

## STATION "LAT. X"

1951

ALBERTA - B.C. - N.W.T. CORNER

W.D. Forrester  
Geodetic SurveyLatitude  $59^{\circ} 59' 56.03''$ Longitude  $119^{\circ} 59' 51.18''$ 

DESCRIPTION: This station was placed at the corner of the British Columbia, Alberta, and Northwest Territories boundaries, being about 2 miles west of a 20 ft. wide creek flowing north at the west end of the Topographic Survey's 1950 winter road. The country in the area of the station is humpy muskeg, scantily covered with scrubby burnt spruce. The station itself was placed atop a fairly large hump of muskeg so that it should remain fairly dry in summer. It was impossible to avoid placing the station in this scrubby area without ignoring the requirement that it be within 60 chains of the true boundaries.

THE STATION MARKER is a regulation  $\frac{3}{4}$ " steel pipe post  $2\frac{1}{2}$  ft. long with "Lat X" marked by cold chisel on one side of its squared top. It was driven into the ground to within 6" of its length, and a trench one foot wide and one foot deep was dug in a 6 ft. diameter around it, the moss from the trench being piled in a mound over the post. A tripod of 12 ft. trees was then erected over the marker with its feet resting in the trench. The station marker is about 150 ft. north of the trail into the station, with a 10 ft. wide out line running due north from the trail to the marker.

BEARING TREES:

BT<sub>1</sub> is a burnt spruce about  $2\frac{1}{2}$  inches in diameter sawed off about 5 ft. high, with a 4 inch metal spike protruding 1 inch from its top. It is just to the east of the station marker.

Azimuth from station marker to BT<sub>1</sub> =  $91^{\circ} 42'.0$

Distance " " " to BT<sub>1</sub> = 32.3 ft.

BT<sub>2</sub> is a burnt spruce about 4 inches in diameter sawed off about 5 ft. high, with a 4 inch metal spike protruding 1 inch from its top. It is just at the south edge of the trail to the east of the out line to the station marker.

Azimuth from station marker to BT<sub>2</sub> =  $135^{\circ} 51'.5$

Distance " " " to BT<sub>2</sub> = 138.7 ft.

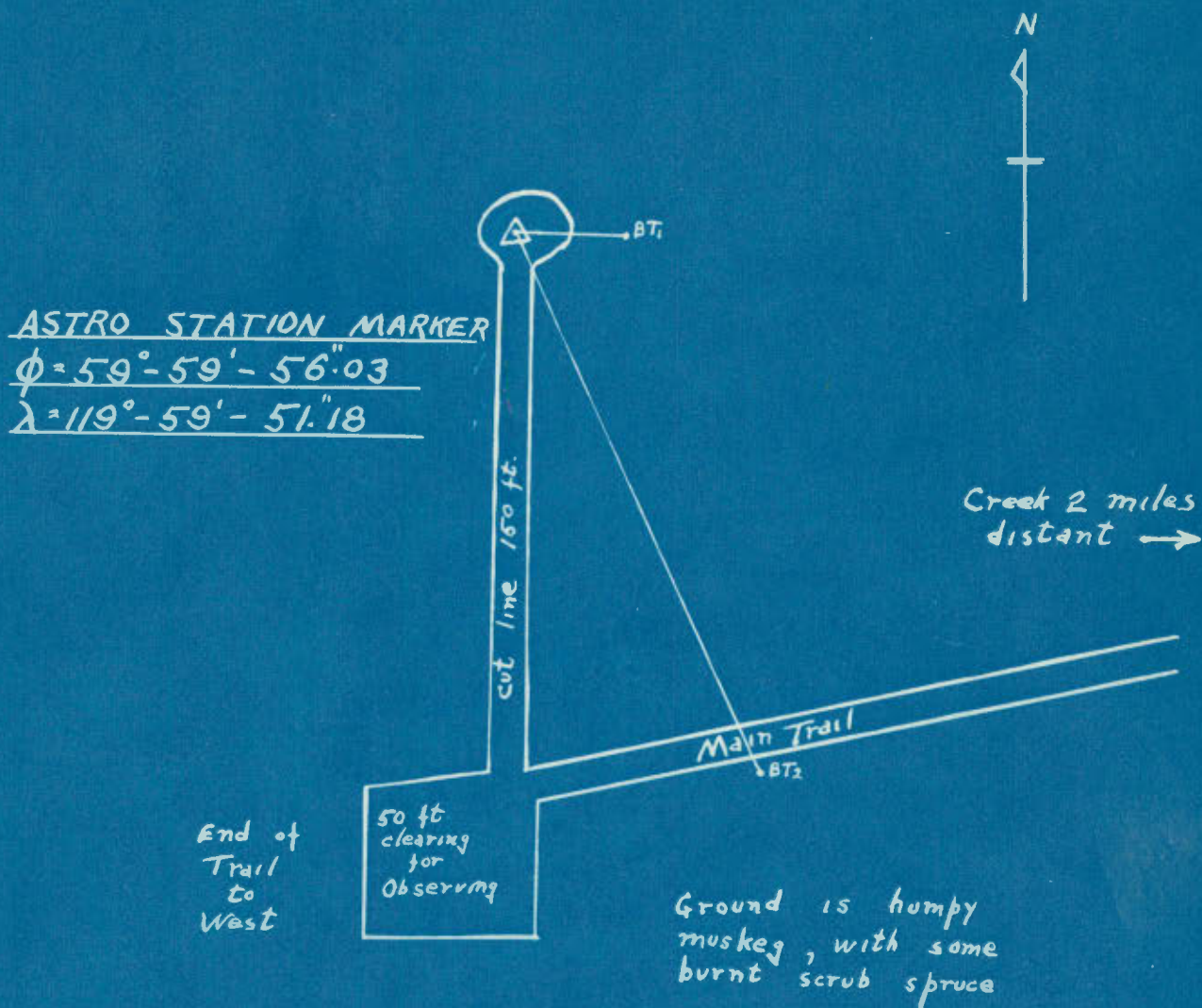
PHOTOGRAPHIC IDENTIFICATION: This station does not appear on the photographs, but on the accompanying photograph, A 12485-342, an arrow is marked showing that "Lat. X" is about 1000 ft. south of the edge of the photograph at this point.



SKETCH MAP of ASTRONOMIC STATION LAT X  
ALBERTA - N.W.T. BOUNDARY SURVEY  
MARCH 17, 1951

W. D. FORRESTER

FILE No. 1319



A - STATION MARKER

BT<sub>1</sub> & BT<sub>2</sub> - BEARING TREES

LINE	DISTANCE	AZIMUTH
A - BT <sub>1</sub>	32.3 ft	91° - 42' 0"
A - BT <sub>2</sub>	138.7 ft.	135° - 51' 5"



File # 1319

PM 506

PM 12

412485-342

Lat X 1000 ft. south



Looking north at station marker at lat. X.



Looking north at station marker at lat. X.



