VOL. 6 JANUARY 1942 NO. 1

FIRE CONTROL NOTES

A PERIODICAL DEVOTED TO THE TECHNIQUE OF FOREST FIRE CONTROL

FOREST SERVICE • U. S. DEPARTMENT OF AGRICULTURE

FORESTRY cannot restore the American heritage of natural resources if the appalling wastage by fire continues. This publication will serve as a channel through which creative developments in management and technique may flow to and from every worker in the field of forest fire control.

Volume 6 Number 1

FIRE CONTROL NOTES

A Quarterly Periodical Devoted to the TECHNIQUE OF FIRE CONTROL

FIRE CONTROL NOTES is issued quarterly by the Forest Service of the United States Department of Agriculture, Washington, D. C. The matter contained herein is published by the direction of the Secretary of Agriculture as administrative information required for the proper transaction of the public business. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., 15 cents a copy, or by subscription at the rate of 50 cents per year. Postage stamps will not be accepted in payment.

The value of this publication will be determined by what Federal, State, and other public agencies, and private companies and individuals contribute out of their experience and research. The types of articles and notes that will be published will deal with fire research or fire control management: theory, relationships, prevention, equipment, detection, communication, transportation, cooperation, planning, organization, personnel management, training, fire-fighting, methods of reporting, and statistical systems. Space limitations require that articles be kept as brief as the nature of the subject matter will permit.

Address DIVISION OF FIRE CONTROL
Forest Service, Washington, D. C.

Fire Control Notes is printed with the approval of the Bureau of the Budget as required by rule 42 of the Joint Committee on Printing

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1942

Contents

EMERGENCY FIRE PLAN FOR THE EASTERN SHORE OF MARYLAND

(A suggestion for national defense planning)

S. H. MARSH

Eastern Region, Forest Service

After the blow-up of April 20–24, 1941, there was a review of some of the larger fires in Region 7 by the Division of State and Private Forestry to find out what made the big fires big and ascertain what might have been done that was not done to prevent them or confine them to smaller areas.

A review of a fire on the Eastern Shore of Maryland that burned about 2,400 acres, including about ⅔ of the Allegheny Experiment Station's forest of 900 acres, proved most interesting and instructive and led to the formulation of a plan to prevent sweeping fires that may be applicable to extensive areas along the Atlantic Seaboard and perhaps some other parts of this and other regions.

In tracing the course of the fire on an aerial photo, it was noted that after burning some 1,200 acres in an area surrounded for the most part by impassable barriers, it swept through a narrow strip of woods about ¼ of a mile wide into another timbered area where it ravaged 1,200 acres more before it finally was brought under control by the aid of a shower. This vivid indication of a lost opportunity led to speculation as to what would have been necessary in manpower and equipment to keep the fire from using this avenue of escape from one area to another and what might be done by advance planning to prevent similar occurrences in the future.

The photographic index, the only aerial map available, was then studied more carefully. Although a casual glance discloses only a mixed pattern of farm, swamp, and forest land, a closer examination shows that the area breaks down into numerous large bodies of forest land, for the most part insulated against each other by areas of cultivated land, swamps, or rivers, that form absolute barriers beyond which a forest fire could not go if it were permitted to run its course unimpeded. There are breaks or gaps in these barriers that will have to be plugged if they are to hold a fire, but roughly 95 to 99 percent of the barrier is there, waiting to be used. A case study was then made of the Delmarva Protection Unit of the Eastern Shore District to determine the location and extent of these divisions, the degree of insulation, and what can be done to plug such gaps as occur in the existing barriers.

Where a choice in barriers was possible as was often the case, preference was given to areas of open land traversed by roads, in order to make the gaps more accessible to the heavy equipment such as is commonly used by the volunteer fire departments on the Eastern Shore.

After roughing out the larger natural divisions of the Delmarva unit, the photos were studied to determine if these divisions could be further broken down into blocks likewise surrounded by good if not impassable barriers. Again this was found to be possible, although more gaps per mile of line were encountered than in the larger divisions. In the block as in the division lines, the boundaries were drawn to take advantage insofar as possible of barriers traversed by roads.

A field check then was made to determine (1) the adequacy of the barriers selected and in some cases ascertain which of two tentative barriers most nearly approached the absolute, (2) the character of the gaps in the barrier and possibilities of defending them, (3) the amount and kind of equipment required, (4) the manpower needed to do the job, and (5) improvements, i. e., fire-hazard reduction along roads, waterholes, etc., required to make the lines tenable.

Strategy then was taken into consideration bearing in mind that manpower probably will not be as abundant as in years past and the necessity of conserving and stretching it as far as possible and likewise taking advantage of all fire-fighting facilities available.

The general procedure decided upon is, briefly, as follows:

1. When a fire is reported in a certain block, dispatch one or more crews to the fire, with instructions to hit it on the nose or flank it into a barrier, whichever procedure promises to hold it to the smaller area. Simultaneously dispatch volunteer fire departments with equipment previously decided upon to prearranged stations in the gaps on the lee side of the fire, so that if it goes wild it cannot get through into another block. Should it run through a block line in spite of the gap tenders, then they will drop back to the next block line between them and the division boundary or to the division boundary itself, beyond which it cannot pass (unless there has been some very faulty planning).

District Forester Rothrock, of the Eastern Shore, is investigating the possibility of using the aerial photographs in the tower and the dispatcher's office, instead of a map. From the mosaic, strategy can be determined at a glance and dispatching, at least in the initial stages, can be simplified to the extent that it can be done by a clerk who is totally unfamiliar with the ground.

To insure that the initial action on a fire is simplified so that it becomes almost automatic, a form for each division and block was prepared which shows along with other pertinent data of value in prevention action to be taken and by whom, and with what equipment. When completed, these forms comprise the suppression chapter of the fire plan.

With the use of the photographs dependence upon towers to report progress and help mold strategy which at best they can only guess at, will be greatly reduced. The good old custom of hitting a fire on the nose would be abrogated in any instance where less acreage would be lost by running the fire into a barrier by an attack on the flank, and incidentally, considerable amounts of money likewise might be saved thereby.

In short, the operation of this plan will:

1. Simplify and expedite dispatching by making it automatic, at least in the initial stages.

2. Reduce burned area by hastening and facilitating dispatching.

3. Save suppression money by preventing the milling and loss of time resulting from faulty planning and lack of adequate supervision.

4. Eliminate a lot of alibis that superiors are asked to believe about the strange and weird behavior of forest fires.

5. Provide for the maximum use of cooperating volunteer fire departments and their heavy equipment and result in assignment to them of jobs they and their equipment are best prepared to handle, thereby making full use of equipment not ordinarily available for forest-fire control.

6. Encourage the warden and his crew since they will know that all foreseeable contingencies have been provided for and that they are backed up at the gaps if the attack on the nose or flank proves futile.

The plan presupposes some very definite advance planning, but the consolation of knowing when bad fire comes along that the prescription for it is in the bag, should be ample inducement to do a little planning.

While labeled "emergency plan" the blocks may also be subdivided as desired to meet the normal conditions. The forms give much of the information needed to work up a prevention program, which is basic to any fire-control program.

It appears to have a very definite place in national-defense planning since a definite and comprehensive plan can be worked out quickly from aerial photographs and the amount and kind of equipment and manpower available can be easily and quickly checked against the jobs to be done. Likewise it will give point to CCC fire-control planning since the kind and location of projects needed will be definitely known.

Volunteer fire departments have a variety of equipment ranging from light forest-fire trucks in a few cases to heavy and expensive trucks that cannot be expected to operate off of hard roads. The heavy equipment which ordinarily is useless in the woods can be assigned to watch the gaps on a hard road, thus opening up a new source of equipment that in the past has not been available.

Reports are current in many States that the draft and the numerous defense agencies are drawing upon manpower to such an extent that by the fall of 1941 there will be a serious shortage in fire fighters. Many States have reported that this shortage was becoming evident in the spring of 1941 and that in some cases it was even impossible to keep the towers manned with experienced observers. Unless such labor and equipment as may be available is used in a planwise fashion, and in the most economical way, the shortage may become critical.

WHAT'S WRONG WITH FIRE PREVENTION?

H. J. TURNEY

District Ranger, Prescott National Forest

Since the early days the Forest Service has carried on an intensive fire-prevention campaign. It has been effective. In Prescott, for example, when National Fire Prevention Week comes around most of the people think of forest-fire prevention rather than of preventing fires in their homes. School children make up posters and all of these are on forest-fire prevention. The merchants always ask for our fire signs for window displays. In talking to the public, both people living on or near a national forest and those from a distance, the subject of forest fires always enters into the conversation. People generally have the impression that all a ranger does is fight fires. In view of such evidence there is no doubt that the general public is fire conscious.

Yet, there continue to be man-caused fires. The surprising thing is that most of them are started by local people—people to whom fire prevention has been preached for years.

In 1939 a picnic fire which had been put out to the best of the picnickers' knowledge started a forest fire. The needles had been scraped away and the fire had been built in the cleared place. Before leaving, the picnickers carried clean sand from a wash 50 feet away, and the fire was carefully covered. Yet this fire crept out because the duff had not been removed when the place was cleared for the fire. In 1940, another picnic fire got away under very similar circumstances.

The evidence on both those fires showed clearly that the parties responsible had done everything they knew how to do to prevent starting a fire. The action, however, showed a lack of complete knowledge of what to do or just what was inflammable material.

Those fires made me wonder whether the general public knew how to prevent fires. Last June, I put in a window exhibit in which "WHAT TO DO TO PREVENT STARTING A FOREST FIRE" was stressed. The reaction of the public was good and numerous favorable comments were heard. Those of a young doctor who was reared in Prescott summed them all up. He said, "I've heard all my life to prevent forest fires but this is the first time I've been shown what to do."

That incident suggests that our prevention campaign had made the public fire conscious but has failed to educate them in just what to do to prevent fires. The campaign can be compared to a four-step training project in which the first step has been taken and a desire has been created to prevent fires. And then the other three steps have

been almost forgotten. The only definite information which has been given out is "The Six Rules to Prevent Forest Fires" and these only occasionally in prevention literature. Never in an address, newspaper article, or other prevention material which reaches the general public, have I seen or heard definite information on what to do to prevent starting a fire.

I am reminded of the first time I was on a national forest. I was on my way by horse to take a fire-guard job. After I entered the forest, the trail I was following had a fire sign almost every mile and I read all of them. I kept on smoking as I rode along and it was only through the grace of God that I didn't set the woods on fire. There were many "PREVENT FOREST FIRES" signs, but nothing telling me how to prevent them.

I believe that if all field men would stress "what to do" in their contacts with the public a lot of fires would be prevented. One of my lookouts, who has a number of visitors to his tower, told me of his experience which may be helpful to others. He said, "If I bring fire prevention up first, a visitor seldom says anything, but if I let him bring it up first, I can discuss it with him and get a lot across because we're talking about the other fellow." So much for the approach. But even if field men do all they can, it is physically impossible on a heavily used district for the ranger and his guards to contact every visitor.

Would it not be more helpful if those making radio talks and other addresses or preparing written articles for publications stated just what to do to prevent starting forest fires instead of just using the over-worked statement "Prevent Forest Fires."

Couldn't posters be made to illustrate the following:

1. How to build a safe fire and how to put it out.
2. That tobacco should be thrown on bare ground and stepped on to be extinguished.
3. How to break a match in two, with notation to the effect, "You may burn your fingers the first time you try this, but that is better than setting the forest on fire." ("Break your match in two" doesn't mean anything unless the trainee does some thinking.)

Most fires are not started through willful carelessness. If the public can be educated in how to prevent starting fires, when they see "PREVENT FOREST FIRES" they will know what it means.

The first step has been taken very effectively. Let's take the other three.

FIRE PREVENTION IN THE EASTERN REGION "HOT SPOT"

GEORGE B. P. MULLIN

District Ranger, Jefferson National Forest, Eastern Region

The Clinch District of the Jefferson National Forest is in the "hot spot" of the eastern region of the United States. Comprising 6 million acres this problem area lies in southwest Virginia, eastern Kentucky, and southern West Virginia.

In 1936, the first land for national-forest purposes was acquired, on the Clinch Ranger District, in the soft coal area. The population of native rural dwellers is dense. The year of 1936 marked a season of heavy fire damage in the area. Prior to the 1937 fire season, an intensive campaign was carried on in which an earnest attempt was made to contact and catalog each family outside incorporated towns. To the local residents were explained the benefits of protecting the natural resources of timber, wildlife, and water from destructive action of forest fires.

