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REDAKSIONEEL — EDITORIAL

It was with much regret that the Association received the resignation of Dr. André van der Merwe as editor of the *Bulletin*. He took over from Dr. J. J. Taljaard in March, 1966 and the effort that was put into the task is evident in the last eleven issues. The standard of the *Bulletin* has steadily improved and today it provides a wealth of information on past South African Antarctic activity. His pen has been responsible for an enormous amount of the information published in the *Bulletin*.

Dr. van der Merwe was a member of SANAE 1 in 1960 and of the 1967/1968 South African—Belgian summer expedition. He is also co-ordinator of the physiological programme and has main-

tained a steady interest in Antarctic organizations. Recently he completed writing a book on Antarctica entitled *Die Wit Horison*. It covers his trips down south, the ice conditions encountered, animal life on land and at sea and the life of people in Antarctica. He also discusses the impression that Antarctica makes on people who have wintered there. A review of the book will appear in the next issue of the *Bulletin*. As this is the first book on Antarctica written by a South African, it should find its way onto many a bookshelf in South African homes.

Thank you very much, Dr. van der Merwe for your services to the *Bulletin* and to South African Antarctic organizations.

Summer Expedition 1968 and SANAE IX

mv. R.S.A.

K. T. McNISH, Master

1. Special problems for this season as a departure from the normal run as in previous years were:

- (A) Loading of two aircraft in mv. R.S.A. (1) A Cessna was removed from its shipping crate and stowed in the hangar on the Helideck. Great care had to be exercised in slinging the fuselage due to its fragile nature. The wings were stowed separately in their special frame also in the hangar. (2) An Otter had to be carried in its crate on the foredeck across number two hatch. This crate had a total weight of eleven tons and was forty-two feet in length by fifteen high and twelve wide. A special platform had to be constructed over the fore part of number two hatch and over the deck on each side of the hatch from ship to ship side. Note: The R.S.A. is forty-two feet in the beam! After construction of the platform the case was landed aboard by the floating crane. The case was then very carefully lashed down as rolling is always encountered on voyages down south.

- (B) Separate stowage for all Summer Expedition cargo was arranged in number two tween deck and for aviation fuel in number one tween deck.

R.S.A. next to the bay-ice at Muskegbukta 1968.
Photo: D. Neethling.



- (C) The voyage south presented no special difficulties, but bearing in mind the prevailing south-westerly wind and swell normally encountered in the fifties, full advantage was taken of good weather after leaving Cape Town to steam due south so as to make as much distance southwards before encountering the winds. This proved to be well worthwhile because once the ship was well into the fifties we were able to keep the wind "on the bow" and minimise the rolling to a large extent.
- (D) Pack ice was encountered fairly far north this year resulting in an ice passage of two hundred and ten miles. Also, unlike other years the pack ice was almost up to the ice-shelf with a very narrow shore lead. Passage through the pack presented no special difficulties, but on several occasions the ship had to stop for some hours to await easing of pressure. In general the pack was not very much thicker than normal. It was mostly broken up and consisted of small floes which were rather closely packed. This required "full power" to push aside and only a limited amount of "breaking". A few small "bridges" did however, hold the ship up for some hours by having to be broken up to permit further progress. Bad visibility on several days did not help matters at all. Proceeding through pack under these conditions was chancy, as we could not see if we were proceeding in a direction of "good ice" or up a blind alley. Nevertheless it only took five and a half days to make the ice passage at an average speed of one point six knots which, taken all round for the conditions prevailing, was a good passage.
- (E) Finding a suitable area of "bay-ice" on which to land the aircraft proved to be fairly easy. It was hoped to be able to use the "bay-ice" in Admiral Byrd Bay for this purpose, as in the past it had been found to be of suitable thickness. However, this "bay-ice" had disappeared due to a large portion of the Troll tunga breaking off. This then made it necessary to use the relatively thinner "bay-ice" in Muskeg and Otterbukten. Unlike other years, the bukten, except for Tottenbukta, were found to be full of good solid ice. It was finally decided to land on Muskegbukta as the surface there was fairly smooth.
- (F) The actual landing operation for the aircraft went very smoothly after the ship had been suitably moored. The Cessna was landed and dragged away from the edge by the SANAE and Belgian teams as were the wings. Assembly proceeded well and within four hours the plane was air-worthy. Landing the Otter was more tedious as the job had to be done in six stages. (1) The derrick had to be plumbed for the centre of balance for the lid. The lid was then unclipped and landed on the ice. (2) The derrick had to be re-plumbed for centre of balance of the plane. The plane was then lifted a few feet so that the skis could be fitted. (3) The ship was then moved ahead to clear the box lid on the ice and the plane swung overboard and landed to be hauled away by the teams assisted by a muskeg. (4) The wings and heater units were then landed. (5) The ship was then moved astern again and the derrick rigged in its first hoisting position. (6) The lid was then hoisted aboard and placed back on the box. (This procedure was reversed when it came to re-shipping the aircraft for the homeward voyage.)
- On the Belgian ship the *Magga Dan* this procedure could not be followed as her hatches were of the mechanical folding type which required the box to be removed entirely. The whole eleven ton box and aircraft had to be landed on the ice and the lid lifted off there. They also had to shift ship more times as the aircraft had to be lifted clear of the box and landed after the lid had been removed. Our method proved to be easier as we could leave the base of the box on board.
- (G) Landing the summer expedition stores and aviation fuel went more or less according to plan with only a few short hold-ups due to "white out" conditions and mechanical breakdowns.

