Chapter XII Communication Bridges:

World War II and the Aircraft Warning System

And now let me say, again, that I am happy to be back in the Forest Service. I believe in it, and in the fellows who are in it, so much so that I'd be perfectly willing to take this gang to South Africa, or Rhodesia, and build a railroad, or anything else.

- Chief Forester Silcox¹

The most obvious wartime changes in the Forest Service came from the call to arms. Shortly after the declaration of war, Gael Simson accepted an appointment as colonel and administered frequency allocations for the Army. Logan Belleville joined the radar receiver research group at the Massachusetts Institute of Technology (MIT), and Earl Schoenfeld went to RCA. The loss of Harold Lawson was averted only after Associate Regional Forester F. H. Brundage warned the Washington Office that it was "...impossible to replace Lawson unless you wish to discontinue Radio Laboratory and all its work except service and repair of equipment..."2

Effects were widespread. Throughout the Forest Service, abrupt orders suddenly removed key figures and thrust new men into their places. Major Kelley, for example, left Region 1 to head a Forest Service southwestern Guayule (rubber production) project. Bill Apgar accepted a commission as a lieutenant commander in the Navy.

The most significant change wrought by the war resulted from plans to protect the Nation from attack. One afternoon in Atlanta, before Gaylord Knight even had a chance to reflect on the course of world events, his supervisors entered the communications office to tell him that Region 8 was assigned the task of providing telephone communications for an Aircraft Warning System (AWS) along the Atlantic and Gulf coasts between South Carolina and the Texas-Mexico border. Reflecting on the condition of many Forest Service telephone lines that had been

neglected for 2 years, Knight shook his head. "They got very agitated," he was to remember with a smile, "and thought for a moment that the best thing they could do was to throw me out to start with." Three hours later they all left on an evaluation trip that confirmed Knight's earlier opinion and kept him on the road for the duration of the war.³

Earlier Trials on Pacific Coast

The assignment of the AWS project to the Forest Service was no less logical than growing guayule for rubber. In both cases, the "gang" was being asked to build what Chief Silcox had earlier referred to as "anything else" during his 1934 remarks at Ogden.⁴

One difference between the two projects was that the Forest Service had been introduced to the AWS in mid-1937. At that time, the Army successfully used Region 5 telephone network and lookout stations for practice warnings of aircraft approaching the coastline. The national defense capabilities of the National Forest fire-control facilities were demonstrated, and this exercise was repeated along the entire Pacific Coast during 1939 and 1939.⁵ Thus, the Forest Service had an idea of what would be required of them in a national emergency. In fact, the Forest Service had provided the Army complete maps of lookout locations and communications facilities in a continuing preparation for use of the system at a later date.

Following the declaration of war, the Secretary of War wrote to the Secretary of Agriculture outlining the expected operation. The interceptor commands would first review the proposed Forest Service locations and then notify the Regional Foresters of the lookouts to be made habitable for year-round use; this included winterizing where necessary. Maintenance funds, necessary improvements, and personnel would be provided by the War Department after it received estimates from the Forest Service.⁶

This transition from fire detection to aircraft detection appeared to be fairly straightforward; in actuality, there were many problems. Although William P. Kramer had replaced Roy Headley as head of the Office of Operation in Washington, the complexities of radio science continued to be misunderstood. One example illustrates this point. The Radio Laboratory and Regions, 5, 6, and 8 had been informed of their AWS assignments. The lack of suitable communications in the arid, underpopulated Southwest had led the Army and Region 5 to conclude that a number of spotters equipped with Forest Service vhf radios and strategically situated relay repeaters would serve as an adequate network for communications with Army filter centers. To set up this system, Region 5 asked the Radio Laboratory to send several staffers to Government Island to train technicians on installation and maintenance procedures. Reviewing its schedule, the Radio Laboratory meanwhile requested Washington Office approval for a number of changes in emphasis more in line with AWS requirements. One request was in support of Region 5's plan to hold an electronics school at Government Island.

