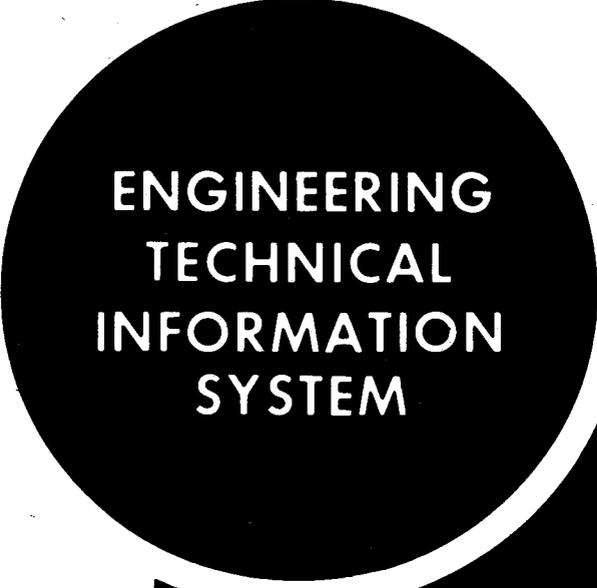


al

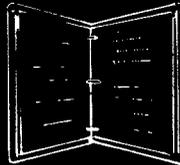


**ENGINEERING  
TECHNICAL  
INFORMATION  
SYSTEM**

**FIELD NOTES • TECHNICAL REPORTS  
DATA RETRIEVAL • MANAGEMENT  
PROFESSIONAL DEVELOPMENT**

Volume 8 Number 12

**Field**



**Notes**

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at Fort Collins**

**Washington Office News**



**FOREST SERVICE**

**DECEMBER 1976**

**U.S. DEPARTMENT OF AGRICULTURE**





## ENGINEERING FIELD NOTES

Volume 8 Number 12

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**FOREST SERVICE**  
**U.S. DEPARTMENT OF AGRICULTURE**  
**Washington, D.C. 20013**



## A TRANSPORTATION PLANNING WORKLOAD ANALYSIS

Allen C. Groven  
Juan Gomez  
William R. Martin  
Region 2

A workload analysis was recently completed for the transportation planning job on the San Juan National Forest in Region 2. The planning activities are probably applicable to most forests, although the amount of time and the distribution of time and responsibilities vary.

The June 1976 Amendment 27 to FSM 7710 made transportation planning an integral function of:

1. Land-Use Planning (Area, Forest, Unit, Project Development)
2. Transportation Design
3. Program Budget
4. Project Criteria Development
5. System Operation

The San Juan analysis recognized all of those functions plus two others which have particular emphasis in Region 2: off-road travel and trail planning coordination.

The major functional areas were broken down into specific recurring activities, and the man-days associated with each activity were estimated. For example, multisale network analysis to support the timber sale program was estimated at 20 man-days/analysis X 6 analyses (1 per district) = 120 man-days. Each activity was examined as to whether it *must* be done or merely *should* be done. Next, a determination was made as to where in the organization (Zone vs. Supervisor's Office) it *could* be done.

Based upon 240 man-days/man-year, the analysis indicated that the *must* do activities exceeded 1 man-year (261 man-days). Of these, 174 man-days *could* be done on the two zones. However, while zone personnel might have the analytic skills to carry out the activities, or could be trained to acquire them, it was considered unlikely that they would have time to do them unless (1) priorities were reordered and some other jobs given up, or (2) additional manpower (1/3 man-year each) was acquired. Also, certain activities had to be done at the Supervisor's Office level and others could be done better with the benefit of a Forest-wide perspective. The conclusion from the analysis was that a Journeyman transportation planning position should be maintained at the Supervisor's Office level.

Other Forests may find this approach useful in analyzing forest transportation planning requirements.

The following list shows the activities defined for each job. Table 1 is a summary of man-days required for transportation planning, and figure 1 gives a schematic presentation of the information contained in table 1.

