EXPLORER SEARCH & RESCUE

AN ESAR
INFORMATION UNIT

May 1975

ACKNOWLEDGEMENTS

Grateful appreciation is expressed to Washington Explorer Search & Rescue for funding this publication and to the Chief Seattle Council, BSA, for printing it.

Special recognition is extended to the leaders and members of the Seattle ESAR Information unit: it is the lessons learned by these young persons which are reported here.

DK

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SUMMARY OF DUTIES

Although each search is different, and sometimes some of the procedures and priorities need to be changed to fit the circumstances, the general concerns of the Information Unit are as follows:

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3. Subject Description for each Team Leader
4. Team list for each Team Leader
5. Team Leader List with radio numbers for use by Field Leaders and Operation Leaders
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8. Radio Log
9. Large map for plotting
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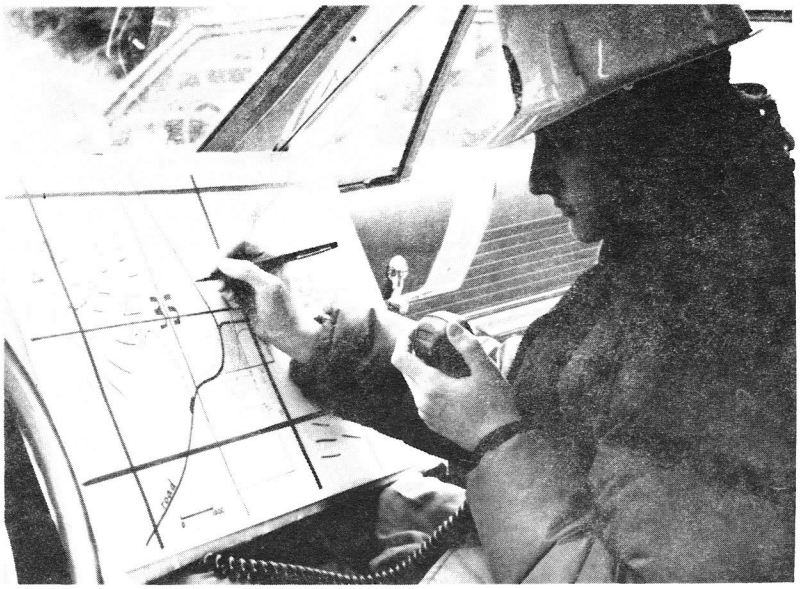


Keeping a continuous plotting of search coverage is one of the functions of the information unit.

INFORMATION UNIT

FUNCTIONS

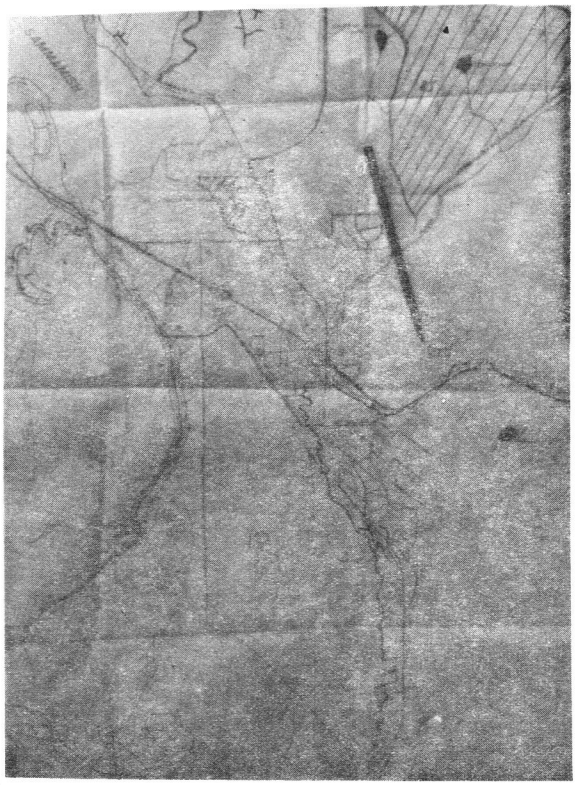
The Information Unit of an Explorer Search & Rescue group can best be described by its functions. It should be responsible for most of the routine paper work generated on a search as well as for keeping an accurate chronological record of the developments during the operation. By doing the routine paperwork in a dependable manner the IU can free the operation leader from the necessity of focusing his attention on each small detail of keeping the operation running. This enables him to concentrate on the more important problem of working out a logical course of action for locating the subject of the search.

Keeping an accurate chronological record of developments can best be done by maintaining a log of all the input from teams in the field and from those in search base. Thus the operation leader can check back on pertinent details (some details only seem to become pertinent later in the operation) or refresh his memory on conversations with the team and field leaders. The record also includes a large scale map with team positions plotted on it as the search progresses. This map allows the operation leader to see at a glance what areas have been covered, current team locations, and other areas that may be important to check out. On this map he can also point out to teams just where he wants them to go and exactly how much he wants them to cover. This map is usually helpful to the sheriff when he is making out his report: he will often request a copy (particularly in the case of an evidence search where something of importance has been found.)

Both the map and the log become a permanent record of the search which can be restudied if any new information is received after the search has been closed. It could be quite instructive to see where the subject is actually found in relation to the search area in some past "negative results"

cases; perhaps something could be learned from it that would enable the SAR unit to be more effective on future searches. Sometimes new information shows a need for re-opening a search. In this case the past records become invaluable in eliminating a wasteful duplication of previous efforts.

Two months following a search, two murder victims were found only 1,000' from a searched area (pencil point.) An accurate operations map makes possible the kind of "informed hindsight" that can be used to improve search methods or strategy.



