

Article 18
LICENSES

NOC 728 through 727
MOD 728
The holder of a license is required to preserve the secrecy of telecommunication, as provided in Article 23 of the Convention. Moreover, the [license] issuing authority shall provide specifically or by reference. . .
Reason: To provide for those administrations who may not issue written licenses.
NOC 729, 730
MOD 731
(3) For land mobile stations, including stations comprised of only a receiver or receivers, a clause shall be . . .
Reason: To explicitly characterize a station noting No. 21 of these Regulations.
NOC 732 through 734.

Article 19

NOC IDENTIFICATION OF STATIONS
MOD 735
Transmissions [without identification or with false identification are prohibited.] and transmitting stations shall be uniquely identified. Administrations shall make every effort at the earliest possible time to introduce and use automatic identification. On frequencies assigned for international use, means recommended by C.C.I.R. shall be utilized.
NOC 735.1
SUP 735, 737A
Reason: To provide universal, unique and automated identification.
NOC 738
SUP 738 through 741
Reason: Consequential to above proposals.
SUP 742
Reason: Unnecessary to incorporate Convention provisions in the Radio Regulations.
NOC II. Allocation of International Series, and Assignment of Call Signs

MOD 743
[All stations open to the international public correspondence service, all amateur stations, and other stations which are capable of causing harmful interference beyond the boundaries of the country to which they belong, shall have call signs from international series allocated to each country as given in the Table of Allocation of Call Sign Series in No. 747.] Each station whose signal could propagate internationally shall uniquely identify itself such as by a call sign formed pursuant to No. 747. Identifications shall preferably be by automated means using the applicable Recommendations of the CCIR. (See Resolution G-C.)
Reason: Consequential to above proposals.
NOC 744 through 748
MOD 749
Between administrative radio conferences, the Secretary General is authorized to deal with questions relating to changes in the allocation of [] supply previously unassigned series of call signs, on a provisional basis. . .
Reason: For clarification.
NOC 749A through 755, 755.1, 756 through 763
MOD 764
However, it is recommended that, as far as possible,

a) the call signs of coast and aeronautical stations consist of: —three letters —three letters followed by one or two digits . . .
Reason: To accord with existing practice.
NOC 765 through 770
Reason: Necessary and adequate as drafted.
MOD 771
However, land mobile stations employing radiotelephony may also use a call sign consisting of: —two, four, three or four letters followed by four digits (other than the digits 0 or 1 in cases where they immediately follow a letter).
NOC 772, 773
Reason: Necessary and adequate as drafted.
MOD 774
774A. . . follow a letter). [See also No. 737A.]
Reason: Consequential to other proposals.
NOC 774 through 781
Reason: Necessary and adequate as drafted.
NOC 782, 783A
Reason: Necessary and adequate as drafted.
SUP
[Formation of ship station selective call numbers and coast station identification numbers]
Reason: Superfluous.
NOC 783B through 783G
Reason: Necessary and adequate as defined.
SUP
[Assignment of ship station selective call numbers and coast station identification numbers]
Reason: Superfluous.

MOD 783H
In cases where selective call numbers for ship stations and identification numbers for coast stations are required for use in the maritime mobile service and the selective calling system is in accordance with Appendix 20C, [as an interim procedure,] the selective call numbers and identification numbers shall be supplied by the Secretary-General on request. Upon notification by an administration of the introduction of selective calling for use in the maritime mobile service: —selective call numbers for ships will be supplied as required in blocks of 100 (one hundred); —coast station identification numbers will be supplied in blocks of 10 (ten) to meet actual requirements; —selective call numbers for selective calling of predetermined groups of ship stations in accordance with No. 783G will be supplied as required as single numbers.
[The final procedure shall be determined at a future competent World Administrative Radio Conference.]
Reason: To establish a satisfactory, interim procedure in ongoing form.
NOC 784 through 787
Reason: Necessary and adequate as drafted.
Article 20
SERVICE DOCUMENTS

MOD 788
The following documents shall be published by the Secretary General. This information shall be available for computer access, and, in response to individual requests, the requested information shall be available in computer printed form.
Reason: For increased use of the information, long-term cost reduction, and to preclude interpretation that service documents shall be produced only in hard copy form.
NOC 789 through 812
Reason: Adequate as drafted.
SUP 813
Reason: Unnecessary, expensive item of limited usefulness.
NOC 814 through 824
Reasons: Acceptable as drafted.
SUP 826
Reason: Item of limited usefulness, difficult for at least some administrations to supply the sought data, and other data, such as sales of equipment, are potentially more useful for administrations' purposes.
NOC 831 through 837
Reason: Acceptable as drafted.

APPENDIX 2A
NOTE: Many of the matters treated in the balance of this Appendix presently fall beyond the scope of the draft agenda established pursuant to the 31st Session of the Administrative Council.
Article 21
MOD INSPECTION OF [MOBILE] STATIONS [AND MOBILE EARTH STATIONS IN THE MARITIME MOBILE SATELLITE SERVICE]
MOD 838
The governments or appropriate administrations of countries which a mobile station or a mobile earth station (in the maritime mobile satellite service) visits, may require the production of the [license] authorization for examination. The operator of the station, shall facilitate the examination. The [license] authorization shall be kept in such a way that it can be produced upon request. As far as possible, the [license] authorization, or a copy certified by the authority which has issued it, should be permanently exhibited in the station.
Reason: To generalise the applicability, and to accommodate such situations as where a written license may not be issued.
MOD 839
The inspectors shall [have in their possession] possess an identity card or badge, issued by the competent authority, which [they] shall be shown on request of the master or person responsible for the ship, aircraft or other vehicle carrying the mobile station (in the maritime mobile satellite service).
Reason: To generalise and simplify.

MOD 840
When the [license] authorization cannot be produced or when [manifest] irregularities . . .
Reason: As above, and to prevent confusion.
NOC 841
Reason: Necessary and adequate as drafted.
MOD 842
. . . the mobile station or mobile earth station [in the maritime mobile satellite service] is subject . . .
Reason: To generalise.
. . . or other vehicle carrying the mobile station or mobile earth station [in the maritime mobile satellite service] if any breach . . .
Reason: To generalise.

