

**ENGINEERING
TECHNICAL
INFORMATION
SYSTEM**

FIELD NOTES • TECHNICAL REPORTS
DATA RETRIEVAL • MANAGEMENT
PROFESSIONAL DEVELOPMENT

VOLUME 9 NUMBER 11

Field



Notes

Index of Engineering and ED&T Publications

Washington Office News



FOREST SERVICE

NOVEMBER 1977

U.S. DEPARTMENT OF AGRICULTURE



ENGINEERING FIELD NOTES

Volume 9 Number 11

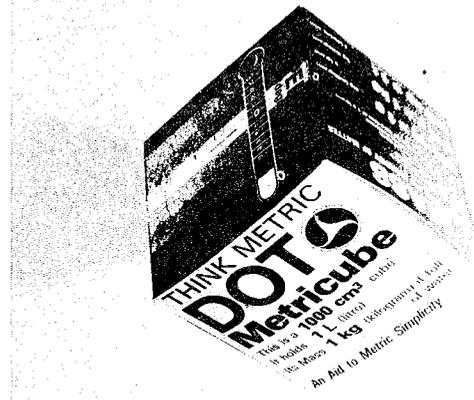
Information contained in this publication has been developed for guidance of employees of the United States Department of Agriculture—Forest Service, its contractors, and its cooperating Federal and State agencies. The Department of Agriculture assumes no responsibility for the interpretation or use of this information by other than its own employees.

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval of any product or service by the United States Department of Agriculture to the exclusion of others that may be suitable.

The text in the publication represents the personal opinions of the respective author, and must not be construed as recommended or approved procedures, mandatory instructions, or policy, except by FSM references. Because of the type of material in the publication, all engineers and engineering technicians should read each issue; however, this publication is not intended exclusively for engineers.

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

METRICUBES



A desk top tool for metric measurements is being distributed separately to all recipients of this issue of Field Notes. An aid to metric simplicity, the *METRICUBES* are provided as a followup to the June 1977 issue of Field Notes, which covered metrication in detail.

CHANGE TO SEPTEMBER FIELD NOTES

Volume 9 Number 9

*A HISTORY OF EXPLOSIVES USE BY THE FOREST SERVICE ROCKY MOUNTAIN
REGION*

Change page 19, last paragraph, 2nd sentence to read:

Recently developed Exploding Bridgewire (EBW) blasting machines, EBW detonators, and shunted cap safety fuses have contributed materially to safer explosives detonation.

INDEX OF ENGINEERING AND ED&T PUBLICATIONS

This index contains information on publications of the Engineering Staff in the field, in the Washington Office, and in the Equipment Development Centers.

The listing is arranged by the series of publications (Field Notes, Engineering Technical Reports, etc.), title, author, document number, and date of publication. It is not a comprehensive list, and previous compilations are cited with each group.

Copies of these publications are available to Forest Service personnel upon request, by writing or calling:

Forest Service--USDA
Engineering, TIC
P.O. Box 2417
Washington, DC 20013

Telephone: FTS 8 235-1424

ENGINEERING FIELD NOTES

This publication is a monthly newsletter published to exchange engineering information and ideas of a technical and administrative nature among Forest Service personnel, Station, and Area Headquarters. If you are not now receiving a copy and would like one, ask your Office Manager or the Regional Information Coordinator to increase the number of copies sent to your office.

Articles published prior to September 1976 are listed in Field Notes, Vol. 8 No. 10, October 1976. Copies of back issues are available from the Washington Office.

Index of Field Notes, October 1976 - October 1977

METRIC--Are You Ready?

Reprinted from 'USDA' Newsletter Vol. 35 No. 17; FN Vol. 8 No. 10, October 1976

Revision of the High Hazard Clause in Powerline Special Use Permits
Specifications for Construction of Roads and Bridges
Signs

Weller, Charles L.; FN Vol. 8 No. 10, October 1976

Geometronics Service Center
Strickland, Harold L.; FN Vol. 8 No. 10, October 1976

San Dimas Forest Residues Machine Completes Field Tests
Taylor, Heyward T.; FN Vol. 8 No. 10, October 1976

Observations on Low-Cost Roads in New Zealand
Lund, John W.; FN Vol. 8 No. 11, November 1976

Vertical Curves and Their Influence on the Performance of Log Trucks
Ohmstede, Robert; FN Vol. 8 No. 11, November 1976

Federal Aid Plots for Percent Abney Level (PAL) Surveys
McCall, Ron; FN Vol. 8 No. 11, November 1976

Civil Liability of Government Employees
Strickland, Harold L.; FN Vol. 8 No. 11, November 1976

New RDS Data File System
Taylor, Heyward T.; FN Vol. 8 No. 11, November 1976

Solar Energy Update
Weller, Charles R.; FN Vol 8. No. 11, November 1976

A Transportation Planning Workload Analysis
Groven, Allen C.; Gomez, Juan; Martin, William R.; FN Vol. 8 No. 12,
December 1976

Comments About Computerized Programs at Fort Collins
Bump, Gary F.; FN Vol. 8 No. 12, December 1976

Engineering
Resources
Fire & Aviation
Safety and Forest Insect Disease Management
Taylor, Heyward T.; FN Vol. 8 No. 12, December 1976

Aerial Tramway Seminar--Electromagnetic Testing of Wire Rope
Weller, Charles R.; FN Vol. 8 No. 12, December 1976

