

ORDER

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

6510.4A

6/19/80

SUBJ: RADIO COMMUNICATIONS REQUIREMENTS FOR AIR TRAFFIC CONTROL FACILITIES

- *1. PURPOSE. This order establishes the system plan for providing radio communications for airport traffic control towers (ATCT), air route traffic control centers (ARTCC), and flight service stations (FSS). It also clarifies the system plan for providing and managing the very high frequency (VHF) and ultra-high frequency (UHF) spectrum for air traffic control facilities. *
2. DISTRIBUTION. This order is distributed to selected offices in Washington and regional headquarters, area offices, and all Air Traffic and Airway Facilities field offices.
3. CANCELLATION. Order 6510.4, Radio Communications Requirements for Airport Traffic Control Towers, Air Route Traffic Control Centers, Flight Service Stations, and Limited Remote Communications Outlets Facilities, dated December 29, 1971, is canceled.
- *4. DEFINITIONS.
 - a. One-For-One Equipment - Two fixed-tuned transmitters and/or two fixed tuned receivers installed on a given frequency. Either transmitter or receiver is fully capable of day-to-day use by Air Traffic personnel, and can be used interchangeably as the need arises. The main transmitter and receiver are those that are in use at any given time when one-for-one equipment is provided. The standby transmitter and/or receiver are off line, in readiness for selection if the need arises.
 - b. Backup Equipment - Tuneable or multichannel transmitters or receivers used in the terminal or FSS environment for the purpose of redundancy to enhance system reliability. Tuneable or multichannel backup transmitters and receivers are not a part of the one-for-one equipment configuration. They are used as part of a configuration which consists of a fixed-tuned transmitter and receiver as main equipment with operational priority, and the tuneable or multichannel equipment as backup. Tuneable or multichannel backup equipment is available to provide advertised service on a continuous basis if needed.
 - c. Main Equipment - Transmitters and receivers that (1) are in service at any given time when one-for-one equipment configuration is provided, or (2) have operational priority where multichannel or tuneable backup equipment is employed. *

Distribution: A-W(LG/RD)-2; A-WXE(AT/AF)-3; A-FAT-O(LTD); Initiated By: AAT-120
A-FAF-O(LTD)

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* d. Emergency Transceivers - Battery-powered transceivers located at FSS and terminal facilities for the purpose of being pressed into service during catastrophic failure of the communications system. Emergency transceivers are completely independent from the facility communication system but, because of their design, may have limited capability in terms of power output, number of channels, interference rejection, and coverage. They are intended to provide limited communications for occurrences such as loss of AC power, cut cables, or failure of radio control equipment.

e. Backup Emergency Communications (BUEC) Equipment - Remotely tuneable multichannel transceivers that are controlled by a centrally located processor. BUEC equipment is intended for use only as emergency backup when the normal remote communications air-ground facility (RCAG) equipment is not available and may not have the same coverage or frequency protection.

f. Paired Channel - Provision for simultaneous keying of a VHF and UHF transmitter (nonselective keying) and individual main/standby control of transmitters and receivers over a single circuit.

g. Selective Channel - Provision for individual keying and control of a VHF and UHF transmitter over a single circuit.

h. Split Channel - Separate and distinct circuit to individually key and control a VHF and UHF transmitter and control a VHF or UHF receiver.

i. Service Volume - The vertical and horizontal limits of airspace within which an assigned frequency is used. These limits are used to determine frequency protection from other frequency assignments. The service volume should represent the desired coverage area to ensure safe usage.

