Appendix A: Forms

This appendix contains forms for photo point monitoring. They may be copied onto three colors of paper or clear plastic for overhead projection, depending on their use.

Paper Color

Office forms are printed on standard white paper.

Field forms should be printed on either of two paper colors: blue for forms placed in photographs to identify each photo or yellow for field forms to ease eye strain. Outline forms for grid analysis are printed on clear plastic. Grids and summary forms are printed on white paper. Paper color suitable for each form is shown in **bold.**

Blue paper is Hammermill Brite Hue Blue or Georgia Pacific Papers Hots Blue to be used in photographs to identify the slide or negative. This shade of blue has proven to be least sensitive to changes in sunlight, from full sun to shade, and has the least tendency to “bleach out” in full sun.

Yellow paper is Champion Goldenrod or Hammermill Copy Plus GOLDENROD to be used for field forms. It has proven to be least annoying to eyes under direct sunlight when recording data, maps, diagrams, and other descriptions.

Clear plastic sheets for printing outline overlays are 3M or Labelon Overhead Transparency Film. These films are specifically designed for different printers such as laser, inkjet, or plain paper.

White paper is used for summary forms and for grids adjusted to the size of the outline overlays.

Forms and References

Forms are listed below by page number, and examples of their use are shown by figure number (figures are from both part A and part B). Several forms consist of two or three pages. The first page lists all pertinent items and the photo number. A second page leaves the photo number blank to be filled in as required. For example, "Camera Location and Photo Points" lists photo "A" and "B" on the first page and has a blank for photo points on the second page. Print enough of the second pages to mount pictures of the photo points established. Similar multipage forms are "Photo Points and Close Photos," "Photo Points with Overhead Views," and "Shrub Photo Transect."

Form	Page	Figure examples
Paper colors for field use	85, 87	None
Photograph identification forms; print on **blue paper**		
Camera-Photo	89	2, 10
Shrub Photo Sampling	90	25
Sampling location maps; print on **yellow paper**:		
Photographic Site Description and Location (map)	91	6, 12
Sampling Site Description and Location (map)	92	22, 23
Photo mounting and data forms; print on **yellow paper:**		
Camera Location and Photo Points	93	13 - 15
Photo Points and Close Photos	95	11
Photo Points with Overhead Views	97	28
Shrub Photo Transect	99	25
Grid Intersect Analysis Outline Form; print on **clear plastic**	102	36, 37, 38, 40, 42, 46 to 48
Analysis Grids: adjust size and print on **white paper**		
1 meter	103	39, 40
2 meter	104	none
Shrub Analysis	105	48
Photo Grid Summary Form; print on **white paper**	106	39, 49

Paper found best for photo identification is this color blue.

It is **Hammermill Bright Hue Blue©**

or **Georgia Pacific Papers Hots Blue©**

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Paper color that is easy on the eyes and used for mapping the monitoring system and recording field notes for mounting photographs.

It is **Champion Goldenrod©**

or **Hammermill Copy Plus GOLDENROD©**

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DATE _____

AREA _____

UNIT _____

CAMERA: 1 2 3 4 5

PHOTO: A B C D

E F G H I J

SHRUB PHOTO SAMPLING

DATE_____ 0 END

AREA_____

ALLOT._____

TRANSECT 1 2 3 4 5

SHRUB 1A 1B 2A 2B 3A 3B

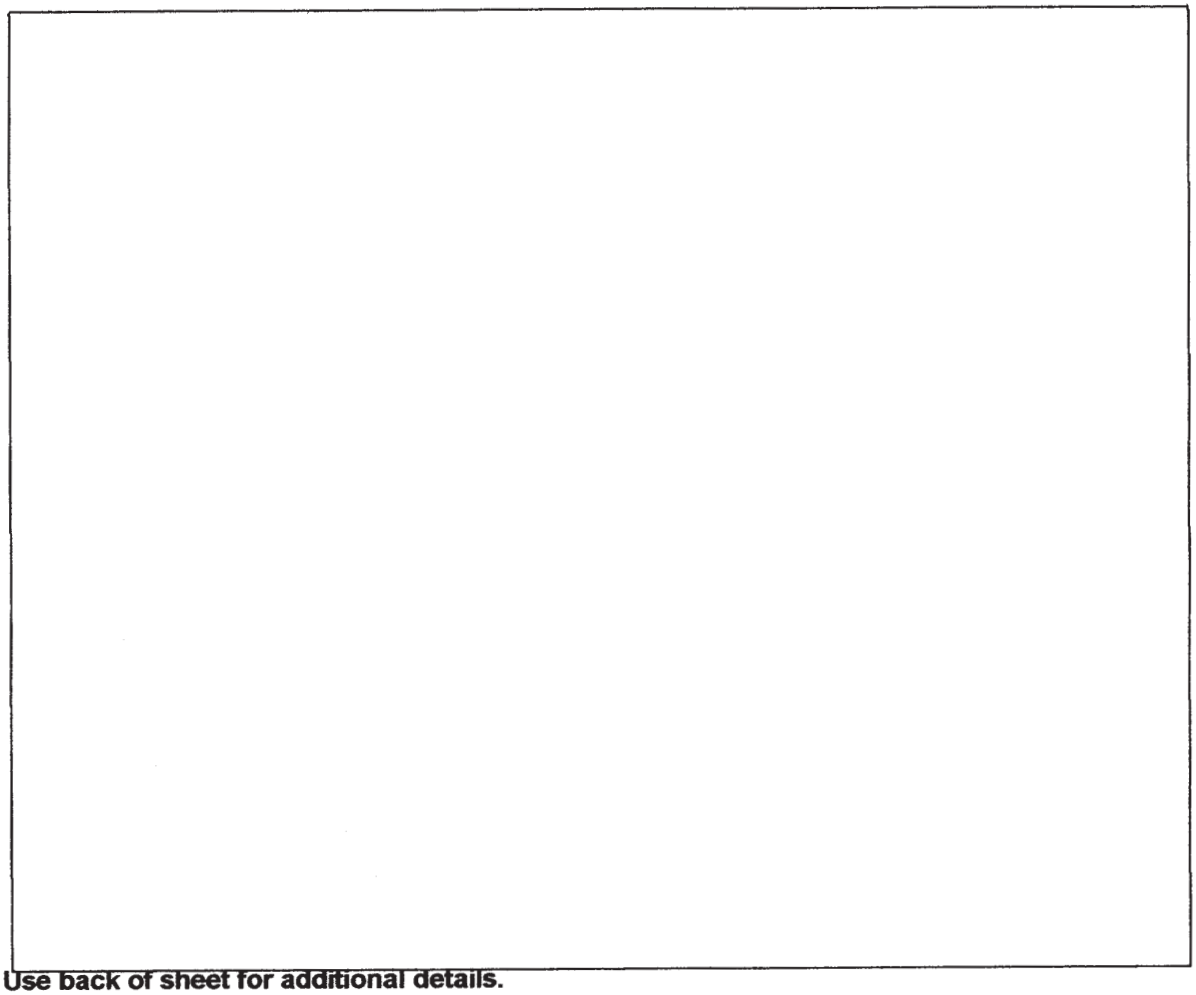
4A 4B 5A 5B 6A 6B 7A 7B

8A 8B 9A 9B 10A 10B

PHOTOGRAPHIC SITE DESCRIPTION AND LOCATION

Date _____ Area_____
Unit_____Observer:_____
No. of Camera locations: _____No. of Photo points:_____
Plant community_____
Location: T._____ R._____ Sec._____
Location description_____
_____
Photo purpose:_____
_____
Discussion:_____
_____
_____
_____

MAP



Use back of sheet for additional details.

SAMPLING SITE DESCRIPTION AND LOCATION

Circle: 1 Sq.Ft. Nested Freq. 1 sq.m. Robel Pole Shrub Form _____

Date _____
Area _____
Allot._____
Cluster No. _____
Transects: 1 2 3 4 5
Plant community _____
_____

Grazing system:
Type _____Date_____
Type _____Date_____
Type _____Date_____

Kind of animal: cattle sheep
horses goats deer
elk _____

Location: T._____ R._____
Sec._____
Description:_____
_____
_____
_____

Site Data: Elev._____ % slope_____
Slope aspect: N NE E SE S SW W NW
Slope position: top up 1/3 mid low 1/3 bottom
Micro topography: convex flat concave
Macro topography: flat undulating rolling
steep rough broken

Geology:
Deposition: wind stream lake colluvial
residual_____
Material: limestone mudstone sandstone
granite serpentine diorite
basalt andesite rhyolite
tuffacious cinders pumice ash

Soil:
Restrictive layer: absent clay pan bedrock
cemented _____
Surface compaction: none moderate severe
Soil profile stone: absent gravel stony
Soil texture: sandy loamy silty clayey ashy
Other notes:_____
_____
_____

MAP

CAMERA LOCATION AND PHOTO POINTS

Date_____
Camera Location_____
Area_____ Number of Photo points: _____
Unit_____Observer_____
Comments _____
_____
Slope_____ Aspect _____ Slope position_____