2. Surveys, etc.

- (A) The ship was expected to re-survey the coastline which was previously done by the ship in 1964 and also carry out as many lines of soundings as possible. As the pack ice this season was, on most days, within a mile of the shelf and in most places right up against the shelf, it was only possible to re-survey the bukten areas, a distance of only about twenty-five miles. A few changes in this area were noted: mainly the sides of Tottenbukta and the shelf immediately to the north of Totten. (The bukten had "bay-ice" in them with the exception of Totten which was free of ice. The shelf in Tottenbukta was estimated to be about twenty feet in height with a fair overhang. It would have been unsuitable for aircraft landing and seeing that Muskegs could proceed on the bay-ice at Otterbukta it was decided to land all cargo thereover the bay-ice.)
- (B) Soundings were also limited to the area which could be surveyed. No startling changes were found.
- (C) It was found by observation (visual) that the large projections on the southern end of the Troll tunga as plotted on the 1964 survey had broken away during 1967 (They were there in January 1967!). These broken off "bergs" were now mostly grounded on the ninety to one hundred fathom bank to the north-north-east of Otterbukta. Also a large number of "bergs" were grounded to the north of the Ice Rise. I suspect that these grounded bergs had a great deal to do with the ice being trapped against the coast because it was eventually found that the pack ice belt did not extend much beyond the northern limits of these grounded bergs.
- (D) Aerial observation confirmed the above statements about the breaking off of the Troll tunga tongues and also the extent of the pack ice two days prior to our sailing.
- (E) Soundings taken on the voyage south and northward passage are being handed to Department of Geology (Professor Simpson) for processing. After being dealt with, they will be handed to the Hydrographer of the S.A. Navy as in previous years. No startling results were detected, but lines were to a large extent NOT over the same routes as followed in previous years due to the original southerly course from Cape Point and a deviation to the east soon after leaving Bouvet on the northward run.
- (F) The visit to Bouvet provided another line of soundings on the south east side and observation of the snow shelf failed to reveal any sign of the wooden hut placed there on the last expedition. The higher slopes were once again obscured by low cloud. Several grounded icebergs were found on the south west side.
3. Discharge of aircraft after arrival in Cape Town was done by a five ton crane using the same method used in Antarctica, viz. the lid removed, aircraft removed and then the base. The heavy floating crane was therefore not required. The aircraft were then transported to Ysterplaat airfield by the S.A.A.F.

Polaris toboggan used at SANAE.
Photo: Hans Loods.



TOBOGGANS IN ANTARCTICA

Wilf. Hodson, SANAE 6 and 8

Since 1964 two types of toboggans have been in use at SANAE; the Polaris K95 model which is now obsolete and the newer 2400 model. My experience has been largely with the latter. As I was in the maintenance section of the expedition, this article will deal more with the faults and troubles experienced rather than with the advantages of this means of transport.