TABULATION OF OBSERVATIONS AT STATION LAT. X

Date	Latitude	V	V <sup>2</sup>
March 13, 1951	59° 59' 53".07	1.32	1.74
" "	53.54	0.85	0.72
" "	52.77	1.62	2.62
" "	51.95	2.44	5.95
" "	54.68	0.29	0.08
" "	54.58	0.19	0.04
" "	55.41	1.02	1.04
" "	55.21	0.82	0.67
" "	55.33	0.94	0.88
" "	56.98	2.59	6.71
" "	53.39	1.00	1.00
" "	55.81	1.42	2.01
" "	54.08	0.31	0.10
" "	53.82	0.57	0.32
" "	55.04	0.65	0.37
" "	53.26	1.13	1.28
" "	54.98	0.59	0.35
March 14	55.16	0.77	0.59
" "	55.07	0.68	0.46
" "	53.70	0.69	0.48
" "	53.41	0.98	0.96
" "	54.58	0.19	0.04
" "	53.21	1.18	1.39
" "	54.91	0.52	0.27
" "	54.40	0.01	0.00
" "	53.53	0.86	0.74
" "	54.56	0.17	0.03
" "	53.95	0.44	0.19
" "	55.00	0.61	0.37
" "	52.94	1.45	2.10

TABULATION OF OBSERVATIONS AT STATION LAT. X (Continued)

Date	Latitude	V	V <sup>2</sup>
March 14, 1951	59° 59' 56".55	2.16	4.67
" "	54.70	0.31	0.10
" "	54.53	0.14	0.02
" "	53.82	0.57	0.32
" "	55.31	0.92	0.85
" "	57.11	2.72	7.40
" "	53.40	0.99	0.98
" "	54.91	0.52	0.27
" "	54.59	0.20	0.04
" "	54.71	0.32	0.10
" "	54.50	0.11	0.01
" "	54.67	0.28	0.08
" "	54.40	0.01	0.00
" "	52.24	2.15	4.62
" "	53.91	0.48	<u>0.23</u>
		Sum of V <sup>2</sup> = 53.22	

Probable error of result =  $\pm 0".11$

Mean Value of 45 pairs = 59° 59' 54".39  $\pm 0".11$

Reduction to site of marker = + 01".72

Reduction to sea level = -00".08

Latitude of Post LAT. X = 59° 59' 56".03  $\pm 0".11$

Longitude

March 15, 1951 = 119° 59' 50".94

" 15 = 51".00

" 16 = 51".61

Mean longitude = 119° 59' 51".18

Reduction to site of marker = 00".00

Longitude of Post LAT. X = 119° 59' 51".18

DAILY DIARY AND ITINERARY

1951

January 13

Left Ottawa via C.N.R. for Edmonton.

January 14

On train.

January 15

On train.

January 16

Arrived Edmonton. Purchased snowshoes, mocassins, cold chisels, axe handles, rope, and files.

January 17

Flew by C.P.A. to Hay River.

January 18

Packed equipment on board tractor train. Flew part way out to abandoned fuel tank, but ran into blizzard. Temperature -40° F.

January 19

Could not leave because Bonds superstitious about Friday starts. Temperature -45° F.

January 20

Train left Hay River at 2:00 p.m. and reached mile 32 on Mackenzie Highway at 10:30 p.m. Temperature -40° F.

January 21

Mounted the blade onto the tractor at rock quarry on highway. Broke canopy frame and waited to have it welded. Reached mile 40.

January 22

Ran all day. Broke roller on cat track. Had to repair a runner shoe.

January 23

Ran from mile 68 to border (mile 80). Pumped fuel oil from truck into our fuel sleighs by hand. Repaired roller on track.

January 24

Left highway at 9:15 a.m. Fixed a broken runner.  
Reached long steep hill on east of Camerons.

January 25

Hauled train up hill in sections. Spent rest of  
day building new bunk for fuel sleigh.

January 26

Reached lake about 24 miles west of highway.

January 27

Reached LAT. VII in morning. Set up two precise  
transits and oriented them in azimuth.

January 28

Observed 12 pairs of latitude stars.

January 29

Cloudy.

January 30

Observed longitude and 36 pairs of latitude stars.

January 31

Packed up camp and left LAT. VII about 1:00 p.m.

February 1

Crossed 6th Meridian and reached part of trail  
north of Petitot River.

February 2

Reached east side of gorge.

February 3

Crossed gorge to PM 504 and out trail 3000 ft. south  
to LAT. VIII. Set up one transit and observed 40 pairs of  
latitude stars.

February 4

Observed 2 sets of longitude stars. Observing  
temperature  $-40^{\circ}$  F.



February 5

Ran traverse from LAT. VIII to PM 504. Moved about 6 miles west of LAT. VIII.

February 6

Told Bonds could go no farther with heavy cat over thin frost.

February 7

Bonds to send out plane to reconnoitre trail.

February 8

Poor flying weather.

February 9

Poor flying weather.

February 10

Reconnoitred trail to test frost. Flew back to Hay River to get light cat.

February 11

Wired information on frost conditions to Ottawa.

February 12

Received authority for light cat from Ottawa.

February 13

Light cat to be sent from Edmonton to Hay River for us.

February 14 - February 20

Waiting in Hay River for arrival of International TD 9 bulldozer.

February 21

TD 9 arrived. Hauled a small caboose to border.

February 22

Ran day and night from highway with TD 9 and caboose. Passed large hill on east of Camerons.

February 23

Passed site of LAT. VII at midnight.

February 24

Continued to run day and night, till we reached camp at 3:00 p.m.

February 25

TD 9 started to plow road, but broke down. Repaired TD 9 and it started out again.

February 26

D 8 waited today for trail across draw to freeze.

February 27

TD 9 broke down again. Filled our fuel tanks from abandoned tank. Left TD 9 and moved on.

February 28

Fuel sleigh box jumped off, and then living caboose upset. Continued to travel without TD 9.

March 1

Reached LAT. IX. Set up one transit. Observed 20 pairs of latitude stars.

March 2

Plane arrived and stayed overnight. D 8 went back to TD 9. Observed longitude.

March 3

Plane flew back to TD 9. Hazy tonight.

March 4

D 8 and TD 9 arrived back at camp. TD 9 still needs further repairs. My birthday today - so what. Hazy tonight.

March 5

Too hazy for observing. Temperature  $-14^{\circ}$  F.

March 6

Too hazy for observing.



March 7

Plane flew in parts for TD 9. Too hazy for observing.

March 8

TD 9 started to plow ahead. Observed 20 pairs of latitude stars.

March 9

Left LAT IX with TD 9 and 2 cabooses.

March 10

Reached spot about 3 miles from end of Topographic trail.

March 11

Reached end of trail, filled in creek, and picked site for LAT. X.

March 12

Moved to LAT. X, and observed preliminary fix.

March 13

Set up transit and observed 2 sets of longitude and 12 pairs of latitude stars. TD 9 broke down - repaired it.

March 14

Observed 26 pairs of latitude stars.

March 15

Cloudy and hazy, but observed one set of longitude.

March 16

Observed one set of longitude and packed up equipment.

March 17

Left LAT. X. Living caboose upset. Arrived back at LAT. IX in evening.

March 18

Repaired cabooses and left LAT. IX with all equipment. Reached abandoned fuel tank.

March 19

Mounted fuel tank on skids and took it with us.  
Reached spot 2 miles west of LAT. VIII.

March 20

Passed LAT. VIII, and stopped 8 or 10 miles west  
of LAT. VII.

March 21

Passed LAT. VII, and stopped about 19 miles west  
of highway.

March 22

Descended long hill on east side of Camerons, and  
reached Mackenzie Highway at 4:30 p.m.

March 23

Left tractor trains at border and took our equipment  
to Hay River by truck. We came along in a taxi.

March 24

Flew to Edmonton by C.P.A.

March 25

Boarded C.N.R. train for Ottawa.

March 26

On train.

March 27

On train.

March 28

Arrived back in Ottawa.

*W. D. L. Forrester,  
Geodetic Survey of Canada.*



625-61 C

F 731



DESCRIPTIVE REPORT OF 1951 WINTER SURVEY OF  
ALTA.-N.W.T. BOUNDARY WEST OF MACKENZIE HIGHWAY

The work projected for this winter was a continuation of the work commenced last winter with two additional stations along the B.C.-N.W.T. boundary added to it. This meant establishing three astronomic stations along the Alta.-N.W.T. boundary between the Mackenzie Highway and the B.C. border, one station at the Alta.-B.C.-N.W.T. corner, and two stations along the B.C.-N.W.T. border, the interval between stations to be about 25 miles. Thus, about 150 miles of border was to be astronomically located and monumented. A tractor train with bulldozer was to be used again this winter. The first 90 miles would be over the winter trail cut in 1950 by the Topographic Survey, while the last 60 miles would require us to cut our own trail. This report and the report on last winter's operation should be considered almost as a unit, since a better picture of winter surveying will be available to the reader who has read the 1950 report first.