Fleet Management Handbook
Driver-Operator Handbook
Forest Service History
Strickland, Harold L.; FN Vol. 8 No. 12, December 1976

What Bugs Engineers Most About Report Writing
Smith, Terry C.; FN Vol. 9 No. 1, January 1977

Resource Conservation and Recovery Act of 1976
Weller, Charles.; FN Vol. 9 No. 1, January 1977

New Mapping Program Affects Forest Service
Strickland, Harold L.; FN Vol. 9 No. 1, January 1977

A Pavement Design and Management System for Forest Service Roads--A Working
Model
Taylor, Heyward T.; FN Vol. 9 No. 2, January 1977

Energy From Water
Hyde, Jerry M.; FN Vol. 9 No. 2, February 1977

Forest Service Safety of Dams Studies
Wolfe, James A.; FN Vol. 9 No. 2, February 1977

Low-Volume Roads Bibliography
Strickland, Harold L.; FN Vol. 9 No. 2, February 1977

Region 5 Fire Equipment Committee
Multiregional Anchor Project Steering Committee
Cooperators From the University of California-Davis
Ad Hoc Slash Equipment Group
Steep-Slope Stabilization Group
American Society of Agricultural Engineers (ASAE) Winter Meeting
Taylor, Heyward T.; FN Vol. 9 No. 2, February 1977

Buildings Handbook Update
Alternate Energy Sources
Weller, Charles R.; FN Vol. 9 No. 2, February 1977

The Problems of Using Standard Specifications Without Adjusting for Specific
Design Conditions
Coghlan, Gerald T. "Skip"; FN Vol. 9 No. 3, March 1977

Polypropylene Fabric as a Reinforcement of Muskeg Subgrade in Road
Construction
Lively, Morris; Vischer, William A.; FN Vol. 9 No. 3, March 1977

Documentation of Road Design System (RDS)
Taylor, Heyward T.; FN Vol. 9 No. 3, March 1977

Compatibility of Electrical Equipment With Electric Service
Weller, Charles R.; FN Vol. 9 No. 3, March 1977

Emergency Relief Funds
Strickland, Harold L.; FN Vol. 9 No. 3, March 1977

Use of Reinforced Earth Company's Retaining Structures on the Olympic National Forest
Erwin, Dave; FN Vol. 9 No. 4, April 1977

The Brownhouse Study Road
Franklin, B.D.; FN Vol. 9 No. 4, April 1977

New Forest Service General Provisions and Specifications for Construction of Roads and Bridges
Cadastral Engineering
Weller, Charles R.; FN Vol. 9 No. 4, April 1977

A Standard Forest Service Scale for Resource Aerial Photography
Strickland, Harold L.; FN Vol. 9 No. 4, April 1977

The American Society of Agricultural Engineers
Taylor, Heyward T.; FN Vol. 9 No. 4, April 1977

Career Counseling for Engineering Personnel
Davey, E. Duane; FN Vol. 9 No. 5, May 1977

A Mathematical Programming Approach for the Analysis of Transport/Logging Systems for Timber Sale
Cox, Wallace R.; Wong, Peter; FN Vol. 9 No. 5, May 1977

Energy Conservation
Strickland, Harold L.; FN Vol. 9 No. 5, May 1977

Traffic Surveillance Survey
Taylor, Heyward T.; FN Vol. 9 No. 5, May 1977

Progress in Consultation and Standards
More About the Press-Lam Bridge
Weller, Charles R.; FN Vol. 9 No. 5, May 1977

Presidential Statement on the Metric Conversion Act of 1975
FN Vol. 9 No. 6 Part I, June 1977

Metric Conversion Act of 1975 (Public Law 94-168)
FN Vol. 9 No. 6 Part I, June 1977

America Joins a Metric World
FN Vol. 9 No. 6 Part I, June 1977

The Metric System of Measurement
FN Vol. 9 No. 6 Part I, June 1977

Brief History of Measurement Systems
FN Vol. 9 No. 6 Part I, June 1977

Impact of Metrication on the Construction Industry
FN Vol. 9 No. 6 Part I, June 1977

Development of Metric Standards for Wire
FN Vol. 9 No. 6 Part I, June 1977

Metrication of the National Standards for Traffic Control Devices
FN Vol. 9 No. 6 Part I, June 1977

American Society for Testing and Materials Instruction on Metric Conversion
FN Vol. 9 No. 6 Part I, June 1977

Metric Education Guide for Employee Training
FN Vol. 9 No. 6 Part I, June 1977

Metric Editorial Guide
FN Vol. 9 No. 6 Part I, June 1977

U.S.-Metric Measurement Converters
FN Vol. 9 No. 6 Part I, June 1977

Metrication: What's Next?
FN Vol. 9 No. 6 Part I, June 1977

Metric Conversion Tables
FN Vol. 9 No. 6 Part II, June 1977

Concrete "Tinker Toy" Bridge
Larson, Ed; FN Vol. 9 No. 7, July 1977

A Method of Marking Boundary Lines Using the HP 25 Calculator
Moonier, Dennis; Vol. 9 No. 7, July 1977

Minimum-Cost Network Design for Timber Transport
Wong, Peter; FN Vol. 9 No. 7, July 1977

International Conference on Low-Volume Roads
Taylor, Heyward T.; FN Vol. 9 No. 7, July 1977

Review of Road and Bridge Preconstruction Activity
Weller, Charles R.; FN Vol. 9 No. 7, July 1977