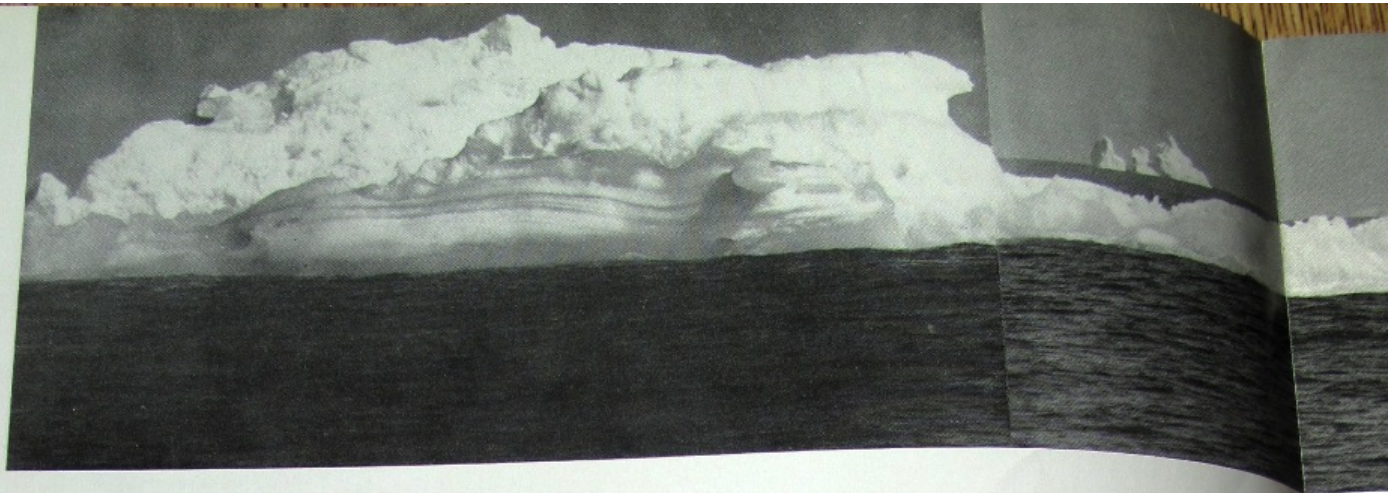
The advantages and disadvantages of motorized as opposed to dog-drawn sledges were much discussed on the expedition. I feel convinced, however, that the advantages of motorized sledges outweigh their disadvantages as compared with dogs. The major disadvantage being a major breakdown in a remote area.

The K95 toboggan gives the impression of being a prototype rather than a well-planned machine. The idea of having the main weight supported on runners or skis which are unsprung with the track solely for driving, appears to be outmoded. The vehicle at SANAE proved to be very reliable if rather bumpy and slow. Starting in cold weather was the cause of much sulphurous language in spite of preheating and the use of multigrade oil. The fact that the engine is completely unprotected from the wind made effective preheating very difficult. The diaphragm in the fuel pump would stiffen in the cold to the extent that it would not pump fuel. On soft surfaces the track would dig in and the machine would have to be pushed and dug out of the hole it had made; again amidst many uncomplimentary comments by all concerned. After each storm the track and steering mechanism had to be cleared of drift snow before the machine

would move under its own power. Generally speaking, the harder the surface the better. No great distances were covered on blue ice, but it operated very well where blue ice was encountered, apart from a noisy and spine-jarring ride. Other points which required attention were the windscreen frame which was reinforced and the tow bar which was also reinforced. During the combined South African Belgian expedition, it was necessary to airlift the South African and two Belgian K95's. These were found to be awkward to strip and both cumbersome and heavy to load into the Otter aircraft used. It was very difficult to load a complete, although stripped toboggan into the aircraft. Usually the motor-track assembly was taken on one trip with other camp equipment and the bodywork and runners on a separate trip. This led to delays in the field, whereas if the complete machine could have been loaded, persons in the field could have used it soon after arrival. Fuel consumption was about 7 km per imperial gallon with a full load.

The Polaris 2400 was considered to be well designed and was faster and more economical on fuel than the K95. The major criticism being that the construction was too flimsy. The two-stroke motor started relatively easily with a little help from a blow torch in temperatures below minus thirty degrees Celsius. Mixing fuel for a two-stroke is always messy and was made more so by the oil not mixing with the fuel in low temperatures. The mixing had to be done gradually and the mixture very well shaken or stirred before the oil would combine with the petrol.

(Continued on Page 34)



BLACK ICEBERGS

ANDRÉ VAN DER MERWE, SANAE I

During a recent visit to London I had the pleasure of a lengthy interview with Sir Vivian Fuchs, Director of the British Antarctic Survey. He is more generally known as the leader of the Trans-antarctic Expedition which made the first crossing of the Antarctic continent during the summer of 1957-58.