## I. FOREST PLANNING

- A. Update forest maps, inventories, and photo records; coordinate with Districts. These are necessary at the Supervisor's Office level.
- B. Functionally classify all forest roads per FSM direction. The classification should be reviewed and updated annually thereafter.
- C. State highway coordination: participate in the State Highway and Forest Service annual meeting, and make at least one visit a year to a State Highway District Office.
- D. County coordination: meet with Commissioners, Road Superintendents, etc., to coordinate county and forest development systems.
- E. Traffic surveillance: a traffic engineering technician is needed during the summer to install, maintain, and read traffic counters. Data analysis and supervision are needed at the Supervisor's Office level.
- F. Annually review the Forest Road Obliteration Plan.
- G. Derive Forest Coordinating Requirements from Area Guides with other staff officers.

## II. UNIT PLANNING

- A. Resource identification: resource functional plans and resource data maps to reveal transportation system needs (e.g. timber type maps, range management plans, and Recreation Information Management (RIM))
- B. Corridor analysis: conduct field review of potential transportation corridors and determine roadability based on slope, mass movement potential, erosion hazard, and other topographic constraints.
- C. Corridor economic analysis: determine the cost and benefits for corridors.

## II. UNIT PLANNING (continued)

- D. Environmental Impact Statement (EIS) Reviews: make an intensive analysis of the transportation system for the selected alternative of each EIS reviewed.
- E. Management requirements: translate unit planning decisions into management requirements. For example: What design criteria must be formulated to comply with partial retention of visual management objectives?

## III. DEVELOPMENT PLANNING

- A. Multisale network analysis: every District should develop an economic analysis for multisales to determine road standards required to haul timber and road standards required for multiresource management. When an alternative other than the most economical is selected, the reason must be documented.
- B. Field review of sale roads: make a periodic field review of each timber road to test against transportation decisions and assumptions.
- C. Environmental Analysis Report (EAR): check each EAR for transportation development adequacy.

## IV. PROGRAM INPUTS

- A. Five-year action plan: analysis performed in the multisale area planning can aid the decisionmaking process.
- B. Program budgeting: show the need for timber purchaser contribution, public works funds, Forest Roads and Trails (FR&T) supplementation and contribution in the program budget.
- C. Right-of-way: the need for right-of-way acquisition should be recognized during the planning stage.
- D. Budget for transportation planning activities.

## V. ROAD OPERATIONS

- A. Maintenance management: establish uniform forest guidance for making road logs and setting maintenance levels. Review actual accomplishments against planned maintenance.
- B. Signing: provide signing advice based on functional classification of roads.

VI. TRAIL MANAGEMENT

- A. Establish maintenance levels based on need. Review actual accomplishments against established levels. Obtain condition surveys.
- B. Prepare development proposals and enter into program budget.

VII. OFF-ROAD TRAVEL

- A. Coordinate travel management and transportation planning with District personnel.
- B. Forest travel map: review and update.

Table 1. Work load summary for transportation planning on the  
on the San Juan National Forest

Function	Must Do Job	Should Do Job	Responsibility	Man-Days
<b>I. FOREST PLANNING</b>				
A. Maps, inventories	X		S.O.	8
B. Functional classification	X		S.O.	4
C. State highway coordination	X		S.O.	2
D. County coordination	X		S.O.	4
E. Traffic surveillance		X	S.O.	90—technician 5—analyst
F. Road obliteration		X	S.O.	2
G. Coordinating requirements	X		S.O.	10
<b>II. UNIT PLANNING</b>				
A. Resource identification	X		Zone/S.O.	10
B. Corridor analysis	X		Zone/S.O.	12
C. Corridor economic analysis	X		Zone/S.O.	12
D. EIS Review	X		S.O.	6
E. Management requirements	X		Zone/S.O.	4
<b>III. DEVELOPMENT PLANNING</b>				
A. Network analysis	X		Zone/S.O.	120
B. Road review		X	S.O.	12
C. EAR review	X		S.O.	10
<b>IV. PROGRAM INPUTS</b>				
A. Five-Year action plan	X		Zone/S.O.	6
B. Program budgeting	X		S.O.	6
C. Right-of-way	X		S.O.	2
D. Transportation planning budgeting	X		Zone/S.O.	2
<b>V. ROAD OPERATIONS</b>				
A. Maintenance management	X		S.O.	21
B. Signing advice		X	S.O.	2
<b>VI. TRAIL MANAGEMENT</b>				
A. Maintenance	X		Zone/S.O.	12
B. Development proposals	X		Zone/S.O.	2
<b>VII. ENVIRONMENTAL IMPACT STATEMENTS</b>				
A. District coordination	X		S.O.	8
B. Forest travel map	X		S.O.	2