BASIC INFORMATION UNIT AND COMPREHENSIVE INFORMATION UNIT

An ESAR Information Unit may be either a basic unit which supplies paperwork and mapping services only or a comprehensive unit which provides these services plus surveying and string line laying. It seems to be the rule, rather than the exception, that most maps available of a search area are hopelessly out of date. It then becomes important to have the new roads

and trails (that are the major land-marks used by the people in the field) correctly located on the map so that teams can be accurately plotted in relation to them. A quick method for doing this is described under surveying. IU members can also be helpful in laying string lines to cut the search area up into manageable segments and give the teams a straight base line to start from when a natural boundary isn't convenient.[1]

TRAINING

BASIC INFORMATION UNIT

Basic Training

To function efficiently, the IU requires good communications with the Team Leaders and Field Leaders. It is vitally important that all members of a SAR team (those in base as well as those in the field) have the same basic abilities to read and interpret all kinds of maps and to speak the same language. In this respect, each should know what the other means by "drainage", "trailhead", etc., and the people in base should know from their own experience what the field teams are encountering as nearly as possible. For this reason it is recommended that everyone have the same basic training (Orientation, Courses I, II, III.)[2] Basic training is also one of the best ways to learn to use and trust your compass and to plot locations on a map.

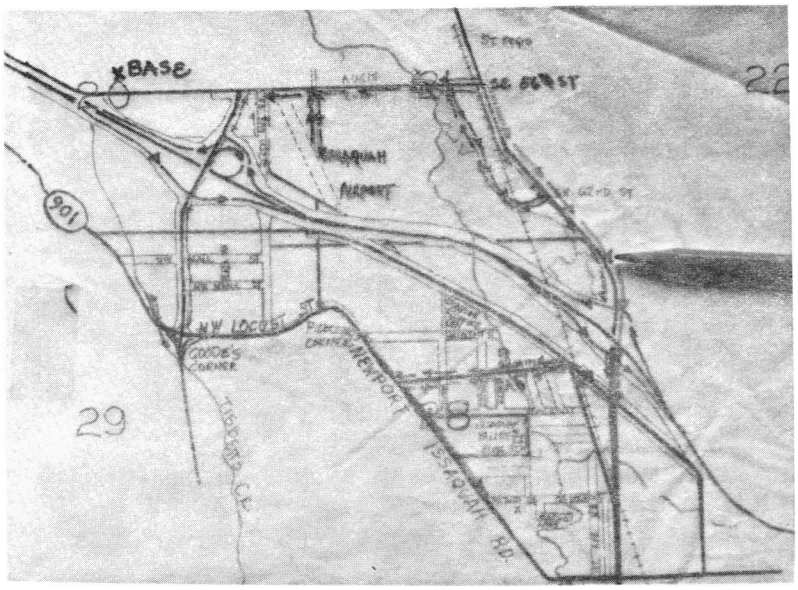
[1] Wartes, Jon & Rengstorf, Bill, The Use of String Lines for Search & Rescue, Western Region Explorer Search & Rescue, 1973, 12 pages, 1111 NE 195, Seattle, WA, 98155, 50¢.

[2] An Explorer Search & Rescue Training Program, Western Region Explorer Search & Rescue, 1972, 39 pages, 1111 NE 195, Seattle, WA, 98155, $1.00.

Beyond this, IU members need more experience in making maps and keeping logs as well as in radio procedures, and more practice with compass in the case of a comprehensive unit. The compass practice can be gained during training for surveying and in string line practice.

Mapping

The person who is going to make the large map for plotting purposes needs to ask the operation leader which areas he expects to cover, keeping in mind that the situation could change at any time. When the OL indicates the areas of immediate concern, the mapper measures its length and height at the widest points and finds the greatest whole number multiple (so that it can be figured quickly) that will still fit on the drawing board. The map should be as large as possible and still show all the areas to be covered in the first several hours of searching (barring unforeseen circumstances.) This whole number I'll refer to as the "Multiple" since this is the number that every measurement taken from the original map must be multiplied by



By using a different color pen or pencil, the path of each team can be readily identified on the map.

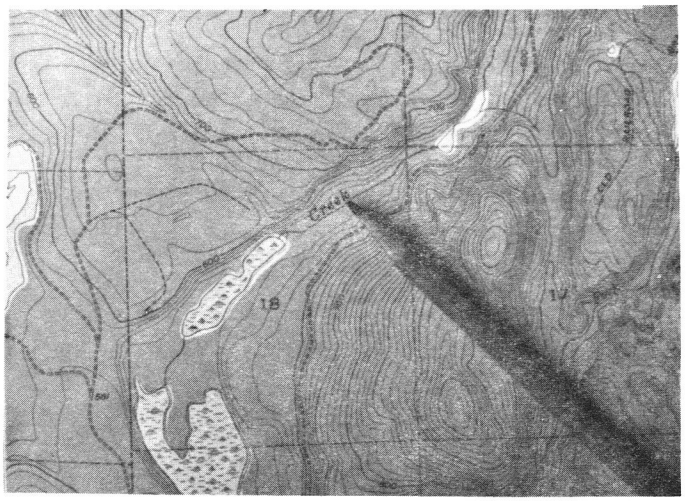
to get its length on the enlarged map. Using the convention that north is always at the top of the map, it may be best to turn the board on end. Tape the paper to the board so that it is not folded over the left edge where the T-square needs to slide up and down. (Working with a T-square and triangle may seem quite awkward at first but with practice it becomes not only much more accurate but also time-saving.)

Making sure that the T-square is tight against the left edge of the board, draw a line all the way across the bottom of the paper. Then, making sure the triangle is flat against the T-square, draw a line up the left side of the paper, moving the T-square and triangle up as necessary. After measuring the side of a section on the original map and multiplying by the "Multiple", mark off the lines at the bottom and left side of the board into these increments and this will give the point where the section lines intersect. Lines projected up from and across from these points of intersection divide the paper into the required number of sections. (A word of caution though -- sometimes sections are irregularly shaped, requiring extra measurements.) Number the sections right after the squares are drawn to avoid confusion later. (If a map is being used that does not contain section lines, the mapper can draw his own N-S and E-W lines on the original map. He then can transpose these reference lines to the new map as described above.)