MOD 1018A Mar3
(5) [However,] when using direct-printing telegraphy or similar systems in any of the frequency bands allocated to the maritime mobile service, the call may, by prior arrangement, be made on a working frequency available for such systems.
SUP 1018 Mar3
MOD 1018A Mar3
(1A) [In the maritime mobile service,] the call, as described in No. 1018A Mar3, shall contain the service abbreviation, indicating the working frequency and, if useful, the class of emission which the calling station proposes to use for the transmission of its traffic.
SUP 1017
SUP 1018
SUP 1019
SUP 1018A
SUP 1020
MOD 1020A Mar3
(1A) [In the maritime mobile service] the calling station shall transmit the service abbreviation after the above-mentioned preparatory signals to indicate a priority message other than a distress, urgency or safety message (see No. 1400) and to indicate the reason for the call.
NOC 1021
SUP 1022
MOD 1022A Mar3
(1A) [In the maritime mobile service] the reply to call consists of: —the call sign of the calling station, not more than twice; —the word DE; —the call sign of the station called, once only.
SUP 1023 through 1040

formation shall be available in computer printed form.
Reason: For increased use of the information, long-term cost reduction, and to preclude interpretation that service documents shall be produced only in hard copy form.
NOC 789 through 812
Reason: Adequate as drafted.
SUP 813
Reason: Unnecessary, expensive item of limited usefulness.
NOC 814 through 824
Reasons: Acceptable as drafted.
SUP 826
Reason: Item of limited usefulness, difficult for at least some administrations to supply the sought data, and other data, such as sales of equipment, are potentially more useful for administrations' purposes.
NOC 831 through 837
Reason: Acceptable as drafted.

APPENDIX 2A
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Article 21
MOD INSPECTION OF [MOBILE] STATIONS [AND MOBILE EARTH STATIONS IN THE MARITIME MOBILE SATELLITE SERVICE]
MOD 838
The governments or appropriate administrations of countries which a mobile station or a mobile earth station (in the maritime mobile satellite service) visits, may require the production of the [license] authorization for examination. The operator of the station, shall facilitate the examination. The [license] authorization shall be kept in such a way that it can be produced upon request. As far as possible, the [license] authorization, or a copy certified by the authority which has issued it, should be permanently exhibited in the station.
Reason: To generalise the applicability, and to accommodate such situations as where a written license may not be issued.

MOD 839
The inspectors shall [have in their possession] possess an identity card or badge, issued by the competent authority, which [they] shall be shown on request of the master or person responsible for the ship, aircraft or other vehicle carrying the mobile station (in the maritime mobile satellite service).
Reason: To generalise and simplify.

MOD 840
When the [license] authorization cannot be produced or when [manifest] irregularities . . .
Reason: As above, and to prevent confusion.
NOC 841
Reason: Necessary and adequate as drafted.
MOD 842
. . . the mobile station or mobile earth station [in the maritime mobile satellite service] is subject . . .
Reason: To generalise.
. . . or other vehicle carrying the mobile station or mobile earth station [in the maritime mobile satellite service] if any breach . . .
Reason: To generalise.

MOD 1018A Mar3
(5) [However,] when using direct-printing telegraphy or similar systems in any of the frequency bands allocated to the maritime mobile service, the call may, by prior arrangement, be made on a working frequency available for such systems.
SUP 1018 Mar3
MOD 1018A Mar3
(1A) [In the maritime mobile service,] the call, as described in No. 1018A Mar3, shall contain the service abbreviation, indicating the working frequency and, if useful, the class of emission which the calling station proposes to use for the transmission of its traffic.
SUP 1017
SUP 1018
SUP 1019
SUP 1018A
SUP 1020
MOD 1020A Mar3
(1A) [In the maritime mobile service] the calling station shall transmit the service abbreviation after the above-mentioned preparatory signals to indicate a priority message other than a distress, urgency or safety message (see No. 1400) and to indicate the reason for the call.
NOC 1021
SUP 1022
MOD 1022A Mar3
(1A) [In the maritime mobile service] the reply to call consists of: —the call sign of the calling station, not more than twice; —the word DE; —the call sign of the station called, once only.
SUP 1023 through 1040

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MOD 844
The Members of the not to] shall not in mobile stations or up earth stations [in the satellite service] which within their territory . . . temporary stay technical and operational more severe than in these Regulations. [] provision in international agreements [] or mobile earth stations are therefore not. . .
Reason: To generalise constraint upon Members Regulations
NOC
Chapter
MOD
Personnel of Stations (in and the Maritime Mobile
NOC
Article 1
MOD
Authority of the []
MOD 845
The service of a placed under the [] (the master) captain responsible . . .
Reason: To generalise applicability of these provisions
NOC 846
MOD 847
The [master] captain Reason As above
MOD 847A
The authority and by No. 855, 846 apply to personnel stations in the satellite service
Reason: To generalise
Article
NOC
OPERATIONS CERTIFICATE
CHART STATIONS AND IN THE MARITIME MOBILE
NOC
Section 1 General
NOC 848, 849, 849A, 850
Reason: Necessary and
MOD 852
The provisions of however, [] apply to station working assigned for inter which operate on gaged in inter flights. Further, a by bilateral agree to stations on gaged in voyages tween the countries Reason: To afford such latitude needed.
MOD 853
In the case of c lity of the operat sea passage, a flag solely as a temp [master] captain able for the stati operator holding by the government of Union to perform ulation service.
Reason: To reflect the of this provision to all
MOD 854

MOD 903
. . . each administration may itself fix the conditions for obtaining a restricted radiotelephone operator's certificate if same are issued by that administration, provided . . .
Reason: To preclude the implication that an administration must issue restricted certificates. See MOD 890.
MOD 904
Administrations [in Region 1 do] need not issue certificates under No. MOD 903 depending on national desire.
Reason: Consequential amendment.
NOC 905, 905A, 906
Reason: Necessary and adequate as drafted.
MOD 907, 907A and 908
. . . general certificates for a first- or second-class radiotelegraph operator's certificate] . . .
Reason: Consequential amendment.
MOD 909
. . . general certificates for a first-class radiotelegraph operator's certificate] . . .
Reason: Consequential amendment.