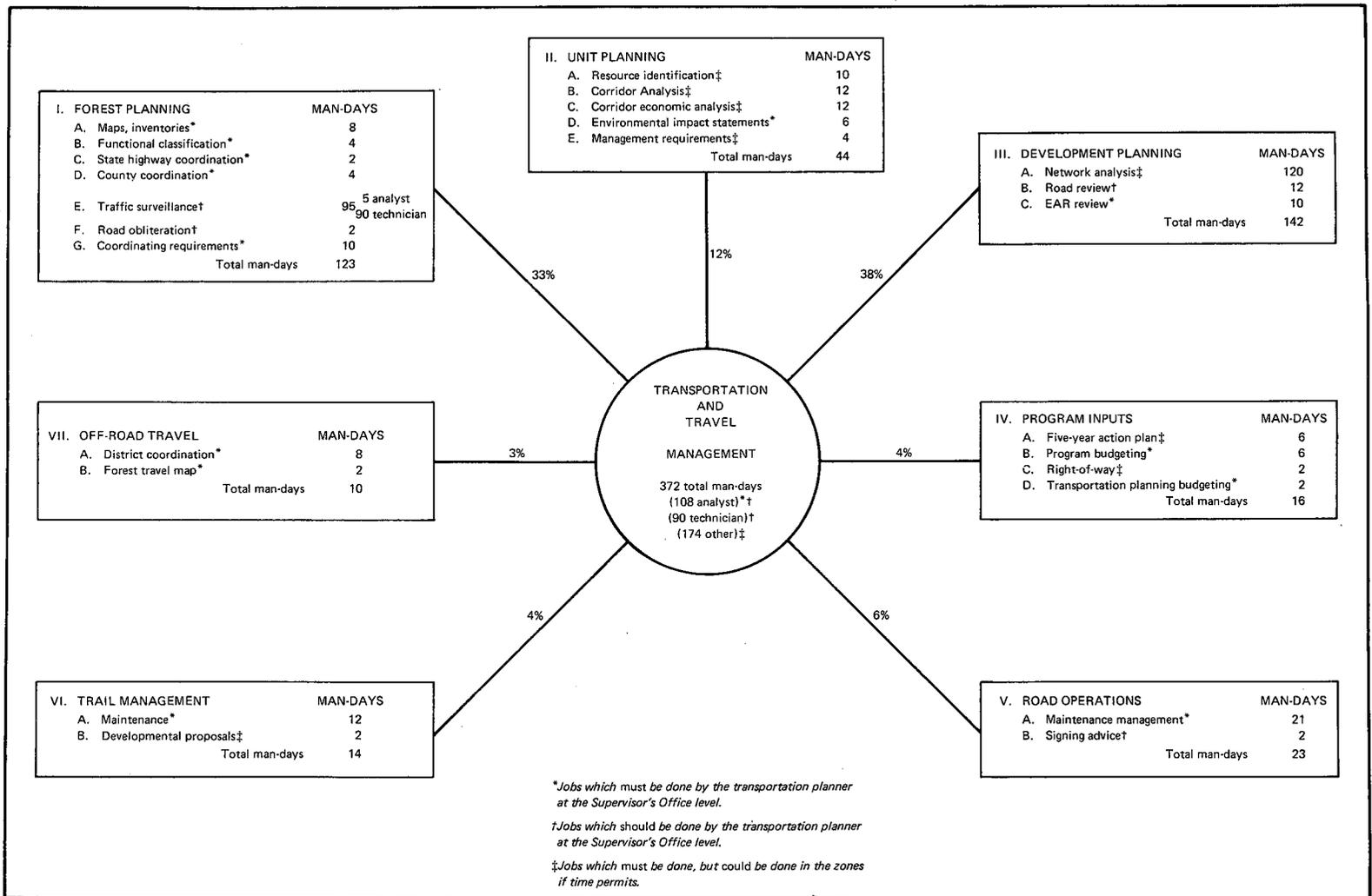


Figure 1. Schematic work load summary for transportation planning on the San Juan National Forest.

COMMENTS ABOUT COMPUTERIZED PROGRAMS AT FORT COLLINS

Gary F. Bump  
Region 5  
Sierra National Forest

The January 1976 issue of *Field Notes* contained an article about the computerized cost estimating guide developed by the Sierra National Forest. The example presented in the article was one of the first printouts.