Then proceed to fill in the sections by measuring where each major road or stream crosses a section line on the original map, multiply by the "Multiple" and put a little mark where the feature will cross the corresponding section line on the enlarged map. (At first it may be helpful to quarter each section on both maps for increased accuracy, but usually speed is more important.) Using the protractor to get a road or stream's general bearing across the section, freehand these features in with pencil. On landmarks such as a pond that doesn't cross a section line, measure the distance over from one section line, use the "Multiple" and put a small mark where its

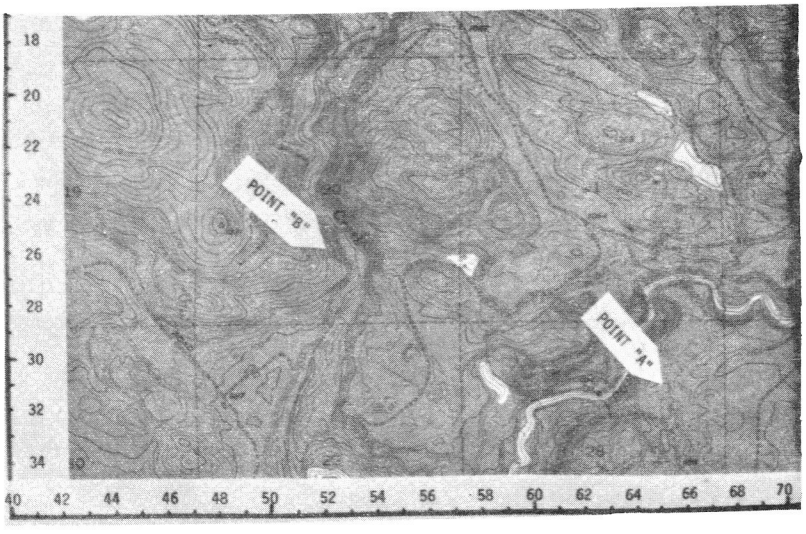
edge will be from the section line on the enlarged map. Do the same with an adjacent side. Then, by measuring the width of the pond and using the "Multiple", the pond can be reproduced in the right place and proportion. Continue in this manner until the section is filled in with all its major features, then check the relationship of each landmark to the others. If they hold up fairly well under close scrutiny and a few random measurements of their proximity to each other, finish the other sections in the same manner. Experience is the only way to gain proficiency in mapping.

As soon as enough information is filled in on the enlarged map to do so, start plotting team movements as their positions are received. If a team is on a unplotted road, make a note to yourself and draw it in as soon as possible. Sometimes a team will not give enough information to



The printing on the map can be used to describe a location. For example, "we are at the stream just under the letter 'k' in the word 'creek' in Section 18."

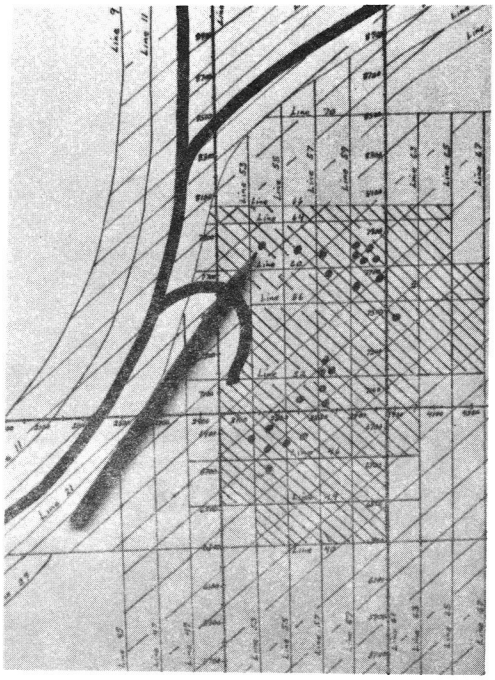
The Uniform Map System provides a very effective way to communicate a team's location. Point "A" is at 6533. Point "B" is located at 5226. (Read horizontal 2 digits followed by vertical 2 digits. Intervals are 1/10 mi.)



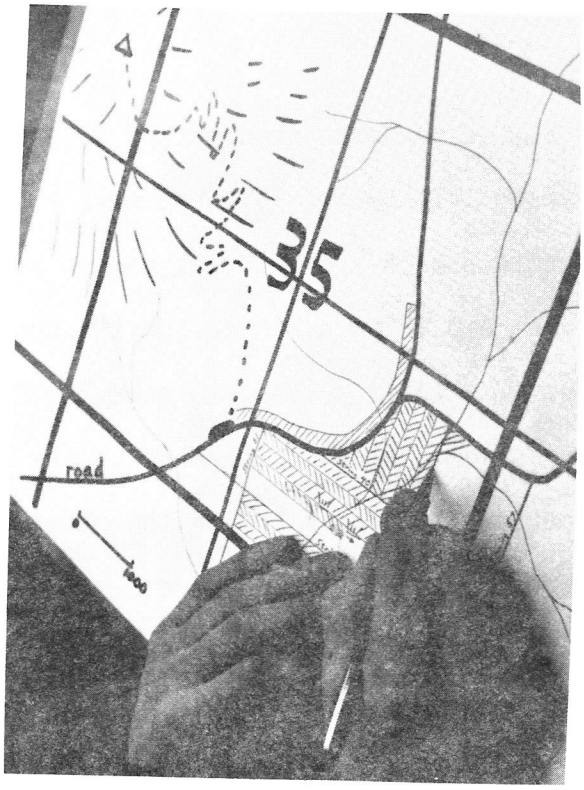
locate them exactly; in this case it is the mapper's responsibility to ask for a clarification. If a team leader says he is gridding perpendicular to the road, ask for a bearing. If he says he's going up hill, ask for a direction (roads are often at the bottom of a gully and "up" could be either way.) You can also utilize the printing on the map, sometimes, in establishing whether the intersection they've reached is the one just under the "T" in "NATIONAL" in Section 26, for example. However, these problems can be virtually eliminated with the use of the Uniform Map System.[3]

The mapper should also check with each Team Leader upon his return to base to make sure that there are no discrepancies between the area accredited to him on the map and the area he actually covered. This is one of those cases where a picture really is worth a thousand words.

Cross-Hatching on the map may be used to mark the searched areas. Wide spacing and close spacing of the marks can be used to indicate two levels of thoroughness in the search.



[3] Wartes, Jon, Explorer Search & Rescue: Team Member & Team Leader Training Manual, Western Region Explorer Search & Rescue, 1975, 1111 NE 195, Seattle, WA, 98155, $1.00.



Map making on a search always requires a compromise between accuracy and speed.

