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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 techniques may be communicated to and from every worker in the field of forest fire control.

Volume 19 Number 3

FIRE CONTROL NOTES

A Quarterly Periodical Devoted to the

TECHNIQUE OF FOREST FIRE CONTROL

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, 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.

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RADIO PROCEDURE—YOUR KEY TO EFFECTIVE OPERATIONS

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The use of radio as a major weapon in fire control activities as well as in general forestry operations has progressed at such a phenomenal pace since the end of World War II that many users have lost sight of proper operating procedure. Radio equipment is now installed in vehicles operated by State foresters, and in dozers, helicopters, and other Service equipment. The ability to utilize the full potential of these adequately equipped radio systems is fully dependent upon proper procedures and practices. Your system is only as good as your worst operator.

Good operating procedure must start at the top administrative level and carry down through the lowest unit by training and example. A standard operating procedure manual describing the radio system in nontechnical terms is the first criteria for successful operation.

The manual should contain the complete procedure as applied to field forces, including many examples of typical transmissions so that even the most unfamiliar crewman can substitute his own case for the example and find a usable message.

Each employee who will operate the radio must be issued a procedure manual. Each station, whether radio equipped or not, should have sufficient manuals assigned to it so that all employees can have an intimate knowledge of proper operating procedures. Prime examples must be set by the dispatcher, rangers, and other supervisory employees. A supervisor who uses sloppy procedure cannot expect anything better from his employees. The ranger, his assistant, or the dispatcher should spend as much time as possible instructing new personnel in proper radio usage before they are permitted to operate. Only in this way can reasonable success be expected. In large forestry agencies, administrative communications personnel should be employed to help in these matters and to provide nontechnical communications assistance to Fire Control and other policy divisions.

STATION IDENTIFICATION

Each base station is assigned a Federal radio call sign, generally 3 letters and 3 numbers. This call sign is the legal identification of the station. In a large system, the number of call-sign combinations is excessive, and the radio channel is a mass of confusing letters and numbers. Obviously this makes it difficult, if not impossible, to remember the call sign of every station. Under such circumstances, geographical call signs are preferred. These are assigned by the system administrator and generally are the name of the ranger station, lookout, or activity where the radio is located.

The geographical call sign is used in all communications between stations and between stations and their respective mobiles. If the Miami Ranger Station calls the Bass Lake Guard Station, the transmission would be as follows: "Bass Lake—Miami." You will note that the name of the called station is transmitted first, followed by the name of the station doing the calling. If the order is reversed, *all* base stations must listen when they hear "Miami" in order to determine whether the call is for them. By using proper procedure, the called station is alerted in time to hear the identification of the station making the call.

The assigned legal call sign must be given at the end of each transmission or series of transmissions. This means the full call, including both letters and numbers, because the use of only the numbers is a violation of the Federal regulations for station identification.

Stations used as temporary base stations are in many cases licensed to only a single call sign, such as KMB453. The licensee then must add a unit identification to the call, such as "Unit 1, KMB453; Unit 2, KMB453." The use of the geographical call sign would still apply to these units, however; in signing off at the completion of the transmission they would identify as "Unit 1, KMB453."

MOBILE IDENTIFICATION

Most mobile units and handie-talkies are identified by unit number and there are few problems. Several methods are used in establishing uniform mobile identification. For example, California employs a four-number identification for all units. The State is divided into six districts for administrative purposes. The 1st digit of the 4-number assignment identifies the district; the 2nd, the ranger unit; the 3rd and 4th, the unit or vehicle number. For example 5424 would be vehicle 24, in ranger unit 4, district 5. Such a mobile identification system eliminates confusion and readily identifies all units.

As in other transmissions, the mobile identification is used first when being called by a base station—"5424—Miami." The mobile need only state his number to signify that he is receiving the call. Other phrases such as "5425 bye," and "5424 go ahead," are not necessary. Because of the increased use of radio-equipped aircraft, the mobile identification number, or a part of it, should be painted on the roof of each vehicle to facilitate air-to-ground identification and communication.

GENERAL PROCEDURE

The strictest procedure possible without loss of efficiency is to be desired. All personnel should be cautioned to keep all messages brief and to the point. One fault common to many operators is their inability to know when they start to repeat themselves. Give the message in brief detail; if more information is required, the other station will ask for it. It should not be necessary to ask initial attack units for an appraisal prior to their arrival at a fire. Good forestry procedure requires that the first

unit issue a size-up on arrival. Likewise, lookout reports should be precise and in a predetermined manner. How many times have you heard a lookout give a very detailed report and then have the dispatcher ask "What's it look like?"

All personnel should be impressed with the need for monitoring the radio channel prior to transmitting. Nonmonitoring causes interference and unnecessary repeats. Particular attention should be given to this by lookouts and aircraft. From high elevations, signals travel many miles and cause considerable out-of-area interference.

One other common fault that increases radio traffic usually occurs at the dispatcher level. General-information broadcasts are transmitted to several stations and/or mobiles by the dispatcher. He signs off with "All units acknowledge" or similar phraseology. The acknowledging units then do as requested, and usually at the same time. This results in a jumble of acknowledgments and many repeats become necessary. It is desirable that the dispatcher at the completion of his broadcast state each station's name or mobile number in order and obtain an acknowledgment before going on to the next one. This is a little more work, but the results are positive because in the long run traffic is reduced.

CODES

A standard radio code that uses numbers to replace standard phrases should be adopted for use by all personnel in a system, because it materially reduces radio traffic. Such a code is given at the end of this article.

LOGGING TRANSMISSIONS

The method of logging a dispatcher's messages varies between agencies, but generally it is done word-for-word in a page-type radio log. In the initial stages of a going fire, the assistance of a second person is usually needed to keep the log up to date. Units going in and out of service are lost in the log pages, and continual rechecking is necessary to find them. Actually, the Federal Communications Commission's Rules and Regulations under which non-Federal agencies operate require logging only the name of the operator of each base radio station (ranger, lookouts, guard stations, etc.) and his period of duty. Systems administrators should review their procedures to determine whether unnecessary log work is being done. Approximately 90 percent of all administrative broadcasts could probably be eliminated from the logs.

One method of keeping track of units is to use a series of pegs upon which are hung 1½- by 3½-inch white tags with the status of each unit written on them. As a unit reports a change in status, its tag is changed. Thus, the status of each unit is readily available at all times.

Another method of keeping track of units is for the dispatcher to keep a fire-alarm log for each fire. It has a place for first report and the time. Each station is listed in order, and a space is available to record the time each station was dispatched. Also a series of columns is available to show the following: 1, Unit

number; 2, time in service; 3, time canceled and returned to station; 4, time of arrival at fire; 5, time assignment completed and in service to station; 6, time of arrival at station. There is a space for "Control-time" and who reported it. This preprinted form keeps a complete record before the dispatcher of units assigned to a fire as well as their progress in reaching the fire, and it becomes a handy aid in completing the formal fire report.

The amount of radio traffic possible on any radio frequency is directly dependent upon the way the system is operated. One of the most valuable natural resources in fire control today is the radio spectrum. Once radio frequencies become saturated, they cannot be replaced. Only by use of effective operating procedure can we conserve this vital natural resource.

RADIO CODE USED BY STATE AND COUNTY AGENCIES IN CALIFORNIA

All calls not accompanied with the statement code: two, three, are routine calls and should be considered code one.
CODE ONE—At your convenience.
CODE TWO—Proceed immediately without siren or red light.
CODE THREE—Proceed immediately with siren and red light.
CODE FIVE—Additional assistance may be needed.

10-1	Receiving poorly
10-2	Receiving well
10-3	Stop transmitting
10-4	OK or acknowledgment
10-5	Relay
10-7	Out of service
10-8	In service
10-9	Repeat
10-10	Out of service at home—subject to call
10-11	Transmitting too rapidly/over-modulating
10-13	Weather
10-19	Return to your station or returning
10-20	What is your location?
10-21	Call the dispatcher by phone
10-21a	Advise my home I will return at.....
10-21b	Call your home
10-22	Disregard last message
10-23	Stand by
10-25	Do you have contact with .....
10-36	Correct time
10-37	Who is the operator?
10-39	Can.....(Name).....come to the radio?
10-40	Is.....(Name).....available for phone call?
10-45	Use code
10-48	I'm now ready to take information
10-49	Proceed to.....
10-55	Confine message to official business
10-69	Have you dispatched..... ..... ?
10-86	Traffic check
10-87	You are to meet.....
10-89	Need radio serviceman at..... .....
10-97	Arrived at scene
10-98	Finished with last assignment
10-99	Unable to copy, change location
903	Airplane crash
904B	Brush fire
904F	Forest fire
904G	Grass fire
904I	Illegal or incendiary fire
904P	Plane fire
904S	Structural fire
904V	Vehicle fire
909	Traffic conditions need CHP
910	Can handle
950	Burning permit fire
951	Need C.D.F. investigator
952	Report on conditions
953	Check smoke
954	Off the air at scene of fire
955	Fire under control
956	Need mechanic

A TRAINING COURSE IN AERIAL SCOUTING

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N. C. Department of Conservation and Development

The North Carolina Division of Forestry has been using both contract and State-owned aircraft for scouting large fires for several years. Most extensive use of this service is in large, inaccessible areas of the Coastal Plain section of the State where aerial scouting has become routine in the suppression of the swamp fires.