Training Program Proposed

William Kramer responded to the proposal in a return letter to Region 6. He doubted the feasibility of sending Laboratory staff to Government Island to run an electronics school. He stated bluntly: "I think it is the function of the Laboratory to train trainers rather than impair its own program by conducting field training school." Harold Lawson telegraphed San Francisco, through the Regional Forester, of both the disapproval and Kramer's suggested alternative that Region 5 send one man to Portland. "This should be satisfactory if you have one man with fundamental radio knowledge and some experience. Otherwise we will request Washington Office to reconsider."9 Region 5 resubmitted its request to have men trained at Government Island because it lacked the "one man" qualified "both as to technical experience and teaching ability."¹⁰

Before the San Francisco letter reached Washington, F. H. Brundage of Region 6 composed a lengthy re-review of the work schedule changes suggested by the Radio Laboratory. He pointed out to Kramer that none of the proposed trainees had a background in radio technique or theory. Training would have to begin with the fundamentals. "This is an unfortunate situation," he pointed out, "for top grade service men cannot be made from such material in two weeks or even in two months." Confident that the Washington Office would appreciate the special qualities required to teach the complexities of electronics, he suggested that Region 5 be authorized to hire someone with radio experience for the special training in Portland. "To attempt to train an inexperienced man and expect him to pass on what he can remember," Brundage emphasized for Kramer's benefit, "would seem to be

an extremely poor way of training the larger group."¹¹ Kramer telegraphed his reply to San Francisco two days later:

UNDESIREABLE STRIP LABORATORY OF THREE PRINCIPLE /SIC/ TECHNICIANS FOR INSTRUCTION PROGRAM YOUR REGION. SUGGEST ALTERNATIVE YOUR SENDING TWO OR THREE MEN TO RADIO LABORATORY FOR SHORT INTENSIVE COURSE THERE WHO IN TURN MAY TRAIN YOUR FIELD TECHNICIANS.¹²

Region 5 agreed and informed the Radio Laboratory that it would send Fred Funke, William "Bill" Williams, and Guy Wood, subject to Portland's approval. Anxious to get the program underway, the San Francisco office set a tentative starting date for 5 days later and suggested that "...it will probably take two weeks for this group to secure even a reasonable grasp of the program." Region 5 also proposed that the Radio Laboratory staff prepare a thorough introduction to radio fundamentals and repair procedures for their telephone engineer, Bill Williams, as he "has little knowledge of radio, and whatever program is designed by the Laboratory group should be based on this information since we would like to give him an opportunity to secure as much training as possible along these lines."13

Harold Lawson responded. Irked at the cavalier attitude displayed by the Washington Office towards the Laboratory's plight as well as the complexities of radio science, he expressed his concern over training inexperienced men to train other inexperienced men. The following handwritten note to Jack Horton reveals Lawson's 10 years of frustration over the administration of the Laboratory program: This business of long distance control of the WO /Washington Office7 of details on which they are not prepared to render a decision is irksome. Maybe I'm just getting my teeth cut--perhaps it's an old story.

Sending men to the Lab certainly does not save an appreciable amount of our time. We will still tie up two men for instruction. The third man proposed for the trip to Govt. Island was not on Lab staff (Claypool).

The real joker in this whole setup is the fact that at least two of the R5 men, Funke and Williams (don't know about Wood) are not even remotely prepared to assimilate technical instruction on the details of radio servicing.

If these fellows remember 50% of what we try to put across they will be doing exceptionally well. By the time that is reduced in passing it along to another unprepared man the net result will be a 100% mess.

All of the above may seem to be rather extreme exaggeration--a reflection on the teaching program or the mentality of the student. Radio service men just aren't made in one easy lesson, not even mediocre ones.

In view of the above and with the authority vested in R6 for administration of the radio project (see Loveridge's policy letter O, Special, Radio, R6, of April 29, 1937) I recommend that the Laboratory conduct the school at Government Island or decline any part in the program.¹⁴

Harold Lawson need not have been concerned over the subsequent veto

of his recommendation,¹⁵ for the needs and demands of the AWS completely restructured the program of the Laboratory in a way that could not have been foreseen during the early weeks of the war.

Telephone Lines Improved in the South

Gaylord Knight found the telephone construction project in the Southern Region less fraught with administrative complications. His task was to oversee the improvement of telephone lines to selected lookouts, construction of feeder lines from strategic coastal locations to the nearest existing commercial line, and tie-in of the system to filter centers at several major inland locations. He was in charge of a number of active and retired telephone employees and personally supervised much of the construction undertaken by the States, planning and reviewing the completion of some 3,000 miles of line in 6 months. The line stretched from Norfolk, Va., down the coast to the tip of Florida, and around the Gulf to the southern tip of Texas. When wartime shortages threatened completion at several points, a telephone call or a conversation with the right person always seemed to result in the appearance of a carload of wire at the proper railroad siding. The States received Federal funding for maintenance of the system when it was completed, but Knight spent the rest of the war years inspecting the lines under the authority given the Forest Service by the Secretary of War.16

Operation of the telephone segment of the AWS was straightforward. To relay a message, the observer cranked the phone, picked up the receiver, and said, "Flash." In that brief moment, the operator would "push two buttons" and the observer's words would be immediately routed to the filter center. The goal was 15 seconds between sighting and reporting, so the center had to be brief. A "Thank you" was the only indication that the observer's message had been received.

