

ABSTRACT

This final report covers a period of 7-1-61 to 7-1-62 on the AN/WRC-1 and AN/URC-35 SSB program.

The major effort on the program during this period was that of supporting the operational testing at NEL on the subject equipments.

PURPOSE

On 1 July 1959, work was started at General Dynamics/Electronics (then Stromberg-Carlson Company) on the design and development of two different single sideband radio sets, the AN/WRC-1 and the AN/URC-35.

The AN/WRC-1 was intended for fixed station, general coverage throughout the range of 2-30 megacycles, with a peak power output of 100 watts. The system was to be composed of a receiver, exciter, power amplifier, and automatic antenna coupler. Tuning was to be accomplished digitally down to 1 kilocycle increments, in less than 20 seconds.

The AN/URC-35 was intended for mobile usage, operating from 2-18 megacycles, with a peak power output of 100 watts. The system was to be composed of a transceiver, power amplifier, remote box, semi-automatic antenna coupler, and a 15 foot fiberglass whip antenna. Tuning was to be accomplished digitally down to 1 kilocycle increments.

The development models of each radio set were built and submitted for evaluation. The first unit (AN/WRC-1) was shipped to the Navy Electronic Laboratory in San Diego, California 1 April 1961, and the last unit (AN/URC-35) was shipped 8 September 1961. The time period spanned was approximately 50

percent less than that perviously incurred in a program of this magnitude. Close cooperation between the Navy and the contractor, and the willingness of both to combine Engineering Model phase and Service Test Model phase had much to do with attaining the accelerated goal.

Shortly after the design phase was started, it became evident that certain changes in the general equipment makeup could produce, as an end result, an extremely flexible series of units, which, in many instances, could be interchanged with existing equipment, interchanged within themselves, and successfully integrated with new proposed equipment. Consequently, the final equipment differs in some aspects from the original specification, but the program has created a series of units which provide considerable flexibility to the user. As an example, the original intent was to use the Automatic Antenna Coupler with the AN/WRC-1 and the Semi-Automatic Antenna Coupler with the AN/URC-35. By recognizing and providing for the comparatively minor dissimilarities, it is now possible to use either coupler with the AN/WRC-1. Many similar changes will become evident later.

The following sections are, in general, divided down to the losest unit presently assigned nomenclature. Because of certain similarities between units, the first subject is covered in detail and similar items are thereafter referenced.

It is intended that this Final Report will serve as a description of what was attained by the subject development. No attempt is made to describe step-by-step development, since this information, if required, is adequately recorded in the Interim Development Reports already submitted.

GENERAL FACTUAL DATA

On March 24, 1961, a change designed to improve the efficiency of the Cost Accounting system of General Dynamics/Electronics was instituted.

While this change improves the effectiveness of Cost Control by providing cost data more rapidly, it prevents indentification of manpower charges in detail.

The hours worked by project personnel are listed as follows:

Supervisory Personnel:

J. E. Harrison	Chief Engineer
R. S. Arao	Section Manager
D. B. Carr	Supervising Mechanical Engineer

<u>Project Personnel:</u>	<u>Hours Worked:</u>
Section Head	41
Sr. EE	23
EE I	583
EE II	562
Sr. Me	290
ME I	109
EA	632
TECH	<u>9</u>
Total	2,249

The following is a summary of the hours expended by General Dynamics/
Electronics on the AN/WRC-1 and AN/URC-35 Development Program.

<u>Period</u>	<u>Hours Worked:</u>
7- 1-59 to 9-30-59	10,637
10- 1-59 to 12-31-60	20,464
1- 1-60 to 3-31-60	17,377
4- 1-60 to 6-30-60	13,924
7- 1-60 to 9-30-60	12,254
10- 1-60 to 12-31-60	11,438
1- 1-61 to 3-31-61	16,948
4- 1-61 to 6-30-61	9,004
7- 1-61 to 7- 1-62	<u>2,249</u>
Grand Total	114,295

It should be noted that in addition to the hours shown above; an additional 464 hours were expended, at no cost to the Bureau of Ships, by General Dynamics/ Electronics personnel at NEL. In addition there were also a large number of hours expended in-plant by various personnel in support of the operational testing at NEL.

DETAILED FACTUAL DATA

The first service test model of the AN/WRC-1 was delivered to the Naval Electronics Laboratory on 30 March 1961. The second service test model of the AN/WRC-1 was shipped to the laboratory on 28 July 1961. These systems, as shipped, included a Receiver-Exciter, 100 W Power Amplifier, Automatic Antenna Coupler, Coupler Control Box, and Junction Box. In addition to these items, spare parts, shock mounts, and preliminary instruction books were delivered.

The first service test model of the AN/URC-35 was delivered to the Naval Electronics Laboratory on 5 September 1961. The second service test model of the AN/URC-35 was shipped to the laboratory on 8 September 1961. These systems, as shipped, included a Receiver-Exciter, 100 W DC Power Amplifier, Semi-Automatic Antenna Coupler, and Control Box.

The testing on the AN/WRC-1 proceeded satisfactorily with provisional acceptance of the system for use by the Navy in December 1961. Subsequently, a contract was received on 29 June 1962, covering preproduction models and 28 pilot production models of the AN/WRC-1.

Testing on the AN/URC-35 systems is continuing as of the date of this report.

The following is a description of each unit of the AN/WRC-1 and AN/URC-35. Because of certain similarities between the units, the first subject is covered in detail and similar items are thereafter referenced.

1.0 R-1051/URR RECEIVER

The R-1051/URR is a single sideband receiver operating between 2-30 megacycles, and digitally tuned in 1 kilocycle steps. Operation in upper sideband, lower sideband frequency shift keying, CW, AM, and independent sideband is provided. A photograph of the unit is shown in Figure 1, and a block diagram in Figure 2.