Resource Information Display System (RIDS)
Strickland, Harold L.; FN Vol. 9 No. 7, July 1977

Wiring Systems for Sewage Lift Stations
Mutch, Frank; FN Vol. 9 No. 8, August 1977

Skycrane Saves the Day In Alaska
May, Gregory L.; Muchmore, Frank W.; Williams, Russell J.;
Vol. 9 No. 8, August 1977

Directory of Geotechnical/Materials Personnel
Vol. 9 No. 8, August 1977

Report on the Status of Safety Design Standards for Low-Volume Roads
Sign Specifications and Sign Catalog
Furen, Walter; Vol. 9 No. 8, August 1977

Study of Service-wide Engineering Computer Systems
Strickland, Harold L.; Vol. 9 No. 8, August 1977

Field Tests at San Dimas Equipment Development Center
Taylor, Heyward T; Vol. 9 No. 8, August 1977

Research Publications
Colley, A.L.; Vol. 9 No. 9, September 1977

Slope Inclinator Data Reduction
Kaufman, Robert E.; Vol. 9 No. 9, September 1977

A History of Explosives Use by the Forest Service Rocky Mountain Region
Adolphson, Ray; Vol. 9 No. 9, September 1977

Geometronics Application of Digitizing Techniques
Strickland, Harold L.; Vol. 9 No. 9, September 1977

FR&T Study on Transportation Investment Decision Policies and Analysis
Furen, Walter; Vol. 9 No. 9, September 1977

Noise Pollution Prediction Method
Taylor, Heyward T.; Vol. 9 No. 9, September 1977

Benefits of Computer Models for Transportation System Analysis
DeKalb, Victor M; Vol. 9 No. 10, October 1977

Native Log Stringer Bridge Research
Muchmore, Frank W.; Tuomi, Roger L.; Wolfe, Ronald; Vol. 9 No. 10, October
1977

Highway Safety Traffic Control
Furen, Walter; Vol. 9 No. 10, October 1977

Geometronics Service Center
Strickland, Harold L.; Vol. 9 No. 10, October 1977

Road Design System
Taylor, Heyward T.; Vol. 9 No. 10, October 1977

ENGINEERING TECHNICAL REPORTS

The Engineering Technical Reports (ETR series) are detailed discussions of specific engineering topics or closely-related subjects.

Material published in the ETR series prior to the period included herein is listed in Field Notes, Vol. 7 No. 10, October 1975.

Measurement of Soil Creep by Inclinator (ETR 7100-4)
Ziemer, Robert; September 1977.

Status Report of Emulsified Asphalt Pavements in Region 6 (ETR 7700-10)
Williamson, Ronald; March 1977.

ENGINEERING MANAGEMENT SERIES

The Engineering Management Series contains publications serving a special purpose or reader, and those involving several disciplines which are applied to a specific problem.

Some of these publications have such interest for readers outside of the Forest Service and Department of Agriculture that requests for them exceed the number of copies initially printed. Available funds are insufficient to meet these additional demands. The particular items are submitted to the Superintendent of Documents of the Government Printing Office (GPO), who prints copies for the public. The cognizant Engineering and publications staff advises GPO and other agencies and offices of planned publication, whenever the interest of those agencies is likely. They may then order copies to be printed at the same time that GPO prints its stock.

Among the publications listed below, those currently available through GPO are marked with an asterisk (*). Inquires and orders from outside the Department of Agriculture for those items should cite the full title and identification number and should be addressed to:

Superintendent of Documents
Government Printing Office
Washington, DC 20402

FR&T Study Policy Team Report--Transportation Investment Decision
Policies and Analysis (EM 8320) June 1977

Topographic Analysis System (TOPAS) (EM 7140-1A)
(Translated in Spanish)
Albee, William; Mahan, Richard; Mahoney, Robert; August 1977

FS General Provisions & Standard Specifications for Construction of
Roads and Bridges (EM 7720-100) *

Unruh, Marion; Badger, David A.

GPO Stock No. 001-001-00425-1 Price \$5.65

Road and Bridge Preconstruction Engineering (EM 7730-3)

Johnston, Beryl; July 1977

EQUIPMENT DEVELOPMENT AND TEST PUBLICATIONS

The Equipment Development and Test Reports (ED&T series) are produced through the Forest Service Equipment Development Centers at San Dimas, California (SDEDC), and Missoula, Montana (MEDC).

These publications are the result of projects assigned to the Centers by the Chief for the evaluation and development of equipment to meet the needs of Forest land managers in the field.

Copies of these publications may be obtained from the TIC, Washington Office, or by requests to the Centers at the addresses below.

A comprehensive description of the publications listed below are carried in "ED&T Program: Progress FY 1976/1976T Plans FY 1977."

Forest Service--USDA
San Dimas Equipment Development
Center
444 E. Bonita Avenue
San Dimas, California 91773

Forest Service--USDA
Missoula Equipment Development
Center
Fort Missoula
Missoula, Montana 59801

An *Equip Tips* is a brief description of new equipment, techniques, materials, or operating procedures. An *ED&T Report* is a general publication containing the results of studies, investigations, tests, evaluations, or extension development projects. *Specifications and Standards* describe requirements of items purchased in quantity or for special Forest Service use.