Since the July 1975 printout, many additions have been made and the program has been put on storage at Fort Collins. The instructions for accessing and running the program are also available at Fort Collins. To get the instructions, all that is required is to print a copy of a file called SIERRA\*HOWTO.COSTEST (fig. 1) through the edit processor.

The May 1975 issue of *Field Notes* described the computer Processing of Contract Pay Estimates from the Six Rivers National Forest. After using this program on a very large contract on the Sierra, an error was discovered in computations involving amounts greater than \$999,999.99. This error has been corrected and a few options added to the program (see fig. 2). For easier reading, the printout was widened to full printer width (fig. 3), and blank cards will print as spaces. There is now an option to allow an item to be excluded from having withholding deducted, and another option to control the flagging of overrun and underrun when using Cost to Government (fig. 4). The Cost to Government report will soon include an option to list anticipated change orders to help forecast an overrun at contract end.

```

@ED,R SIERRA*HOWTO.COSTEST
READ-ONLY MODE
CASE UPPER ASSUMED
ED 14.02-04/26-17:12-(3,)
EDIT
0:>P!

```

THIS PROGRAM (FORTRAN) IS THE COMPUTERIZED METHOD FOR DOING THE COMPUTATIONS INVOLVED IN PREPARING THE BASIC COSTS FOR ESTIMATING TIMBER PURCHASER CONTRACTS ON SIERRA NATIONAL FOREST

THE RUNSTREAM IS:

```

@RUN
@ASG,A SIERRA*PROG.
@XQT SIERRA*PROG. COSTEST
***EQUIPMENT RATES***
***LABOR RATES***
***MISC OTHER INFO***
@FIN
@@

```

FORMAT OF THE DATA

EQUIPMENT RATE CARDS	FIELD	DESCRIPTION	COLUMNS
	1	D-8 CAT	1-5 XXXXX.XX
	2	LOADER,CAT	6-10
	3	TRUCK, OFF-HWY	11-15
	4	BRUSH CHIPPER	16-20
	5	CHAINSAW	21-25
	6	GRADER, CAT	26-30
	7	D-8 CAT	31-35
	8	COMPRESSOR	36-40
	9	JACKHAMMER	41-45
	10	RUBBER-TIRED ROLLER	46-50
	11	WATER TRUCK	51-55
	12	GRID ROLLER	56-60
	13	COMPRESSOR	61-65
	14	AIR TRACK	66-70
	15	TRUCK TRACTOR	71-75
	16	TRAILER, LOW-BED	76-80
	17	SCRAPER	1-5
	18	TRUCK, PICKUP	6-10
	19	BACKHOE	11-15
	20	WACKER	16-20
	21	DUMP TRUCK	21-25
	22	CONCRETE MIXER	26-30
	23	GAS WELDER	31-35

Figure 1. SIERRA\*HOWTO.COSTEST printout.

LABOR RATE			
CARDS			
1	LOADER OPERATOR	1-8	XXXXX.XX
2	TRACTOR OPERATOR	9-16	
3	TRUCK DRIVER	17-24	
4	CHAINSAW OPERATOR	25-32	
5	CHOKESSETTER	33-40	
6	CONSTRUCTION LABORER	41-48	
7	GRADER OPERATOR	49-56	
8	AIRTOOL OPERATOR	57-64	
9	DUMP TRUCK DRIVER	65-72	
10	ROLLER OPERATOR	73-80	
11	WATER TRUCK DRIVER	1-8	
12	BLASTER AND POWDERMAN	9-16	
13	HEAVY DUTY TRANSPORT DRIVER	17-24	
14	OPERATOR - RUBBER-TIRED EARTHMOVING EQUIPMENT	25-32	
15	BACKHOE OPERATOR	33-40	
16	WELDER	41-48	
OTHER RATES			
CARDS			
1	BLASTING MATERIALS (EXC)	1-5	XXXXX.XX
2	BLASTING MATERIALS (CULVERTS)	6-10	XXXXX.XX
3	DATE OF COSTS	11-22	ALPHA
4	PER DIEM RATE PER HOUR	23-26	XX.XX
5	NUMBER OF COPIES PRINTED	29-30	XX
<hr/> FOR ANY ADDITIONAL INFORMATION CONTACT GARY BUMP FTS 467-5406 <hr/>			
SCAN:97			
EOF:97			
0:>EXIT			
NO CORRECTIONS APPLIED.			
>			

