

# Ferguson Furrows

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Back hoe on one of the Ferguson TEF-30 Diesel tractors at Halley Bay Base. They spent one unsuccessful day trying to dig a tunnel from the main hut to the radio echo hut with the tractor back hoe. Photographer :L.W. (Les) Barclay, *Ionospherics*

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# Ferguson Tractors at Halley Bay and Deception Island (Part 1)

By David Lory

Edited by Brice Lory

## Introduction

In issues 56 and 57 of the Ferguson Furrows, I discussed one part of the International Geophysical Year and the Trans-Antarctic Expedition (TAE). This was to be the first complete overland crossing of the Antarctic Continent. The International Geophysical Year, (IGY) was from July 1, 1957 to Dec. 31, 1958. On Jan 4th, 1958, Sir Edmund Hillary led a party of 4 driving three Ferguson tractors to the South Pole. These three tractors were the first vehicles to drive to the pole.

The IGY was a special focus of Antarctica where there was to be a collaboration of 67 countries on projects to study the earth's environment and its interaction to the sun from July 1st, 1957, to Dec. 31st, 1958. One of the British Bases at Antarctica for the IGY was set up at Halley Bay. In this article I would like to look at the Ferguson tractors at the British bases at Deception Island and Halley Bay.

Note: If you do not have issues 56 & 57 the articles can be read online at: [www.antarctican.org/antarctican\\_society/Pack%20Ice/pack\\_ice.cfm](http://www.antarctican.org/antarctican_society/Pack%20Ice/pack_ice.cfm) The titles of the article are: "Ferguson's Snow Cats, Weasels



## Planning and Setting Up

A special committee for the International Geophysical Year (IGY) met during the years of 1952 through 1954. By the 1954 meeting in Rome, a number of the Antarctic stations had already been planned. In Rome, the committee suggested that there was an additional need for another station at Vahsel Bay at 77 deg S 35 W off the coast of the Weddell Sea. It was recommended that if this station were established, it should study meteorology, aurora and airglow, ionospheric physics, glaciology, seismology, and gravity measurements.

The British Royal Society agreed to take on the task of setting up this research station on the east coast of Antarctica. Personnel were hired, supplies were purchased and a ship was chartered for the advance party of this station. The ship was the m.v. *Tottan*. The *Tottan* was built at Goole in Yorkshire, England, in 1941 as a "T" Class ship for the British Royal Navy. She was meant for duty escorting North Atlantic convoys, bringing food to the British civilian population during WW II. Her name then was *Morris Dance*. After the war she was rebuilt in Norway to be a sealing ship. The 900 HP coal-fired engine was replaced with a 1,400 HP U-Boat diesel Engine. They



The m.v. *Tottan* at the edge of the sea ice of Halley Bay during one of her many trips to the base.

"Frame from the film *Antarctic Observatory*," filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.

doubled the number of the ribs in the hull, added three extra steel longitudinal members to each side of

the hull, and rounded the sharp bow for use in the ice (p. 280 *On Floating Ice*, by Joseph MacDowall.)

The m.v. *Tottan*, with the 10 members of the Royal Society's advance party, left Southampton (Southwest of London) on Nov. 22nd, 1955. The advance party for the TAE left Butler's Warf, London, on Nov. 14th, 1955, aboard the Canadian sealing ship m.v. *Theron*. Dr. Vivian Fuchs was on the *Theron* and was head of the TAE. He was working in conjunction with the advance party on the *Tottan*. The *Theron* carried an Auster airplane which was to be used to aid their trip though the ice pack with aerial reconnaissance trips. The *Theron* picked up Edmund Hillary at Montevideo on the way to Antarctica and that is where he became impressed with the reliability and ease of maintenance of the Ferguson tractors as they unloaded the *Theron* later at Shackleton base.

On the way to Shackleton base, the *Theron* took a more westerly course through the Weddell Sea and became stuck in the pack ice for almost a month, causing a late arrival to Shackleton Base. Once they arrived, they did not have time to build a permanent hut. A 21' x 8' x 9' emergency shelter was built out of a Sno-Cat crate, and they slept in 2-man tents. They did not have time to move all their supplies from the sea ice to their base on the ice shelf before part of the sea ice broke up during a blizzard, and they lost much of their supplies and one of the Ferguson tractors. Fortunately, all the parties brought enough supplies for two years just in case the supply ship was not able to relieve them the following year, so they had enough supplies to last through the year.

#### Halley Bay

Meanwhile, the advance party onboard the *Tottan* was stuck in heavy ice packs three times on Jan. 3rd, 1956. Twice they had to chop their way free, and on the third time they were forced to free themselves with dynamite. Not able to travel any further in the Weddell Sea, they turned toward the coast to look for a suitable base site. On Jan. 5th, they made a second trip south but were met with impenetrable ice and were again forced to turn back. They had spotted several possible landing sites on the original trip south, so they went back to look for the best suitable site for a base. On Jan. 6th, 1956, they rounded a cape south of what they were to soon call Halley Bay, which was named after Edmund Halley, the man who calculated the orbit of Halley's Comet, which also bears his name. 1956 was the 300th year anniversary of Edmund Halley's birth.