The response in 1937 was remarkable, even considering that it was a year of relatively low fire danger. In 1938, the prevention contacts were made again and, in the meantime, the ranger enforced the requirement for campfire and berry-picking permits. In 1938, the respect for fire prevention was noticeably less evident. The number of fires on the Clinch District was on the increase. In 1939, the Clinch District, with about 18 percent of the total area within the protection boundary of the forest, had 33 percent of the fires. In 1940, Wise County, with 5 percent of the area of national-forest land, had 18 percent of the fires on the national forest. The evidence was sufficient to prove that fire-prevention efforts through moving picture showings, personal contacts, press releases, and a vigorous enforcement of the State and Federal fire laws were inadequate to produce acceptable fire-occurrence standards.

As a result of the Elkins, West Virginia, fire-prevention conference, in August 1940 the Jefferson National Forest was assigned the experiment of trying out an adaptation of the fire-prevention school contests successfully staged by Supervisor Conarro of the Mississippi National Forest in Louisiana. The western third of Wise County, with 16 rural grade schools having approximately 2,000 pupils in attendance, was selected as an experimental area. The area consists largely of privately-owned land and small farms up to the edge of the forested area. The population of this area contributed to the fire problem within the national-forest protection area, and it was considered that the number of schools to be contacted would make a full-time job for one man for the duration of the program.

The assistance and cooperation of the County Superintendent of Schools were secured in conducting four periods of instruction in each of the 16 schools on preventing smoker, camper, and brush-

burner fires and in making contacts to get fire-prevention pledges signed. The objective was to instruct each pupil *how* to prevent such fires, so that he in turn would be able to teach adults how to smoke safely and to burn brush without causing a forest fire.

The forest guard assigned to the job was a local man experienced in fire-prevention work, a good instructor, who had the ability to get people to cooperate. Three to four schools per day were instructed until each had received four ¾-hour periods of instruction. He drew upon his own experience to illustrate the destructiveness of forest fires. He told of young birds perishing in their nests, of baby squirrels being killed by the cruel flames, and showed how stupid and uncalled for most such fires are.

Pledges similar to the one shown, which lists a set of simple precautionary measures necessary to avoid smoker, camper, and brush-burner fires, were prepared. During the first two weeks of March the children contacted people in their school areas and brought in as many signed pledges as they could obtain. The section of the pledge which listed the prevention rules was left with the signer, and the stub with his signature was retained for counting. A value of five points was assigned to camper and smoker pledges and ten points to brush-burner pledges.

BRUSH-BURNER PLEDGE

Date _____, 1941
Signed _____
Pledge taken by:
Name _____
School _____

PLEDGE

I promise to observe the following rules while burning brush:

1. I will notify the nearest fire warden or lookout before starting a fire.
2. I will not burn before 4:00 p. m.
3. I will have sufficient help and tools to control any fire started.
4. I will rake a fire line around the area to be burned.
5. I will not leave fire until it is out.
6. I will burn in small piles and begin burning at the top of the hill.

Date _____ Signed _____
Pledge taken by _____ School _____

The final score of each school was based on the number and value of pledges obtained and the average attendance of the school during that period. A deduction of 25 points was made from the score of any school if a camper, smoker, or brush-burner fire occurred in the school area between March 15 and April 30 if the person causing the fire had not been contacted by a pupil.

Prizes were subscribed from local civic clubs, fish and game clubs, and coal operators in the area. Contributions of materials and stories carried by local newspapers also helped to build widespread interest in the program. The prizes were as follows: First prize $25 cash, an American flag, and a 40-foot flagpole; second prize $15 cash and an American flag; third prize $10 cash. A framed certificate signed

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by the superintendent of schools, the State forester, and the forest supervisor was presented to each school in the contest. Exercises for the presentation of prizes were held at the three prize-winning schools, with participation by members of the State forester's staff, the board of education and the forest supervisor's staff.

Eleven thousand pledges were signed during the 2-week period, an average of five and one-half per pupil. The total number of fires in the area, including both State and national-forest fires, was 57 in 1941 compared with 58 during the spring fire season of 1940. The percentage of national-forest fires in Wise County dropped from 18 in 1940 to 13½ during the first half of 1941.

It is too early to evaluate the permanence of this prevention effort. Some incidental subsequent check-ups have indicated that the boys and girls retained the *how* of preventing fires. This was a community project; it was the school children'se plan for saving the forests from injury. Unmistakably, the boys and girls penetrated the inner consciousness of their elders, for there was much evidence that the pledges were taken seriously by those signing them.

Although some time will be required to judge the full effectiveness of our prevention program, it is apparent that the procedure outlined is effective in getting people to substitute new habits of carefulness for old habits of careless indifference. These questions arise: How long will thoughtful considration survive old habits and inertia? When should the performance be repeated? How many times must it be repeated to get satisfactory permanent results?

The school prevention program furnished a gage of the effectiveness of the former prevention work. In a school prevention contest conducted on the Holston District, in an area which had been under administration many years and in which it was thought that local sentiment was in favor of fire prevention, many adults refused to sign any pledge of cooperation. Actually, exterior evidence was deceiving, and there was a deep undercurrent of antagonism to fire prevention. Apparently, these individuals went along because the ranger seemed to be a pretty good sort of fellow. Only the exceptional available employee has real ability as an instructor. Our experience to date, indicates that lesson plans must be carefully prepared. Interest and effectiveness could be stepped up through the use of Kodachrome slides. These might, for example, show in several steps how to make and extinguish a campfire safely. The lesson plans in this way could be made almost foolproof. Projection equipment using a wet storage battery is available. A school program such as ours, covering a relatively small area, requires 6 weeks' full time of one man. This is a relatively heavy burden on a ranger district, especially since part of the time, at least, is in the busy fire season.

Figured on the basis of the cost of each contact, the program was a great success; that is, 11,000 personal contacts were made by the efforts of one man in 6 weeks.

The amount of ceremony and flag raising, and this also goes for the cost of the prizes, should be held to a minimum. In the Wise County contests the prizes were probably too costly and the awarding of certificates to each school was also relatively expensive and not entirely necessary.

AN INTENSIFIED FIRE-PREVENTION PROGRAM

A. B. Larson,

Fire Prevention Specialist, Angeles National Forest, California Region

Many persons who feel that the phrase "fire prevention" has been so overworked as to have lost its appeal to the public will find a new approach to those who use the forests in the plan outlined herein. The programs discussed in this article illustrate accomplishments which can be obtained by a full-time prevention specialist working in cooperation with several local organizations.

New ways of accomplishing an old objective—fire prevention—were tried in the 1941 fire season of Angeles National Forest.

It is much too early to boast of the results, but there seems to be little doubt that a far greater number of Southern Californians have had their attention focused on the problem of forest protection than ever before.

The campaign received its initial impetus from the Southern California Conservation Association, and that organization's backing has been an important factor throughout.

The following outline presents the varius phases of the Angeles effort:

Conventional Methods.—During the week preceding Labor Day the editorial cooperation of Los Angeles' metropolitan papers was solicited and 100 percent response resulted. Likewise, many of the newspapers in the county's smaller cities gave similar support. Two Los Angeles papers carried effective cartoons dealing with forest-fire prevention. It may be said in this connection that editorials probably do not reach the persons most likely to be careless with fire, but nonetheless such aid is valuable in that it appeals to community leaders whose cooperation is always important.

Through the generosity of Fox-West Coast Theaters, 150-foot trailers counseling care with fire and cigarettes in national forests were shown in more than 900 theaters throughout the State. Approximately 2,500,000 persons were reached by this means.

Talks dealing with the current fire hazard were delivered before numerous Los Angeles organizations by William V. Mendenhall, supervisor of Angeles Forest; DeWitt Nelson, supervisor of San Bernardino Forest; George H. Cecil, executive-secretary of the Southern California Conservation Association, and other persons acquainted with the problem.

Mr. Cecil's association concentrated particularly upon industrial house organs and the publications sent by public utilities to their hundreds of thousands of consumers. He induced such concerns as the Southern California Edison Company to enclose slips in payroll envelopes admonishing employees to refrain from carelessness with fire and cigarettes in forest areas.

Furthermore, Mr. Cecil provided radio stations with week end weather reports which included timely fire-prevention publicity.

Through the medium of lectures, slides, and silent and sound pictures presented to 469 groups of persons, such fire-prevention agencies at the Forest Service, the County Forester, and the Los Angeles Fire Department have made direct appeals for cooperation to nearly 80,000 people during 1941.

The James Montgomery Flagg poster "Yours in Trust" was distributed to scores of industrial plants for display on bulletin boards and to barber shops. Boy Scouts in several cities in the metropolitan area had the posters exhibited in the windows of many business houses.

To reenforce the publicity program, five additional fire-prevention employees were hired to serve as moving patrols in Angeles Forest. It was their task to contact forest users and watch for infractions of smoking and campfire rules. Extra men were also assigned to act as registrars to meet the public at forest entrances during week ends of heaviest use.

"DON'T BE A FLIPPER!"—This theme for a special poster that strikes a new note in Forest Service advertising resulted from a speech by DeWitt Nelson, supervisor of San Bernardino National Forest. Nelson declared in his talk that Southern California forests were as inflammable as a hula dancer's skirt. George H. Cecil, executive-secretary of the Southern California Conservation Association, had this remark converted into an attention-getting cartoon by R. H. Scribner. Thereafter, John P. Kaye of the Angeles Forest induced American Legion Post No. 570 to finance the printing of posters bearing Scribner's grass-skirted hula girl and cigarette-flipping hand. The Los Angeles Street Railway and the Pacific Electric interurban lines carried 500 of the posters throughout the county for more than a week. Probably close to a million persons repeatedly had an opportunity during that period to read these words:

DON'T BE A FLIPPER!
FOREST COVER WILL BURN LIKE A GRASS SKIRT
HELP PREVENT FIRE
FOR
NATIONAL DEFENSE

Subsequently, similar posters were used by San Bernardino Forest, which had the cooperation of its local Legion posts. The same forest employed the Scribner illustrations and an expanded message in getting out an attractive hula girl folder for distribution to deer hunters.

FIRE-WARNING PATROLS.—The extensive use of Boy Scouts to act as pickets in crowded downtown business districts throughout the county, was contemplated in this phase of the program. The effort was only partly successful, because too few boys responded to make an impressive showing. Moreover, the posters and placards in stock were inadequate for the occasion. The Flagg posters were too small, and there were too few placards of the "Stamp it Out!" variety.

It was obvious enough from the lively interest aroused by the few fire-warning patrols appearing on downtown sidewalks that the idea

was sound. Therefore, it is hoped to make thorough preparation for its widespread use during the 1942 fire season. The Boy Scout organization has volunteered to man an "all-out" display in our behalf next year, promising to organize fire-warning patrols to "picket the public" (a term we refrained from using) each Friday in order that week-end forest visitors and vacationists will have a last minute reminder of the cooperation expected of them by the Forest Service.

A large number of specially-designed posters should be prepared during the winter months, and probably one of the trade schools will make the placards for nothing if materials are furnished. The plan is to have different sets of placards for each week end so public interest will not lag.

The 1941 experimental tryout of the idea, which was based on the fact that a moving sign is superior in attracting notice to one that is stationary, gained the cooperation of the police commission, which facilitated the picketing; a lumber company, which furnished 500 stakes for mounting the placards; two paper concerns, which furnished the heavy cardboard for backing the posters; and the C. C. C., whose boys put the picket signs together.

FAG BAGS.—A small muslin bag, closed with a drawstring and bearing a "fire-conscious" pledge tag was originated in an effort to halt automatic smoking in the forest. All inveterate cigarette smokers know from experience that automatic smoking is the act of taking out a cigarette and lighting it without conscious thought. The purpose of the "fag bag" is to hold a smoker's package of cigarettes while he is in the forest and thus remind him constantly that he must smoke only in posted areas. The fact that he has signed the attached pledge card probably increases considerably the effectiveness of the bag in preventing thoughtless smoking.

Before the idea was put to the test Labor Day week end, it was submitted to psychologists and all agreed it should accomplish its purpose; namely, bring to the level of consciousness the habitual act of unconscious "lighting up." The psychologists advised that considerable care should be taken in presenting the bags to the public at the forest entrances. It was their suggestion that forest officers personally place smokers' cigarettes in the bags, in a good-natured and unpoliceman-like manner, at the same time offering a pen for the signing of the pledge tags. This advice was transmitted in a special memorandum to forest officers and they followed it well and with fine results.