Before the State purchased aircraft, the contract system was used exclusively for several aircraft at scattered points to insure coverage. It was found that the success of these scouting flights depended entirely upon the ability of the man in the plane to analyze the problem of the fire boss and to provide him with information that was both accurate and relevant to his suppression problem. It was also discovered that neither an experienced pilot nor an experienced fire control man made a good aerial scouting observer until experience was gained in this particular type of work. Consequently, the time required to get one of the few qualified observers to the plane often offset the value of the flight.

The most practical solution seemed to be to train selected forest rangers throughout the area in the technique of aerial scouting. Beginning in 1951, this training was conducted during the annual ranger training schools for eastern districts. Twelve hours of instruction were devoted to the course, and the course was repeated 3 times during the 2 schools to insure small classes and individual instruction. Several men were able to take the course each year. After acquisition of State planes and employment of regular pilots, this training was on an on-the-job basis, but the same subject-matter structure was retained.

Since all the students were experienced fire bosses, emphasis was placed on the type of information that could be obtained from the air and how it could be transmitted to the ground. This was accomplished through intensive instruction and practice in aerial mapping and radio and message-drop communication.

The course followed this pattern. The estimation of distance and direction in locating a fire and of size in plotting it were approached through navigational methods, and the aircraft compass was used to obtain bearings. After preliminary lecturing, all of the navigation techniques were covered in hypothetical problems worked out individually by the students with assistance from the instructor. This was followed by an orientation flight in a four-place aircraft with the instructor present. On this flight the students located ground points on their maps by plotting bearings from known landmarks and by computing distances by time and speed. The purpose of the flight was to introduce the students to flying.

A second flight was made over a distinct old burn with only the student and the pilot in a conventional two-place scouting aircraft. This flight allowed the student nearly an hour over the burn. He mapped the fireline, sketched in the breaks, determined the cover types, answered questions about the nature of the fire, and dropped messages to a party on the ground. Radio contact was maintained throughout this flight, and the pilot acted strictly on the instructions of the student.

This flight was followed up by a trip to the burn on the ground where the student could compare his impressions from the air with the actual terrain.

The final step was either a third flight or a series of colored slides showing the burn at several angles and from different altitudes. Aerial photos and a type map of the area were also provided after the students had completed their mapping flights.

By using the four-place plane for the first flight, carrying two trainees and the instructor, the cost of instruction per student was kept very low. Most of the men who received the instruction have scouted several fires from the air since receiving this training. They have gained confidence in their ability and are using aerial scouting to a much greater advantage. A short course of this type cannot be expected to fully qualify aerial observers, but the men who have received this training gain proficiency much faster in subsequent actual experience than they would otherwise.

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Red, White, or Blue—Wear an extra Shirt on the Fireline

A fire fighters efficiency is often greatly reduced by heat when he makes a direct attack on a fire edge. Tests at Pilgrim Creek on the Shasta-Trinity National Forest, reported by E. L. Alpens, C. P. Butler, and others in Research & Development Technical Report USNRDL-TR-84, NM 006-015.2 in 1955, have shown just how much heat is given off in some common fire situations and also have suggested how to minimize its effects.

The heat received 6 feet away from a wood crib fire was 100 times that received from the sun on a summer afternoon. Less than 1 percent of this is visible since nearly all of a fire's heat energy is in the infrared region of the spectrum. From these facts we can draw two conclusions about proper clothing.

First, the color of a fire fighter's clothing is unimportant in absorbing the heat from a fire because all cloth is "black" to infrared radiation. Also, we know that two layers of cloth are four times as effective as a single layer in reducing the heat penetrating to the skin. Conventional summer underwear fails to give maximum protection because it does not cover the arms and legs. Therefore, a lightweight jacket or extra shirt will reduce the discomfort of close-quarters fire fighting.—ARTHUR R. PIRSKO, *Forester, California Forest and Range Experiment Station*, maintained at Berkeley, Calif., by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of California.

A FOUR-PURPOSE ENCLOSURE CARD FOR TRAINING FILMS

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California Forest and Range Experiment Station[1]

Motion pictures are excellent visual aids to training when they are used correctly. Using them correctly means that as a part of a training session they must supplement other methods of instruction in a way that increases the speed and effectiveness of learning. We have found that an attractive descriptive folder helps meet this objective.

To make the most of films, a forest officer needs the answers to many questions. Is there a motion picture available on his specific subject? Exactly what part of the training material does it cover? How? Is it an orientation or a skill-training film? What points does it emphasize?

If he happens to be where films are readily available, he can find these things out by the long, slow process of projecting them one at a time. The man at an isolated headquarters is slowed down even more as he waits for review copies to arrive. Descriptive literature can save time for both men, but it needs to be more specific than most catalog listings are about the subject and the training job. When film literature is consistent in form, brief and to the point, and available for all training films, the training leader can use it four ways:

1. To include inside the film can with each copy of the movie. For this purpose it must fit the film can without bulky folds so that it can easily be removed and replaced. The name of the motion picture, its purpose, who it is for, running instructions, and points of emphasis should be identifiable at a glance.

2. To mail out to district personnel concerned with training as an advance notice so that they can consider the movie for use before ordering it. For this purpose, the folder should provide whoever is doing the mailing with the "meat" of the movie. Then he can amplify the material in his letter of transmittal and suggest adaptations for particular training problems.

3. To keep in a file case at district headquarters or training-aids library with similar cards on other training movies and visual aids for handy review when preseason plans are being drawn up. Consistency is most important if the cards are to be usable for this purpose. The cards for each movie should be identical in size and similar in appearance. For easier reference, they can be printed in different colors to denote various subject-matter training series; for example, red and blue for all those used in teaching the use of water on forest fires.

4. To provide a brief guide on how to use a motion picture as a training aid.

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[1] Maintained by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of California, at Berkeley, Calif.

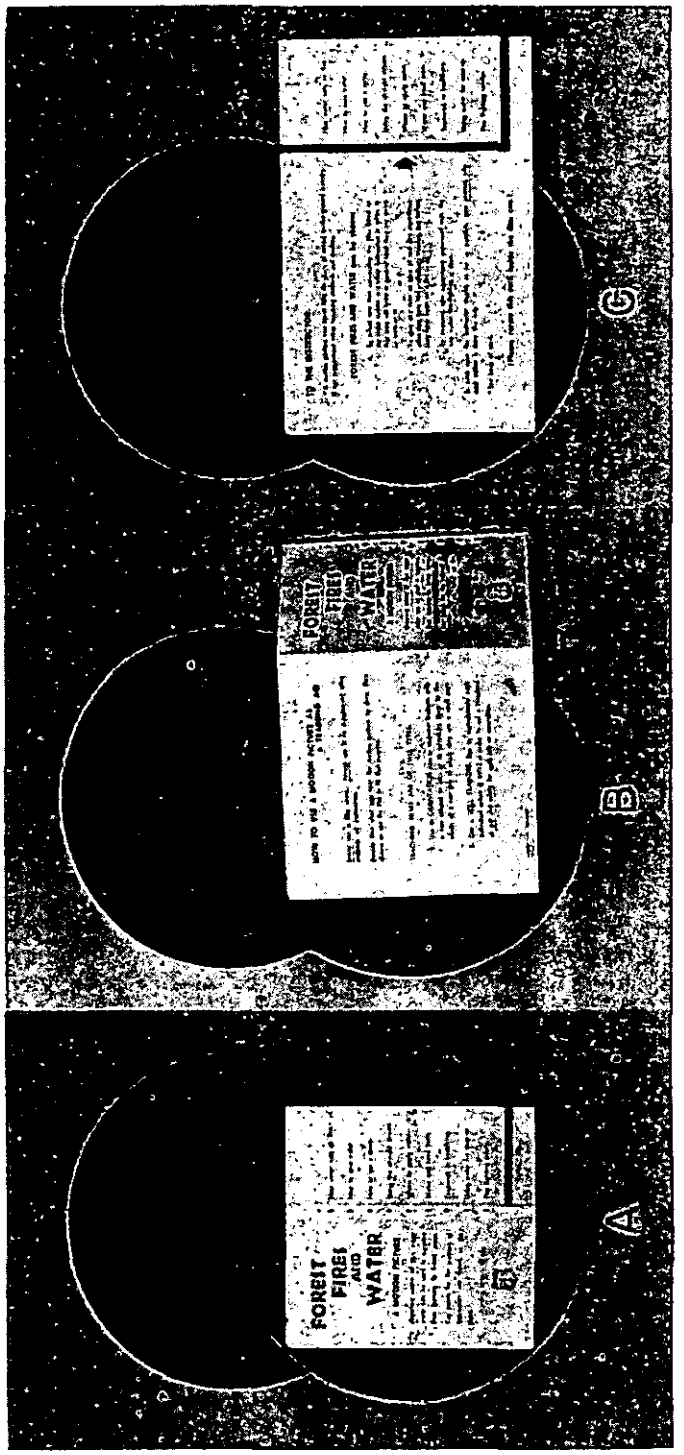

FIGURE 1.—Printed on standard 8- by 5-inch size stock, the four-purpose enclosure card folds to fit a 400-foot film can.