The slope up to the top of the ice shelf was wide and free of penguins, unlike the smaller steeper slope that was just to the south. They later called the smaller bay Emperor Bay, after the emperor penguins that resided nearby. Although they were not able to reach Vahsel Bay, they did reach their goal of setting up a base south of 75 deg S. By Jan. 23rd, the ship had been unloaded, and the *Tottan* left

for South Georgia. There was always a rush to unload the ship because it needed to head back as soon as possible before the sea ice froze up again. Halley Bay is located on the east side of Antarctica and is about 800 miles from the pole. The base was actually on the floating ice shelf, around 40 miles from the actual land mass of the Antarctic continent. Halley Base has been occupied from Jan. 6th, 1956, to the present. An ozone spectrophotometer was installed in September of 1956, and Halley has been measuring the ozone layer ever since. It was here that British scientists first measured the ozone depletion of the Antarctic stratosphere in 1985.

There were three English-built Ferguson TEF-20 (diesel) tractors on half tracks to haul the 220 ton of supplies from the *Tottan* at the edge of the sea ice to the base at the ice shelf. The party worked 15 hour days starting at midnight. They worked until the bright sun made the ice too soft. The temperature was colder at night, and the surface of the snow was harder.

The advance party's first objective was to construct the main hut, which was 128-feet long and 27-feet wide. It provided accommodations for up to twenty-four men. While the foundations and floor were being laid, the men spent a month sleeping in sleeping tents with temperatures reaching -23 C , - 10F. They then worked on the outer walls and the roof, which were completed by April 1st. The party then moved some of their supplies and construction materials inside so they could work more comfortably during the winter months.



Locating and bringing supplies to the surface was an ongoing process -- so much so that in 1959, Dr. Michael Sheret stated that "British Antarctic Survey motto 'Research and Discovery' was soon converted to 'Resite and Recovery' at HB." Here a tractor is using a Ferguson winch to recover a buried oil drum.

"Frame from the film *Antarctic Observatory*," filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.

Supplies were originally stored in supply dumps outside marked with about twenty-foot long bamboo poles. By the end of April, some of these supplies were already under six feet of snow. They had fifty forty-four gallon drums of diesel and forty drums of Avtur (aviation turbine fuel,) which the Ferguson diesel tractors and diesel-electric generators were run on.

Twenty-five of these drums were set aside, along with a year's supply of food, in case they could not be relieved next year. They stored Anthracite (a dense hard coal with a high carbon content that burns with a clean flame) in seventy pound bags and used it in the three stoves, the thermostatically controlled cooker (fitted with a water heating unit for melting snow in a 160 gallon tank,) and the water heating boiler. Early in February, a 6.8 KW diesel/electric generator was installed under a tarp, which later was installed in a converted Ferguson tractor crate. Two more similar generators of this size were later put into service along with the first and were moved to a generator hut. A fourth generator was mounted on a sledge and used as a mobile power source.



In case of an emergency evacuation, the lifeboat was suspended in a way that allowed it to always be raised above the surface of the snow.

"Frame from the film *Antarctic Observatory*," filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.

In case of an emergency, tents, sledges, rations, sleeping bags, primus stoves, and the like were stored in a tractor crate six feet off the ground to keep it clear of snow. A boat was suspended above the surface in case of emergency evacuation.

Daily fire precautions consisted of topping off the 160 gallon kitchen and 80 gallon bathroom water tanks. At the center of the hut, there were two forty-gallon oil drums filled with water, which were two feet off the floor to keep from freezing. Other fire

preventive items included buckets, pumps, breathing apparatuses, axes, asbestos smothering cloths, and carbon dioxide and dry chemical fire extinguishers, which were placed in various locations throughout the hut.

I was unable to find more information on the use of the tractors during 1956, save that when the Main Party arrived in January, 1957, Joseph MacDowall, in his book, *On Floating Ice*, on page 44, said the following:

*"The tractors were not in brilliant condition when we arrived. Little or no maintenance had been performed, and they had been driven hard by almost everyone on base. They had worked extremely hard in adverse conditions. Consequently, in the first day or so, Alf Amphlett and Ivor Beney had to do a number of repairs to keep them going. It was not until the following summer that we were in position to give them the extensive overhaul needed to make them fit to do the unloading the following year. Although they were not designed for the Antarctic conditions, the Ferguson tractors eventually did the job required of them."* (The coldest temperature for the advance party was  $-50.6\text{ C } [-59\text{F.}]$ )

Both main parties, the 21 members of the Royal Society IGY Antarctic Expedition (RSIAE) and the 12 members of the TAE, left Butlers Warf, London, on Nov. 15th, 1956, on the new Danish ship m.s. *Magga Dan*. The Norwegian ship m.s. *Tottan* was again chartered to carry additional supplies that would not fit on the *Magga Dan*. The *Tottan* sailed from London on Nov. 17th and was waiting for the *Magga Dan* at Halley Bay by the time she arrived on Jan. 4th, 1957. Twice on Dec 30th, the *Magga Dan* was trapped between ice flows, and all members on board



Supplies were stored above ground on metal shelving to keep them from being buried in the snow drift, but in a few months they were still covered with snow. "Frame from the film *Antarctic Observatory*," filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.



This photo was taken from the edge of the sea ice near the ship *Magga Dan*. In the photo you can see the TAE airplane and one of the Sno-Cats that was aboard the *Magga Dan*, which was used by Sir Vivian Fuchs on the Trans-Antarctic Expedition. The plane and Sno-Cat were unloaded when the supplies for Halley Bay Base were unloaded, and then reloaded on the ship and moved to Shackleton Base where Fuchs was preparing for the TAE.