CLASS AND REDUCED NUMBER OF OPERATORS FOR STATIONS ON BOARD SHIPS AND AIRCRAFT
SUP 913
Reason: Superfluous. Other considerations will ensure that administrations will have sufficient personnel on hand to handle public correspondence.
Article 23
GENERAL RADIOGRAPHY PROCEDURE IN THE MARITIME MOBILE [AND AERONAUTICAL MOBILE] SERVICES
MOD 1000
§ 1. (1) In the maritime mobile [and aeronautical mobile] services [the procedure detailed in this Article is

MOD 1018A Mar3
(5) [However,] when using direct-printing telegraphy or similar systems in any of the frequency bands allocated to the maritime mobile service, the call may, by prior arrangement, be made on a working frequency available for such systems.
SUP 1018 Mar3
MOD 1018A Mar3
(1A) [In the maritime mobile service,] the call, as described in No. 1018A Mar3, shall contain the service abbreviation, indicating the working frequency and, if useful, the class of emission which the calling station proposes to use for the transmission of its traffic.
SUP 1017
SUP 1018
SUP 1019
SUP 1018A
SUP 1020
MOD 1020A Mar3
(1A) [In the maritime mobile service] the calling station shall transmit the service abbreviation after the above-mentioned preparatory signals to indicate a priority message other than a distress, urgency or safety message (see No. 1400) and to indicate the reason for the call.
NOC 1021
SUP 1022
MOD 1022A Mar3
(1A) [In the maritime mobile service] the reply to call consists of: —the call sign of the calling station, not more than twice; —the word DE; —the call sign of the station called, once only.
SUP 1023 through 1040

MOD 1056
MOD 1057
The signal . . . — (end of work) shall also be used.]
[] when the transmission of radiotelegrams of general information, meteorological information and general safety notices is finished, [and] [] When transmission is ended in long distance radiocommunication services with deferred acknowledgment of receipt or without acknowledgment of receipt.]
SUP 1058
NOC 1059
NOC 1060
MOD 1061
§ 25. When it is necessary for a mobile station to send signals for testing or adjustment which are liable to interfere with the working of [] bearing coast or aeronautical] another station, the consent of [] the station] shall be obtained before such signals are sent.
NOC 1062
NOC 1063AA
NOC 1063AB
NOC 1063AC
NOC 1063AD
NOC 1063AE
NOC 1063AF
NOC 1063AG
NOC 1063AH
NOC 1063AI through 1063BE
Article 30
CALLS BY RADIOGRAPHY
NOC 1068 through 1097A
MOD 1068

MOD 1018A Mar3
(5) [However,] when using direct-printing telegraphy or similar systems in any of the frequency bands allocated to the maritime mobile service, the call may, by prior arrangement, be made on a working frequency available for such systems.
SUP 1018 Mar3
MOD 1018A Mar3
(1A) [In the maritime mobile service,] the call, as described in No. 1018A Mar3, shall contain the service abbreviation, indicating the working frequency and, if useful, the class of emission which the calling station proposes to use for the transmission of its traffic.
SUP 1017
SUP 1018
SUP 1019
SUP 1018A
SUP 1020
MOD 1020A Mar3
(1A) [In the maritime mobile service] the calling station shall transmit the service abbreviation after the above-mentioned preparatory signals to indicate a priority message other than a distress, urgency or safety message (see No. 1400) and to indicate the reason for the call.
NOC 1021
SUP 1022
MOD 1022A Mar3
(1A) [In the maritime mobile service] the reply to call consists of: —the call sign of the calling station, not more than twice; —the word DE; —the call sign of the station called, once only.
SUP 1023 through 1040

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MOD 1076 through 1178, 1181B, 1191C, 1191DA, 1204, 1204A
SUP 1207, 1208
Article 31
USE OF INTERCOMMS FROM STATIONS IN THE MARITIME MOBILE
SUP 1210
MOD-1210
(2) Aircraft stations radio telephony stations of the maritime mobile service for radiotelephony comply with the provisions of Article 27.
NOC 1211 through 1220A
NOC 1220
NOC 1222
NOC 1223
NOC 1224 through 1226
NOC 1228 through 1230
NOC 1240 through 1241
NOC 1241B
NOC 1241C
NOC 1241D
NOC 1241E
NOC 1241F
NOC 1241G
NOC 1241H
NOC 1241I
NOC 1241J
NOC 1241K
NOC 1241L
NOC 1241M
NOC 1241N
NOC 1241O
NOC 1241P
NOC 1241Q
NOC 1241R
NOC 1241S
NOC 1241T
NOC 1241U
NOC 1241V
NOC 1241W
NOC 1241X
NOC 1241Y
NOC 1241Z
MOD 1242A
(3) These stations maintain their watch operator using some such as headphones, or loudspeaker.
MOD 1243
§ 17. (1) For the c

Article 18

LICENCES

NOC 725 through 727
MOD 728

The holder of a licence is required to preserve the secrecy of telecommunication, as provided in Article 22 of the Convention. Moreover, the [license] *licencing authority* shall provide specifically or by reference, * * *

Reason: To provide for those administrations who may not issue written licences.

NOC 729, 730
MOD 731

(2) For land mobile stations, including stations comprised of only a receiver or receivers, a clause shall be * * *

Reason: To explicitly characterize a station noting No. 21 of these Regulations.
NOC 732 through 734.

Article 19

NOC IDENTIFICATION OF STATIONS

MOD 735

Transmissions [without identification or with false identification are prohibited.] and transmitting stations shall be uniquely identified. Administrations shall make every effort at the earliest possible time to introduce and use automatic identification. On frequencies assigned for international use, means recommended by C.C.I.R. shall be utilized.

NOC 735.1

SUP 736, 737A

Reason: To provide universal, unique and automated identification.

NOC 738

SUP 739 through 741

Reason: Consequential to above proposals.

SUP 742

Reason: Unnecessary to incorporate Convention provisions in the Radio Regulations.