5. GENERAL.

a. Frequency protection shall be provided air/ground communications frequency assignments (except for BUEC) which are engineered to meet the operational requirements of air traffic control facilities. This demands the provision of frequency protection for co-channel and adjacent channel separation within prescribed distances, depending on the type of air traffic service involved. *

b. Each selected frequency is authorized and recorded in the master radio frequency list through the National Telecommunications and Information Administration. Authorized frequencies are recorded at FAA Headquarters on master radio frequency engineering charts.

c. Frequencies shall not be commissioned or their operational airspace changed at any location without regional Frequency Management Office approval.

d. Frequencies are assigned to specific air traffic control functions, therefore, a frequency shall not be used outside the airspace (service volume) designated to its function without authorization from the regional Frequency Management Office.

* e. When operational experience indicates that a frequency is unsatisfactory for the function assigned, corrective action shall be taken through the regional Airway Facilities Division. *

f. Direct air/ground communications outlets shall be the primary means of communications between controllers and pilots. Indirect communications shall be used only when direct pilot/controller communications capability is not available.

* g. In the interest of national resource conservation, the number of frequencies required per facility shall be the minimum necessary to perform assigned air traffic control (ATC) functions. The feasibility of multiple position terminations of a given frequency within a single facility shall be operationally considered before authorizing/requesting additional VHF/UHF channels. Site selection (from either of multiple sites, all on the same frequency) should be used where possible to provide coverage in a large sector to avoid a requirement for an additional frequency assignment. *

h. VHF and/or UHF frequencies shall not be installed at any facility or at any position unless there is a requirement to provide air traffic service via air/ground radio communications.

* i. Each operating position requiring the capability to communicate directly with aircraft shall be provided air/ground channels as appropriate for the function assigned.

j. Except for an operational emergency, frequencies shall not be changed from function to function, sector to sector, or between facilities for more than 24 hours, without Frequency Management Officer approval.

k. Emergency frequencies 121.5/243.0 MHz are established at selected ATCTs, FSSs, ARTCCs, and remote facilities to ensure reception of distress calls. Frequencies shall be authorized at those locations/positions deemed necessary to meet operational requirements or where an adequate geographical network coverage pattern does not exist.

Note: UHF guard-transmitting and receiving capability shall be assured at all control positions where air traffic control services are routinely provided to military tactical flights. The installation of 243.0 MHz at locations where departure control override now exists shall not require this capability to be decommissioned.

l. Funding for new equipment requirements to conform to this Order will be accomplished through the normal budget process concurrent with future establishment, relocate or modernization projects. *

- * m. Budgetary request to deviate from the provisions of this Order shall be justified and submitted to the ATC System Programs Division, AAT-100, for consideration.

6. TERMINAL AIR TRAFFIC CONTROL FACILITIES.

a. Each radio operating position used primarily to control Instrument Flight Rules (IFR)/STAGE III aircraft shall be provided one-for-one equipment on the primary VHF and UHF frequency/s.

b. Operating positions covered in this subparagraph shall be provided one-for-one radio equipment based on facility complexity as follows:

Level I - One-for-one radio equipment for the local control's primary frequency/s.

Level II - One-for-one radio equipment for the local control's and ground control's primary frequency/s.

Level III, IV, and V - One-for-one radio equipment for the primary frequency/s at each radio position.

c. Each operating position provided main and standby equipment shall have remote switching of main to standby to main equipment for that position's discrete frequency/s.

d. As a minimum, one portable battery-powered VHF emergency transceiver with at least three (3) channels shall be provided for the operating area in each Federal Aviation Administration (FAA) tower, terminal radar approach control in tower cab (TRACAB), Terminal Radar Approach Control Facility (TRACON), radar approach control (RAPCON), and radar air traffic control facility (United States Navy) (RATCF).

e. As a minimum, one portable battery-powered emergency UHF transceiver with at least three (3) channels shall be provided for each FAA tower, TRACAB, TRACON, RAPCON, and RATCF which records 2,000 or more annual military operations.

f. A separate UHF frequency is not authorized for the ground control and clearance delivery functions in air traffic control towers without separate justification on a site-by-site basis.