Photographer: L.W.(Les) Barclay, *Ionospherics*.

bear doubled from six drums of fuel to twelve drums (aprox. 5350 lbs.) When the full tracks were installed, the steering was locked, and the tractors were steered with the rear individual brakes.

They had to pull the sledges 4.8 miles over the sea ice and then 3.8 miles up a 1-in-10 slope of drifted snow to the top of the ice shelf. Later they discovered that the ice shelf at Halley Bay was a huge ice berg about 100 miles wide by 35 miles across that was moving three to four hundred yards per year. The shelf was pinned to shore by rocks under the surface.

On the first day, they were only able to unload 35 ton, mainly of coal. The tractors were constantly

had to go over the ship with iron poles to break up the ice in front of, and alongside of, the ship to free her. The first time took five hours and the second took four hours.

Four hundred ton of supplies and equipment had to be unloaded from the *Magga Dan* and *Tottan* as quickly as possible so they could complete the rest of their summer projects.

The TAE provided the use of their Muskeg tractor to work alongside the three Ferguson tractors. They had three Maudhem and five Army T34 Sledges. For the first four days, the Ferguson tractors were still on the half tracks they had arrived on with the advance party. When the half tracks were replaced with full tracks, the load the Ferguson tractors were able to



Although this photo was taken in 1959, it shows a common problem of the tractors getting bogged down hauling supplies from the ship to the base.

"Frame from the film *Antarctic Observatory*" filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.



One of the Ferguson tractors pulling a Maudhem sledge. Steering was done by levers attached to the individual hand brakes. One lever can be seen outside of the drivers left knee.

Photographer: L.W.(Les) Barclay, *Ionospherics*.



This shows two of the Ferguson TEF-20 diesel tractors in front of the main hut in 1957. By the first part of 1957 the main hut was halfway buried by snow drift. The first tractor is fitted with a M-UE-20 High Lift (banana loader).

Photographer: L.W.(Les) Barclay, *Ionospherics*.

getting bogged down in the soft snow that had fallen earlier. When this happened, the tractors were unattached from the sledges, moved forward, reattached to the sledges with a longer rope, and pulled again. If this did not work, they had to dig out the tractor.

By Jan. 11th, after about a week, they had the



Among the supplies that arrived on the *Tottan* in 1959 were materials to build a new ozone hut mounted on a sledge foundation that could be moved out of snow drifts to keep from getting buried like the first ozone hut had been.

Photograph by Dr. Michael Sheret.

*Magga Dan* unloaded, and she sailed off with the Royal Society's advance party and the TAE party to Shackleton Base, where they unloaded the rest of the supplies for the TAE. By Jan. 13th, the *Tottan* was unloaded, and she sailed away the following day.

They had completed their first assignment: to unload the supplies, and on Jan. 14th, they began building the four main structures of the base: the non-magnetic hut, the balloon shed, the generator shed, and the radio echo hut. They also had to build three sledge mounted aerial huts.

The radar shed was to be mounted on three sledge runners so it could be hauled up out of the snow and moved to keep it from getting buried by the accumulating snow and snow drift. This technique was also applied to the new ozone shed built in 1959. The balloons were launched from the balloon shed to measure the temperature, humidity, and winds in the upper atmosphere.

The most challenging unit to build was the non-magnetic hut. None of the construction materials could contain any magnetic metal. They had to use copper nails and a specially developed non-magnetic brass. To insure that the delicate instruments worked properly, they needed to maintain as near a constant temperature as possible. They were able to keep the air temperature in this building between 5 C and 10 C (41-50F.) This building also had to have a firm foundation. As such, they drove twenty-foot telegraph poles into the snow and topped them with

brick pillars and marble slabs on the pillars. It took all day to drive the first pole because they wound up the weight of pole-driver by hand. On the second day, they used the winch on the Ferguson tractor to lift the weight on the driver and move the rig. With this set up, they were able pound in the 2nd pole in one and a half hours. Ten more were driven the second day and the pile driving was completed on the third day. Once the non-magnetic hut was completed and the instruments were working, this was the first time continuous recordings had been made of the Earth's magnetic field from a floating ice field.

The generator shed was being built at the same time as the non-magnetic shed. And by Jan. 20th, the exterior on the non-magnetic shed was completed, so some members started working on the balloon shed. By Feb. 11th, they completed the exterior of the balloon shed.

The balloon shed had a 10-foot high roller-garage



Releasing the weather balloons was a daily challenge. If the wind was more than a few miles per hour, it would be smashed on the surface and be destroyed.

"Frame from the film *Antarctic Observatory*" filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.

style door where the inflated balloons were released. By the end of April, 1957, all of the scientific equipment was in use. The first balloon went to a height of 66,000 feet. Every three hours, someone had to go outside to observe the clouds, perception, visibility, and temp wind speed. They then went to the balloon shed to generate hydrogen, which was generated by adding hot water from the main hut to a carefully measured mixture of aluminum chips and caustic soda crystals.

In February, two Meadows diesel-electric 22 KW generators were winched into the generator shed and replaced two smaller generators on Feb. 13th. Two



One of the Ferguson tractors in front of the aerial antennae in 1958. Photographer: John Smith

of the smaller generators remained in the generator shed as emergency and supplementary equipment, and the other two remained as reserves.