Two enclosure cards that fit these specifications have been released. Both cards were reproduced on 2 sides of readily available 8- by 5-inch white cardstock. The cards were scored and folded to form a 5-inch square that exactly fits a 400-foot reel film can (fig. 1, A). The folded 3-inch end appears on the left of the card and lists the picture name, what it is about, who it is for, running time, and who produced it. On the right, indicated by small arrows, are the key points emphasized in the film. When the card is opened the key points remain on the right for immediate check reference (fig. 1, C). The ways the movie can be used—plus hints to the instructor—now appear on the left, but are still related to the key points on the right. The back of the folded card contains the material on using a motion picture as a training aid (fig. 1, B).

One of the cards was prepared before making the movie, "Training in the Use of Water on Forest Fires." This card served as a statement of purpose, a base for the shooting script, and a guide to actual filming.

"Capsule" cards like these help state the problem behind every training movie, how it was solved, why, and what the solution can mean to the practical work force. They can clarify the purpose of the movie in advance and serve as a permanent aid to its use.

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Turning Pump Motors Over During Storage

Motors of pumps packed in shipping boxes for field use must be turned over every 6 weeks so that the pistons and crankshaft will be in a new position. This helps to retard scarring and etching. Much time will be saved if a 2-inch hole is cut in the box directly in line with the flywheel nut. A socket wrench that fits the nut can then be used to turn the motor. If the motor has a rewind starter, a ⅜- or ½-inch hole can be drilled opposite the rewind handle and the end of a ¼-inch sash cord tied to it; other end of cord is run through hole in box to the outside and a knot tied in it so that it will not slip back in. We have 54 pumps at the warehouse that can now be turned over in 30 minutes. When it was necessary to unpack them, turn them over, and repack them, an average of 30 minutes per pump was required, or 27 hours of labor. Time saved by method that permits leaving pumps in boxes, 26½ hours.—ROY O. WALKER, *Warehouse Supervisor, Region 6, U. S. Forest Service.*

A CAMPAIGN AGAINST HUNTER FIRES

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N. C. Department of Conservation and Development

Hyde County, in coastal North Carolina, is characterized by vast unbroken swamp and dismal areas of peat soil and flash-fuel types. Ground fires are common during dry summer and fall seasons. Suppression of these ground fires often extends over periods of a month or more until rainfall is sufficient to raise the water table to the burning peat. The State fire control organization in this county is extended to the limit to suppress one of these project fires, and two or more ground burning fires at one time present an impossible situation.

Such a situation was encountered during the opening days of the deer hunting season almost every fall up through 1948. On opening day in 1948, 2 hunter fires started almost simultaneously, and the resulting loss was a total ground burn of more than 20 thousand acres for the summer and fall season.

The prevention problem was unique. Total occurrence in an average year was only ten to fifteen fires representing several causes. Yet the occurrence of two or three hunter fires during late October meant the tremendous loss in acreage. It was decided that the prevention of just one or two fires at the right time would justify a concentrated prevention effort.

Hyde County is sparsely populated and heavily hunted. A large number of the male population are licensed guides, and the county literally lives on the hunting business. By noon on opening day of the 1949 hunting season every hunter and every local resident interested in hunting had been contacted personally with a fire prevention message.

The campaign was centered around a handbill that carried a message of welcome and warning from the local people over the signature of the County forest ranger. The damage from the 1948 hunter fires was cited with an earnest plea for cooperation. In addition to the usual rules of safety, directions were given concerning what to do in the event that a fire was discovered. The law-enforcement angle was introduced indirectly by mentioning the fact that a ranger in a radio-equipped truck was "in your vicinity now" and that his assistance would be prompt upon receipt of a call to designated phone numbers. To strengthen this point, two or three outside rangers assisted in patrolling the county, and both trucks and drivers were changed daily.

Under direction of Hyde County Forest Ranger A. G. Berry, the county was divided into routes and covered systematically beginning one day prior to the season's opening. District Office men were provided with local wardens familiar with the area. Every hunter encountered was contacted, and copies of the handbills were left at every place where hunters might be expected to

visit. All the local guides were requested to distribute bills and to talk to their hunters. Storekeepers cooperated by issuing a handbill to each hunter customer.

On the morning of opening day, the campaign was stepped up by the use of an airplane to drop handbills, wrapped with copies of the forest fire laws, to hunting parties in the woods. Bills were placed under the windshield of every parked car in the wooded area and a patrol greeted each party as the hunters left the woods. This activity was continued in a diminishing degree until the hunting pressure dropped to normal. Radio and press cooperated throughout the campaign.

In 1950, the campaign was repeated with one notable exception. The handbill was revised to center the theme on a message of appreciation from the local people to the hunters for their care and thoughtfulness in preventing fires during the previous year. Similar programs have been carried out with less vigor but with complete coverage in each subsequent year.

It may be stated safely that this campaign has been successful. Several fall seasons since the beginning of the program have been extremely dry, and only one hunter fire has been recorded in Hyde County since 1948, later evidence indicated that there was a strong possibility that this was actually a grudge fire involving local landowners.

It is recognized that this program must be continued indefinitely to assure continued success. Undoubtedly its success to date has been due to the fact that a specific prevention problem in a localized area has been given a vigorous local treatment.

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The Ozark Swatmaster—A Swatting Tool For Grass Fires

Control of fast-moving grass fires has always been a problem in inaccessible areas. Limited field tests indicate that the Ozark Swatmaster will be an effective aid in controlling such fires in fields and open glades. Treating the water with a wetting agent may result in more efficient use of manpower and water.

The swatmaster is an adaptation of previous swatter principles, with innovations. Water in the back-pack can is used sparingly to keep the swatter wet. The water flows through a ½-inch conduit, 5 feet long, which forms the handle of the swatter. The water is channeled by a 4-way pipe T into three ¼-inch feed pipes 4 inches long. Each of the 3 feed pipes has two ⅛-inch drilled holes to facilitate flow and distribution of water. The amount of water input to the swatter is controlled by a garden valve set 1 foot from the end of the handle. Flow can be regulated to keep the swatter wet, yet not waste water.

The 16- by 21-inch swatter was made from a piece of salvage, heavy canvas. The canvas was doubled and the edges sewed; a zipper at the top on each side of the handle keeps water escape due to back pressure at a minimum. The three feeder pipes fit into water flues sewed in the swatter. Inside seams allow water to flow into the "water pockets"; they also keep the swatter flat.—JOHN L. KERNIK, *Assistant District Ranger, Missouri National Forest.*

A FIBERGLASS CUPOLA FOR LOOKOUT TOWERS

Alberta Department of Lands and Forests

Until 1953, cupolas used on steel lookout towers of the Alberta Forest Service were made of wood. That year an effort was begun to find a material that would eliminate some of the following undesirable features of the wood cupola: (1) expected lasting time of the cupola is poor as compared with that of the steel tower; (2) erection problems; i. e., too much is left to discretion of the builder, and ratio of weight and bulk to strength is too great; (3) glass width too narrow as compared with corner posts; (4) weatherproof qualities, fair to poor; (5) windows difficult to open in wet weather—loose in dry weather.

During the summer of 1953, all-metal cupolas were designed and manufactured, but they proved unsatisfactory for several reasons. Their construction was far too expensive, and complicated assembly problems arose. Damage to panels and window-frame assemblies occurred in transportation. Repair, such as welding and riveting, was not practical at the tower site.

The next material considered was fiberglass. The Edmonton Transit System had used it as replacement body panels on their buses with considerable success. A rough design for a fiberglass cupola was drawn up and submitted to them for an opinion of its feasibility. The proposal was enthusiastically received, and arrangements were made with E. T. S. for a test on one panel. The first mold was made of plywood, and a rough panel or section of fiberglass was cast. The result proved that further work was warranted. A steel mold, which provided its own complications, was then manufactured.

In July of 1955 a prototype cupola (fig. 1), was completed and declared a success. The total weight of the cupola is approximately 750 pounds, which is roughly two-thirds that of the wooden ones, and the cost is not expected to exceed $750 per unit. (Cost of wood cupola, $400.) Due to the nature of plexiglass, the cupola is expected to last as long as the steel tower on which it is erected. Repairs of all kinds can be made at the site without special tools, and maintenance costs have been reduced to a minimum.

