FIRE CONTROL NOTES

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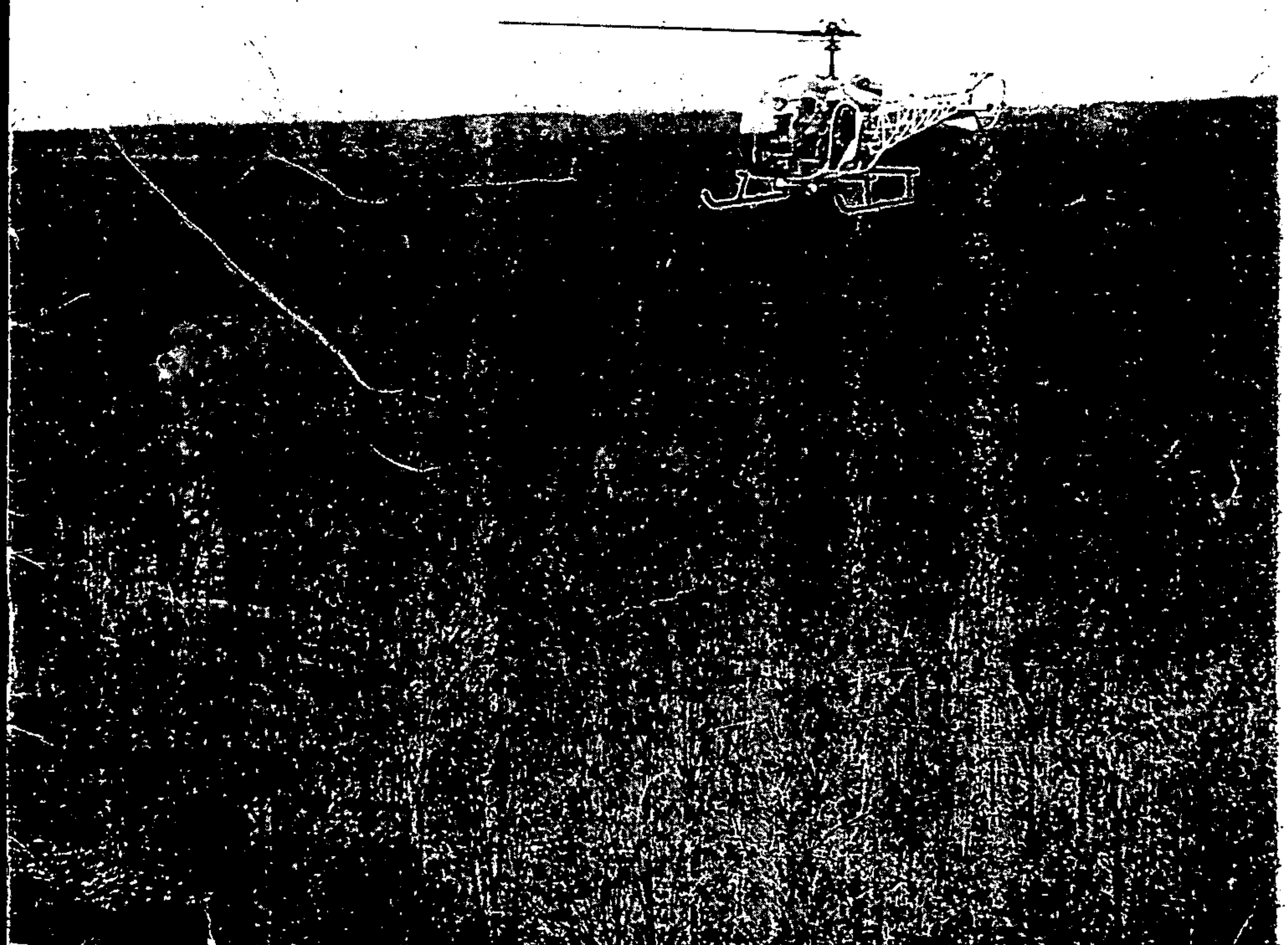

FIRE CONTROL NOTES

A quarterly periodical devoted to forest fire control

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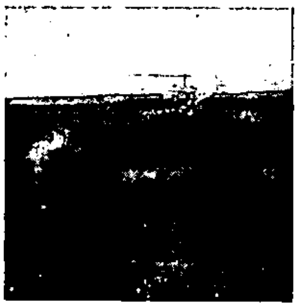

COVER—The Clark National Forest (Missouri) prevention helicopter is shown scouting a small fire. Such early arrivals deter incendiarists and permit early warnings to be given to legal burners. On wildfires, the two-man crew can usually handle the initial attack. See story on page 6.

(NOTE—Use of trade names is for information purposes and does not imply endorsement by the U.S. Department of Agriculture.)

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PROBLEMS IN ESTABLISHING FIRE-WEATHER STATIONS IN ALASKA

F. D. Paxton, R. M. Bowman, and C. D. Johnson[1]

The role of the Fire-Weather Forecaster in Alaska in the early detection and control of lightning-caused fires is fairly new. However, the value of the forecasting assistance provided by the Weather Bureau to the Bureau of Land Management is clearly recognized.[2] But more stations in remote areas are needed to intensify the observation network and thereby strengthen implementation of the National Fire Danger Rating System.

Many interesting problems may be encountered in establishing a new fire-weather observation station in Alaska. The State's vast area and sparse population provide a serious obstacle to adequate weather sampling. There are two primary requirements in the selection of new sites. They must fill a void on the meteorologist's map to assist in the early detection of critical lightning storms, and, more important, someone must be available to take observations.

In 1965, one suitable site was selected at Stevens Village, a settlement of about 80 Athabascan Indians 100 miles north of Fairbanks, on the Yukon River. Official reports had not been recorded at the village, but analysis indicated that the general area had a high incidence of thunderstorm activity. Therefore, it was necessary to establish an observation station in the locality. However, it could not be installed until early June because of the Yukon River breakup and subsequent flooding. Meanwhile, planning and logistics, while not extensive when compared to some Arctic area supply situations, consumed considerable time. Aircraft schedules were coordinated with other suppression and presuppression activities; equipment was purchased, and instruments were packed for the rugged trip by amphibious plane.

On the date of the trip (June 7), the waters of the Yukon, while not in flood stage, were still high. The current is particularly swift near the village as it weaves through a maze of islets and across bars. The banks at the village are steep and covered with black sand and clay. The pilot landed after he was certain that there were no visible snags or obstructions which would endanger the aircraft. Soon he was able to pull the craft far enough upon the bank to unload. Interested villagers lined the bank to watch. The Chief of the village was immediately contacted, and a potential native observer was soon interviewed.

Shortly thereafter, selection of a proper instrument exposure site was begun. A narrow grassy area in the center of the village was not usable because of the nearness of the buildings and traffic. Since the buildings were located upon the highest ground close to the river, and a shallow slough surrounded the backyards of the log houses, the rear area of the log house cluster was also unacceptable. A path went across the slough and through a heavy brushy stand of willow, white birch, and alder to a small dirt airstrip, still unusable due to mud, about 800 yards from the village. Because the trees were tall, a site too near the runway could not be used, for the anemometer tower would be a hazard to incoming aircraft. A site along this path, about 300 yards from the village, was finally chosen.

Four men from the village were hired to clear an area approximately 130 feet square. Disposal of the brush was not difficult—it was piled in rows along the outside edges of the clearing. After these windrows are cut about every 5 feet with chain saws and left in the summer sun to season, this wood becomes a readily available source of winter fuel for the villagers and will soon be used in their stoves.