g. Remote receiver and/or transmitter sites shall be established whenever the number of antennas exceeds roof mounting capacity or when a study indicates that deteriorated performance in air/ground communications will/does exist due to antenna proximity or other interference problems.

h. Diverse routing to remote sites shall be provided at radar approach control locations. The method used to obtain diversity shall be based on the following guidelines: *

* (1) Primary frequencies qualifying for one-for-one transmitters and receivers must have separate circuits for main and standby equipment. For example, if both the main and standby transmitters on a given primary frequency are located in the same remote site, alternate cables (or other redundant remoting media) between the remote site and tower are required. However, if the main and standby equipment is separated into two different sites, each with separate remoting circuits to the tower, no alternate cabling is required. Similarly, if a transmitter on a given primary frequency is located in the tower, and its companion transmitter is located in a remote site, alternate cabling is not required.

(2) Where a primary frequency qualifies for one-for-one equipment, and both main and standby equipment is to be installed in the same remote site, redundant remoting comprised of alternate cables, Telco circuits, FAA links, or a combination thereof is required. This provision applies whether the remote site is located on or off the airport. For on airport locations the loop cable configuration should be used. (See Appendix 1.)

i. At other ATCT locations with remote sites, alternate cable runs in the same duct or trench shall be provided. (See Appendix 2.)

j. Single frequency approach (SFA) procedures are a unique military requirement. Equipment to support future frequency additions to this program shall be funded by the appropriate military service, including terminations and control circuits. Provisions of paragraphs 6.a. and 6.b. do not apply to SFA frequencies unless justified by the appropriate military service.

k. Remote transmitter receiver (RTR) Class O facilities may be established at satellite airports to satisfy limited air/ground and ground/ground communications requirements. The criteria for establishment of RTR Class O facilities are contained in the yearly F&E Call for Estimates. Subparagraphs 6a, 6b, and 6h do not apply.

7. AIR ROUTE TRAFFIC CONTROL CENTERS.

a. Frequencies assigned to a high altitude sector may be used when combined with low altitude sector(s), provided the boundaries of the underlying low sector(s) lie within the geographic boundaries of the high sector. This does imply the coverage at the lower altitude will be the same as the higher altitudes. The facility shall determine that such usage is suitable for operations.

b. One-for-one transmitting and receiving equipment associated with air/ground communications shall be provided for each frequency used in the control of air traffic. This will allow the standby equipment to be used in the event the main equipment fails and/or is taken out of service.

* c. Each operating position provided one-for-one equipment shall have remote switching of main to standby to main equipment for that position's discrete frequency/s.

d. The following shall be taken into consideration when providing positions of operation with pilot-to-controller communication:

(1) Operational requirements shall be the basis for determining whether split or paired VHF and/or UHF control circuits are to be installed. If the position does not share its assigned VHF or UHF frequency with an adjacent position/s and either a spare circuit (Selective Switching (SS-1) or Line Automatic Sensing and Switching (LAS)) or backup emergency communications are available to the sector, the RCAG circuit should be paired. If the position shares either its VHF or UHF frequency with another position, the RCAG circuits may be split.

(2) The Tactical Special Use frequency shall be configured for split channel operation.

(3) A sector which utilizes a common frequency assignment from more than one (1) RCAG site will be provided an automatic/manual lockout device. This is to prevent simultaneous transmissions. The device shall be installed so as to be readily accessible to the controller.

(4) At RCAGs having unusual maintenance conditions, such as mountain top or extremely remote locations, selective signaling circuits/equipment may be provided if justified on a location-by-location basis. Justification shall be submitted to the ATC System Programs Division, AAT-100, for consideration.