Once again a decision was made to work with the Bond Construction Company of Edmonton and Hay River, who agreed to supply a D 8 caterpillar tractor with blade, one kitchen caboose, one bunk house caboose, and two fuel sleighs. They also were to supply the train crew and cook, and be responsible for boarding both train crew and surveyors while in the field. Most of the problems of securing proper clothing and adapting observing apparatus to -50° temperatures were ironed out in last year's operation, and have been dealt with at length in the 1950 report. Only one major change from last year's observing technique was experimented with this year, two complete





sets of observing apparatus being taken along with two separate teams of observer and recorder. It was hoped that the operation might thus be speeded up, since the two observers could work simultaneously.

To accompany me from the office on this year's trip were Gordon Corcoran, the other observer, and Donald Coombs and Si-Liu Kao, the two recorders and assistants. We left Ottawa by train on the evening of January 13, to arrive in Edmonton on the morning of January 16. After a brief shopping expedition in Edmonton to pick up a few articles not available in Ottawa, we flew to Hay River on January 17. In contrast to last year's experience, we found our tractor train practically ready for the road, with the cook and the train crew already on the job, and most of the supplies loaded aboard. The catskinners were Bill Greer, the swamper Dale Holliman, and the cook Roy Moore.

On the previous year with the Topographic Survey, Bonds had abandoned a full fuel tank on the trail we were to travel this year, and Dick Bond planned to send a plane out to locate the sleigh and determine whether he could count on using any of its fuel this year. As this provided an excellent opportunity to scout the ground we were to cover, I went along with Bill Greer on this flight. Unfortunately the plane was turned back by a blizzard before we reached the fuel sleigh. However, we did get a fairly good look at the type of country we were to cover. On the return flight one of the six cylinders in the plane's engine stopped firing, so that the last 60 miles back to Hay River were rendered quite unpleasant. The motor vibrated so badly that we were sure it would break free from the rest of the plane and return to base by

itself.

On the next day, a Friday, although all was in readiness, departure was postponed because of a superstition entertained by the Bond Construction Company against starting any operation on a Friday. Apparently two of their operations which had commenced on Fridays came to considerable grief in the past. On Saturday, January 20, with the jinx safely outwaited, we commenced our journey down the Mackenzie Highway toward the 60th parallel. Travelling over the gravel highway is much harder on the tractor than travelling over a bush trail, since the washboard stretches set every part of the tractor vibrating until any weak spots either break or shake loose. This treatment caused the protective canopy over our tractor to break at one of the supports, delaying us a half day while it was taken back to Hay River to be welded. The shaking also broke a roller on one of the tracks of the tractor. It was not necessary to repair this, however, until we reached the intersection of the highway with the border on Tuesday, January 23.

Now that we were starting along the bush trail it would be the cabooses and fuel sleighs rather than the tractor that would take the beating, since instead of washboard road we would now have frozen humps of muskeg and rough ground to jostle over. We crossed quite good ground for about 12 miles, which brought us to a long steep incline on the eastern side of the Cameron Hills. To ascend this it was necessary to break up the train, haul the fuel sleighs up one at a time, and then return for the two cabooses. The jerky pulling that the tractor had to do to get one of the fuel sleighs up the hill broke a bunk and pulled it right off the sleigh. It took about a half a day





Long steep incline up eastern side of  
Cameron Hills.



G.A. Corcoran with one of transit set-ups  
on Lat. VII.

to make a new bunk from green timber, burn holes in it for the bolts, and to mount it in place. However, the operation was successful and we ended up with a better and stronger bunk than the one which had broken.

We continued on over the hilly Cameron highlands through alternate areas of muskeg and swamp spruce, poplar, and jack pine, snowplowing as we went, with only minor troubles such as runners jumping out of place or bunting poles dropping off. On the fourth day after leaving the highway we reached the spot chosen off the aerial photographs for our first station, LAT. VII, about 25 miles from the highway at a place where the Topographic winter trail crossed the approximate location of the 60th parallel. It was not necessary to take a preliminary astro fix because we were able to plot our position from the traverse sketch supplied us by the Topographic Survey. Both transits were set up in their own observing tents, the station was observed, and a local survey of station mark and bearing trees was run, so that four days later, on January 31, we were able to set off for our next point.

Still following the Topographic Survey's 1950 winter trail, we went quite a way north of the 60th parallel to avoid crossing the Petitot River, which wound its way north of the border at this spot. It was while passing close to the swampy banks of the Petitot that we first verified an earlier fear that this year's early and heavy snowfall might have prevented the frost from penetrating deeply enough to render tractor train travel ideal. One track of the D 8 broke through the crust and sank about 8 inches, squeezing a big puddle of water out onto the trail. Although the cat managed to ride out alright, it was an unpleasant reminder of last winter's escapade with





DS plowing road and filling in creek in gorge  
near lat. VIII.



Tractor train starting down hill into gorge  
near lat. VIII.

a sunken bulldozer. We passed on over rough muskeg country or through patches of jack-pine or spruce, without further incident, until we reached a large gorge running roughly north and south, with a small creek at the bottom of the gorge. The bulldozer cleared the road through the gorge and filled in the little creek with snow and brush before taking the rest of the train across. On the west side of the gorge we located the Topographic Survey's mark, PM 504, and cut a side trail about 3000 ft. south through fair-sized spruce trees to the chosen site of our next station, LAT. VIII.

It had been noticed on the previous station that the advantage of setting up two transits was not as great as would be expected at first, since the maximum time an observer can stand the cold is about three quarters of an hour to an hour. After that, he must come in to thoroughly warm himself. Thus, two observers working on one transit can accomplish almost as much as on two transits, since one observer may work while the other warms himself and vice versa. In the light of this and the fact that we arrived on the station too late to conveniently set up both instruments, it was decided to work the first night on only one transit. Since most of the work was completed in the one night, the second transit was not set up at all, and the observing was completed on the second night. On the next morning, February 5, the local survey, including a traverse to PM 504, was finished and we moved off, feeling that very satisfactory progress was being made. This feeling was soon to be dispelled.

The country we had been travelling over up till now had been fairly high and dry, while what lay ahead was lower and wetter, pocked with bog holes and swampy draws.

On the first day away from LAT. VIII, the bulldozer track twice broke through the frozen crust of the ground, but fortunately rode out of the hole each time. Testing the ice with a needle bar showed that bog holes which had been crossed safely last year by the Topographic Survey's tractor trains could not be crossed this year. This necessitated cutting much new trail around soft spots in the original trail and slowed us down considerably. On the second day we ran up against a swampy draw about an eighth of a mile wide running north and south for as far as we could trace it on snowshoes or on aerial photographs. By sidling one track of the cat out onto the draw until it broke through, the catskiner verified that the draw could not be crossed. Our catskiner, Bill Greer, had been over this same trail last year with the Topographic train when this draw, as well as all other draws and bog holes, had been safely crossed without any detours being necessary, and could only credit the lack of frost this year to the early heavy snowfall. His opinion was that even if we were able to bypass this draw by cutting a new trail 5 miles or so south, the country was so covered with bogs and draws for the next forty or fifty miles that we would be little further ahead. He quite understandably refused to risk sinking the bulldozer by going farther without getting a go-ahead signal from Dick Bond at Hay River.

Bonds were advised of the situation by radio that night and decided to send a plane out to reconnoitre the trail ahead before making any decision. It was three days before weather permitted the arrival of the plane. The nearest landing place was a lake about three miles from our camp across the forbidding draw. We had kept a snowshoe trail open to it, so that when the plane arrived the catskiner and I were able to make our way over to it



fairly easily. Bill Greer, Dick Bond, the pilot, and myself then flew the length of the trail, landing at three lakes along the way to check the depth of frost. The farther west we went the deeper the snow seemed to be, and the thinner the frost. Dick decided he could not let the train continue with the heavy D 8 tractor, but thought a light tractor could be sent in to plow the snow off the trail so that the frost could penetrate deep enough to support the D 8. We then flew back to Hay River to advise Ottawa of developments and suggested solutions. I offered to attempt a couple of more stations by dog team and aircraft if they thought hiring another light bulldozer was too expensive. However, the light cat was approved and a small International TD 9 tractor with blade was despatched from Edmonton, arriving at Hay River on February 21. Bill and I started out the next day with an assistant skinner to return to our stranded tractor train with the TD 9 and one small caboose in tow. Three days later, on February 24, we arrived back at our camp after struggling through hard packed snow that had blown in over our old trail. Everyone at the camp was glad to see us return, because sitting for two weeks in the bush with nothing to do can be a pretty monotonous business.