Before the instrument shelter, the rain gage, and the anemometer were erected, it was necessary to remove roots and debris, and to level a 16- by 16-foot area near the center of the clearing for the instrument enclosure. The first blow of the pulaski firefighting tool hit permafrost. All digging and leveling had to be accomplished in the frozen subsoil. The dislodging of roots and stumps in permafrost is, at best, difficult, but here the problem was greater because the shade of the brush and the duff covering the ground had prevented even a superficial permafrost retreat. To provide for the leveling of the shelter, pulaskis were used to chop into the dirt and ice. To measure the true wind at the site, the anemometer had to be placed 20 feet above the average height of the surrounding brush. This required a 50-foot tower, which

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[1] Paxton is a Fire Weather Forecaster, Weather Bureau, Environmental Science Services Administration, U.S. Department of Commerce. Bowman is Unit Manager, Ft. Yukon Administrative Unit, and Johnson is Fire District Supervisor, Fairbanks District and Land Office. Both are employed by the Bureau of Land Management, U.S. Department of Interior.

[2] Paxton, F. D., and King, L. D., Sky fire in Alaska—Summer 1964, Fire Control Notes, v. 26, No. 2, April 1965, pp. 6-7.

A LOOKOUT CARGO WINCH

Missoula Equipment Development Center

A hand-operated winch for raising and lowering cargo between the ground and the catwalk of a fire lookout tower has been designed at the Missoula Equipment Development Center. The design meets the following requirements:

1. Capacity of 200 pounds.
2. Ability to handle loads of at least 3′ by 3′ by 3′.
3. Capacity for 75 feet of cable.
4. Locking device to keep boom from swinging while a load is raised.
5. Breaks.
6. Rapid unwind system for returning empty hook to ground.
7. Safe and simple operation.

A prototype model was extensively tested during construction of a new lookout on Blue Mountain on the Lolo National Forest, Mont. The model was used to raise materials for the cupola (fig. 1).

While the winch was designed primarily for use on Region 6 style lookout towers, it is adaptable with minor modifications to other tower designs. However, some older lookouts lack standards, and custom modifications would be needed.

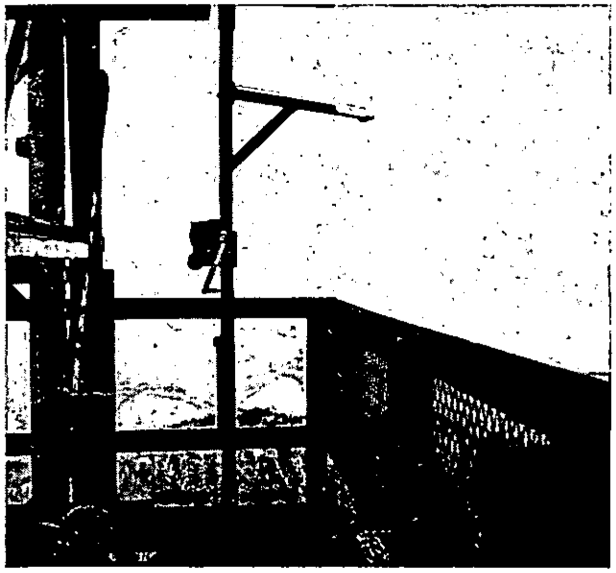

Figure 1.—View of winch installed on a lookout tower catwalk.

Cost of the winch when produced singly or in small quantities is about $150. Fabrication drawings are available from the MEDC.

BALLOON DROP

James C. Larkin, Western Zone Air Officer, Region 4

During early September 1966, the Payette National Forest in Idaho was being plagued by a seemingly unending rash of lightning fires. The largest, the Flossie Lake fire, was burning on more than 5,000 acres of lodgepole pine in the remote Chamberlain Basin area.

Manning and supply had to be carried out by air, with the planes landing at a back-country airstrip located just south of the fire. Extensive use of the Forest Service C-46, three C-47's, and many smaller aircraft soon had 300 firefighters and their equipment on the fire. However, the dense smoke which blanketed the area made the job of supplying these men touch and go. Many trips by the planes were cancelled, or the aircraft turned back to McCall, because of almost zero visibility at the Chamberlain strip.

A light rain fell during the night of September 12. This proved a godsend to the firefighters, but compounded the supply problem. The next morning the airstrip was blanketed by a dense, 500-foot-thick layer of fog. Rations at the fire camp were short. Breakfast had been prepared in McCall, but there was little chance that the plane could land at Chamberlain before noon.

Fire Boss Reed Christensen radioed McCall: "Load up the Doug with chow, rigged for para-drop. We'll have something worked out by the time you get here."

We arrived over Chamberlain in the C-47 shortly after dawn. Floating above the fog was a string of fluorescent weather balloons. Airport Manager Gary White came on the airnet. "Make your drop on the balloons."

I made a pass and two bundles were kicked out. White reported, "Good! Next time correct a hundred feet to the right, and drop a little sooner!"

By the third pass we zeroed in on the target, our chutes landing "right on." Fifteen minutes later chow was on the table.

A gimmick fostered by 300 empty stomachs, yes, but also a demonstration of real initiative and one more note to add to the fire control story.

Editor's note:

Such low-level flights over fog or cloud cover should be carried out only in multiengine aircraft. Also, particular care must be exercised on the ground to designate the drop zone so that personnel and equipment are not endangered by the drop.

FIRE DANGER COMPUTERS

FRANK E. LEWIS, *Forester*

Forest Service Electronics Center

Can electronic computers be used by fire control managers to efficiently and economically calculate fire danger ratings? To provide an answer, in September 1965 an equipment development project was assigned to the Forest Service's Electronics Center, Beltsville, Md. Use of analog methods seemed feasible. A pilot model of a computer was designed and constructed by Fred Biggerstaff, an electronics engineer, and this development led to the fabrication of a test unit (fig. 1) now being demonstrated and evaluated.

The device is designed to perform most of the necessary calculations for determining spread index based upon the National Fire Danger Rating System. Four weather elements—RELATIVE HUMIDITY, DRY-BULB TEMPERATURE, WIND SPEED, and PRECIPITATION—are inserted by setting dials calibrated for each element. The BUILDUP from the previous day is also set to the proper value by use of a dial. An estimate of the appropriate HERBACEOUS STAGE is introduced by setting a switch at one of three positions. A three-position meter switch permits the following items to be read directly from the meters: FINE FUEL MOISTURE, FINE FUEL SPREAD INDEX, and DRYING FACTOR and, after the buildup dial has been repositioned to reflect the latter, ADJUSTED FUEL MOISTURE and TIMBER SPREAD INDEX.

One feature in the design of the first test model is a lighted display which uses appropriate colors to indicate FIRE DANGER CLASS. As constructed, it is linked directly to the SPREAD INDEX meter. Those rating systems that combine certain other factors with SPREAD INDEX to arrive at a FIRE DANGER CLASS would require a slightly different circuitry to provide a similar display capability. The estimated cost of producing such computers in volume is about $1,000 per unit, depending on the design refinements. Other approaches toward fire danger computers have been suggested as a result of developments to date.

A simpler, much less expensive, and essentially nonautomated electronic fire danger computer has also been proposed. Such a computer could be patterned after the "do-it-yourself" type constructed from high school science kits. Such computers usually operate on flashlight batteries and use inexpensive potentiometers and a simple electrical meter. As with slide rules, graphs, and tables, several successive steps would be required to obtain final answers. To perform one step in a series of calculations, two of the three potentiometers must be rotated and set to appropriately calibrated scales. Then the third potentiometer must be rotated until the null meter reads zero; at that position the answer for the particular step can be read from a suitably calibrated scale.