Photo point A:
Compass bearing: _____
Distance:_____

Photo Point A

Photo point B:
Compass bearing:_____
Distance:_____

Photo Point B

CAMERA LOCATION AND PHOTO POINTS

Date _____ **Camera Location** _____

PhotoPoint ____
Compass bearing: _____
Distance: _____

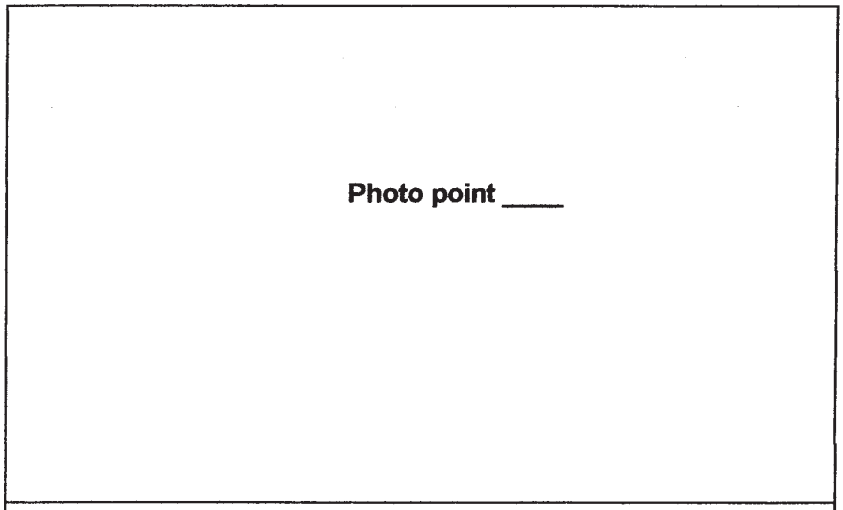


Photo Point ____
Compass bearing: _____
Distance: _____

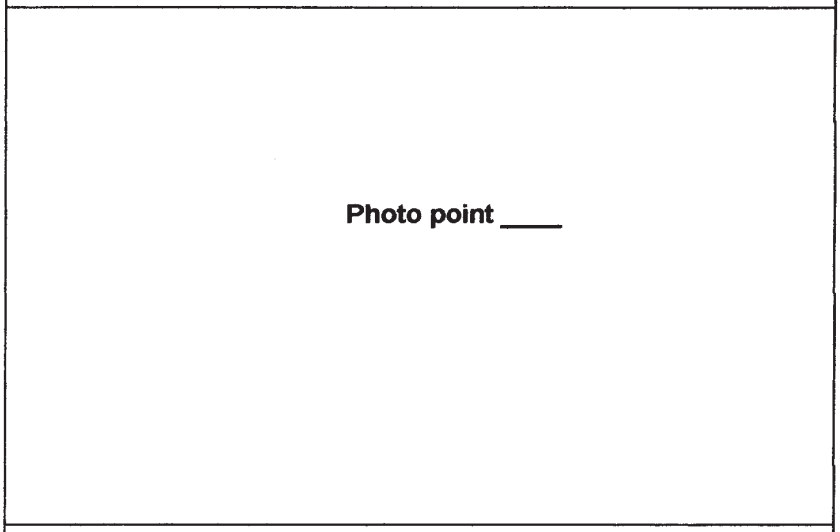


Photo Point ____
Compass bearing : _____
Distance: _____

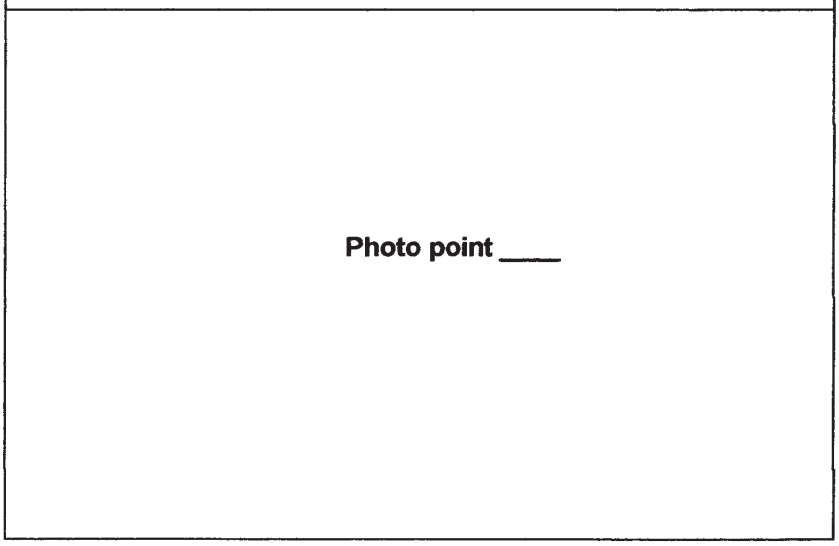


PHOTO POINTS AND CLOSE PHOTOS

Date _____ **Camera** _____

Area_____
Unit _____
Photo point: A
Observer_____
Remarks _____

General photograph of point A

Photo point A:
Left of meter board
Species/cover:_____

Close photo to left of meter board

Comments:_____

Photo point A:
Right of meter board
Species/cover: _____

Close photo to right of meter board

Comments:_____

PHOTO POINTS AND CLOSE PHOTOS

Date_____
Area_____
Unit _____
Camera _____
Photo point: ____
Observer_____
Remarks _____
_____
_____
_____
_____
_____

General photograph of point _____

Photo point _____
Left of meter board
Species/cover:_____
_____
_____
_____
_____
_____
_____
_____
Comments:_____
_____
_____
_____
_____

Close photo to left of meter board

Photo point _____
Right of meter board
Species/cover: _____
_____
_____
_____
_____
_____
_____
Comments:_____
_____
_____
_____
_____

Close photo to right of meter board

PHOTO POINTS WITH OVERHEAD VIEWS

Date_____ Camera Location_____
Area _____Number of photo points_____
Unit _____ Observer_____
Comments _____
_____
Slope _____ Aspect _____ Slope position _____Topography _____

Photo Point A
Compass bearing_____
Distance _____
Photo comments:_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

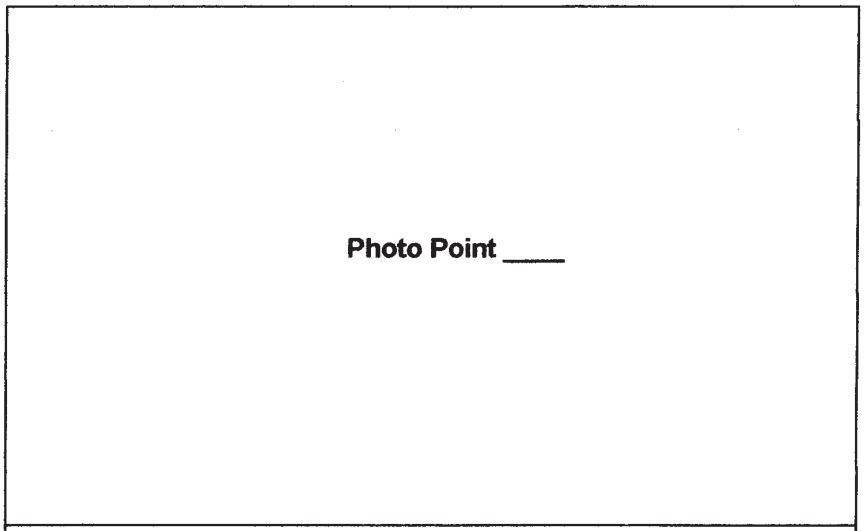
Photo Point A

Overhead of Photo Point A
Comments:_____
_____
_____
_____
_____
_____
_____

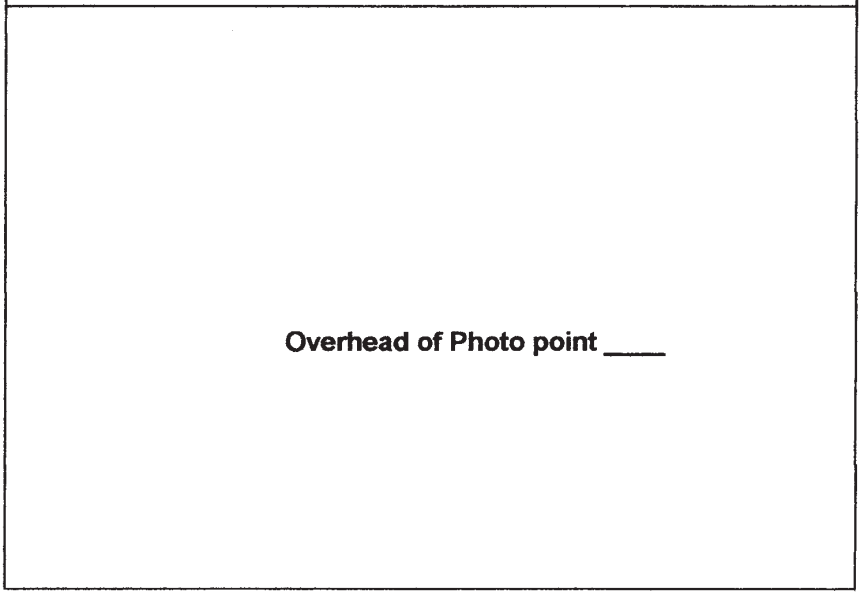
Overhead of Photo Point A

PHOTO POINTS WITH OVERHEAD VIEWS

Photo Point ____
Compass bearing: _____
Distance _____
Photo comments:_____



Overhead of Photo Point ____
Photo comments:_____



SHRUB PHOTO TRANSECT

Date _____ Cluster _____ Transect 1 2 3 4 5

Area _____
Allot. _____
Investigator: _____
_____
Season of use_____
Grazing system: _____
_____
Animals _____
_____

Direction_____
Distance_____

General photograph down the transect

Shrub 1A
Direction _____
Distance _____
Comments_____
_____
_____
_____
_____
_____
_____

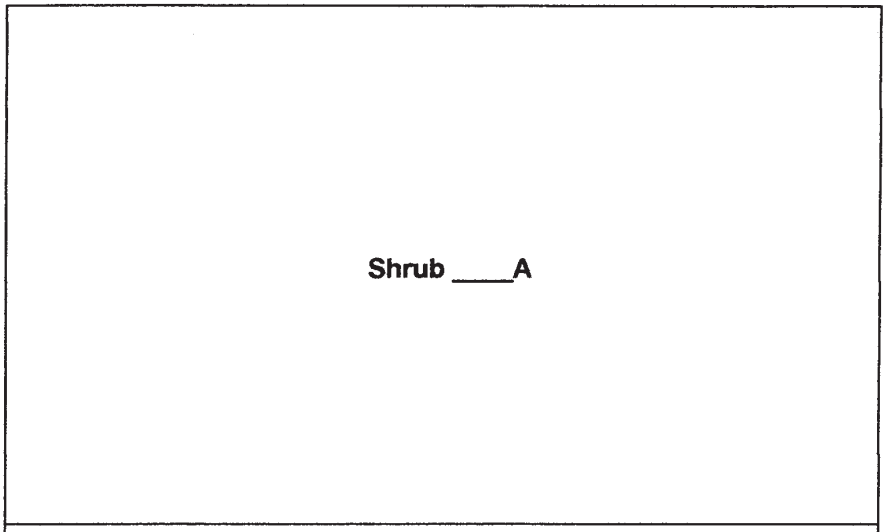
Shrub 1A

Shrub 1B
Direction _____
Distance _____
Comments _____
_____
_____
_____
_____
_____
_____

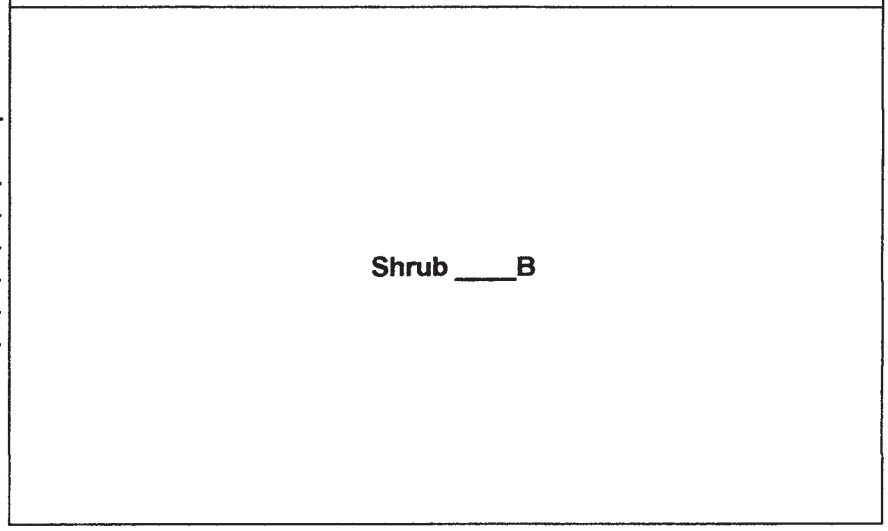
Shrub 1B

SHRUB PHOTO TRANSECT

Shrub ____A
Direction _____
Distance _____
Comments_____
_____
_____
_____
_____
_____

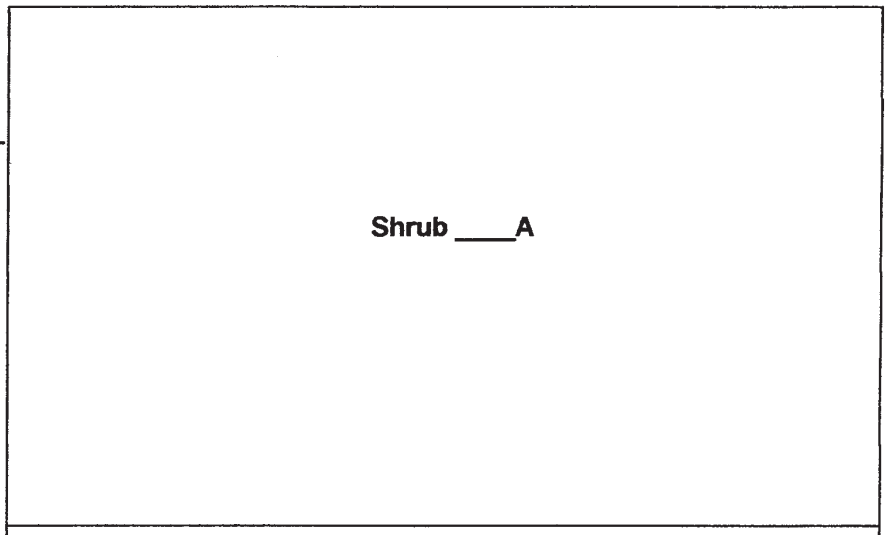


Shrub ____B
Direction _____
Distance _____
Comments_____
_____
_____
_____
_____
_____

