

## \*ARMY Declass/Release Instructions On File\*

The Files

5 March 1962

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### Army Evaluation of AS-3 Equipment

1. On 20-21 February 1962 a visit was made to the Airborne, Electronics and Special Warfare Board, Ft. Bragg, North Carolina to discuss the Army test of the Automatic Agent Set, AS-3, and associated equipment. The Board has been directed by COMARC to evaluate the AS-3 vis-a-vis the KE-8 and AN/GRC-109, the latter being a military version of the RS-1. The Board's report is due at COMARC by 1 April 1962 to allow time for contract follow-up this fiscal year. Since Special Forces is the primary military customer for medium-speed equipment, they are following this evaluation closely and had a representative at our meeting.

2. The project officer, Major Eugene Biondi, described the problems encountered in the test which had thus far been limited to the AS-3. Major Biondi and two assistants took the equipment on a two week cross-country test during January, working into a mobile base station at Ft. Bragg. Results were discouraging, but may in part be attributed to the test procedures and to unfamiliarity with 300 wpm operation, particularly at the base end. The test procedure called for manual CW contact at scheduled times to be followed by a 300 wpm burst if conditions seemed favorable. No propagation curves were drawn for the test which was conducted on 10 HFARCOM frequencies between 3 and 24 megacycles. Interference from HFARCOM was a serious problem throughout the test. Out of 132 contact attempts, successful manual CW contact was established 8 times. On each of these 8 occasions, a medium-speed burst was transmitted. Four bursts were missed at the base station due to operator error, and on receipt, only the plain text portion of the other four was recognizable; the 5-letter code group portion was not recoverable. The KE-8--AN/GRC-109 was not tested on this trip.

3. Major Biondi said his results were so bad that he had been ordered to make another trip and come up with a better report. Consequently he planned to leave on Saturday, 24 February 1962, for a 14-day trip to Alabama, Texas and Arizona. The Pentagon had been asked

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to furnish specific frequencies for the second test on the basis of propagation curves run by the Signal Corps Propagation Agency.

4. During the January test, the Army field team had two AS-3 systems and used 12 volt vehicular batteries. Their major complaint was with the RR/D-11 receivers. The sensitivity of both sets was measured at 5 microvolts as against the 1.5 microvolts of the AN/GRC-109 receiver (RR-2B). This reduced sensitivity was thought to be the reason the base station, a 400-watt BC-610 into a doublet antenna, was not heard on several occasions. (The inherently poor calibration accuracy of the RR/D-11 and an apparent tuner malfunction in one of them is felt by the writer to be a more likely cause). Band II of one of the receivers was completely inoperative due to a transistor failure. The test team complained about the lack of waterproofing in the AT-3, the fragility of its dial windows, and the appearance of transmitter converter hash on the receiver antenna lead, which seemed to worsen as the test continued. The limited battery capacity for manual CW contacts was also commented on.

5. The base for the cross-country test consisted of a van with three R-390 receivers, using whip antennas, a CV-13B and a RT-7. No oscilloscope was used for CV-13B tuning during the test. Fort Monmouth, New Jersey and an ASA Battalion at Ft. Bragg which had been asked to monitor the test also reported negative results, but no details on their equipment were available.

6. Col. Edwin O'Connor, Chief of the Electronics Division of the Board, convoked a meeting on Wednesday 21 February to discuss their evaluation thus far. Present at this meeting were:

- Col. Boyle - Deputy President of the Board
- Col. O'Connor, Chief, Electronics Division, AE+SW Board
- Col. Power, AE+SW Board
- Charles Swearingen - Engineering Advisor to the Board
- Mr. White - Engineering Advisor to the Board
- Major Yount - AE + SW Board
- Kenneth Rielly - Electronics Technician
- Lt. Col. E. Reulin - Special Warfare Center, Ft. Bragg
- Mr. Arthur Fungelley - Chief, Long Range Radio Branch  
Ft. Monmouth, New Jersey
- Mr. L. J. Lindberg - Long Range Radio Branch, Ft. Monmouth

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7. Col. O'Connor said that the tests so far had shown that the AS-3 possessed no significant advantage over the AN/GRC-109 on manual operation. He said his engineering advisors had expressed some doubt about 300 wpm operation in anything less than a "voice quality circuit", normally not provided by low powered equipment. In reply he was assured that extensive testing on our part had established that 300 wpm operation was feasible on the same class of circuit used for manual CW traffic handling, although under different operating conditions from those used in his tests.