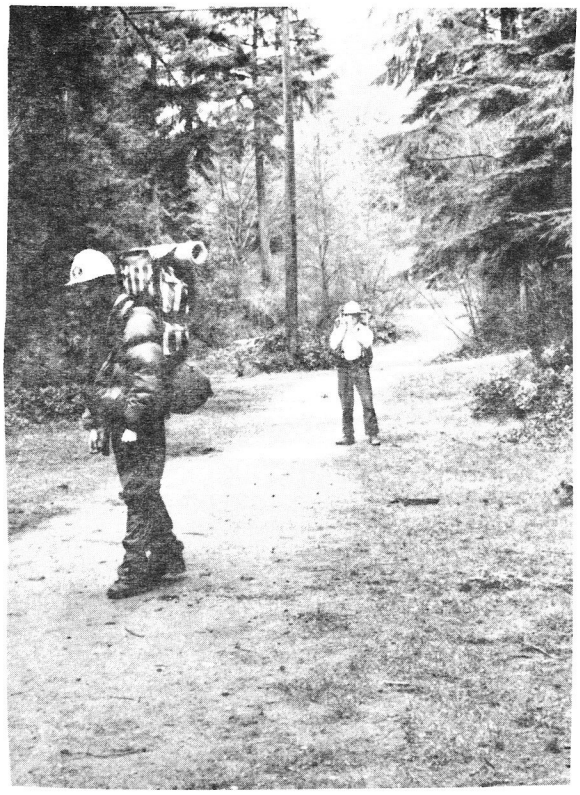
In one corner of the map, usually the lower right corner, give the scale of the map, the search number, date, and any other information necessary for interpreting the map. In most cases each team is identified by a different color of felt tip marker that traces its movements throughout the search. In a close grid of one contiguous area (as in a hands & knees evidence search) it is usually enough just to cross-hatch the areas searched and to locate each find as accurately as possible on the map.

Experience is the only way to strike the right balance between speed and accuracy. A very accurate map could be made by quartering each section on both maps over and over again, then measuring where every landmark crosses every line; but, by then the search would probably be over before the map was complete enough to be of any use. On the other hand, an inaccurate map isn't very helpful either. So practice freehanding the features in with only a few measurements and judging the rest by eye.

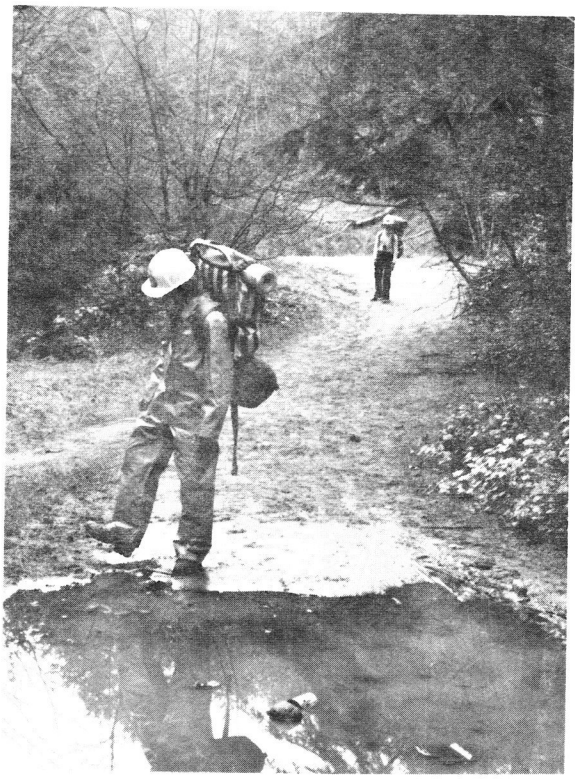
COMPREHENSIVE INFORMATION UNIT

Surveying

Surveying for Search and Rescue purposes need not be done with as many bearings as for other purposes. It generally works well enough on the lightly travelled roads in a wooded search area for one person to stand at the junction of the center of the road to be surveyed and the center of the starting landmark (be it base camp, a trail or another road.) Meanwhile, his partner goes ahead to stand in the center of the road at the point where it just starts to bend. Both persons take bearings on the other (for a double check) and the last person then paces (or measures with steel tape as in the case of an evidence search where accuracy is critical) the distance to the forward person's position. The bearing and distance should be recorded in a field log as in Figure 1. Keep in mind that junctions are where centers cross, i.e., where the center of a stream crosses the center of a road.



A two-man team is used for surveying. The second person sights on the first man, records the bearing and measures the distance.



Speed can be increased if the first person marks the ground and starts off on the next leg while second person is still catching up

FIGURE 1
FIELD LOG

FIELD LOG

Bearing	Distance	Remarks
032°	120'	
040°	30'	Crossed Creek at 10'*
048°	75'	
044°	25'	Trail to left on 358° bearing**
048°	80'	
060°	110'	
ETC.		

*Center of creek is actually 130' from point of beginning in this case.

**The center of the road crosses the center of the trail 250' from point of beginning, and the trail starts out on a bearing of 358° before it starts to bend.

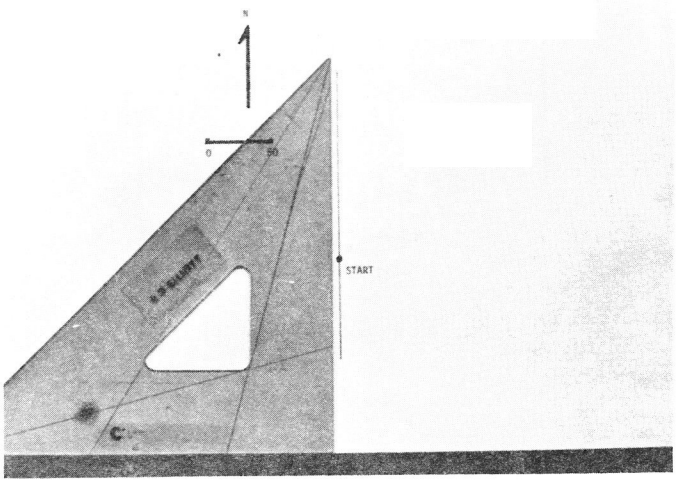
Although it is necessary to get an accurate bearing on straight sections of road this is not absolutely necessary on curves. Much time can be saved on curves if the forward person moves along the center until he is just barely in sight around a curve and the bearing is taken then. This, of course, gives a very angular-looking drawing, but by rounding off the angles a fairly accurate curve can be obtained in a minimum of time. If the forward person can mark his exact stopping place in some unmistakable manner (with crossed sticks or a freshly marked "X" in the dirt) he can be moving foreward while the other person is moving up and save more time in this way. Continue in this manner until the needed portion of road or trail is finished. End at a distinct point that can be identified again in case the search situation changes and you should need to go further from that point at some later time.

