

Chapter XIV

Communication Leadership:

Toward Consensus and Standardization

...I believe we should have clearly in mind that communication facilities, whatever they may be, are simply the means by which we get our main job done. We are not running the National Forests just to have a place where we can operate communication gadgets. I remember once a telephone engineer told me that I must not ever forget that the reason the National Forests were created was so he would have trees to hang telephone wire on.

- F. V. "Jack" Horton¹

George H. Duvendack was Supervisor of the Kaniksu National Forest in 1947. Thirty-one years later, he recalled his reaction when the order from Bill Kramer reached him. On the one hand, he "hated the idea" of going back to Washington; on the other, he agreed with the policy that "When asked, you went." But more than that, his selection caught him off guard. "Jesus," he remarked, "I was dumbfounded. I knew nothing about the insides of a radio. All I knew was when I picked up a radio I wanted it to work."

Not confident in his ability to manage the program, he approached Colonel Gael Simson, past administrative head of the Radio Laboratory and Chief of Radio Communications in the Washington Office until 1943, while in Washington, D.C. Duvendack told him he knew little about radio and insisted he had "no damn interest in it" except as a means of communication. Simson advised him to take the job nonetheless. Administrative ability was needed, not technical expertise, Simson pointed out.



Figure 128. George H. Duvendack at Dugger (radio) Tower, Ala., ca. 1948, soon after his appointment as director of the Forest Service's communications program. (Forest Service photo, History Section)

Duvendack, however, was not a novice to radio.² He had more background on the subject of electronic technology than it would at first appear. While working his way up through the Region 1 ranks to the level of Forest Supervisor, he had observed the application of this technology on the "doer level." He understood the promise of radio, its limitation as a tool, and, like Dwight Beatty, many firefights and actual communication experiences crowded his memory.

Duvendack set about organizing his priorities in Washington even though he was convinced that Kramer "...didn't appreciate what the hell I was up against." There I was on IRAC," he recalled, "with Admirals and Generals who knew what they were doing," and conversing with technical types even though "I was a fish out of the water." He found in Erwin Wagner, head of Administrative Services, an ideal means to channel his ideas to the IRAC members. In Harold Lawson he found "a damn nice fellow and

competent man" who would act as his spokesman on technical matters before manufacturers' representatives.³

It did not take Duvendack long to run into some of the same problems faced by Jack Horton when dealing with the Washington Office. Two encounters with Assistant Forest Service Chief Earl Loveridge left him shaking his head. Loveridge called Duvendack one afternoon and requested a type SF set for a high-level meeting that same afternoon. Duvendack explained that the only SF in Washington was in the next office, disassembled down to the last tube and screw. Loveridge, totally unaware of the mechanics of the SF, was "not pleased" that the set could not be reassembled within a few minutes. Another time, Duvendack had just left his office to attend a meeting in one of the far corners of the huge South Building at the Department of Agriculture. As he walked down the hall, Loveridge fell in step beside him. Nearing the end of the corridor and a parting of the ways, Loveridge, known to agency personnel as "Our Work Finder and Efficiency Expert," asked Duvendack, "How many tubes in the SF?"

"Something like 16," George replied.

"Take four out," was Loveridge's terse command. He was dead serious.⁴

Duvendack had settled on a four-point plan of operation by the end of his first year in Washington. Highest priority was the manufacture of new Forest Service radios by private enterprise and the replacement of the Forest Service telephone lines with a combination of commercial lines and radio. He was concerned that the Forest Service was competing

with industry in these two fields, so he thought it best to purchase the needed telephone service and to investigate the possibility that radio manufacturers might be induced to design ready-made units to Forest Service standards.

This latter venture was a matter of some standing, even at the Radio Laboratory. As early as January 1939, Gael Simson had outlined the "Objectives of (the) Radio Development Unit" and stressed that "...with a view to increasing the amount of commercial radio and materials and equipment suitable for forestry communication users..." the Laboratory would keep the radio industry informed of forestry's needs. Since then, many promising commercial developments had taken place.⁵ "Present plans," it was also emphasized in an early 1947 report, "contemplate replacement of the Service-sponsored development program by commercial facilities to the fullest practicable extent and as soon as industry is able to supply the types and quality of equipment that the Forest Service must have."⁶

Duvendack had come to view the Laboratory staff as a "closed corporation," not necessarily from the viewpoint of vendors but in terms of exchange of ideas. It seemed to the new communications chief that when they dealt only with the smaller manufacturers near Portland they were losing by not utilizing the brains of engineers in the larger corporations. "My mission," he concluded, "was to stop our manufacturing, except under competition, in Portland, and get these sets manufactured by the larger manufacturers..."⁷

As a preliminary step, he scheduled an extensive trip for Lawson and himself to some 25 manufacturers "in the eastern part of the United

States." They also planned to look into the application of the nickel-cadmium battery, the transistor, and any "new developments in the radio art."⁸

Major Firms Show Great Interest

Between October 4 and 31, 1948, Lawson and Duvendack traveled to Chicago, Boston, New York City, Washington, D.C., and several other cities. They met with chief engineers, sales managers, and, in most cases, also the company presidents or vice-presidents. An SF set and pictures of the TF were passed around for review at each stop. The response was overwhelming. "We had innovations that none of the companies had," remembered Duvendack.⁹

"Time after time, they heard that the engineering in the handie-talkie would have cost over \$100,000 if the work had been done in the laboratories of the large manufacturers."¹⁰

Intent on obtaining competitive bids to reproduce the sets, Lawson and Duvendack extolled its possible applications and markets in Federal agencies, as well as State divisions of forestry, the logging industry, railroads, and utility companies. They emphasized that the Army FM version of the handie-talkie would not be complete for another 18 months. "Sold on the field that exists," observed Duvendack, "RCA, General Electric, Belmont [Radio] and Federal Telephone and Radio were particularly enthusiastic and showed by their statements that they desire to submit bids sufficiently low to insure that they could use the engineering in our equipment and add another item or two to their line of radio equipment."¹¹

The major obstacle with the plan to purchase commercial models was the

absence of specifications covering Forest Service requirements. The Laboratory had lacked the instrumentation to measure required performance parameters and, therefore, had provided type samples for the manufacturers. Lawson and Duvendack agreed after their trip that a program to determine specifications should be instituted immediately.¹² Lawson assigned this task to Biggerstaff, and a new era in radio for the fireline was inaugurated.¹³

The long-standing issue of nonstandard communication systems was one of the first problems that Duvendack had to resolve. For the last dozen years, various Regions had questioned radio development and instituted communication planning just about whenever and however they saw fit. It would require considerable diplomacy to overcome this independent tradition and thereby achieve the essential level of uniform performance and standardization.