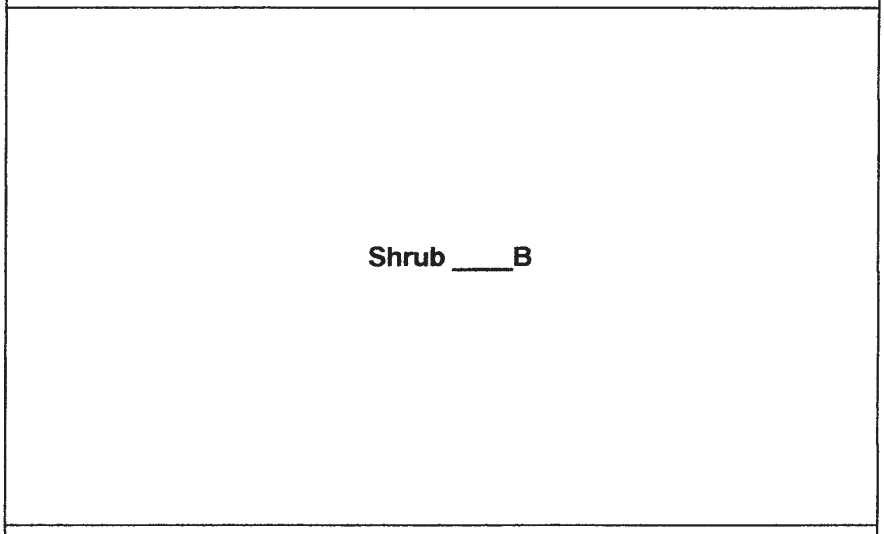


SHRUB PHOTO TRANSECT

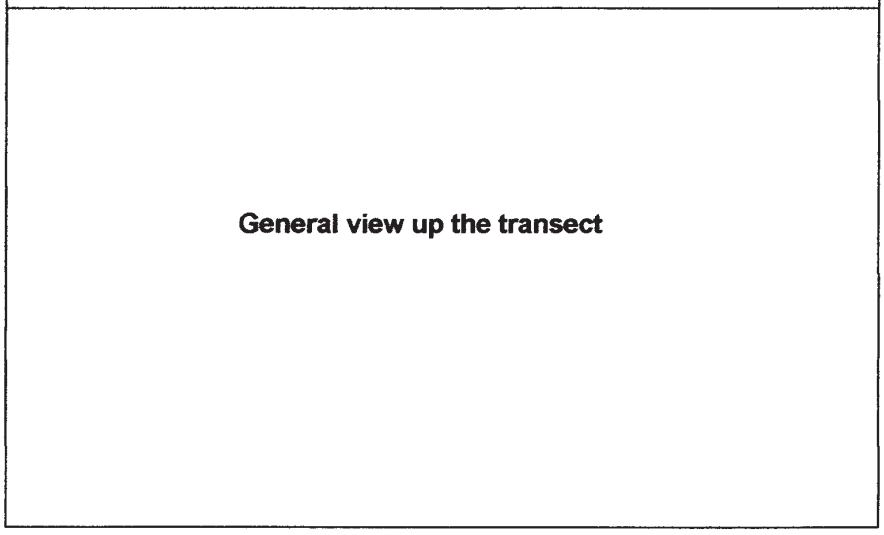
Shrub ____A
Direction_____
Distance_____
Comments_____



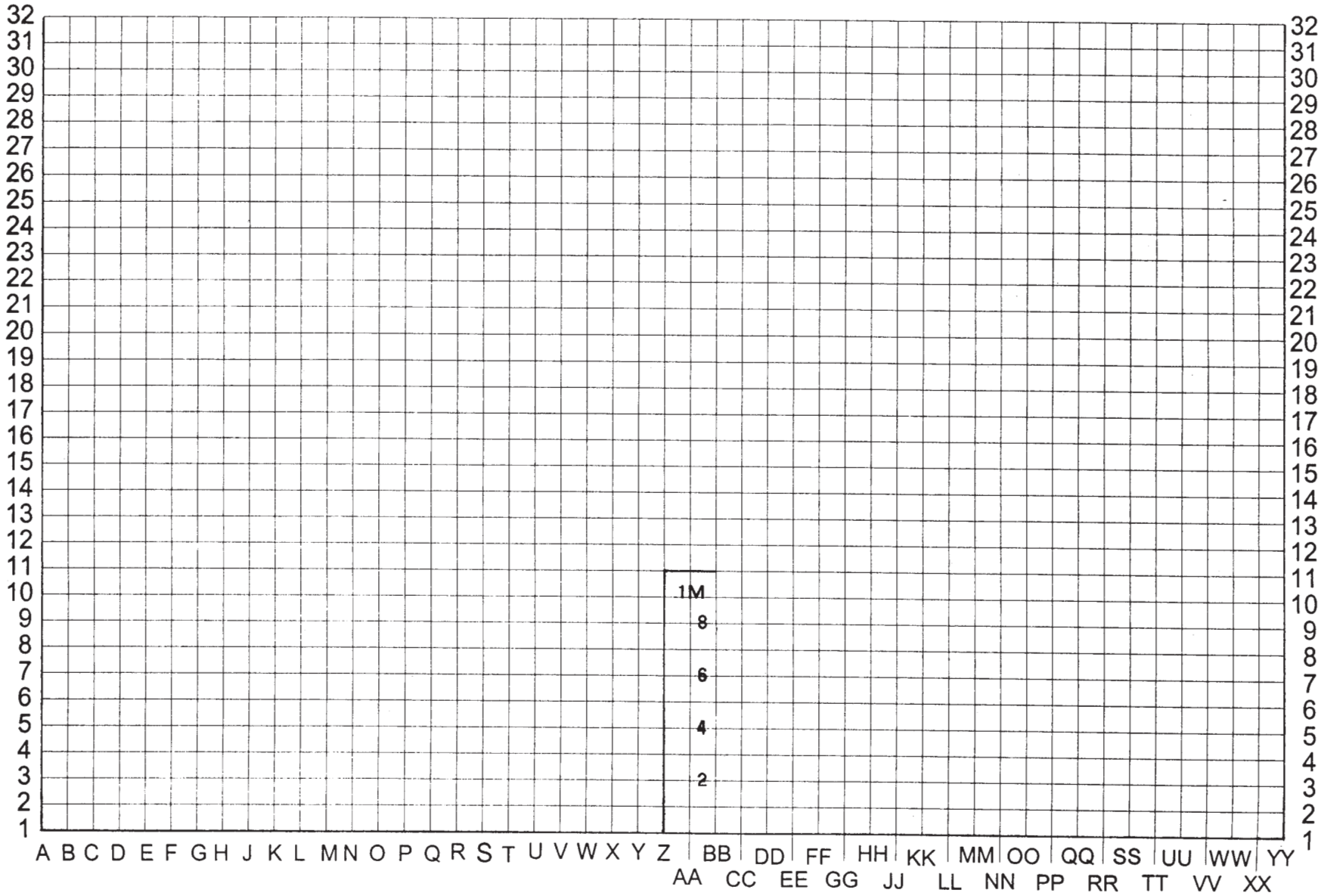
Shrub ____B
Direction _____
Distance _____
Comments_____



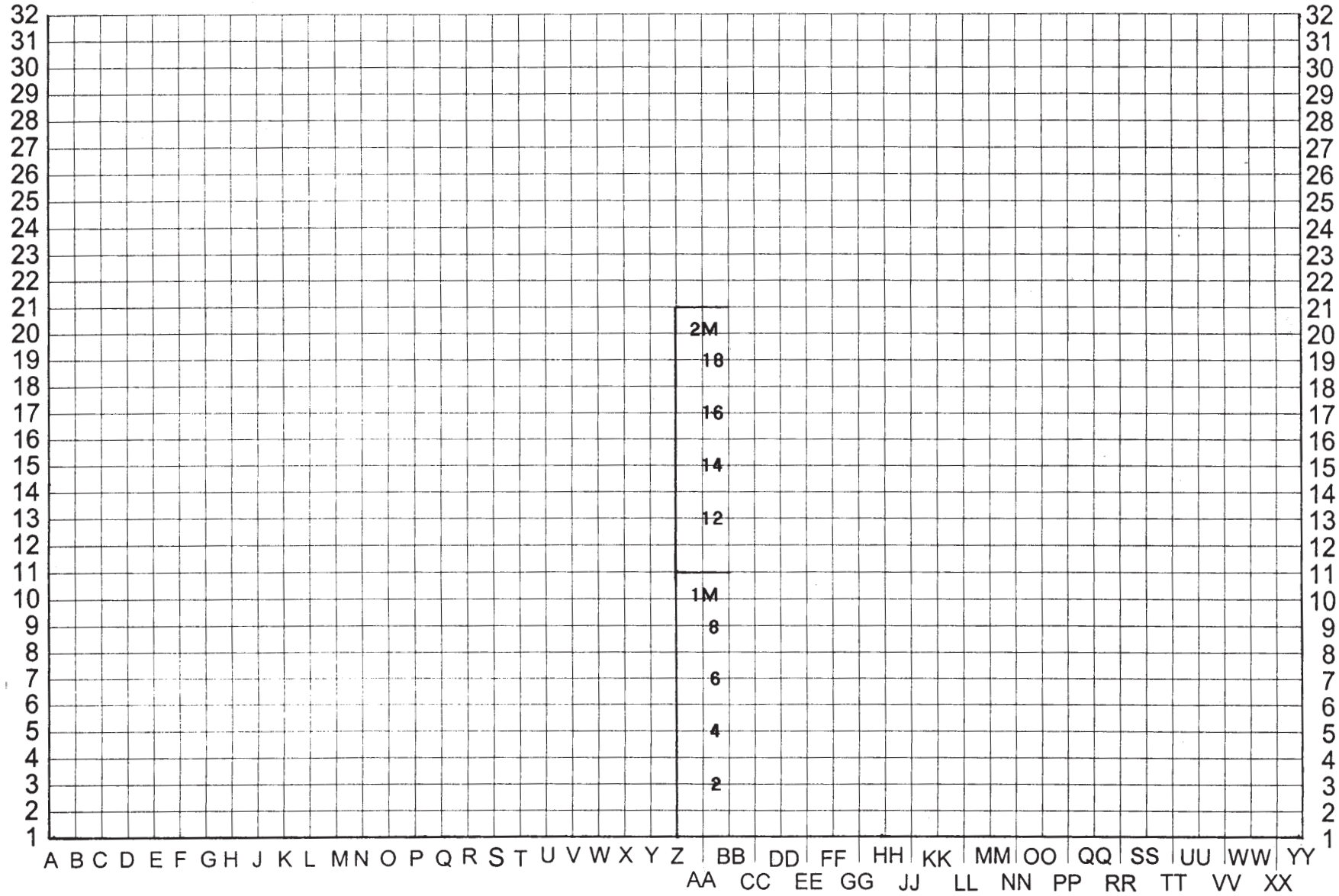
View up the transect:
Direction _____
Distance _____
Comments _____