Plotting Surveyed Areas

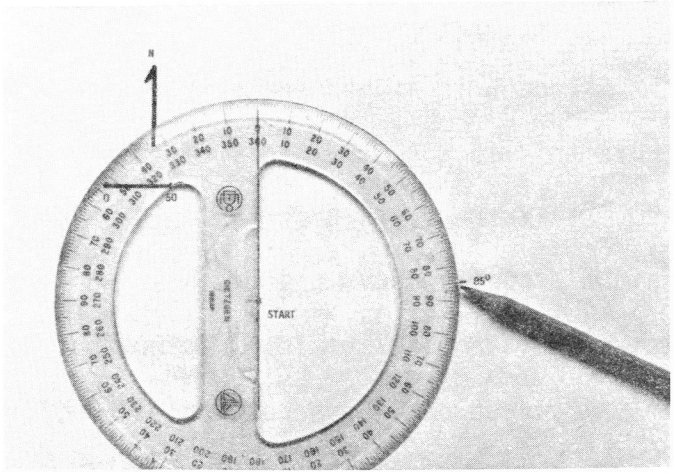
A general direction of travel can be established from the field log

to enable the plotter to allow enough room in the right direction when putting the point of beginning on a map. For example, if the direction of travel was generally north and east, put the starting point in the lower left corner of the paper.

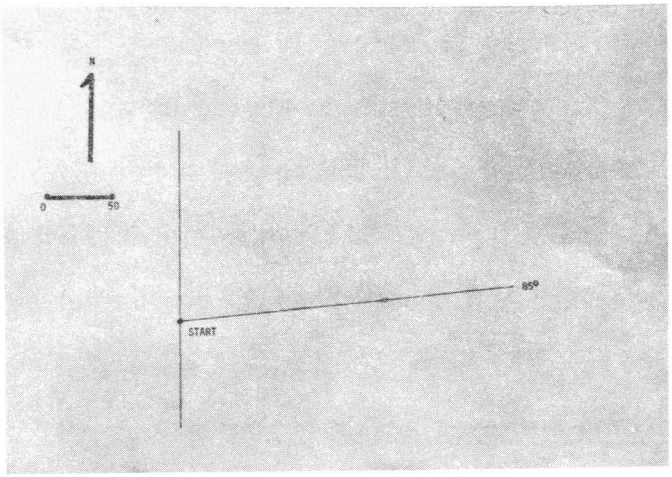
Using a T-square and triangle, lightly draw a vertical line through the starting point.

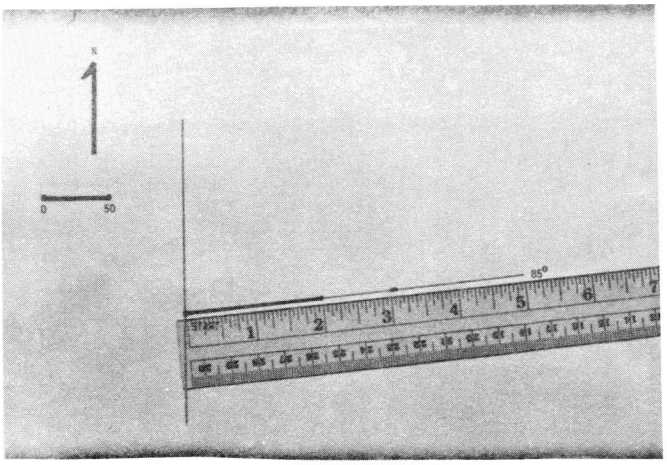


With the protractor lined up on this north-south axis, put a small dot beside the correct degree mark on the protractor for the 1st bearing (in this example 85^{0}.)

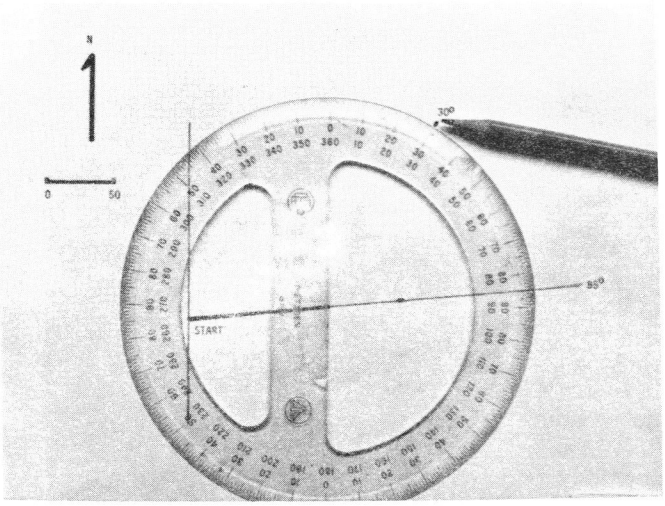


With a straight edge, draw a light line connecting these two points, extending the line beyond the second point.