The day after we arrived back, Bill, along with Pete, the assistant skinner we brought out with us, set out with the TD 9 and small caboose to plow the snow off the trail ahead. We did not leave with the D 8 until two days later, February 27, so that the trail would have some chance to freeze. Then we moved successfully across the draw and on to the spot where the fuel sleigh had been abandoned last year. The TD 9 had broken down about a



Attaching fuel sleigh box to blade of D8 with chains after box slid off its bunks.



Raising fuel sleigh box with D8 blade preparatory to swinging it back onto its bunks.



Living caboose experiences first upset of the season.

half mile beyond the fuel sleigh, apparently with a broken fuel pump. We decided we could wait no longer so would continue as far as possible with the D 8, leaving the TD 9 where it was for the present. After replenishing our fuel tanks from the abandoned fuel sleigh, we continued on over the roughest muskeg country yet encountered, about 65 miles west of the highway. On the next morning just after starting out for the day the first fuel sleigh broke off its bunks and slid sideways off onto the trail as a result of the very rough humps of frozen muskeg. This was repaired in about an hour and a half only to have the rear caboose, the one in which six of us slept and lived, tip right over on its side as it passed over the muskeg. It took another hour and a half to right it and restore the interior to some semblance of its previous order. On the last year's operation no upsetting of cabooses was experienced because the cabooses were two feet wider than the ones this year. However, Bonds chose to build narrower cabooses this year because the wide ones required clearing too wide a trail through the trees, which meant making twice as many passes with the bulldozer blade. We continued on through rough muskeg for about ten miles, the monotony of the low muskeg country being broken once by some very small hills boasting healthier jack-pine, poplar, and spruce than we had seen for some while.

It was becoming quite difficult to identify our position relative to the Topographic trail now since we were continually having to make new trail around soft bogs and swampy areas; nor could the aerial photos be used to aid us since this section of the trail lay south of the area photographed. However, we were able to identify the



spot chosen from the traverse for LAT. IX when we reached it on March 1. As we arrived quite late in the afternoon at the station, only one transit was set up. Twenty pairs of latitude stars were observed the first night, but frosting over of the electrical contacts on the transit micrometer prevented the observing of any longitude. Word had been passed on to Bonds by radio concerning the plight of the TD 9, and Dick flew out with repair parts while we were still observing on LAT. IX. Dale and Pete then returned on the D 8 to the abandoned TD 9 while Dick and the pilot flew back to it. Dale and Bill then brought the D 8 and the TD 9 up to our camp site. The TD 9 had been put in running order now, but it still needed new injectors and new batteries. These were flown in on March 7, and the next day Bill set out with the TD 9 to plow the road west of LAT. IX. We finished observing on this station by March 9, and while we were dismantling the equipment Bill and Dale continued to plow the road ahead. Dick Bond had now decided that the TD 9 could not clean the snow off the trail efficiently enough to freeze the trail sufficiently deep for the D 8, and refused to let the D 8 proceed west of LAT. IX under any conditions.

We were thus faced with the choice of abandoning the last three stations or of attempting to continue as far as possible with the TD 9. The next station being the one at the Alta.-B.C.-N.W.T. corner, it was decided that this station at least should be finished at all costs. The trail ahead had been cut by the Topographic bulldozer last year to within three miles of our corner station, and the TD 9 had now plowed it for about six miles. The limitations on the TD 9 were that it could not haul enough fuel behind it for many days running, and it was not heavy enough to

clear much new trail beyond the end of last year's Topographic trail. However, by leaving the kitchen caboose and the two fuel sleighs behind at LAT. IX, it was hoped we could reach LAT. X with the TD 9, our living caboose, and the small caboose that had come in with the TD 9. Because of insufficient bunk space in our caboose we could not take the cook with us, and since we could not very well leave him all alone, we left Si-Liu behind with him. The small caboose consisted of the van off an old truck mounted on a sleigh. On the sleigh in front of the van there was space enough to carry four or five drums of fuel oil and lubricating oil for the cat. The van itself was used as our temporary kitchen and storeroom. In it we kept our observing instruments, batteries, and food. Don Coombs offered to act as cook for this part of the journey, leaving Bill and Dale free to handle the running and maintenance of the train, and Gordon and I free to handle the observing. Only one transit was taken since space was at a premium and since we had to leave one recorder behind anyway.

With this outfit and crew we left LAT. IX on the afternoon of March 9. After reaching the end of the plowed portion of the trail the TD 9 had to be cut free to plow ahead, since it was not strong enough to plow the road and pull the cabooses at the same time. By carrying on this shuttle process day and night we reached the creek at the end of the Topographic trail on the morning of March 11. To run day and night like this is very hard on everyone's nerves because it is almost impossible to get any sleep in a caboose that is jostling and jolting over a rough trail, especially when you never know at what moment it may decide to tip right over on its side. It was important, however,



TD9 filling in creek bed at western end of  
Topographic trail.



Another view of TD9 filling in creek bed  
at end of Topographic trail and 3 miles  
east of lat. X.



to complete this part of the work as quickly as possible since we were paying stand-by time on the D 8 tractor for every day until we returned to it. While the creek was being filled in with brush and snow so we could cross it, I scouted ahead with a compass and aerial photograph to try to locate the approximate position of the intersection of the two borders. The spot had been scaled off on the aerial photograph, being about three miles west and a little south of the end of the Topographic trail. However, there were not enough prominent features on the ground to tie in with the spot marked on the photograph. Nevertheless, by following a compass course and judging my distance I marked a spot for a preliminary fix, and by the late afternoon of March 12 the TD 9 had cut trail and hauled the cabooses up to this spot. A preliminary fix taken that night indicated we were within 800 ft. of the desired position, well within the allowable limit. The next day we set up the precise observing equipment and commenced observing that night.

Everyone was just a little uneasy about having to rely on the weak and rather fickle TD 9 to get us out of this station. It was left running most of the time so that no trouble would be experienced in restarting it, although it had to be shut off part of the time to conserve the rather scant fuel supply we had been able to carry. Considerable concern was caused when the motor suddenly stopped to the accompaniment of a weird noise, a noise not at all common to well behaved motors. It was found that a valve had stuck and the push rod had been badly bent by the resulting pressure on it. The rod was pounded back as nearly straight as possible, and the valve loosened by a few blows with a hammer. No one knew how long this repair would last, and although the motor would have run on five



Living caboose again upset on return trip about  
3 miles east of Lat. X.

instead of six cylinders, it would have been so inefficient as to use up all our fuel supply before we reached our old camp. It is doubtful even at that if the TD 9 could have pulled our outfit on five cylinders.

Without further trouble we completed our observing on the night of March 16, and commenced our return journey the following morning. By running all day we arrived back at the other camp on the same evening. Our only incident on this trip was to have our living caboose once again tip over onto its side. However, since we were now on the way home, the resulting confusion could be viewed in a much more philosophical manner. Although we were grateful to the TD 9 for taking us safely to and from the last station, the sight of the ample fuel tanks and the sturdy D 8 back at the other camp were indeed welcome ones.

The morning of March 18 was spent repairing our battered cabooses and repacking our equipment for the next leg of the journey home. By noon we were on the trail again. On the way we cut some large timbers and hauled them along behind. These timbers were used the next day to build skids for the fuel tank abandoned last year by the Topographic crew, and we then continued on our way with this fuel tank added to the parade. The rest of the trip was fairly uneventful, and we continued to plow our way back over the drifted trail, travelling about 12 hours a day, until we reached the Mackenzie Highway again at 4.30 p.m., March 22. The cabooses, sleighs, and cats were all to be left at the intersection of the border with the highway until Bonds decided where they were going to send them, so we went to Hay River by taxi, a very pleasant change in mode of transportation.



On March 24 we departed from Hay River by C.P.A. The evening of March 25 saw us safely on the train from Edmonton, and by March 28 we were all tucked into our own trundle beds in Ottawa.