NOC

Section II. Allocation of International Series, and Assignment of Call Signs

MOD 743

[All stations open to the international public correspondence service, all amateur stations, and other stations which are capable of causing harmful interference beyond the boundaries of the country to which they belong, shall have call signs from international series allocated to each country as given in the Table of Allocation of Call Sign Series in No. 747.] Each station whose signal could propagate internationally shall uniquely identify itself such as by a call sign formed pursuant to No. 747. Identification shall preferably be by automated means using the applicable Recommendations of the CCIR. (See Resolution G-C.)

Reason: Consequential to above proposals.
NOC 744 through 748

Reason: Necessary and adequate as drafted.

MOD 749

Between administrative radio conferences, the Secretary General is authorized to [deal with questions relating to changes in the allocation of] supply previously unassigned series of call signs, on a provisional basis, * * *

Reason: For clarification.

NOC 749A through 755, 755.1, 756 through 763

Reason: Necessary and adequate as drafted.

MOD 764

However, it is recommended that, as far as possible,

a) the call signs of coast and aeronautical stations consist of:

—three letters

or

—three letters followed by [one or two] not more than three digits * * *

Reason: To accord with existing practice.
NOC 765 through 770

Reason: Necessary and adequate as drafted.

MOD 771

However, land mobile stations employing radiotelephony may also use a call sign consisting of:

—two, [or] three or four letters followed by four digits (other than the digits 0 or 1 in cases where they immediately follow a letter).

NOC 774, 773

Reason: Necessary and adequate as drafted.
MOD 773A

* * * follow a letter). [(See also No. 737A.)]

Reason: Consequential to other proposals.

NOC 774 through 781

Reason: Necessary and adequate as drafted.

NOC 782

NOC 783, 783A

Reason: Necessary and adequate as drafted.

SUP

[Formation of ship station selective call numbers and coast station identification numbers]

Reason: Superfluous.

NOC 783B through 783G

Reason: Necessary and adequate as defined.

SUP

[Assignment of ship station selective call numbers and coast station identification numbers]

Reason: Superfluous.

MOD 783H

In cases where selective call numbers for ship stations and identification numbers for coast stations are required for use in the maritime mobile service and the selective calling system is in accordance with Appendix 20C, [as an interim procedure,] the selective call numbers and identification numbers shall be supplied by the Secretary-General on request. Upon notification by an administration of the introduction of selective calling for use in the maritime mobile service:

—selective call numbers for ships will be supplied as required in blocks of 100 (one hundred);

—coast station identification numbers will be supplied in blocks of 10 (ten) to meet actual requirements;

—selective call numbers for selective calling of predetermined groups of ship stations in accordance with No. 783G will be supplied as required as single numbers.

[The final procedure shall be determined at a future competent World Administrative Radio Conference.]

Reason: To establish a satisfactory, interim procedure in ongoing form.

NOC 783I through 788

Reason: Necessary and adequate as drafted.

Article 20

SERVICE DOCUMENTS

MOD 789

The following documents shall be published by the Secretary General. This information shall be available for computer access, and, in response to individual requests, the requested in-

formation shall be available in computer printed form.

Reason: For increased use of the information, long-term cost reduction, and to preclude interpretation that service documents shall be produced only in hard copy form.

NOC 790 through 812

Reason: Adequate as drafted.

SUP 813

Reason: Unnecessary, expensive item of limited usefulness.

NOC 814 through 829A

Reasons Acceptable as drafted.

SUP 830

Reason: Item of limited usefulness, difficult for at least some administrations to supply the sought data, and other data, such as sales of equipment, are potentially more useful for administrations' purposes.

NOC 831 through 837

Reason: Acceptable as drafted.

APPENDIX 3A

NOTE: Many of the matters treated in the balance of this Appendix presently fall beyond the scope of the draft agenda established pursuant to the 31st Session of the Administrative Council.

Article 21

MOD

INSPECTION OF [MOBILE] STATIONS [AND MOBILE EARTH STATIONS IN THE MARITIME MOBILE SATELLITE SERVICE]

MOD 838

The governments or appropriate administrations of countries which a mobile station or a mobile earth station [in the maritime mobile satellite service] visits, may require the production of the [license] authorization for examination. The operator of the station, or the person responsible for the station, shall facilitate this examination. The [license] authorization shall be kept in such a way that it can be produced upon request. As far as possible, the [license] authorization, or a copy certified by the authority which has issued it, should be permanently exhibited in the station.

Reason: To generalize the applicability, and to accommodate such situations as where a written license may not be issued.

MOD 839

The inspectors shall [have in their possession] possess an identity card or badge, issued by the competent authority, which [they] shall be shown on request of the master or person responsible for the ship, aircraft or other vehicle carrying the mobile station or the mobile earth station, [in the maritime mobile satellite service].

Reason: To generalize and simplify.

MOD 840

When the [license] authorization is not produced or [irregularities] * * *

Reason: As above, and to avoid confusion.

NOC 841

Reason: Necessary and adequate as drafted.

MOD 842

* * * the mobile station or mobile earth station [in the maritime mobile satellite service] is subject * * *

Reason: To generalize.

* * * or other vehicle carrying the mobile station or mobile earth station [in the maritime mobile satellite service]. If any breach * * *

Reason: To generalize.

MOD 844

The Members of the Union [undertake not to] shall not impose upon foreign mobile stations or upon foreign mobile earth stations [in the maritime mobile satellite service] which are temporarily within their territorial waters or make a temporary stay in their territory, technical and operating conditions more severe than those contemplated in these Regulations. This [undertaking] provision in no way affects arrangements which are made under international agreements relating to [maritime or air navigation.] mobile or mobile earth stations, and which are therefore not covered by these Regulations.

Reason: To generalize and to tighten the constraint upon Members not to exceed these Regulations.

NOC

Chapter VI

MOD
Personnel of Stations [in the Mobile Service and the Maritime Mobile Satellite Service]
NOC

Article 22

MOD

Authority of the [Master] Captain

MOD 845

The service of a mobile station is placed under the supreme authority of the [master] captain or of the person responsible * * *

Reason: To generalize and to reflect the applicability of these provisions to all mobile stations.