The bags were made by the Los Angeles Girl Scouts for whom 500 yards of muslin was obtained. The Southern California Automobile Club generously furnished the pledge tags. In all, more than 10,000 fag bags were prepared for Labor Day week end, and a considerable volume of advance newspaper and radio publicity was obtained on this new approach to the long-bothersome problem of automatic smoking.

More than 97,000 persons visited Angeles Forest over the week end, and the bag supply was soon exhausted. The week end went by without a single fire in the forest's 690,000 acres. It would be impossible, of course, to allocate credit for this record, but probably part of it might properly be attributed to fag bags and the "smoke safely" stories that accompanied publicity about them.

Reports from registrars and guards who handed out the bags were very interesting, for they show that with only a few exceptions the bags were enthusiastically received. Indeed, some persons drove to forest entrances solely for the purpose of obtaining the bags, for they headed back to the city immediately after receiving the "habit-smashers."

Highways leading into the forest, above checking stations, were scanned for thrown-away bags, but none was found. It is likely the signed tags restrained the impulse of some to discard the bags.

Results of the Labor Day try-out were sufficiently encouraging to warrant plans for distributing the fag bags throughout the 1942 fire season. The Girl Scouts have given assurance that they will turn out several hundred thousand fag bags for next year. They expect to make the project their main activity during the Spring months.

How to provide additional material without expense, and at the same time widen the scope of public participation in the program, was a problem tentatively solved by a general appeal for flour, sugar, and salt sacks. An appeal was carried repeatedly by newspapers and radio stations. September 22 was designated by the Los Angeles Board of Education as Fag Bag Day in the city's 380 schools, which have 273,000 pupils. Again the Los Angeles Police Department cooperated by having their patrol cars pick up the sacks and concentrate them at their various substations where Forest Service trucks collected them. Enough material is now on hand to do part of next year's job. It is expected that additional sources of free supply will be uncovered before long.

All in all, fag bags seem to have caught the public fancy—so much so that within the first 10 days after their initial use they were made the subject of a 5-minute nation-wide broadcasts—by John B. Hughes of Mutual Broadcasting System, and by Kate Smith over Columbia.

Recently the fag-bag idea has been adopted by both San Bernardino and Cleveland National Forests. The Los Angeles Fire Department is studying the device with a view of recommending the use of similar bags to control smoking on the waterfront docks, and there is a report to the effect that the Consolidated Aircraft Company in San Diego may employ the bags in its plants.

A free lance writer furnished *Science Service* in Washington, D. C., with a brief story about the bags and the endorsement they received from Dr. Robert A. Millikan, Nobel prize winner and president of the California Institute of Technology. As a result, *Science Service* has obtained 5,500 fag bags for distribution to its subscribers throughout America.

Signals.—Fire Guard Oley F. Scott, has found that a police whistle is very useful on the fire line. He uses the whistle to recall the crew when a breakover or spot fire occurs that cannot be handled by the patrolman. Because of the noise created by a crew at work it is often difficult for them to hear an ordinary voice signal. On Scott's crew this difficulty has been eliminated by the use of the whistle.—E. W. Forbes, *district ranger, Mark Twain Forest.*

SOMETHING NEW IN PUMPS

GEORGE P. MELROSE,

Assistant Chief Forester, British Columbia Forest Service

The author describes a new portable power pump which resulted from efforts to get extreme light weight coupled with dependability of operation. Although its output is much less than that of the portable pumpers used commonly in the United States, the author indicates possibilities of its employment where the larger pumps are not used.

A little water promptly and properly applied, will do more good on a fire than unlimited quantities poorly used and wasted. That "axiom" worked for years in the practical Scotch brain of Fire Inspector J. G. (Jim) MacDonald of the Vancouver Forest District, British Columbia.

Economy and mechanical engineering skill came naturally to Jim so he began to look around. He listened to hydraulic engineers with their discharge formulas, pressures and heads; he listened to mechanical engineers talking R. P. M.'s and brake horsepower; he listened to many a firefighter with his demand for more power, more pressure, and more water.

But Jim has fought fire for 30 years, has seen oceans of water pumped by high-pressure pumpers, and he still felt that there was great waste in power, weight, and cost in many cases where only a little water was needed quickly.

His experience also ran to pump troubles—to worn-out engines, conrods through the casings, flywheels twisted off, and the many other breakdowns that occur in high-speed engines run at top rating.

Jim decided he wanted an ultra-lightweight unit, operating at moderate speeds, delivering a fair stream of water and complete in one pack. After a couple of years experimenting, discarding, redesigning, and trying in the field he has now produced a pumping unit that has the earmarks of a highly useful tool. It is complete to suction and discharge hose, nozzle, gasoline, and universal tool in one 60-pound pack. Here are the specifications:

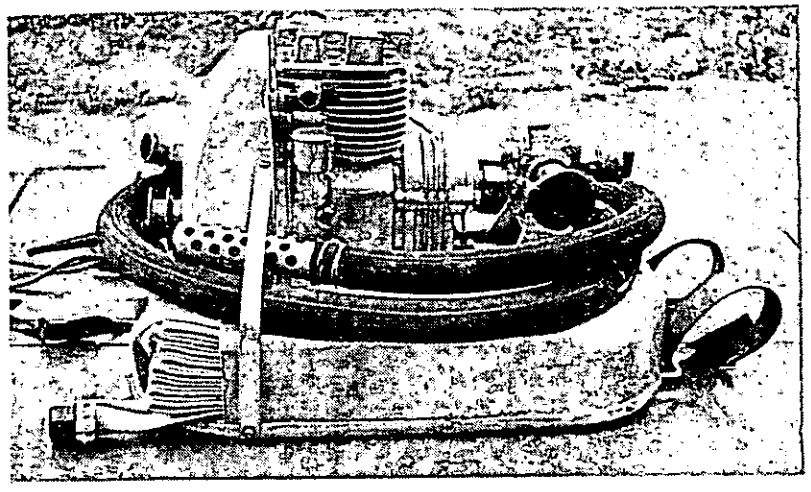
Length over all 18 inches.
Width over all 15 inches.
Height over all 13 inches.
Weight, complete with 100 feet of 1-inch linen hose—60-61 pounds.
Motor—1 h. p., air-cooled, 4-cycle Lauson, governor controlled to 2,800 r. p. m.
Pump—1-inch geared.
Coupling—3:2 reduction gear in air-cooled housing.
Base—Aluminum, shaped to fit back; pack straps attached.
Gas-tank—in base; capacity 3 pints, sufficient for 4 hours' operation.
Hose, discharge—1-inch linen; 100 feet carried in base.
Hose, suction—1-inch rubber garden hose with aluminum strainer.
Nozzle—$\frac{5}{16}$ inch.

The revolutionary part of the pump is not the size or weight but the gear-reduction coupling. It was this coupling that permitted the use of such a small motor and low speeds. It operates a pump

Portable pump and hose as carried on back.

that, directly connected, requires a 3–3½ h. p. motor and operates efficiently below its maximum rating.

The pump will not eliminate any of the various excellent pumps now on the market. They have their place most decidedly in the protection picture, but where men are scarce and the country is rugged, where water is needed quickly at strategic places and possibly the supply is small, this unit will give value. One man can pack and operate it. The reliable little engine plugs along without attention. If a change of hose is needed or another length needs to be added, the stream is stopped by simply lifting the suction hose out of the supply without danger of burning out the motor or delay in restarting.



Portable pump and hose.

Delivery of water in the experimental model is about 10 gallons per minute at 65 pounds pressure through a 5/16-inch nozzle. A 63-foot stream through a ¼-inch nozzle is obtained through 1,000 feet of 1½-inch linen hose with an elevation of about 25 feet.

Those are the only figures Jim MacDonald will quote on performance. He is content with the facts that he gets a fair stream and can now quote experience of rangers and other fire fighters who have used experimental models and found that this little gadget is useful in many spots where other pumps would not or could not be used.

And finally—economy. The units are cheap to build compared to present standard pumpers. The comparison must, of course, be local, but experience indicates a proportion of at least 2 to 1 and maybe 3 to 1.

The British Columbia Forest Service has now had a dozen units built for field use next year. It is possible that it can be improved, but only use on the fire line will tell.

425851—41——3

A FIRE-DISPATCHING GUIDE FOR USE IN THE LAKE STATES

J. A. MITCHELL

Lake States Forest Experiment Station

While judgment cannot be dispensed with in fire dispatching, information as to normal manpower requirements is useful as a guide. The device described is an attempt to supply this information in convenient form for field use.

The Lake States fire-dispatching guide is designed to indicate the manpower normally required to control forest fires in northern Minnesota, Wisconsin, and Michigan within the time allowed by local Forest Service standards. That is within 5 hours in the case of "low" rate-of-spread fuels, 4 hours in the case of "moderate" rate-of-spread fuels, 3 hours for "high," and 2 hours for "extreme." Essentially the device is a slide rule with scales for each of the factors considered which, when combined, indicate the average number of men required to control fires with hand tools under the conditions set up.

The factors considered are (1) Danger or burning conditions as indicated by the Lake States fire-danger meter, (2) wind velocity, (3) travel time, and (4) fuel-type class based on rate of spread and resistance to control.

To use the meter both slides are grasped at (A) and pulled out until the end of the long slide coincides with the current "Wind velocity" on the wind scale opposite the degree of "Danger" prevailing. Next, the short slide (B) is set for "Rate of spread" class on the scale opposite the "Travel time" called for. The "Number of men" required is then indicated on the top scale by the arrow for the appropriate "Resistance to control."

For example, if the meter is set for a class 5 day, a 10-mile wind, 1-hour travel time, and high rate-of-spread fuel, the average number of men needed, in the case of moderate resistance to control, is 14 as indicated by the arrow marked "Moderate," while "Low" resistance to control calls for 7 men, "High" 28, and "Extreme" 56.

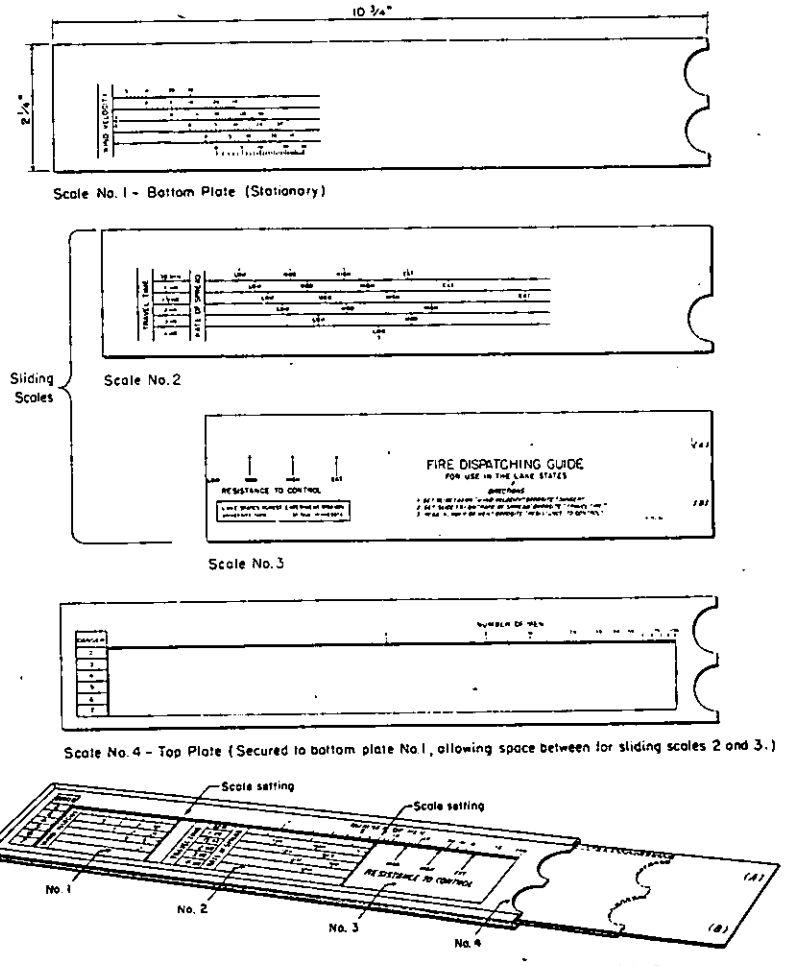
The fuel-type classes used are those adopted by the Forest Service in region 9, which classifies fuels on the basis of their average rate of spread and resistance to control on class 5 days with a 4- to 7-m. p. h. wind. Rate of spread is defined as the increase in the perimeter of a fire in chains per hour and resistance to control, as the ratio of final perimeter to man-hours required for control (exclusive of mop-up and patrol). On this basis the average rate of spread and resistance to control for the fuel type classes recognized are: Rate of spread—"Low," 8 chains per hour; "Moderate," 16; "High," 32; "Extreme," 64. Resistance to control—"Low," 8 chains per man-hour; "Moderate," 4, "High," 2, and "Extreme," 1.