By April 4th, the outside lights had been installed to all huts including the remote aerial huts. Telephones had been installed in all huts but were installed outside the non-magnetic hut to avoid magnetic interference and outside the balloon hut because of the risk of sparks igniting the hydrogen. They drove stakes with shoulder high guide ropes up to all huts except the remote aerial huts. This allowed safe movements around the base during times of low visibility in the oncoming winter.

The sun set at the end of April 30th and did not rise again until August 12th.

Our thanks to the following who contributed to this article, many of whom actually lived and worked at the base from the dates indicated.

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

1957 and 1958

Barclay L.W. (Les) *Ionospherics*

MacDowall J. (Joe) *Met., Geomagnetic., Glaciology., Seismology and 1958 base leader for 1958*

1958

Smith J.A. (John) *Meteorologist*

1959

Dr. Sheret M.A. (Michael 'Black Mike') *Geophysicist*

Norman J.N. (Nelson) *MO medical officer*

1960

Blackie J.R. (Jim) *Physicist*

Millar A. (Alex) *Meteorologist*

1961

Skilling J. (John) *Carpenter*

Thronton E. (Edwin) *Meteorologist*

Lee R.G. (Bob) *GA, Tractors*

1962 & 1963

Jehan D.R. (Dudley 'Cuddles') *Meteorologist (and in 1963 as a general assistant)*

1971 & 1972

Smith Andy: At Halley Bay, Editor of Z-fids Newsletter (Halley Bay is called Base Z, fids refers to 'Falkland Islands Dependencies Survey.') Also Webmaster Halley Bay Web site, [www.zfids.org.uk](http://www.zfids.org.uk) and worked for the BAS till 2005.

2009 till 2012

Brown Matthew: Halley as Base Commander

The following books were also used in researching this article.

- "The royal society international geophysical year Antarctic expedition - Halley Bay: Coats Lands, Falkland Islands Dependencies, 1955-1959." Volume IV: Meteorology, Glaciology, Appendices. United Kingdom: The Royal Society. Creators: Brunt, David, Date: 1964

- "On Floating Ice" "Two Years on the Antarctic Ice-shelf South of 75 degrees S" by Joseph MacDowall ISBN 1 85821-720 2 printed 1999 by The Pentland Press LTD NOTE: Joseph MacDowell has donated a copy of his book to FENA and it will be one of the items available at our 2013 FENA EXPO Auction in Vienna, OH.

- "In Search Of A Penguin's Egg" by Nelson Norman ISBN 978-1-4490-1729-3 (sc) published by Author House 9/8/2009

## Ferguson tractors at Halley Bay and Deception Island (Part 2)

By David Lory

Edited by Brice Lory

Halley Bay continued..

The coldest day in 1957 was on July 29th, with temperatures as low as -59.1 F, and with winds of 27mph. Electric motors stopped working and needed to be repaired, and the wind-measuring equipment failed on top of a 30 foot tower and had to be replaced. Maximum wind gusts were 85 miles per hour that day.

On Oct. 7th, 1957, the men at the base heard radio signals from the USSR artificial earth satellite *Sputnik 1*. They were well aware that the USSR and USA were planning on launching a satellite as part of their contribution of the IGY.

On Oct 30th, the sun was up for twenty-four hours and would not set for three and a half months. In December, they started to prepare for the arrival of the *Tottan*, which was to bring in 110 tons of supplies. They had to dig out the bridge timbers that had not been used for a year. These timbers were used to cover the cracks or gaps in the sea ice so the tractors and sledges could cross safely. In a year, the timbers were under five feet of snow. Once they were found, the heavy timbers were pulled up out of the snow with the tractor's winch.

The *Tottan* arrived on Dec. 31st, 1957, the second time that year. The sea ice was about one half mile longer than it was the last time the *Tottan* arrived and was two feet above sea level and six feet thick. The temperature during the unloading was between -7 C to -2 C, (19-28 F.) There was soft snow, which constantly bogged down the tractors. As they unloaded the ship, only two tractors were running, so they were only able to unload 15 ton per day. The weight of the snow on the sea ice near the ship depressed the ice below the water level. After a few days of unloading, the compacted snow became mushy and developed pot holes. The length of the tow rope between the tractor and sledge was lengthened so the tractors could pull from a solid surface. The crew flew the TAE Auster airplane up from Shackleton and loaded it on the *Tottan*, which departed on Jan 7th.

The average annual snowfall was around three feet. For nine months of the year, there was an average of six gale force/ blizzard winds, but there were at least several blizzards every month.

The winds left a level surface when they were done, which had a tendency to bury anything above ground such as tractors and supplies. Consequently, as much as possible, the supplies were stored on metal shelving four feet above ground, which allowed some of the snow drift to blow under. But eventually during the year, the shelving and supplies would be buried. Everything left outside was marked with long



The first glimpse of the sun after 100 days of darkness.  
Photographer: Jim Blackie in 1960.



Two of the Ferguson tractors after a "blow" in the spring of 1958.  
Photographer: John Smith.



Two of the Ferguson tractors trying to get started after a "blow" in 1959  
"Frame from the film *Antarctic Observatory*" filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.



bamboo poles so it could be located once covered with snow.

