against the fenders. All the oils in the tractors were #5 SAE oil. When driving over extremely rough terrain, the fan would hit the radiator shroud, so 1/2 inch was cut off of the fan. And for the same reason, they cut about three inches off the inside end of the left front axle extension because it interfered with the lower radiator hose connection. The angle of the blades was lessened as the fan's cooling effect was more than adequate. The track idler wheel

On "Sue" the tractor with the extra steel cleats, a 1/4 inch plate was welded onto a piece of channel iron and attached to the inside of the fenders to stop the track cleats from hitting and jamming against the fenders Photo Credit: John Kennedy of the UK.



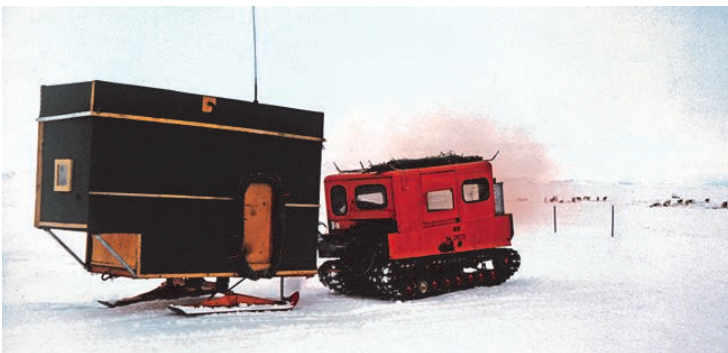


The black pieces are the pieces of Waratah fencing post that were used to strengthen the front axles.
 Photographer Belinda Weir, credit Sir Edmund Hillary Alpine Centre

had to be modified to apply more downward pressure on the track. This would help spread out the weight of the tractor more evenly over the tracks because the tractor was very heavy in the rear.

The support for the front axle was not sufficient when using full tracks. Under severe conditions, the radius rods would bend and cause damage to the front axle support. This was remedied by welding a piece of steel from the front of the radius rod to the bottom of the front axle extension and another from this piece of iron to the rear of the radius rod. For this they used Waratah fencing posts (a brand of New Zealand steel post used when the ground was too hard to dig) that were brought down to make wind-breaks for the dogs. Even when working hard at sea level, the gas in the tractors' tank would boil. This may have been because they were using the wrong type of fuel. A polished aluminum plate was placed between the tank and the engine to reflect some of the engine's heat.

On the trip to Cape Crozier, they found there needed to be a warm place for those who were not



The caboose was built to keep those not driving the tractors warm as well as a place for the radio equipment and other supplies. In this photo the caboose is being pulled by the American built WW II Weasel.
 Photo credit Geoffrey Lee Martin

actually driving the tractors. On that trip the men rested on the sledge until they became too cold and then ran alongside until they were warm or too exhausted to continue. There was also a need for the radio equipment. So they decided to build a caboose. It was 11 feet long and only 4 feet wide. It was filled with cupboards, radio equipment, and a stand for two Primus stoves and bunk beds for two. To heat it while they were travelling, they ran the exhaust from the tractor that was pulling it into a radiator in the caboose, and then the gas was exhausted outside.

With the reliability and ease of maintenance of the Ferguson tractors, Hillary was able to expand the scope of the summer operations. Instead of relying on the dog parties to supply the depots, now they were able to do more exploring. One party would travel north to map and survey new areas. The second party would travel south to help with setting up the depots and then continue doing more survey and exploration. The third party, the tractor party, would consist of three Ferguson tractors and 1 Weasel. They would travel with enough fuel to reach Depot 480. There, the Beaver would fly in more supplies to stock the depot and allow the tractor party to travel to Depot 700 to stock the Depot with enough fuel and supplies for Dr Fuchs' party. And if all went well, Hillary's party would have enough supplies to continue on towards the South Pole, although this at the time seemed unlikely. If Fuchs could keep to his schedule, they would meet around Depot 700 and continue back to Scott base with him. Because the tractors' roles in the expedition were expanding, the Beaver aircraft would have to make more flights to the polar plateau to bring in fuel. Once again, British Petroleum Company was contacted and was willing to supply the extra fuel for both the vehicles and the Beaver.

Next month, **The Journey.**

Special Thanks to:

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VEHICLES OF THE TRANS-ANTARCTIC EXPEDITION

vehicle	manufacture	Engine	horse power	ground pressure	fuel tank cap	dry weight	lbs/ hp	miles per gallon	turning radius	carrying/ towing capacity
Sno-cat	USA Tucker Sno-Cat Corp.	Chrysler V8	200 at 4000 rpm	3/4 lbs / sq inch	90 gal	7000 lbs	35	.8 to 2 under load	28 feet	carry 1 ton tow 2 sledge 2 1/2
Weasel	Studebaker for US WWII	Studebaker L head 6	75 at 3800 rpm	1.9 lbs/ sq inch	35 gal	4800 lbs	64	.7 to 3 dep. On load	12 feet	carry 1200 lbs tow 1 sledge 2 ton
Ferguson	Standard Motors LTD UK	Std. Motors 4 cylinder	28 at 2000 rpm	1.3 lbs/ sq inch	9 gal	3370 full tracks	120	1.1 to 1.8 to S. Pole	20 feet	tow 2 ton on hard surface
Muskeg	Bombardier Co. of Canada	Chrysler strait 6	115 at 3400 rpm	3/4 lbs / sq inch	15 gal	4600 lbs	40	1 to 1.8 2 ton loads		carry 1 ton tow 1 sledge 2 ton

**Some of the above information was taken from Appendix A
The Crossing of Antarctica by Sir Vivian Fuchs and Sir Edmund Hillary**

J. Bombardier Museum, Quebec

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- The Crossing of Antarctica by Sir Vivian Fuchs and Sir Edmund Hillary, published by Little Brown & Co.