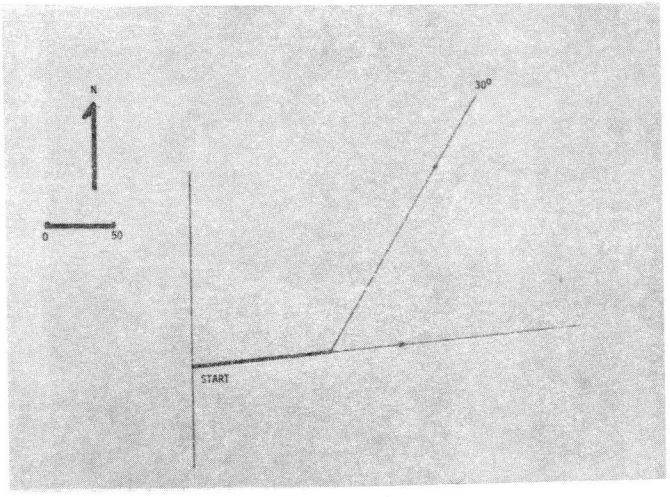




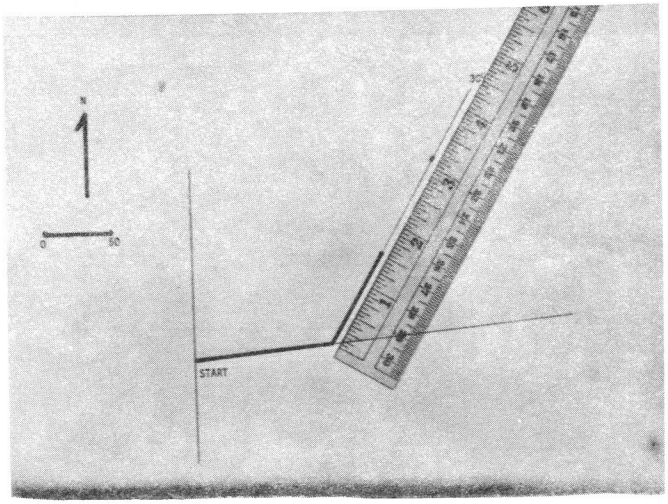
Measure the distance traveled on this bearing along the line.



Move the protractor along the bearing line, placing the center at the end of the 1st bearing. Make sure that the bearing just used (85^{o}) still lines up with the end of the 1st line drawn. Then put a small dot beside the degree mark for the next bearing (30^{o} in this example.)

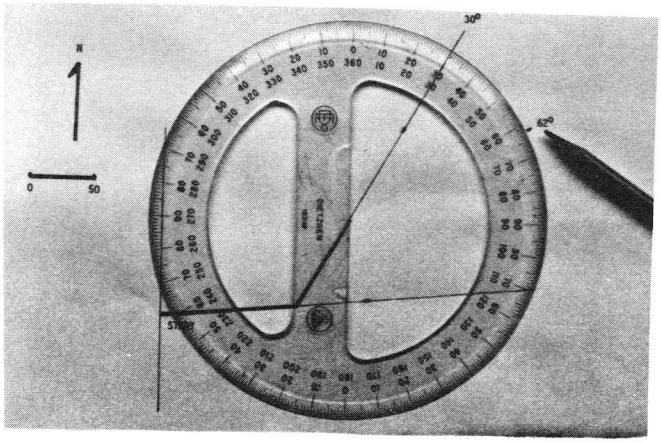


Draw a light line through, and slightly beyond this small dot.

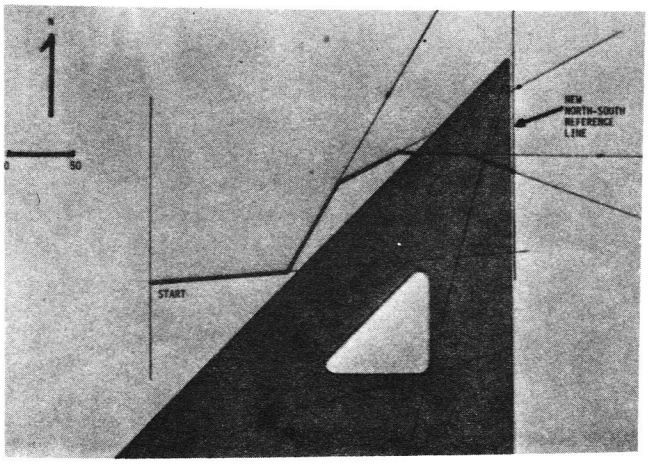


Measure the distance traveled on the 2nd bearing.

Move the center of the protractor to the end of the 2nd bearing, line up the 2nd bearing (30^{o}) with the line already drawn for that bearing and then make a small dot for the 3rd bearing (62^{o} in this example.) Continue in this manner.



Use the T-square and triangle to draw a north-south axis through the cross line every four or five bearings and line the protractor up with this as a check and to maintain accuracy.



Proceed in this way until all the gathered field data has been entered on the map.

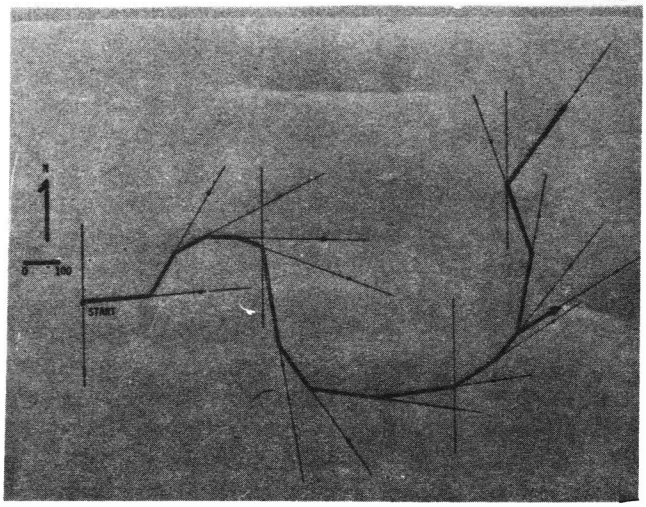


FIGURE 2
FIELD LOG FOR MAP PICTURED ABOVE

FIELD LOG

Bearing	Distance	Remarks
085°	100'	
030	75	
062	50	
091	50	
110	40	
170	150	
144	80	
098	100	
082	120	
058	75	
040	50	Road goes off at 60°
012	120	
341	110	
037	150	

String Line Laying

It is crucial that the string lines used to divide the search area up into segments be as precise as possible so that they correspond accurately to the lines on the map. This will minimize the chance of marking off any portion of the map as searched that wasn't actually covered. For this reason a person exceptionally accurate on compass work should be used for this task. (The string or grid ribbon lines used to mark the path of the end man on a grid sweep may shift right and left with the team and are not included in this.) Both the beginning and the end of a string line should be clearly marked with grid ribbon so it can be readily identified, and tags may be affixed to the string at intervals to show the distance from the string's beginning. When tags are used, the distance must be paced by the string man or a partner. One tag, giving the string line number and showing a distance of zero feet, should be left beside the grid ribbon marking the line's beginning. When several string lines are to be laid it is helpful to assign

String lines used for control purposes must be accurately plotted on the operation's map.