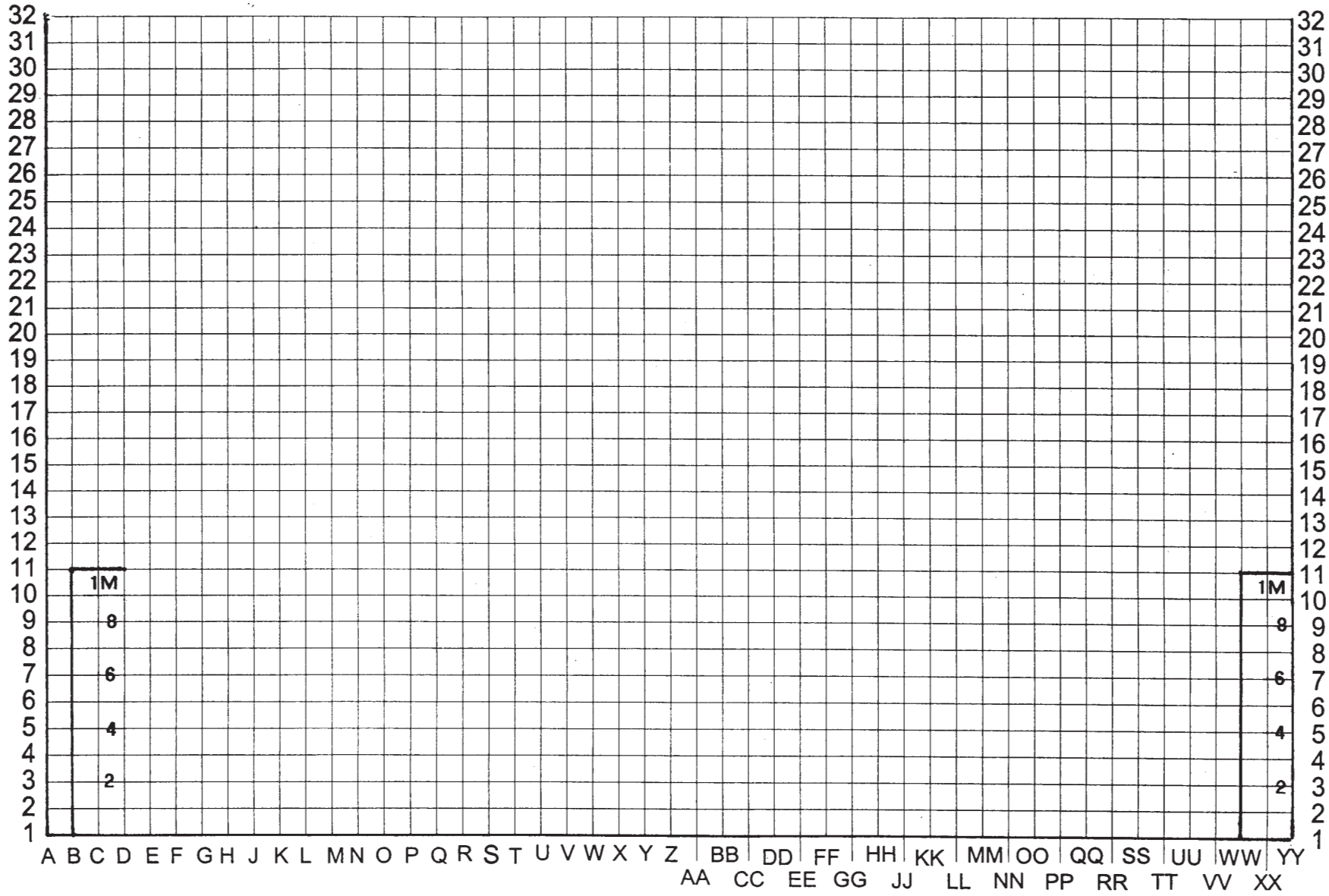
Date _____ **GRID INTERSECT ANALYSIS** **Area** _____
Observer _____ **Unit** _____
Cluster/Transect _____ **Transect/Photo** _____



ANALYSIS GRID - 1 METER



ANALYSIS GRID - 2 METER



ANALYSIS GRID - SHRUB ANALYSIS

1999/2/19

PHOTO GRID SUMMARY

Date________________ Observer_______________________________________

Area____________________________________Unit_____________________________

Cluster/Camera ______________________ Transect/Photo____________________

Item #	Date	Item #	Date	Item #	Date

Appendix B: Equipment

Introduction

This appendix illustrates equipment required for photo point monitoring. Six items are discussed: meter boards, photograph identification sheet holder, camera leveling system for overhead photography, bracket for using two cameras (one with color and the other with black-and-white film), orange tags for identifying monitoring sites, and flimsy fenceposts.

Meter Boards

Meter boards are used to mark photo points. They help in taking consistent repeat photographs by orienting the camera on the "1M" of the board. Sharp exposure at the meter board is assured by focusing the camera on the "1M." The meter boards also provide a size control in photographs that can be used to adjust analysis grids when measuring attributes in a photo. This section describes how to construct meter boards.

1-meter board—

***Materials*—**Prices given are in dollars as of 2001.

	Cost
	Dollars
1 piece ½-inch, 4-ply plywood, finished on one side, exterior, 1 foot by 4 feet @ $20 per sheet	3
3/16-inch-diameter steel rod, 36 inches long	1
Numbers:	
5¼ inches tall, on a reflector, adhesive, packet of 10 (need 2, 4, 6, 8)	4
(Alternative is 4-inch nail-on numbers [5 @ $2 each])	(20)
Line or pocket level 4 to 5 inches long	4
16-ounce can of yellow spray paint, exterior	4
Screws:	1
2 line level screws #4 ⅝ inch	
9 spike plate screws #6 ¾ inch	
1 role black electricians tape	4
Total	21

***Construction*—**Meter boards are constructed from ½-inch 4-ply plywood, at least exterior quality and preferably marine quality (waterproof glue). Waterproof glue is desirable when sampling in riparian areas is expected because the meter board often will be placed in water. Dimensions and layout are shown in figure 51. Cut out according to specifications (fig. 51).

Prime the front of the board before painting. Then apply two coats of dull textured yellow to reduce reflection from the sun. Yellow is used for visibility. If dull yellow is not available, do not sand or smooth the front of the board. Roughness tends to diffuse sun reflection because it adds roughness to the paint. Most of a 12-ounce pressure can will be required for two coats.

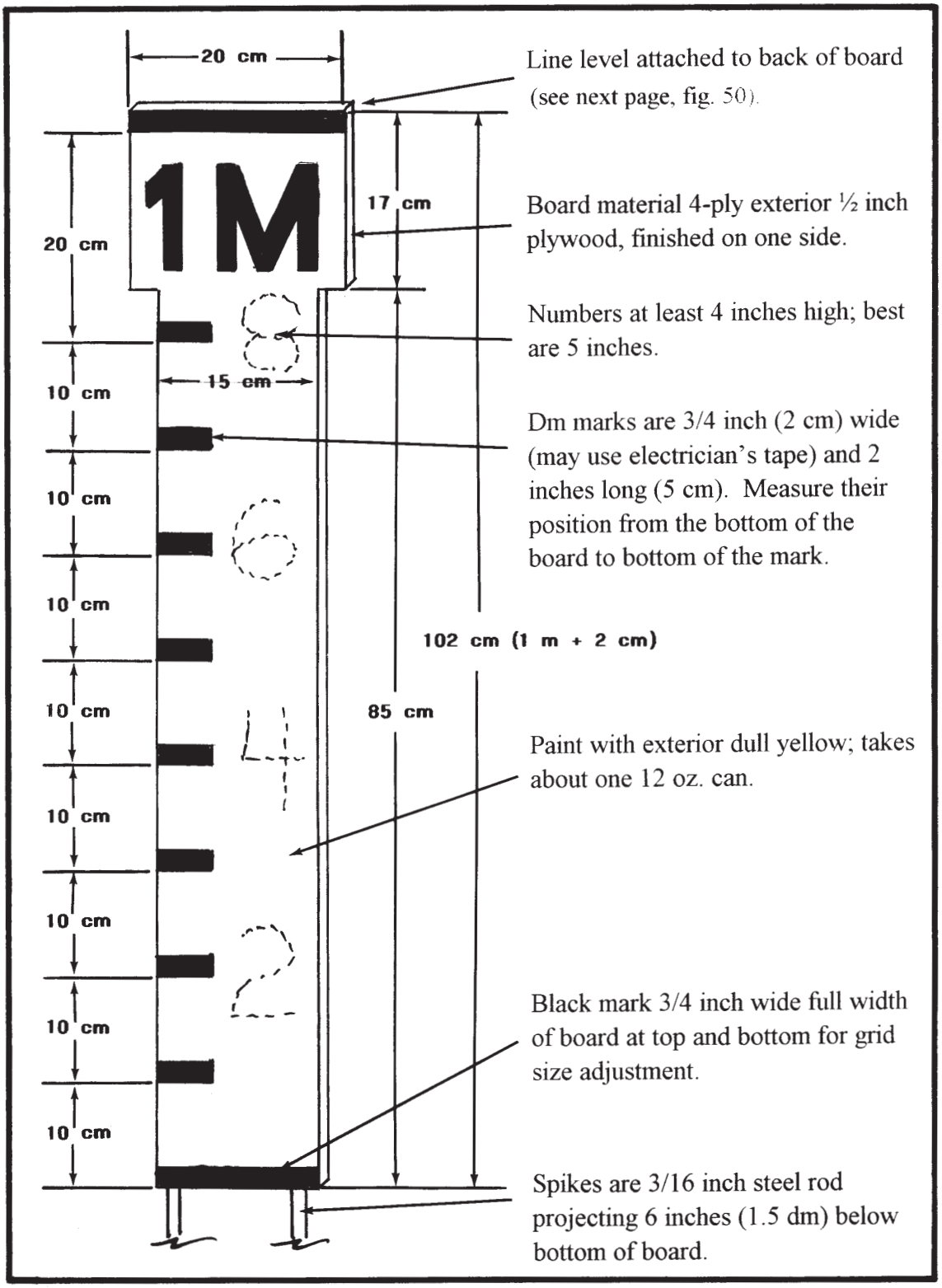


Figure 51—Construction details of a 1-meter-tall meter board. The same measurements are used for the 1-meter-tall folding board. A 2-meter folding board, hinged at 1 meter, has a 2-centimeter difference in board heights. See figure 54 and text for details.

Figure 52—A line level is used to orient the board vertically. Obtain a 4- to 5-inch-long (10- to 12-cm) line level and drill a hole in each end for a screw. Attach one end of the line level to the back of the meter board ½ inch (1 cm) from the top. Then orient the board vertically by using a carpenters level along one side. Hold the board in position, adjust the line level to horizontal, and carefully screw in the other end.

Numerals—The numerals 2, 4, 6, and 8 should be black and at least 4 inches tall. My preference is 5 inches tall for good readability when slides are projected. All illustrations in this publication show 5-inch numbers. There are many sources of these, including paste-on numbers, numbers on a card that must be cut out, and nail-on numbers. I use 5¼-inch-tall numbers on a reflective card with adhesive on the back. Each number must be cut out and applied to the painted surface. The “M” for “1M” is made from electrician’s tape or it may be painted on.

Black marks at each decimeter and bands at top and bottom may be applied in either of two ways: painted at 0.78 inch (2 cm) wide or by use of black electricians tape, which is 3/4 of an inch wide (1.8 cm). The top, bottom, and decimeter marks are used to adjust grid size before grid analysis of items in the photographs. The marks on the meter board, therefore, must be positioned exactly (fig. 51).

Line level—A line level is attached to the back of the board at the top (fig. 52). This allows the board to be oriented vertically, which not only is essential for grid analysis but also makes pictures look good.

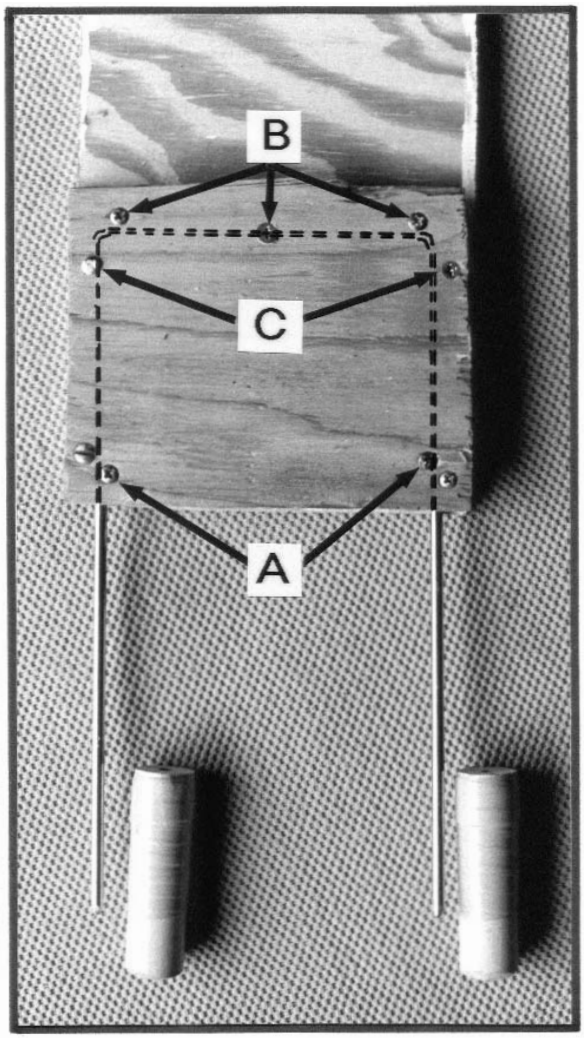


Figure 53—Spikes in the bottom of the board are pushed into the ground to hold the board upright. Use 3/16-inch-diameter steel rod about 30 inches (75 cm) long. Bend it into a "U" shape as shown by the dotted line. It is placed under a plywood plate and held in place by nine screws. Leave about 6 inches (1.5 dm) of rod below the board. (**A**) Insert screws on each side of the rod at the bottom; (**B**) insert three at the top to prevent upward and downward movement of the rod; and (**C**) place one at each side at top to prevent sideways movement. Drill out doweling to fit over the spikes for safety.