In practice, rate of spread and resistance to control are determined by reference to a map showing the fuel type class prevailing on the area in question. In the same way travel time is usually determined by reference to a map showing the time required to reach any point on the protection area from the nearest established base.

The computation of manpower is based on the formula

$$N=R/2C+RT_1/T_2C$$

in which $R/2C$ equals the number of men required to offset the increase in the perimeter of the fire after attack begins and RT_1/T_2C the num-



Fire-dispatching guide as constructed and assembled.

ber required to control the fire burning on arrival, N being the total number of men required, R the rate of spread in chains per hour, C resistance to control in chains per man-hour, T_1 the elapsed time from origin to arrival, and T_2 elapsed time from arrival to control.

In calibrating the meter, elapsed time from origin to arrival (T_1) is assumed to be travel time plus ½ hour. If known to be more or less, the difference can be allowed for by using a correspondingly longer or shorter travel time in setting up conditions on the meter.

Since empirical values are used in its calibration the meter is not recommended for use outside of the Lake States. The formula used in computing manpower and the method of integrating the various factors, however, are applicable generally.

No dispatching table or meter should be followed blindly as local conditions often call for special consideration. In such cases there is no substitute for experience and good judgment. All a dispatching guide can do is to indicate normal requirements as a check on judgment.

In practice the tendency is to overman fires when conditions are favorable and to under man them when conditions are critical. This results in a waste of effort on small fires and allows bad fires to get away. There may be some excuse for overmanning small fires in the interest of safety but undermanning bad fires is serious. The trouble appears to be a lack of appreciation of the rapid increase in rate of spread with wind velocity in the higher danger classes, particularly when high rate-of-spread fuels are involved. The importance of adequate first attack cannot be overemphasized if area burned is to be kept small. The fire-dispatching guide serves to call attention to conditions which require increased strength of attack.

More About Burros.—The suggestions made by J. H. Sizer about burros (Fire Control Notes, July 1941, paragraph 5, page 142, "Fire Control Work in Isolated Sections") seem very impracticable, judging from our experience with burros in these mountains a few years back. Perhaps, however, Sizer has a different kind of burros than we had, or some burro tenders who know a lot more about such animals than do ours.

Burros may be all right in a fairly level country, where you can herd them around, but ours were decidedly poor animals to try to lead around very much; being slow and stubborn. When you turn them loose and expect one to follow the others, you are again disappointed in being able to get them to travel at more than a snail's pace. If you then try to herd them along to get more speed out of them, they crowd each other off the trail and roll half of the string down the mountainside. You then spend the balance of the day, or night, packing the equipment back onto the trail (the part worth packing back) and getting the rolled burros back, if you don't have to dispose of them for injuries. They are tough though and can stand a lot of rolling.

The burros can be subsisted cheaply and will stick around camps quite well for a short time if a constant check is made on them and they are fed something at camp. Otherwise, they wander farther and farther away and eventually will wind up back at the ranger station, or other main base camp, or home range. Each camp has to be protected by a good pole fence or barricade of some kind unless a watchman is left in camp to keep the burros out during the absence of the crew.—LESTER D. ROBINSON, *district ranger, St. Regis District, Cabinet National Forest.*

MAPPING ACTIVITIES OF THE WISCONSIN CONSERVATION DEPARTMENT

JOHN W. OCKERMAN,

Principal Topographer, Forest Protection Division, Wisconsin Conservation Department

Maps and the theories and practices underlying their construction are often not understood even by those who use them. The author mixes together a little history, a little theory, and a little practice in such a manner as to dispel some of the mysterious aura surrounding maps.

A map is not just an abstract plan of a portion of the earth's surface but in reality is a piece of equipment. In the case of the forest-protection division, it is an important part of the fire-control equipment. It does its part in locating the fire, in the rapidity with which the men get to the fire, in the location of water supplies, and in the general plan of attack.

But in addition to being purely utilitarian the map is an important adjunct to recreation. It helps in the planning of trips, whether on land or water, and adds enjoyment to the vacation by revealing new places to explore. The map helps the air traveler and orients the continually changing panorama of lakes and woods so that he may fly safely.

Before we plunge into the actual business of map making, let's look backward into the history of mapping. A review of deficiencies and idiosyncrasies of the earlier maps will tend to give added weight to the qualities of our present maps and a greater appreciation of the maps now available.

The first prerequisite of a map is that it have a definite scale so that distances can be denoted. Actually measurements on the ground were made as early as 1300 B. C. in the survey of the Nile land, but the standards of measurement were extremely confused up to the eighteenth century. For example, in 1781 the map of France had 20 different scales shown on it. In 1789 the map of England showed 3 miles, the long, the mean, and the short mile.

The second need for a map is direction. Distance without direction is meaningless. Prior to the advent of the compass, maps were based on religious or geometric principles and consequently were pictures rather than maps as we now think of maps. The reverence for the east was pronounced, and east dominated the maps even after the compass made its appearance. We still say "orient" a map, but we orient it to north instead of east now.

To put a map together it is necessary to have a plan or projection by which the data can be assembled. A projection may be defined as a systematic drawing or meridians and parallels on a plane surface. Though projections were devised by Ptolemy, none was used until the

eighteenth century. We now have our prime meridian running through Greenwich, England, but in the earlier maps using projections, the prime meridian was put in many places with resulting confusion.

As can be seen, mapping is a relatively new science. Certain phases of it are extremely new, and advances are continually being made in both the technique of mapping and the finished product.

The map section at the forest-protection headquarters at Tomahawk, Wisc., is actively engaged in the preparation of several types of maps, the most important being the forest-protection maps. Since one of the principal uses of these maps is to locate fires by intersection, accuracy is of prime importance. To accomplish this it is necessary to have an accurate base, precise control, and as good cultural data as possible.

For constructing the base the polyconic projection has been selected. This projection is well adapted to Wisconsin and facilitates the use of data from the United States Geological Survey and the United States Coast and Geodetic Survey. The maps are constructed on drawing paper, mounted on either side of a sheet of aluminum. This base minimizes the distortion due to shrinking or stretching of the paper and gives a very permanent master copy. The base map is drawn on a scale of 8/10 inch per mile and is called a quadrangle. It is 30 minutes of latitude and 30 minutes of longitude on a side, which translated into miles is approximately 25 miles east and west and 35 miles north and south. These quadrangles are so drawn that several can be assembled to form whatever size area is desired.

After the polyconic base has been constructed, the control points are then accurately placed on the outline. These control points consist of fire towers, United States Coast and Geodetic triangulation stations, water tanks, and other tall structures for which there is a precise location. In 1934 the United States Geological Survey triangulated all the fire towers in Wisconsin and furnished us with their precise positions in latitude and longitude as well as distance between adjacent towers. From this data it is possible to plot the position of the towers very accurately on the maps. The tower control is supplemented with other triangulation stations which are parts of several major control networks in Wisconsin. All of these towers and stations have been tied into the Government land survey, and it is possible to build the land survey lines around these control points quite accurately. Whenever possible, surveys of Government agencies are used in laying out the land lines.

The final stage in the construction of the quadrangle is filling in the cultural data. During the last few years the entire State has been photographed from the air, and it is from these pictures that the lakes, streams, roads, trails, railroads, etc., are taken. These pictures, of which there is a complete set at the office of the Highway Commission in Madison, were taken at approximately 15,000 feet altitude with a single lens camera. The original pictures are 7 by 9 inches in size and are on the scale of 1/20,000 or about 3¼ inches per mile. At the time the pictures were being taken many land corners were marked with cheesecloth crosses so that they could be located and identified on the pictures. This was extremely important in

areas where there were few roads and little cleared land that might help to identify the land lines and corners.

By the use of a suspended pantograph, on which the slight variations in scale can be corrected, the information from the pictures is reduced to 2 inches per mile, and compiled in township form on what is called a topographic base map. On these bases are shown the original meander lines and Government lots, present lake outlines and stream courses, roads, trails, fire lanes, towers, telephone lines, and all information pertinent to fire-control work. These maps are sent out in preliminary form to the respective district rangers for field check as to road types, names of lakes and streams, and any additions or corrections to get the map as complete and correct as possible. When these have been returned and corrections have made on the original tracing, sets of these maps are issued to the districts to be used for compiling varied data such as tree plantings, hazard zones, burned areas, etc., as well as new information on roads, towers, etc., and for future correcting of the quadrangle map. It is from these corrected topographic base maps that the cultural data for the quadrangle is secured, and it is transposed or pantographed onto the quadrangle map.

When the quadrangle map has been completed, it is photographically reproduced to scale and printed on a uniform type of paper so that several can be matched and mounted for the large wall maps or dispachers' maps. In the case of the latter, 6-inch protractors are overprinted in red ink at each tower position, the zero of the protractor being oriented to true north, as are the protractors in each of the fire towers.

The district maps are issued on the scale of ½ inch per mile and are made by assembling as many quadrangles and parts of quadrangles as lie within the district boundaries. When the maps have been put together and a border and legend has been constructed, the composite is photographed down in scale from 8/10 to ½ inch per mile. In addition to the black and white maps, a portion of the district maps are issued with red tower protractors superimposed over each tower.

In addition to the forest-protection quadrangles, topographic base maps and district maps, there are several other types of maps produced by or issued from the map section at Tomahawk.

Ground-water survey maps are similar to the topographic base maps in scale and make-up, but in addition to cultural data they show the ground-water conditions. After a careful study of the township has been made to determine the location and amounts of ground water, and test wells have been sunk, this information is incorporated in a ground-water survey map. These maps are useful tools in fighting fires in areas of little or no surface water.

Lake survey maps, showing the depths, weed beds, bottom materials, etc., prepared under the supervision of the biology division, are issued from the Tomahawk office.

In addition to miscellaneous maps and plats of surveys, such as fire lanes, ranger station sites, state properties, etc., many building plans have been prepared at this office, ranging from small tower cabins to large ranger stations and garages, and many drawings of equipment have likewise been prepared and issued at this headquarters.

A SIERRA RATION AND EQUIPMENT OUTFIT

RALPH L. CUNNINGHAM AND WESLEY W. SPINNEY

Sierra National Forest

The Sierra National Forest (California) is divided roughly north and south by the San Joaquin River which runs west and southerly toward the main valley. The canyon formed by this river in the Sierra is steep, rugged, inaccessible.

The forest cover is highly inflammable. In the southern end of the canyon it consists largely of scrub oak, grass, and brush. The middle and upper portions break away into ponderosa pine and sugar pine with some fir and cedar in the upper reaches.

Whenever a fire starts in the canyon area, it usually covers considerable acreage and is very costly to control. Because of the prevailing high-velocity SW. winds, sometimes reaching 30 to 35 miles per hour, fires travel up the canyon rapidly during the day. The topography and lack of roads in the area make travel to a fire slow. Precipitous canyon walls and lack of transportation facilities also make it impossible to put fire camps in close proximity to the fire. Consequently, line crews are obliged to do considerable walking, which cuts deeply into the daily line production. Some of the canyon country is too dangerous for CCC crews.

In searching for means of eliminating the use of CCC crews and of reducing excessive walking, the personnel of the Sierra decided upon a modification of the 40-man suppression crew used in Region 6 (Described in FIRE CONTROL NOTES, April 1940, The 40-man Crew—A Report on the Activities of the Experimental 40-man Fire-Suppression Crew). Fortunately local Indians, loggers, and residents who are familiar with the country and who depend upon a certain amount of income from fire fighting each year are available for use in organizing fire crews. Local experience has indicated that large crews are not necessary down deep in the canyons, but that small compact units located at strategic places will suffice in a good many cases.