*Figure 1. SIERRA\*HOWTO.COSTEST printout.  
(Continued)*

CONTRACT COMPUTER FORM

Project: \_\_\_\_\_

Card One

Forest

Sierra

Columns

(1-15)

Card Two

Estimate Number

5

(1-5)

Original Contract Amount

2,197,747.65

(6-15)

Increase or Decrease

- 23,508.05

(16-25)

Previous Payment

242,859.00

(26-35)

\*Retention

10.00

(36-45)

Days Allowed

500

(46-50)

Extensions Granted

2

(51-55)

Days Used

137

(56-60)

Date Contract Began

7/4/74

(61-68)

Cut-off Date

12/17/76

(70-77)

Complete Report

Yes

No

(78-80)

\*Note: For 10% enter 10

For full payment enter zero

For lump sum enter amount

(keypunch no. only in col. 78-79)

*Do not keypunch commas  
or decimal points*

Card Three: Project ID and Contract Number

Bass Lake Water Pollution Abatement Project 39-5403

Card Four: Contractor's Name

W. Jason Baker

Card Five and Six: Remarks

Figure 2. Sample contract computer form.

Example

ITEM CARDS FOR *Bass Lake WPA*

Item	Unit	Contract Price	Quantity To Date	Bid Quantity	Probable Quantity
1 _____ 40	41 _____ 48	49 _____ 56	57 _____ 64	65 _____ 72	73 _____ 79
<i>01900 Mobilization</i>	<i>Lump Sum</i>	<i>166,000.00</i>	<i>.75</i>	<i>1.00</i>	
<i>02110 Demobilization</i>					
<i>A. 2 unit vault toilet</i>	<i>Each</i>	<i>620.00</i>	<i>2.00</i>	<i>2.00</i>	
<i>B. 4 unit vault toilet</i>	<i>Each</i>	<i>900.00</i>	<i>1.00</i>	<i>1.00</i>	
<i>C. Pine Slope Campground</i>	<i>Lump Sum</i>	<i>9,700.00</i>	<i>.60</i>	<i>1.00</i>	
<i>02221 Trench Evacuation</i>					
<i>and Backfill</i>					
<i>A. Trench Type 1</i>	<i>Lin. Feet</i>	<i>10.50</i>	<i>3,437.00</i>	<i>13,122.00</i>	
<i>B. Trench Type 2</i>	<i>Lin. Feet</i>	<i>4.40</i>	<i>.0</i>	<i>10,431.00</i>	<i>9,753.00</i>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Codes: X = Omit underrun and overrun marks.  
 \* = Do not take retention.

Note: If Probable Quantity = Bid Quantity, leave Probable Quantity blank.

11

Figure 3. Sample of wider printout form.

RUNSTREAM FOR CONTRACT PROGRAMS FROM CARDS

```
@RUN,? AAAXXX,  
@ASG,A SIERRA*CON.  
@ASG,T NAME (temporary data file)  
@DATA,I NAME  
***** DATA GOES HERE *****  
@END  
@USE 5.,NAME  
@XQT SIERRA*CON.XCOST (Cost to Government)  
@XQT SIERRA*CON.XEST (Pay estimate)  
@FIN  
@@
```

---

RUNSTREAM FOR STORED DATA

```
@RUN  
@ASG,A SIERRA*CON.  
@ASG,A DATA*FILENAME (if not accessed recently)  
@DATA,L FILENAME (if list is not desired remove @DATA & END)  
@END  
@USE 5.,FILENAME  
@XQT SIERRA*CON.XCOST (Cost to government)  
@XQT SIERRA*CON.XEST (Pay Estimate)  
@FIN  
@@
```

Figure 4. Runstreams for contract programs from cards (top) and stored data (bottom).

WASHINGTON OFFICE NEWS

TECHNOLOGICAL IMPROVEMENTS

Heyward T. Taylor  
Assistant Director

In the August issue of *Field Notes* the San Dimas equipment development program was highlighted to keep you informed on the progress of ongoing projects at the Equipment Development Centers. This issue highlights the Missoula Equipment Development Center's program.