***Steel spikes*—**Steel spikes are attached to the bottom of the board (fig. 53) to hold it in the ground. Steel rod 3/16-inch in diameter works well because it is strong enough to hold the board upright and small enough in diameter to be pushed down into rocky soil. Spikes should extend 6 inches (15 cm) below the bottom of the board (fig. 53). Rods come in 36-inch lengths. About 30 inches is required. Bend the rod into a "U" shape to match the dotted outline in figure 53. Doweling drilled out to fit the rod is placed over the spikes for safety.

For convenience, a carrying handle may be attached to the edge of the board around the 5-decimeter position.

2-meter folding board—Two 1-meter boards may be connected by a hinge.

Double meter boards 2 meters in height are used when shrubs or other vegetation exceeds the height of a 1-meter board (fig. 21, part A). They are simply two single meter boards attached by hinges and a barrel bolt so that either the 1- or 2-meter length may be used.

Materials—Prices given are in dollars as of 2001.	**Cost**
	Dollars
2 pieces ½ inch, 4-ply plywood, finished on one side, exterior, 1 foot by 4 feet, each @ $20 per sheet	6
3/16-inch-diameter steel rod, 36 inches long	1
Numbers: 5¼ inches tall, on a reflector, adhesive, 2 packets of 10 (need 2 each of 2, 4, 6, 8)	8
Line or pocket level 4 to 5 inches long	4
Two 16-ounce cans of yellow spray paint, exterior	8
2 strap hinges, heavy duty, 4-inch size	5
1 barrel bolt, heavy duty, 5-inch size	8
Screws:	2
2 line level wood screws #4 ⅝ inch	
9 spike plate wood screws #6 ¾ inch	
1 sheet metal screw #10 ½ inch, placed under barrel bolt (sheet metal for hardness)	
10 hinge wood screws #10 1 inch	
8 barrel bolt wood screws #10 ½ inch	2
1 role black electricians tape	4
Total	$46

Construction—Construct two 1-meter boards as discussed previously with one important difference. The top board will **not** be 1 meter 2 centimeters tall. Instead it will be exactly 1 meter tall. The top board has its bottom decimeter mark supplied by the lower (1-meter) board (fig. 54).

Construct the bottom (1-meter) board, with spikes at the base and numerals as shown in figure 51. On the top board, use “2M” at the top instead of “1M”, and add numeral “1” to each of the decimeter numbers as shown in figure 54. The numeral “1” may be made from electricians tape. The top board will **not** have a decimeter bar at its base; this bar is supplied by the bottom board.

Hinge system—Figure 55 illustrates the hinge, barrel bolt, and position of the line level between the two halves of the meter board. The barrel bolt holds the boards open and prevents them from flopping in wind.

1. Refer to figure 55. First, measure thickness of the barrel bolt. Cut plywood from the same thickness as the barrel bolt and glue to both meter board halves. The 5-inch bolt shown in figure 55 required 3/8-inch plywood. These plywood blocks separate the meter board halves when folded so that the barrel bolt will clear both its connecting strap and the line level.

2. Attach the hinge straps to the top board first. Use a straight edge to align both meter board halves in a straight line, then attach the bottom straps to the bottom board while holding both halves firmly together.

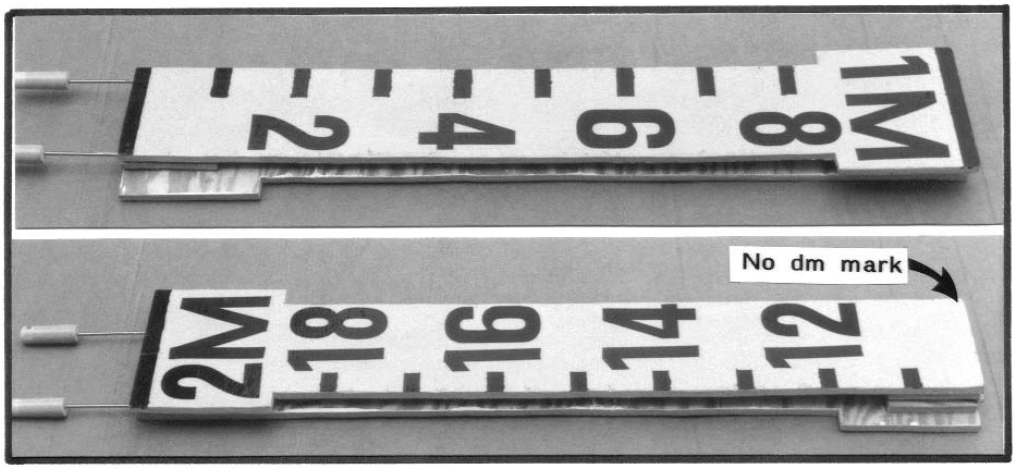


Figure 54—The 2-meter board system. In the top photo, a standard 1-meter board is shown with the 2-meter half folded under it. In the bottom photo, the folded board has been turned over showing the 2-meter section. “No dm mark” designates the lack of a decimeter mark at the base of the top board; it is at the top of the 1-meter board shown directly above. Length of the 2-meter section must be 2 centimeters shorter (exactly 1 meter instead of 1 meter 2 centimeters) than the 1-meter board to account for this decimeter mark.

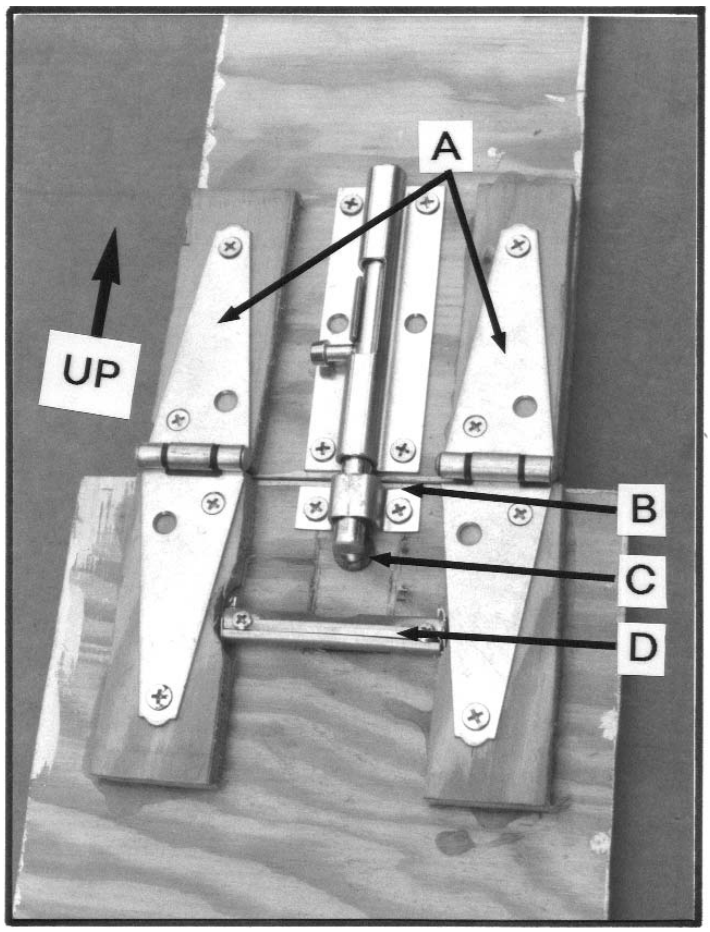


Figure 55—Hinges and a barrel bolt connect the two meter boards. (**A**) When installing hinges, attach to the top board first, carefully align the boards in a straight line, then attach the lower straps of the hinges. (**B**) The barrel bolt should be oriented to fall down when the board is unfolded. Position the bolt and its strap at the edges of the board halves so that the bolt protrudes about ⅜ inch below the strap. (**C**) Install an adjusting screw (see fig. 56) to force the barrel bolt against its strap to stiffen the two boards when unfolded. (**D**) A line level is placed an inch (2.5 cm) below the barrel bolt on the lower board half so that it can be seen from above when the boards are folded and from behind when they are unfolded as shown.

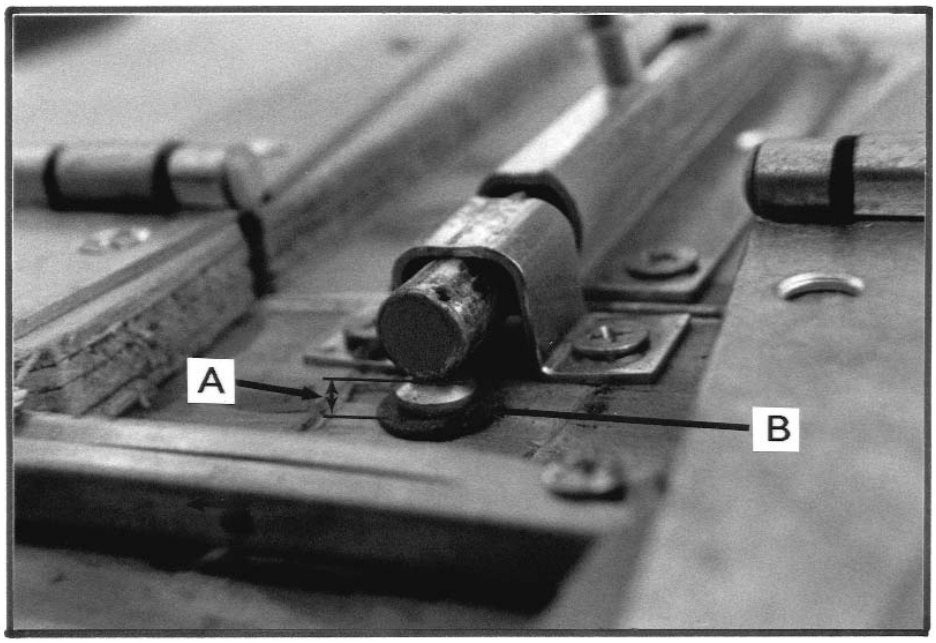


Figure 56—Adjusting screw and washer used to remove play between the barrel bolt and its strap to stiffen the two halves of a 2-meter board when unfolded. (A) Measure distance between the bolt and the board. (B) Insert a round headed sheet metal screw with enough washers to make the bolt fit firmly under the strap. Sheet metal screws are preferred because of their hardness. Pound the flange down if necessary.

3. Install the barrel bolt next (fig. 56). Position the barrel bolt at the very bottom of the top meter board so that the bolt drops down when the boards are erected. Place the barrel bolt strap as close to the top of the bottom board as possible without screws splitting the wood (fig. 55). The bolt should protrude about ⅜ inch below the strap. Insert a sheet metal screw under the bolt end with sufficient washers to hold the bolt firmly against the strap. This will prevent flexing of the erected boards (fig. 56).