Other reports prepared by the Centers are published as papers for technical society meetings and transactions, bulletins, descriptive pamphlets, and special purpose articles. *Project Record Films* are sound motion pictures showing new equipment in operation or new operating techniques. *Project Records* are detailed engineering reports which generally include procedures, techniques, systems of measurement, results, analyses, special circumstances, conclusions, and recommendations rationale. Requests for these documents or films should be directed to the Center listed as the author.

The authors are shown as MEDC for Missoula Equipment Development Center and SDEDC for San Dimas Equipment Development Center.

The publications listed include only those published by the two Equipment Development Centers within the past 5 years.

Equip Tips

TITLE	DATE	AUTHOR
The SPH-4 flight helmet	January 1977	SDEDC
Orthographic projector	October 1976	MEDC
Chemicals and support equipment to reduce friction in hose lays	July 1976	SDEDC
New slide insert for physical fitness calculator	June 1976	MEDC
Traffic surveillance equipment reports	June 1976	MEDC
Resource publications	February 1976	MEDC
Equipment-mounted air filtering system	February 1976	MEDC
New Safety Fuse Igniter	January 1976	MEDC
Firefighters equipment pack	September 1975	MEDC
Belt first aid kit	September 1975	MEDC
Two new fire camp kits	September 1975	MEDC
Lighter forest fire shelter	September 1975	MEDC
Date available on earth sciences equipment	August 1975	MEDC
Comfort station interior finishes	August 1975	SDEDC
Oil-recirculating waterless toilet	August 1975	SDEDC
Plastic tops--picnic tables and benches	July 1975	SDEDC
Trail equipment publications and films	June 1975	MEDC
Automation of the ISCO water sampler	May 1975	MEDC
Safe, versatile firing set for seismic work	May 1975	MEDC

Tractor light kit	May 1975	MEDC
Making culverts good fish passages	January 1975	MEDC
New porcupine-resistant signs	January 1975	MEDC
Safer detonator available	October 1974	MEDC
Aids for battery selection	September 1974	MEDC
GSA hardhats	September 1974	MEDC
Road traffic counters recommended	August 1974	MEDC
Protect your hearing!	July 1974	SDEDC
Crossbow tree marking system for trees up to 90 feet tall	June 1974	MEDC
Firefighters' trousers	June 1974	MEDC
New look in 2- and 4-quart canteens	March 1974	MEDC
Hearing protection for off-road vehicle operators	March 1974	SDEDC
Microphor model H-12 flush toilet treatment unit	February 1974	SDEDC
Helicopter-serviced toilet system	January 1974	SDEDC
Improving the durability of routed wood signs	September 1973	MEDC
Caution: Electric power converters	September 1973	MEDC
Trail traffic counter now available on GSA contract	September 1973	MEDC
Nomex fabric firefighters' shirt	July 1973	MEDC
Emergency jacks for light trucks	June 1973	MEDC
Improved emergency ration	June 1973	MEDC
A minimum water toilet fixture, the Duner 509	March 1973	SDEDC
Gloves for forest workers	March 1973	MEDC

ED&T Reports

Catalytic converter exhaust system temperature tests	January 1977	SDEDC
Clearing, grubbing, and disposing of road construction slash	October 1976	SDEDC
Development of the Forest Service trail traffic counter	September 1976	MEDC
Iodine dispenser for water supply disinfection	January 1976	SDEDC
Pickup truck slip-on equipment for cleaning recreation facilities	July 1975	SDEDC
Slash-equipment and methods for treatment and utilization	April 1975	SDEDC
Surfacing forest trails with crushed rock	January 1975	MEDC
Roadside slope revegetation (past and current practice on the National Forests)	June 1974	SDEDC
Functional evaluation of the John Deere 570 motor grader	June 1974	SDEDC
Sound propagation and annoyance under forest conditions	March 1974	SDEDC
Snowmobile noise	January 1974	SDEDC
Flexible downdrains	January 1974	SDEDC
Flight evaluation of Short Brothers and Harland Limited SC7 Military Skyvan--series 3M	June 1973	SDEDC

Project Records

Static-line load requirements for anchor cables	January 1977	MEDC
Development of specification for painted metal signs	January 1977	MEDC
Survey of high-production grass seed collectors	January 1977	SDEDC

Parameters for the design of efficient forest residues reduction machinery	December 1976	SDEDC
Remote sensing for big game counts	December 1976	MEDC
A case history: Traffic counter service and repair	October 1976	MEDC
Controlling stinging and biting insects at campsites	October 1976	MEDC
Results of two timber management equipment needs surveys	October 1976	MEDC
Orthographic projector	October 1976	MEDC
Trailer tractix equations and computer program for curve widening	October 1976	SDEDC
Liquid concentrate fire retardant blenders for ground tankers	October 1976	SDEDC
Chemicals and support equipment to reduce friction in hose lays	October 1976	SDEDC
Helicopter noise and its effects on personnel--a preliminary survey	September 1976	SDEDC
Evaluating precision seeders for Forest Service nurseries	August 1976	MEDC
Developing and testing a shear/plow for fireline construction	August 1976	MEDC
Evaluating the Bowie Industries' Vac-U-Seed harvester	August 1976	MEDC
Chain-flail barker development	June 1976	SDEDC
Roadside ditch-cleaning machine development	April 1976	SDEDC
Mobile equipment for servicing recirculating chemical toilets and pumping vault toilets	March 1976	SDEDC
Chemical fire retardant corrosion test methods	March 1976	SDEDC