Bill Claypool in Region 6 was able to rely on the existing network of telephone lines, selected vhf radioequipped lookouts and special repeater stations for the northwestern portion of the AWS. The Claypool residence took an active part in the operation after Claypool terminated the system in his home and connected the link to the filter system with a telephone line.¹⁸

Operating fire lookouts in the winter was a new experience for Region 6. Ice and high wind plaqued observers at elevations over 5,000 feet. "If we were lucky," wrote H. J. Andrews, "we simultaneously had one crew going in, one crew manning the tower, and one crew coming out." Not only did men resign under these conditions, but the Region also learned that aircraft observers could not hear or see airplanes during inclement weather. These stations were closed in favor of more temperate 19 locations after the second season.

The California AWS north of Los Angeles was similar to that in Region 6, while the less-populated areas of the desert Southwest were eventually covered with vhf observer stations and repeaters. Guy Wood was assigned the task of locating these remote sites and placed on permanent assignment from the Sequoia National Forest. He crisscrossed the desert to verify the transmitting and receiving potential of over 100 sites proposed by the Army, returning to supervise the installations.²⁰ "It is going to be a tough job but /1/ think we can do it," he wrote to Lawson.²¹



Figure 115. The Forest Service's networks of lookouts throughout the country, developed and perfected over the years for efficient fire detection and control, provided an excellent working system for another emergency during World War II--the Army's Aircraft Warning System (AWS), later called a Service. The lookouts were ideal observation points from which to spot enemy planes. Having telephone and radio links with Ranger Districts, and National Forest and Regional headquarters, they provided the rapid communication needed by the Army to perform this essential function. Shown here is Burney Mountain Lookout, Lassen National Forest, in northern California. Photo was taken in 1936. (NA:95G-342262)

The time required for site selection, preparation, and installation delayed Wood's completion of this portion of the AWS. Simson wrote to ask if the Forest Service would be interested in putting the network on 41-49 MHz. The technical aspects of his question were not as difficult to answer as was his suggestion that the Radio Laboratory respond "quickly and confidently." The process of making frequency tests at the locations was time-consuming and when told of the time limitation, Fred Funke complained of Simson's lack of consideration for his former workmates. He asked of Lawson:

What the heck does he think we do, just fly around from peak to peak and say 'here she is?' There is one world of work attached to such a job. Must examine sites--plot detection coverage, estimate road or trail job, moving of equipment to do job--housing of work crew --source of water supply--local source of building materialsestimate cost of materials and labor for shelter, etc.,--then if all that seems O.K.--figure out about 4 stations to the net.

Funke then added as an afterthought, "This is just a little beef--pay no attention to it."²²

The Southern Region operated the telephone AWS until the end of the war in Europe. The southwestern AWS radio network, however, was disbanded shortly after completion in 1944. The success of radar research and development, including the work at MIT to which Logan Belleville was assigned, made the post-reporting 23 method obsolete on the West Coast.

Modified T/D, RRS Sets Used

The Army decided on modified versions of the Forest Service T/D and RRS

units for the AWS. The Radio Laboratory immediately began work on the revised editions and had models near completion by late March 1942.24 The relay unit was housed in a 37-inch cabinet sufficient for dual transmitters and receivers and designed to include automatic radio control, remote telephone control, and carrier-25 controlled automatic switching. The T/D, renamed the type T model E (T/E), was modified to incorporate a timed switching device that permitted simultaneous standby on two channels; it could lock on to a detected signal on either channel.²⁶ The use of AWS units on the Forest Service 30- to 40-MHz frequencies was expected to create further interference for fire control. As Funke explained when he wrote to Lawson: The "soup" was "thick down here" from the police, the Navy, "the Clumsy Callen Clue /CCC7 til the cows come home," the walkie-talkies on the artillery range, and the military mobile units.²⁷ But suggestions to move to 224 MHz in order to pass over this interference were not approved.²⁸

The Army Air Corps was originally expected to require at least 60 fixed-base stations and repeaters for the system. But the Radio Laboratory was warned that complications would arise covering every technical problem in the book. "Indeed," cautioned Region 5, "many 29 of them were not found in the book.' In addition to the Army's underestimate of the number of units needed, Guy Wood had no more than completed a detailed parts list for the radio repeater when he learned that only a unit description was needed for Army procurement. The authority to purchase parts had to go through time-consuming Army Air Corps channels because the Forest Service had a lower priority number

for acquiring critical wartime components. $\overset{30}{}$

The most significant problem was finding a means to produce the units when "...it would appear that getting the equipment built by contract is almost out."³¹ Harold Lawson suggested that the sets could be constructed at the Laboratory. Following the usual exchange of correspondence with Washington, it was then agreed that radio technicians from Region 5 would be sent to the Laboratory.³²