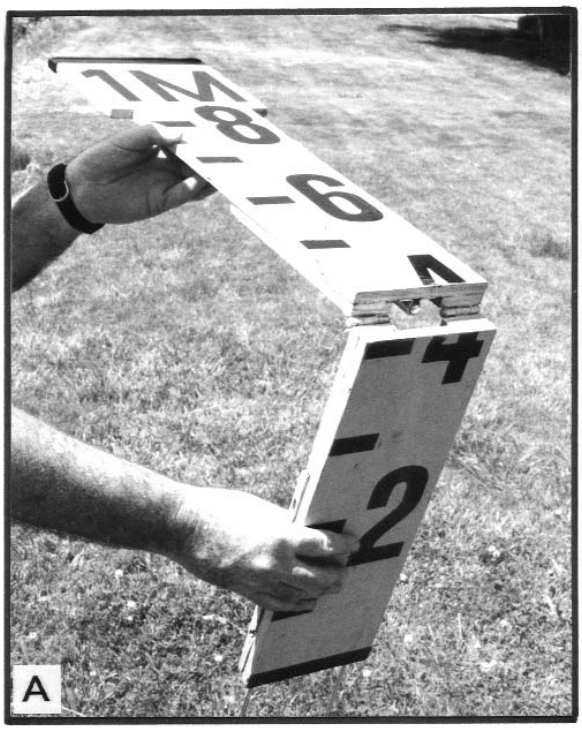
4. Position the line level on the bottom (1M) board where it can be seen from above when the boards are folded for 1-meter use, and from the back when unfolded for 2 meters (fig. 55). One can see the line level with boards folded by viewing down through the strap into which the barrel bolt drops.

Folding 1-meter board—If field transportation of a meter board is a concern, the 1-meter board can be made to fold at the 4-decimeter mark. The hinge system is described and shown in figures 55 and 56. Figure 57 illustrates dividing the board at 4 decimeters to provide protection for the spikes.

Photograph Identification Sheet Holder

Each photograph taken in photo monitoring should be identified. General and topic photos taken of the meter board are identified by a form attached to a clipboard and positioned between the camera and meter board. The clipboard and an adjustable post to hold it are described.

Clipboard—The clipboard is shown in figure 58. It is a standard 12-inch (30-cm) clipboard with the addition of a second clip removed from another clipboard and attached by rivets or screws as shown. The critical factor is to place the clips no closer than 10½ inches (26 cm) apart to avoid covering any information on the identification paper. Two clips are required to prevent the identification sheet from blowing in the wind.



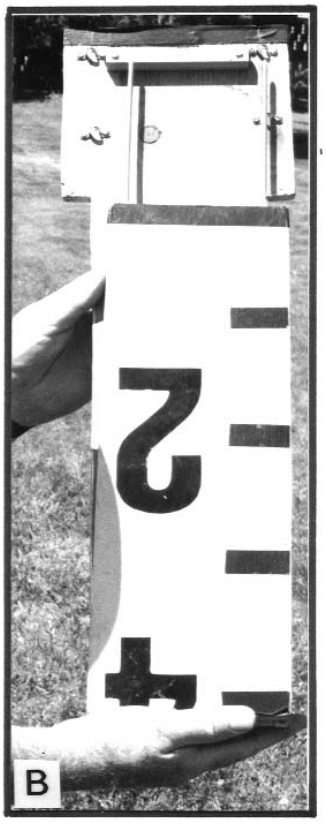


Figure 57—Folding 1-meter board concept. (**A**) Cut a standard 1-meter board at 4 decimeters and install hinges and a barrel bolt. This offset is used to protect the spikes as shown in (**B**). Assemble the board before painting and application of decimeter marks to assure correct measurements.

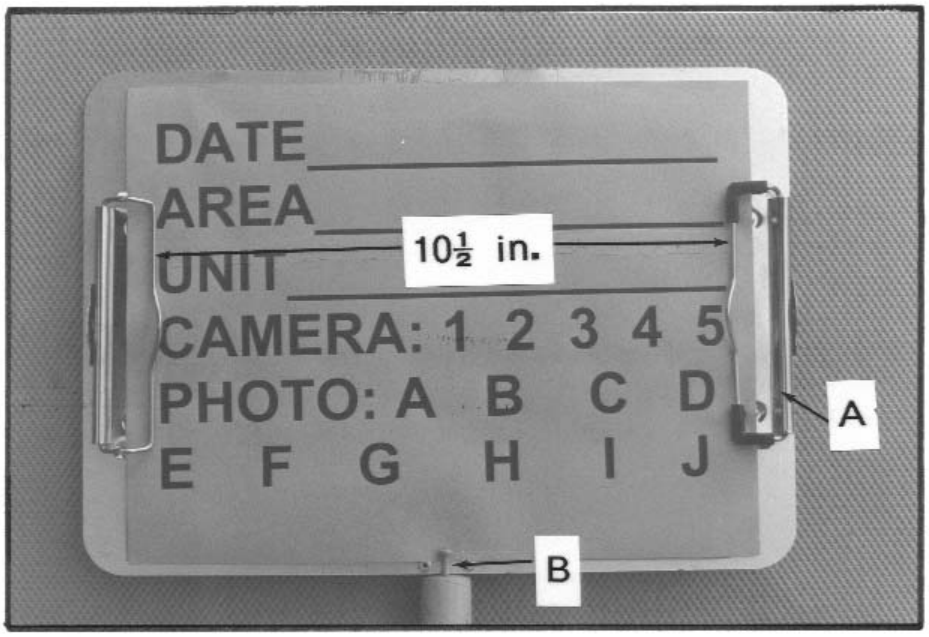


Figure 58—Clipboard for displaying photo identification forms. It includes a second clip (**A**) taken from another clipboard that is either screwed or riveted in place. Distance between the clipboard clips should be 10½ inches (26 cm) to (1) hold the sheet in windy conditions, and (2) not cover essential information. The clipboard is placed on the ground for plot photos or on top of a clipboard post (fig. 59) to be set in front of the camera. When placed on the post, a screw (**B**) inserted into the wooden block holding the ¼–inch rod behind the clipboard (figs. 58 and 61) prevents the clipboard from rotating in the wind. The form shown, "Camera-Photo" (app. A), is used for general photography.

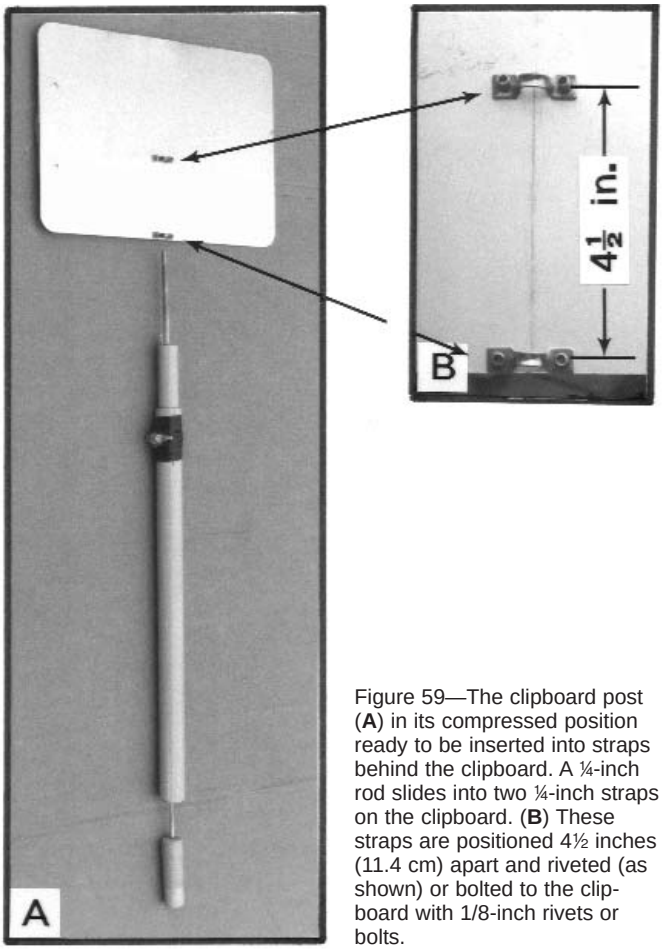


Figure 59—The clipboard post (**A**) in its compressed position ready to be inserted into straps behind the clipboard. A ¼-inch rod slides into two ¼-inch straps on the clipboard. (**B**) These straps are positioned 4½ inches (11.4 cm) apart and riveted (as shown) or bolted to the clipboard with 1/8-inch rivets or bolts.

***Materials*—**Prices given are in dollars as of 2001.	**Cost**
	Dollars
2 clipboards 12 inches long @ $4.50 each; second clipboard for its clip	9
6 each ⅛-inch diameter bolts or rivets to attach the clipboard clip and straps for the clipboard post	1
2 each ¼-inch line guides or straps	1
Total	11

***Construction*—**Remove the clip from the second clipboard and attach it to the first with either two bolts or two rivets (fig. 58).

Clipboard post—The clipboard post is an adjustable pole 1 inch in diameter with a spike on the end to be placed in the ground, a telescoping inside pole, and a rod at the other end on which the clipboard is placed (fig. 2 in part A; figs. 59 to 61). It is composed of telescoping plastic pipes each 18 inches (45 cm) long (fig. 60). It is 22 inches (56 cm) long when compressed and 32 inches (81 cm) long when extended. An adjustable hose clamp is attached to the upper end of the larger pipe, which compresses around the inside pipe to hold it in place (fig. 61).

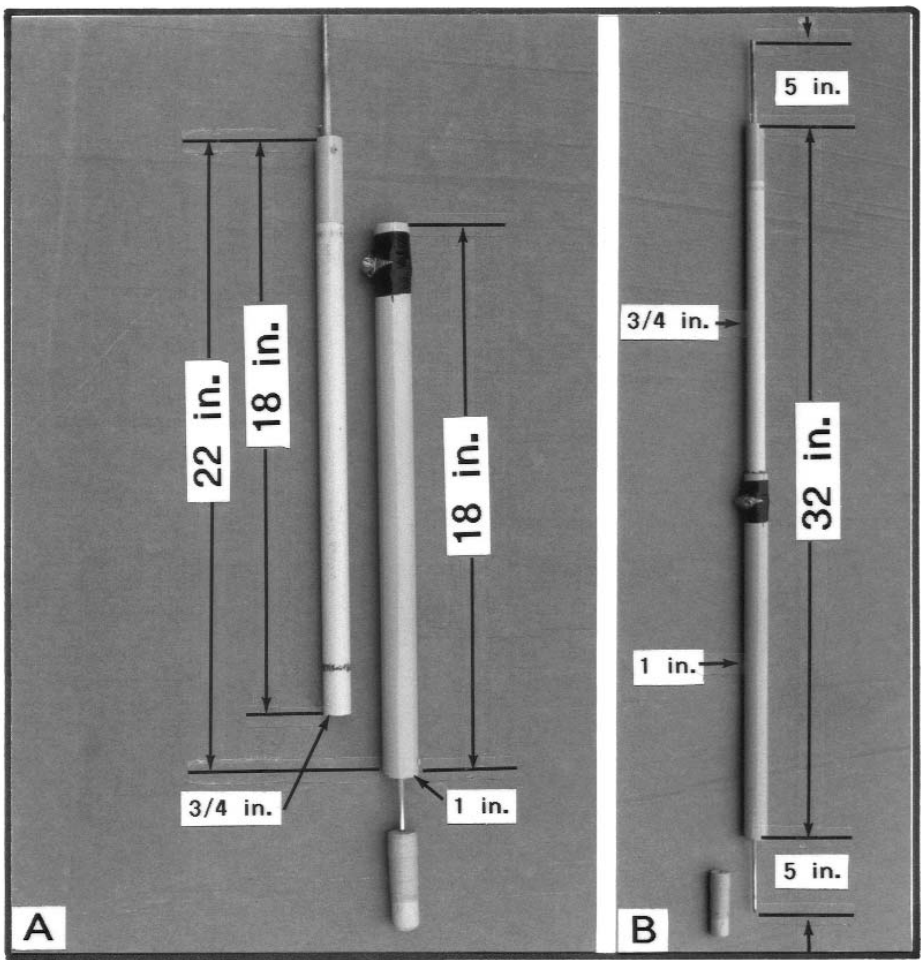


Figure 60—Construction details for the photo identification clipboard post. In (**A**), 1-inch PVC pipe CL 200 and ¾-inch PVC pipe CL200, which fits inside the 1 inch pipe, are each 18 inches (46 cm) long. When the ¾-inch pipe is inserted into the 1-inch pipe and compressed, they are 22 inches long (56 cm). In (**B**), the 18-inch inside pipe has been extended 14 of its 18 inches (36 of its 46 cm), increasing the length to 32 inches (81 cm). The ¼-inch diameter spikes at the bottom and top both extend 5 inches (12.7 cm) beyond the pipe and are imbedded into doweling inserted in the pipe.