8. The writer pointed out that in our operational situation the base used powerful transmitters, rhombic antennas for transmitting and receiving, and experienced operators for recording and playback of 300 wpm messages, and that a wider choice of operating frequencies was usually available to us. The shortcomings of the RR/D-11 were readily admitted and several deficiencies recently uncovered in the AT-3 were brought to the Board's attention. The Board was told that the RR/D-11 was being used despite its calibration error simply because there was no other tunable shortwave transistor set available in anything like an "agent radio" package. It was pointed out that an accessory power supply, PS-4, permitted use of the RR-2B with the AT-3 transmitter. The Board was told that we were aware of the fragile windows and the converter hash problem in the AT-3 and there was a fix for these and the other problems recently encountered in production units. Col. O'Connor was told that modified transmitters would be forwarded to them during March to replace the units he now had.

9. The Board was told that only the Army could decide whether the AS-3 was rugged enough for military use, but that it would be a mistake to turn down 300 wpm operation on the basis of the limited testing done so far. It was suggested that special attention be paid to the KE-8--AN/GRC-109 combination in the next test phase, and that each contact include a 300 wpm burst, even though the base was unheard and contact was not made on manual CW. The Army agreed to these procedural changes and said that an oscilloscope would be used at the base during the next test phase.

10. Col. O'Connor said that military characteristics were now being drawn up for a new field radio to replace the AN/GRC-109. This set would satisfy four of the five outstanding Army requirements for a low power radio. (The fifth requirement, for a sub-miniature agent set, was being filled by the AN/PRC-52 soon to be service tested at Ft. Holabird, Md.) The proposed set would be a 30 watt CW/SSB set with an optional 100 watt amplifier. It is intended to meet military requirements for:

- a. A long range command and administrative radio
- b. A reconnaissance patrol set
- c. A Special Forces radio
- d. A conventional Army set, using SSB

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Col. O'Connor said that he realized a new development meant a four year lead time and asked if we had anything now operational or nearly so that might fulfill Army requirements in the meantime. He was told that the AT-3 was the only complete set now available and that the KE-8 would probably be the standard 300 wpm keyer for the foreseeable future since it was intended to operate with present and future transmitters. The Board was told that the KE-8 had been used successfully at Ft. Monmouth with two new military transmitters, the AN/PRC-52 and the AN/TRC-77. The Agency's R+D program continually studied new and improved equipment, he was told, but nothing better than the AT-3 was available for issue.

11. The AE and SF Board, according to Col. O'Connor, was considering recommending a variable keying rate for the new army set, adjustable to any speed between 60 and 300 wpm to meet various interference and signal strength conditions. The writer expressed the opinion that this was an unnecessary complication at both base and field ends, and said that our experience had been that there was no noticeable difference in the propagation of 60 and 300 wpm signals. It was suggested that the Board defer inclusion of the adjustable keying rate feature until after the 300 wpm tests had been completed.

12. Special Forces has levied a formal military requirement (QMR) on the Signal Corps for the development of a special base station for receiving 300 wpm traffic and relaying it on to the military network. On the day of the writer's visit, the two Ft. Monmouth representatives listed above were at Ft. Bragg to discuss a 25-page specification they had drawn up preparatory to going out on bids for the equipment.

13. The Ft. Monmouth approach involved a control center linked by microwave to transmitter and receiver sites up to 30 miles away with on-line crypto and automatic message handling between units. The receiver van had 3 dual diversity receiving positions, automatic Morse to Baudot conversion, and immediate reencipherment and relay to the control center. The writer pointed out that we had done some work in the area of receiving 300 wpm transmissions and recommended that the military engineers learn in detail what we had done before going out on contract. Mr. Pengelley and Mr. Lindberg accepted an invitation to visit Washington, D.C. for a conference with us on the 300 wpm base station.

14. In summary, Col. O'Connor said that the results thus far had indicated the Army should not use the AS-3 equipment and that he himself was not yet convinced that the KE-8 offered any advantage over manual operation. He was told we would monitor the next phase of the Ft. Bragg test and forward him a report on our results.

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