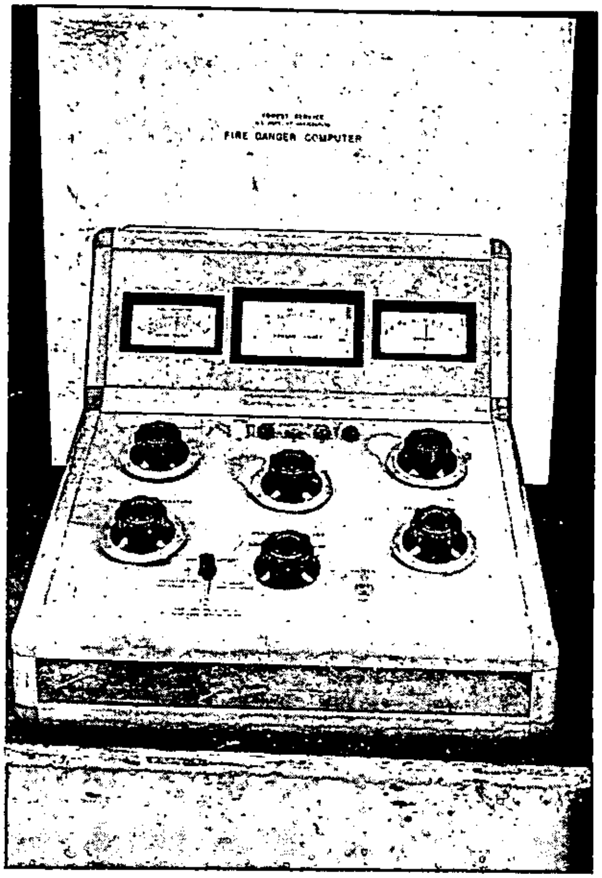

Figure 1.—Fire Danger Computer (Test Unit No. 1).

Computers are employed as research tools in the development and/or modification of various systems; one with a suitable design could serve a similar purpose for the National Fire Danger Rating System. A fire danger computer could be linked with suitable weather sensors via telemetry equipment and recorder equipment to provide fire danger data continuously or at preprogramed intervals. Such systems would, of course, require a computer design somewhat more sophisticated than that provided in the test unit. Suitable telemetry systems and sensors already exist.

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Fire Danger Computers—*Continued from page 5*

Perhaps the greatest present potential for units such as the one being evaluated is for training. Such a device can clearly illustrate the relative effects of the various individual input elements, as well as some of the concepts represented by the various calculations. The same purposes cannot be accomplished as conveniently or effectively with pencil and paper, tables, graphs, and slide rules and meters.

Additional phases of the National Fire Danger Rating System are still being developed. While these aspects will be of great importance to fire control managers, they will further complicate the rating process. Use of electronic computers may be the best solution for performing all of the various operations which may ultimately be required. If rating systems become too cumbersome or too subject to errors in calculations, it would be best to use a computer at a central location to handle the rating process for individual rating areas. A suitable communication system would, of course, be vital to any such centralization of the rating job.

Meanwhile, the slide rule meter or a simple computer such as that described above may be the only items both sufficient and justifiable. Use of the more elaborate and automated systems, except for training or research, may not be practical now. It is increasingly valid for managers to obtain assistance in choosing the best alternatives for making decisions. Increasing importance attached to the values at stake and suppression costs will require application of all phases of modern technology to the protection job, including fire danger measurement and rating.

THE HELICOPTER—AN EFFECTIVE FIRE-PREVENTION "TOOL"

DIVISION OF FIRE CONTROL

Region 9

A different approach to fire prevention problems is being evaluated on the Clark National Forest in Missouri. Since the spring of 1966, a helicopter fire-prevention and initial-attack project (with emphasis on prevention) has been conducted on three ranger districts. The other districts are serving as control areas. The Clark has a history of a high rate of man-caused fires.

PLANNED OPERATIONS

A Bell 47 Super-G helicopter, which carries a pilot and two-man crew, is used. The aircraft has a radio and a 40-watt public address system.

Planned use of the helicopter during the fall and spring fire seasons totals 110 hours. This time is budgeted as follows: Fall, 30 hours for hunter prevention contacts and surveillance and 10 hours for smoke investigation; spring, 50 hours for smoke investigation and 20 hours for prevention contacts and surveillance. In their prevention work, the helicopter crew patrols areas of hunter concentration and works with ground patrolmen in making prevention contacts. During general surveillance or smoke investigation missions, the crew contacts landowners doing burning (fig. 1). They also conduct "hot" investigations on fires started by incendiarists, debris burners, hunters, and others, and they observe and pursue suspects.

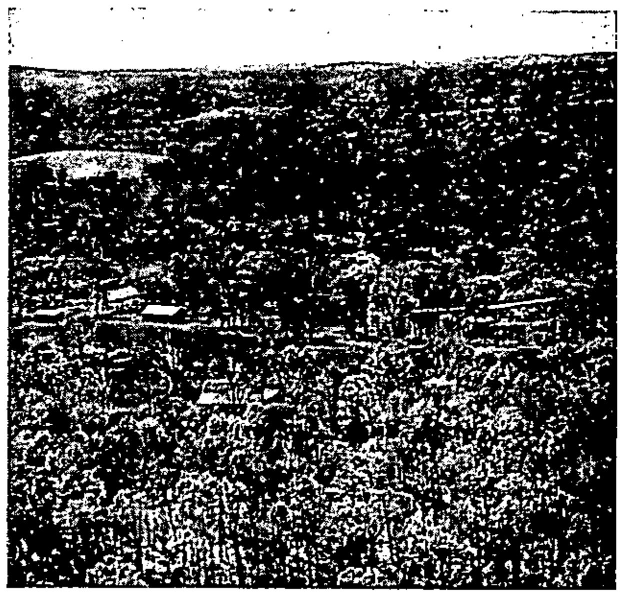

Figure 1.—"Controlled" fires of local ranchers that escape are responsible for one-third of the fires on the Clark National Forest. The helicopter crew can land nearby and advise the farmer on safe burning.

The helicopter crew is used on initial attack only on fires where it has a definite advantage over ground forces. When the crew is used in initial attack or for scouting a going fire, it is relieved of fire duty as soon as possible so that the men may return to prevention work.

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DISPOSING OF SLASH, BRUSH, AND DEBRIS IN A MACHINE-LOADED BURNER

HARRY E. SCHIMKE AND RONALD H. DOUGHERTY

Forest Fire Laboratory, Forest Service, USDA

Riverside, Calif.

Land managers continually seek better methods of disposing of slash, brush, and debris resulting from logging, thinning, and other clearing operations. The problems of disposal are many. When slash is dry enough to burn, burning in many cases is unsafe or difficult because of the control lines, constant watch, and mopup which are required. However, if weather conditions permit slash burning to be done safely, the material may not burn well; constant kindling, stoking, and chunking may be necessary. And sometimes slash will not burn at all. Of course, slash can be chipped, buried, or hauled away, but these methods are relatively expensive.

At times it is undesirable to "live" with the slash until conditions are right for burning by the usual methods. This is particularly true of slash left after road construction, or after the development of fuel-breaks or recreation areas. A method is needed to permit the burning of slash when it is created, regardless of its moisture content or weather conditions; this method must also cost less than other disposal methods.

Personnel of the Pacific Southwest Forest and Range Experiment Station developed and tested a portable slash burner. This unit is mechanically loaded and consumes slash as fast as it can be fed into the burner—regardless of how green or wet the material is. Burning can be done safely under all but the most hazardous burning conditions (fig. 1).