With the local situation and problems in mind and looking ahead to future canyon fires, "blitz-blaze" ration and equipment outfits were made up. They were so planned that a man might subsist alone for at least 72 hours if he were left on patrol work or the outfits might be combined into ten 12-man set-ups in case a temporary camp were established. Since each outfit is self-sufficient, the size of the crew can be enlarged simply by adding another man and pack.

Each outfit complete weighs in the neighborhood of 40 pounds and can be handled by the average man, while in good shape, going

into the fire. If necessary, the packs and equipment can be brought out by stock or by a fresh crew after the fire had been controlled.

One man in each group of 12 carries a supplemental cooking outfit. Contents and weights of different items in the Sierra outfits follow:

1. Individual crew member pack:

Article	Amount	Weight in ounces	Article	Amount	Weight in ounces
Roast beef.....cans..	3	36	Peaches, sliced.....cans..	2	16
Butter.....can..	1	13	Milk, evaporated.....can..	1	14½
Date-nut bread.....do....	1	8	Spaghetti.....do....	1	15¾
Raisins.....package..	1	15	Pork and beans.....do....	1	30
Prunes.....do....	1	16	Canteen with cup and cover quart..	1	16
Macaroni.....do....	1	16	Army mess kit with knife, fork, and spoon.....can..	1	16
Sausage, breakfast.....cans..	2	21	Army blanket, W. O. D.....	1	48
Cheese.....can..	1	7¾	Zwieback.....package..	1	6
Bread, brown.....cans..	2	32	Granulated sugar.....do....	1	16
Coffee.....can..	1	32	Headlamp, new 4-cell type...	1	48
Potatoes, peeled whole, new can..	1	20	Salt and pepper (mixed) shaker.....	1	8
Rice.....package..	1	16	Knapsack.....	1	16
Soap, Lava hand.....bar..	1	6	F. M. B. file 8-inch.....	1	01
Soup.....can..	1	10½	Matches, paper.....	1	1
Tomato juice.....do....	1	15	Socks, towel, tooth brush, etc.		16
Jam.....do....	1	24			
Grapefruit.....do....	1	8			

Total weight knapsack and contents	pounds....	34.4
Average weight of fire tools	do.....	6.6
Total weight of outfit	do.....	41.0

2. Items in cook's knapsack:

Article	Amount	Weight in ounces	Article	Amount	Weight in ounces
Blanket, W. O. D.....	1	48	Tea, black.....	1	8
5-gallon can, square.....	1	40	Dipper, tin.....	1	4
Dish towels.....	3	16	Fry pans, folding.....	2	48
Spoons, table.....	5	16	Soap, laundry.....	1	12
Knife, butcher.....	1		Dry soup, mixture.....	2	16
Cheese.....	1	32	Army meat, can with knife, fork, and spoon.....	1	16
Matches, penny size.....	2	2	Canteen, 1-quart, with cup and cover.....	1	16
Coffee.....	1	8	Nails, assorted.....		16
Roast beef.....	3	36	Soap, bar Lava, hand.....	1	6
Date-nut bread.....	1	8	First-aid kit.....	1	16
Sandwich spread.....quart..	1	32	Salt pills (100).....bottle..	1	10
Butter, canned.....	1	13	Gasoline lantern with extra mantles.....	1	80
Milk, tall, evaporated.....	2	29	Knapsack.....	1	16
Pepper (can).....	1	2			
Pickles, dill.....	1	26			
Flour.....	2	80			

Total weight, 40¾ pounds.

Small articles are rolled in three 10-pound cloth sacks—sacks to be used to carry lunches if necessary, or as towels otherwise.

One W. O. D. blanket is sufficient for most mid-Sierra summer nights. However, if the shift system is used, each man will have access to an extra blanket.

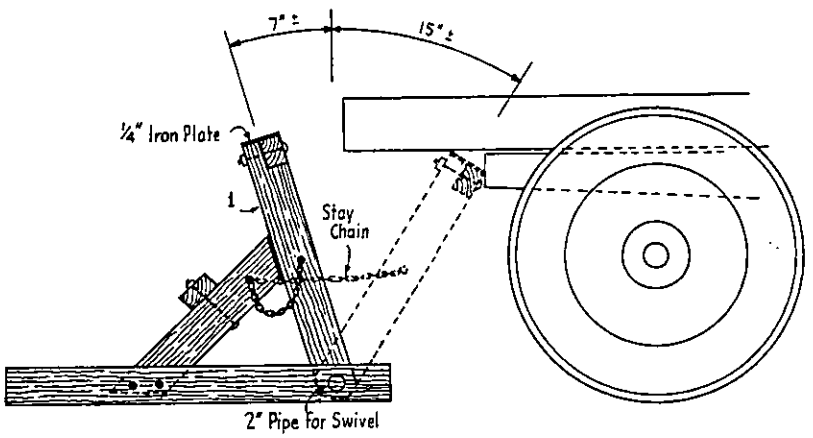
Although the outfits described may not be perfect in food and calory content, they should enable the crews to get by in good shape for at least 3 days. They were made up of standard R–5 equipment and of supplies on hand insofar as was possible. Nonperishable items, such as canned meat and butter, were purchased specifically for such use. The plan would be to supplement the rations and supplies with a radio

set, light batteries, fresh meat, bread, water if necessary, and sharp tools delivered either by pack train or by plane when possible.

The man in charge of each crew must be trained in the use of the ration and supply outfits. When the crew is grouped together, he must see that the food is pooled in order to prevent waste and spoilage. He must also "rough out" menus in order to make the rations last.

It must be remembered that the "blitz-blaze" outfits have been made up for use in cases of emergency, in a hazardous area where a few men can do the job, and where decreased walking time and increased line production are necessary for prompt control of fires. Their value and practicability are yet to be tested by actual use on the fire front.

Relieving Weight From Overloaded Truck Springs.—Shown on the accompanying sketch is a design for relieving weight from overloaded springs on trucks where it is necessary to keep the truck loaded for any length of time. This model was designed and built by mechanic Herman Isbell at Camp F-12, Stearns, Ky., for use in relieving springs on a fire truck that is constantly loaded.



Apparatus to relieve weight from truck springs.

The material consists of 3- by 4-inch piece of oak or equivalent wood and a 2- or 3-inch pipe for swivel or axle. The distance and arch can be varied to suit height of truck frame. If necessary, a chock block for the truck can be added. Note that the vertical piece (1) should be low enough that the truck can maneuver on and off jack under its own power.—*Cumberland National Forest.*

COMPARISON OF 1-, 2-, 4-, 6-, AND 8-MINUTE WIND-VELOCITY MEASUREMENTS

WILLIAM G. MORRIS

Pacific Northwest Forest and Range Experiment Station

Wind velocity for fire-danger rating is often estimated for a given period of the day by making brief measurements with a wind gage at certain observation times. One type of gage in widespread use is designed for a 1-minute count of the revolutions to obtain the wind velocity, and another type is designed for a 2-minute count. It is frequently suggested that a period several times as long should be used so as to average the irregular effects of gusts. The following article gives results of a study to determine the relative desirability of different velocity measurements ranging from 1 to 8 minutes in length.

Wind velocity is an important factor in rating forest-fire danger in R-6. In present practice it is measured by a 2-minute observation at 8 a. m., noon, and 4:30 p. m. Either the noon or afternoon measurement is usually used with the current fuel-moisture measurement to determine the rating of fire-weather conditions.

The rating of fire weather is intended to represent conditions during a considerable proportion of the afternoon and not just the conditions at exactly noon or 4:30. It would be more desirable to have a continuous record of wind velocity and fuel moisture, but available recording instruments are too expensive. A greater frequency of 2-minute observations also would be desirable, but other duties of the observers prevent this at many of the observing stations.

It is known that fuel moisture usually changes rather gradually and steadily in a certain pattern during the afternoon but wind velocity may fluctuate greatly from minute to minute or hour to hour. The study to be described as made, therefore, to obtain an estimate of the reliability of short observations of wind velocity when used to represent prevailing conditions for the afternoon during a period that was chosen arbitrarily to be 2½ hours in length.

The general method of study was to measure wind velocity for each minute during an 8-minute period. The 8-minute periods of measurement were repeated 10 times during each afternoon and were begun at 15-minute intervals. A Friez aneomometer with three 2⅞-inch cups and with buzzer contacts every $\frac{1}{60}$ mile were used. The observations were taken on 5 days on a mountain top when the wind velocity averaged from 7 to 11.5 miles per hour for the afternoon period sampled, on 3 days on the mountain top when the wind velocity averaged from 3.5 to 5 miles per hour, and on 10 days in a 1-mile-wide valley when the wind velocity averaged from 2.8 to 4.4 miles per hour.

The measurements for each minute in the 8-minute period were later grouped to form observation periods of differing length. Thus 1-minute, 2-minute, 4-minute, 6-minute, and 8-minute periods of observation were obtained for comparison. The fifth minute in the series of 8 was used in each case as the 1-minute measurement period. The fourth and fifth minutes were used as the 2-minute measurement period. The third, fourth, fifth, and sixth minutes were used

as the 4-minute period. The second to seventh minutes were used as the 6-minute period. Thus each long period included each shorter period.

The manner in which the observations differed from each other owing to variations in wind velocity between different hours of the afternoon, different periods within the hours, and different lengths of observation was studied by methods of statistical analysis. These methods were used also to obtain estimates of the comparative reliability of single observations differing in length and used to represent the average velocity for a 2½-hour period.

The fact that all observations were taken at regular intervals of 15 minutes instead of at random casts a certain degree of doubt on the interpretation of statistical measures designed for use with random distributions. If the wind should show a tendency to rise and fall in 15-minute cycles the results of random sampling methods of analysis certainly could not be correctly interpreted for the data collected in this study.

The velocities observed during the first, fifth, and eighth minutes of each 8-minute period were analyzed to determine if there was any tendency for 15-minute cycles to occur and none was found. Continuous automatic recordings of wind velocity at the valley station during two summers have been inspected and no regular pattern of wind velocity variation during the afternoon could be found. The writer feels safe, therefore, in using methods designed for random sampling to estimate from the present data the reliability of 1-minute, 2-minute, 4-minute, etc. measurements.

The wind velocities for afternoons of low average velocity and for relatively high average velocity showed that these two groups should be studied separately. The data taken on afternoons of low velocity on the mountain top and on afternoons of low velocity in the valley did not differ and were grouped for analysis. Thus the results will be discussed separately for afternoons on which the wind velocity averaged from 7.0 to 11.5 miles per hour on the mountain and for afternoons on which it averaged from 2.8 to 5 miles per hour at the valley and mountain-top station.

Following are some of the probable limits of accuracy to be expected when the average velocity for a 2½-hour period is estimated from measurements of short duration:

Afternoons on which the velocity averagee 2.8 to 5 miles per hour

	Length of measurement period—minutes				
	8	6	4	2	1
Expected maximum error in miles per hour for 1 measurement [1]	1.8	2.1	2.1	2.7	2.9
Number of measurements needed to obtain an average having a maximum error of 3 miles per hour.[1]	Less than 1.				

Afternoons on which the velociuy averaged 7.0 to 11.5 miles per hour

Expected maximum error in miles per hour for 1 measurement [1]	4.8	4.8	5.0	6.2	7.2
Number of measurements needed to obtain an average having a maximum error of 3 miles per hour [1]	2.5	2.6	2.8	4.8	5.8

[1] In 95 percent of infinite cases. From 1.96 X S. D.

These data show: (1) Short-period measurements of wind velocity used as estimates of the average velocity for a 2½-hour period had a much greater error in terms of miles per hour for average velocities of about 7 to 11 miles per hour than for average velocities of about 3 to 5 miles per hour. (2) With either wind-velocity class the accuracy of estimating a 2½-hour average from brief measurements increased as the length of measurements increased, but the increase in accuracy was small for measurements longer than 4 minutes.

From another analysis it was found that in most cases there is more difference in velocity between the first, fifth, and eighth minutes within the same 8-minute period than there is between different 8-minute periods spaced 15 minutes apart. This shows that the use of a measurement period several minutes in length will add more to the accuracy of estimating the average 2½-hour velocity than will several short measurements 15 minutes apart.

It was found that on certain days there was a significant difference in average velocity between the first and second 1¼ hours in the 2½-hour period when compared to the difference among the velocities recorded every 15 minutes. On most of the days this difference between 1¼-hour periods was not significant. Definite conclusions concerning the chance that the first and second 1¼ hours will differ in average velocity cannot be drawn from the available data because a sufficient number of days were not sampled.