1951

STATION LAT "VII"

W.D. Forrester  
Geodetic Survey

ALBERTA - N.W.T. BOUNDARY

DESCRIPTION: This station was placed among a group of lakes in the high lands of the Cameron Hills about 25 miles west of the Mackenzie Highway. It is on the south side of the Topographic Survey's 1950 winter road, and is in an area of live spruce trees about 4 inches in diameter and 20 ft. tall. The ground is dry muskeg. The station is in a clearing 50 ft. square with a line 10 ft. wide cut 400 ft. north and 200 ft. south of the station at right angles to the trail.

THE STATION MARK is a regulation  $\frac{3}{4}$  inch steel pipe post  $2\frac{1}{2}$  ft. long with "Lat VII" marked with a cold chisel on one side of its squared top. The post was sunk into the muskeg to within about 6 inches of its length. A trench about a foot wide and a foot deep was dug in a 6 ft. circle around the post and the moss removed from the trench was piled onto the stake, covering it. A tripod of 10 or 12 ft. trees was then erected over the mark with its feet resting in the trench.

BEARING TREES:

BT<sub>1</sub> is a live spruce about 4 inches thick blazed on the side of its trunk facing the station marker with 2 vertical blazes about 9 ft. from the ground. It is just at the south edge of the clearing to the west of the cut line to the south.

Azimuth from station mark to BT<sub>1</sub> =  $220^{\circ} 49'$

Distance " " " to BT<sub>1</sub> = 63.8 ft.

BT<sub>2</sub> is a live spruce about 4 inches thick blazed on the side of its trunk facing the station marker with 2 vertical blazes about 9 ft. from the ground. It is just at the south edge of the clearing to the east of the cut line to the south.

Azimuth from station mark to BT<sub>2</sub> =  $177^{\circ} 32'$

Distance " " " to BT<sub>2</sub> = 43.8 ft.

PHOTOGRAPHIC IDENTIFICATION: The location of this station is marked as well as possible from the ground with an ink circle and pin-point on the accompanying photograph A12470-44. The marked location should be accurate to about 500 ft.

CO-ORDINATES OF MARKER:

Latitude  $59^{\circ} 59' 57.33''$

Longitude  $117^{\circ} 45' 17.82''$



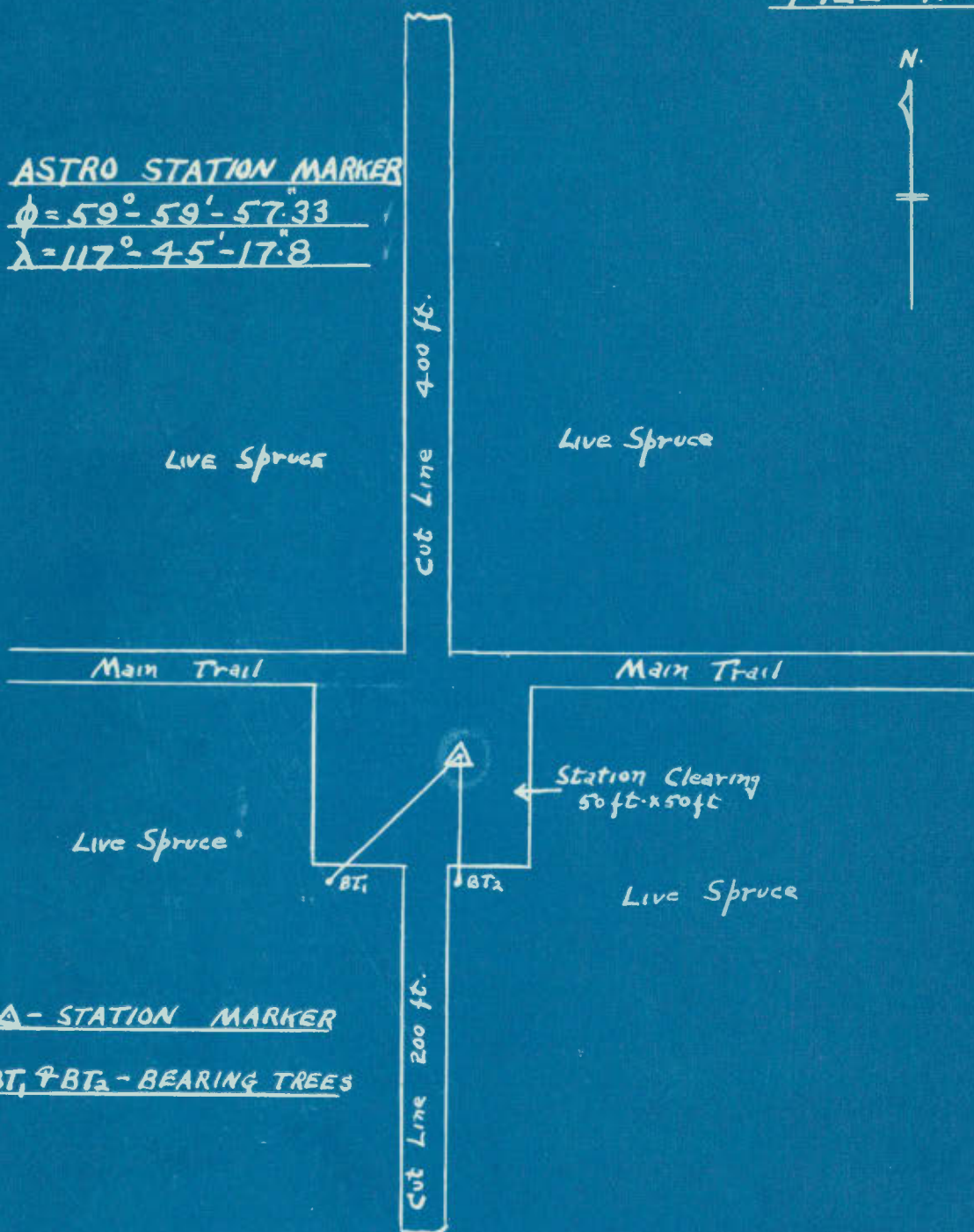
SKETCH MAP of ASTRONOMIC STATION LAT VII

ALBERTA - N.W.T. BOUNDARY SURVEY

JAN. 31, 1951

W. D. FORRESTER

FILE No. 1316



Δ - STATION MARKER

BT<sub>1</sub> & BT<sub>2</sub> - BEARING TREES

LINE	DISTANCE	AZIMUTH
Δ - BT <sub>1</sub>	63.8 ft.	220° - 49'
Δ - BT <sub>2</sub>	43.8 ft.	177° - 32'



4-470-14

○ LAT VII

File #1316



Looking south at station marker at Lat. VII.



Looking southeast at station marker at Lat. VII.

TABULATION OF OBSERVATIONS AT STATION LAT. VII

Date	Latitude	V	$V^2$
January 28, 1951	59° 59' 56".55	0.86	0.74
" "	57.73	0.32	0.10
" "	56.87	0.54	0.29
" "	58.68	1.27	1.61
" "	56.01	1.40	1.96
" "	59.74	2.33	5.43
" "	55.37	2.04	4.16
" "	58.16	0.75	0.57
" "	57.31	0.10	0.01
" "	56.82	0.59	0.35
" "	56.64	0.77	0.59
" "	57.60	0.19	0.04
" "	59.68	2.27	5.15
January 30	57.70	0.29	0.09
" "	58.60	1.19	1.42
" "	58.47	1.06	2.12
" "	57.27	0.14	0.02
" "	57.48	0.07	0.00
" "	56.77	0.64	0.41
" "	57.37	0.04	0.00
" "	57.16	0.25	0.06
" "	59.22	1.81	3.28
" "	56.81	0.60	0.36
" "	57.72	0.31	0.10
" "	56.02	1.39	1.93
" "	57.83	0.42	0.17
" "	57.61	0.20	0.04
" "	58.72	1.31	1.72
" "	56.12	1.29	1.66



TABULATION OF OBSERVATIONS AT STATION LAT. VII (Continued)

Date	Latitude	V	V <sup>2</sup>
January 30, 1951	59° 59' 55".93	1.48	2.19
" "	57.84	0.43	0.21
" "	56.93	0.48	0.23
" "	57.48	0.07	0.00
" "	60.51	3.10	9.61
" "	56.55	0.86	0.74
" "	57.78	0.37	0.14
" "	58.42	1.01	1.02
" "	59.45	2.04	4.16
" "	57.27	0.14	0.20
" "	56.93	0.48	0.23
" "	56.13	1.28	1.64
" "	55.40	2.01	4.04
" "	56.53	0.88	0.77
" "	56.58	0.83	0.67
" "	56.65	0.76	0.58
" "	57.35	0.06	0.00
" "	56.62	0.79	<u>0.62</u>

Sum of V<sup>2</sup> = 60.28

Since two separate observing sites were used, the values of the latitude quoted above have all been corrected for the eccentricities to the station marker.