Standard performance may be obtained either by fiat or by a more democratic process that achieves the same results without backlash. Through the process of majority rule, opposing sides can be brought together under one roof, the issues discussed in a common forum, policy statements developed, and majority vote allowed to determine policy while allowing some latitude for local conditions and needs. The only caution required of the leadership is that their opinions and conclusions be amply represented among the voting members.

The 1948 Communications Conference

Using the logical guise of the long absence of a much-needed communications conference, Duvendack made plans to hold the first meeting in the eight years since 1940. He enlisted the support of Forest Service Chief Lyle Watts and Assistant Chief William Kramer.

They agreed that numerous developments had "created new problems in our field of communication," and that "there is a need for a meeting of minds and a united approach on many of our problems and procedures, not only among our communication technicians but more importantly among responsible administrative personnel to be included in the invitation."¹⁴

A few days later, the Division of Operation presented an agenda to the Regions for the January 19-23 conference. The 11 topics ranged from the general "Management's Job and Responsibilities" to the more specific "A Study of Frequency and Power Allocations." Each topic was assigned to a committee picked by the Washington Office. The emphasis was upon "committee work sessions" as opposed to "minimum time to adequately present a topic" and severe restriction on "floor discussion time." It was expected that "the committee reports and recommendations, coupled with their acceptance by the conference or the registration of specific objections, will be used here in setting policy, establishing standards and guidelines in planning, organizing, and managing the Forest Service enterprise."¹⁵ In other words, the committees preselected by Washington would meet to reach a consensus and draw up a position paper. This paper would be presented to the conference as a whole, amended as needed, voted upon by the members-at-large, and submitted for "Washington Office action."

Several topics were presented each day of the conference. The tone of what was to come was set by Horton's presentation on management. "It is not until Management has indicated needs in communication," he firmly

addressed the communication men, "that we require the advice and assistance of communication technicians." Stressing the differences between line and staff authority, Horton made no pretense about the expected role of communications personnel in the hierarchy of Forest Service administration. He partly blamed management leaders for shirking their responsibilities and partly blamed the technicians for devising systems "which did not express the needs of field men."

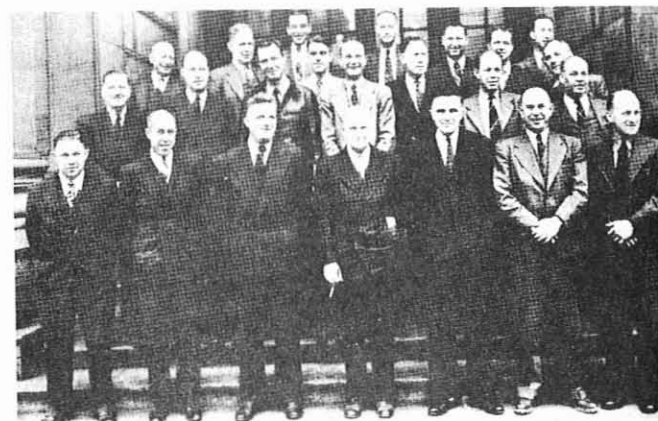


Figure 129. Postwar problems were discussed at the January 1948 Servicewide communications conference in Portland, Ore. Front row, left to right: W. Fred Biggerstaff (R-6), David S. Nordwall (Washington Office), George Duvendack (Washington Office), F. V. "Jack" Horton (R-6), Harold K. Lawson (R-6), Mayhew H. Davis (R-9), and Lawrence K. Mays (R-6). Second row: Norman F. Johnstone (R-9), Herbert T. Holmquist (Washington Office), Arthur L. Turner (R-2), Richard H. Lewis (R-3), Bernard A. Anderson (R-4), Guy V. Wood (R-5), and Thomas H. Burgess (R-6). Third row: William S. Williams (R-5), Raymond M. Conarro (R-8), E. Allan Loew (R-6), Francis W. Woods (R-4), Gaylord A. Knight (R-8), and Ernest M. Karger (R-7). Back row: James C. Iler (R-1), William B. Apgar (R-1), and Harvey O. Robe (R-2). (Forest Service photo, History Section)

"The first big job," Horton then concluded, "is to get some communications planning done on a Servicewide basis," and it should reflect the views of the Forest Ranger, not the communication technician.¹⁶

Vital Place of Radio on the Fireline

This first committee report reestablished the responsibilities of the communication technician. The second committee report reestablished the importance of communications on the fireline. "We may have Cadillac appetites, but Fords will get you there as well," this group concluded. Concerned that the administrative use of radio deprived "the man on the ground" of the limited communication funds, the committee stressed "it is far more important that the grass-roots organization, the doer level, be provided with the very best of communication than it is that the upper-bracket supervisors be provided with fingertip information."¹⁷

With two major issues down and one to go, Duvendack chaired the third group. It was made up of Lawson, Apgar, and Guy Wood, and a wiser choice for discussing "A Study of Frequency and Power Allocations" could not have been made. On the one hand, Apgar would undoubtedly be outvoted even if the new Washington Office chief of communications abstained. On the other hand, any minority report would probably never reach the conference floor. Especially after Washington's stamp of approval, recommendations passed through the majority-rule process would be difficult to ignore in Region 1.

"I like to compare the radio spectrum to a life boat," Duvendack later addressed the conference. "Both have limited capacities. If the lifeboat is overloaded, it swamps and sinks and thereby does not fulfill the job

it was intended to do." Continuing in the allegorical vein, he pointed out that frequency spectrum management began on a worldwide basis. What would happen, he asked, if the United States did a "bang-up" job of regulation and control, but Mexico "ran wild?" The boat would sink, by implication. Only through "cooperation and a spirit of give and take on the part of all countries" did the boat stay afloat. This analogy, Duvendack concluded, was applicable within the Forest Service.¹⁸

Before completing his remarks, Duvendack also emphasized that the Forest Service was "sitting in clover" by comparison to many other Government agencies. "We have at this time an adequate number of frequencies," and "we enjoy group assignments."