One particular problem was the balloon shed's 10-foot door. By 1958, the balloon shed was buried up to twelve feet deep, and after every gale the snow had to be dug out. This had become an almost daily task. The snow had a consistency of soft sandstone, so it was not an easy task. By the end of the year, the outside walls of the main hut were fifteen feet below the surface, and snow chutes were fitted for the delivery of snow to the kitchen and bathroom where it was melted for all their water needs. In February, a coal chute was constructed to the indoor coal area. This greatly reduced labor for these tasks. The men dug tunnels from the doors of the huts to vertical shafts to the surface. A hatch made of a two-foot by three-foot crate was attached above the surface and was extended as necessary to keep it above the surface. A larger shaft at the rear door of the hut was cut to remove large items. These hatches along with the vent and chimney pipes needed to be lengthened after each blizzard.

The tractors were run on Avtur (aviation turbine fuel,) which did not jell like the diesel fuel they were designed to run on. Starting the tractors in temperatures less than -30 C (-22 F) was not an easy task. First a small oil fire was lit in an old tin can and then placed under the engine. Shortly flames would lick around the engine to warm it up. The trick was to make sure that the flames would only lick around the relatively non-flammable side of the tractor.

Later, after the generator shed was buried with snow, they dug a steep ramp down to the shed and placed a large lid at the surface of this ramp. The lid could be raised with a block and tackle, and it allowed a tractor to be driven down the ramp to the warmth and light of the generator shed. One time, they could not get the tractor restarted, so six men had to man-haul it back to the surface with a system of block and tackles. Also, after the generator shed was buried by over 30-feet of snow in 1959, a tractor was parked over the shed, and the exhaust from the diesel generators was piped up to the tractor, which was under a tarp. This helped in a small way to warm it up. The batteries were stored in the generator shed to keep the batteries warm. Long leads over 30 feet were passed to the tractor for starting.

If the temperatures were above -20 C (-4 F,) the tractor's factory Ki-Gas starting aid was used. This consisted of a heater element fitted to the intake manifold. There was also a Ki-Gas pump mounted on the dash, which sucked fuel from the small Ki-Gas tank under the hood and sprayed a small amount of fuel into the intake manifold. If this would not start the tractor, they used an ether injection system. After running short of this ether, they used anesthetic ether. They used the anesthetic ether in the tractors because it was too dangerous to use in the main hut where the low humidity could have led to explosions.



Here the tractor's winch is being used to bring ice and snow up the ramp from the door of the generator shed, which was buried 30 feet below the surface.

Frame from the film *Antarctic Observatory* filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council



To help start the tractor, it was parked under a tarp near the buried generator shed. The exhaust of the diesel electric generators was piped up under the tractor to aid in its starting.

Photographer: Jim Blackie.

The problem with having the batteries in the generator hut was that if the tractor stalled while in use during the winter months, it had to be abandoned until spring.

Some of the implements that the tractors had, included a Ferguson high lift loader (banana loader), three-point rear blades for pushing snow, a Ferguson winch, and a back hoe.

One of the uses of the tractors was to move the solid garbage from the main hut to the dump. This could be as much as 150 cubic feet in 6 days, such as on one occasion in May. For the first two years, the tractor's winch was used to winch out the 44-gallon drums of waste from the latrines in the main hut, and to haul them to the dump. Later, as

the hut became buried deeper, a more practical and easier method of waste disposal was developed. The tractors were used to haul empty boxes to the dump and to move the 44-gallon drums of fuel from the storage dump to the generator shed for the generators. The Radar unit was dug out of the snow drift and moved to higher surface by the tractor's winch eleven times during the eighteen months of the IGY.

The tractors hauled tins of caustic soda and granulated aluminum to the balloon shed to generate hydrogen for the balloons. Several times, one of the



If the tractor stalled during winter, it had to be abandoned until spring when it was dug out from the snow. This was because the batteries were stored in the generator shed. The blown snow had a consistency of soft sandstone so this was not an easy task. The long bamboo poles were used to mark the tractor and other supplies, so they could be located in the spring.

Photographer: Dr. Michael Sheret.



Another shot of the tractor in the process of digging out of the snow. A Ferguson winch can be seen on the rear of the tractor. The tractors for the first year were fitted with half tracks and steered with the steering wheel. During the unloading of the ship the second year they were converted to full tracks and the steering was locked. They were then steered with levers attached to the individual brake levers. If you look close you can see the vertical hand brake lever in front of the fender.

Photographer: John Smith.



Starting the tractor in the open in cold temperatures consisted of bringing a battery in a heated box, a primus stove to thaw out the antifreeze, and another to warm up the oil and ether to start the engine.

"Frame from the film *Antarctic Observatory*" filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.



A back blade on one of the tractors pushing snow.

"Frame from the film *Antarctic Observatory*" filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.

tractors went down to the sea ice and brought back seals for food. They spent one unsuccessful day trying to dig a tunnel from the main hut to the radio echo hut with the tractor back hoe. A tractor and winch were used to haul snow and ice up a ramp from the buried generator shed; the winch was also used to pull supplies out of the snow drifts. Sledges full of coal were pulled by the tractors from the storage dumps to the main hut.

On Dec. 6th, 1958, until Dec. 15th, a tractor was driven back and forth daily from Halley Base to the edge of the sea ice to compact the snow. The route was tested on Jan. 5th with a sledge pulling two

ton (12 drums of fuel.) Unfortunately, cloudy warm weather deteriorated the route during the unloading of the *Tottan* later in Jan. 1959, which bogged the Ferguson tractors with eight drums of oil down.