*ENGINEERING*

The Missoula Equipment Development Center is working with the Intermountain Forest and Range Experiment Station to develop a new cable transport system. Michael Gonsior, a logging engineer with the Intermountain Station, conceived the idea and the Center engineers built a 1:20 scale model which has been demonstrated to many persons in the logging industry, Forest Service, and other Federal, State, and private agencies.

The system is intended to extend cable yarding capabilities, while reducing costs. It differs significantly from present systems:

1. It features capstans, and consists of only one continuous cable.
2. It requires no interlocking of drums because the storage drum is separate from powered drums. The power drums always operate in a fixed 1:1 ratio, so lines travel at the same velocity. This improves efficiency and offers better yarding performance through increased spans, unlimited drop line length, and lateral excursions.
3. For a given configuration of load, span, and deflection, its load-carrying capability is greater than the present systems for a given line strength or size; hence, a smaller diameter cable can be used.

In addition, its carriage can pass an intermediate support, so adverse topographic features can be overcome by extending the span far enough to gain needed single span deflection, or intermediate supports can be placed in suitable locations.

The goal is to fabricate a prototype to evaluate economic and environmental consequences and prepare drawings and specifications that will be made available on request.

The Center is continuing to monitor the rapid changes occurring in traffic surveillance hardware. Suppliers are beginning to market a new generation of inductive loop vehicle detectors that have improved sensitivity and reduced energy demands. One new detector uses coaxial cable; it offers the advantages of reducing energy demands even further, and reducing the cost and effort of installing loops. The detector has never been tested on gravel roads, so evaluations are planned in cooperation with Regional and Forest traffic surveillance personnel.

### *RESOURCES*

The Forest Resource Program at Missoula is composed of 29 individual projects that cover most phases of forest and rangeland management. Descriptions of a few projects will illustrate the variety of the program:

Center engineers developed a method of projecting cloth markers from the ground into treetops. The markers accurately delineate cutting unit boundaries, section corner locations, etc., from the air. The 1- by 25-foot markers are contained in powder-propelled projectiles that are fired from a Stun-Gun. The markers can be placed in the tops of trees up to 200 feet high.

Center personnel are designing a machine that incorporates organic matter such as straw or sawdust into compacted soils like those found on rehabilitated strip-mined lands to promote plant growth. The machine will loosen the soil, and feed and mix the organic material into the soil in one operation. The Bureau of Land Management is sponsoring this project.

To help improve cone and seed collection techniques, the Center is working with industry in the South to complete the development of a vacuum seed harvester. The machine, built by Bowie Industries, Bowie, Tex., will undergo what we anticipate to be its final testing this fall. If successful, the machine should find wide application in tree seed orchards in the South for collecting tree seed from orchard floors.

The Center has entered into an agreement with the Naval Weapons Center at China Lake, Calif., to develop a safe, effective grenade for the control of avalanche hazards in winter sports areas.

### *FIRE & AVIATION*

Two projects nearing completion that may benefit field engineers concern dustproofing helispots, and explosives for blasting fireline on wild and prescribed fires.

Two polyvinyl acetate (PVA) film-forming materials are being used for helispot dustproofing. These materials, DCA 1295, manufactured by Union Carbide, and "Vynsol", distributed by Environmental Stabilization Engineering, Inc., are basically soil stabilization materials. They could be used

in many ways to stabilize disturbed or unvegetated soils. The Center has also designed a portable applicator to be ferried by helicopter.

Developmental work on a system for blasting fireline on wild fires is completed. The explosive will not start fires, so it can be used in high temperatures or when fuel moisture is low. Because of these special considerations, the explosive is fairly expensive, about \$2.50 a foot. For this reason, the Center is also evaluating off-shelf explosives that are less expensive, about 50 cents a foot, for blasting control lines around prescribed fires. These off-shelf explosives may start fires so they must be used at higher fuel moisture contents. Both systems may have application in engineering field tasks like "L" line clearing, trail construction, boundary line clearing, and other jobs requiring vegetative clearing or soil ditching.

#### *SAFETY AND FOREST INSECT DISEASE MANAGEMENT*

The Occupation<sup>al</sup> Safety and Health Program for FY 77 includes a project to investigate the opposition to grader seatbelts, evaluate the practicality of the seatbelt requirement, and investigate alternative safety belt systems.