Evaluation of backpack frames	March 1976	MEDC
Evaluation of the Vermeer Model TS-44A tree spade for transplanting trees on surface-mined land	February 1976	MEDC
An analysis of substrates, inks, and paints for improving outdoor posters	February 1976	MEDC
Mechanically harvesting seeds in southern orchards	February 1976	MEDC
Investigation of equipment needs for chemically treating hardwoods and conifers	February 1976	MEDC
Evaluation of the wayfinder 360 system	November 1975	MEDC
Wildlife habitat management needs results of the 1975 followup survey	October 1975	MEDC
Surveys on the use of fire retardants in ground tankers	October 1975	SDEDC
Night helicopter operations	July 1975	SDEDC
Impact of off-road vehicle noise on a National Forest	July 1975	SDEDC
Survey of portable wheel and axle load scales and State statutory weight limits	June 1975	MEDC
An evaluation of two-man backpacking crews for trail maintenance	June 1975	MEDC
An operational system for constructing fireline with explosives	June 1975	MEDC
Firefighters' exposure to carbon monoxide on the Deadline and Outlaw Fires	May 1975	MEDC
Qualifications test of two fire retardant chemicals Fire-Trol 931-N & Fire-Trol 931-P	May 1975	SDEDC
Small check dam energy dissipator	April 1975	SDEDC

Analysis of reflective overflow and readability of the Forest Service logo: National Forest	April 1975	MEDC
Comfort station interior finishes	February 1975	SDEDC
Experimental blends of dry liquids	February 1975	MEDC
Test and evaluation of model 70 tanker	May 1975	SDEDC
Evaluation of the Vari-Dozer	December 1974	SDEDC
Development of marking systems	December 1974	MEDC
Limited accuracy tests of two inductive loop counters	November 1974	MEDC
Earth sciences equipment needs an introductory plan	November 1974	MEDC
Ignition time vs. temperature for selected forest fuels	November 1974	SDEDC
Wildlife habitat management needs, results of 1973 survey	October 1974	MEDC
Investigation of the need and feasibility of improving ground detectors	September 1974	MEDC
Investigation of equipment needs in United States nurseries	September 1974	MEDC
Equipment for orthographic projection in timber sale layout	September 1974	MEDC
Fuel treatment systems for partially cut stands	August 1974	MEDC
Investigation small seed lot processing equipment	August 1974	MEDC
Weather Measure Corporation Model WS750 Automatic Weather Station	August 1974	MEDC
All-terrain vehicle noise	August 1974	SDEDC
Firefighters' physiological study	July 1974	MEDC

An investigation, survey, and analysis, Forest Service posters	July 1974	MEDC
Linear fireline explosive system	July 1974	MEDC
A field evaluation helicopter-mounted grenade dispenser and incendiary grenades	June 1974	MEDC
Investigation of fish passage problems through culverts	May 1974	MEDC
Spray aircraft tracking/guidance system: A concept	May 1974	MEDC
Fire detection systems for seed orchards or small high-value areas	May 1974	MEDC
Site preparation machine phase I investigation	May 1974	MEDC
Site preparation machine phase II development	May 1974	MEDC
Vault toilet pumper vacuum interruptors	April 1974	SDEDC
Federal prison industries safety shoes	April 1974	MEDC
Snowmobile survival kit	March 1974	MEDC
Treatment of oversized rock on non-surfaced roads	February 1974	SDEDC
Bridge inspection equipment	February 1974	SDEDC
Motorcycle noise	February 1974	SDEDC
Investigation of selected problems in range habitat improvement	February 1974	MEDC
Retardant flowmeter for airtanker bases	January 1974	SDEDC
<u>Other Reports</u>		
Equipment for reclaiming strip-mined land (Handbook)	February 1977	MEDC

Fitness and work capacity (available from Supt. of Doc., U.S. Govt. Printing Office, Wash., DC 20402)	February 1977	MEDC
Summary--smokejumper injuries and parachute malfunctions, 1975	January 1977	MEDC
Implement hitch for forest operations	December 1976	SDEDC
Fireline explosive use and purchase instruction	December 1976	MEDC
Potential for heating western tree seedling greenhouses with geothermal energy	November 1976	MEDC
Nursery equipment catalog	October 1976	MEDC
Steep-slope scarifier/seeder	October 1976	SDEDC
Reviewing and maintaining specifications at the Forest Service Equipment Development Center, Missoula	October 1976	MEDC
Vegetative rehabilitation and equipment workshop annual report	September 1976	MEDC
Evaluation of interregional travelway closure and rehabilitation problems and techniques	June 1976	MEDC
Evaluating the need for environmental monitoring to predict timber harvesting impacts	May 1976	MEDC
100-man medical treatment kit	May 1976	MEDC
Emergency medical field station	May 1976	MEDC
Lessening energy waste in the road-tire vehicle-driver system (copies are available from: Univ. of CA-Berkeley, Instit. of Transp. Studies, 109 McLaughlin Hall, Berkeley, CA 94720 for \$6.50/copy + \$0.40 handling charge--CA residents add sale tax)	April 1976	SDEDC
Rating method--chain saw hazard	March 1976	MEDC