Probable error or result =  $\pm 0".11$

Mean Value of 47 pairs = 59° 59' 57".41

Reduction to sea level = -00".08

Latitude of Post LAT. VII = 59° 59' 57".33  $\pm 0".11$

Longitude

January 30, 1951 = 117° 45' 18".3

Reduction to site of marker = -00".5

Longitude of Post LAT.VII = 117° 45' 17".8



1951

STATION "LAT. VIII"

W.D. Forrester  
Geodetic Survey

ALBERTA - N.W.T. BOUNDARY

DESCRIPTION: This station was placed just to the west of a large gorge running north and south across the Topographic Survey's winter road about 55 miles west of the Mackenzie Highway. The station is located on a side trail about 3,000 ft. due south of the Topographic marker PM 504. It is in an area of high dry muskeg covered with live spruce trees up to about 30 ft. in height. The station is in a 50 ft. clearing with a cut line running about 400 ft. farther south.

THE STATION MARKER is a regulation  $\frac{3}{4}$  inch steel pipe post  $2\frac{1}{2}$  ft. long with "LAT VIII" marked by cold chisel on one side of its squared top. It was driven into the frozen ground about  $1\frac{1}{2}$  feet, but would go no further without bending. A trench about a foot wide and a foot deep was dug in a 6 ft. diameter around the post, the moss dug from the trench being piled in a mound to cover the post. A tripod of poles about 15 ft. long was erected over the marker with its feet resting in the circular trench.

BEARING TREES:

BT<sub>1</sub> is a live standing spruce 8 inches thick, and about 25 ft. tall marked with 2 vertical blazes 6 ft. from the ground on the side of its trunk facing the station marker. It is just north of the station clearing and east of the trail from PM 504.

Azimuth from station marker to BT<sub>1</sub> =  $351^{\circ} 09'.5$

Distance " " " to BT<sub>1</sub> = 106.3 ft.

CO-ORDINATES OF ASTRO MARKER, AND OF TOPOGRAPHIC MARKER PM 504:

Traverse run from station marker to PM 504 indicated that PM 504 was

29.38 north in latitude from astro marker  
1.28 east in longitude " " "

Astro station marker:

Latitude  $60^{\circ} 00' 03''.35$

Longitude  $118^{\circ} 41' 51''.12$

Topographic point PM 504: (as obtained from traverse from astro determination)

Latitude  $60^{\circ} 00' 32''.73$

Longitude  $118^{\circ} 41' 49''.84$

Topographic point PM 504: (as quoted by the Topographic Survey from their 1950 work)

Latitude  $60^{\circ} 00' 32''.26$

Longitude  $118^{\circ} 41' 53''.66$

PHOTOGRAPHIC IDENTIFICATION: LAT VIII and PM 504 are marked as well as could be done from the ground on accompanying photograph A12470-28. The marking of PM 504 is accurate to about 200 ft., and the marking of LAT VIII is accurate to about 400 ft.



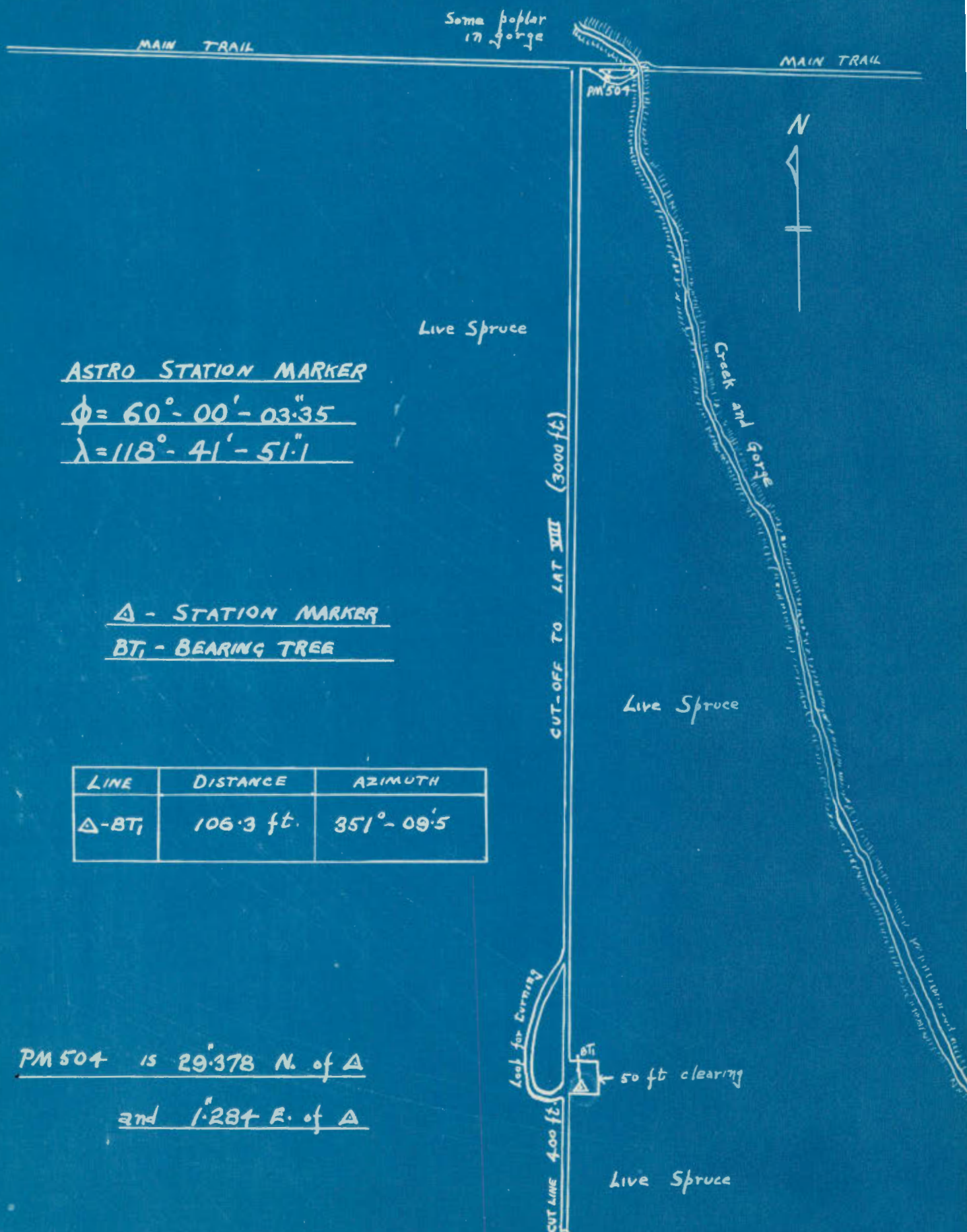
# SKETCH MAP of ASTRONOMIC STATION LAT VIII

ALBERTA - N.W.T. BOUNDARY SURVEY 1951

FEB. 5, 1951

W.D. FORRESTER

File No. 1317



ASTRO STATION MARKER

$\phi = 60^{\circ} - 00' - 03.35''$

$\lambda = 118^{\circ} - 41' - 51.1''$

$\Delta$  - STATION MARKER

BT<sub>1</sub> - BEARING TREE

LINE	DISTANCE	AZIMUTH
$\Delta$ -BT <sub>1</sub>	106.3 ft.	351° - 09.5'

PM 504 is 29.378 N. of  $\Delta$

and 1.284 E. of  $\Delta$



PM504

LAT VIII

File # 1317



Looking north-northwest at station marker  
at lat. VIII.