The fluctuation of wind velocity during a 2½-hour period in the afternoon in some localities might be greater or smaller than found in this study and correspondingly the expected maximum error of one measurement and the number of measurements needed for an average of given accuracy would be greater or smaller. But experience in recording the duration of gusts makes it appear probable that the comparative desirability of measurements 1, 2, 4, 6, or 8 minutes in length to represent the average for a 2½-hour period in the afternoon in most places will be approximately the same as found in this study. These results may be used at least as a guide in other localities to determine the length of wind-measurement period that should be used until more intensive studies can be made. Additional studies for velocities over 12 miles per hour are especially needed.

The following conclusions and recommendations have been drawn from the study: (1) An observation period at least 4 minutes long should be used in estimating afternoon wind velocities of about 3 to 12 miles per hour. This may be done with wind gages designed for 1-minute observations by counting the contacts for 4 minutes and dividing the total by 4. Similarly, for gages designed for 2-minute observations count the contacts for 4 minutes and divide by 2. (2) If a 2½-hour average velocity is to be estimated from short observations, and if the velocity is between about 7 and 12 miles per hour, it is highly desirable to obtain several measurements scattered through the 2½-hour period. Three such measurements each 4 minutes in length will be necessary if an average with a maximum error of about 3 miles per hour is desired. (3) If a 2½-hour average velocity in the range of velocities less than 7 miles per hour is to be estimated one measurement 4 minutes in length will be sufficient for many purposes, because it can be expected to fall within about 2 miles per hour of the 2½-hour average.

A GOOD SUPPRESSION RECORD

C. R. Byers

Assistant Supervisor, Lolo National Forest, Region 1, U. S. Forest Service

Steve Doyle, CCC foreman, Camp F–42 on the Lolo National Forest in region 1, was stationed at Fort Missoula Spike Camp during the 1940 fire season. He had charge of a crew of 15 men who were maintained and trained as a fire-fighting unit. The regular course of fire training was given, plus continued special training.

Part of the training was given while burning firebreaks around Fort Missoula and Waterworks Hill in grass types. The special training continued in the use of the Bosworth trencher, the step-up method, the one-lick method, direct attack, and other methods on early small fires. Every advantage was taken of the opportunity, for training both off and on the early season fire job.

The crew was on 12 fires during the summer, ranging in size from a ½-acre fire to the Jones Creek fire of more than 4,000 acres on the Lewis and Clark National Forest.

On the Post Office Creek fire in the Lochsa Canyon, the crew drove to Jerry Johnson Lookout which required approximately 8 hours' travel time from Missoula. After arriving at Jerry Johnson the crew hiked down to the fire, a distance of approximately 5 miles and arrived on the fire line at 10:15 p. m. The 15 men completed 75 chains of fire line by 10 o'clock the next morning. That is at the rate of 0.42 chains per man-hour, not allowing any time out for rest or lunch. The resistance varied from medium to heavy-medium. The line constructed all held.

A functional-unit organization was used on the Post Office Creek fire. First came five ax men, then two saw crews, then a five-man trench and swamper crew, and one water buck. If the ax and saw gangs got too far ahead of the trenching crew, they worked back and helped swamp out and trench. The crew was kept in as compact a unit as possible, yet providing adequate spacing to meet the needs of the job for safety.

During the summer, Foreman Doyle's crew lost only 1½ chains of trench (caused by a burning log rolling across the line). They traveled 1,800 miles by truck and more than 100 miles on foot.

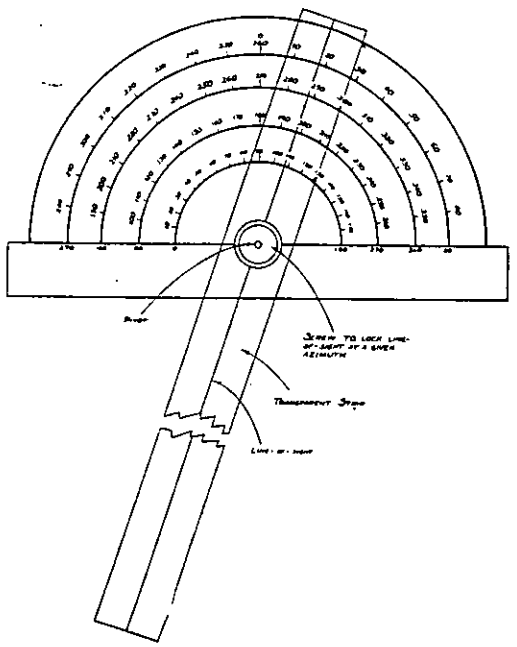
No doubt there have been many other crews similarly trained which have functioned with comparable success. Nevertheless, a comparison of the record of this compact, well-trained crew with the average performance of a few years ago, and even with recent records of what has happened on fires where unskilled men have been used, appears to prove that more and better training will pay big dividends.

A TYPE OF MAPBOARD AND PROTRACTORS FOR DISPATCHER USE IN LOCATING FIRES

LAWRENCE W. ZACH

School of Forestry, Oregon State College

Accompanying diagrams show the type of mapboard used in dispatching on the Coeur d'Alene District of the Coeur d'Alene National Forest at Coeur d'Alene, Idaho. This system of map and protractors was designed and developed by W. W. Larsen, district ranger, and H. Flodberg, alternate ranger, about 5 years ago. They have used this board and protractors every season since their development, and they report the board superior to any device previously used.

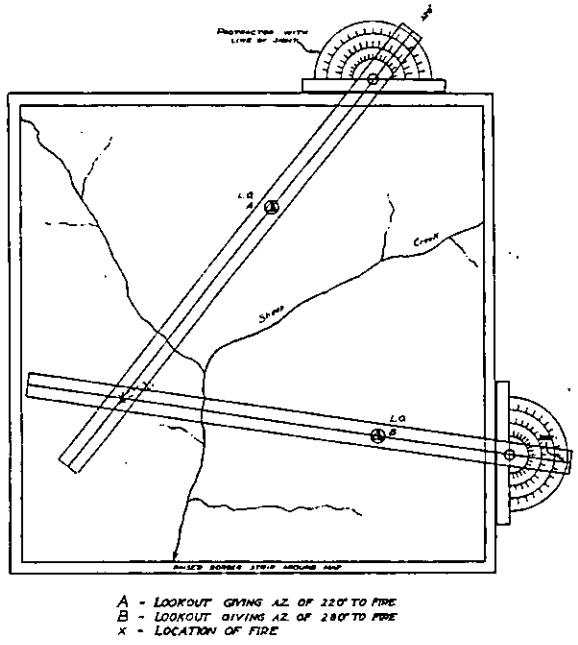


Detail of protractor and line-of-sight strip for dispatcher's mapboard.

The map consists of a regular ½-inch-to-the-mile map of the forest mounted on a plywood base. The map and metal bordering strips are raised enough to allow the map surface and the top of the protractors to be flush; this allows the lines of sight on the transparent strips to lie flat in contact with the map. These lines of sight are drawn on transparent celluloid strips which fasten to the protractors

as shown in the diagrams. The map and surrounding strips are oriented to lie in the cardinal directions. Screws through the metal border strips and base allow the map and strips to be properly oriented, using slotted holes.

The protractors are divided for azimuths, as shown by the protractor diagram. This allows the lookout's azimuth to be set off on the protractor and the line of sight to be fixed securely by the screw on the protractor. The protractor is then moved along the proper side of the board by the dispatcher until the line of sight



Dispatcher's mapboard with protractor.

crosses the lookout location from which the reading was reported. The second protractor is similarly used to set off an azimuth from any other peak reporting the fire and the location of the fire is then indicated by the crossing of the lines on the transparent strips.

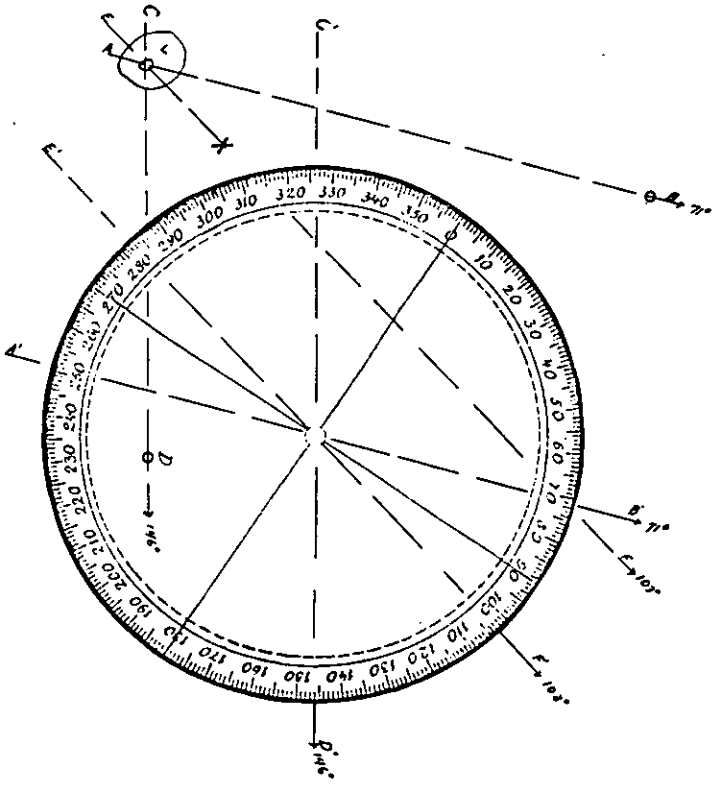
Larsen and Flodberg report that this mapboard with the protractors is unsurpassed for speed, accuracy, clearness of vision, and ease of operation. No lines need be drawn, and no confusing set of azimuth circles and strings clutter up the mapboard; the entire face of the map is entirely visible at all times.

A PARALLEL RULE FOR SMOKE CHASERS

F. E. Williams

Assistant District Ranger, Nezperce National Forest, Northern Region

The compass and protractor have been stressed in guard schools as means of orientation and of drafting courses to fires. The value of such training cannot be overemphasized. However, I have observed that the compass-and-protractor method has not been, shall we say, "comprehensible" to all of the guards. Why? It may be our fault as trainers, but, nevertheless, it is not used to the extent desired.



Method of obtaining the location of a smoke chaser en route to a fire and the proper azimuth to reach a fire.

Why not teach the men to reach the same objectives, in a simpler way, but avoid converting back shots to foresights in orientation, avoid converting azimuth readings for a 180° protractor, and other confusing motions?

Why not use full azimuth circles on our smoke-chaser maps, the number of circles depending upon the size of the map? One circle

will do for a small map, and more for larger maps. A parallel rule may be made out of a piece of plastacele (my sample is 4 x 9 inches), with parallel lines ⅛ inch apart etched in the plastacele, the lines running the long way of the plastacele. The advantages of the solid piece over an adjustable rule are obvious. This rule may be used on either a solid piece, rolled map, or a cut and folded map. For a folded map the line is marked at the edge of the piece map with the azimuth circle, then extended directly opposite to the edge of the next piece. The parallel rule is again laid on the original line and a parallel line is used from the edge of the second piece. The parallel rule will roll up with a rolled map, and may be placed flat with a fold-up map.

The diagram illustrates use of the parallel rule with an azimuth circle on the map that the smoke chaser carries with him in the field. The azimuth circle is stamped by means of a rubber stamp at a convenient point on the map where the center opening will be clearly visible. Its purpose is to enable the smoke chaser to draw lines on the map at certain azimuth readings, the parallel rule enabling him to carry the lines through specific points on the map.

A smoke chaser en route to a fire at X, a known location on the map, finds an opening (irregular area L) in heavy timber. He knows the fire is in heavy timber and wishes to locate himself and draft a course to fire X. His compass reads 71° on point B, and 146° on point D, both of which he can identify on the map. He places his parallel rule across the azimuth circle on 71°, line A^1B^1, and finds a parallel line running through point B, line AB; then he knows he is somewhere on that line. He likewise finds line C^1D^1 and from it the parallel line CD. The intersection of lines AB and CD indicates his own position O on the map. He then draws a line between points O and X and with his parallel rule finds the reading of line O^1X^1 is 103°. He now proceeds to his fire on a compass reading of 103°. Note, no readings were converted to back sights; only foresights were needed.

If the fire is on the right side of the oriented location, read the right side of the azimuth circle; if on the left side, read the left side of the azimuth circle.