During our discussion I raised the matter of black icebergs which the R.S.A. encountered on its voyage to the Belgian base and on its return from SANAE at the beginning of 1967, when I again visited Antarctica. Their origin and composition still seem to remain a puzzle, as it also appears from the comment by Dr. Swithinbank which is contained in a letter from Sir Vivian. Owing to the terrific rise and fall of the waves (± 24 ft.) against these bergs in the open water, it is hazardous to attempt to collect specimens from a boat. Contact with helicopter might be feasible.

I submit copies of the relevant portions of my letter to Sir Vivian, in order to give the precise locality of these bergs, and his reply.

“26th April, 1968.

“I promised to send to you copies of the photos of black icebergs which we encountered on our trip to and from SANAE-base at the beginning of 1967.

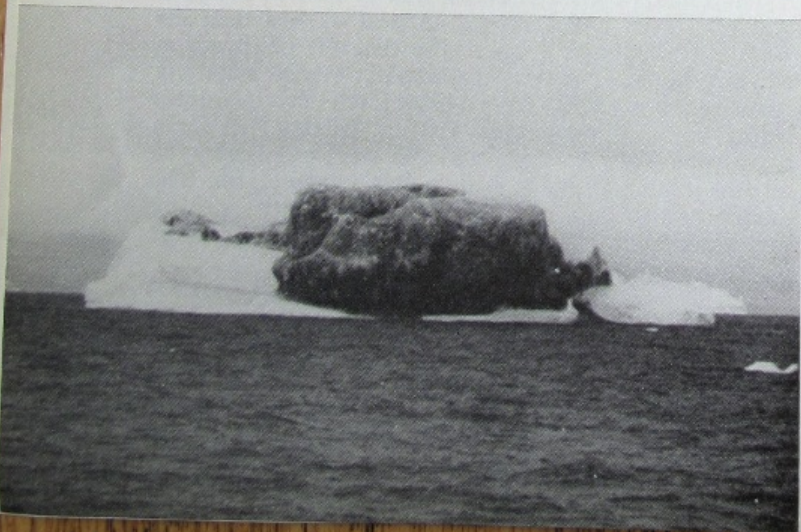
“Unfortunately we found all of them in open water so that there was no chance of getting specimens for closer examination and analysis. We can, therefore, at this stage only guess at their composition.

“Mr. Dirk Neethling of Geology in Pretoria also saw some black bergs on another occasion and ventures the thought that the black colour might be due to increased density. I, not being a geologist or a glaciologist, venture the theory that the discoloration may be due to chemically decomposed plankton. What is remarkable is the sharp demarcation line between white and black in some of the bergs.

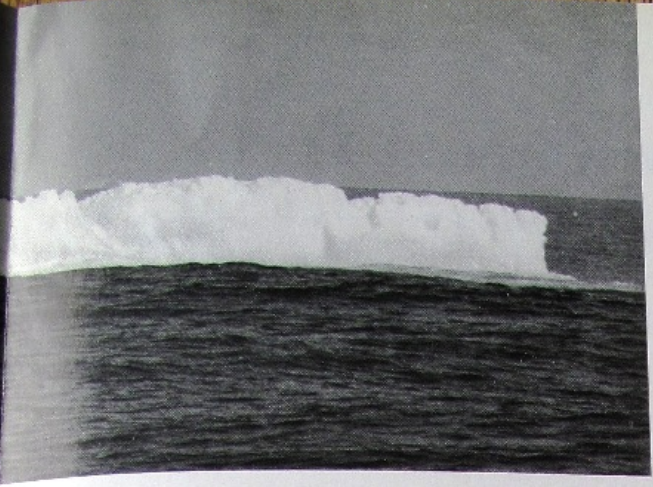
“The bergs of which I enclose photos (the black one and the one with stratification) were found between $47^{\circ} 35'S$, $8^{\circ} 54'E$ (water temperature $7.6^{\circ}C$, air $5.4^{\circ}C$) and $47^{\circ} 14'S$, $9^{\circ} 16'E$ (temperatures 5.5° and $4.5^{\circ}C$ respectively) on 13th February, 1967.

“On our way down south towards the Belgian base we also spotted a partially black iceberg at $59^{\circ} 25'S$, $25^{\circ} 10'E$ (water temperature $0.5^{\circ}C$, air $1.0^{\circ}C$). It was flat on top and round with a black eastern face. Wherever we found the black bergs there were white ones around. In the vicinity of the latter black berg we passed a smallish one with bright green peaks.

“One photo shows a berg with a solid rock in one of its faces.”