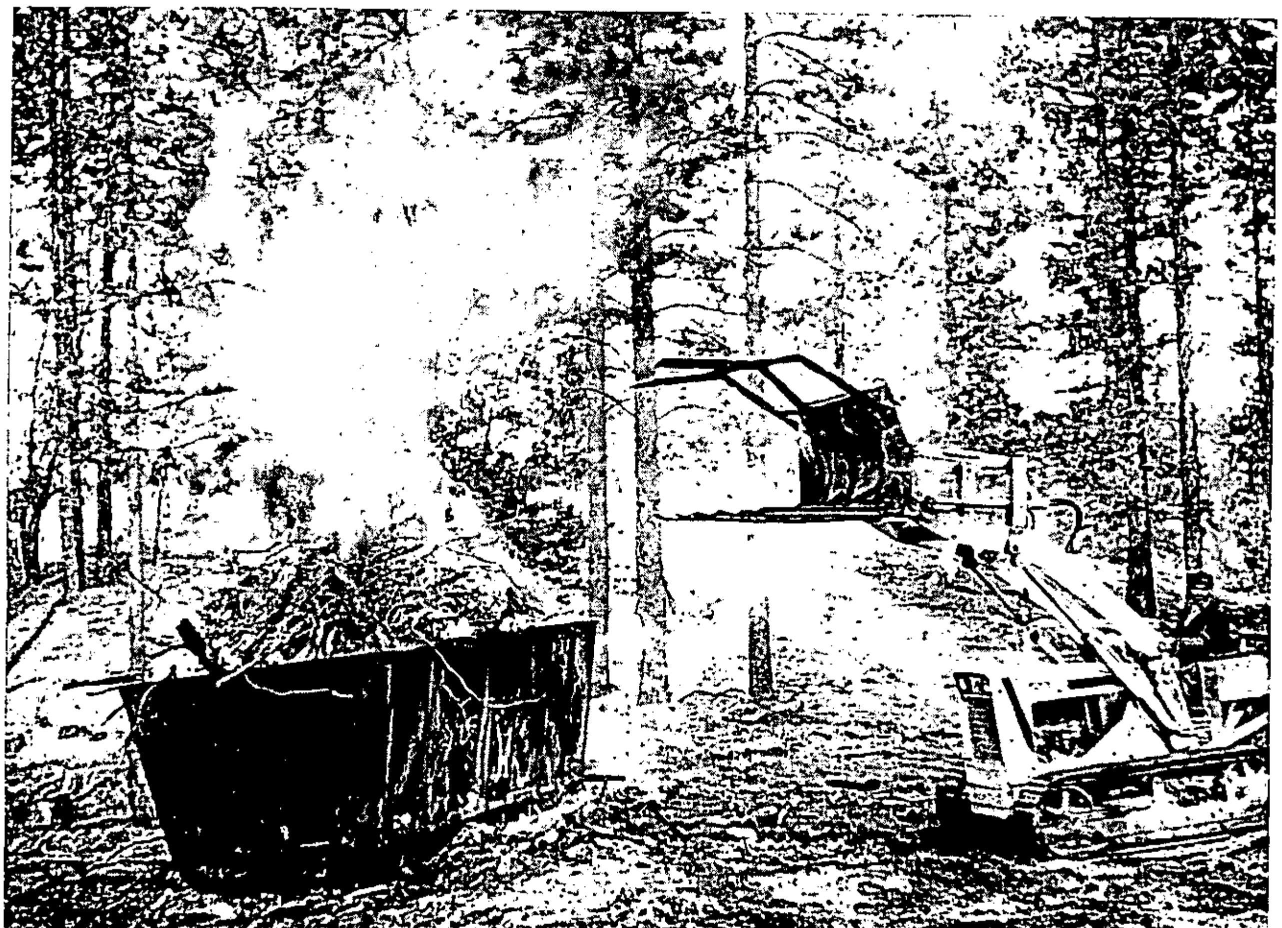

Figure 1.—Slash is hoisted into the burner box by this loader equipped with a specially constructed fork unit.

TEST CONDITIONS

The slash burning equipment was tested on six types of materials under various weather conditions. All trials were held early in 1966 at an elevation of 5,000 feet. The types of material burned during this test were:

1. Partly cured mixed-conifer slash resulting from fuel-break thinnings (hand-piled).
2. Small, green mixed-conifer sawlogs (cut and piled after fuel-break rethinning).
3. Cured mixed-conifer logging slash (as lopped).
4. Cured mixed-conifer slash and brush (piled by bulldozer during fuel-break construction).
5. Green mixed-conifer thinning-area slash (broadcast over the thinning area).
6. Green manzanita brush (bulldozed during land clearing).

Burning was done when it was raining, snowing, windy, calm, dry, and fair.

The burning was done in a confined unit; therefore, there was little danger of escape, and the operation was continued when open burning would not have been permitted owing to the danger of escape. More than 957 tons of material, an average of 9.2 tons per hour, were burned.

EQUIPMENT

The burner was an open-top, skid-mounted, transportable metal "box." It was 14 feet long, 6 feet wide at the base, and tapered outward to 8 feet at a height of 6 feet. The box was supported by 1-foot uprights on plow steel runners curved up on both ends. Fourteen-gage steel sheets were mounted to an angle iron frame on the sides and ends, with 1-foot holes at the base for a draft. The grates of the burner consisted of a channel iron frame supporting perforated airplane landing mats.

The loader was a small, 42-hp., crawler-type tractor with hydraulically operated, specially made front unit forks. None of the commercial forks were satisfactory for picking up slash. Therefore, Station personnel constructed a four-tined fork mounted to the backplate of the loading unit and a three-tined holddown fork which could be actuated by the hydraulic cylinder used to operate the loader bucket. The total unit weighed about 9,000 pounds and could lift and transport loads up to 2,000 pounds—a weight equal to that of a slash pile with a 7-foot diameter.

OPERATION OF BURNER/LOADER

One man could perform the entire operation. However, a swamper was kept with the unit—primarily for safety.

The loader pulled the burner into the slash area, unhooked it, and fed a couple of loads into the burner. After the load was ignited and began burning, the loader fed slash almost continuously, moving the burner as needed so the loader would not have to travel more than about 25 yards. Farther travel slowed the operation. The burner also had to be moved regularly to prevent a buildup of coals and ashes beneath the grates because such a buildup would reduce the desired air draft. And grates continuously embedded in coals would warp or burn out.

Slash which was not too wet was easily ignited with any conventional ignitor. For wet or green fuels, one or two discarded tires were used to get the fire going.

Sufficient coals usually remained in the burner overnight, and reignition was not necessary each morning.

More air was often forced through the burner with a wind machine to see if the addition of a blower system to the unit would be desirable. After numerous trials under various conditions, it was concluded that the added air, while accelerating the burning rate, was not needed. The fuels usually were consumed as rapidly as the loader could feed the burner.

The loader unit proved highly maneuverable and could work within close confines.

One phase of the test involved picking up unprepared material within a pine thinning area. The thinned trees had been sawed off and allowed to fall in place. Some thinnings were up to 25 feet long. Although considerable maneuvering was required, the material could be gathered and removed by the loader. But it was difficult to get the slash into the burner. If the trees had been bucked into 12-14-foot lengths and arranged in one direction, they could have been gathered, removed, and burned much more easily.

It was easy to pick up scattered logging slash where it lay. The forks were lowered to the ground, and the unit was moved through the slash deposits. When the forks were full, the load was delivered into the burner. The same procedure was followed in clearing slash and debris on roadsides.

Another phase of the test involved loading and burning green manzanita brush as it was cleared by a bulldozer. This material burned very hot and rapidly. A larger burner would be required if much brush of this size were to be burned. Because of its size and shape, manzanita brush usually would hook onto the sides of the burner and not fall completely into the fire.

COSTS

Average hourly costs for slash disposal follow:

End loader, crawler type	[1]$2.00
Operator	[2] 3.26
Swamper	[3] 2.71
Burner	[4] .31
Total	$8.28

[1] Based on Forest Service WCF equipment rental rates for FY 1966.

[2] Based on 1966 GS-7 salary.

[3] Based on 1966 GS-5 salary.

[4] Initial cost of $800 amortized for 4-year period (based on annual use of 8 hours per day, for 20 days per month, and for 4 months).