Moving the radar unit during the summer of 1957/58 to a new location above the snow surface.  
Photographer: John Smith.

The *Tottan* was again chartered to bring down supplies to Halley Bay in Jan, 1959. The Falkland Islands Dependencies Survey (FIDS) party that was to replace the Royal Society IGY party was on board. Before the ship's arrival, three small cracks, several feet across, in the sea ice had to be bridged for unloading. The *Tottan* arrived on Jan 10th, 1959. Also on Jan. 14th, Halley Bay Base was transferred to the FIDS.

Among the supplies brought down on the *Tottan* was a new engine for one of the tractors and a new eight-foot by eight-foot ozone observation shed mounted on a sledge foundation so it could be moved out of the snow drift from time to time, instead of getting buried in the snow like the old one had.

All three Ferguson tractors were available for unloading and loading. Each tractor could pull two Maudheim sledges. It took three quarters of an hour to load them, another half an hour to cross the sea ice to the top of the slope, and another hour to reach the base and unload for the return trip.

On the 12th of January, the weather turned bad and they had to stop unloading by 3 pm because of poor visibility. It took three hours to get up to the base because they had to follow a member of the party who was walking on foot to make sure they remained on the correct path to the base. To speed up unloading, they made an agreement with the new party to leave the supplies at an interim dump on top of the ice shelf. The FIDS party would then move the supplies to the base at a later date. On Jan. 13th, Bert Brooker took one of the tractors out in whiteout conditions. He did not see a sharp dip in the terrain, and the tractor tipped over on Bert throwing him facedown under the tractor's still turning tracks. They were able to stop the tractor only after the tracks had ripped into his back and hurt his shoulder.

On Jan. 14th, 1959, the tractors went down to the *Tottan* but were unable to unload again because of bad weather. The visibility was so bad that one of the tractors had nearly gotten lost.

By Jan. 16th, the *Tottan* was completely unloaded and then loaded with the twenty ton of scientific data and equipment from the IGY that was to be taken back home. Several times during the unloading, due to poor visibility, one of the tractors drove off the trail to the bay and stopped just a few yards short of the edge of the ice shelf onto the sea ice about 200 feet below.

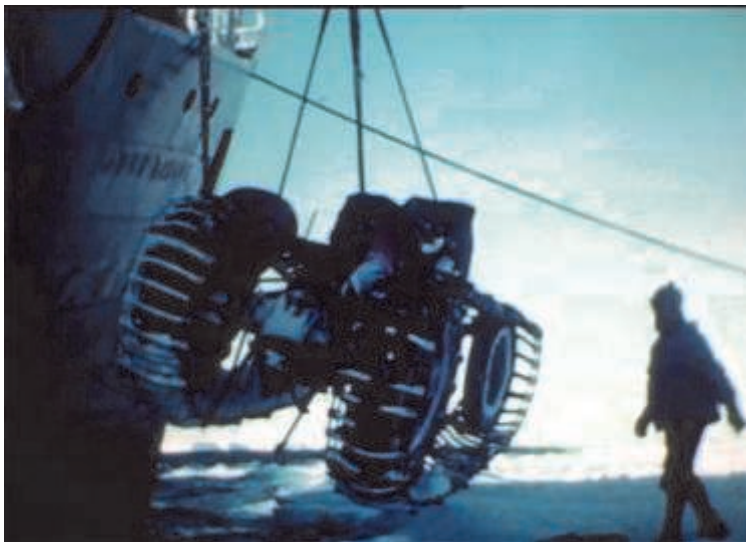
The ship RRS *John Biscoe* was the first British ship to get this far south since Shackleton's *Endurance* was beset and lost in the Weddell sea, the same latitude as Halley Bay. The *Biscoe* arrived in December, 1959, and the unloading of the ship went without any incident. The *Biscoe* took one of the three Ferguson tractors with her when she left. It was thought that this tractor, TEF-20 serial # 474331, was dropped off at Deception Island as the ship returned to England.



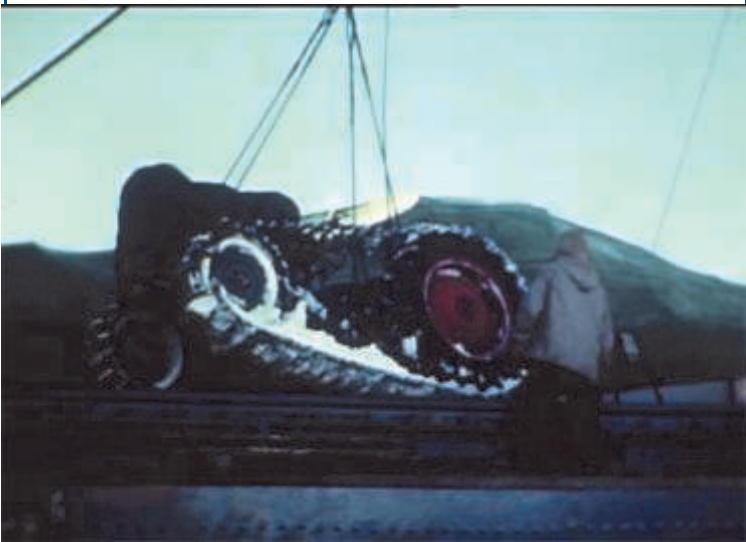
Ferguson tractor pulling two Maudheim sledges and a man-sledge up to Halley Bay Base.  
Photographer: Nelson Norman.