USE OF TYPE SV RADIO INSTALLED IN AUTOMOTIVE EQUIPMENT

E. W. Woods

District Ranger, Clark National Forest
North Central Region

During the spring fire season of 1940–41, two type SV radios were installed in trucks used as initial attack units on fires out of the Fredericktown Ranger Station. One of these was put in a 1940 model Chevrolet ½-ton pickup and the other in a ¾-ton International fire truck.

In order to conserve all of the space possible, a special case was built to hold only the radio chassis and speaker. The glove compartment on both trucks was removed and the radio was installed in its place. The case containing the radio was held in place by means of two galvanized metal strips which fastened with the same screws that originally held the glove compartment. The dimensions of the case were 16x6x4¾ inches. The construction was of plywood reinforced with metal corners and edges.

A 5-foot, 5-conductor battery cord was substituted for the one regularly supplied with the set; this allowed the batteries to be carried under the seat in a specially built wooden box. The battery cable was run under the floor mat and up the inside of the dash to the radio. It was found that the super heavy-duty B-batteries could be used, which resulted in a long period of service without replacement and also a saving in cost over a period of time. Regular 1½-volt telephone dry cells were used for A-batteries.

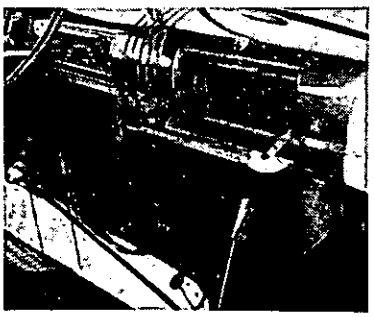
An ordinary telescoping, 7-foot whip aerial was used for the antenna. This was fastened to the right side of the cowl and connected to the set by a short lead-in.

One of these sets has been in operation 7 months and the other 6 months, and neither has ever given a moment's trouble. One truck has traveled over 8,000 miles since the radio was installed and the other about 4,000. Most of the travel has been over very rough roads and under all sorts of conditions. There seems to have been no failure from excessive vibration. The sets did not seem to pick up any excessive engine noise, as conversations are carried on very satisfactorily while the truck is traveling along the road.

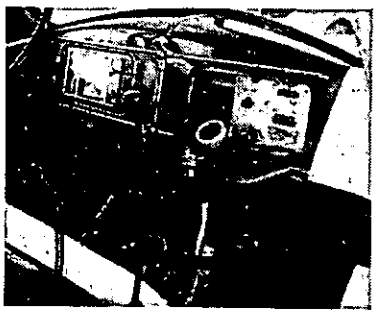
It was found that communication was generally possible with either the ranger station or some lookout tower from any point on the district. The sets were especially useful in communication with airplanes. On several occasions two-way conversation was maintained between the plane and the initial attack crew in one of the radio-equipped trucks. Officers in the plane were thus enabled to direct the crew to the fire with a minimum of travel and also inform the

fire foreman of the fire's behavior, hot places, danger spots, and in other words, have the fire scouted for him when he arrived. The arrangement also has great possibilities in apprehending fire setters, for the plane pilot can occasionally keep the incendiarist in sight and inform the fire crew of his movements.

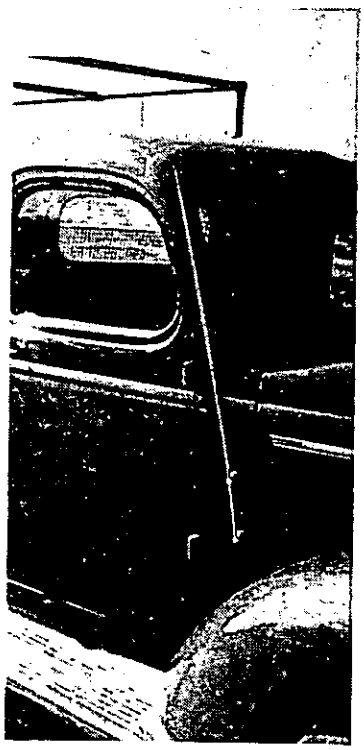
One of the foremen, during the fire season, rigged up a steel fly rod as an aerial on his truck and connected it to an SV set carried on the seat beside him. This worked very well and on two different



SV radio installed in Chevrolet pick-up.



SV radio in International ¾-ton truck.



Aerial for SV radio in Chevrolet pick-up.

occasions was used to receive directions from the airplane on how to get into a fire that was burning in country new to the fire boss.

The installation of two-way radio equipment in our fire trucks has apparently very materially contributed to a decided drop in the size of the average fire on this district. It has also greatly increased the effectiveness of the use of plane by making possible direct communication with the crew going to the fire.

RADIO COMMUNICATION ON THE WASHAKIE NATIONAL FOREST

ROY L. WILLIAMS

Forest Supervisor, Washakie National Forest, Region 2, United States Forest Service

Forty-five percent of the Washakie National Forest is wilderness area and much of the remainder carrier lodgepole slash from tie sales. The short-term force of the forest consists of one lookout and one recreation guard. On an area such as this, the use of radio can go far in providing communication flexibility in the back country. What was unusual yesterday is commonplace today.

During the last 3 years, short-wave radios have been used on the Washakie National Forest to enable district rangers to spend a maximum of time in the field, eliminating the necessity of standing by at headquarters during periods of high hazard. Communication has been maintained throughout the fire season over a network of seven stations, which are centered around the Warm Springs Lookout Station. The lookout serves as chief radio operator and the station is connected by telephone with all ranger stations and the supervisor's headquarters.

One of the later sets, SPF 783, is in use at Warm Springs and gave satisfactory service during the entire 1940 season. Daily contacts were maintained with the supervisor's office in Lander, a distance of 80 miles, and with the Wapiti CCC camp on the Shoshone Forest, a distance of 60 miles.

During the peak of the fire season, an SP set was installed at a secondary lookout on Indian Point and hourly contacts were made with Warm Springs. Another SP set was installed at the timber sale ranger's headquarters and scheduled contacts were made daily with the lookout.

Trail crews on both the Absaroka and Wind River Districts were furnished with SP sets and contacts were made morning and night with these crews, except during period when the fire-danger readings were in the high class, when more frequent contacts were made.

The Washakie Forest is very rough with practically no roads. Range administration is the principal activity during the field season, making it necessary for rangers to spend a large percentage of time on long pack trips. Two rangers were equipped with SPF sets and made regular contacts with the lookout station in the morning and at night. During periods of high hazard, noon contacts were made. Such contacts gave the rangers a feeling of security and enabled them to continue trips in the field.

The new SPF sets are very satisfactory and can be sujected to very rough use. They were carried on pack horses throughout the season, and when set up gave no trouble. Contacts were established on sched-

ule except on a few occasions when some of the tubes shook out of the sockets. Also it was found necessary to carry an extra set of batteries with each set.

The greatest difficulty experienced with these sets on field trips was with the long antenna. In timbered areas, it could usually be hung from trees but this took time both in setting up and dismantling, a job which the field men disliked to do, especially at lunch time. Many noon contacts were passed up last year because of the time required to hang up the 150-foot antenna. Where camps were made above timber line, it was difficult to find antenna locations. One end of the antenna was generally attached to a rock in such situations and the other to a peg in the ground. Contacts were established in this manner but not always satisfactorily. It is possible that some form of fishpole antenna might be developed which, when not in use and for packing, could be telescoped together; and when in use could be stuck into the ground and connected to the set.

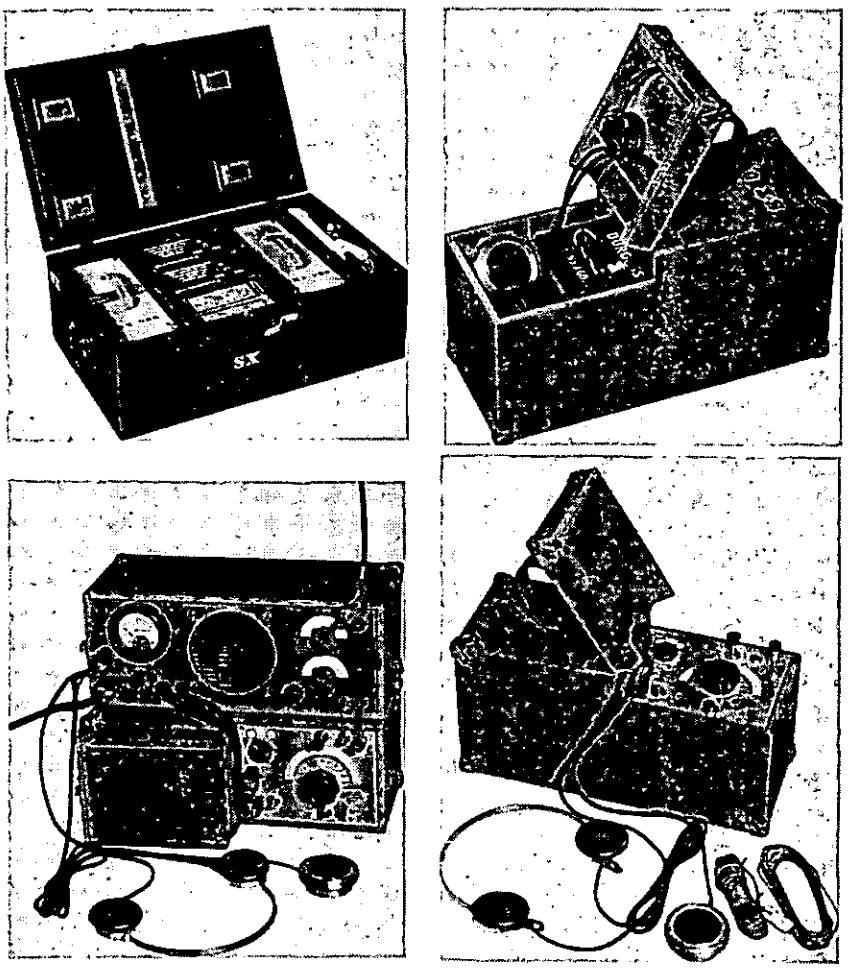
Experience over the 3-year period has clearly demonstrated that the use of radios by field men is practicable on the Washakie and, in fact, is necessary. The rangers have become so dependent upon radios that it is now almost impossible to carry on the work in the field without such equipment. The fact that the Warm Springs Lookout Station is centrally located for a dispatcher set-up adds considerably to the efficiency of the radio-communication system and also has made it unnecessary to employ special dispatchers to handle the radio-communications program.

The Washakie Forest expects to continue and enlarge the radio system and provide trail crews, emergency guards, and other short-term men with additional sets as rapidly as funds permit so that they can carry on and broaden their usual duties during the field season without interruption to stand by during periods of high hazard.

A PUSH BUTTON TUNING PORTABLE RADIO

RADIO EQUIPMENT BULLETIN

The type SX radiophone is a stabilized unit having extreme flexibility in application. The type SX is a portable radiophone with



Type SX radiophone, model A.

self-contained batteries, applicable to uses of scouts, smokechasers, and others requiring extreme portability. The addition of the type

SXA radiophone attachment, which incorporates a loudspeaker, adapts the unit to semiportable service in lookouts, ranger stations, and wherever standby operation is needed. The type SX in the portable form supersedes the type S, and with the attachment supersedes the type SV.

The type SX transmits and receives voice only. The portable unit weighs about 10 pounds, and has a rated working range of about 50 miles over *optical paths*. However, with low antennas and over level terrain, this may be reduced to 3 or 4 miles. A panel switch permits selection of any of three transmitting frequencies, any or all of which may be crystal controlled. The receiver is substantially nonradiating.

The provision for selecting any of three crystal-controlled frequencies adapts the unit for operation in fixed-frequency networks, and permits ready transfer from one network to another. The procedure for establishing communication is far simpler than for types S and SV. A panel pushbutton provides means for setting the receiver on any of the three transmitter frequencies.

Where strictly portable operation is contemplated, the radiophone is normally used without the attachment. The type SXA radiophone attachment is desirable where standby service is needed, since its amplifier and loudspeaker relieve the operator of the necessity of wearing headphones. No additional wiring or mechanical change is required to install the attachment. It is merely necessary to remove the microphone and battery-cable plugs from the radiopohone and insert them into receptacles on the attachment. Short stub cords on the attachment are then plugged into the radiophone receptacles.