Fred Biggerstaff, the first California technician to arrive, found the depleted staff at the Laboratory already engaged in production. Within the next few months, in early 1943, he was joined by four or five other Region 5 technicians. "All of the fellows felt as I did. It was an opportunity we would probably not get again," he remembered. Shortly thereafter, eight local women were hired and the Laboratory was turned into a "miniature factory."33 The special crew was discharged on January 4, 1944, after constructing, testing, crating, and shipping some 877 units. The breakdown was as follows:

Quantity	Туре	Description
118	T/E	Dual channel transmitter- receiver combination.
32	U <u>∕</u> - <u>2</u> 7	Dual channel a.c. fixed station.
76	RC	Double relay transmitter receiver combination.
107	RDR	Relay receiver.
101	RD-2T	Dual channel relay transmitter.
219	VPR	Receiver vibrator power supply.
224	VPT	Transmitter vibrator power supply. ³⁴

The type TE (Tin Ear) enemy bomber listening device was an unsuccessful Laboratory project, but the design of a radio packset for the Coast Guard shore patrols was successful. Unable to locate a suitable commercial or military set for their application, Lawson "within less

Figure. 116. Radio relay repeater sets for remote station locations, designed for use in the Army's Aircraft Warning Service during World War II. Photos on both right and left are from the production line at the Forest Service's



than 30 days, had produced an original circuit design and supervised production of a working model..." The radio packset, operating between 2 and 3 MHz and weighing slightly more than 20 pounds, was reproduced for the Coast Guard by a commercial manufacturer.³⁵

Radio Laboratory, Portland, Ore. Forest Service technicians built nearly 900 of these units for the Army Air Corps during 1943. The sets operated in the 30- to 40-MHz range.

(Forest Service photos, History Section)



SPF Set Used by Army, Navy in World War II

The Forest Service type SPF found favor in the military forces. The Navy ordered and presumably used the popular set between ships and gun fire control shore parties in the landings at Sicily.³⁶ The Army also used the SPF for a number of communication applications. Simson contacted the Radio Laboratory at least once for spare units after he learned the Army was having trouble with its radio units.³⁷

Regions 5 and 8 also turned over a number of SPF sets to the Army during the war. In 1944 Region 5 took part in a unique vacation for "an old intimate friend" of many West Coast Forest Service personnel from the early aerial fire patrol days. Guy Wood was asked to provide radio communications for Henry H. "Hap" Arnold, Commanding General of the Army Air Forces, and General George C. Marshall, Army Chief of Staff. The two sought "a little mental relaxation" on a Sierra mountain fishing trip, just after the U.S. invasion of southern France. Wood kept them in contact with Army communication channels during the period August 28 to September 6. A few days later, Hap expressed his appreciation in a letter to Guy: "You did a grand job and I want to thank you for the communication that you furnished us with the outside world."38

Several communication lessons learned during World War II tended to support a later move toward 10meter radio use in the Forest Service. The favored frequency status of the military on the 100-meter bank had emphasized the tenuous position of the Forest Service in devising communication plans on these frequencies. Shortly after the outbreak of hostilities, the Washington Office reminded the Regions of restrictions on use of 100 meters, pointing out, "The military may at any time require all three thousand kc /kHz7 frequencies for their exclusive use. Also, the military may at any time impose complete radio silence on all nonmilitary stations below 30,000 kc /30 MHz7."³⁹ The Regions were again reminded of this priority 6 months later after the Army and the Navy filed a number of interference complaints. Region 5 wrote its officers the following reprimand:

We wish to again remind you that:

- 1. The armed forces control the 3000 kc /kHz channels.
- They can order us off the air or prevent our using M, SPF and similar radios for the duration.⁴⁰

The prior claim of the military to this frequency range naturally evolved into a Forest Service policy to "use ultra-high frequency /vhf/ radios and telephone lines whenever possible."41 It also resulted in the first breakthrough in the prohibitive lease agreements with A. T. & T. for use of administrative radio. The Forest Service had been limited, of course, by the policy that "radio will not be used to parallel existing commercial wire facilities except where those facilities are inadequate, unsatisfactory or undependable ... "42 Now it concluded that wartime priorities made the telephone, like the 3-MHz frequencies, "inadequate, unsatisfactory and undependable."