At that time, the Forest Service had 29 frequencies (12 clear) in the 3- to 4-MHz band and 71 (23 clear) between 30 and 40 MHz, and could shift stations at will. Other agencies not only had fewer frequencies, but they had to secure authorization from IRAC for any variation in their approved assignments. "We enjoy this position," Duvendack reminded them, "because of limiting ourselves to 25 watts of power," getting in on the "ground floor," conforming to the policies handed down by the International Telephonic [Telecommunications] Union and IRAC, and "the good judgement and foresight in securing our frequencies,"¹⁹ or what he would later refer to as the "pack rat" tendencies of Gael Simson toward accumulating frequencies.²⁰

As one last argument against the higher levels of output power and the use of 3-MHz Regional networks, Duvendack made this prediction: "The picture as I see it doesn't look very rosy for the retention and use of the

frequencies we have from 2952 kc to 5905 kc (kHz)." Due to the higher classification of other users in this spectrum, the implication was clear. Continued expansion of investment in this region of the spectrum might be for naught.²¹

The remainder of the week was taken up with issues of safety; a demonstration of the SF, TF, and KF; maintenance; the practice of hiring technicians; cooperative relationships with state divisions of forestry; and financing. Participants also reaffirmed communications policy as stated in the *Manual* under "National Forest Protection and Management."²²

At first glance, it may appear that the communication conference was composed of only antinetwork personnel. Certainly, the gathering had proposed regulations in line with prior Radio Laboratory philosophies. But the consensus favoring a new job definition for the communication technician and for providing communication on the "doer level," as well as the threat that 3-MHz frequencies might become useless, suggests that the administrative levels of Forest Service management were more concerned with costs than communication principles. To a man--from Bill Apgar to Harold Lawson--conferees accurately reflected the fiscal concern of the Washington Office. "We were certainly a shoestring budget outfit," Lawson recalled. He would be echoed many times over.²³

Economic considerations, therefore, were significant determinants of Washington Office attitudes at the 1948 Portland conference. The loss of the 3-MHz frequencies was viewed, not as a technical issue, but as a financial problem. It would be difficult and embarrassing for Washington to explain later to taxpayers why, say, \$500,000 worth of 3-MHz radios were no longer useful.

The Place of the Technical Specialist

The effort of National Forest administrators to come to grips with the phenomenon of "specialists" was the final issue at the Portland conference. During the next years, these selectively educated individuals would proliferate in all areas of administration--game management, grazing, forest pests, soil and water, public relations, recreation, fiscal management, and landscape architecture. In 1948, however, many were not yet certain of either their proper role or the authority they should wield. Even Bill Apgar, who harbored decided prejudices against the incursion of specialists into what he perceived as the domain of the Ranger, could not recognize that he was himself a specialist, indeed, one of the first communication specialists in the Forest Service.

The Portland gathering included administrators who were beginning to grasp the significance and implications of the issue. Jack Horton had had 20 years to reflect on this point when he addressed the conference. "At the risk of being misunderstood," he steadfastly maintained, "I believe it is fundamental that technicians should only act in an advisory capacity."²⁴

But Duvendack has other motives for redefining the responsibilities of the communications technician. "My fourth priority," he explained, before accepting the job in Washington, "was to find a replacement for myself and return to my part of the woods."²⁵ When he returned to the woods he did not want "the tail wagging the dog."

There were high expectations over the ability of the Portland conference to limit the instances of increased transmitter power. This optimism was soon to be dampened, at least

momentarily. Region 1 had been developing a Regional aircraft network for several months. Separate application had been made to IRAC to include the National Park Service at Yellowstone and Glacier National Parks in the network. In consideration of Region 1 agreements with the Park Service, which funded 12 smokejumpers, the application was "somewhat reluctantly" approved. Maximum power, however, was to be limited to 125 watts, Glacier was to communicate only with the Forest Service, and then only "in an emergency jeopardizing life, public safety or important property under conditions calling for immediate communication where other means of communication do not exist or are temporarily disrupted or inadequate."²⁶

Encouraged by this initial success, Region 1 went one step further and asked the Washington Office to request the inclusion of the Weather Bureau in the network. Regional Forester Percy D. Hanson, noting the importance of fire-weather forecasts, spelled out the need for a 500-watt station in Boise and 100-watt sets in Weather Bureau mobile units. Hanson also pointed out that the Region was not using one of its assigned 3-MHz frequencies and would be willing to relinquish this channel for the Weather Bureau.

The response to Bill Kramer was less than enthusiastic. In fact, the Washington Office Chief of Operation was upset. "We have no intention of relinquishing" any frequencies, he wrote in a scolding three-page reply. He reminded Region 1 that other Regions had been doing without a 3-MHz network since the aircraft network was approved. Indeed, Kramer had no intention of submitting the application even without the frequency recommendation because "...the Forest Service will be asked by IRAC to share some

of its frequencies for Weather Bureau use," a precedent he wished to avoid. If this were not enough, he reminded Hanson, "IRAC will not allocate frequencies for use between fixed points (Boise and Missoula) which can be served by wire."

Kramer also told Hanson he did not approve of this attempt to "drive wedges" in "fixed policies." Citing the "power limitations" of 25 watts on 3 MHz, which were "reaffirmed at the Portland Communications Conference," he accused Missoula of proposing and attempting to circumvent this "fixed policy."

More importantly, Kramer was most upset with the intent behind the Region 1 request. Communications between Boise and Missoula was point-to-point communication, not plane-to-ground communication. It had nothing to do with the aircraft network. Region 1, as a result, had put the Division of Operation on the spot and Kramer was not going to let them off easy. "The installation and resultant performance of your high power net has three adverse results." He noted:

1. It has delayed your development of a vhf net, wherein you would have much better radio communications than you now have in areas that can be served only by radio or messengers.
2. It has deprived other regions of the use of a frequency that they were using.
3. A few others would like to follow suit.

Kramer took a parting shot at Apgar for not "discussing" this application after the Portland conference when "asked" by Duvendack to refrain from further 3-MHz development in

light of the possible restrictions on Forest Service use on these frequencies. For the benefit of Missoula, he reiterated the point that "adherence to our stated policies" would be expected. "Communication Officer Duvendack will be in Region 1 during the latter part of August and he will discuss the problem involved in more detail," Kramer forewarned the Region.²⁷

The results of Duvendack's visit to Missoula are no longer on the record. But it is interesting to note that the communication plans for each of the Region's National Forests had begun to place important emphasis on vhf radio use. Apgar drew up very detailed plans, and now, in contradiction to his earlier opinions on the "worthlessness" of 10-meter communications, warned that "vhf radio, is not restricted to line-of-sight..."²⁸

Frequency Allotments Reallocated

Most of the National Forests in Region 1 were well-equipped with vhf by 1956,²⁹ even though Missoula was allowed to retain its "existing regional net."³⁰ As predicted, the Regions were notified of the loss of 3-MHz frequencies following the 1952 International Radio Conference (IRAC) in Geneva. Nearly half of the Forest Service hf allocations were classified "out of band" at that time.³¹

Additional IRAC frequency authorizations were acquired in the higher frequencies during Duvendack's tenure in Washington. By 1948, the Department of Agriculture had two frequencies between 144 and 146 MHz, 26 from 146 to 172 MHz, 8 in the 216- to 219-MHz band, and 8 between 411 and 415 MHz. Most of these were allocated to the Forest Service.³² Unlike previously, use of these frequencies awaited the availability of suitable commercial products.