The two remaining Ferguson tractors were in poor condition after the ship was unloaded. Fortunately, a large supply of parts for the tractors came with the ship's cargo, and the expedition could do major overhauls and modifications to the tractors soon after its arrival. It was essential to keep at least one of the tractors running during the next year to perform the many tasks required of them.

During January or February of 1961, the ship *Kista Dan* brought back the Ferguson tractor that had been taken away earlier on the *Biscoe* to help with the unloading. Unfortunately, the tractor was filled with the wrong fuel and oil in the sump and was not able to be started. There was such a short time for the ship to get unloaded and sail before the sea froze that they dealt with the problem immediately. The *Kista Dan* also brought two Bombardier Muskeg tractors that were going to be left at Halley Bay Base. The



The ship *John Biscoe* took one of the three Ferguson tractors with her when she left. It was thought that this tractor, TEF-20 serial # 474331 was dropped off at Deception Island as the ship returned to England. **Both of these two photos are** "Frame from the film *Antarctic Observatory*" filmed by Johannes Bothma in 1959 (British Antarctic Survey Archives Ref AD6/16/1959/1.2). Reproduced courtesy of British Antarctic Survey/Natural Environment Research Council.



three Ferguson tractors and all the spare parts were loaded on the *Kista Dan* and left Halley Bay Base with her.

The Muskeg tractors had a Chrysler flat head strait six engine that was rated at 115 HP at 3,400 rpm and weighed 4,600 lbs. The best feature of the Muskeg was that it had a cab that seated three people in the front seat. The Muskegs, or "Kegs," were not without their own problems. Each tractor had sixteen tires -- four sets of duals on each side -- and it was a constant challenge to keep them inflated. When traveling with the "Kegs" on long trips, the men left the engines running the whole time in fear that they would not be able to start them when they wanted to continue traveling.

Starting the "Kegs" in cold weather involved the use of two gas blow heaters which they built at the base. These heaters were directed in the engine

compartment by two three-inch tubes. The flames were directed into the engine block, intake manifold, and oil sump for an hour or more. The engine compartment was covered by an insulated cover during this process. If this did not work, they would inject methanol directly into the carburetor as the engine turned over. This was a risky process, done sparingly, as they were afraid it would damage the engines, but it sometimes proved necessary. The methanol capsules were used to start the diesel



The new garage was built in 1961. Photographer: Bob Lee



Digging out the generators from the buried generator shed under the snow. The new generator shed is in the back ground. This was the ramp down to the old generator shed with a lid that the Ferguson tractors were driven down to for repairs. Photographer: Bob Lee.

generators.

The new base hut was started in 1960 and was completed before they lost the sun on Sunday, May 9th, 1961. The sun returned around August 10th that year.

#### Deception Island

Deception Island is a giant volcanic crater located south of Argentina and Chile and off the northern tip of the Antarctica Peninsula. Whalers Bay was first established as a whaling station in 1911 by the Norwegians. It was closed in 1931 because of the



One of the new Muskeg tractors pulling a load of oil drums from the ship. Notice the two "bumps" in each set of tracks. This is due to each side having four sets of dual wheels for a total of 16 wheels, which were a constant battle to keep inflated. Also notice the ice cliffs in the background. These cliffs were similar to those that a Ferguson tractor was almost dove off several times when it lost track of the trail during whiteout conditions throughout the loading and unloading of ships.

Photographer: Jim Blackie.



Two of the Muskegs moving supplies to an inland supply dump. The building in the background is the generator shed. Behind the "Kegs" are chimneys and hatches for shafts that went down 40 feet to the original hut. These were raised many times every year. The rectangular frames are supports for the radio feed lines to the rhombic antennae; these were also raised many times every year. The radio shack was in the original hut.

Photographer: Edwin Thornton.

low price of whale oil.

On Feb 3rd, 1944, the Royal Navy established British Base B on Deception Island in Operation Tabarin, using three of the whaling station buildings. The aim of this operation was to deter access of **enemy ships and to strengthen Britain's claim on the Falkland Island Dependencies.** It also allowed the undertaking of scientific research. In 1945, the base was handed over to the Falkland Island Dependencies Survey (FIDS), the forerunner of the British Antarctic Survey (BAS). In 1955, the Falkland Islands Dependencies Aerial Survey Expedition 1955-57 began, and a new hut was built (the FIDASE hut). At the end of the expedition they handed over the hut to FIDS. The aircraft hangar was completed by BAS in 1962. The main activities carried out at Base B were meteorological studies and the operation of an air facility to support survey work and the other bases in the Antarctic Peninsula region.

In 1959, a gas engine MF 35, serial number SGM114923, was delivered at Base B on Deception Island to construct an airstrip and to move aircraft and supplies around the area. This tractor was fitted with Norwegian half tracks. In Nov., 1960, a second gas engine MF 35, serial number SGM 162391, was delivered to Deception Island and fitted with full Norwegian tracks. In late 1961, a third Ferguson tractor, TE 474331, was delivered to Deception Island. It was thought that this tractor was originally from Halley Bay.

The two gas MF 35's were occasionally shipped to Halley Bay for use in moving supplies there. These two tractors were moved back to Deception Island to move the planes back and forth from the hangars. In 1965/66 a third MF gas engine tractor was delivered.

