

FIRST PROGRESS REPORT

DEVELOPMENT OF AS-3 PORTABLE RADIO STATION

October 1, 1956

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The performance requirements for the AS-3 Semi-automatic Portable Radio Station are well described in Specification 56-A-1046A. Development of equipment to provide the desired objective has begun under Contract [redacted] Task Order #1 with [redacted]

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This first report describes progress made in the first two months of work on this contract. It also portrays the basic concepts of the system, at the risk of some repetition of the Technical Proposal for this project, in order to establish a common departure point for the work. The present status of the work is included, as well as projected objectives for the next reporting period.

Basic Program

The working facilities for accomplishing the development work required by this project have now been well established in our new engineering laboratory at [redacted]. The completion of these facilities and the establishing of the work team for the project has consumed a major part of the period.

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The personnel assigned to this project consist of:

1. [redacted] Project Engineer
2. [redacted] Development Engineer

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In accordance with our regular procedures, these men draw upon a pool of up to 12 draftsmen and 7 model builders in the accomplishment of their daily tasks.

The proposed time schedule for the project has now been revised and is tabulated as follows:

- a. System design plan Oct. 30, 1956
- b. Operating breadboards of transmitter and power supplies Jan. 15, 1957 (optomical)
- c. Operating breadboards of remainder of items Apr. 15, 1957
- d. Engineering model of system July 1, 1957
- e. First model delivered for tests ... Oct. 1, 1957

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- f. Delivery of two preproduction models Jan. 1, 1958
- g. Delivery of eight additional pre-production models ~~Apr. 1, 1958~~ ^{March}
- ~~h. Delivery of final report May 1, 1958~~

*2 1/2 months from Jan 29**See 3rd Progress Report*

Every effort will be made to keep this program on the above time schedule.

The next progress report will be submitted at the end of a one-month period and will contain our proposed design plan for the equipment needed to provide the performance required by your specification. Review and comments by your technical staff will be sincerely appreciated. Any additions or changes will then be made and the resulting design plan will become the development objective of this project.

Progress to Date

Initial consideration has been given to the establishment of a number of the major building blocks of this system in order to establish their relative sizes and hence their shapes and location in the final package. A block diagram of the system is shown in Figure 1-1.

Battery ABA-3

Since the choice of battery type will have a major contribution to the weight and bulk of the system, this item has been given first consideration. Several types of rechargeable batteries have been considered. Preliminary data indicate that the nickel-cadmium type offers the most promise because of the following:

1. Voltage holds up well to near the end point.
2. May be sealed if charging rate kept within certain limits.
3. Almost complete absence of self discharge.
4. Excellent performance over wide temperature variations.
5. Weight per kwh is satisfactory.

Using catalogue data, the battery required to supply the specified performance would be contained in a 2 3/8 x 4 1/8 x 8 package and weigh 5 lbs. This has shown sufficient promise that a sample 12-volt unit has been ordered.

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Of next importance in establishing the overall size and weight of the system is the power converter to provide the required plate voltages for the transmitter from the dc source. Our company has had considerable experience in the design and construction of transistor power supplies. Based upon this work, the unit required for this system could probably be packaged in 25 cubic inches and would weigh approximately 2 1/2 lbs. It is probable that the Delco 2N173 transistor will be used.

Transmitter AT-3

The search for a suitable transmitter final amplifier tube has pointed up the RCA Type 6883. This is a dependable tube, easily capable of providing the required 25 watts output without excessively high voltages. The use of the lowest possible voltages is highly desirable to conserve volume through the use of close-spaced tuning condenser and other final-tank parts. This tube is efficient at low voltages and requires very low driving power.

$F_1 = 12.6 \pm 10\%$
 P @ 6 Watts
 $E_p = 500$
 $E_g = 170$
 $E_{g1} = 66$
 Drive = 2

Preliminary investigation indicates that it will be possible to use a single oscillator stage to drive this final amplifier, the stage functioning as an oscillator only in the range 3-10 mc and as an oscillator/multiplier in the range 10-30 mc. Tank circuits are being designed to cover this frequency range in only two bands.

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 wire?)

Grid block keying is to be employed, enabling us to properly shape the keying waveform. This type of keying is readily adaptable to any speed.

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Grid modulation at a 150 cps tone will be used for recognition keying. This will require the least number of components and smallest battery drain. Transistors will be incorporated as a free-running multivibrator at 150 cps to produce the square-wave output.

Coder AC-3

The first sketches of the coder indicate it can be packaged in a 2 1/4 x 4 x 5 case. The buttons for space, dot and dash are to be protected by the edge of the equipment, preventing accidental depressing. The movement of the buttons will be between 1/4 and 1/2 inch travel with positive interlocking mechanism.

The keying medium will be magnetic tape using 1 1/2 mil mylar 3/8" wide. This will give dependable service and is to be carried in the cartridge. Positive stops are employed so that a maximum of 127 words can be recorded. This unit will be spring loaded so that it will be ready to operate when removed from either the keyer or coder.