Duvendack also took a sympathetic approach to other users of radio, giving up a number of Forest Service frequencies. He recognized that scarcity of frequencies made it vitally important that such organizations as State forestry departments have more than one joint frequency assignment, and he lent his support to this effort. He defended this action by pointing out that the Forest Service "could do nearly everything on telephone."³³ Meanwhile, Lawson got Horton's permission to use his own time to work on relieving State forestry departments of some frequencies in the interest of the logging industry. Although this "raised a lot of hell" with State forestry, Lawson defended his work with the same rationale used by Duvendack.³⁴

Two factors aided Duvendack's quest to convert Forest Service telephone lines to commercial telephone circuits: The increasing incidence of inductive interference created by nearby high-power electric transmission lines and the advent of dial telephones.

Inductive interference was not new to the Forest Service telephone engineers, but the construction of distant hydroelectric plants, long stretches of high-powered lines, and the expansion of Rural Electrification Administration (REA) services following World War II reached a point where monetary damage agreements favoring the Forest Service were increasingly being settled. Between 1947 and 1949, the public utility companies in California, Washington, Oregon, Idaho, and Montana had to expend some \$250,000 to correct interference on Forest Service lines caused by new powerline construction.³⁵ Radio was substituted in some cases,³⁶ but, in others, the previous single-wire, ground-return lines were replaced with higher quality double-wire, metallic lines.³⁷

The conversion to dial exchanges in the Bell Telephone System created additional telephone problems for the Forest Service. Wherever National Forest lines ran through or to a local exchange, an operator would no longer be there to make the proper connection. Electronic switching systems would now relay the call in conjunction with the commands transmitted by the dial. It was convert, or else, for the Forest Service.

Much Forest Telephone Line Sold

These two matters provided more reasons for not maintaining Forest Service lines. Duvendack's favorable attitude, combined with these circumstances, led to increased sales of telephone line. The process usually involved putting a particular section of line up for bid in local newspapers, through mailings to interested parties, and by posting sale notices in the area Post Offices. A listing, for example, might describe the line as "one metallic telephone line consisting of two #9 wires attached to trees and occasional poles starting at the Sunset highway and extending approximately 4 miles to Kachess Guard Station, Wenatchee National Forest." The line might then be sold to Pacific Telephone and Telegraph for \$100.³⁸ Or the ad might be for a combination of single wires on telephone company poles, and the setup purchased by lodges, ranchers, resorts, or residents who served as Forest Service cooperators. Between 1946 and 1949, decreases in holdings resulting from these sales and abandoned lines amounted to some 12,500 miles. Chief Watts expected that the extension of REA lines to many out-of-the-way locations would soon bring a further reduction in Forest Service holdings.³⁹

The radio bid specifications requested of Biggerstaff had no precedent. The

Radio Laboratory had tried at the close of World War II to interest RCA in the production of an "a-m Packtype Radiophone" based on very general specifications for size, weight, and power, and on specific suggestions for crystal control of the transmitter and a super-regenerative receiver. It was only an anticipatory request, however, in response to some indication of interest from RCA.⁴⁰ Nothing had come of the matter.

Bids were advertised on specific commercial products that the staff agreed were promising. The problem with this approach was that the bid was addressed to a certain make and model, "or equal." "This created ill feeling with other manufacturers..." Biggerstaff learned, because the "implication was obvious" that the Forest Service wanted only the stated make and model.⁴¹ He was pressed to find a means to define specifications allowing other manufacturers' products to be included. He was stumped by the Radio Laboratory's lack of appropriate electronic test and measurement equipment.

Fortunately, Guy Wood was also sensing a real need to accurately measure the performance of Forest Service sets. He knew that trouble-shooting was more successful when technicians were provided with a repair manual that gave the precise expected performance criteria for each section in a radio. To obtain the nominal values for properly operating sets, he imposed upon his friends at the Hewlett-Packard Co., Palo Alto, Calif., to lend him the necessary equipment for recording performance.⁴² He completed these measurements by early 1949 and forwarded them to the Laboratory.

First Use of Radio Specifications

The arrival of these specifications could not have been timed better. Biggerstaff needed bid procedures that could be used to test manufacturers' compliance with contracts. He rewrote the specifications to eliminate such nonessential items as color, and stated exactly how to measure the required performances. A dispute on performance "raged for a time" over such particulars as dynamotor versus vibrator power supplies. By eliminating restrictions on circuit types and stressing performance, he was able to increase the possibility of competition. The Forest Service thus would not be limited to one manufacturer and the associated high prices. "I believe it was this philosophy," he recalled later, "that gained much of the early recognition for the Forest Service specifications."⁴³

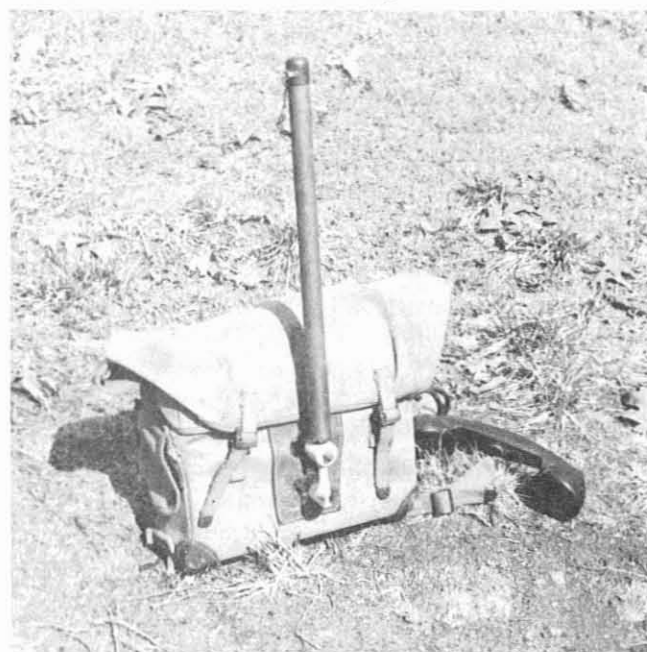


Figure 130. An early Link lightweight FM radiophone packset (model 695-B). It was purchased in the early 1950's by the Forest Service under competitive bid on the basis of specifications developed by the Radio Laboratory. (Forest Service photo, History Section)