String tags showing the line number and footage provide useful reference points for the teams as they search the area.

odd numbers to all those going in one general direction and even numbers to cross strings. If ribbons are used instead of string, it is very important to put them close enough together so that one is readily visible from the other so that no time is lost hunting for the next one.

SEARCH PROCEDURES

The Information Unit really needs several people at the very beginning of a search, but only three (two can manage if necessary) to carry on the basic IU work once the teams are in the field. Consequently, it is nice to have all IU personnel fully trained for the field as well so that, after the initial rush, those not needed in base can work on field teams.

ROSTERS

The very first chore on any kind of operation is to sign in all personnel on the roster. (Figure 3 is an example.) This gives the operation leader a count of how many persons he has to work with in each capacity. Depending on the SAR unit's setup either two or three copies of the roster are needed: one for the sheriff, one for the OL, and one for IU use. The sheriff generally likes to have an estimate of the total mileage and man-hours expended on the search: either the IU or the OL will use the rosters to figure this data.

Usually a Field Leader will work with one member of the Information Unit to select Team Leaders and assign Team Members.

FIGURE 3
SEARCH & RESCUE ROSTER

ROSTER

UNIT NAME: _____ MISSION NUMBER _____

Name	DES #	Dist.	Assign or Team	Date In	Date Out	Date In	Date Out	Date In	Date Out	Man Hrs.	Milage, Driver Only
1.											
2.											
3.											
4.											
19.											
20.											

Total Number of Personnel _____ Total Number of Man-Hours _____
Total Number of Vehicles _____ Total Vehicle Miles _____

Report Submitted by _____ Phone _____

INFORMATION GATHERING

While one person is doing the roster, the rest of the IU people should be gathering other information. One person should be in on the sheriff's briefing, taking notes and filling in the subject description forms (Figure 4.) Meanwhile another person should be finding out what will be used for individual maps for each Team Leader. Ask the OL if he or the sheriff brought any maps or if they need to be copied (either by hand or by copy machine.) Another person should be working with the person designated by the OL to make out team lists (usually the FL, but sometimes the IU is asked to do this.) Two copies of team lists are needed -- one for the Team Leader and

another, in large print, to be posted near the radio with the team leaders' radio number on it. The FL's also need a list of team leaders and their radio numbers.

FIGURE 4
SUBJECT DESCRIPTION FORM

SUBJECT DESCRIPTION

Name _____
Home Address _____
City _____ Phone _____
Age ___ Sex ___ Height _____
Weight _____ Physical Cond. _____
Recent Ailments:

Clothing (color and material)	Equipment
Coat _____	Shelter _____
Rain Coat _____	Pack _____
Shirt _____	Light _____
Pants _____	Map ___ Matches ___
Hat _____	Sleeping Bag ___
Shoes & Tread	Food, how much
_____	_____
Smoke? Kind?	_____
_____	_____

Experience in woods: _____
Prep. for this trip: _____
Location last seen: _____
Time last seen: _____
Known intentions: _____
_____
Other:

INFORMATION PACKETS FOR TEAM LEADERS

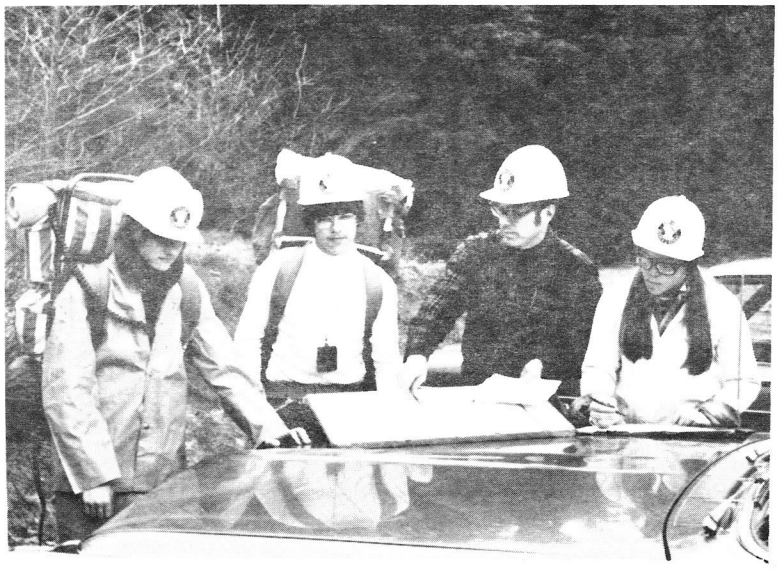
When the IU person attending the sheriff's briefing returns with the subject description and a list of other equipment the subject may have had with him, this information is written on individual slips of paper for each Team Leader and becomes part of the TL's "information packet." The packet also includes his team roster and a map of the search area. If the information

is all available at the same time, it can be stapled together. Sometimes it's easier to give the TL his team list first(if it's ready first.) This way, while you're preparing the other information and copying maps, the TL can be getting his team together and making sure each team member has all the equipment necessary for that particular search. Every operation is different, though, so the person in charge of the IU has to adjust his priorities to take advantage of the information available to him at any given time. Sometimes, as in the case of most evidence searches, speed isn't so important so that all information can be assembled before dispersing any of it. During long-term operations, the information packets can be assembled each evening in preparation for the following day.

BRIEFING

It is also helpful if an IU person can listen in and take notes when the OL gives the teams their assignments. This will give him some idea of where each team will be going before they leave base camp. Knowing from the beginning where each team is going gives the mapper a better idea of which areas to plot first and makes it easier to make sense

If possible, one IU member should be present and take notes as the OL assigns various tasks to the Team Leaders.



out of any information a team leader sends back. If he says he's reached the trailhead, he's usually referring to a trailhead mentioned in the OL's verbal instructions, for example.

RADIO LOG AND OTHER DUTIES

In most cases the IU also checks equipment (string cans, machettes, etc.) in and out, and, as mentioned in the beginning, keeps a radio log of messages between the persons in the field and base camp. (See Figure 5.)