(5) Workload frequency/s may be authorized, in addition to sector frequencies, where air traffic requirements exist for dividing the sector during peak traffic conditions.

e. UHF frequencies used exclusively for undergraduate pilot training shall be restricted to providing air traffic control services to pilots participating in this program.

f. BUEC shall be provided to all CONUS ARTCCs. The BUEC is intended only as an emergency backup in the event an RCAG frequency fails and/or is taken out of service, and is not a gap filler or workload facility. Planning for future BUEC establishments or relocations shall take into consideration the following:

(1) If leased circuitry is used for controlling the BUEC equipment, the circuit(s) routing should, to the maximum extent possible, be separate and diverse from the circuitry used to control the primary RCAG equipment. The degree of diversity available may influence the site selection process. *

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- * (2) The BUEC equipment should be located in a manner to provide backup communications capability to a maximum number of sectors, considering normal sector traffic loads and the amount of coverage available. As a minimum, each BUEC transceiver will serve two (2) sectors, provided adequate coverage can be achieved.

8. FLIGHT SERVICE STATIONS.

a. FSSs shall be provided one-for-one transmitters and receivers to backup each local VHF and UHF frequency/s.

b. Each operating position provided main and standby equipment shall have remote switching of main to standby to main equipment for that position's frequency/s.


c. Each En route Flight Advisory Service (EFAS) outlet shall be provided one-for-one transmitting and receiving equipment as backup for each frequency assigned to that outlet to ensure continuous service in the event main equipment fails.

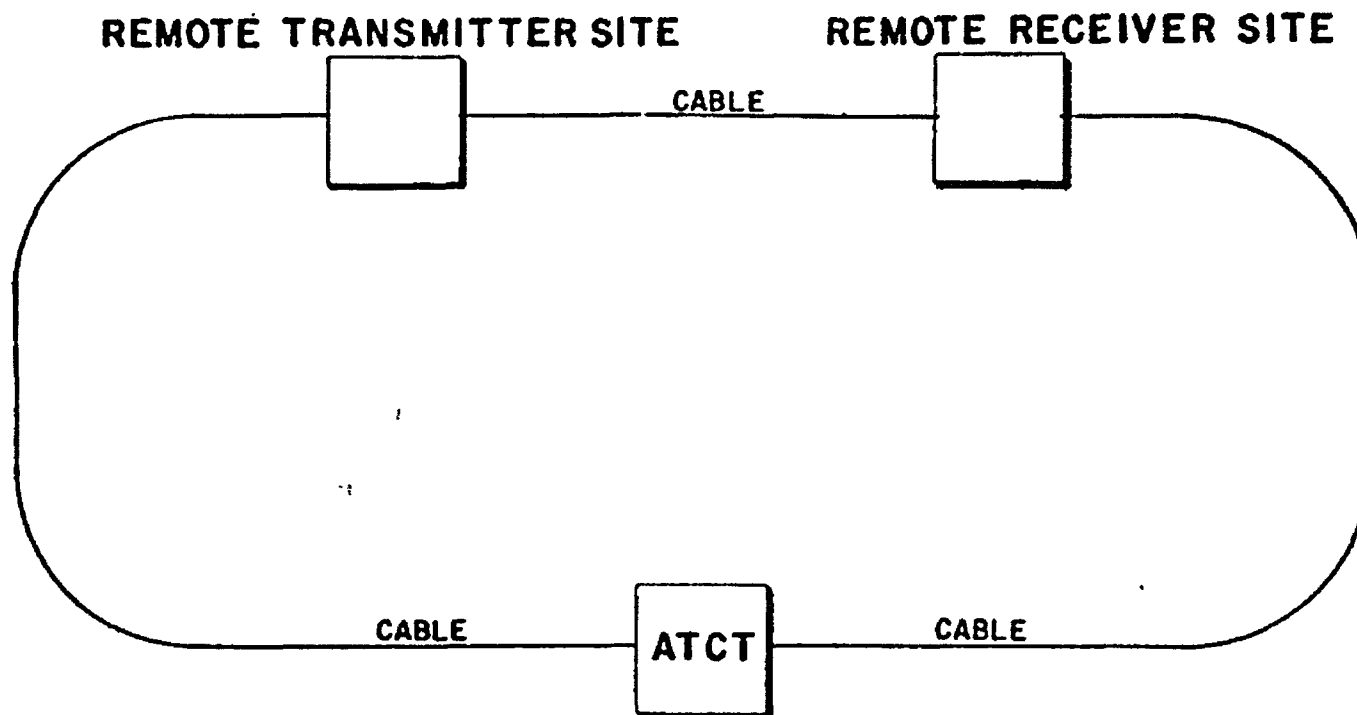
d. Except as provided in paragraph c, standby/backup equipment will not normally be authorized at other remote communications outlets.

