NATIONAL HEADQUARTERS
CIVIL AIR PATROL
500 Fifth Avenue
New York 18, New York

COMMUNICATIONS MEMORANDUM)
NO. 2) 22 November 1943

CONSTRUCTION OF WERS RADIO SETS

1. General. a. The following information is of a general nature and is meant to be used as a guide only as it is desired that ingenuity be encouraged to the utmost. The exchange of information through National Headquarters is encouraged in order to make available, throughout CAP, valuable information gleaned by individual Communications Officers.

b. It is readily apparent that it is impractical to design radio equipment which could be used on a standard basis by all Civil Air Patrol units. The types and amounts of equipment available will vary throughout the nation. However, it is believed pertinent to invite the attention of all Communications Officers to certain practices which have been dictated by experience.

2. Air-ground operation. a. Reliable communication between aircraft and ground on the frequencies used by CAP (115.2 - 116 megacycles) can be expected somewhat beyond the "line of sight." Although the signal will not disappear immediately upon dropping below the horizon, reliable communication cannot be expected and under average conditions will be limited to relatively short distances. Inherent directional characteristics of the aircraft transmitting and receiving antenna, due to the position of the antenna on the plane and the physical dimensions of the plane as a whole, or any member of the plane, may further result in restricting the range of communication. The topography of the area of operation may produce artificial horizons which must be taken into account when considering the reliable range of communication.

b. The use of very high frequencies for air-ground communication has proven feasible, but not without extreme care in the construction and installation of the radio equipment.

(1) All connections should be both electrically and mechanically tight, special attention being given to vibration. The equipment should be easily accessible and not interfere with the operation of the aircraft. All cables should be so installed that the danger of fouling any of the ship's control mechanism is not possible.

(2) Serious interference from the engine ignition system may be experienced in the reception of very high frequencies aboard aircraft unless precautions are taken to properly shield the ignition system and bond all metal parts of the aircraft structure together. If other electrical equipment, such as motors, generators, etc. are used aboard the aircraft, it may be necessary to extend the shielding to include all the associated wiring and the equipment itself. In some instances, electrical noise filters have been found effective in the eliminations of such interference, but in fabric-covered planes it will often be necessary to apply electrical shielding and bonding.

3. Point-to-point-operation. a. The distances over which reliable communication may be conducted by point-to-point net works will naturally be limited by the restricting factors present in air-ground operation. Moreover, point-to-point distances generally will be considerably shorter because of the decreased "line of sight" and rapid attenuation caused by terrain features and man-made obstructions. Topographical interference will present many more complications and in mountainous areas will be severely restrictive.

b. Transmission difficulties will be considerably reduced if sound principles are employed in the design of the equipment and the terrain is carefully studied when establishing a net work.

(1) Sets should be neatly constructed and enclosed to facilitate mobility. Wires should be as short as possible. The noise level may be considerably reduced by employing adequate shielding.

(2) It is recommended that transmitters be of the Master-Oscilator-Power-Amplifier type. Because of the high interference likely to be present with the transceiver type of equipment, their use should be limited to the lower power brackets. The super-regenerative type of receiver is the most practical for use with the frequencies authorized for CAP.

c. Wing and Groups should attempt to standardize socket and plug connections, tube types, and antennas to the fullest extent of available equipment. Whenever practical, equipment should be so designed that an alternate source of power may be used.

By direction of National Commander JOHNSON:

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