Region 5 was quick to perceive this, "Certainly, there is ample proof that commercial /telephone/ circuits, especially in critical defense areas are inadequate and the service unsatisfactory."⁴³ With limitations on both telephone and 100-meter radio use, it was now possible to justify network communication. Within 38 days after the declaration of war, the San Francisco Regional office instituted plans for a 10-meter Regional network "...for emergency communication between National Forests and with the Regional office when commercial facilities become clogged due to National Defense activities."44



Figure 117. Working plan for 10-meter radio network in Region 5 (California, now Pacific Southwest, Region), February 1942. (Gaylord A. Knight Collection)

The status of Forest communication and radio maintenance was a frequent cause for anxiety during the war. The Radio Laboratory and the Regions were engaged in the AWS project, the Regional

communication staffs were depleted, the CCC was disbanded, and wartime funds were seriously low. It was becoming increasingly apparent that much momentum had been lost since 1941. Even at the Radio Laboratory, the annual budget had progressively decreased from a high of \$29,640 in 1937 to a low of \$16,500 in 1945. Regional purchases were low and even the Laboratory building "was sorely in need of a coat of fresh paint."46 The Washington Office was worried about further deterioration in the telephone as well as radio communications setup. They decided in mid-1944 to review the situation. The Regional Forester in Portland was asked to appoint two inspectors.

Telephone, Radio Deteriorate in Field

Region 6 selected Raymond Conarro, head of administrative management in the Southern Region, and Harold Lawson of the Radio Laboratory to conduct the inspection. Conarro and Lawson selected 13 National Forests in Regions 1, 4, 5, and 6 for study, and contacted the Regional office staff, Forest Supervisors, District Rangers, and others who had direct contact with the communications systems. Their 14-page report was completed in August and found the systems in generally poor shape. Lawson and Conarro deplored the lack of a progressive Servicewide communications program; they found it encouraged "local attitudes" of Regional officers and Forest Supervisors to determine policies and practices that were "...most inefficient and unbusinesslike ...," considering the \$8 million investment in telephone systems alone.

In one Region, telephone lines were built to commercial standards; in another, construction and maintenance were based on piecemeal "patch and splice" using nonstandard operational procedures and a halfdozen homemade switchboards. Some systems were of excellent quality, but others were just a collection of wires and switches thrown together in a desk drawer. They found "hodgepodge, hit-and-miss" stores of line wire, pole hardware, insulators, drop wire, lightning protectors, underground cables, and other accessories. The wartime lack of funds had worsened the situation. Regions had to abandon or maintain lines strictly according to urgent need or budget. Maintenance, service, and reliability declined, and the time incurred in trouble-shooting increased proportionately. The inspectors noted that allowances for maintenance of ground-return tree lines needed to be increased by more than half, and more than seven times for metallic pole lines.

Radio in the four Regions had fared no better than the telephone in the judgment of Lawson and Conarro. They believed as many as half the wartime technicians were incompetent. Much of the maintenance seemed to be of the experimenting and tinkering variety, where "in every case the equipment involved had been lessened in efficiency or the work was not pertinent and was primarily a matter of personal amusement." Limited by a lack of technical training and numerous equipment failures, field radio operators made improper use of equipment. The inspectors came across an SX set in a lookout station, while the appropriate T sets were aging in a warehouse. They did not say so, but perhaps this was because they found officers in charge of radio to be "definitely prejudiced" against radio use. "Throughout this Region," they concluded, "...radio is largely a plaything."49

Lawson and Conarro frequently found radio networks paralleling telephone



Figure 118. Civilian Conservation Corps (CCC) enrollee installing a single-wire, ground-return telephone tree line on the Columbia (now Gifford Pinchot) National Forest, Wash., in 1939. (NA:95G-380399)

lines and "long-haul telephone lines constructed where radio would have been more economical." Supervisors and divisional heads authorized Regional communications plans that should have guarded against unnecessary expense and duplication but failed to do so because they gave little thought to their attendant responsibilities. The oversight came from a lack of interest, ignorance of technical requirements, or because they automatically concurred in recommendations. As a result, communication plans often overlooked the basis for communication planning and were unbalanced,

reflecting the particular opinions and prejudices of their authors. In this sense, Lawson and Conarro concluded, the plans would remain "worthless" until Servicewide conformity was required. Without such requirements, the Forest Service could expect not only inconsistent application, but--as in the four inspected Regions where two of the Regional communication engineers were assigned to Operation and two to Engineering--divided loyalties.⁵⁰

The end of the war marked an end to nearly 4 years of quiescence in the Forest Service communication program. Nowhere was this more evident than in the radio design effort. The Radio Laboratory had been totally occupied in producing radios for AWS since January 1, 1943. Previous development and design programs had stopped, and Regional purchases had been limited by unavailable parts and other project priorities. Only 286 pieces of standard Forest Service radio equipment were procured and inspected by 51 the Laboratory during World War II. Before the war, this would have been the approximate total yearly purchases of Region 5 alone.