The cost per hour per ton ($0.90) compares favorably with other methods of slash disposal, and it is cheaper than most methods. Disposal by piling and burning cost $1 per ton, where there were 15 tons of slash per acre.[1] In studies of slash disposal in the central Sierra mixed-conifer type,[2] burying slash cost $1.76 per ton and chipping $2.77 per ton.

DISCUSSION

The method of slash disposal described in this article can be adapted to most situations. However, use of the loader is limited in steep, rocky, or dense-growth areas.

For most burning jobs, the largest burner that can be transported legally on a 1½-ton truck should be used. Such a unit could be 18 feet long, 8 feet wide, 7 feet high, and have a minimum clearance of 18 inches between the grates and the ground. A larger unit could be designed for logs, stumps, or other large material, but this would require special transportation equipment (tilt bed, low boy, etc.). The sides of the unit should be vertical so the slash load will bear directly onto the fire bed and grates and not onto the sides. To prevent the grates and frame from sagging, the runners should be placed well in from the sides so they will support the slash load directly. The unit should be equipped with a stiff hitch to prevent the burner from overrunning the loader when traveling downhill. The steel used in building the unit should be of heat-tolerant firebox plate. Its cost is slightly higher than that of mild steel.

The 40-hp. crawler loader proved a satisfactory companion for a burner of this size. The loading unit should have six forks, each 5 feet long, spread over an 8-foot width. It should be made of spring steel heavy enough to withstand all stresses encountered. Three holddown forks, made of the same material, are sufficient. A plastic shield should be provided to protect the driver from the intense heat of the fire.

With this loader-burner combination, slash volumes of about 200 cubic feet can be cleanly picked up with one pass. Once a loading technique is developed, production rates of 10 tons per hour can be expected.

Owing to the high burning temperatures and combustion efficiency maintained, little smoke was emitted. Little spotting occurred because the material that normally develops firebrands was rapidly and completely consumed. Because the fire was always contained, the need to care for many fires, as in pile burning, was eliminated. Therefore, there was no need to place lines around numerous pile fires, chunk and patrol, or extinguish them. If conditions require the burning to be shut down, it is easy to extinguish the burner fire.

[1] Unpublished fuel-break construction costs on file at the Stanislaus National Forest, U.S. Forest Serv., Sonora, Calif.

[2] Schimke, H. E., and Dougherty, R. H. 1966. Disposal of logging slash, thinnings, and brush by burying. U.S. Forest Serv. Res. Note PSW-111, Pacific SW. Forest & Range Exp. Sta., Berkeley, Calif., 4 pp.

INFORMATION FOR CONTRIBUTORS

Please submit contributions through appropriate channels to Director, Division of Fire Control, Forest Service, U.S. Department of Agriculture, Washington, D.C. 20250. Articles should be typed in duplicate, double spaced. The author's name, position, and organization should appear directly below the title.

Articles covering any phase of forest, brush, or range fire control work are desired. Authors are encouraged to include illustrations with their copy. These should have clear detail and tell a story. Only glossy prints or India ink line drawings can be used. Diagrams should be drawn with the page proportions in mind, and lettered so as to permit any necessary reduction. Typed captions should be attached to the illustrations, or included in the text following the paragraph in which they are first mentioned.

ARSON IN THE FOREST

EDWIN R. OUTLAW, *Criminal Investigator*
Ozark-St. Francis and Ouachita National Forests

Arsonists are hard to apprehend, so it is a great day in the life of a criminal investigator when he is able to obtain a confession made freely and openly. This happened recently to the author, when a young man, who we'll call John Thomas, admitted setting several fires.

The story began on a Monday in early March when Thomas reported a fire to Forest Service personnel and then helped suppress it. The fire was on private land, immediately adjoining National Forest land, and burned 28 acres. The same night another fire burned itself out, destroying an old house. Two days later, nearby fires were extinguished, again after being reported by Thomas, who had smelled leaves burning. District personnel noted that Thomas had reported each of the fires. On Friday the situation really became difficult. Thomas reported that he had been wounded in a gun battle with arsonists.

I immediately contacted the county sheriff, who had made a preliminary investigation of the shooting. He stated that while he could not obtain evidence, he thought Thomas set the woods on fire and shot himself to make it look good.

Thomas was called in for an interview. He told me how he had helped put out the fires. He also said that on Friday night, he went over the ridge and saw two men setting fire to the woods. He fired at one of them, and they began to run, shooting at him as they fled. He returned their fire, and believed he hit one man, as he heard him grunt. Part of our conversation follows:

"The other man turned around and started shooting at me, and the stock of my rifle probably saved my life. As it was I got hit in the leg with a bullet."

"Could you describe either man?"

"No, they were running away from me, and I didn't get a good look at them."

"Do I have your permission to make laboratory tests of the revolver and rifle?"

"Sure, and if you want me to, I'll take a lie detector test."

The State Police obtained a .22 revolver, the rifle, and Thomas' trousers, minus a swatch mysteriously cut from one leg, and sent these items to the FBI laboratory for tests. The examination disclosed that the right side of the front portion of the stock of the rifle had been damaged by a projectile about 0.23 inch in diameter. The damage was the same as that produced by a small caliber bullet fired at close range and traveling at a relatively low velocity.

When this report was obtained from the FBI, I went to reinterview Thomas, but he had vanished. I then visited his girlfriend, and she said he was working in a nearby city. When I told her I wanted him to take a lie detector test, she was surprised for she thought he had taken one. She said she would help me locate him. On Saturday night, March 26, the girl called me and said Thomas was ready for a telephone interview. He promised to meet me on Monday the 28th. However, he didn't appear for this interview or for a second one arranged for April 11th.

He had left the area, according to the county sheriff, who told me that he had a warrant for Thomas' arrest on a charge of issuing a bad check. He said that he would notify me if Thomas were apprehended. When I again interviewed his girlfriend, she told me he was living in a motel in the city and had a job there. Accompanied by the investigator on the Kisatchie National Forest, John E. Boren III, I located the motel, and started watching it. During the evening a man—not the suspect—came to the room to pick up Thomas' clothes. At 11:30 p.m., we received a phone call from Thomas, who said he would be in the Ranger's office the next morning. Again he did not appear.

On April 27, Thomas was finally interviewed. He had been apprehended in Minnesota on the bad check charge, and returned to the county jail.

He told the story substantially as it had been deduced, and added details about the shooting. He said he was carrying his pistol in a cocked position and accidentally shot himself in the left leg. After being hit, he became frightened and returned to his truck and got his rifle. He then fired three shots from his pistol at the stock of the rifle, and the remaining shots into the air. He then got back into his truck, returned to his girl's house, and told her about running into the man.

In confessing, he said that he did not know why he had set the fires, that he did not know whether they were on private land or on National Forest land, and that he really didn't care. He told me he was sorry he had set the fires, and that after serving his time on the check charge, he would reimburse the Forest Service in any way possible.

This investigation is an excellent example of what can be accomplished when Forest Service personnel carefully investigate a fire, and receive all possible cooperation from county, State, and Federal law enforcement agencies.

A NEW TOOL FOR SLASH DISPOSAL

ROBERT L. ASHER, *Fire Control Technician*
Winema National Forest

The disposal of logging slash in the pine and transition types has long presented a problem. Patch clearcutting, where the slash can be treated by broadcast burning, is seldom practiced. Selective cutting or various degrees of shelterwood harvesting are much more common. The cost of disposing of the logging debris in these areas is high, and the possibility of the residual stand being extensively damaged is great.

EQUIPMENT TESTS

To reduce costs and to minimize damage to valuable reproduction, personnel of the Wimena National Forest, Oreg., experimented with machine piling. Various tractor sizes, from a John Deere 440 to a D-8, were used. Straight blades and standard brush blades were tested. Success varied according to the combinations of equipment used.

The larger tractors effectively piled the slash, but they were expensive to operate and often damaged the residual stand extensively.