The total panoramic view from the cupola has been increased approximately 33 percent, the narrow corner posts facilitating easier use of the fire-finding equipment. Because the wall structure is less bulky, interior space is approximately 20 percent greater than formerly. A double diamond glass with steel frames is used in the windows, and the window slides or frames are made of fiberglass, which eliminates former window troubles. The floor is made of double sheets of ¾-inch plywood nailed on 6-inch centers, thus eliminating floor sills and cupola understructure. The angle beams, which are a part of the tower, provide

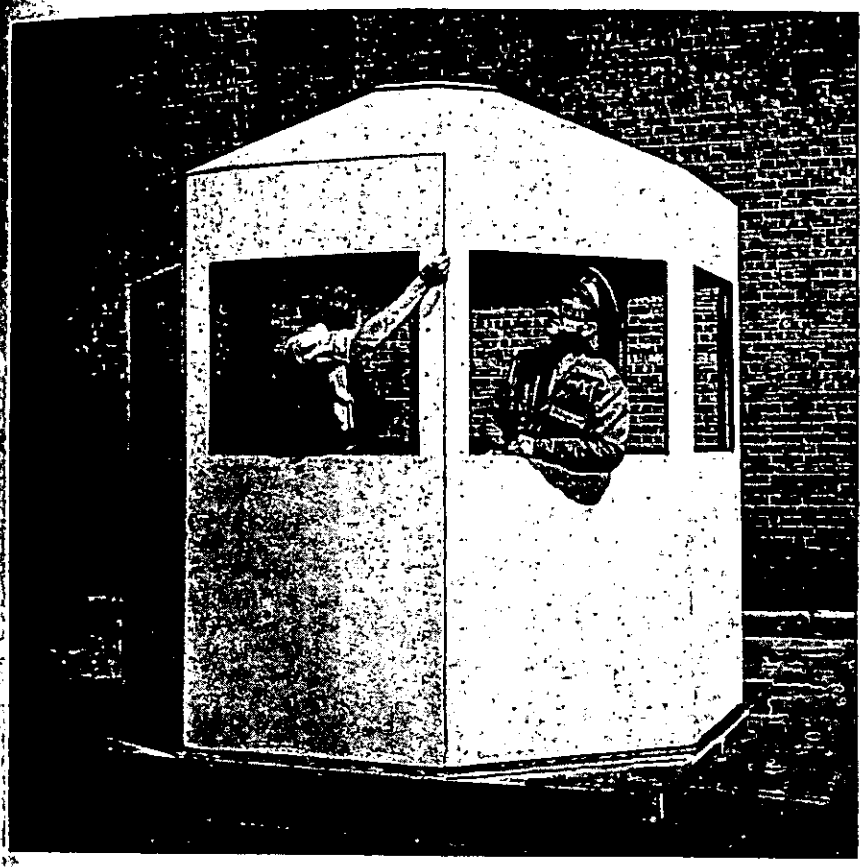

FIGURE 1.—The prototype cupola. Each prefabricated flanged panel comprises a wall and roof section as one segment. The panels are formed from fiberglass and polyester resin in a hinged mold that has a steel insert for the window opening.

sufficient support for the 1½-inches of plywood floor. This floor system eliminates many assembly problems, and 2 men can easily assemble the weathertight cupola in 2 days.

Details of construction and design of the cupola can be obtained on request from the Department of Lands and Forests, Edmonton, Alberta, Canada.

WAR SURPLUS CRASH TRUCK CONVERTED TO FOREST FIRE USE

DON M. POST
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The University of Florida School of Forestry converted a war surplus crash truck for fire control on the school forest. This unit was originally designed for use with foam or fog to combat aircraft fires on landing strips. It is equipped with a 100-hp. gasoline engine connected directly to a 3-inch high-pressure centrifugal pump capable of pumping 200 gallons per minute at 150 pounds pressure. The 6 x 6 all-wheel drive can handle the load under most conditions easily.

The conversion consisted of removing all excess gear not necessary for forest fire control and increasing tank capacity from 800 to 1,200 gallons. All foam equipment was removed because it was impractical for our conditions; the foam nozzles on the main gun were replaced by two $\frac{5}{8}$-inch solid stream nozzles. There are two $2\frac{1}{2}$-inch and/or two $1\frac{1}{2}$-inch standard hose outlets on the sides and rear of the machine. The most useful and convenient outlet is the large gun on top of the unit with a $\frac{3}{16}$-inch fog nozzle and two $\frac{5}{8}$-inch solid stream nozzles. A man standing on a platform on top of the unit controls the gun with a pair of handlebars. He can change from fog to solid stream parallel nozzles by flipping a single lever (fig. 1).

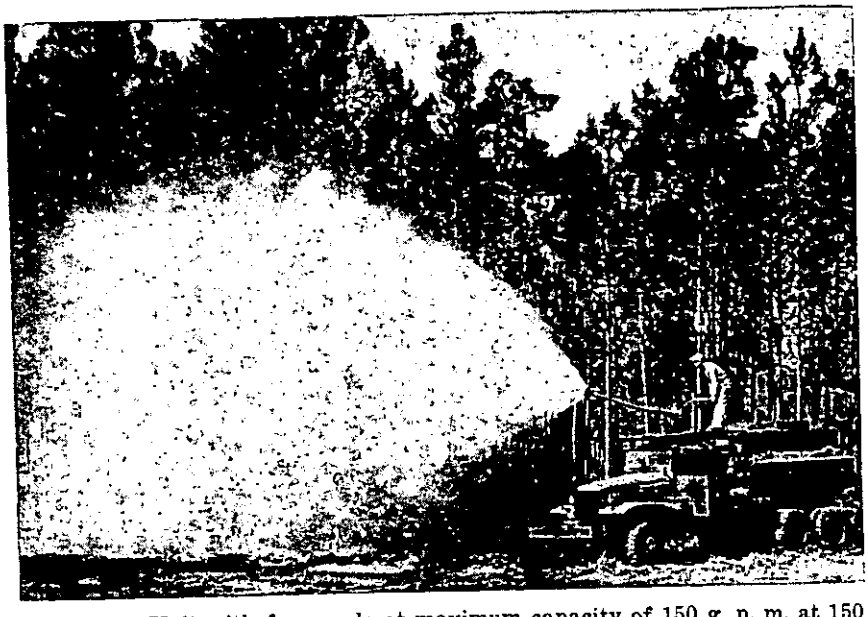

FIGURE 1.—Unit with fog nozzle at maximum capacity of 150 g. p. m. at 150 p. s. i.; the water has hurricane force at 25 to 30 feet with a maximum range of 50 feet. The solid stream at maximum capacity of 200 g. p. m. at 150 p. s. i. with twin $\frac{5}{8}$-inch nozzles has a range of 80 to 90 feet.

The unit works very well on direct attack but its greatest advantage comes when used for wetting down the side of a fireline or road opposite a backfire where sparkovers can be common during dry, windy weather. It will thoroughly soak a strip 30 to 40 feet wide for ¼ to ½ mile, depending on the amount of fuel. The use of a suitable wetting agent is highly recommended as this increases the efficiency of the water tremendously. The unit is equipped with an exhaust primer which can fill the tank in less than 1 minute from a suitable supply of water.

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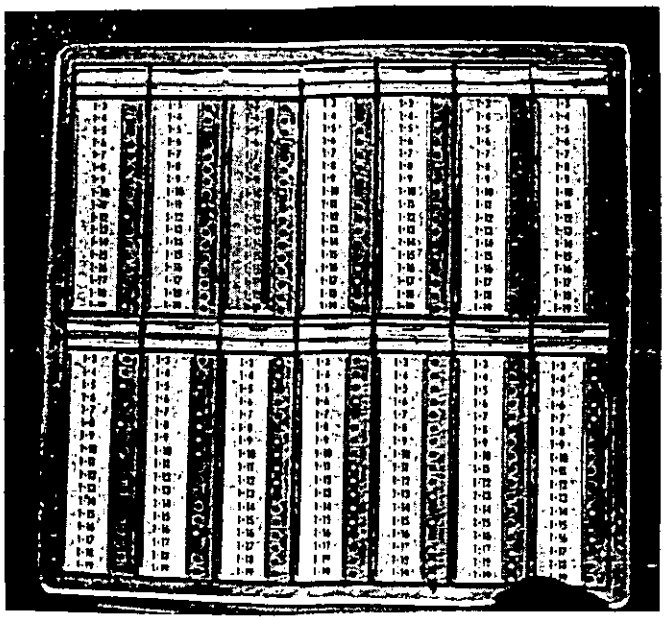
Personnel Scheduled Pass and Leave Chart Board

Quick action may be required at any place in this five-county district. The chart board tells district supervisors, radio dispatcher, and office personnel at a glance which of the 17 conservation officers are on duty that day or any day during the 2-week pay period. Colored ¼-inch dowel pins show the officers *not on duty* because of pass days, compensatory time, annual or sick leave. No pin indicates officer is on duty. The board is posted at the beginning of each period and kept current. A movable red plastic strip mounted vertically indicates the day of the week.