Fred Biggerstaff also placed heavy reliance upon the published standards of the Electronic Industries Association (EIA) for his specification parameters. A communication conference in Portland between December 5 and 8, 1949, provided an opportunity for the Regional communication officers and five State forestry departments to have a hand in composing the specifications. "Exceptional close agreement was reached...in the matter of technical standards," reported the *Radio Laboratory Newsletter*.⁴⁴

Once the standards were agreed upon, Biggerstaff initiated the practice of continually updating and improving the data so that no one manufacturer obtained a monopoly. He strove to achieve specifications applicable to no less than two available commercial sets, and preferably, three or more. He also set about measuring the performance characteristics of a number of available commercial models, relying on test equipment that included dry ice for cold tests, light bulbs for heat, a Laboratory-designed "shake table" to measure such qualities as ruggedness, and whatever other equipment served his purpose.⁴⁵

The bid specifications also proved valuable for "in-factory inspections" and Laboratory tests to insure compliance by successful bidders. It was originally expected that manufacturers would produce models of the SF, TF, and KF; however, the start-up costs proved prohibitive. So the manufacturers submitted their own designs as satisfactory substitutes in accordance with Laboratory specifications.

Problems did arise, however, with attempts to have the SF reproduced. The Harvey-Wells Co. of Southbridge, Mass., agreed to manufacture the type SF model C and was awarded a contract

over other bidders who proposed their versions of the handie-talkie. The Radio Laboratory purchased 145 units in spring 1950 and distributed them to the field. Technical problems with the sets became evident almost immediately. In a case reminiscent of the problem with Western Wireless, the type SF suffered from unsoldered joints, faulty tubes, inoperative press-to-talk switches, and off-frequency transmitter and receiver circuits.⁴⁶ Mr. Harvey argued that "the failure must have happened in transit."⁴⁷

The evidence of poor workmanship was overwhelming. Bill Kramer informed the company that the sets were being returned to the factory and that Biggerstaff would act as an inspector during the rework.⁴⁸ From this inauspicious and accidental beginning, the "in-factory inspection" became a regular specification compliance test carried out by Biggerstaff on all Forest Service bids.

Initial awards to manufacturers of non-Forest Service type sets also produced some early compliance problems. Radio Specialty Manufacturing Co. (RSMC) of Portland, one of the first manufacturers to bid for the early Radio Laboratory sets, attempted to move into the competitive market with the production of its own FM semiportables, lookout, mobile, and pack-type sets. Guy Wood discovered that several units in the RSMC type 1144 Packset picked up spurious signals transmitted by stations 10 MHz from the receiver setting. "It is obvious," he wrote the Radio Laboratory, "that the units do not meet the spurious response standards established in the USFS radio specifications" and were therefore considered "unusable" in the Region 5 network.⁴⁹ This led Gordon J. Gray of the Scientific Management Branch, Washington Office, to caution RSMC to

correct the engineering problem in future deliveries.⁵⁰ Several months later, it was learned that RSMC was handicapped by a lack of working capital, a situation stemming from numerous contract extensions and delivery delays of up to 14 months.⁵¹ "Although RSMC makes some types of radio that would be difficult to obtain elsewhere," forewarned Kramer's office, "we cannot continue to do business with them under their present delivery policies."⁵²

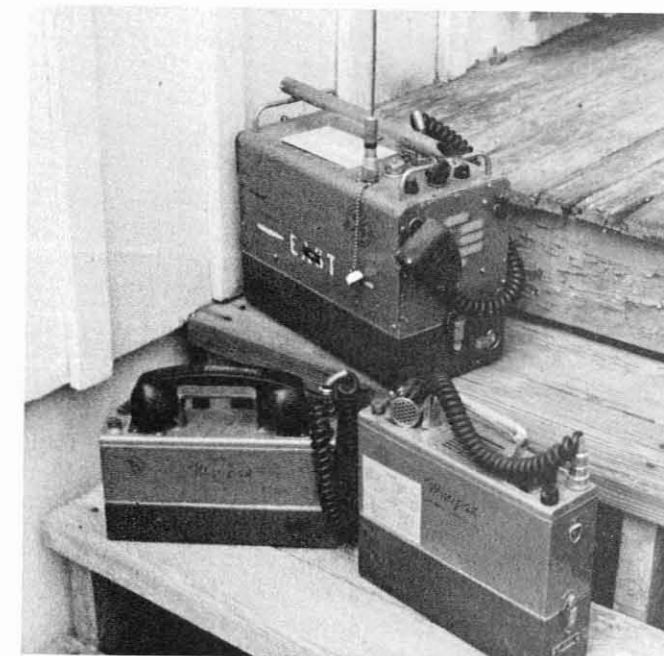


Figure 131. FM radiophone sets purchased by the Forest Service in the early 1950's under competitive bid. At top, model 1144-57-1; lower left, model 1160-37-1; lower right, 1160-15-1. The manufacturer (Radio Specialty Manufacturing Co.) had provided some of the earliest Forest Service radios. (Forest Service photo, History Section).

Corporations with more financial clout also received their share of negative compliance reports. Motorola, Inc. and GE, to name two, submitted some early equipment that had minor technical problems. Region 1 complained that because Motorola's SP-30049 universal

remote control system did not perform satisfactorily, and Lawson had to have considerably preliminary work done on these units. "From the experience we've had so far with the various types of equipment," Bill Apgar informed the Laboratory, "the Region is certainly not satisfied with Motorola products."⁵³

The problem with GE radio equipment was more specific. In one of the early GE sets, the fixed bias of the grid-drive circuit was erratic due to the use of the type 807 tube. When Bill Claypool, who had returned from Mexico to the Radio Laboratory, traveled to the GE plant to confront them with the problem, he detected an attitude implying that the GE engineers felt somewhat superior to the technical staff of the Forest Service. In response to the confrontation, Claypool amusingly informed Bud Fontaine, GE argued that the cost of the 807 tube was so low that the "infrequent" loss due to the failure of the grid drive "was of no great importance."⁵⁴

The Radio Laboratory also discovered that some larger corporations could not be enticed to bid on the less lucrative contracts in the earlier phase of the specification program. When bid requests had been let in an attempt to obtain a fixed-base FM set for St. Anthony, Idaho, GE and RCA responded, but Motorola did not. The Radio Laboratory concluded "that Motorola is just not hungry enough for business this time and did not choose to sharpen its pencils for such a small order."⁵⁵

This situation would be corrected in time as Forest Service annual radio purchases approached significant figures. Biggerstaff, Claypool, and Lawson remembered that Motorola, in particular, became very cooperative towards the Laboratory, perhaps more

so than certain other manufacturers who exhibited an early attitude of "take what we have, or do without." Other manufacturers also developed a cooperative attitude. The degree of interest, of course, varied over time with all firms, including Motorola, often depending on who⁵⁶ the technical contact person was.