The Loran-C navigation system is in the limelight of current position location systems being studied. It is a low-frequency, hyperbolic radio navigation system that may be used in three different modes: (1) position location, (2) remote monitoring or tracking, and (3) vehicle navigation. Although this system has many potential uses, Center engineers are concentrating on its capability to guide spray aircraft on predetermined flight paths to improve the effective coverage of pesticide application on forest insect epidemics.

Later this year the Center hopes to evaluate a military version of a Loran-C position location system. If this system meets expected performance, it will allow the location and relocation of points to within 50 to 100 feet. By the end of 1977, 80 percent of the National Forests should have Loran-C coverage.

## CONSULTATION AND STANDARDS

Charles R. Weller  
Assistant Director

### *AERIAL TRAMWAY SEMINAR--ELECTROMAGNETIC TESTING OF WIRE ROPE*

A seminar on the electromagnetic nondestructive testing of wire rope and track cable was held on August 31 in Denver, Colorado. At the first session, Professor Juliusz Stachurski of Krakow, Poland, was the principal speaker. At the second session, October 13-14, Mr. Ernst Kundig of Lucerne, Switzerland, and Jack Lang of Scarborough, Canada, demonstrated their equipment and described procedures for its use. The seminar was sponsored jointly by the Forest Service and the Mining Enforcement and Safety Administration.

The seminar was organized to provide information on the new technology and equipment available in this field to aerial tramway and mining interests and to develop recommendations on the mandatory use of nondestructive testing techniques in periodic checking and inspection of wire rope and track cable used for personnel transport. An article on that subject is planned for an early issue of *Field Notes*.

## OPERATIONS

Harold L. Strickland  
Assistant Director

### *FLEET MANAGEMENT HANDBOOK*

After several Regions requested that the Chief reestablish the Service - wide Fleet Management Handbook, the WO Administrative Management Staff asked all Regions to forward material recommended for a new handbook.

The Directives Group reviewed the Regions' recommendations and decided that there is sufficient material to justify development and issuance of a new FSH for Fleet Management.

Since much of the FSH material will be taken from FSM 7130, that chapter will be amended when work on the handbook is completed.

We plan to have detailers from several Regions accomplish this work.

### *DRIVER-OPERATOR HANDBOOK*

The "Driver-Operator Guide" is being revised; it will be published as part of the Directives system as the Driver-Operator Handbook, FSH-7109.18.

The new handbook will be pocket-sized; it will be as easy to carry for reference as was the "Guide."

The handbook is in the final editing stage; initial distribution is planned before the next field session. After the initial distribution, additional copies may be ordered through the normal procedures for directives.

### *FOREST SERVICE HISTORY*

Harold Steen's book "The U.S. Forest Service--A History" can be purchased from the University of Washington Press. Forest Service employees and retirees are offered a 20 percent discount on the retail price of \$12.00. Address inquiries to:

University of Washington Press  
Attn: Pat Soden  
Seattle, Washington 98105

**INVITATION TO READERS OF  
*FIELD NOTES***

Every reader is a potential author of an article for *Field Notes*. If you have a news item or short article you would like to share with Service engineers, we invite you to send it for publication in *Field Notes*.

Material submitted to the Washington Office for publication should be reviewed by the respective Regional Office to see that the information is current, timely, technically accurate, informative, and of interest to engineers Service-wide (FSM 7113). The length of material submitted may vary from several short sentences to several typewritten pages; however, short articles or news items are preferred. All material submitted to the Washington Office should be typed double-spaced; all illustrations should be original drawings or glossy black and white photos.

*Field Notes* is distributed from the Washington Office directly to all Regional, Station, and Area Headquarters, Forests, and Forest Service retirees. If you are not currently on the mailing list ask your Office Manager or the Regional Information Coordinator to increase the number of copies sent to your office. Copies of back issues are also available from the Washington Office.

Each Region has an Information Coordinator to whom field personnel should submit both questions and material for publication. The Coordinators are:

R-1	Bill McCabe	R-4	Ted Wood	R-9	Norbert Smith
R-2	Royal M. Ryser	R-5	Jim McCoy	R-10	Frank Muchmore
R-3	Bill Strohschein	R-6	Kjell Bakke	WO	Al Colley
		R-8	Bob Bowers		

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