In all Regions, communication personnel returned from active duty and nonmilitary assignments to find the communication program in total disarray. Radio units purchased before 1942 were in bad shape. "Many were non-operative and had been placed in storage," Gaylord Knight noted on returning to Region 8.52 Others had been repaired by anyone around, and operated accordingly. All units were at least 5 years old, showed wear, and reflected obsolescence. Of the 2,937 radios in inventories, 688, or nearly one-fourth, were rated as "not effective."53

The 62,938 miles of telephone line⁵⁴ also posed a monstrous problem. The *Telephone Handbook* was obsolete, lines had not been maintained and many had been constructed or repaired by an overburdened staff.⁵⁵ They had deteriorated before their time and, without the CCC, threatened to remain that way unless they could be abandoned or sold.

The solution to the telephone problem would evolve slowly. But as Harold K. Steen remarked in his history of the Forest Service, "The war was the last hurrah for many forestry pioneers and brought a change of direction for American forestry." The Forest Service telephone line was one of those pioneers.

The inevitable question--cost--was brought up at a meeting in the Atlanta Regional office. How much would it cost to rebuild Forest Service lines to commercial standards? Gaylord Knight, with 3 years' experience behind him, was asked to select a moderately difficult area, build a line to commercial standards, and report back on the associated costs. He selected a district on the Ocala National Forest and rebuilt some 250 miles in 3 to 4 months using Forest Service personnel and some "inexpensive conscientious objectors." The cost of that line has since been forgotten, but Knight recalled it was two to three times his estimate. The Regional administration agreed that costs of that nature were prohibitive. Someone suggested radio as a suitable long-term alternative. Knight was caught by surprise. Until now there had not been enough money for any long-range radio planning. From now on in Region 8, "...long-range was three days."57

Conditions at the Radio Laboratory were little better than those in the Regions.

Jack Horton deplored the fact that "aside from one item of laboratory equipment purchased during the war period there has been no new or replacement instruments added for approximately six years." Observing that radio science had "long passed the rule of thumb design procedure stage" and higher frequencies "have simply obsoleted it," he recommended the immediate purchase of \$1,500 for equipment and an allotment of another \$3,800 for later purchases.⁵⁸

Radio Laboratory Resumes Work

Fortunately, the Radio Laboratory lost only Gael Simson and Earl Schoenfeld after the war. Both remained in their new positions. Simson's former administrative role was assumed by Raymond M.

Figure 119. Unmanned Forest Service radio relay repeater stations at remote sites, housed incongruously but adequately in Navy surplus bulkhead, left, and in a former outhouse, right. These



Conarro, who remained attached to Region 8 but traveled with Harold Lawson on inspection trips when necessary. Logan Belleville returned to Portland after flirting with an offer to join Schoenfeld at the RCA laboratory.⁵⁹ With Lawson, Carl Davis, and Ralph Kunselman remaining, Belleville returning, and Fred Biggerstaff retained from the Region 5 AWS crew, the staff of five geared itself for the postwar era.

Biggerstaff's talents proved invaluable as technology brought further changes. A Marion County, Ohio, high school graduate, he had joined the CCC in 1933, serving as a leader of enrollees in the primary fire crew of the Lassen National Forest in California. The next year, his abilities were noted by

improvisations saved construction costs
of shelters and reflected continuing
shortages of funds in the immediate
postwar period. (Forest Service photos,
History Section).



the Forest Supervisor and he became a seasonal fire guard at the Yellow Jacket Lookout on Mill Creek Rim. This led to his appointment 2 years later as the fire dispatcher and radio technician on the Mineral Ranger District of the Lassen National Forest. After a brief stint as fulltime radio technician first for the Lassen at Susanville and then for the Tahoe National Forest at Nevada City, he came to the AWS project.