Certification Program Is Begun

An important factor in the success of the Forest Service bid-specification procedures was the coincidental development of a "certification" program. With knowledge gained through specification and in-factory inspections, Biggerstaff was able to measure the performance of any available commercial set. In substance, the certification of a set was merely a pre-bid statement by the Radio Laboratory that a particular model was in compliance with existing specifications. Knowing the unit had already passed inspection gave manufacturers more incentive to submit bids and encouraged them to consider the needs of the Forest Service in the early stages of design. Manufacturers could then confidentially approach the Laboratory staff to ascertain the value of particular techniques or modifications before incurring further developmental costs. Agreement was not always achieved, but this process gave the Forest Service an avenue to affect the configuration and performance of purchased sets. This advantage had been lost with the cancellation of the Laboratory design program.

In addition, the certification program allowed Biggerstaff to keep the specifications up to date. New concepts could be immediately incorporated into the data, and the Forest Service assured of obtaining the latest equipment.

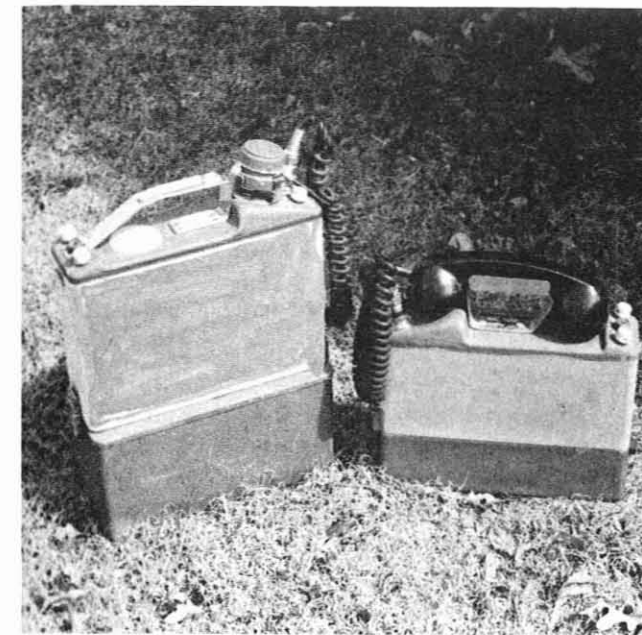


Figure 132. Handie-talkies, made by the Motorola Corporation, were purchased by the Forest Service under competitive bid in the early 1950's after precise specifications for the sets were completed by the Radio Laboratory. At left, model P31BAC-1061AM. At right, model H-21-3. (Forest Service photo, History Section)

Records of the certification program were faithfully maintained by Biggerstaff. Early tests indicate that the first compliance inspections began in mid-1949 and covered everything from central stations to mobile units and handie-talkies. Belmont Radio Corp. (Raytheon Corp.), Philco Corp., RSMC, Motorola, RCA, Link Radio Corp., Harvey-Wells Co., and GE all made the list. A notation beside each entry records "Rejected," "Accepted," or "Accepted Conditionally." By the end of 1951, only 8 out of 27 commercial models inspected had been given favorable ratings.⁵⁷

The Regions began the process of converting to FM during Duvendack's tenure. One of the sets used in significant numbers for a few years was the military surplus SCR-610.

It provided an economical alternative for mobile, fixed-base, and lookout-tower use on the Chelan National Forest, Wash.⁵⁸ When it came time for the Siskiyou and part of the Rogue River National Forests in Oregon to convert, the Regional office recommended purchase of this set. Even though the 640's provided by surplus warehouses were in only "good to poor" condition, the initial costs of reconditioning averaged less than \$100 apiece, including transportation and the expense of sending someone to select the better ones.⁵⁹

The 1951 cost estimates of Region 6 continued to reflect the advantages of the SCR-610 during the conversion from AM to FM. Although recommending 44 handie-talkies, 14 packsets, and 20 mobile sets--all commercial models--at a total cost of \$37,432, the Region included 26 SCR conversion kits, indicating the set was still considered relatively important.⁶⁰ By this time, the total Region 6 radio inventory was approaching 1,500 units, with 1,053 sets already on FM and only 362 still on AM.⁶¹

Despite its usefulness, however, the SCR-610 had serious faults. "...It was difficult to maintain, its a.f.c. often failed to keep it on frequency, and the special bias batteries were soon impossible to obtain. They [the sets] were therefore not used long, and their annual life cost, including maintenance and failures, was probably as high [as] or higher than the equivalent commercial radios."⁶²

Having significantly converted the Forest Service to commercial radio and telephone service and established a visible semblance of order in Regional approaches to communication planning, George Duvendack began to act on his third goal. It was time

to move the Radio Laboratory closer to the Washington Office.⁶³

Arguments in favor of moving the Laboratory were about as old as the Radio Laboratory itself. Occasional voices had been heard on the subject since the beginning of the design program in Portland. The 1935 Portland conference discussed the location of the Laboratory and drafted a resolution in favor of relocating the personnel where they would "...have opportunity to contact other individuals doing work of a like nature."⁶⁴ But it was not until 1947 that anyone gave much credence to the possibility.

At that time, David S. Nordwall of the Washington Office Operation staff, concluded his inspection of the Portland facility and recommended that "in view of the probable curtailment of [the] scope of [design] activities, consideration should be given to the desirability of locating the Laboratory and its staff at some point near Washington--such as Beltsville."⁶⁵

Radio Laboratory Is Moved to Beltsville, Md.

Beltsville, Maryland, was a logical selection. On the edge of the town were the sprawling research facilities and farmland of the Experiment Station of the U.S. Department of Agriculture, no more than a half-hour drive to the Forest Service headquarters in the South Building near the Washington Monument, Washington, D.C., and a similar trip to the major airports near Washington or Baltimore. The facility had sufficient open space available for any experiments. Electrical interference was minimal, and short flights could take the staff to the headquarters of manufacturers. In addition, the staff could easily participate in Washington Office meetings and IRAC

conferences. All these impressive advantages made the location an appealing choice to Duvendack, and he set out to convince Kramer that the cost was worth the move. First, however, he took steps to reach his last goal, a replacement for himself. George was ready to return to his part of the woods.

Duvendack kept an eye out for a suitable replacement on his trips through the Regions. Some months before, he had settled on E. Allan Loew of the Region 6 Engineering Division.⁶⁶ When the time was right, he approached Kramer about moving the Laboratory to Beltsville and promoting Loew to the job of Chief of Communications. Duvendack returned to St. Maries, Idaho, as supervisor of the St. Joe National Forest, the place where Harold Lawson had installed the first Forest Service radios on a National Forest.