The board is ¾-inch plywood, 23 by 23 inches, edged with chrome molding. It is divided into two sections (weeks) of 7 days each. Beneath each day are the radio call numbers of each patrol car (officer) with a ¼-inch hole, drilled ½-inch deep, beside each number to hold a dowel pin as needed.—JOHN J. MARNICH, *Office Manager, Baraga District, Michigan Department of Conservation.*

TILT-BED TRACTOR TRANSPORT

WILLARD J. VOGEL
Fire Control Officer, Yakima Indian Reservation
Bureau of Indian Affairs

The Yakima Indian Reservation on the east slopes of the Cascade Mountains in Washington has an area of approximately 500,000 acres of timber and 525,000 acres of grass and brush land that requires intensive protection against fire. The reservation is roughly 50 miles wide and 70 miles long with most of the areas requiring protection containing only substandard roads. Transporting of tractor equipment in the past has posed many problems with slowness of delivery to the fire being the most serious.

Because of the arid conditions and heavy, flammable growth present on the reservation, speed in placing suitable first-attack equipment on a fire becomes a must. Transportation of this equipment by means of a semitrailer or a low-boy is impractical because of steep, narrow, twisting roads, particularly in the back country. For this reason, it was decided to purchase a heavy truck and to construct on it a tilt-bed body originally developed by the State of California, Department of Resources, Division of Forestry (fig. 1).

The truck used is rated at 35,000 GVW with the frame modified to the exact dimensions of CA 110″ and CEF 147½. The tandem-drive rear axles are straight-line-drive to provide clearance for a cylinder on each side of the propeller shaft. The transmission is 5 speed with an auxiliary 3 speed. The large 406-cubic-inch engine and the many available gear ratios enable the truck to transport our OC-12 tractor with dozer at speeds of 50 to 55 m. p. h. on highways and to maintain satisfactory speeds on all the various grades encountered. Since the truck operates over both heavily traveled highways and back mountain roads where handling ease and safety are essential, it is equipped with power steering and air-over-hydraulic brakes. We consider it essential that heavy trucks to be operated in such rough country be equipped with power steering.

The tilt-bed body, which has a capacity of 19,000 pounds, hinges just ahead of the rear set of drivers. Two systems, one hydraulic and one air, control operation of the bed. The air system is used only to raise or lower the bed empty and is controlled by a three-way valve in the cab. The hydraulic system is merely a hydraulic cushioning cylinder that determines the speed at which the bed will tilt or lower with the tractor. The hydraulic cylinder is controlled by a globe valve requiring only an initial adjustment at the beginning of the season. The bed is locked in running position by an automatic safety lock.

To unload the tractor, it is necessary to release the safety lock, back the tractor until its weight tilts the bed and then back down the ramp (fig. 2). The bed will stay in the raised position until the tractor is reloaded or, if desired, the bed can be lowered with the air control. Chock blocks set in stakepockets at the front

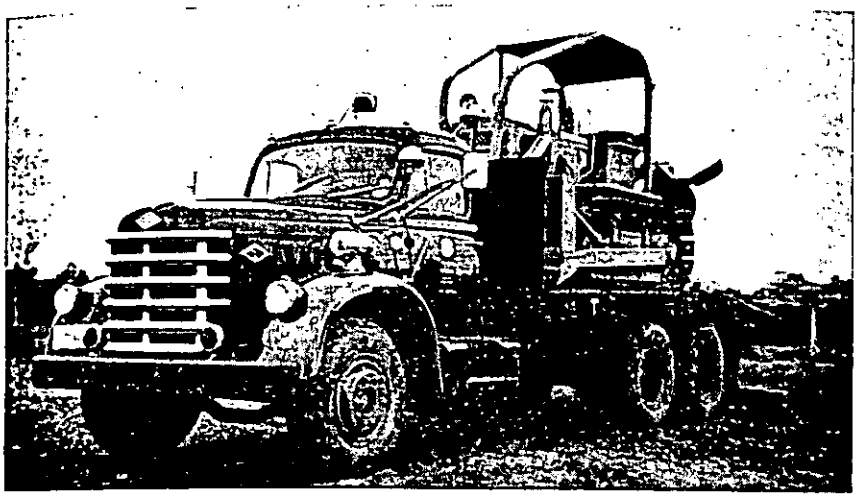


FIGURE 1.—Tilt-bed tractor transport.

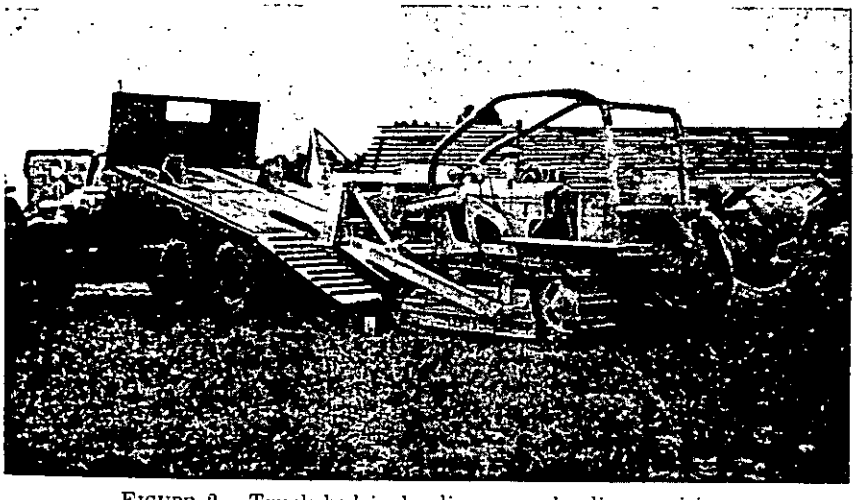


FIGURE 2.—Truck bed in loading or unloading position.

of the tread runway prevent the dozer blade from striking the back of the cab. These also enable positioning of the tractor in such manner that weight is properly distributed.

Experience during the 1957 fire season indicated no need for modification of the unit, although practically all conditions were encountered in transporting the heavy tractor dozer equipment. Because of the tilt-bed it is not necessary to waste time in picking an unloading site and the tractor can be quickly unloaded by one man. When necessary to change the tractor's location on a fireline, it is often quicker to reload and move by the tilt-bed truck rather than by "walking" the tractor. It is felt that with a heavier truck this type of bed would be suitable for transporting tractors that are larger than the OC-12, D-4, or TD-9 class.

A TRAINING COURSE IN PRINCIPLES OF ORGANIZATION FOR FIRE SUPPRESSION

Region 7, Division of Fire Control, U. S. Forest Service

In the Eastern Region, comprising 14 States from Kentucky, West Virginia and Virginia, northeast through Maine, opportunities for developing skills in organizing large fire suppression forces are limited. There are numerous fast-spreading and dangerous forest fires most years, but these are controlled within hours by well-seasoned small crews. Campaign fires requiring large forces occur only rarely during the critical years. Ten years may pass before the skill of a fire control man in mobilizing and managing a large fire organization is put to a test. Some young firemen have never seen a large fire organization in action.

For these reasons, the Regional Fire Training Committee set out to perfect a fire organization training course that would meet needs peculiar to this region. Their desire was to make full use of available excellent handbook information and to stay out of the old wheel tracks of previous training courses by organizing and developing a new approach.

The scope of the task was narrowed by focusing on three key items for the 1957 training program. A lesson plan was developed for each item; a test training session was run; the results of the test were evaluated and revisions made as required. The committee used this restricted approach to pay respect to the training principle of "one thing at a time." It answered the question of what was basic and why, and set up a standard of proficiency expected of trainees for each key item.

Lesson one had for its subject "Principles of Organization." The command, plans, service, and line functions were explained in a series of organizational setups beginning with a 2-man fire and proceeding through a 3-sector fire. Charts were used as training aids. This is about as exciting as a multiplication drill to a schoolboy, but the test training run established the soundness of this approach; namely, that specific knowledge of organization principles must be a part of the trainee's equipment. He is not ready for the steps ahead until he has become grounded in the principles. The textbook used for this subject was "Principles of Organization for Forest Fire Suppression," 1953.

The next step in the training process was the application of principles of organization. The subject of "recruiting, training, and maintaining in a state of readiness the organizational forces planned for a protection unit" was covered in Lesson No. 2. For this, the demonstration method of instruction was used. A three-sector fire organization was set up for a particular district. Live organization charts were built up from a form devised for this purpose. The details of size of an organization required, where it will come from, and other considerations vary by protection units, but the basic principle does not change. Lessons No. 1 and 2 are required to prepare the trainee for the next stage of instruction, the application of principles to a specific suppression problem.

In Lesson No. 3, the operational procedures of a fire headquarters in the suppression of a specific fire were demonstrated.

Before the demonstration, the trainees were briefed in the following: (1) the geographical location of the fire, the topographic features and fuel of the fire area; (2) the fire weather preceding and leading up to the fire; (3) a sequence of events from time of discovery up to time fire boss gets on the fire.