- The White Desert by Noel Barber, published by Hodder and Stoughton

- Opposite Poles by Douglas McKenzie, published by Robert Hale LTD

- Something Different, The Hillary Tractor Restoration by John Callesen, published by The Sir Edmund Hillary Alpine Center, Aoraki Mount Cook, New Zealand

- Land of the Long Day, by Bernard Gunn

- Ferguson TE20 in Detail by Michael Thorne, published by Herridge & Son LTD

- Joanna Rae, Assistant Archivist, Archives Service, British Antarctic Survey

All of the above sources have graciously contributed to this article with the stipulation that NO PART be copied for other uses without obtaining their permission first.

Cover Photos

Front - Sir Edmund Hillary driving a Ferguson with half tracks and double front wheels, pulling one of the many sledges hulling supplies from the Endeavour. It took three weeks of continuous 12 hour shifts to unload the 500 ton of supplies from the Endeavour. Photographer David Pratt, credit Royal Geographical Society

Back - Advertisement for Ferguson tractors in Power Farming in Australia and New Zealand, June, 1955, from David Lory's collection.

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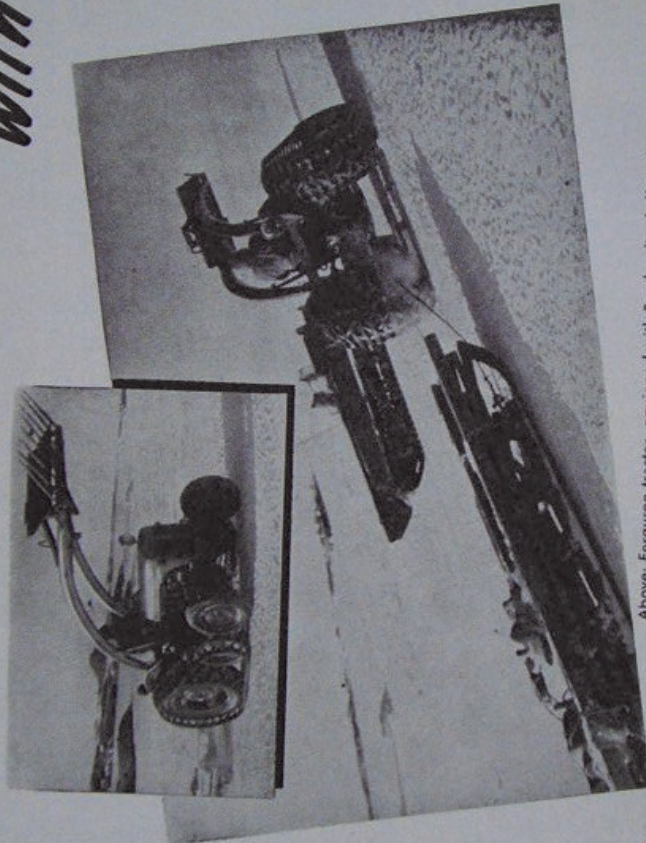
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Above: Ferguson tractor, equipped with Bombardier half tracks, operating on 1 in 7 grade ice slopes at Mawson, McRobertson Land, where temperatures sink to 42° below zero. — Photographs courtesy Mr. P. G. Law, Director Antarctic Division.

READ THESE AMAZING OFFICIAL EXTRACTS!

Ferguson exposed to full blast of wind and drift . . . without weather protection for 12 months . . . starts instantly, even though engine is snowed over . . . operated on glass-smooth ice slopes rising in sweeps up to 1 in 7 grade . . . in 3 miles one slope rises to 1800 ft. . . dogs could not haul up ice slopes — the "fergy" saved the day.

⊛ These extracts are yet another testimonial to Ferguson versatility — in all sorts of conditions all over Australia, over 43,000 users pay similar tribute to the amazing reliability and adaptability of Ferguson tractors — prove it with a demonstration on your farm!



3 FINE MODELS
LOW DEPOSIT
EASY TERMS

The impossible" The ANTARCTIC EXPEDITION

OFFICIAL REPORT. . . . 28th Feb. '55
 Mawson Station Engineering Dept., 13th Feb. '54

The Ferguson has worked for 565 hours since landing here one year ago — It has been outside without any weather protection. It has given no trouble at all, no parts have been required. The terrain and working conditions are tougher than anyone would expect upon to continue to operate upon with such complete reliability. It has had a hand with almost every job on the station — including haulage of nut sites, carting rock fill, lifting seals for sections — hauling light to dog feed, providing light to enable after dark working, when emergency outside jobs had to be performed. Without the winch many jobs may not have been possible.

Its last job before shipment to Ansisie was to haul upright a 90ft. sectional steel radio mast. It has been operated by a number of people and hasn't been given gentle treatment at all. The rocky terrain provides the roughest surface that could be found — many loose scree slopes and areas of loose boulders. To all — even the scuffers, it has demonstrated its ability to do the impossible and all who have witnessed its operations here are Ferguson Fans.

Signed

John Russell
 Engineer, A.N.A.R.E.

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