NOC 848

MOD 847

The [master] captain * * *

Reason: As above.

MOD 847A

The authority and obligations imposed by Nos. 845, 846 and 847 shall also apply to personnel of mobile earth stations in the [maritime] mobile-satellite service.

Reason: To generalize.

Article 23

NOC

OPERATORS' CERTIFICATES FOR SHIP AND AIRCRAFT STATIONS AND MOBILE EARTH STATIONS IN THE MARITIME MOBILE SATELLITE SERVICE
NOC

Section I. General Provisions

NOC 848, 849, 849A, 850, 850.1, 851

Reason: Necessary and adequate as drafted.

MOD 852

The provisions of No. 851 shall not [however.] apply to any ship or aircraft station working on frequencies assigned for international use, and which operate on ships or aircraft engaged in international voyages or flights. Further, administrations may, by bilateral agreements, apply No. 851 to stations on ships or aircrafts engaged in voyages or flights solely between the countries involved

Reason: To afford each administration the latitude needed.

MOD 853

In the case of complete unavailability of the operator in the course of a sea passage, a flight or a journey, and solely as a temporary measure, the [master] captain or the person responsible for the station may authorize an operator holding a certificate issued by the government of another Member of Union to perform the radiocommunication service.

Reason: To reflect the general applicability of this provision to all mobile stations.

NOC 854

(MOD) 855

In all cases, such temporary operators must be replaced as soon as possible by operators holding the certificate prescribed in [§ 1 of] this Article.

Reason: To afford editorial simplification.

MOD 856, 856A

Each administration shall take the necessary steps to prevent, to the maximum extent possible, the fraudulent use of certificates. For this purpose, such certificates shall bear the holder's signature and shall be authenticated by the issuing administration. [Administrations may employ, if they wish, other means of identification such as photographs, fingerprints, etc. However, in the maritime mobile service the] Certificates [issued after 1 January 1978] may bear [the] a photograph of the holder, which the administration shall verify is recent, and the holder's date of birth.

Reason: To update and simplify these provisions while reducing still further the likelihood of fraudulent usage.

NOC 857

Reason: Adequate and necessary as drafted.

MOD 857A

However, in [the maritime] mobile and mobile-satellite services all certificates not in one of the working languages of the Union [and issued after 1 January 1978] shall carry at least the following information in one of these working languages:

- the name and date of birth of the holder,
- the title of the certificate and its date of issue,
- if applicable, the number and period of validity of the certificate,
- the issuing administration.

Reason: To generalize applicability.

NOC 858

Reason: Adequate and necessary as drafted.

NOC

Section II. Classes and Categories of Certificates except for the Operators of Ship Stations

MOD 859

There are two classes of certificates, a radiocommunication operator's general certificate and a radiotelegraph operator's certificate¹ [as well as a special certificate, for radiotelegraph operators.]

Reason: For simplification.

MOD 860

There are two categories of radiotelephone operators' certificates, general and, should an administration desire, restricted.¹ There is also a radiocommunication operator's general certificate for the aeronautical and maritime mobile services

NOC 861, 862

Reason: Adequate as drafted.

MOD 863

The holder of a radiotelephone operator's restricted certificate may carry out the radiotelephone service of any aircraft station, [when working on frequencies of the maritime mobile service.] provided that:

* * * * *

Reason: To generalize.

NOC 864, 865, 866

Reason: Adequate as drafted.

MOD 866A

There are [four] 2 categories of certificates for radiotelegraph operators,¹ namely:

- the radiocommunication operator's general certificate,
- [—the first class radiotelegraph operator's certificate,
- the second class radiotelegraph operator's certificate,]
- the radiotelegraph operator's special certificate.

MOD 866B

There are two categories of radiotelephone operator's² certificates, general and, should an administration desire, restricted.

Reason: Simplification.

MOD 866C

The holder of a radiocommunication operator's general certificate, or of a first class or second class radiotelegraph operator's certificate, may carry out the radiotelegraph or radiotelephone service of any ship station.

Reason: Consequential amendment.

NOC 866D

Reason: Adequate as drafted.

(MOD) 866E

* * * transmitter does not exceed [1.5] 1.5 kilowatt.

Reason: To accord with normal English language usage.

NOC 866F through 866I

Reason: Adequate as drafted.

SUP 867

Reason: Redundant. Continuation of this provision does not serve a useful purpose.

NOC 868 through 869

Reason: Necessary and adequate as drafted.

NOC 870

Reason: Adequate as drafted.

MOD 870A

However, [with respect to the maritime mobile service.] administrations should also take whatever steps they consider necessary to ensure the continued proficiency of operators while in service.

Reason: For generality. The provision, as written, was adopted by a specialized maritime conference thus necessitating the restriction of this provision's applicability.

NOC 870B through 870K

Reason: Necessary and adequate as drafted.

SUP through 888

[B. First Class Radiotelegraph Operator's Certificate]

Reason: To reduce the number of classes to the general and special certificates to better future needs.

NOC 889 through 893

Reason: Adequate as drafted.

MOD 893A

* * * ship station operators. [after 1 January 1976.]

Reason: Overtaken by events.

NOC 894 through 898

Reason: Necessary and adequate as drafted.

MOD 899

The restricted radiotelephone operator's certificate [is] may be issued to candidates who have given proof of the knowledge and professional qualifications enumerated below:

Reason: To save for administrations the option of whether the restricted certificate is to be issued.

NOC 900

Reason: Necessary and adequate as drafted.

MOD 901

Ability in at least one working language of the Union to send correctly and to receive correctly by telephony.

Reason: To facilitate intercommunication by radiotelephony such as where the safety of life or property may be involved.

NOC 902

Reason: Necessary and adequate as drafted.

NOTICES

MOD 903

... each administration may itself fix the conditions for obtaining a restricted radiotelephone operator's certificate if same are issued by that administration, provided ...

Reason: To preclude the implication that an administration must issue restricted certificates. See MOD 899.