It was fitted with skis instead of front wheels for a time. The volcano on the island erupted in Dec of 1967, and they were forced to evacuate. The base was reopened in December of 1968 but had to be closed for good on Feb. 23rd, 1969, following another eruption because the eruption's mud-flow destroyed most of the buildings.

The MF 35 on the back cover of this magazine, was buried in the volcanic ash that also changed the topography of the coastline of Whalers Bay.

Although Deception Island was closed in 1969, Halley Bay has remained open and is to this day. Halley Bay Base became Halley Base on Aug 15th, 1977, after the ice shelf in the bay disappeared. On Jan 1st, 1962, the FIDS was renamed BAS (British Antarctic Survey.) There have been six bases built at Halley Bay. The first four bases were buried and



Hauling Beaver VP-FAJ from repair shed at Deception Island. AD6/19/3/A23

Photographer: Tween, Michael Harry (diesel mechanic) British Antarctic Survey Archives Service



Otter VP-FAK (and part of VP-FAL) at Deception Island. AD6/19/3/A27  
 Photographer: Killingbeck, John Basil, (general assistant and Base Leader) British Antarctic Survey Archives Service



Construction of hangar at Deception Island. AD6/19/3/A30  
 Photographer: Killingbeck, John Basil (general assistant and Base Leader) British Antarctic Survey Archives Service

crushed with snow. The fifth, Halley V, was built on legs that could be raised but were fixed into the snow. In time it had moved with the ice flow too close to the sea and had to be abandoned. Halley VI was the first re-locatable research station built in the world. It consisted of eight modules each on top of skies fitted to hydraulic legs, which can be raised to overcome snow accumulation. Each module can be towed to a new location when the horizontal motion of the ice carries the base too close to the edge of the shelf.

Much of the abandoned British Research Base and the Norwegian whaling station remain today. During the summers of 1990-91 and 1991-92, clean up operations of hazardous waste fuel, batteries, and general debris were removed by the British Antarctic Survey. It was not planned that any of the abandoned buildings be removed, and in 1995 the remains of the Norwegian whaling station were designated as an Historic Site and Monument under the Antarctic Treaty.

The Antarctic Treaty was signed in Washington on Dec. 1, 1959, and was signed by the 12 countries whose scientists had been active in and around Antarctic during the IGY. The treaty was enforced on the 23 of June, 1961, and now has around 50 countries, or 80% of the world's population, acceded to it.

The main objectives are:  
 ♦to demilitarize Antarctica, to establish it as a zone free of nuclear tests and the disposal of radioactive waste, and to ensure that it is used

for peaceful purposes only;

- ♦to promote international scientific cooperation in Antarctica;
- ♦to set aside disputes over territorial sovereignty.

Our thanks to the following who contributed to this article, many of whom actually lived and worked at the base from the dates indicated.

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

1957 and 1958

Barclay L.W. (Les) *Ionospherics*

MacDowall J. (Joe) *Met., Geomagnetic., Glaciology., Seismology and 1958 base leader for 1958*

1958

Smith J.A. (John) *Meteorologist*

1959

Dr. Sheret M.A. (Michael 'Black Mike') *Geophysicist*

Norman J.N. (Nelson) *MO medical officer*

1960

Blackie J.R. (Jim) *Physicist*

Millar A. (Alex) *Meteorologist*

1961

Skilling J. (John) *Carpenter*

Thornton E. (Edwin) *Meteorologist*

Lee R.G. (Bob) *GA, Tractors*

1962 & 1963

Jehan D.R. (Dudley "Cuddles") *Meteorologist*

(and in 1963 as a general assistant)

1971 & 1972

Smith Andy: At Halley Bay, Editor of Z-fids Newsletter

(Halley Bay is called Base Z, fids refers to 'Falkland Islands Dependencies



Moving "A" module. In 2011, fifty five years after the original Halley Base Hut was built, the 200 ton module was on skies and was pushed and pulled out of a seven-foot deep bulldozed ramp by two John Deere tractors, two Cat Challengers, and four D4 or D5 Cat Dozers. Once level with the snow, the module was completed, and the John Deere's and Challengers moved the module over 9 miles in two hours to the new Halley VI location. Credit Halley Bay VI party.

Survey.") Also Webmaster Halley Bay Web site, [www.zfids.org.uk](http://www.zfids.org.uk) and worked for the BAS till 2005 2009 till 2012

Brown Matthew: Halley as Base Commander

The following books were used to research this article.

- "The royal society international geophysical year Antarctic expedition- Halley Bay: Coats Lands, Falkland Islands Dependencies, 1955-1959." Volume IV: Meteorology, Glaciology, Appendices. United Kingdom: The Royal Society. Creators:

Brunt, David, Date: 1964

- **"On Floating Ice" "Two Years on the Antarctic Ice-shelf South of 75 degrees S" by Joseph MacDowall** ISBN 1 85821-720 2 printed 1999 by The Pentland Press LTD NOTE: Joseph MacDowell has donated a copy of his book to FENA and it will be one of the items available at our 2013 FENA EXPO Auction in Vienna, OH.
  - **"In Search Of A Penguin's Egg" by Nelson Norman** ISBN 978-1-4490-1729-3 (sc) published by Author House 9/8/2009
-



Ferguson Tractor  
half buried by lahar  
on Deception  
Island. AD6/19/2/  
B103, Photographer  
Maurice Reginald  
Summer. Date  
1969.02.04  
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