Vault toilets . . . design and maintenance considerations	February 1976	SDEDC
Machine for row-mulching logging slash to enhance site--a concept	December 1975	SDEDC
The San Dimas slash machine	November 1975	SDEDC
Purchasing description for Morrison trailblazer	November 1975	MEDC
1st international conference on noise from recreational off-road vehicles (copies available from Univ. of Montana, Missoula, MT 59801, Attn: Dr. R. Chaney, Jr., for \$10, payable to the Univ. of Montana)	November 1975	SDEDC
Progress report for the service-wide conference on planting stock product	September 1976	MEDC
Greenhouse instrumentation study	August 1975	MEDC
Traffic surveillance publications	August 1975	MEDC
Night helicopter operations	August 1975	SDEDC
Summary--smokejumper injuries, eight parachute malfunctions, 1974	August 1975	MEDC
Catalytic converter temperature tests (preliminary)	July 1975	SDEDC
Feasibility study of self-contained tether cable system for operating equipment on slopes of 20 to 75 percent	June 1975	SDEDC
Night helicopter operations steering committee, a chronology of the project	June 1975	SDEDC
Cassette traffic recording system, brochure	May 1975.	MEDC
Equipment for processing small seed lots (Catalog)	May 1975	MEDC

Automated classifier for analyzing traffic data	March 1975	MEDC
Distribution of particles (by number and size) in Micro-cel E and HI SIL 233 dry liquids, data report, U.S. Army Dugway Proving Ground	February 1975	MEDC
An engineering approach to the problem of maximizing Zectran particle capture on spruce budworms in a dense coniferous forest. U.S. Army Dugway Proving Ground Technical Note	January 1975	MEDC
Aerial spray evaluation, pine butterfly test, Bitterroot National Forest, MT Data Report, U.S. Army Dugway Proving Ground, USDA Forest Service R-1 Division of State and Private Forestry, and Missoula Equipment Development Center	January 1975	MEDC
Greenhouses for forestry seedlings, (Ekblad), 1974 Winter Meeting American Society of Agricultural Engineers	December 1974	MEDC
A survey of nursery practices and equipment needs presented Winter Meeting American Society of Agricultural Engineers, Chicago, IL	December 1974	MEDC
Evaluation of power requirements and blade design for slash-cutting machinery	December 1974	SDEDC
Relating operational variables to tire wear	October 1974	SDEDC
Night helicopter operations for fighting wildfires	September 1974	SDEDC
Off-road vehicle noise effects on operators and bystanders	September 1974	SDEDC

Cost of raising containerized trees in the United States--a computer program paper presented at North American Containerized Forest Tree Seedling Symposium, Denver, CO	August 1974	MEDC
Systems engineering for greenhouse operations, proceedings of the North American Containerized Forest Tree Seedling Symposium, Denver, CO, Great Plains Agricultural Council Publication No. 68	August 1974	MEDC
Field trails with Super 8 movie cameras for traffic classification	July 1974	MEDC
Crosscut saws description, sharpening reconditioning	April 1974	MEDC
Application of meteorological prediction models to forest spray problems. Workshop aerial application of insecticides against forest defoliators, Missoula, MT	April 1974	MEDC
History Range Seeding Equipment Committee 1946-1973	January 1974	MEDC
Evaluation of brushcutters, Hydro-Ax and Kershaw	December 1973	R-8
Operators' at-ear noise exposure for off-road recreational vehicles	October 1973	SDEDC
Using heat for sagebrush control	October 1973	MEDC
Application of "dry liquids" to insecticide dissemination	October 1973	MEDC
Civilian needs and case studies for the USDA Forest Service (technical transfer colloquium, American University)	September 1973	MEDC
Relation of noise measurements to temporary threshold shift in snow-mobile users	June 1973	SDEDC

Exhaust particle ignition characteristics. Cooperative study between USDA Forest Service, SDEDC, and Univ. of Calif. Dept. of Statistics, Riverside, CA	February 1973	SDEDC
A field experiment on the impaction of Zectran particles on spruce budworm larvae. Technical Report. USDA R-1 Division of State and Private Forestry and Missoula Equipment Development Center	February 1973	MEDC
The CL-215: summary of its performance as an airtanker	1973	FFSAR SDEDC
Developmental model chain-flail barker/cleaner	(undated)	SDEDC
Limited evaluation Canadair CL-215 Amphibious Airplane. Cooperative study between SDEDC and Edwards AFB, CA	October 1972	SDEDC
A guide to cleaning recreation sites. Cooperative project between Rocky Mountain Region and SDEDC	1972	SDEDC
Implement-carrying hitch for forestry use	December 1972	SDEDC
Efficiency and economy of an air curtain destructor used for slash disposal in the Northwest	December 1972	SDEDC

WASHINGTON OFFICE NEWS

CONSULTATION AND STANDARDS

Walter E. Furen
Assistant Director

PRACTICES AND EQUIPMENT PROBLEMS IN ROAD MAINTENANCE

In FY 1975 the Forest Service, through the San Dimas and Missoula Equipment Development Centers, initiated a study to assess road maintenance equipment needs and to identify equipment problems that might be solved by the Equipment Development Centers. An interview technique was used to gather data from 38 National Forests. Many of you participated in this process, and your willingness to provide input was greatly appreciated.

This study, identified as *ED&T 2521*, has been completed and *Special Report*, No. 7771-2813, was published in September 1977. If you have not already done so, obtain a copy of the Special Report to review it in depth.

The study did not identify new, highly significant areas of improvement of an equipment development nature. Although this situation existed, 27 different project ideas were determined to be useful, and they are shown in table 1. These projects will be included in the ED&T program as time and funding permit.