Materials—Prices given are in dollars as of 2001.	**Cost**
	Dollars
PVC pipe 1 inch CL 200 at $1 per 10 feet	1
PVC pipe ¾-inch CL 200 at $1 per 10 feet	1
Hose clamp 1-inch diameter	1
Steel rod ¼-inch diameter, 36-inch piece, cut two 7 inch pieces	1
Electricians tape	1
Total	5

Construction—Figure 59 illustrates the clipboard post in its compressed position. Two straps capable of having a ¼-inch-diameter rod inserted are attached to the back of the clipboard at the middle, as shown. They are centered 6 inches (15 cm) from each end and placed 4½ inches (11 cm) apart so that the 5-inch (13-cm) rod will engage each.

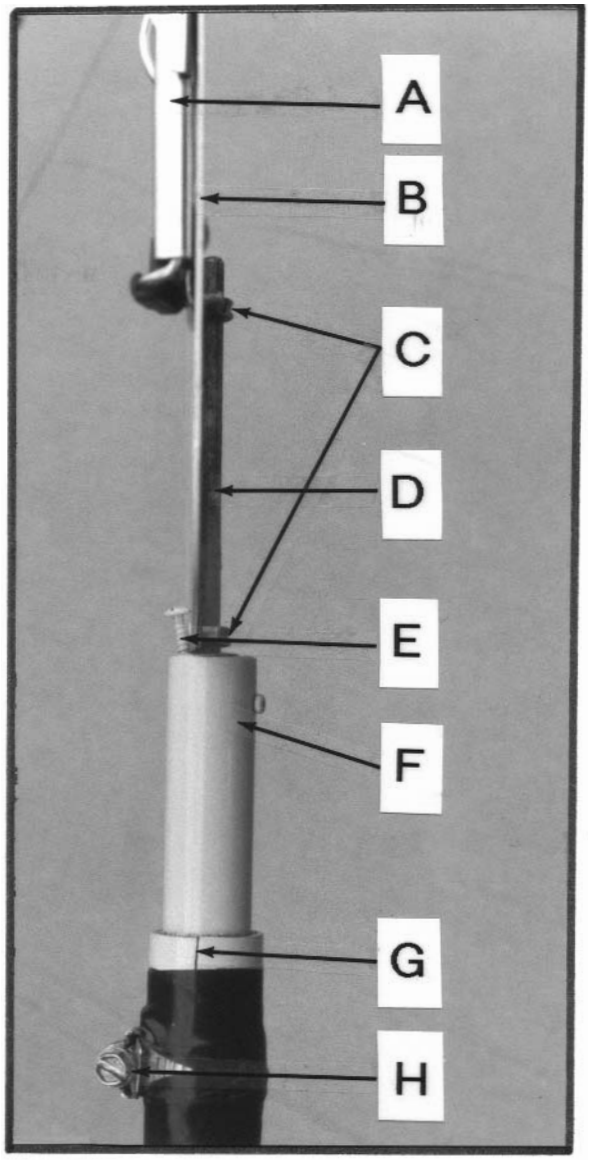


Figure 61—Details of how the clipboard is placed over the rod as viewed from the edge of the clipboard. (**A**) The clip of the clipboard. (**B**) The edge of the clipboard, in this case an aluminum board. (**C**) The ¼-inch straps into which the ¼-inch rod of the post is inserted. (**D**) The ¼-inch rod of the post inserted into the clipboard straps. (**E**) A screw is inserted into the wood doweling that holds the ¼-inch rod. The screw prevents the clipboard from rotating in the wind (fig. 58). (**F**) A piece of doweling fitted inside the ¾-inch PVC pipe is drilled out for a ¼-inch steel rod and is held in place by a screw. (**G**) With a saw, cut down 2 inches (5 cm) into the 1-inch PVC pipe so that the pipe can be compressed by the hose clamp (**H**) to hold the inside pipe at the desired height. At (**H**), secure the hose clamp with electricians tape.

The clipboard post is composed of two parts (fig. 60). One is 1-inch CL 200 PVC pipe and the other is ¾-inch CL 200 PVC pipe, both 18 inches long. The ¾-inch pipe fits inside the 1-inch pipe with some slack. If pipe specifications other than these are used, be sure that one pipe will fit inside the other. When compressed, the clipboard holder is 22 inches (0.5 m) tall. When extended with 4 inches of interior pipe inside, it is 32 inches (0.8 m) tall (fig. 60).

To make the clipboard post adjustable, saw down 2 inches (5 cm) into the upper end of the 1-inch pipe (fig. 61). Then attach a 1-inch hose clamp an inch below the top of the pipe and secure it with electricians tape. Tighten the hose clamp so that the inside ¾-inch pipe can just be moved up and down to adjust height of the clipboard above vegetation or other obstructions.

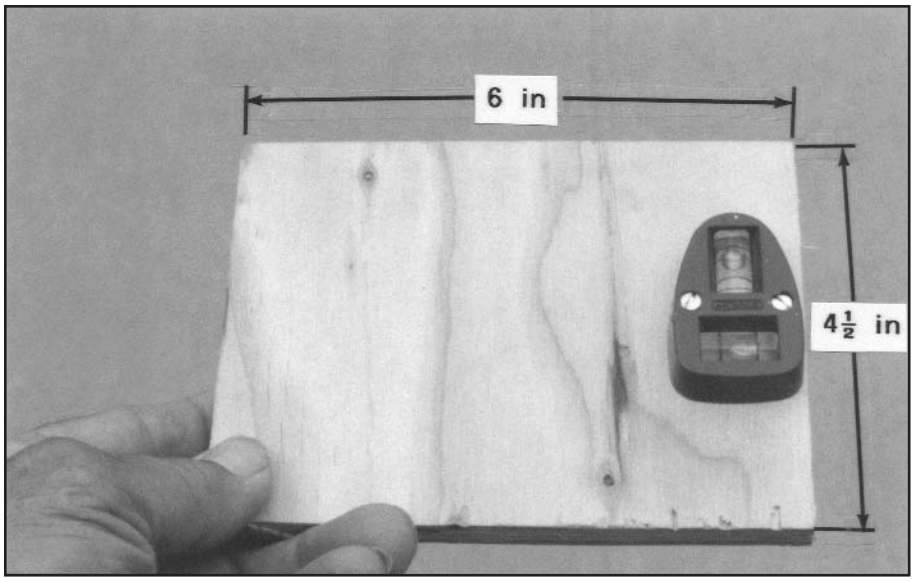


Figure 62—A leveling board for taking photos of tree canopy cover directly overhead measures 4½ by 6 inches (11.2 by 15.3 cm) and has a two-way level attached. It is made from scrap ½-inch plywood.

Figure 63—The camera leveling board is used to take repeat photographs of the tree canopy with some consistency. Place the leveling board on top of the meter board for consistent height above the ground. Place the meter board at right angles to the photo view. Move the meter board sideways to center the cross-view bubble, then tilt the level board to center the down-view bubble, move your head back, and photograph.

Camera Leveling System

Photographs taken by looking up at the tree canopy require a camera leveling system for consistent repeat photography. A leveling system described here uses the top of the meter board as one axis for consistently orienting the camera and a leveling board for the other axis (fig. 62). Figure 62 illustrates the camera leveling board and figure 63 illustrates use of the board.

Materials—Prices given are in dollars as of 2001.	**Cost**
	Dollars
One two-way level or two line levels	4
Scrap piece of ½-inch plywood 4 by 6 inches (10 by 15 cm)	—
Total	4

Figure 64—Double camera bracket for use when photographing in both color and black and white. The bracket is made from 1-inch by ⅛-inch aluminum bar-stock with holes drilled to mount the cameras. Identical cameras are recommended to simplify camera adjustments. Figures 65 and 66 illustrate construction details.

Construction and use—Figure 62 illustrate the dimensions of the camera leveling board and placement of the two-way level. Figure 63 illustrates use of the leveling board. Place the board on top of the meter board, move the meter board left or right to center the cross-view level, then tilt the board to center the down-view level. Move your head out of the way and photograph.

Double Camera Bracket

Two cameras reduce complications when photographs are needed in both color and black and white. A bracket to hold both cameras together allows for simple and effective manipulation of the cameras (fig. 64), and identical cameras simplify adjustment. When ready to photograph, simply shoot with the top camera, then the bottom, and advance the films.

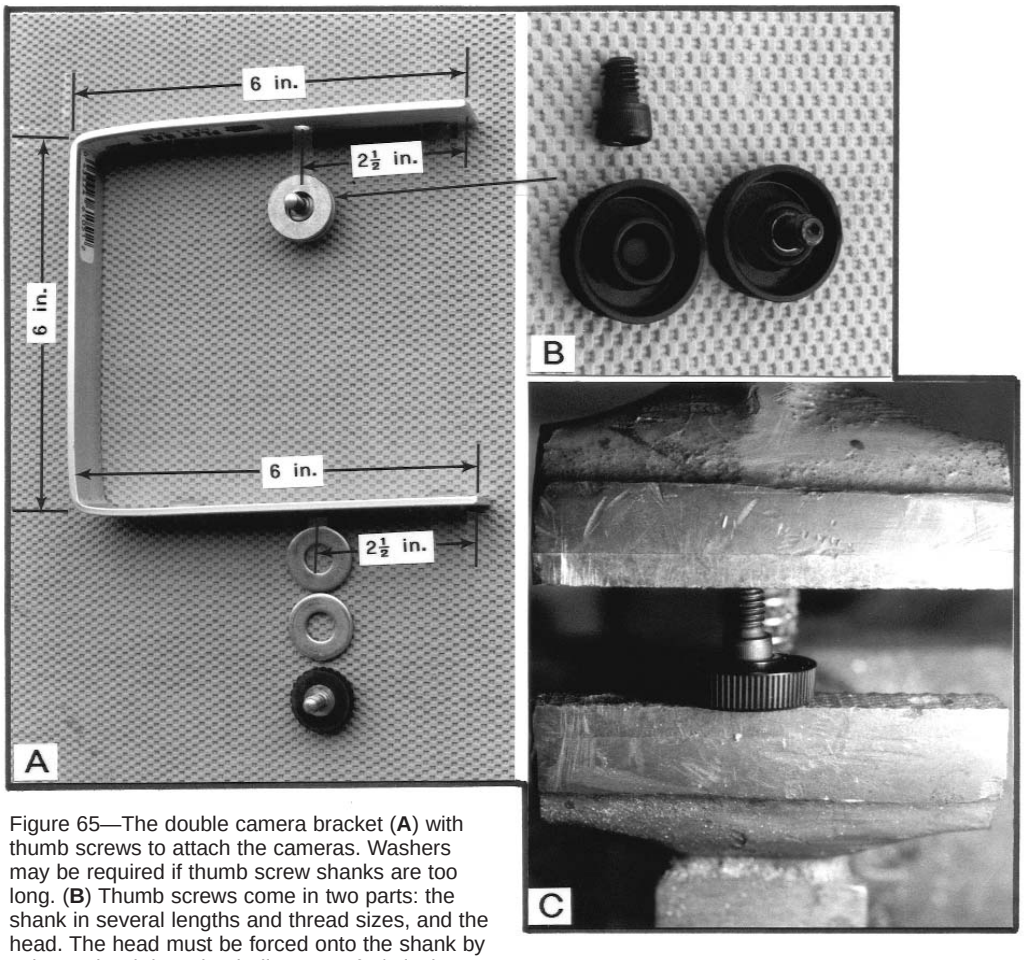


Figure 65—The double camera bracket (**A**) with thumb screws to attach the cameras. Washers may be required if thumb screw shanks are too long. (**B**) Thumb screws come in two parts: the shank in several lengths and thread sizes, and the head. The head must be forced onto the shank by using a vise (**C**). A shank diameter of 1/4 inch, length of 3/8 inch, and 20 threads per inch fits many cameras.