Smaller tractors did not damage the residual stand as much, but they could not move some of the material efficiently.

Use of straight blades resulted in excessive stand damage and soil disturbance. Even the best operator could not see well enough to avoid damage. Also, without the rake effect, either excessive material is left on the ground or much soil is carried into the piles. Therefore, burning was difficult.

Much better results were obtained with the standard brush blade. Because of the rake advantage and better visibility, much cleaner piles were built. Damage to residual stands also was reduced. However, the tractor had to be positioned behind the slash to be piled, or the slash had to be sideswiped away from residual trees so it could be moved into the piles. This operation often created as much slash from destroyed reproduction as the amount treated.

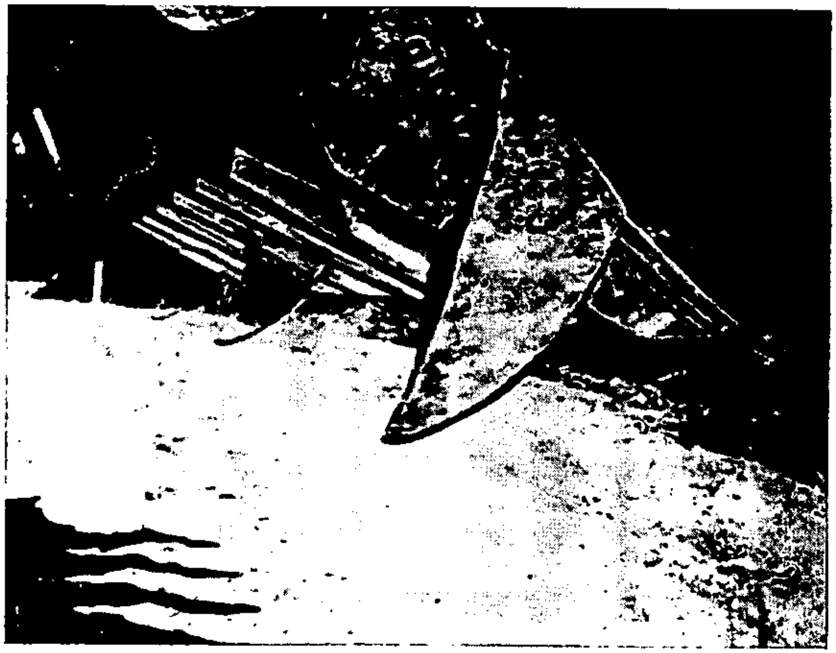

Figure 1.—View of reverse teeth mounted on standard brush blade.

USE OF REVERSE TEETH

To reduce damage to the residual stand, the old principle of reverse teeth on a brush blade was employed. There are several blades which will do the job, but they are quite expensive. They work on the principle of a set of teeth which can be reversed when the blade is to be used to pull material. After the conversion is completed, they make an effective tool. These blades were developed for rock work on road construction, but they are adaptable for slash disposal. Their main disadvantages are their excessive cost and the difficulty and expense of changing the position of the teeth. Also, with the teeth reversed, the blade is not as effective in pushing material.

To overcome these drawbacks, the standard brush blade was modified by welding three solid reverse teeth on the outside and middle teeth (figs. 1, 2). The teeth are small and utilize the back of the brush blade as part of the whole device. The cost of modifying the blade, including buying the stock, cutting the teeth and braces, and welding them in place, was about $75.

ADVANTAGES OF NEW BLADE

This device has several advantages over other brush blades and reverse tooth systems. In addition to lowering the cost of the initial investment, residual stand damage can be substantially reduced because the slash can be pulled away from standing trees instead of being pushed. Second,

Continued on page 12

Slash Disposal—*Continued from page 11*

one piece of equipment can be adapted to several jobs. Finally, the size of the brush crew working with the tractor can be reduced considerably. With the conventional brush blade, six men and four chain saws were needed. They had to hand treat almost 25 percent more slash. With the new blade, the slash could be treated by two men with chain saws and the tractor operator.

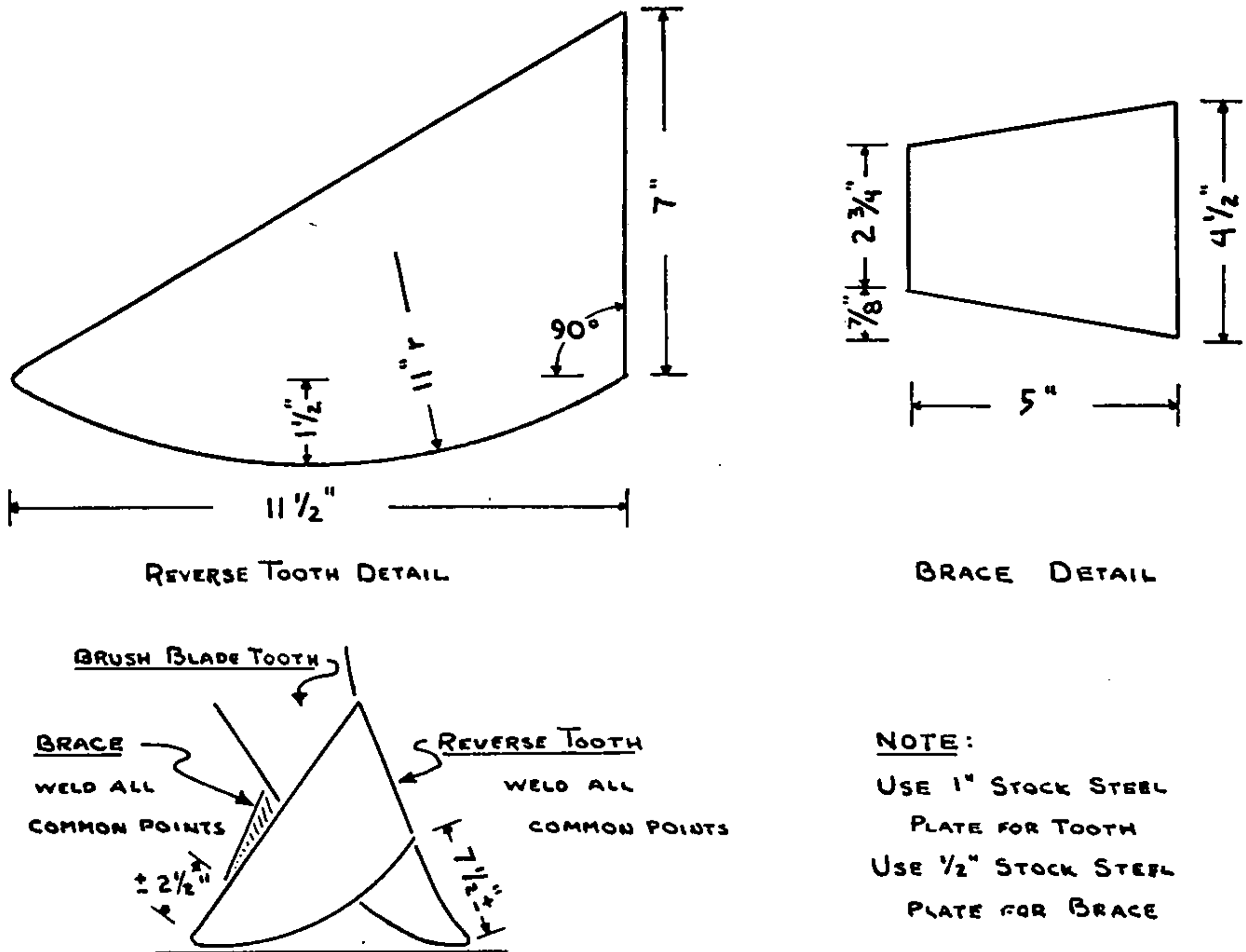

Figure 2.—Fabrication details of reverse tooth and brace are shown. The brace is welded to the reverse tooth and the opposite side of the brush blade tooth.