A kitbox is normally supplied when the attachment is ordered with the radiophone. This has compartments for storing the radiophone, radiophone attachment, heavy-duty batteries, heavy-duty battery cable, type J antenna, and halyards.

Orders for the type SX should state the desired transmitter frequencies, and which of these are to be crystal controlled. When ordered without the attachment, the type SX radiophone will be supplied with portable batteries, but without the kitbox, unless otherwise specified. Where the companion type SXA attachment is also ordered, the kitbox will be furnished, together with the type J antenna, halyards, and the heavy-duty battery cable. Heavy-duty batteries are not normally supplied, since they add weight to the shipment and are usually available locally.

A MORE "EATABLE" EMERGENCY RATION

M. A. BENEDICT

Forest Supervisor, Sierra National Forest,
Region 5, U. S. Forest Service

The emergency fire rations used in region 5 have "refueled" many weary fire fighters, but there has been little praise for their "eatability." However, it took a bear that broke into the Sierra Forest's guard station at Placer to convince the Sierra force that a change of diet was needed.

The bear ripped open all sorts of canned foods, beans, and flour, but carefully avoided the roast beef, hash, and brown bread in the emergency ration sacks. The only possible conclusion was that what a bear wouldn't eat wasn't just the right dish for a man. So, thanks to Old Bruin, fire fighters on the Sierra are looking forward to a new menu in their 1941 ration sacks.

A 1-man, 1-day ration has been made up as follows:

Item	*Weight in ounces*	*Cost on bid*
Luncheon meat	12	$0.196
Date-nut bread	16	.188
Grapefruit juice	8	.036
Sliced peaches	9	.045
Beans	16	.074
Raisins	15	.054
Tomato juice	10	.041
Shoestring potatoes	4	.081
		.715
Freight		.015
Total cost per 1-man, 1-day ration		.760

Total gross weight, 7½ pounds.

Also, a 1-man, 1-meal ration has been developed:

Item	*Weight in ounces*	*Cost on bid*
Vienna sausage	4	$0.071
Date-nut bread	8	.094
Tomato juice	10	.041
Grapefruit juice	8	.036
Beans	8	.037
		.279
Freight		.011
Cost of a 10-pound misprint sugar sack		.020
Cost per 1-man, 1-meal ration		.310

Total gross weight, 3½ pounds.

EARLY AIRPLANE SUPPLY IN REGION 6

GLENN E. MITCHELL

Wildlife Management, North Pacific Region

The use of airplanes as standard equipment for fighting forest fires has gone a long way since 1926. When one sees the special packaging of "chute loads" and "parachute smoke jumpers" fully equipped to attack remote fires, the contrast is amazing.

Back in 1926 on the Chelan, an airplane of the old Army DeHaviland type was used for reconnaissance. After the Boulder Creek fire was controlled, as I started out to headquarters, some of the boys said, "Be sure to send a plane over with our mail." The cook added, "You had better add a few pounds of butter, too." The mail and butter were dropped by putting them in a large white sugar sack, tied at the end to give as much air resistance as possible. The report was that they got both mail and butter in good shape.

In 1932 the Siskiyou had a large number of lightning and incendiary fires. Five class C's were going at once. The forest was about the most inaccessible in the region at that time, and one fire, the "Red Mountain," was difficult to reach. It was only 12 miles from the end of the road to the top of Red Mountain, but the topography and ground cover is such that distance is a poor indicator of travel time; a pack train required 2 hard days to make a round trip.

Radios were not so good those days as they are now and communication was slow and discouraging. The regional office secured the services of an autogiro in Seattle and sent it down to Grants Pass for reconnaissance. The fires were all near the ocean so the home port was established at Crescent City. Occasionally fog obscured the beach and once the "giro" started for Grants Pass, 90 miles away, to refuel. The pilot was alone and not knowing the country landed where no one ever had before, in an isolated field, deep in a canyon 18 or 20 miles from Grants Pass and 12 miles from a road. The rancher had a little gasoline for use in lamps which was sufficient to take the pilot to Grants Pass. The pilot asked the general direction. Though he never admitted it, he was probably lost as well as short of fuel.

Word came out from Red Mountain that the crew needed lunch foods. We decided to use the "giro." Meats, jam, and bread were tied in large burlap sacks with as much slack as possible, putting probably 25 or 30 pounds in each sack. When we were over the fire camp, the pilot by reducing the speed of the engine, would allow the "giro" to settle down close to the ground and we would heave out the sacks. Two or three such loads were all the pilot would take at a trip. One of the interesting things we belatedly learned on that job was that solid loaves of bread would shatter so they could

not be sliced, but that sliced loaves were seldom damaged. Occasionally a can was broken, but we purposely dropped the sacks on thickets of knobcone pine to break the fall as much as possible.

The supplying of lunch foods by "giro" made it possible to support a larger crew than could have been maintained with the available pack train. It also indicated early the possibilities of such methods of supply.

Another interesting incident occurred when we were out over the ocean. The ship gave an unusual jerk and I thought the pilot was trying to attract my attention as I was in the forward seat. Immediately he started for land and signaled O. K. We landed in a hay field and found a guy wire used to space the fins of the "giro" had broken. When the repairs had been made we took off without any difficulty and returned to the base.

The "giro" was limited as to load and range but it was excellent for detailed vision of the ground as it would hover over a spot for several seconds and it was possible to converse with the men on the ground by short messages.

It was interesting to me to compare the 1932 plane service with that of 1938 on the same forest. During the latter season we were supplying all equipment and rations, including water, to four camps of more than 50 men each and part of the equipment to four more camps. The terrain was exceedingly rough and the dropper could have used a bomb sight to good advantage. Some of the camps were so located that a miss of 100 yards would result in a complete loss, but only a few chute loads were lost on that account. Once a chute load dropped in the fire close to the line. Supplies were so badly needed that two men rushed in to save the food but were successful in salvaging only a part of it.

In those days we dared not think of dropping men on fires. Brains and courage, however, can do much to shape nature to the needs of man.

AIRPLANES VERSUS PACKHORSES

JACK B. HOGAN

Wallowa National Forest, Region 6, U. S. Forest Service

The following contribution to airplane experience bears on the questions raised in the April 1941 issue of FIRE CONTROL NOTES. Securing and analyzing data on all phases of the subject will aid in determining under what conditions airplanes may best be used in fire control.

The Wallowa National Forest has been one of the experimental grounds for dropping supplies and equipment to fire camps from airplanes. Additional experience in this phase of fire suppression was gained during the 1940 season on the Cook Creek fire. Caused by an abandoned campfire this class C fire burned 22 acres. It was located in the bottom of a deep draw along the edge of a stringer of timber leading to the head of the draw, paralleled by slopes covered with bunchgrass, cheatgrass, and various species of brush.

The part of the forest in which Cook Creek fire occurred is approximately 8 miles airline from the location of the Rogersburg fire of 1939, which started in the State of Washington and burned south into Oregon to within a mile of the Wallowa Forest boundary, covering more than 11,000 acres. The area adjacent to the location of the Cook Creek fire is similar to much of that burned over in the Rogersburg blaze.

The horizontal distance from the nearest road to the Cook Creek fire location is about 1¾ miles. The difference in elevation between these points is more than 2,500 feet and the topography is extremely rough. From 2 to 2½ hours were required for a packhorse trip from the base camp on the road to the camp on the fire line.

The base camp was located approximately 50 miles from the Enterprise fire warehouse (Enterprise is the supervisor's headquarters), a distance requiring 2 to 2½ hours' driving time by truck.

Accurate time records were not kept for packing horses or for packaging, preparing for dropping, and loading supplies and equipment transported by airplane. However, statements of forest officers concerned indicate the time required for preparing and loading was about the same for each operation.

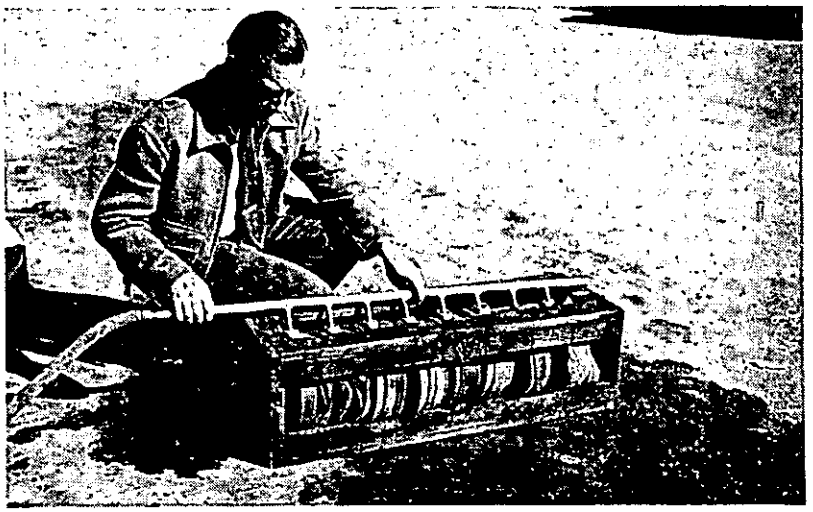
The landing field at Enterprise is 2 miles from the Forest Service warehouse. A Travelair plane, operated by Zimmerly Brothers Air Transport of Lewiston, Idaho, with a capacity of 800 pounds in addition to pilot and dropper, made repeated trips from the Enterprise landing field to the fire and return in 1 hour. For delivery of supplies and equipment from the Enterprise warehouse to the fire, including unloading time, approximately 45 minutes was required by airplane and about 5 hours by pack horse.

The cost per pound for delivery of supplies and equipment to the Cook Creek fire was 5.4 cents by airplane and 2 cents by pack

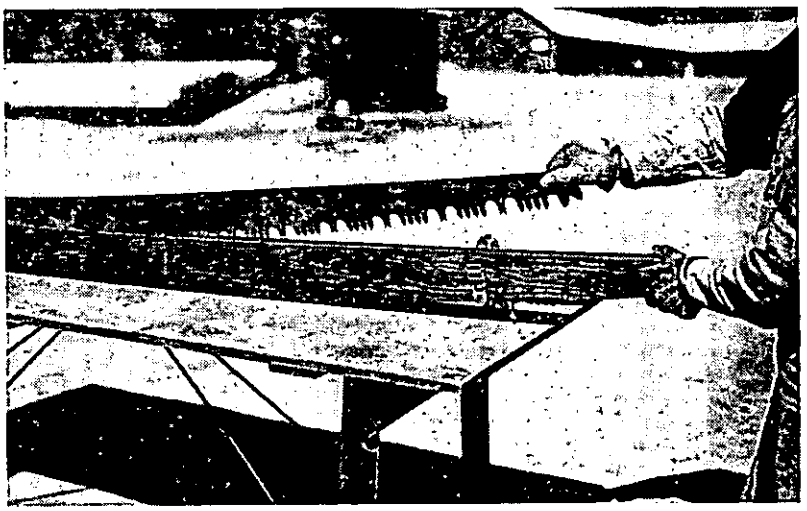
animal. The objective of fire control requires that immediate and thorough action be taken to control fires, mop them up to the point of safety, and then extinguish them wholly or in part in accordance with fire-fighting standards. If airplane transportation is available, its use seems justified on fires in inaccessible locations comparable to that of the Cook Creek fire, and such transportation should be used for supplies and equipment needed until mopping up to the point of safety is completed.

The fact that the Cook Creek fire was confined to 22 acres indicates the effectiveness of the action taken. The favorable outcome may have resulted from the initial attack by four Forest Service employees and nine cowboys, mop-up work done by the 40-man CCC crew, or "an act of God." Probably all the "actions" described, combined with the delivery of food and equipment by airplane, were responsible. Incidentally the campers, who left the campfire burning, were apprehended and satisfactory law-enforcement action was obtained.

Equipment Hints.—Pictures have recently been received of two devices developed on the Sierra National Forest of the California Region which have interest beyond that forest. The canteens of suppression crews are carried in racks of 8. Filling them daily from one faucet apparently proved time consuming so a pipe was rigged with garden hose threads on one end and with 8 outlets welded to the pipe. The 8 canteens can be filled as quickly as one could be previously. No valve is shown in the picture but one could be used if desired.



Multiple spout filler for canteens.



Wooden saw guard.

The other illustration shows a saw guard devised to replace the rubber guards which are no longer being purchased because of the need for rubber in national defense. The saw guard is made of three pieces of plywood by bolting together the two sides and the separator and riveting a web strap with a buckle at each end.

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