Fred Biggerstaff considered his seasonal Forest Service employment to be ideal. At the end of the fire season, he would return to the warmer climate of Monterey, Calif., where he worked as a "machinisto" on the sardine boats or as a laborer on Cannery Row. Utilizing this offseason time to best advantage, he also acquired a first-class FCC radio license at Western College of Radio, and then studied electrical engineering at Ohio State University for several semesters. He acquired an amateur radio license (W70JB and W3YRV) after the AWS appointment. 60 Biggerstaff eventually became the principal electronics engineer of the Forest Service and enhanced its reputation for technical excellence in the land/mobile radio field.⁶¹

In addition to the wartime setback in the radio development program, several other developments promised to affect Forest Service communication planning. The most significant was the rapid change in radio technology precipitated by the wartime efforts of the armed services to get a communication advantage over the enemy. Research grants and large production contracts had encouraged commercial manufacturers, as well as such research groups as the one at MIT, to promote numerous technological advances. Wartime developments in radar, sonar, communication, and other electronic devices provided information that was transferable to civilian programs. They also contributed to improvement in frequency use above 30 MHz, FM radio, mobile radio, and portable radio.

Perhaps more important, the war years demonstrated radio's advantages in tactical situations. Many military men returned to civilian jobs knowing the value of communication, as well as with communication skills. This created a new market and a labor pool for manufacturers. Perhaps for the first time since Dwight Beatty demonstrated his "contraption" near Missoula, the Forest Service would have a commercial source for radio as well as experienced personnel. As Gaylord Knight remarked on this changed attitude towards radio, the men coming back from the military "now wanted a truckload." 62

Electronic communication changes were in the making. Whether the Forest Service would take advantage of these changes, accepting some and rejecting others, or continue with its own development program was yet to be determined. Then, too, the prewar communication issues were still alive. Networks, interference, vhf use, point-to-point communication, and administrative radio had been ignored for the duration, but they were not forgotten.

Reference Notes

 Ferdinand A. Silcox, "Opening Remarks at the Ogden / Utah/ Grazing Conference," 2 November 1934, Gaylord A. Knight Collection.

2. F. H. Brundage, radio telegram to the Chief via Mackey Radio, 2 April 1942, Gaylord A. Knight Collection.

3. Gaylord A. Knight, interview with the author in Atlanta, Ga., November 1977, February 1978, April 1979.

4. Silcox, "Opening Remarks," p. 1.

5. Major Frederick Lofquist, 3rd Coast Artillery, H. Q. Harbor Defenses of the Columbia, Ft. Stevens, Ore., to James Frankland (R-6), 11 July 1938; M. L. Merritt (R-6) to Forest Supervisors (R-6), 10 July 1939, mimeographed summary of AWS operations; and series of cerrespondence between Region 6 and Ft. Stevens, including maps on locations, all stored in National Archives and Record Service, Seattle, Wash., Box 66742.

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12. Telegram copy included in
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15. F. H. Brundage to Forest Service
(R-5), 15 January 1942, telegram,
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16. Knight, interview with author.

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18. Wilbur Claypool, interview with the author in San Antonio, Tex., July 1978.

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 Box 66742.

20. These plans were not approved by the 4th Fighter Command until September 1942. See Guy /Wood7, "Memorandum for Harold Lawson," 8 October 1942, handwritten, Gaylord A. Knight Collection.

21. Guy /Wood/, "Memorandum for H. K. Lawson," 16 October 1942, handwritten, Gaylord A. Knight Collection.

22. Fred /Funke7 to Harold /Lawson7, 15 September 1942, handwritten, Gaylord A. Knight Collection.

23. Guy V. Wood, interview with the author in Porterville, Calif., January 1978.

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37. Biggerstaff, interview with author,
and Knight, interview with author.

25. John C. Kuhns (R-6) to S. B. Show38. H. H. Arnold to Guy Wood,
8 September 1944, letter in the
possession of Guy Wood. Wood used
an SPF set and an I set.

26. <u>/Region 67</u>, "O, Personnel, Lawson,
H. K.," 13 August 1943, Gaylord A.
Knight Collection.
39. F. P. Cronemiller (R-6) to
Forest Officers (R-5), 14 January
1942, Gaylord A. Knight Collection.

27. /Funke7 to /Lawson7.

28. C. B. Morris (R-5) to Regional Forester (R-6), 30 July 1942, Gaylord A. Knight Collection.

29. Morris to Regional Forester.

30. /Wood7, "Memorandum for H. K. Lawson."

31. Guy /wood7 to Harold /Lawson7, 9 November 1942, handwritten, Gaylord A. Knight Collection.

32. /Wood7 to /Lawson7; Harold K. Lawson, interview with the author in King City, Ore., May 1978; and W. Frederick Biggerstaff, interview with the author in Beltsville, Md., April 1979.

33. Biggerstaff, interview with author.

34. F. V. Horton, "Inspection Memorandum," 9 May 1946, National Archives and Records Service, Seattle, Wash., Box B4266.

35. <u>(Region 67, "O, Personnel,</u> Lawson, H. K." The contractor produced 155 packsets.