Special props were used for briefing and for the demonstration that followed. One end of a ranger warehouse provided the required classroom space, a space for a fire headquarters setup, and a relief model of the part of the ranger district on which the fire occurred. The fire headquarters was furnished with a table, chairs, 2 bulletin boards each 4 by 8 feet for display of easel-sized (27 by 36-inch) charts. To one side of the fire headquarters and in front of the trainees was a relief model of the fire area.

The model was made out of 1½ cubic yards of sawdust and shaped to bring out the main mountain ranges, prominent spur ridges, and drainages, to approximate features of the actual fire area. The fire edge was shown by a red paper ribbon with sector locations plainly marked. Topographic and operational features were identified on the model by a small cardboard poster secured in a cleft of a twig stuck in the sawdust. Another important prop was a chart that showed the sequence of events from the time the fire was discovered until the fire boss got to it.

The props added a touch of realism that gave the trainees a feeling of looking in on the entire situation. Most important, the props helped them to arrive at a common understanding of the problem. Since the trainees had in the previous lesson worked on the organizational setup for the protection unit, their background included this information. Trainees were instructed to disregard all tactical considerations and concentrate on organization. The presentation up to this point could be summed up in these words "Here is the problem."

The next phase, the actual demonstration, in effect said, "Here is how we handled it." The demonstration was built around the acceptance of responsibility of the fire boss for the fire, his preliminary analysis of the problem, and how he assembled a staff for plans, service, and line functions; also, how the fire suppression plans were made and executed through the headquarters staff. This demonstration was made by the fire boss as he explained the action he took from the time he received the report of the fire.

Demonstration of functional responsibility of staff members through discussion and with the help of charts made clear staff responsibilities. Staff work was demonstrated by the use of skits that were carefully prepared and rehearsed prior to the demonstration. No attempt was made to recite lines, but the essential action was acted out in a natural manner. The demonstration was climaxed in a planning and strategy meeting of the fire boss with his staff.

The following organization fundamentals were emphasized:

1. Decision making by the fire boss, including his initial decision that as fire boss he is responsible for aggressive suppression action.

2. Mobilization requirements as met by the fire boss.
3. The initial estimate of a job and the aggressive action to get staff appointed, briefed, and at work. (In deference to the "one thing at a time" principle of training, instruction was limited to fire headquarters operations.)
4. Operations based on full consideration of fire weather and special fire forecasts.
5. Safety predicated on natural hazards and the effect of fire weather.
6. Operations conducted on a timetable basis that require proper coordination of planning and execution of plans and service.
7. Fire boss exercises his command function through a fire staff.

The task of developing competent organizers to function on an occasional big fire is complicated and difficult. Training methods must be expert if they are to offset the lack of actual practice and experience of the trainee. The 1957 regional test training session was favorably received by the trainee group of rangers and staff men.

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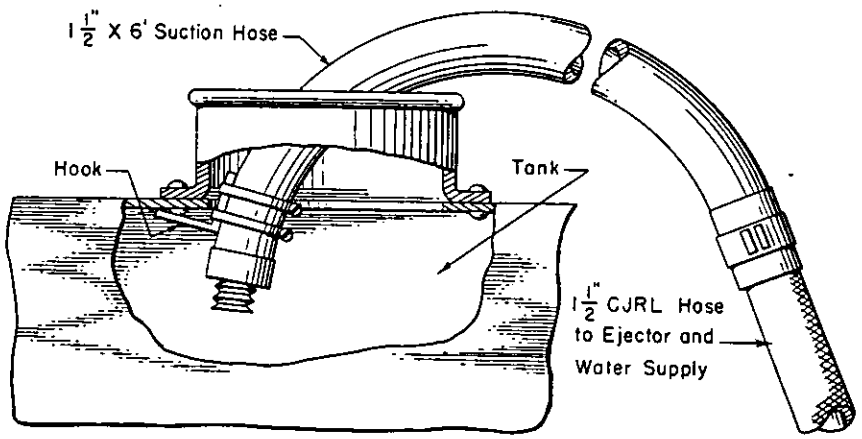
Improved Ejector Drafting

We have experienced difficulty in drafting water into a demountable fire tanker because the cotton-jacket hose to the ejector kinks when it is bent into the filler-cap opening. The kink results in an uneven flow of water, and it has been necessary for a man to be in attendance at the filling to see that the hose doesn't slip out. Both of these problems have been solved by substituting a length of 1½-inch suction hose for the final length of hose into the tank and using a wire hook to hold it in place.



The release of the services of the man at filler-cap opening can be very important where drafting and discharging to hose lines are being done simultaneously. Most slip-on fire tankers are already equipped with the 1½-inch suction hose, but the addition of the wire hook would be beneficial. —RAYMOND E. JUAREZ, *Fire Control Aid, Shasta-Trinity National Forests.*

AIRCRAFT USE IN MISSOURI

OSAL B. CAPPS
Chief of Fire Control, Missouri Conservation Commission

The Missouri Conservation Commission uses aircraft for administration, waterfowl and game surveys, law enforcement, forest land inspection, forest fire control, and many related activities. It acquired its first airplane in 1946, a war surplus L-5. Three years later this unit was replaced by a Stinson station wagon that was used for all activities until 1954 and then replaced by a Cessna 180. The Cessna 180 is still in service. A Piper PA-18 was also purchased in 1954 and assigned directly to a fire control district that has a large acreage of State-owned land. This particular district had been plagued each year with incendiary fires.

Full-time pilots are employed to operate and maintain the two State-owned airplanes, and when not engaged in these duties they are assigned other work. Direct operating costs amount to $6.50 an hour for the Cessna 180 and $5.50 an hour for the Piper PA-18. This includes gas, oil, maintenance, overhaul, and miscellaneous expenses, but not the pilot's salaries, insurance, hangar, depreciation, etc.

Each of the 10 fire control districts is authorized and encouraged to lease aircraft from private operators within their district or close by, either with or without pilots, as needed. The State-owned Cessna 180 can also be obtained when urgently needed to supplement district aircraft. Types of aircraft leased have been the Cessna 140, Aeronca 7 AC, Aeronca 7 BC, Piper Tripacer, etc.

The rate per hour for leased aircraft, including all flying time, was raised from $9.25 to $10.00 in 1957. Some operators with much experience are paid $10.75. We are paying $15.00 per hour for a Piper Tripacer, 150 hp., which is used on an experimental basis for night work. An aircraft and operator on standby costs $2.50 per hour. Standby time is limited and is normally not authorized at the home base of the airplane.

Radio equipment is installed in the leased aircraft by State radio technicians. Army surplus SCR-610 equipment has been used in the past but transistorized commercial-type equipment is now being installed. State-owned aircraft have multifrequency radio equipment.

Detection.—Fire control aircraft are used to supplement detection work of towers on days when visibility is limited and/or when fire danger is high. Also, they are used for detection when a towerman is off the tower fighting fires. The pilot of the airplane acts as observer; he uses a State highway map with a scale of one-half inch to the mile to report fires to a dispatcher by section, township, and range. Topographic maps are also used for this purpose.

Suppression.—The pilot scouts a fire and gives the fire crew leader such information as size, fuel, topography, rate of spread, critical areas, men or equipment already on fire, possible cause, and the best place to start fighting the fire. On large fires the fire boss relies on the pilot to keep him informed of breakovers, backfires, wind changes, potential danger areas, etc. (fig. 1). The district forester checks on a large fire by air as soon as possible after it is reported and quickly determines what steps should be taken to bring it under control and whether reserve manpower or equipment should be dispatched. Aircraft are often used to direct fire crews to fires in isolated spots. Large fires are patrolled and mapped from the air, and small fires are checked several times a day after they are suppressed if there is danger of breakovers.

Prevention.—Quick checking of fires materially reduces incendiary action during daylight hours. The point of origin of a fire can be rather accurately determined from the air. This is an important factor in law enforcement (fig. 2). During the past few years, aircraft and ground personnel working together have caught several men who set incendiary fires. Experimental work

FIGURE 1.—Aircraft provide the fire boss with information he needs on a fire like this one.

FIGURE 2.—Aircraft are effective in fire-law enforcement.

was done last year to determine whether the use of aircraft at night would be effective in reducing incendiary fires started under cover of darkness. The results were promising and the experiment will be continued this year.

Although airplanes have an undisputed place, helicopters are probably the coming thing in fire control work in Missouri. In areas where there are small clearings, they would be ideal for getting a small, initial attack crew on a fire. The helicopter could be used for both detection and suppression, and it would be very effective in fire-law enforcement. Helicopters are used for the latter purpose on a large military reservation in our forested area, Fort Leonard Wood. We have been able to use these on adjacent areas in order to get an idea of their value. Although the cost per hour seems excessive, there is no doubt that the helicopter is a very versatile fire control tool.

THE AIR TANKER AS AN INITIAL ATTACK TOOL

GEORGE E. LAFFERTY
Fire Control Officer, Boise National Forest

The use of air tankers as an aid in the control of wildfire has been increasing year by year. Although much has been written about their use in combating large, uncontrolled fires, little has been written about their use as an initial attack tool.