Black iceberg.



Discoloured iceberg with stratification.

Sir Vivian Fuch's reply:

1st July, 1968.

"I am sorry to have been so long in replying to your letter about the black icebergs. Because I myself did not feel I knew enough about the subject I passed your letter and photographs to Dr. Swithinbank who looks after our glaciological programmes.

"The following is a copy of the note he sent me and you will see that in fact very little is known about this phenomenon.

"It would certainly seem desirable for any of our ships, which observe such icebergs, to bring back samples of the white and black ice.

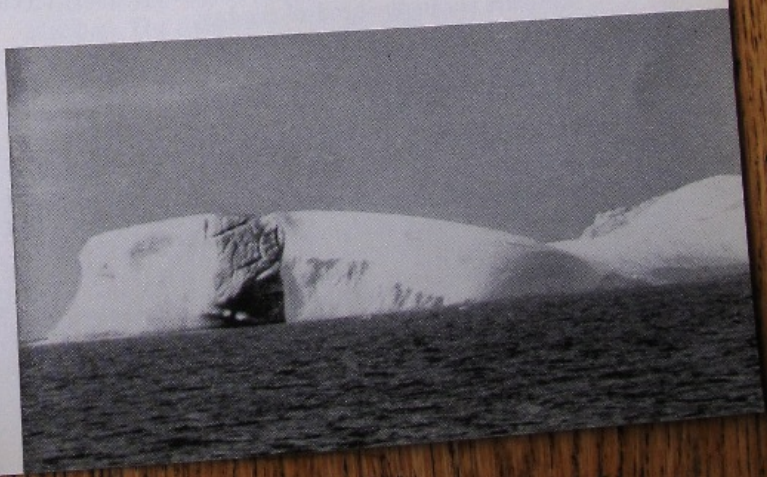
"I have done no work on black icebergs and I do not know anyone who has, though they are not very uncommon and there are many reports of such sightings in the literature. Samples held in the hand have been reported to consist of clear bubble-free ice, providing a conspicuous contrast with the white bubbly ice of which most antarctic bergs are made. Until someone takes home a substantial and representative piece and subjects it to chemical analysis (organic and inorganic), all suggested explanations are no more than guesses.

"I have two alternative guesses. The first is that the black ice represents what was formerly a layer in an ice shelf or iceberg tongue that became soaked with sea water and then froze. This would account for the clean ice above and below the black ice, since brine-soaked layers are believed to be of only limited thickness (Ref.: *N.Z.J. Geol. & Geophys.*, Vol. 10, No. 2, May, 1967, pp. 484-97). The icebergs calved from the ice shelf have later capsized, so that the layer of black ice may be at an angle.

"The alternative is that the black ice represents what was formerly water at the bottom of the ice sheet (Ref.: *Antarctica Journal of the United States*, Vol. III, No. 2, March 1968, p. 51). This would explain the occasional association of rocks and rock flour with the black ice, for the water refreezes before the ice reaches the edge of the ice sheet. The fact that there is white ice not only above but also below the black ice would then have to be explained by the refrozen layer overriding more stagnant ice at the edge of the ice sheet. This is known to occur whenever such a process can readily be identified, that is to say where the ice sheet terminates on land."

Signed V. Fuchs.

This photograph illustrates the difference between a black iceberg (see left facing photograph) and a Moraine iceberg which contains a solid rock in one of its faces.



VOORSITTER SE JAARVERSLAG

(Uittreksels uit die 1967/1968 jaarsverslag van mnr. A. M. Venter, uitredende voorsitter van die Suid-Afrikaanse Antarktiese Vereniging.)

Die Suid-Afrikaanse Antarktiese Vereniging is sewe jaar gelede gestig met die doel om persone met 'n gemeenskaplike belang in Antarktika en Sub-Antarktiese Eilande saam te snoer in 'n vereniging waar Antarktiese navorsing, logistiek, menslike aanpassing en so meer bespreek kan word. Lidmaatskap tot ons vereniging was en is nog steeds oop vir alle ouderdomsgroepe sonder enige verpligting van oorwintering of verblyf op Antarktika. Die kern van die vereniging moet egter gevorm word deur persone wat die voorreg het om op Antarktika of die eilande te werk, en te leef. Dit is hierdie persone se kennis en ervarings wat vir die Vereniging oorgedra word na die mede-lede en ook die publiek om sodoende reklame te maak vir ons navorsingswerk. As 'n mens na die lys van ingeskrewe lede van die vereniging kyk, is dit opvallend hoe baie buitestaanders—die persone wat nog nooit op Antarktika of op 'n Sub-Antarktiese Eiland was nie—aan die Vereniging behoort, maar helaas, dit is ook pynlik opvallend om op te merk hoe min oud-SANAE-ekspedisie lede se name op hierdie lys verskyn. Die komitee sou graag sien dat meer oud-ekspedisie-lede aktief deelneem aan die Vereniging.