e. Remote communications outlets may be established when inadequate air/ground coverage exists in an area. The establishment criteria for remote communications outlets are contained in the yearly "F&E Call for Estimates."

f. Remote communications outlets may be established to provide communications consistent with DF coverage.

g. To ensure that communications service is not derogated when an FSS is decommissioned, all remaining local VHF and UHF frequency/s will be provided one-for-one transmitting and receiving equipment. *


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ATCT
LOOP CABLE

AIR/GROUND REMOTE SITE
INTERCONNECTING CABLES

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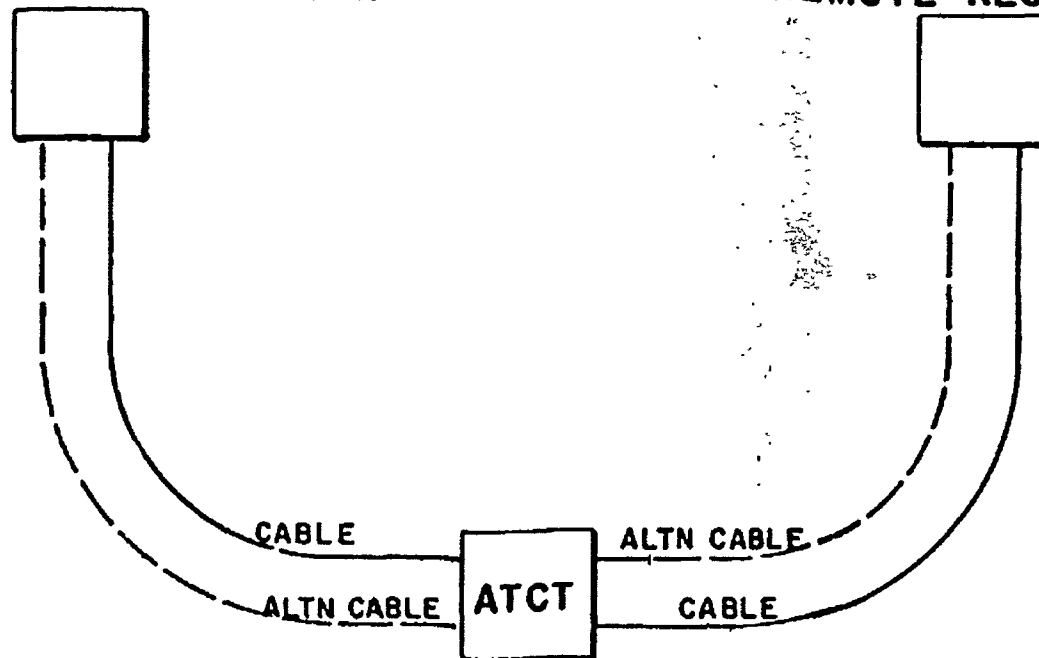
APPENDIX 1. ATCT LOOP CABLE

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Appendix 1

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REMOTE TRANSMITTER SITE

REMOTE RECEIVER SITE



NOTE:

CABLES IN SAME
DUCT OR TRENCH

APPENDIX 2. ATCT ALTERNATE CABLE

ATCT

ALTERNATE CABLE

AIR/GROUND REMOTE SITE
INTERCONNECTING CABLES

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Appendix 2