During the 1957 fire season the Boise National Forest experimented with air tankers and chemicals for initial attack. A contract Ford Tri-motor airplane (fig. 1) rigged for aerial spraying was converted to an air tanker by the addition of 19- by 20-inch free-swinging gates to the bottoms of the spray tanks. The aircraft carried two 275-gallon tanks in tandem. Cable releases permitted emptying one tank at a time or both at once. Five hundred gallons of water-suspended sodium calcium borate was normally carried in the two tanks. This water and chemical slurry weighed approximately 10 pounds per gallon, making the total cargo exceed 5,000 pounds.

Calibration tests showed a drop pattern roughly 70 feet wide and 700 feet long when both tanks were emptied at an altitude of 50 feet. Concentrations as heavy as 6 gallons per 100 square feet were measured in the drop pattern. The entire load could be discharged within 7 seconds.

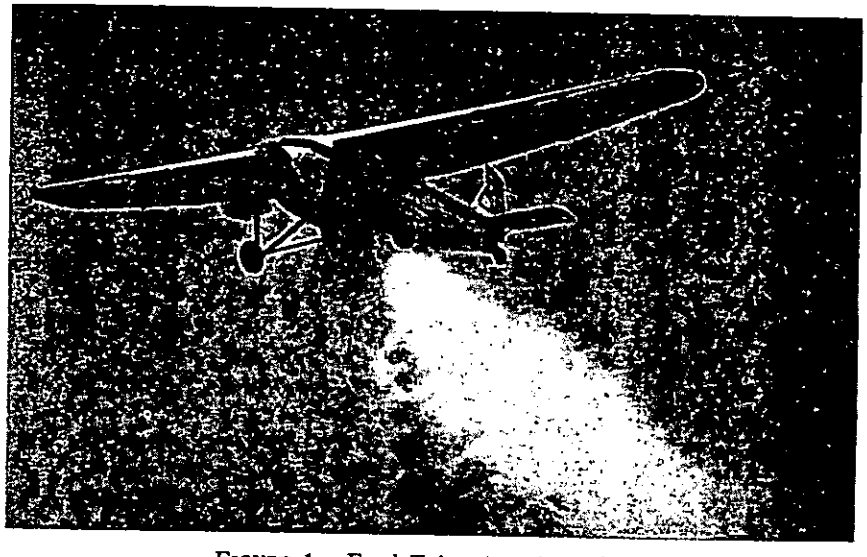


FIGURE 1.—Ford Tri-motor air tanker.

In addition to 50 drops on large project fires, 24 "borate" drops were made on 13 small fires (table 1). The results were beyond expectations. We know that part of the success was due to the skill of operator-pilot Glenn Higby. His experience includes hundreds of hours of mountain flying in aerial spraying and paracargo operations. The aircraft itself seems to be especially adapted to the dropping of liquids in steep and rugged mountains. While it is relatively slow (airspeed 100 m. p. h.) compared to modern aircraft, this deficiency is offset by its maneuverability and accuracy.

TABLE 1.—*Use of air tankers, Boise National Forest, 1957*

Name of fire	Drops	Flying time	Cost[1]	Result		
				Assured control	Helped control	No value
	Number	*Hours*	*Dollars*			
Warm Spring Creek	4	5.3	1,250	X	. .	. .
Louse Creek	1	1.2	300	X	. .	. .
Lincoln Creek	2	1.4	500	X	. .	. .
Pine Creek	2	2.4	600	. .	X	. .
Golden Age	1	.8	260	. .	. .	X
Profile Creek	2	4.5	820	X	. .	. .
Middle Fork	2	2.2	580	X	. .	. .
Sheep Corral	1	.7	250	X	. .	. .
Peace Rock	1	1.2	300	. .	. .	X
Blue Moon	1	1.7	350	. .	. .	X
Whitehawk	1	1.2	300	. .	. .	X
Fullmoon	5	5.6	1,220	X	. .	. .
Mineral Creek	1	1.1	290	. .	X	. .
Total	24	29.3	7,020	7	2	4

[1]Cost includes procurement, flying time, labor, and equipment purchase or rentals.

Part of the effectiveness of the tanker as an initial attack tool depends on both it and the pilot being in a constant standby status during daylight hours. Procedures were established that permitted takeoff 15 minutes following "scramble" orders.

The effectiveness of air-delivered chemicals is highly dependent upon the accuracy and location of the drop. A lack of trained personnel on a fire will usually necessitate making tactical decisions from the air. There are two solutions to this problem. One is to have a fire-behavior specialist in the air tanker or in a radio-equipped spotter airplane to direct operations. The second requires that the pilot of the air tanker be adequately trained in fire behavior and in suppression tactics so that he can make proper applications without guidance. The latter solution would minimize loss of time and eliminate the chance for complete failure in event of communication trouble.

The principal value of sodium calcium borate is in retarding the spread of a fire for a sufficient time to permit suppression forces to effect control. This is of the utmost importance during periods of extreme fire danger. Air tankers were used in conjunction with action by both ground forces and smokejumpers,

and with notable success. The program can be credited with being directly responsible for the control of 7 threatening fires. These fires started during periods of high fire danger and the rapidity with which they spread indicated serious control problems.

Other reports testify to the air tanker's success as an initial attack tool. The Payette National Forest's fire staff officer had this to say after investigating a fire we first attacked with chemicals: "The Profile Creek fire was discovered at 1315 on August 17. Fuel moisture percent was 4. For the following 4 days the fuel moisture percent remained at 4. The fire originated in the bottom of a canyon and had 3 miles of heavy fuels on moderate to steep slopes ahead of the fire.

"As soon as the fire was reported, smokejumpers were dispatched from Idaho City and a Ford load of borate from Boise. When the jumpers arrived it was too windy to jump so they returned to Idaho City. The load of borate was dropped across the lead of the fire and the plane returned for another load. . . .50 men reached the fire by 1600. . . .Ranger Dahlgreen reported that if it hadn't been for the borate drop, the personnel on the fire could not have held it that day. The borate held the fire from spreading uphill until the ground personnel and jumpers arrived. Considering the burning conditions and fuel available for the fire to spread in, the borate undoubtedly prevented a large project fire."

Ranger Jim Butler of the Mountain Home District, Boise National Forest, reported, "The Lincoln Creek fire started on August 16, in medium slash and had burned an area between 2 and 3 acres in size. . . .the Ford came over as it was crowning and very effectively downed the fire. The first load cut the fire down to where direct close attack on the lead was possible."

Another experience was reported by Ranger Butler as follows: "The Ford was on this fire immediately and hit the head of the fire with a load of slurry that really flattened it. Without this help, considering the 30 m. p. h. wind which prevailed, we would have been unable to control it at the 2 or 3 acres it burned."

Ranger Jack Wilcock of the Bear Valley District, Boise National Forest, in reporting the Warm Spring Creek fire writes, "I conclude from observing the progress of the fire from the air and on the ground that the water and chemicals stopped the spread of the fire in the light fuels and kept the fire on the ground in heavy fuels. I believe this potentially dangerous fire was kept to an area of 2 acres by the use of this new tool."

Since protection dollars are normally fixed, initiating a new method or piece of equipment requires a shift in present organizations. The cost of adding a standby air tanker is reflected in reduced crews or other equipment. Realizing this, we still feel that the air tanker has proved itself. Our confidence in the use of "borate" in the initial attack is such that we plan to have a standby air tanker in 1958.

WATER DROPPING FROM SEAPLANES ON THE SUPERIOR NATIONAL FOREST

L. J. Mc DONALD, *Superintendent, Ely Service Center,*
and W. J. EMERSON, *Assistant Supervisor*

A new and unique type of water dropping on fires is being worked out on the Superior National Forest in the wilderness-lakes country of northern Minnesota. Seaplanes operating out of Ely, Minn., on fire control missions are now equipped to pick up water from lake surfaces while taxiing on the takeoff run, then take to the air and cascade the water onto forest fires.

The 3-million-acre Superior Forest, with its many lakes and inaccessible Boundary Waters Canoe Area, is ideally suited to this kind of fire fighting (fig. 1). Successfully directed water dropping

FIGURE 1.—Seaplane on fire control mission over Boundary Waters Canoe Area of Superior National Forest.

missions may serve as a holding action on remote forest fires and give ground forces the time they need to get to the fire and apply control measures. Although the project is still in an experimental stage, the mechanical problems of picking up and dropping the water are essentially solved, and the main problems remaining are those of skillful application. Because the development of these procedures was completed late in the 1957 fire season, they have not been tried on actual fires.

Water dropping from seaplanes on the Superior Forest was an outgrowth of the fish-dropping technique that was successfully developed several years ago. Fish-stocking operations are carried

on by flying over remote, inaccessible lakes and cascading a load of water and fingerlings, or fry, into the lake from a fish-dropping hopper installed in the cargo-dropping hatch. The 40-gallon fish hopper provided the means of experimenting with water dropping on fires, but the volume of water was too small for an effective fire-suppression operation.