Gedurende die afgelope jaar het die Vereniging twee keer vergader. Mnr. John Pitts, nuusredakteur van *The Star* het kleur skyfies vertoon en lewendige kommentaar gelewer oor sy besoek aan SANAE gedurende 1966/1967. By die daarop volgende ver-

gadering het ek self 'n praatjie gelewer oor die moontlike gebruik van radio-aktiewe isotoop kragbronne op Antarktika (*Ant. Bull.* No. 24). Die komitee het vyf keer vergader om sake rakende die dinee, die toekenning van die medalje ens. te bespreek.

Die midwinersgroete en kersgroete is soos gebruikelik aan SANAE en ander Antarktiese basisse gestuur.

MNR. GRAF OOSTHUIZEN

Die heengaan van mnr. Graf Oosthuizen wat baie aktief gemeed was met die Antarktiese navorsings program, was 'n groot skok vir al die lede van die Vereniging. Die Vereniging het medelye met sy eggenote en kinders betuig.

DIE SUID-AFRIKAANSE—BELGIESE SOMER EKSPEDISIE

Aan die einde van verlede jaar is 'n nuwe era in ons Antarktiese navorsing ingelei toe die SANAE ekspedisie en 'n aantal Belgiese geoloë 'n geslaagde gesamentlike somer ekspedisie onderneem het. Dit was ook die eerste keer dat die SANAE ekspedisie lugvervoer tot hulle beskikking gehad het.

Dit was vir my 'n voorreg om die afgelope jaar saam met 'n baie toegewyde komitee te werk. Aan hulle almal wil ek dank betuig en die bestuur vir die volgende jaar alle sukses toe wens.

PLACE NAMES OF THE PRINCE EDWARD ISLANDS

By SILVESTER L. CROZET

These two islands, which are now under the jurisdiction of the Republic of South Africa, were discovered by Captain M. Marion-Dufresne on 13th January, 1772. Marion, the larger of the two, is some 12 miles long from East to West and about seven miles wide at its greatest breadth. It culminates in an almost centrally located peak, the summit of which rears itself to a height of 4,200 feet above sea level. Prince Edward, its neighbour, lies nearly 12 miles NNE of Marion and has a circumference of almost 15 miles. This island also terminates in a peak much lower than that on Marion, rising only to an elevation of 2,370 feet.

In Schedule No. 1 the names of places on Prince Edward are tabulated and, with the exception of two of these, the remainder are of geographical nomenclature.

SCHEDULE No. 1

Cave Bay: A cave in a perpendicular rock face which stretches across the head of the bay.

East Cape: Geographical designation.

High Bluff: Geographical designation.

North-west Cape: Geographical designation.

Ross Rocks: James Clark Ross, who was later elevated to the knighthood, first sighted these islands on 12th December, 1776.

South Cape: Geographical designation.

West Point: Geographical designation.

The derivation of place names on Marion Island makes far more interesting reading than do those of Prince Edward Island, as the details in Schedule No. 2 indicate.

SCHEDULE No. 2

Alpha Kop: A name given to a survey beacon which was erected during 1948 and which has been retained.

Boot Rock: So called on account of its resemblance to a Wellington Boot.