The major issue identified by this ED&T study was that road maintenance personnel are dissatisfied with maintenance management direction and emphasis as it existed at the time the field interviews were conducted. The Special Report contains a listing and discussion of 17 problem statements to support the ED&T finding. The Chief has written a letter to the Regional Foresters expressing his concern and emphasizing the importance of appropriate implementation of the maintenance management system. A copy of his letter is included in the "Foreword" of the Special Report.

The *Transportation System Maintenance Handbook* (FSH 7709.15), published in October 1975, outlines the maintenance management system that has been adopted for use in the Forest Service. We have had approximately 2 years to become acquainted with and to begin using this system. In order to evaluate progress and problems in implementing this system and to develop recommendations for improvement, we have scheduled a *Road Maintenance Management Workshop* to be held the week of January 9-13, 1978. Each Region will be represented by its Regional Road Maintenance Engineer. Please communicate your comments and recommendations to your Regional Maintenance Engineer, so that he can present them at the January workshop. Input from the ground

Table 1--Promising project ideas arranged by value to Regional engineering staffs

Priority	Project proposal title	Project No.	Status	Regional value*
1	Techniques for surveying road conditions	7066	New	2.8
2	Road maintenance equipment lifetime costs	7043	New	2.8
3	Training aids	—	New	2.8
4	Impact of road design and construction on road maint.	7048	New	2.8
5	Pavement maintenance support	—	New	2.8
6	Maintenance of traffic control signs	2685	Continuing	2.6
7	Traffic surveillance equipment user instructions	2537	Completed	2.6
8	Transportation cost study	2285	Continuing	2.5
9	Grader cutting edges	7052	New	2.5
10	Low-cost reflective signs	7068	New	2.5
11	Road deterioration studies	2609	Continuing	2.5
12	Rock rakes for road maintenance work	7019	New	2.4
13	Road grader operator safety belts	7070	Continuing	2.4
14	Reduction of sign theft	7067	New	2.4
15	Culvert inlet devices	7053	New	2.4
16	Reducing equipment vandalism	7071	New	2.4
17	Roadside brush control equipment	2677	Renew	2.4
18	Slope revegetation equipment	2683	Continuing	2.4
19	Outfit sign trucks	—	New	2.3
20	Project signals and signs	—	New	2.3
21	Culvert cleaning devices	2674	New	2.3
22	Motor grader substitutes	7065	New	2.3
23	Redundant brakes	—	New	2.1
24	Maintenance systems for treatment of oversized rock	2055	Continuing	2.1
25	Ditch cleaner	—	Renew	2.1
26	Backhoe accessories for rock	—	New	2.0
27	Grader blade extensions	—	New	2.0

*Regional staffs rated each project idea 1 to 3 based on its benefit to the Region: 3 if it would benefit; 2 if unsure; 1 of little value. Scores were averaged to rank project ideas.

level will assure that significant problems be addressed at the workshop and will provide guidance as we proceed from the implementation to the operational phase of the maintenance management system.

SERVICE-WIDE PROBLEM STATEMENTS IN ROAD MAINTENANCE

1. "A sound base for actual maintenance needs does not exist on National Forests due to a lack of documented conditions and traffic using the transportation system, and road user safety is not adequately considered. Without this base, planning and budgeting procedures for road maintenance activities cannot accurately describe the work to be done (with associated cost) or evaluate results when activity has been complete."
2. "Most Forest personnel are aware of needs and dedicated to efficient performance, but in some cases, they are frustrated by lack of a clear and concise means of implementing the maintenance management system."
3. "Roads (even some constructed recently) are substandard and need reconstruction (or 'completion' effort) to be put into a maintainable state."
4. "Some in-house maintenance organizations are not of a size to maximize management and manpower skills and equipment utilization, or to allow for flexibility."
5. "The required skills at various organizational levels have not been totally identified in either road systems operations or specialized areas of road maintenance."
6. "Some Service-wide programs in road maintenance training and information dissemination are lacking in order to effectively carry out operations."
7. "The Forest Service lacks equipment and techniques to maintain paved roads, which are being constructed in increasing numbers."
8. "Timber sale road maintenance is not being uniformly accomplished in accordance with the contracts or with applicable maintenance standards."
9. "Increased costs are reported because inappropriately sized equipment, downtime, local parts availability, and local service are not considered when decisions about available equipment are made. Fleet managers and users feel they are not adequately involved in the equipment selection process."

They have some 'expert opinion' that is not being used in matching the proper equipment to the local job to be done."

10. "Where the Development Centers have made available specialized equipment and materials, the maintenance staffs at the Forest level often are not fully in agreement with or appraised of the goals and are left on their own to integrate the use into their operations. Equipment managers feel the projects have been too narrow in scope and have not addressed the problem in many cases."
11. "Transportation planning, design, and construction deficiencies continue to adversely impact maintenance procedures and costs."
12. "Maintenance activities frequently do not consider problems caused by contaminants interfering with regular maintenance procedures. For example, contaminants such as grass, leaves, pine needles, and rocks have an adverse effect on motor grader performance."
13. "Current timber sale agreement procedures and clauses are not in all cases compatible with existing road management and maintenance standards and directions."
14. "Roads under questionable jurisdiction and lacking definitive maintenance agreements continually create maintenance performance responsibility problems."
15. "The historic emphasis to increase contracting of maintenance is receiving limited acceptance."
16. "Road closure is an important part of maintenance management, but locked gates are vandalized or bypassed; enforcement is felt to be lacking by maintenance personnel; and, there is a reluctance to use closures as an effective tool to balance available capabilities with road use."
17. "Management does not give the necessary emphasis to the job of road maintenance."