AS 1/4"

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Plans for the Next Reporting Period

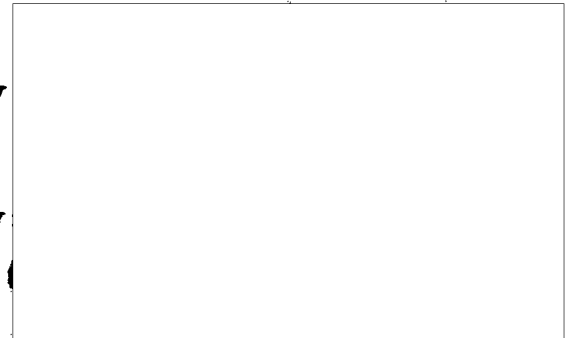
All effort will be directed toward the establishment of the basic units of this system to a sufficient degree to permit presentation of the complete equipment design plan in the next report.

A request was made on September 6 by your engineers regarding additions and modifications to the AS-3 equipment as follows: (1) a dial type coder which would imprint code numerals on a tape instead of the three buttons outlined in paragraph 3.7.1 of the specification, and (2) a method to play back at slow speed the coded medium so it might be checked by the operator. Both of these proposals are being taken up by our engineers; however, insufficient information is available at this time. A complete review will be included in the next reporting period.

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SYSTEM BLOCK DIAGRAM

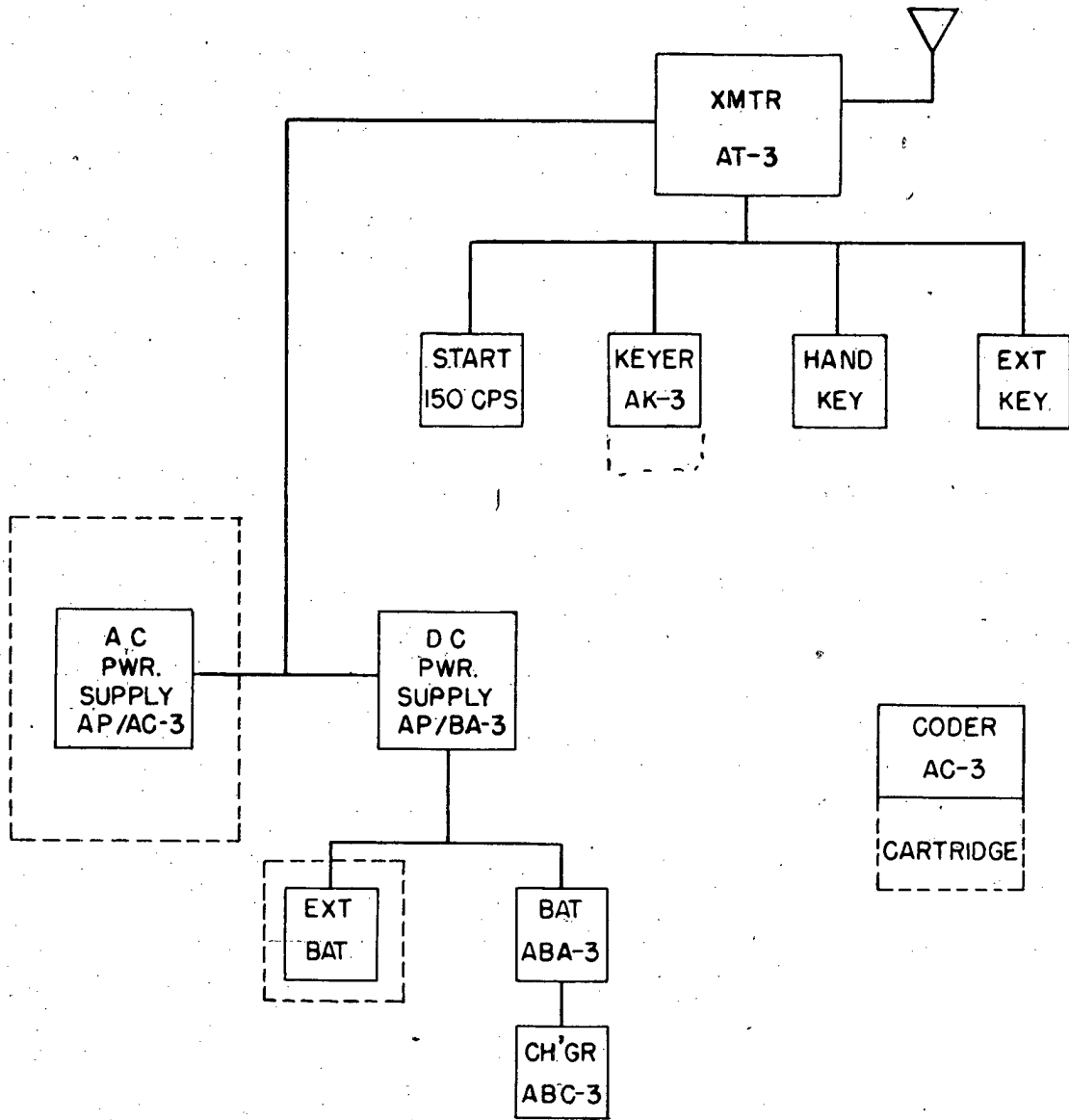


FIG I-1

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