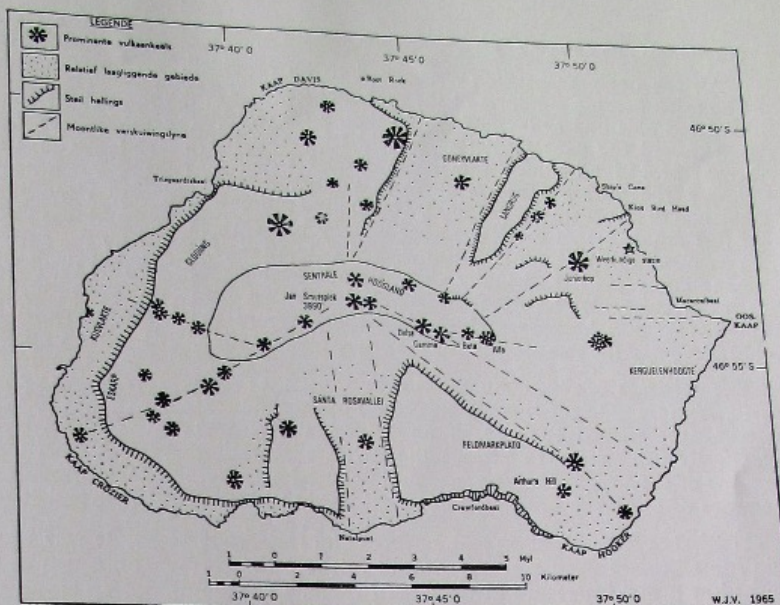
Cape Crozier: Named by Captain James Clark Ross in 1840 after Captain Crozier, who was in charge of the second ship *Terror* which was under former's command on his voyage of exploration of the Antarctic.

Cape Davis: After Sub-Lieutenant Samuel Davis of the frigate *S.A.S. Natal* which took over duties from the guard ship *S.A.S. Transvaal* on the annexation of the islands in 1947.

Cape Hooker: Designated by Captain James Clark Ross after the botanist Sir Joseph D. Hooker, of the Antarctic Expedition of 1840.

Crawford Bay: Assigned to chart of the island by Alan B. Crawford, who made a survey of it in 1948.

Marion Island.
Map: Dr. W. J. Verwoerd, *Ant. Bull.* No. 13.



Duiker's Point: The Duiker is a species of a cormorant which frequent this area.

East Cape: Geographical designation.

Fred's Hill: After Fred Swain, one of the six Tristan islanders who accompanied the occupation party. He erected the survey beacon on the top of that hill when the island was surveyed in 1948.

Gamma Kop: Eminence on which a survey beacon was erected during 1948, the name of which has been retained.

Halfway Kop: This is a knoll half-way between the meteorological station and Jan Smuts Peak.

Jan Smuts Peak: Named after Jan Christiaan Smuts, Prime Minister of the Union of South Africa in 1947 when the islands were annexed by that country.

McMurray's Kop: Sub-Lieutenant A. C. Murray was one of the party from *S.A.S. Transvaal* who remained on the island when this ship sailed on her return to Cape Town.

Macaroni Rocks: The Macaroni is a species of penguins which make their home in this area.

Marion Island: On 12th December, 1776, Captain James Clark Ross visited this island while making his last voyage in the ships *Resolution* and *Discovery*. He claimed this island and its neighbour, Prince Edward, for Great Britain and named them Prince Edward Islands, after the fourth son of the reigning monarch of England. This was the Duke of Kent who was to be the father of Queen Victoria. On Ross' return to England he heard that the islands had already been

discovered by Marion-Dufresne in 1772 and thereon gave the name of Marion to the larger of the two islands, which was the first of the two to be discovered.

Natal Bank: Named after *S.A.S. Natal*, which was the first vessel to sight and chart the bank.

Ned's Kop: Appellation by Alan B. Crawford after Ned Green, another of the Tristan islanders who accompanied the South African occupation party and who assisted with the survey of the island.

Paddy Rock: The Paddy are a species of sheathbill which frequent this locality.

Solglimt Blinders: The sealer *S.A. Solglimt*, under Captain Ree, foundered at this point during October 1908 and was lost.

Ship's Cove: The remains of the *Solglimt* are still to be seen here.

Transvaal Cove: The *S.A.S. Transvaal* was one of the ships which took part in the annexation of the islands in 1947.

Trypot Beach: Here, partly embedded in the sand on the beach, is a large disused cast iron whaler's trypot, which was at one time used for rendering down blubber. The remains of this pot still exist.

Of the 19 place names on Marion Island, it will be seen that four of these are of South African origin, while several have been made after geographical features.

Despite the institution of enquiries at the offices of the Admiralty Hydrographer, London and the Ministry of Marine, Paris, no information could be unearthed as to the origin of the name Aldebert Reef.

(Continued from Page 29)

All the bogie suspension struts had to be rewelded. The track bearing supports at the rear tore out and new modified pins had to be made and fitted, after this fault had caused the cancellation of a field trip. The wind-screen proved no match for the Antarctic winds and disappeared during a storm early in winter. The fuel tank had to be constantly repaired. This caused estimation of fuel requirements to be a rather chancy business. A larger capacity fuel tank is required. The catches on the engine cover proved virtually useless both because of their inaccessible location, particularly for gloved hands, and also because shrinkage of the cover in the cold prevented the two sections of the cover from mating.