A 125-gallon water tank with baffles was constructed of aluminum, with a round opening in the bottom (fig. 2). It fits into the 17-inch circular hatch of the plane and can be installed quickly and easily through the side door of the plane when requests for water dropping are received. A quick-opening, gate-type release permits cascading the full volume of water from the plane in a very few seconds. The water-cascading release mechanism is operated by one man sitting in the co-pilot's position. Advice on the accuracy of each drop can be received by the pilot and bombardier from radio-equipped groundmen.

The airplane used in the initial experimental and development work was a Noorduyn-Norseman. This was replaced recently with a DeHavilland Beaver. Pickup and dropping equipment have been modified to fit the latter airplane.

Test drops during the past season indicated that the water pattern, when it hits the ground, is about 300 feet long and 50 feet wide, averaging about .01 inch of "rainfall." Since these tests were in the open, others are planned to determine the influence of trees and vegetation on the effectiveness of the operation. Also planned for this season are dropping experiments with

FIGURE 2.—View of bottom of 125-gallon water tank showing outlet and release gate at left and water pickup tube at right.

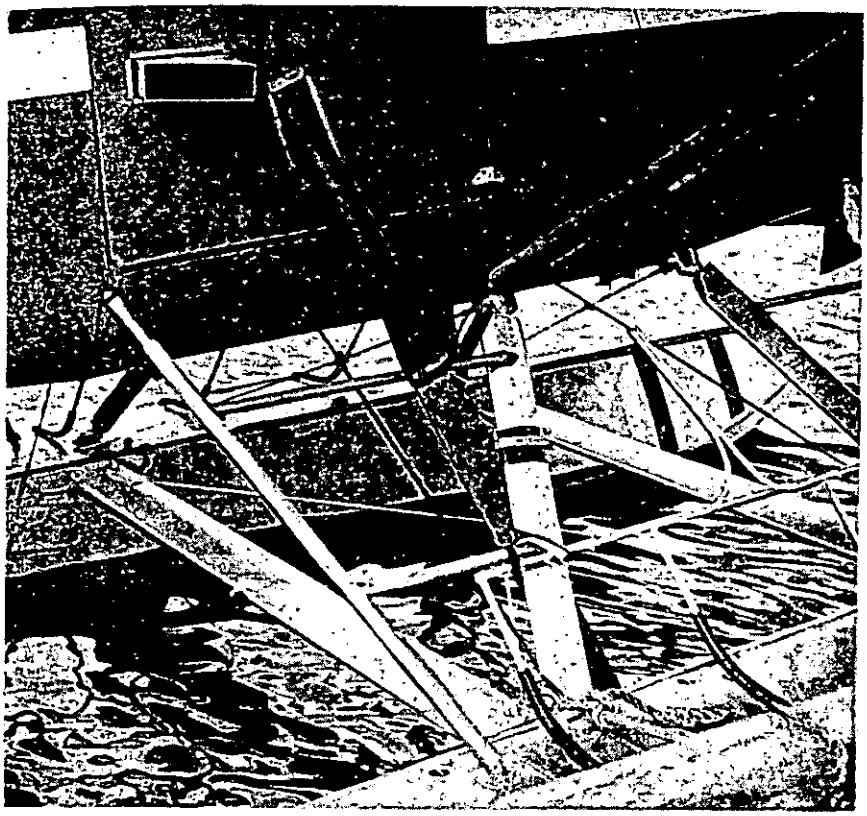


FIGURE 3.—Side view of DeHavilland Beaver Seaplane showing water pickup tube extending from tank inside plane through hole in false door. Square hole just left of tube is tank overflow tube.

the addition of detergents of various types and borates. These drops will be applied to slash-burning projects and other test fires.

While a single drop of 125 gallons of water on most fires is not expected to have a very marked effect, repeated drops in a relatively short time should have. Such drops are possible because of the water pickup device. The pickup consists of a piece of airplane strut that is connected to the water tank through an opening in the fuselage (fig. 3). The lower end of the tube rests just above the surface of the lake when the seaplane is stopped.

As the plane makes its takeoff run, the pontoons assume a position parallel with the lake surface. This brings the end of the water pickup tube down into the water and the tank is filled in about 15 seconds (fig. 4). An overflow vent from the tank throws excess water out the side of the plane as soon as the tank is filled. The seaplane then lifts from the lake and proceeds to the fire.

The large number of lakes scattered throughout the Superior National Forest make it possible for a seaplane to pick up water within relatively close range of any fire that may occur. With

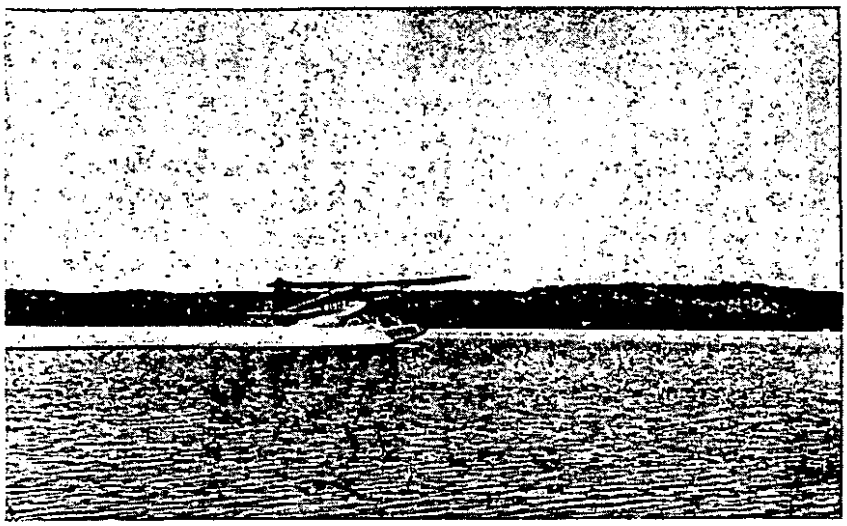


FIGURE 4.—Seaplane picking up water for a fire drop.

only a few minutes flying time involved between pickup and drop in most areas, it is estimated that by repeated drops sufficient moisture can be cascaded onto a fire in the early stages to hold it and keep it from "taking off" into inaccessible areas until ground forces arrive. Even when a suppression force is working on a fire, repeated water drops on spot fires and hot spots should help to take some of the pressure off the fire fighters and to insure that the fire does not crown and get out of control.

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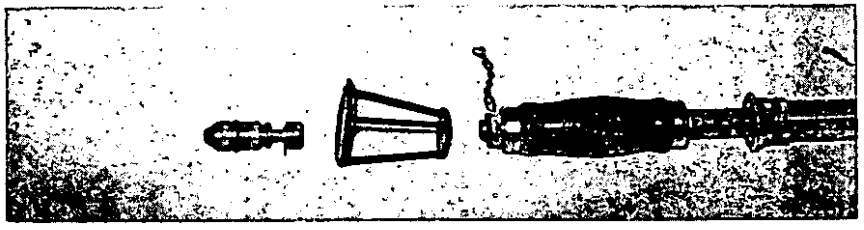
Nozzle Guard For Jack Pumps

The common jack pump used on the 5-gallon back-pack can or water bag will usually break where the spray attachment joins the handle whenever it is dropped. This can easily be prevented by installing an inexpensive guard made of a one-half inch washer, a 2-inch steel ring of one-eighth inch material, and 9 inches of one-eighth inch steel rod. The steel rod is cut into 3-inch struts which are spaced equidistant and welded in place between the



ring and the washer. The guard is readily installed by removing the pump spray nozzle and inserting the one-half inch washer over the threaded end of the pump handle. Spray adjustment of the nozzle can be made by using the index finger between any two struts on the guard.—GEOFFREY E. GREENE, *District Ranger, Helena National Forest.*

INFORMATION FOR CONTRIBUTORS

It is requested that all contributions be submitted in duplicate, typed double space, and with no paragraphs breaking over to the next page.

The title of the article should be typed in capitals at the top of the first page, and immediately underneath it should appear the author's name, position, and unit.

Any introductory or explanatory information should not be included in the body of the article, but should be stated in the letter of transmittal.

Illustrations, whether drawings or photographs, should have clear detail and tell a story. Only glossy prints are acceptable. Legends for illustrations should be typed in the manuscript immediately following the paragraph in which the illustration is first mentioned, the legend being separated from the text by lines both above and below. Illustrations should be labeled "figures" and numbered consecutively. All diagrams should be drawn with the type page proportions in mind, and lettered so as to permit reduction. In mailing, illustrations should be placed between cardboards held together with rubber bands. *Paper clips should never be used.*

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India ink line drawings will reproduce properly, but no prints (black-line prints or blueprints) will give clear reproductions. Please therefore submit well-drawn tracings instead of prints.


Smokey's
Commandments
BREAK MATCHES
CRUSH SMOKES
BE SURE ALL
FIRES ARE OUT!
Remember–
Only you can
PREVENT
FOREST FIRES!