MOD 904

Administrations [in Region 1 do] need not issue certificates under No. MOD 903[.] depending on national desires.

Reason: Consequential amendment.

NOC 905, 905A, 906

Reason: Necessary and adequate as drafted. MOD 907, 907A and 908

... general certificate [for a first- or second-class radiotelegraph operator's certificate] ...

Reason: Consequential amendment.

MOD 909

... general certificate [for a first-class radiotelegraph operator's certificate] ...

Reason: Consequential amendment.

Article 24

CLASS AND MINIMUM NUMBER OF OPERATORS FOR STATIONS ON BOARD SHIPS AND AIRCRAFT SUP 912

Reason: Superfluous. Other considerations will ensure that administrations will have sufficient personnel on hand to handle public correspondence.

Article 29

GENERAL RADIOTELEGRAPH PROCEDURE IN THE MARITIME MOBILE [AND AERONAUTICAL MOBILE] SERVICE[S]

MOD 1000

§ 1. (1) In the maritime mobile [and aeronautical mobile] service[s] the procedure detailed in this Article is obligatory, except in cases of distress, urgency or safety, to which the provisions of Article 36 are applicable.

SUP 1001

SUP 1002

MOD 1003

§ 2. The use of the Morse code signals specified in the Telegraph Regulations* shall be obligatory in the maritime [and aeronautical] mobile service[s]. However, for radiocommunications of a special character, the use of other signals is not precluded.

SUP 1004

MOD 1005 Mar

(2) In the maritime mobile service, [only] the service abbreviations given in Appendix 13A are to be used.

NOC 1007

NOC 1008

NOC 1010

NOC 1011

MOD 1009

a) The mobile station whose emission causes interference to the correspondence of a mobile station with a coast [or aeronautical] station, shall cease sending at the first request of the coast [or aeronautical] station.

MOD 1012

§ 6. (1) The Morse call consists of:
—The call sign of the station called, not more than three times;
—the word DE;
—the call sign of the calling station, not more than three times.

SUP 1013

SUP 1013A

SUP 1013AA

SUP 1013AB

NOC 1013B Mar2

NOC 1013C Mar2

NOC 1014

SUP 1015

MOD 1015A Mar2

(3) [However,] when using direct-printing telegraphy or similar systems in any of the frequency bands allocated to the maritime mobile service, the call may, by prior arrangement, be made on a working frequency available for such systems.

SUP 1016 Mar2

MOD 1016A Mar2

(1A) [In the maritime mobile service,] the call, as described in No. 1013B Mar 2, shall contain the service abbreviation indicating the working frequency and, if useful, the class of emission which the calling station proposes to use for the transmission of its traffic.

SUP 1017

SUP 1018

SUP 1019

SUP 1019A

SUP 1020

MOD 1020A Mar2

(1A) [In the maritime mobile service] the calling station shall transmit the service abbreviation after the above-mentioned preparatory signals to indicate a priority message other than a distress, urgency or safety message (see No. 1496A) and to indicate the reason for the call.

NOC 1021

SUP 1022

MOD 1022A Mar2

§ 10A. [In the maritime mobile service] the reply to calls consists of:

—the call sign of the calling station, not more than twice;

—the word DE;

—the call sign of the station called, once only.

SUP 1023 through 1040

SUP 1041

SUP 1042

NOC 1043

NOC 1044

NOC 1045

NOC 1047

MOD 1048

§ 16. (1) As a general rule, radiotelegraphs of all kinds transmitted by ship stations [and radiotelegrams in the public correspondence service transmitted by aircraft stations,] shall be numbered in a daily series; number 1 shall be given to the first radiotelegram sent each day to each separate station.

MOD 1048

§ 17. (1) [In cases where both stations are able to change from sending to receiving without manual switching, the transmitting station may continue to send until completion of the message or until the receiving station breaks in on the transmission with the service abbreviation BK. Before commencing, both stations normally agree on such a method of working by means of the abbreviations QSK.] Unless operations are agreed to by means of the abbreviations QSK and BK, long radiograms shall be transmitted in sections. Each section shall contain no more than 50 words in the case of plain language and no more than 20 words or otherwise.

SUP 1049

NOC 1050

SUP 1051

NOC 1052

NOC 1053

NOC 1054

MOD 1055

(2) The acknowledgment of receipt shall be transmitted by the receiving station on the traffic frequency [(see Nos. 1041 and 1042)].

NOC 1056

MOD 1057

(2) The signal . . . — — (end of work) shall also be used[.]

[X] when the transmission of radiotelegrams of general information, meteorological information and general safety notices is finished, [and]

[X] When transmission is ended in long distance radiocommunication services with deferred acknowledgment of receipt or without acknowledgment of receipt.]

SUP 1058

NOC 1059

NOC 1060

MOD 1061

§ 25. When it is necessary for a mobile station to send signals for testing or adjustment which are liable to interfere with the working of [neighbouring coast or aeronautical] another station[s], the consent of [these] this station[s] shall be obtained before such signals are sent.

NOC 1062

NOC 1062AA

NOC 1062AB

NOC 1062AC

NOC 1062AD

NOC 1062AE

NOC 1062AF

NOC 1062AG

NOC 1062AH

NOC 1062AI through 1062BH

Article 30

CALLS BY RADIOTELEGRAPHY

NOC 1063 through 1067A

MOD 1068

(2) Continuous or frequently repeated emissions of its call sign or the enquiry signal CQ by coast station [should] shall be avoided (see No. 693). In particular CQ shall not be used for more than 5 consecutive minutes in any half hour.

NOC 1068A through 1087

Article 31

RADIOTELEGRAPHIC CALL TO SEVERAL STATIONS

NOC 1087A through 1094

Article 32

USE OF FREQUENCIES FOR RADIOTELEGRAPHY IN THE MARITIME MOBILE AND AERONAUTICAL MOBILE SERVICES

NOC 1094A through 1107

MOD 1108

(2) However, ship and aircraft stations which cannot transmit 500 kHz [should] may use any available frequency or station might be attracted

NOC 1109 through 1149

1165 through 1971

1177.1, 1177A.