The noisiness of the exhaust was found to be a drawback. A more efficient silencer would be appreciated. If a passenger wished to stop in an emergency, it was practically impossible to attract the driver's attention because of the noise. The driver would proceed merrily, unaware of the crisis brewing a few feet behind him.

The 2400 operated well on soft surfaces and numerous thin snow bridges were crossed without mishap, thanks to the low ground pressure of the broad track. On blue ice the toboggan was completely uncontrollable. Special track cleats with spikes or some sort of grouser plates would be a solution here.

This machine was found to be very easy to airlift in the Otter. It was only necessary to remove the steering skis (one bolt each) and to disconnect the handlebars (two bolts) and the whole of the machine could be lifted by three men. (On occasion, two men were found to be sufficient.)

The track and bogie wheels also had to be cleared of snow after every wind, before the toboggan could pull off under its own power. The engine cover seemed to be more effective as a snow collector in storms than as protection from wind, but helped a great deal as protection when travelling.

The vehicle was operated for most of the time without a windscreen and as there was only a hand throttle available, the driver suffered considerably from a cold right hand, as the moment the throttle was released the machine would, of course, come to a standstill. The fitting of a foot accelerator would be greatly appreciated under these circumstances.

It was necessary to decarbonise the exhaust port only once during the year and this was probably largely due to the fact that the motor was run most of the time on the wrong type of oil, as no two-stroke oil was available. This operation took about one hour to perform, as the motor is very accessible. As no spare spark plugs were available, it was also operated for most of the time on the wrong type of plug, which possibly also caused carbon to form prematurely.

Although the toboggan can seat two, it was found advisable for only the driver to ride on the seat, as the carrying of a passenger caused the suspension to bottom over the slightest unevenness. The extra space was considered better used when carrying extra fuel which was transported in two jerry cans, one on either side

of the seat. Fuel consumption was about nine km per gallon when pulling a heavy load.

The sledges used with the toboggans were the heavier type of Nansen sledge and were found to be not very effective, because their narrowness made the loading of items such as food boxes (paraffin boxes) and jerry cans very difficult. During the second summer, one sledge was modified to the full width of the 2400 toboggan and was also reinforced. This sledge was used extensively by the surveyor to transport bulky items such as empty fuel drums for marking points and proved effective and much more stable than the normal Nansen. It is recommended that where extensive use is to be made of toboggans, that the wider sledges be used. Either the existing ones could be modified, which entails virtually complete rebuilding of the sledge, or preferably, wider sledges should be made.

Unfortunately no first hand experience was had with this modified sledge in the field, but persons who used it found it to be effective.

It was found best to tow not more than two sledges on a trip as more than one was difficult to control on a steep slope, particularly when travelling obliquely across a downhill section of country. The sledge would overrun the toboggan, turn sideways, and then be jerked onto its side as the toboggan took up the slack in the tow rope. One effective way to combat this trouble was to manoeuvre the sledge onto the uphill side of the toboggan and, resting against it with the passenger on the sledge holding onto the toboggan, the sledge could then be handled as a unit and was completely controllable. Naturally, at all times watch had to be kept on the tow ropes to prevent their becoming entangled in the track. This did happen occasionally and the difficulty of freeing the rope had to be experienced to be believed.

Both types of Polaris could do with a rack or some provision for carrying items such as skis and marker poles as well as convenient storage place for all the loose paraphernalia essential in Antarctica. Things such as a compass, binoculars, cameras, spades and a few loose tools are difficult to transport. The stowage space provided in the nose of the K95 and under the seat of the 2400 was normally taken up with spare parts, rope, kerosene, a blow lamp and ether (for cold starts), and this space on both vehicles tended to collect snow and ice so that when any article was required it would first have to be chopped free.

It is considered inadvisable to operate the Polaris, even on short trips from the base, without pulling a sledge on which camping equipment (tent, sleeping bag, primus with fuel and a pot) and emergency food are carried. A Verrey pistol with cartridges should also be carried.

Some method of charging a battery from the motor would also be a distinct advantage as at present a portable battery charger has to be taken on field trips in order to charge the radio battery. Use of the hand-cranked radio generator is very inconvenient and requires two men. If one man of a two-man field party were to be injured, this means of radio contact would be ineffective.