Al Loew was better prepared for the communications assignment than his predecessor. He was a native of Washington State and had earned a degree in electrical engineering (power transmission) from the University of Washington, where his father was on the faculty of the School of Engineering. Loew had accepted a job with the Regional office in Portland in November 1936. Here he had been put to work surveying, controlling stream erosion, and installing small hydroelectric plants and gas generators at Ranger stations. He was then assigned responsibility when the administration and control of the Regional telephone systems were moved over to the Division of Engineering.⁶⁷ In this capacity, he had been involved in communication issues affecting both radio and telephone, attended the 1940 and 1948 communications conferences,⁶⁸ and had come to

know Jack Horton well. "I got more support sometimes," Loew related about Horton's control of Regional budgets and financing, "than I did from my own boss."⁶⁹

Arrangements to move the Laboratory were made by Loew in September and October and completed in November 1951.⁷⁰ Most of the active projects made the transition, with the exception of an experiment for potting subcircuit assemblies in a polystyrene compound. Only Biggerstaff and Claypool, however, remained with the Laboratory. Logan Belleville left the Forest Service for Tektronix Co. in Beaverton, Ore., when the shift to commercial purchase of radios became certain. He became significantly involved in the company's oscilloscope development program.

Deciding whether or not to move to Beltsville was an agonizing experience for Harold Lawson. He had been an integral part of the program since Dwight Beatty had hired him 20 years before, but he realized that the old days were over. Many rewarding experiences crowded his memory as he contemplated a decision. He had designed and constructed the first voice-transmission, semiportable SP set with no more than a hand drill, tin snips, and a few other tools. He had seen the Laboratory grow from a ramshackle house in Tacoma to quarters in Portland indicative of its stature in lightweight, low-power radio design and development. He had spent countless hours struggling at the workbench to extract the maximum efficiency from a collection of tubes, resistors, and capacitors. And he had been as pleased with a coworker's success as with his own.

A champion of vhf radio from the outset, Lawson would argue the

merits and defend the faults of 10-meter radio in the interest of providing the best possible communication systems for the men on the fireline. Years later he sat in his living room and gently held a Forest Service handie-talkie as he recounted the Laboratory decision to go to FM. The SF unit, found in a surplus store junk box and given to him by a friend, represented far more than an inanimate object from the past. As Lawson talked, his eyes followed the outline of the shiny chrome enclosure. His hand went gently around the smooth contours of the case. His thumb depressed the press-to-talk switch as naturally as if the set invited operation. His conversations were technical and his demeanor authoritative as he reflected on history. The voice did not mask the pride. "We were not a research group; we were an applications group," he emphasized. The contradiction between his words and the object in his hand never occurred to him.

On May 15, 1951 Harold Lawson received a "Superior Service Award" from the Federal Government. It cited his "zeal, initiative, and success in developing greatly improved radio equipment to meet the communication requirements of land management agencies resulting in marked savings to the Government and usefulness for certain military search and rescue communication purposes."

For a while, Duvendack thought he had talked Lawson into making the move to Beltsville. But Harold and Bea Lawson had lived all their lives in the Pacific Northwest, and they chose to stay there. Lawson resigned from the Forest Service as the Radio Laboratory was being emptied of its contents. Thus ended a significant chapter in the history of electronics communications.⁷¹

Reference Notes

1. F. V. Horton, "Management's Job and Responsibilities" (Paper presented at the Forest Service All-Regions Communication Conference, Portland, Ore., 19 January 1948, pp. 1, 2, Gaylord A. Knight Collection.

2. George H. Duvendack, interview with the author in Missoula, Mont., May 1978. Duvendack, as indicated, expressed total ignorance of the theory and principles of electronics and set design, and claimed a lack of skills in set construction, maintenance and repair. He implied a minimal knowledge of or experience in radio communication. Bill Morton expressed surprise to the History Section at this response. As a technician in Region 1 (see chapter 15) and later assigned to Station KCBX in Missoula, Morton heard Duvendack sending messages in international Morse code at 20 words per minute from his station, KBBN, Sandpoint, Idaho, late in the evenings in an attempt to catch the KBCX technicians off guard. Also, Morton recalled Duvendack as a radio amateur who had had military communications assignments. See William B. Morton to Dennis Roth, Forest Service History Section, 18 April 1980, History Section files, p. 6.

3. Duvendack, interview with author.

4. Duvendack, interview with author.

5. A. G. Simson, "Memorandum," 27 January 1939, Gaylord A. Knight Collection and Harold K. Lawson, interview with the author in King City, Ore., May 1978.

6. D. S. Nordwall, "Memorandum for the Record-Radio Laboratory Inspection," 24 March 1947, p. 15, Gaylord A. Knight Collection.

7. Duvendack, interview with author.

8. [George Duvendack], "Memorandum for the Record," 16 November 1948, p. 1, Gaylord A. Knight Collection.

9. Duvendack, interview with author.

10. Duvendack, "Memorandum for the Record," p. 2.

11. Duvendack, "Memorandum for the Record," p. 2.

12. Lawson, interview with author, and Duvendack, interview with author.

13. W. Frederick Biggerstaff, interview with the author in Saratoga, Calif., January 1978.

14. R. E. Marsh to Regional Foresters, 6 November 1947, Gaylord A. Knight Collection.

15. D. S. Nordwall to Regional Forester, 12 December 1947, Gaylord A. Knight Collection.

16. Horton, "Management's Job," pp. 15, 17.

17. B. A. Anderson, "Communication Planning" (Paper presented at the Forest Service All-Regions Communication Conference, Portland, Ore., 19 January 1948, p. 21, Gaylord A. Knight Collection.

18. G. H. Duvendack, "A Study of Frequency and Power Allocations" (Paper presented at the Forest Service All-Regions Communication Conference, Portland, Ore., 19 January 1948, p. 27, Gaylord A. Knight Collection.

19. Duvendack, "Study," p. 30.

20. Duvendack, interview with author.

21. Duvendack, "Study," p. 31.

22. Duvendack, "Study," app., pp. 1-12.

23. Lawson, interview with author; Wilbur S. Claypool, interview with the author in San Antonio, Tex., July 1978; Gaylord A. Knight, interview with the author in Atlanta, Ga., November 1977, February 1978, April 1979; Francis S. Woods, interview with the author in Ogden, Utah, January 1978; W. B. Apgar, interview with the author in San City, Ariz., January 1978; and Biggerstaff, interview with author.