36. Spokane Daily Chronicle, 2 December 1953, p. 3. These were manufactured under contract to the Navy by Spokane Radio Company. 40. C. B. Morse (R-5) to Forest officers, (R-5), 29 July 1942, Gaylord A. Knight Collection.

41. Morse to Forest officers.

42. U.S. Department of Agriculture, Forest Service, Forest Service Manual, 1944, "Forest Service Policy-G.A.-17," p. 3.

43. Cronemiller to Forest officers, p. 2.

44. Cronemiller to Forest officers, p. 1.

45. D. S. Nordwall, "Memorandum for the Record-Radio Laboratory Inspection," 24 March 1947, p. 6, Gaylord A. Knight Collection.

46. Horton, "Inspection Memorandum."

47. R. M. Conarro and H. K. Lawson, "Report on Communication Study,"
August 1944, typed, pp. 2, 10, Gaylord
A. Knight Collection. The forests were:
R-1: Kaniksu, Coeur d'Alene, and Lolo;
R-4: Boise and Payette; R-5: Los Padres,
Angeles, Sequoia, Tahoe, Eldorado, and
Klamath; and R-6: Siuslaw, Wenatchee,
and the Radio Laboratory.

48. Conarro and Lawson, "Report," p. 10.
49. Conarro and Lawson, "Report," p. 5.
50. Conarro and Lawson, "Report," pp.
4, 5.

51. Horton, "Inspection Memorandum."

52. Knight, interview with author.

53. G. H. D. /Duvendack7, "Communication Inventory-F. S.," 18 November 1947, mimeographed, Gaylord A. Knight Collection. These figures were plotted for 1947.

54. Lyle F. Watts /Chief/ to Regional Foresters and Directors, 16 November 1950, Gaylord A. Knight Collection.

55. Conarro and Lawson, "Report," p. 10.

56. Harold K. Steen, The U.S. Forest Service: A History (Seattle: University of Washington Press, 1976), p. 234.

57. Knight, interview with author.

58. Horton, "Inspection Memorandum."

59. Logan <u>Belleville7</u> to Harold <u>Lawson7</u>, 29 August 1945, Gaylord A. Knight Collection.

60. Biggerstaff, interview with author.

61. William B. Morton to Dennis Roth,Forest Service History Section,18 April 1980, History Section files.

62. Knight, interview with author.

Chapter XIII Putting the Pieces Back Together:

Postwar Adjustments and FM Radio

With the transition of FM and the adoption of miriad [sic] improvements developed during the war, the Forest Service has reached a most important crossroads in its communications development program. It is important, therefore, that all interested factions understand and agree upon the various aspects of the developmental work and its application in the field.

- David S. Nordwall1

By the end of World War II, Harold Lawson had invested 14 years in the development of Forest Service communication systems. The temporary concentration of Radio Laboratory efforts on the AWS had not diverted him from the original goal of the design program as he watched wartime technological advances broaden the chasm between the prewar accomplishments and postwar requirements. The rapid advance of technology reemphasized the need to be prepared for peacetime conditions. Many new techniques and new discoveries would have to be assimilated into the design goals of the Laboratory.

Lawson frequently updated the projected Laboratory work plans while supervising AWS production and testing. Through Regional inspections, special studies, and concept papers on probable applications, he could compare the present status of Forest Service communication with the probable future requirements of the Laboratory. The 1944 working plans emphasized his perception of the Laboratory mission if the war ended before too long. He looked at the prior restraints on network use vis-a-vis a "policy for use of radio for point-to-point communication in view of new agreement/s/ with A. T. & T."

Lawson also gave thought to investigating "new developments in the radio field," "the perfection of the automatic relay," and the preparation of sample "Forest Radio Communication Plans." The emphasis upon "continued development /of/ light weight portable radio in cooperation with Fire Control ..." also received attention. In fact, he went one up on the previous definition of portability by devising the following new yardstick for simple, rugged, and reliable portable radio equipment:

The Yardstick for Portable Radio Equipment

- Light. Is it light enough to be readily carried or moved about?
- Small. Is it small enough to be readily carried or moved about?
- 3. Simple. Is it simple enough to be operated by regular personnel without a long course of instructions?
- 4. Rugged. Is it rugged enough to withstand the shocks normally encountered by fire equipment?
- 5. Dependable. Does it always work when you need it?

Lawson was anxious to continue the application phase of radio after the war. The ultimate objective of the Laboratory effort had been full acceptance of radio. But the issues of interference, point-to-point use, administrative radio, and portable radio for the fireline had evolved into major areas of disagreement before the war, limiting certain applications. He did not wish to see this pattern repeated. Each issue could be handled if kept in proper perspective.