Looking north-northwest at station marker  
at lat. VIII.



TABULATION OF OBSERVATIONS AT STATION LAT. VIII

Date	Latitude	V	$V^2$
February 3, 1951	60° 00' 05".17	1.14	1.30
" "	04.81	0.78	0.61
" "	06.32	2.29	5.24
" "	04.88	0.85	0.72
" "	03.58	0.45	0.20
" "	02.39	1.64	2.69
" "	03.05	0.98	0.96
" "	04.29	0.26	0.07
" "	04.26	0.23	0.05
" "	03.95	0.08	0.01
" "	03.66	0.37	0.14
" "	05.95	1.92	3.69
" "	04.30	0.27	0.07
" "	04.50	0.47	0.22
" "	04.17	0.14	0.20
" "	02.42	1.61	2.59
" "	03.93	0.10	0.01
" "	04.24	0.21	0.04
" "	05.00	0.97	0.94
" "	01.21	2.82	7.95
" "	02.39	1.64	2.69
" "	04.17	0.14	0.02
" "	03.83	0.20	0.04
" "	05.24	1.21	1.46
" "	04.31	0.28	0.08
" "	03.80	0.23	0.05
" "	03.91	0.12	0.01
" "	05.14	1.11	1.23
" "	04.07	0.04	0.00

TABULATION OF OBSERVATIONS AT STATION LAT. VIII (Continued)

Date	Latitude	V	V <sup>2</sup>
February 3, 1951	60° 00' 04".41	0.38	0.14
" "	04.92	0.89	0.79
" "	05.06	1.03	1.06
" "	04.85	0.82	0.67
" "	04.26	0.23	0.05
" "	01.50	2.53	6.40
" "	03.13	0.90	0.81
" "	03.25	0.78	0.61
" "	03.85	0.18	0.03
" "	05.34	1.31	1.72
" "	05.23	1.20	1.44
" "	03.12	0.91	0.83
" "	02.99	1.04	1.08
" "	02.51	1.52	<u>2.31</u>

Sum of V<sup>2</sup> = 51.16

Probable error of result =  $\pm 0".11$

Mean Value of 43 pairs = 60° 00' 04".03  $\pm 0".11$

Reduction to site of marker = -00".59

Reduction to sea level = -00".09

Latitude of Post LAT. VIII = 60° 00' 03".35  $\pm 0".11$

Longitude

February 4, 1951 = 118° 41' 52".7

February 4, 1951 = 118° 41' 49".5

Mean longitude = 118° 41' 51".1

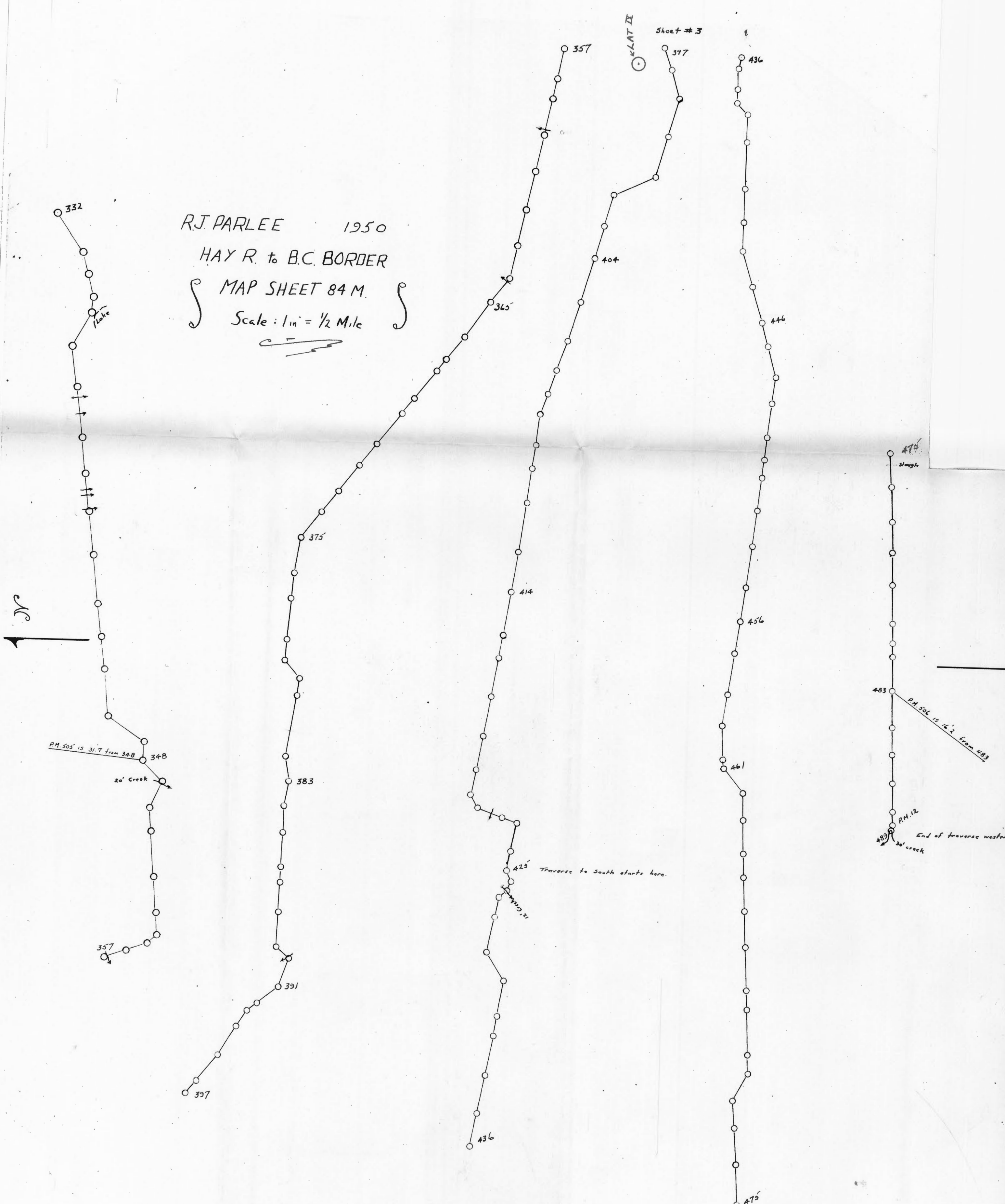
Reduction to site of marker = 00".0

Longitude of Post LAT. VIII = 118° 41' 51".1

R.J. PARLEE 1950

HAY R. to B.C. BORDER

MAP SHEET 84 M.  
Scale: 1 in = 1/2 Mile





## STATION "LAT. IX"

1951

ALBERTA - N.W.T. BOUNDARY

W.D. Forrester  
Geodetic SurveyLatitude  $60^{\circ} 00' 10''.46$ Longitude  $119^{\circ} 20' 19''.6$ 

DESCRIPTION: This station was placed in a 50-ft. square clearing on a by-pass of the Topographic Survey's winter road about 80 miles west of the Mackenzie Highway. It is in an area of scrub and dead spruce near the turn in the trail at the Topographic Survey's 1950 turning point #397 (see Topographic Survey's traverse chart attached). The ground here is mostly dry muskeg.

THE STATION MARKER is a regulation  $\frac{3}{4}$  inch steel pipe post  $2\frac{1}{2}$  ft. long with "LAT IX" marked by cold chisel on one side of its squared top. The post was sunk to within 6 inches of its length with a trench 1 ft. wide and 1 ft. deep dug in a 6 ft. diameter around it. The moss removed from the trench was piled in a mound covering the post and a tripod of 12 ft. poles was erected over the marker with its feet resting in the trench.

BEARING TREES:

BT<sub>1</sub> is the taller of two live spruce trees about 15 ft. tall and 3 inches thick just at the south edge of the station clearing. It is marked with a 2 ft. blaze on the north side of its trunk.