MOD 1177B

§ 30B. If it is attended to maintain watch on all the receiving channels within a group, the administration concerned, in order to ensure an even distribution of calls, shall determine the channel or channels on which watch will be maintained but only after coordination [as far as possible] has been undertaken with administrations sharing the same group (see Resolution No. Mar 2-5).

NOC 1177C, 1177D

SUP 1177E

NOTICES

27845

MOC 1178 through 1179, 1189 through 1191, 1191B, 1191C, 1191DA, 1200, 1200A, 1203, 1204, 1204A
 SUP 1207, 1208

Article 35

USE OF FREQUENCIES FOR RADIOTELEPHONY IN THE MARITIME MOBILE SERVICE

SUP 1319
 MOD 1320

(2) Aircraft stations may enter into radio telephone communication with stations of the maritime mobile service on frequencies allocated to that service for radiotelephony. They shall comply with the provisions of this Article and Article 27.

NOC 1321 through 1322AB
 NOC 1322C
 NOC 1322D
 NOC 1323A
 NOC 1324 through 1336
 NOC 1338 through 1340
 NOC 1343 through 1351
 NOC 1351B
 NOC 1351E
 NOC 1351F
 NOC 1351G
 NOC 1351H
 NOC 1352AA
 NOC 1353B
 NOC 1354
 NOC 1354A
 MOD 1354B

(2) These stations [should] shall maintain this watch by means of an operator using some aural method, such as headphones, split headphone or loudspeaker.

MOD 1355

§ 17. (1) For the conduct of duplex telephony, the transmitting frequencies of the coast stations and of the corresponding ship stations shall be associated in pairs, as indicated in Appendix 17 and Appendix 17 Rev., except temporarily on the coast station frequency in accordance with No. 418 in cases where working conditions prohibit the use of paired frequencies in order to meet operational needs.

Reason: To improve duplex telephony's circumstances.

NOC 1356, 1357, 1359, 1359A, 1359B, 1361, 1362, 1363
 MOD 1363A

(6) Before transmitting on the frequency 156.8 MHz, a station in the mobile service should listen on this frequency [for a reasonable period] to make sure that no distress traffic is being sent (see No. 1217).

NOC 1363B
 NOC 1363C
 MOD 1364

§ 19. (1) A coast station providing an international maritime mobile radiotelephone service in the band 156-174 MHz and which forms an essential part of the coverage of the area for distress purposes [should] shall during its working hours in that band, maintain an [efficient] aural watch on 156.8 MHz (see Recommendation No. Mar2-10).

NOC 1365 through 1366
 MOD 1367

(4) Ship stations should, where practicable, maintain watch on 156.8 MHz when within the service area of a coast station providing international maritime mobile radiotelephone service in the band 156-174 MHz. Ship stations fitted only with VHF radiotelephone equipment operating in the authorized bands between 156 and 174

MHz, [should] shall maintain watch on 156.8 MHz, when at sea.
 NOC 1367A, 1367B, 1368, 1368A
 MOD 1369

§ 21. (1) [Where practicable], coast stations open to the international public correspondence service shall be capable of working with ship stations equipped for duplex or semi-duplex operation.

NOC 1370, 1371, 1371A, 1372
 MOD 1373

(2) in the band 156 to 174 MHz administrations shall, where practicable, assign frequencies to coast and ship stations in accordance with the Table of Transmitting Frequencies given in Appendix 18 for such international services as administrations consider necessary (see Resolution No. Mar2-14).

NOC 1373A, 1374, 1375
 SUP 1376
 NOC 1377
 MOD

Article 35A

CONDITIONS TO BE OBSERVED BY MOBILE EARTH STATIONS IN THE MARITIME MOBILE-SATELLITE SERVICE

NOC 1379AA
 Reason: Necessary and adequate as drafted.
 MOD 1379AB

The frequencies of emissions of mobile earth stations shall be checked [as often as practicable] at least annually by the inspection service to which these stations are subject.

Reason: To insure at least annual checks.
 MOD 1379AC

The energy radiated by receiving apparatus [shall be reduced to the lowest practicable value and] shall not cause harmful interference to other stations.
 Reason: The expression "lowest practicable value" is not quantified.

MOD 1379AD

Administrations shall [take all practicable steps necessary to] ensure that the operation of any electrical or electronic apparatus installed in mobile earth stations does not cause harmful interference to the [essential] radio services of stations which are operating in accordance with the provisions of these Regulations.

Reason: To preclude interpretations which might negate the effect this provision as drafted would otherwise have.

Article 36

DISTRESS SIGNAL AND TRAFFIC, ALARM, URGENCY AND SAFETY SIGNALS

NOC 1380 through 1464
 MOD 1465

§ 40. (1) The radiotelephone alarm signal consists of two [substantially] sinusoidal audio frequency tones transmitted alternately. One tone shall have a frequency of 2 200 Hz and the other a frequency of 1 300 Hz, the duration of each tone being 250 milliseconds.

NOC 1466 through 1476
 MOD 1476AA

§ 44AA. (1) The navigational warning signal consists of one [substantially] sinusoidal tone of the frequency 2 200 Hz, interrupted so that the durations of tone and space are 250 milliseconds each.

NOC 1476AB through 1495
 SUP

Article 37

RADIOTELEGRAMS, RADIOTELEPHONE CALLS AND RADIOTELEX CALLS

MOD

Article 37A

ORDER OF PRIORITY OF COMMUNICATIONS IN THE [MARITIME] MOBILE SERVICE AND IN THE [MARITIME] MOBILE-SATELLITE SERVICE

NOC 1496A

Article 38

INDICATION OF THE STATION OF ORIGIN OF RADIOTELEGRAMS

NOC 1497 through 1499

Article 39

ROUTING OF RADIOTELEGRAMS

NOC 1500 through 1501
 SUP 1502
 MOD 1503

§ 3. If the sender of a radiotelegram handed in at a mobile station has indicated the coast or aeronautical station to which he desires his radiotelegram to be sent, the mobile station shall, in order to effect this transmission to the coast or aeronautical station indicated, wait, if necessary, until the conditions specified in Nos. 1500 to [1502] 1501 above are fulfilled.