24. Horton, "Management's Job," p. 17.

25. Duvendack, interview with author.

26. Wm. P. Kramer to Region 1, 7 July 1947, Gaylord A. Knight Collection.

27. Wm. P. Kramer to Region 1, 29 July 1948, Gaylord A. Knight Collection.

28. W. B. Apgar, "Communication Plan-St. Joe National Forest," 16 July 1948, typed copy. Copies of the 1948-49 plans for all Region 1 forests were in my possession at the time of this writing. I expected to put them in the Gaylord A. Knight Collection.

29. J. H. "Bud" Coats, "Communications in the National Forests of Region One," ca. 1979, unpublished draft, p. 11, Gaylord A. Knight Collection.

30. R. Max Peterson (Engineer, Region 1) to Forest Service Radio Laboratory, 2 February 1960, Gaylord A. Knight Collection. Peterson became Chief of the Forest Service on June 27, 1979.

31. Howard Hopkins (Washington Office) to Regional Foresters, 12 April 1952, Gaylord A. Knight Collection.

32. Howard Hopkins (Washington Office) to Regional Forester, 22 April 1948, Gaylord A. Knight Collection. Gael Simson had been responsible for a large number of these between 140 and 160 MHz. See Knight, interview with author.

33. Duvendack, interview with author.

34. Lawson, interview with author.

35. G. H. Duvendack, "Rough Draft," intended for part of a report by "Mr. Muenster" on REA inductive interference, 1 February 1949, Gaylord A. Knight Collection.

36. Lyle F. Watts to Regional Foresters and Directors, 15 March 1951, National Archives and Records Service, Seattle, Wash., Box 53981.

37. Watts to Regional Foresters and Directors. See also, Leo M. Moore, REA, St. Louis, to Regional Forester (Regions 1, 6, and 8), 23 April 1942; Wm. P. Kramer to Regional Foresters, 23 April 1942; "GHD" [Duvendack], "Memorandum to the Record," 9 February 1949; and G. H. Duvendack to Mr. [Gordon] Fox, 26 January 1951, all Gaylord A. Knight Collection.

38. U.S. Department of Agriculture, Forest Service, Region 6, "Invitation, Bid, and Acceptance," 3 November 1948, National Archives and Records Service, Seattle, Wash., Box 19034.

39. Lyle F. Watts to Regional Foresters and Directors, 16 November 1950, National Archives and Records Service, Seattle, Wash., Box 19034.

40. Wm. P. Kramer (dictated by Lawson) to Radio Corporation of America, 20 April 1945, Gaylord A. Knight Collection.

41. Fred Biggerstaff, "Forest Service FM Radiophone Bid Specifications,"

draft prepared for later use, ca. 1966, p. 1, Gaylord A. Knight Collection.

42. Woods, interview with author.

43. Biggerstaff, "Bid Specifications," p. 2. See also, Region 5, "Invitation Bid and Acceptance-Short Form Contract," 1949, National Archives and Records Service, Seattle, Wash., Box 53982. The sale of these two systems required 30 pages of description.

44. Forest Service, *Radio Laboratory Newsletter*, no. 3, January 1950, p. 1.

45. Biggerstaff, interview with author.

46. Kermit W. Lindstedt (R-6) to the Chief, 19 May 1950; L. K. Mays to Chief, 26 May 1950; W. B. Apgar to Harold Lawson, 6 May 1950, all National Archives and Records Service, Seattle, Wash., Box 53982; and Al Loew to Regional Forester (R-6), 4 August 1950, National Archives and Records Service, Seattle, Wash., Box B4266.

47. Lindstedt to Chief.

48. Wm. P. Kramer to Harvey-Wells Co., 6 June 1950, and Wm. P. Kramer to Regional Forester (Regions 1, 2, 4, 5 and 6), 15 September 1950, both National Archives and Records Service, Seattle, Wash., Box 53982.

49. Guy V. Wood, "Memorandum to the Files," 10 December 1951, National Archives and Records Service, Seattle, Wash., Box 53981.

50. Gordon J. Gray (Washington Office) to Radio Specialty Manufacturing Co., 14 December 1951, National Archives and Records Service, Seattle, Wash., Box 53981.

51. Gordon D. Fox (Washington Office) to Region 6, 9 May 1952 and W. L.

MacDonald (R-6) to Wm. P. Kramer, 10 June 1952, National Archives and Records Service, Seattle, Wash., Box 53982.

52. Fox to R-6.

53. Region 1 to Region 6, January 1951, National Archives and Records Service, Seattle, Wash., Box 53981.

54. W. S. Claypool to C. V. Fontaine (R-6), 17 December 1951, National Archives and Records Service, Seattle, Wash., Box 53981.

55. E. Allan Loew to All-Region Communication Officers, 15 May 1951, National Archives and Records Service, Seattle, Wash., Box 53981.

56. Biggerstaff, interview with author; Claypool, interview with author; and Lawson, interview with author. Also see William B. Morton to Dennis Roth, Forest Service History Section, 18 April 1980, History Section files.

57. Forest Service Radio Laboratory, "Certification Tests," Log book of entries, typed and handwritten, Gaylord A. Knight Collection.

58. Paul K. Taylor (Chelan National Forest) to Regional Forester (R-6), 25 April 1950, National Archives and Records Service, Seattle, Wash., Box 53982.

59. L. L. Colville (R-6), "Memorandum," 12 July 1951, National Archives and Records Service, Seattle, Wash., Box 53981.

60. C. V. Fontaine (R-6) to Fire Control (R-6), 12 March 1951, National Archives and Records Service, Seattle, Wash., Box 53981.

61. James Frankland (R-6) to Operations (R-6), 11 May 1951,

National Archives and Records Service, Seattle, Wash., Box 53981.

62. Morton to Roth, 18 April 1980, p. 7.

63. Duvendack, interview with author.

64. U.S. Department of Agriculture, Forest Service, "Forest Service Communications Conference," Portland, Ore., 20 February to 2 March 1935, typed copy, p. 4, Gaylord A. Knight Collection.

65. Nordwall, "Radio Laboratory Inspection," p. 15.

66. Duvendack, interview with author.

67. E. Allan Loew, interview with the author in Beltsville, Md., November 1978.

68. Forest Service, "Inter-Regional Radio Communication Conference-Minutes of Meeting," Portland, Ore., 2 December to 7 December 1940, pp. 1, 2; and "1948 Communications Conference," pp. 1-5, both Gaylord A. Knight Collection.

69. Loew, interview with author.

70. Howard Hopkins (Washington Office) to all Regional Foresters and Directors, 26 September 1951 and Edward C. Crafts (Washington Office) to all Regional Foresters and Directors, [n.d.], both Gaylord A. Knight Collection.

71. Harold K. Lawson to the author, tape-recorded comments on review of preliminary manuscript, [n.d.], Gaylord A. Knight Collection.