Materials—Prices given are in dollars as of 2001.	**Cost**
	Dollars
Aluminum bar stock 1 inch (2.5 cm) wide by ⅛ inch (3 mm) thick, @ one 6-foot piece (will need 18 inches [45 cm]	8
Two instant thumb screws:	
Shank ¼-inch diameter, standard 20 thread, ⅜ inch long (2)	1
Instant thumbs (2)	1
Total	10

Construction—The aluminum bar stock, cut into an 18-inch (45-cm) piece, is bent into equal 6-inch (15 cm) segments to form a “U” (fig. 65). Then ¼-inch holes are drilled 2½ inches (7.5 cm) in from the ends (fig. 66) to hold the cameras. Make sure the holes hold the camera in such a position as to make the rewind button available (fig. 66B).

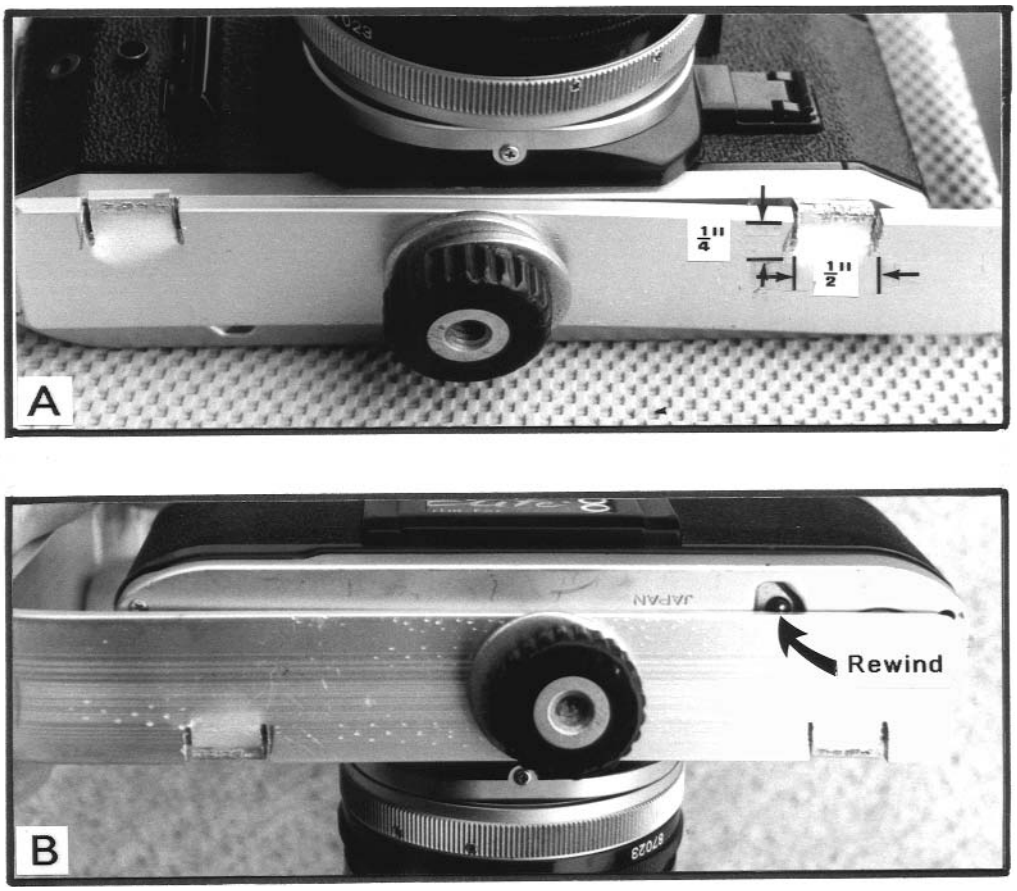


Figure 66—Two factors are important in attaching a camera to the bracket. (**A**), Make two cuts ¼ of an inch deep and ½ inch apart into the front of the bracket. Bend up to about a 30-degree angle to prevent rotation movement of the camera. (**B**) Make sure the bracket clears the rewind button so that film may be changed while the camera is attached to the bracket.

Next make two ¼-inch (6 mm) cuts ½ inch (12 mm) apart into the aluminum toward the front of the camera and bend the ½-inch piece upwards to about a 30-degree angle (fig. 66A). Do not bend more than 30 degrees or the aluminum will break. These will prevent the cameras from rotating on the bracket.

Finally, assemble the thumb screws, which come in two parts: the shank and the thumb head. Make sure the shank will fit the camera mounting socket. Usually a ¼-inch diameter, 20-thread shank ⅜ inch long will work. Press the head onto the shank as shown in figure 65C by using a vise. Generally, heavy pliers do not apply sufficient force to seat the thumb head.

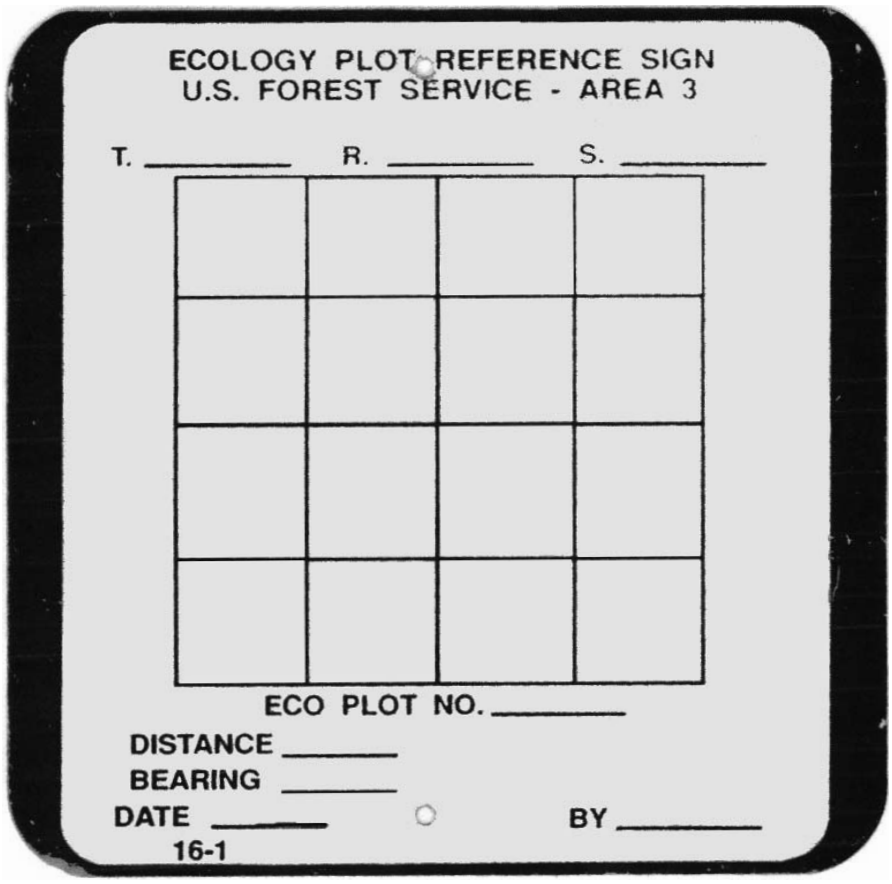


Figure 67—Orange identification tag used to mark photographic monitoring sites. Inscribe, with a carbon point instrument, the monitoring identification name or number, date, person installing the system, and direction and measured distance to key items, such as camera locations or photo points. Mount the tag on a witness post or tree specified in the map on the "Photographic Site Description and Location" or "Sampling Site Description and Location" form.

Orange Identification Tags

Photo monitoring sites may be identified in the field by an orange tag attached to a witness post, tree, or other item identified on the sampling location maps. One kind of tag is shown in figure 67. It was custom printed for use with ecology plots. Other formats are available. The sign in figure 67 costs $1.45 each in minimum lots of 50. New, custom printing costs $20 for set up (prices in 2001). They may be obtained from:

Dixie Seal and Sign Co.
P.O. Box 54616
Atlanta, GA 30306
Phone: 404-875-8883
FAX: 404-872-3504

Flimsy Fenceposts

My preferred system for marking camera locations and photo points is flimsy, stamped metal fenceposts 5 feet (1.5 m) long (fig. 68). They are preferred over strong, T-bar posts for several reasons: (1) they are low in cost, about $2.50 each; (2) they are lightweight such that four or five may be carried for the weight of one

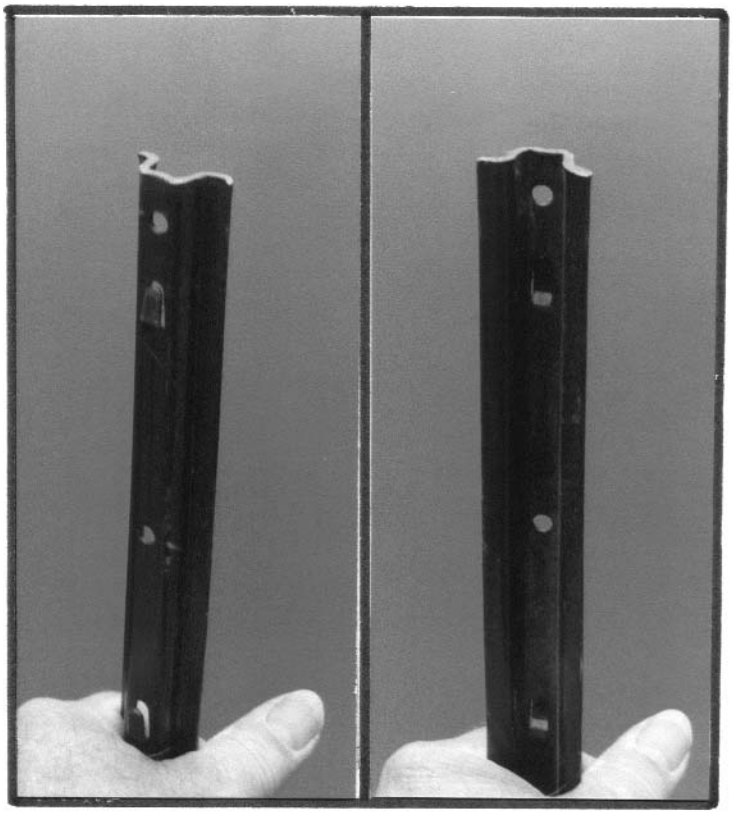


Figure 68—Flimsy stamped metal fencepost used to mark camera locations and photo points. Flimsy means the post can be twisted by hand. A 5-foot (1.5-m) length allows for pounding it 2 feet (0.6 m) into the ground, which tends to deter theft because the effort needed to remove it is not warranted by the post's value.

T-bar; (3) they are easy to pound, and the pounder weighs half of that used for T-bar; (4) of this 5-foot length, about 2 feet is in the soil when the top is even with a meter board, sufficient to require more effort to remove than the flimsy post is worthy of, thus deterring theft; (5) the flimsy strength means an animal can run into it and only be scratched, not impaled, or it can be driven over with minimum vehicular damage; and (6) the post will bend flat with the ground and remain in place when crushed by ice, logs, animals, or vehicles instead of being pulled out.

These posts are available at many large building material stores. My supply is through Home Depot. The manufacturer is Keystone Steel and Wire, 1-800-447-6444; select "Sales" from their menu, and ask for the representative in your area (such as Oregon) for a sales outlet. Ask for "5-foot, **light** duty, stamped metal fenceposts." They are also manufactured in medium duty, which are about an inch broader and stronger, an unnecessary attribute. The "light duty" posts probably will have to be ordered because they have limited usefulness.

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A = Part A pages
B = Part B pages
Regular = page where item is included in discussion
Bold = page where major discussion occurs
Italic = page with an illustration
Italic = page with an illustration and a major discussion

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