SPARK ARRESTING MUFFLERS FOR POWERSAWS

Washington Office Division of Fire Control

Forest Service timber sale contracts and other permits usually contain provisions which require spark arresters on internal combustion engines during the fire season. Effective mufflers and arresters for heavy equipment have been available for many years, and in 1959 a standard[1] was established for them to qualify under the contract provisions.

However, this standard does not apply to arresters mounted on engines used in multiposition applications (for example, chain saws). Without definite guidelines to rate such arresters, requirements for chain saws have varied by regions. Usually the standard factory mesh- or baffle-type mufflers in good condition have been accepted for situations other than extreme fire danger.

In 1964, the San Dimas Equipment Development Center conducted special tests to establish suitable

[1] Forest Service Interim Standard No. 1 for Spark Arresters for Internal Combustion Engines, Apr. 7, 1959. (Superseded in Jan. 1965 by Forest Service Standard for Spark Arresters for Internal Combustion Engines, Standard 5100-1)

requirements for powersaw spark arresters. These tests measured the temperatures of the arrester shell and the exhaust gas, the carbon arresting effectiveness, and the back pressure that developed. Results have been shared with the manufacturers and with the Power Saw Manufacturers' Association Committee on spark arresters.

The Center determined that a screen-type arrester-muffler will meet the requirements for powersaw engines if screen openings do not exceed 0.023 inch. At least 80 percent carbon arresting effectiveness is obtainable. Screen clogging is usually due to lead precipitates from the gasoline, rather than carbon. As with all arresters, careful inspection and maintenance are necessary for satisfactory performance.

While an official standard has not yet been established, the San Dimas Center has developed the following guidelines for powersaw muffler-arresters:

1. The arrester should have a woven screen with a maximum opening of 0.023 inch.
2. The screen should be constructed of heat- and corrosion-resistant wire at least 0.025 inch in diameter. Stainless steel or a chromium alphatized screen is recommended.
3. The total screen opening area (effective exhaust area) should be at least 125 percent of the engine exhaust port area.
4. Construction of the unit should permit easy removal and replacement of the screen for field inspection and cleaning.
5. The arrester should be capable of operating for a minimum of 8 hours before cleaning is needed.
6. The screen should be usable for 50 hours.
7. The screen should be inspected at least after every 25 hours of use, and should be replaced as soon as corrosion and a resultant increase or decrease (clogging) in opening size are noted.
8. Replacement screens should be carried by saw crews.

A FIRE TOOL SUPPLY TRAILER

Milo R. Drilling, *Forestry Technician*
Huron-Manistee National Forest

A fire tool supply trailer developed on the White Cloud District provides a fire cache that can be moved quickly and easily to a going fire (fig. 1). During high fire danger the trailer is dispatched to each fire with the initial attack force, making tools and equipment readily available for use by reinforcements or volunteers reporting at the fire scene.

The trailer can hold tools and equipment for as many as 60 men. It also has a small portable pump, hose, and a 100-gallon water supply (fig. 2). The compartments are of varying size, permitting the transportation of equipment needed for any local conditions.

The unit has a gross weight of 2,100 pounds and can be pulled by a half-ton pickup. It has a "Prior Level Ride" axle, which permits good stability even on rough roads.

The unit, which has proven useful on 20 fires, also serves as a fire headquarters, a communications center, a timekeeper's station, and a first aid station.

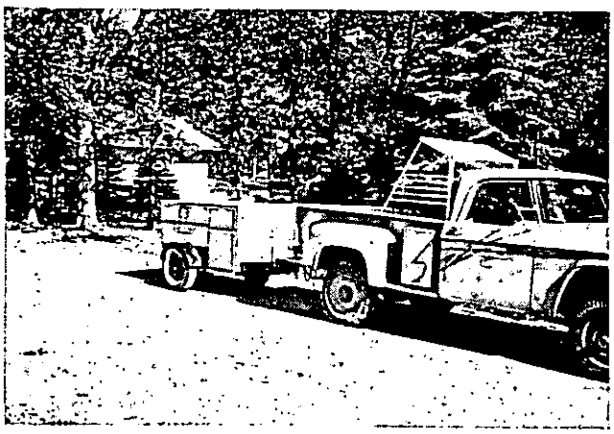

Figure 1.—The fire tool supply trailer is shown.

Figure 2.—These tools and equipment are transported by the trailer.

Fire-Weather Stations—*Continued from page 3*

was constructed from 3- to 5-foot segments of hollow aluminum tubing. The stakes for guy wire supports for the tower were driven into the frost with sledge hammers.

The observer, Winthrop Silver, closely watched the unpacking of the instruments and their installation in the shelter. Each instrument and its operation was explained, and indoctrination in taking observations was given (fig. 1). He was shown cloud charts and how to identify various cloud types, particularly the cumulus varieties. He was also shown how to encode the sky condition, dry and wet bulb temperatures, wind direction and speed, rainfall amounts, maximum and minimum temperatures, and thunderstorm activity. Silver was shown how to operate the radio, which we installed in one corner of his log cabin, and how to transmit this information. All fire-weather observers in Alaska report weather data twice daily. These observations are sent by radio to collection centers at McGrath, Fairbanks, and Anchorage at 8 a.m. and at 2 p.m. Alaska Standard Time.

Our airplane finally left the shore at Stevens Village and pulled out onto the wide, roily Yukon River at 6 p.m., and we then flew to the airport at Fort Yukon further to the northeast.

The recorded cost of the initial establishment of the Stevens Village Fire Weather Station was $1,947. This figure does not include time spent in planning or successive costs for operation and maintenance.

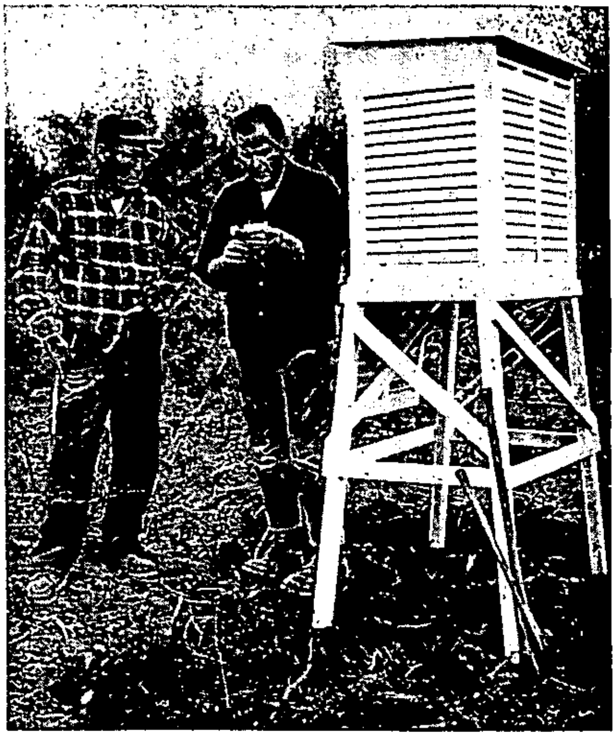

Figure 1.—Winthrop Silver receives instructions on the operation of the newly installed Stevens Village fire weather station, just south of the Arctic Circle in Alaska.

THE FOREST LOG

Oregon Department of Forestry

Forest fires last year destroyed more value in Oregon than at any time since the first Tillamook fire of 1933.

Forest property damage approached $4,050,000 during the 1966 fire season on lands under protection of the State Forestry Department and cooperating Forest Protective Associations. Some 1,301 forest fires burned over 52,671 acres. Although the number was only 20 more than the previous year, the burned area was up 38,625 acres.