FIGURE 5
RADIO LOG

RADIO LOG

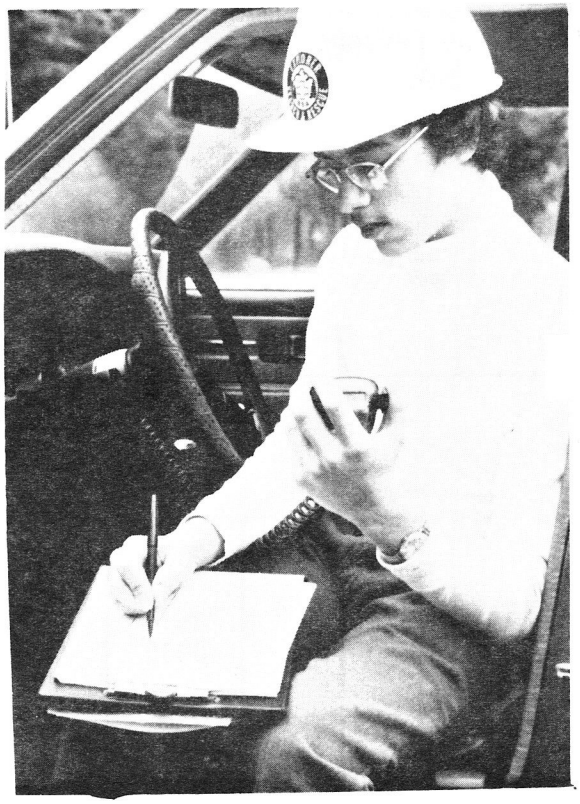
From	To	Time	Message
46	80	0830	Check out 1st drainage to the west as you go up the trail.
80	46	0830	Copy
46	82	0834	Have you reached the swamp yet?
82	46	0834	Negative, it should be about 100 yards ahead.

Sometimes logs may be tape-recorded. This method has the drawback of making it more difficult to check back on any given previous message without risk of missing something coming in while checking back. It is also more difficult to locate a given bit of information on a taped log than on a written log. It has the advantage of being more accurate.

While the search is going on, the IU keeps the large map up to date, maintains the log, and does the other paper-work such as signing in new arrivals.

In the case of the comprehensive IU, where the OL requests it, the IU may also be running string lines and surveying, as needed.

After the search is over, equipment needs to be checked in, the mapper must confirm the last areas covered with each TL, and then everyone needs to be checked out to be certain that all persons are out of the field and accounted for.



An accurate radio log can become a valuable reference.

EQUIPMENT

EQUIPMENT FOR BASIC AND COMPREHENSIVE INFORMATION UNIT

The equipment necessary for a basic IU is the same as for a comprehensive IU except for the string cans, cones of string, string tags and grid tape for marking the beginning and end of the string lines. Besides personal gear, (including a compass) you will need the following:

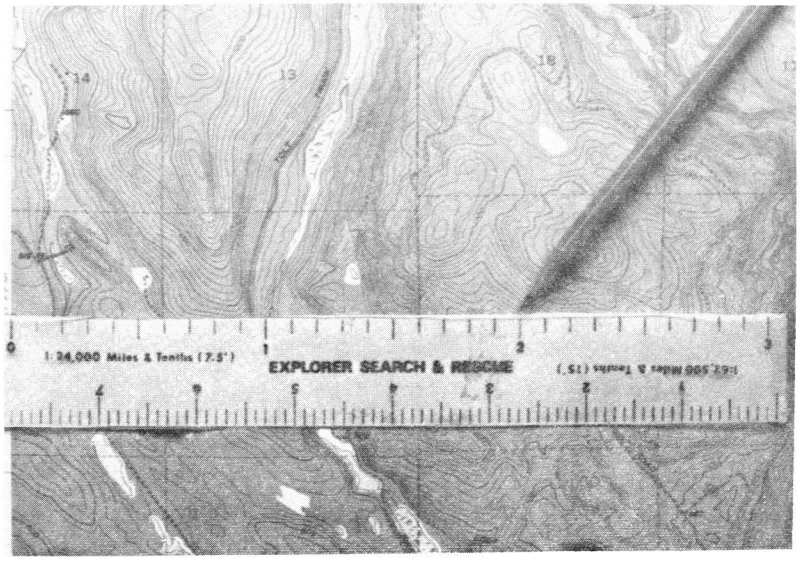
1. Plotting board
2. T-square
3. Roll of Clearprint 1000 H Paper. Tracing paper may be substituted but is not as satisfactory.
4. Masking tape
5. Scotch tape
6. Paper scissors
7. Triangle
8. Full Circle protractor (C-Thru #255 is a good one.)
9. Scale (ruler) marked in 1/10" increments.
10. Stapler and staples

11. Eraser
12. Pencils (also crayons are sometimes helpful.)
13. Pencil sharpener or knife
14. Ball point pens (blue cannot be copied on some copiers.)
15. Large color assortment of fine point felt tip markers.
16. Paper for radio log
17. Scratch paper
18. Compartmented briefcase (or box.)
19. Rosters and other forms in use by your unit.
20. Mailing tube for paper roll.

A good, roomy briefcase makes it possible to pack just four items (besides personal gear) when a search is called -- drawing board, T-square, roll of paper and the briefcase (containing everything else.) The back side of used computer printout sheets works well (and the price is right) for both scratch paper and the radio log since the sheets will stay in order unless torn apart.

Also, when coordinating with other Search and Rescue groups or with aircraft, you may find it helpful to have the Uniform Map System grids and scale available from Tacoma ESAR.[4]

4 Tacoma ESAR, Box 7092, Tacoma, WA, 98407. 50¢ per ruler.



A small plastic ruler, available from Tacoma ESAR, allows for convenient measure in units of 1/10 mi. on both 7½' and 15' topogs.

NICE-TO-HAVE NON-ESSENTIALS

Although not essential, a pair of proportional dividers is a good time-saving device. It eliminates the need for multiplying each measurement out -- it is all done for you on the other end of the dividers.

If a source of AC power is available, a copy machine speeds up the process of getting teams into the field by quickly duplicating the maps and subject description needed for each Team and Field Leader. It is also useful for copying rosters and other information. An over-head projector and a transparant copy of the map (made on the copy machine) is a help in drawing complicated maps quickly and accurately. You just project the transparancy on your paper and trace the map features instead of measuring and multiplying for each one.