Azimuth from station marker to BT<sub>1</sub> =  $167^{\circ} 46'$

Distance " " " to BT<sub>1</sub> = 92.5 ft.

PHOTOGRAPHIC IDENTIFICATION: This station does not appear on the aerial photographs, but is marked on the accompanying sketch of the station site, and also on the accompanying Topographic Survey's 1950 traverse sketch.



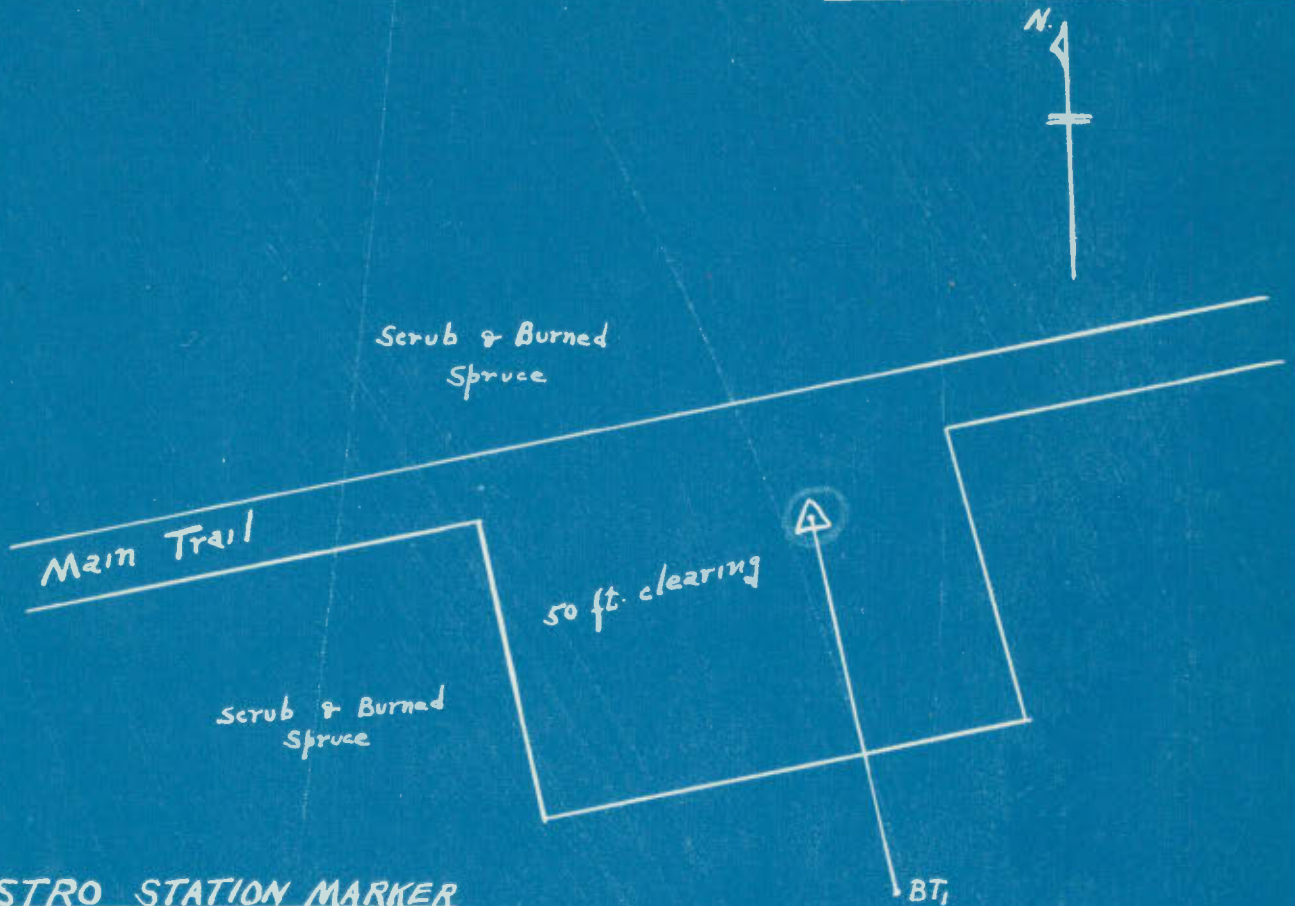
SKETCH MAP of ASTRONOMIC STATION LAT. IX

ALBERTA - N.W.T. BOUNDARY SURVEY

MARCH 9, 1951

W.D. FORRESTER

FILE No. 1318



ASTRO STATION MARKER

$\phi = 60^{\circ}-00'-10.46$

$\lambda = 119^{\circ}-20'-18.6$

$\Delta$  - STATION MARKER

BT<sub>1</sub> - BEARING TREE

LINE	DISTANCE	AZIMUTH
$\Delta$ -BT <sub>1</sub>	92.5 ft.	$167^{\circ}-46'$



Looking east at station marker at lat. IX.



Looking east at station marker at lat. IX.

TABULATION OF OBSERVATIONS AT STATION LAT. IX

Date	Latitude	V	V <sup>2</sup>
March 1, 1951	60° 00' 10".13	0.47	0.22
" "	08.76	1.85	3.42
" "	10.72	0.11	0.01
" "	10.46	0.15	0.02
" "	10.36	0.25	0.06
" "	11.06	0.45	0.20
" "	10.99	0.38	0.14
" "	12.36	1.75	3.06
" "	10.57	0.04	0.00
" "	10.95	0.34	0.12
" "	10.65	0.04	0.00
" "	09.77	0.84	0.70
" "	12.04	1.43	2.04
" "	10.64	0.03	0.00
" "	10.59	0.02	0.00
" "	10.94	0.33	0.11
" "	10.07	0.54	0.29
" "	10.44	0.17	0.03
" "	09.98	0.63	0.40
" "	11.73	1.12	1.25
" "	11.71	1.10	1.21
" "	13.07	2.46	6.05
" "	09.69	0.92	0.85
" "	10.51	0.10	0.01
" "	10.71	0.11	0.01
March 2	10.73	0.12	0.01
" "	13.28	2.67	7.13
" "	09.61	1.00	1.00
" "	12.57	1.96	3.84



TABULATION OF OBSERVATIONS AT STATION LAT. IX (Continued)

Date	Latitude	V	V <sup>2</sup>
March 2, 1951	60° 00' 12".64	2.03	4.12
" "	08.65	1.96	3.84
" "	08.91	1.70	2.89
" "	10.70	0.10	0.01
March 8	09.93	0.69	0.46
" "	10.14	0.47	0.22
" "	11.44	0.83	0.69
" "	09.25	1.36	1.85
" "	10.08	0.53	0.28
" "	11.12	0.51	0.26
" "	09.74	0.87	0.76
" "	08.99	1.61	2.59
" "	09.77	0.84	0.71
" "	08.46	2.15	4.62
" "	10.28	0.33	0.11
" "	10.28	0.34	0.12
" "	10.05	0.56	0.31
" "	11.10	0.49	0.24
" "	11.10	0.49	0.24
" "	10.30	0.30	0.09
" "	12.34	1.73	2.99
" "	09.48	1.12	1.25
" "	09.98	0.63	0.40
" "	12.62	2.01	4.04
" "	10.70	0.10	0.01
" "	10.81	0.20	<u>0.04</u>

Sum of V<sup>2</sup> = 65.30

TABULATION OF OBSERVATIONS AT STATION LAT. IX (Continued)

Latitude (continued)

Probable error of result =  $\pm 0''.10$

Mean value of 55 pairs =  $60^{\circ} 00' 10''.62 \pm 0''.10$

Reduction to site of marker =  $- 0''.07$

Reduction to sea level =  $- 0''.09$

Latitude of Post LAT. IX =  $60^{\circ} 00' 10''.46 \pm 0''.10$

Longitude

March 2, 1951 =  $119^{\circ} 20' 19''.1$

Reduction to site of marker =  $+ 0''.5$

Longitude of Post LAT. IX =  $119^{\circ} 20' 19''.6$