CONSULTATION AND STANDARDS PERSONNEL CHANGES

Effective October 9, 1977, Jim Wolfe was assigned to the WO as the Hydraulic Engineer. A graduate of New Mexico State University, Jim worked for the Bureau of Reclamation and Corps of Engineers before coming to the Forest Service in 1971 as the Water and Sanitation Engineer for R-3.

Jim was responsible for providing direction and guidance concerning dams and related water resource developments such as reservoirs, canals, ditches,

ponds, and erosion control structures. This work involved feasibility, preliminary engineering, design, construction, and maintenance of structures built on or affecting lands administered by the Forest Service.

* * *

Effective December 4, 1977, George Lippert became the new Structures Engineer in the WO. George is a graduate of South Dakota State University; his Forest Service experience includes assignments on the Snoqualmie NF, at the R-6 Regional Office, and most recently in R-8, where he was the Facilities Engineer in the Regional Office.

George is the technical specialist responsible for the planning, design, and construction of building, structures, and appurtenant facilities.

OPERATIONS

Harold L. Stickland
Assistant Director

The budget process has resulted in many ramifications to the way we conduct business in the Forest Service. Direction is often given by Congress to the agency as footnotes to our appropriations, and in committee reports. For your information, three such footnotes follow, which apply for FY 1978.

1978 ITEMS OF INTEREST--DIRECTION FROM CONGRESS

House Appropriations Committee Report:

1. "The Committee expects, as a result of fund increases, that special attention be given to the establishment of realistic output goals by Region, individual National Forests, and Ranger Districts for the various activities administered by the Forest Service so maximum results are achieved for the benefit of the American people. The Forest Service is expected to closely monitor the success of the Regional, individual National Forest, and Ranger District Managers in meeting these goals and to include the goals and actual accomplishments in future budget justifications."

Our goals should be related to the RPA program. Beginning in 1978, special attention will be given to achieving maximum results. This will include close scrutiny of accomplishments.

2. "The Committee cannot state too strongly that if significant increased resources are going to continue to be provided to the Forest Service, a management system must be implemented so that the productivity of the forestry personnel and managers can be adequately *determined and improved as required*. The Committee will expect a full report on the achievement of the Forest Service in this the fiscal year 1979 budget hearings." (Italic added.)

We are taking management actions to:

1. minimize the need for additional Federal employees;
2. develop a workforce planning process; and

3. develop a new work measurement system.

These efforts are expected to further improve Forest Service management and productivity.

3. "It has come to the attention of the Committee that timber purchaser road construction costs are significantly less than the road construction costs under direct funding from the Forest Service. The Forest Service indicates this cost differential is merely one of bookkeeping and accounting techniques. The Committee has directed its Investigative Staff to review the Forest Service roads program to determine the reasons for the cost differential and validity of the Forest Service assertion. This investigation will also review whether the roads constructed by the timber purchasers meet the standards established by the Forest Service."

The investigation of road costs is underway; the investigating staff visited several Forests in Regions 1, 2, and 6, and are now preparing a report. Normal procedure is to submit the report to the House Committee for review and publication. This will probably be done just prior to the FY 1979 appropriations hearings.

TECHNOLOGICAL IMPROVEMENTS

Heyward T. Taylor
Assistant Director

DATA STORAGE SYSTEM

A new system for storing road design data is being implemented at the Ft. Collins Computer Center. This system uses an individual file for each project and gives the designer or the Forest control of individual project files. The old system, in use since 1970, placed all RDS project data in a single file per Region, which necessitated Regional job directories, directory support routines, and RDS file backup routines. That method caused considerable maintenance support activity, both at the Regional Office and at FCCC. The new system uses the data file maintenance capabilities of the Central Computer Operating System and interfaces them to RDS, thereby reducing input at FCCC and Regional levels. More user control and responsibility should reduce data files so that only those necessary files will remain on the system.

Storing data at the central site reduces terminal transmission time, eliminates data format conversion, and improves user aids such as Interactive Road Design System. Online/onsite storage capabilities enhance the flexibility of rapid response and economic processing through slow-speed terminals.

Region 2 pilot-tested the new system, and afterward Region 9 began using it. By January 1, 1978, all Regions should be using the system.

Another significant advantage of the new system is that training adjustments are needed when using either RDS or IRDS. This system minimizes overall costs to the Forest Service, allocates costs closer to the actual user, and minimizes overall Forest Service data support activities. The concept for the system is a direct result of suggestions and documentation work done in cooperation with Colorado State University.

**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	Melvin Dittmer	R-4	Ted Wood	R-9	Norbert Smith
R-2	Royal M. Ryser	R-5	Jim McCoy	R-10	Frank Muchmore
R-3	Juan Gomez	R-6	Kjøll Bakke	WO	Al Colley
		R-8	Bob Bowers		

Coordinators should direct questions concerning format, editing, publishing dates, and other problems to:

USDA Forest Service
Engineering Staff, Rm. 1108 RP-E
Attn: Gordon L. Rome or Rita E. Wright
P.O. Box 2417
Washington, D.C. 20013

Telephone: Area Code 703-235-8198