The Oxbow fire which exploded on August 20 accounted for 42,875 acres of the burned area this past year and caused in excess of $3,000,000 damage. Control costs on this fire ran to over $900,000. The second most disastrous conflagration was the Ivers Peak fire which occurred on August 9 and covered 1,636 acres before it was controlled at a cost of $443,204. Damage was estimated at $298,225.

Fire Prevention "Tool"—*Continued from page 6*

Wide publicity has been given to the helicopter project. News media personnel throughout Missouri were invited to see the operation. Demonstrations of the aircraft and its capabilities were made at schools and at smaller communities within the study area. Selling fire prevention was the main goal.

RESULTS

The helicopter prevention project is proving effective, not only in the many prevention contacts within the study area but in the investigation of incendiary fires. It has discouraged persons who might set fires because they realize how easily and quickly the crew can arrive (fig. 2).
Forest officers directly connected with this project feel that the response of the school children and citizens who have been contacted is good.

One apparent result has been that the incendiary fires are now generally set at night. To counter this effect, the Forest personnel have increased their fixed-wing, multiengine night aerial detection flights, and ground patrols have set up stakeouts during high fire danger. Incendiarists are finding it more difficult to set fires within the study area.

During the 1966 spring fire season, it was difficult to determine the success of the program due to many variables in weather, risk, etc. However, the cost of the project was definitely offset by the reduction in ground forces needed for smoke chasing, fire suppression, investigation, and prevention contacts.

In the fall season, when den tree fires are the main cause of wildfire in the study area, an effort was made to contact all hunters, either at their cars or in their camps. If no one was present, a prevention message was left. Sometimes a hunter or camp would be contacted through the public address system on the helicopter or by dropping a message. During the latter half of the deer season, only one "accidental" fire occurred. During the squirrel season, only one den tree fire occurred in the area; formerly there was a high concentration of den tree fires.

During the 1967 spring fire season, the helicopter continued to prove its value as a prevention tool. Through April 15 the Potosi Ranger District checked 101 landowner-controlled fires which did not develop into statistical fires. The helicopter checked 80 of these. However, eight additional fires escaped control by the owners and required

Figure 2.—Fast initial attack by the helicopter crew held this incendiary fire to less than one-fourth of an acre. Their early arrival probably prevented other sets.

suppression. The average size of these fires was 1.75 acres; prior to the helicopter project, debris fires averaged 6.5 acres.

CONCLUSIONS

The following improvements in the Forest fire control program have been noted in the study area:

1. No severe incendiary fires.
2. A drastic reduction of hunter and den tree fires.
3. A reduction in debris fires which escaped owners' control.
4. Stimulation of all phases of fire control.
5. A reduction in fire costs, and strengthening of the suppression organization.
6. Good public reaction supporting the stepped-up program and this new "tool."

In summary, the helicopter is proving an effective tool in both fire prevention and suppression in Missouri. But the helicopter alone cannot substitute for all prevention and investigation activities. However, in combination with supporting ground crews, night aerial detection, periodic round-the-clock surveillance, and good public relations, it offers an opportunity to reduce indiscriminate burning in the Ozarks.

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ELECTRONIC DISPLAY FOR FIRE NEWS

MERLE F. PUGH, *Writer-Editor*
Pacific Northwest Region

Because major forest fires are of interest to almost everyone, Forest Service fire dispatchers are very frequently asked for information during a "going fire" situation. Coworkers and the public want to know what's going on.

Last summer an electric "bulletin board" was installed (fig. 1) in the lobby of Portland's Multnomah Building, where Region 6's headquarters are located. The board proved popular and valuable.

The visual display system was used throughout the fire season to show fire danger by areas and the location and size of going fires. A two-circuit panel in back of a cork facing illuminates the lights (Glo-pins) and tubes (Glo-tubes) stuck into it. A flashing unit permits certain pins to flash on and off (when fires are out of control). Lighted tubes indicate the names of fires burning and their acreages. When a fire is controlled, a "controlled" tag is placed on the tube.

The Region also uses the electronic display to provide information on other National Forest activities. For example, during the winter ski areas are shown. Areas open daily have one color of lights; those which operate only on weekends have another color.

Several electronic display boards are sold; they cost $200 to $2,000. The two-circuit unit purchased by Region 6 costs $360; in addition, a power-pack costs $146; a flashing unit, $82.10; and Glo-pins, $1.75 each. The total cost was approximately $600.

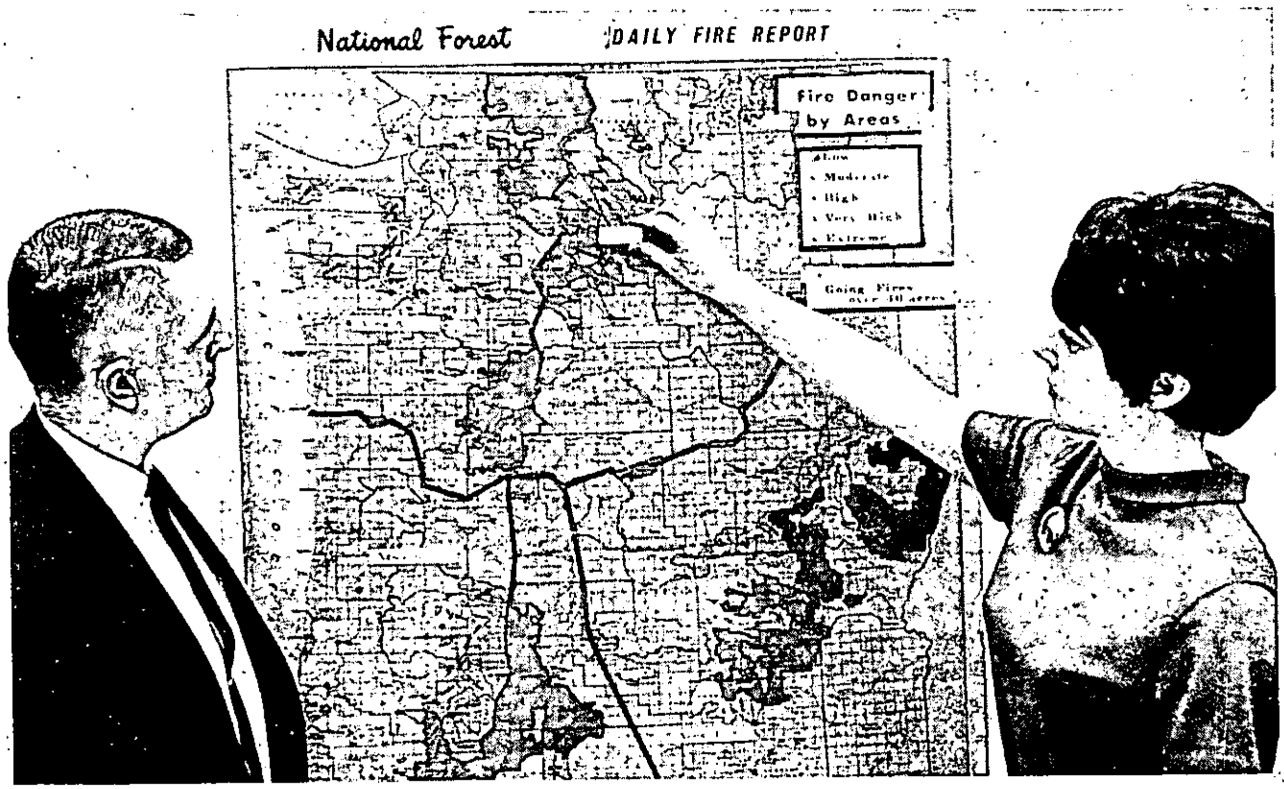

Figure 1.—Region 6 Fire Dispatcher Clarence Edgington and Assistant Dispatcher Yvonne McNeil examine electric display board showing fire danger and going fires.