I have never made an observation on Polaris for a bearing other than doing the preliminary calc's in order to get the instrument set to find the star in the daytime.

All my bearings were derived by direct solar observations, early on using the altitude method and in the late 1970's or early 1980's using the hour angle method and doing a solar attachment observation in order to check my calculations. I am attaching a copy of the field notes of one of my solar observations so you can see the format setup in the field book. If I was to make a Polaris observation I would use the same format and procedure. I also used a short wave radio tuned to WWV for time and took my readings on the ½ minute and minute intervals from the signals. My preference is the field book method I used rather than a module like the HP 41 or HP 48. Anyway, below is my field procedure for an observation. I also found it was much easier to have another person or even two there when making the observation, one to keep track of the time to let me know about 5 seconds ahead of when the minute and ½ minute interval was coming up to make the sighting on the trailing edge of the sun. The other person, if I had one, would write the horizontal angle from your mark to the sun and the time from the timekeeper, usually on a yellow pad or scrap field book page or I would also keep the notes. I have taken observations by myself and did the time bit and notes, but it makes the hour angle system a lot more difficult by doing all three.

Know beforehand where you plan to make the observation (Before the advent of GPS I scaled the Latitude and Longitude from a USGS quad or other available map and had this data ready in order to do my field calc's of the observation. I tried to use something on the quad like a section corner to make the observation point less critical for position determination, but a lot of times I did use a best position point from the quad or did my Lat/Long scaling in the field).

Set up and level the instrument (Critical) (I used a Gurley Solar Transit with a 30" Horizontal Vernier that I had built at my specs).

Determine what you want to use for a sight mark (I use to find some prominent point, i.e. a point on a windmill, power pole, tower, another survey line point either at the terminus of a long tangent or the previous long line into the occupied point, or anything that was easily discernable at a fairly long sight distance).

Sight the Mark and point to and follow the trailing edge of the sun and at the minute or ½ minute signal, lock onto the trailing edge, read the angle right (D1), continue following the trailing edge and again at the minute or ½ minute signal, lock on to the trailing edge, read the angle right (D2), continue following the trailing edge of the sun and again at the minute or ½ minute signal, lock on to the trailing edge, read the angle right (D3) and read the vertical angle to the sun (this is for an aid to position the scope when reversing the instrument to make it easier to pick up the sun and not for calculation purposes).

Reverse the instrument, and get the sun positioned in the scope and do the same procedure as outlined above. This time the readings will be noted as: R1, R2, and R3. This is based on the 3 direct and 3 reverse observations, but it can be set up to do as many as you want, i.e. D4, R4, etc.

Once all the observations are completed and not disturbing the setting, sight to your mark and record the horizontal angle to determine if there is or has been any error in the instrument that occurred during the observation. You should be 180° from the initial reading.

The old Lietz or Sokkia Ephemeris had several programs for different handheld calculators. I had my youngest boy modify the one that was for the HP 71B in order to use it in my HP 75C, as the language was not quite the same for one machine to the other and also to add a little more pizzazz to the printout. The program I have calculates either Solar or Polaris Observations using the same data entry. Polaris does not have to be sighted at Elongation using this program and can be sighted during the day if you can find it.

A good book for observation procedures is "Astronomic And Grid Azimuth" by Ben Buckner. Also the Lietz/Sokkia Ephemeris has some examples. Probably the best ones to contact about Polaris Observations would be the BLM posters on the RPLS Board, such as: Jerry Knight; Jerry Wahl; Keith Williams. These are guys with a wealth of information.

You do not want to sight your mark and then the sun and reverse around and sight the sun and then your mark as some have said to do and continue alternating using this format. That procedure is a bunch of wasted effort and time.

As you can see by the notekeeping format I use by placing the observations in sets, you can check your observation angles and time for errors if the means do not check and you know instantly if you need to take another set. With my HP 75C program, I can calculate each set of 3 individually and calculate each observation reading individually for further checks. This will also give you a quick field check to verify your sightings. I have had some of my bearings checked by GPS Observations (Astronomic) between points and the most there was in deviation was 13". Most were 5" or less.

If you have any questions do not hesitate to contact me.

Charles L. Dowdell, PLS

NOV. 14, 1994

CBDL
CALM
CLEAR

CLD A (CLEAR)
MEP TIME CLOUD

SOLAR OBSERVATION
SEC. 19 - T0. 19 - 30 - STONE
T 5, R 15 E
JOB. NO. 94-232

A ON SEC. COR NEW - STONE 19|20 / 30|29
POINT NO. 312
MARK - CONTROL POINT 308
SOUTH POST OF DOUBLE TRAVERSE LINE

INSTRUMENT - GURLEY SOLAR TRANSIT
MANUFACTURED - OCT., 1974
SPECIAL BUILT - 30" HORIZ. VERNIER -
OPTICAL PLUMMET 1' VERT CIRCLE

HORIZ & LT		UCT
D1	50-45-30	16:26 00 (15:26 AM)
R3	51-24-00	16:2900
	51-04-45	16:2130
D2	50-52-00	16:2630
K2	51-17-30	16:2830
	51-04-45	16:2730
D3	50-58-30	16:2700
K1	51-11-00	16:2800
	51-04-45	16:2130
MEAN=	51-04-45	16:2730

ϕ = 31° 24' 22.1"
λ = 110° 50' 27.6"
dec 0HR = -18° 06' 22.7"
dec 24 HR = -18° 21' 59.5"
GHA 0 HR = 193° 54' 36.4"
GHA 24 HR = 188° 52' 13.7"
EQ. TIME = 16' 11.5"

N85° 13' 05.7"E
N85° 12' 18.7"E
N85° 12' 42.2"

N85° 12' 39.1"E

N85° 12' 51.1"E
N85° 12' 29.3"E
N85° 12' 40.5"

N85° 12' 39.1"E

N85° 12' 37.3"E
N85° 12' 41.6"E
N85° 12' 39.5"

N85° 12' 39.1"E

N85° 12' 40.1"E

N85° 12' 39.1"E

N 85° 12' 39" E - LINE BEARING.

SOLAR ATTACHMENT BEARING =
N 85° 16' 30" E FOR CALC CHECK