NOC 1504
 NOC

Article 41

AMATEUR STATIONS

Reason: Sufficient as drafted.
 MOD

Article 42

EXPERIMENTAL STATIONS

NOC 1568 through 1572
 Reason: Adequate as drafted.
 MOD 1573

All the general rules of the Convention, and of these Regulations, shall apply to experimental stations. In particular, experimental stations shall comply with the technical conditions imposed upon transmitters operating in the same frequency bands, [except where the technical principles of the experiments prevent this.] unless an appropriate waiver is secured from the administration concerned.

Reason: To clarify that the decision as to when departure from otherwise applicable technical conditions rests with the administration concerned as opposed to the operator(s) of the experimental station(s).

NOC 1574, 1575
 Reason: Adequate as drafted.
 MOD

Article 43

NOC

RADIODETERMINATION SERVICE AND RADIODETERMINATION-SATELLITE SERVICE

MOD 1576

Administrations which have established a radiodetermination service shall take the necessary steps to ensure the effectiveness and regularity of that service [; however they accept no responsibility for the consequences that might arise from the use of inaccurate information furnished, defective working, or failure of their stations].

Reason: To preclude internal inconsistency and for clarity.

NOC 1577 through 1583
 Reason: Adequate as drafted.
 SUP 1584

Reason: Superfluous. Radiocommunication by radiotelephony or radiotelegraphy is presumed to be subject to the provisions of these Regulations unless a specific proviso otherwise stipulates.

(MOD) 1584A

[1584] 1583 * * *

Reason: Consequential.

NOC 1585 through 1595

Reason: Necessary and adequate as drafted.
MOD

Article 44

NOC

SPECIAL SERVICES

NOC 1596 through 1614

Reason: Necessary and adequate as drafted.

MOD 1615

Messages originating in mobile stations and containing information concerning the presence of cyclones shall be transmitted, with the least possible delay, immediately to other mobile stations * * *

Reason: Any delay in the transmission of advice in respect to a possibly nearby cyclone may prove catastrophic.

NOC 1616 through 1622

Reason: Necessary and adequate as drafted.

MOD 1623

To facilitate more efficient use of the radio frequency spectrum and to assist other technical and scientific activities, administrations should [endeavour to] provide, on a co-ordinated world-wide basis, a service of standard frequency and time signal transmissions. Attention should be given to the extension of this service to those areas of the world not adequately served.

Reason: To strengthen this provision, noting its purpose together with the fact that it is not proposed that the word "should" be modified.

NOC 1624 through 1628

Reason: Adequate as drafted.

NOC

Appendix 6

Reports of Monitoring Data

Reason: Necessary and adequate as drafted.

NOC

Appendix 7

Report of an Irregularity or of an Infringement on the Convention or the Radio Regulations

Reason: Necessary and adequate as drafted.

NOC

Appendix 8

Report of Harmful Interference

Reason: Necessary and adequate as drafted.

MOD

Appendix 9

Service Documents (See Article 20 MOD)

NOC

List I, List II

Reason: Continued possible need for hard copy version.

SUP

List III A.

Reason: Same information is available from IFL. Electronic facilities would enable selecting IFL-entered data as desired. Finally, List III A is bulky, expensive, little-used and is not sold at a profit to administrations thus forcing other administrations to subsidize this List.

SUP

List III A.

Reason: Same information is available from IFL when updated, from current, applicable Tentative High Frequency Broadcasting Schedule, from High Frequency Broadcasting Schedule for past season in

question, or from recapitulative Annual High Frequency Broadcasting Frequency List issued per Radio Regulation No. 655.

NOC

List IV, V, VI, VII.

Reason: Continued possible need for hard copy version.

MOD

List VIII A: It is proposed that this List be among those made available in micro form

Reason: To enhance utilizability.

ADD

Resolution G-C

Relating to Automatic Identification

The General World Administrative Radio Conference, Geneva, 1979, considering

- a) the state of the art in respect to identification
- b) the need for unique identification
- c) the possibility of inadvertent operator error
- d) the ever increasing number of active transmitters not only within existing administrations but also noting the on-going assignments of new call sign and selective calling series
- e) the economics of presently available equipment which is directly applicable to automatic identification
- f) the possibilities for use of automatic, faster message transmission service in conjunction with automatic identification equipment
- g) the increased ease of resolving cases of harmful interference and of ensuring compliance with the provisions of the Convention and the Radio Regulations

resolves

1. that administrations shall implement automatic identification as provided in Article 19 MOD at the earliest possible time, and
2. that automatic means of identification should be adopted by all administrations.

requests the CCIR

to develop and recommend the technical parameters and operational aspects needed, in sufficient time utilizing, as necessary, Interim Working Parties instructs the Secretary General to make a special effort to keep all administrations advised on a regular basis of any related development including those having direct application to automatic identification.

APPENDIX 4. PROPOSAL FOR RESOLUTIONS AND RECOMMENDATIONS

Resolutions

Resolution 1—SUP

Reason: This Resolution is no longer applicable

Resolution 2—SUP

Reason: This Resolution has been overtaken by events and is no longer applicable

Resolution 3—SUP

Reason: This Resolution has been overtaken by events and is no longer applicable; see narrative par. 203

Resolution 4—SUP

Reason: By 1979, This Resolution will have been overtaken by events and will no longer be applicable

Resolution 10—

Reason: Reviewed; see narrative par. 204

Resolution 11—SUP

Reason: This Resolution has been overtaken by events and is no longer applicable

Resolution 13—SUP

Reason: should be overtaken by events as result of 1978 AWARC

Resolution 14—SUP

Reason: Replace with ADD Resolution Aer 2-(C) as stated in proposals for 1978 AWARC FCC Docket No. 20290

Resolution 15—

Reason: Reviewed; no action proposed

Resolution Aer 1—SUP

Reason: Replace with ADD Resolution Aer 2-(D) as stated in proposals for 1978 AWARC FCC Docket No. 20290

Resolution Aer 2—SUP

Reason: Replace with ADD Resolution Aer 2-(E) as stated in proposals for 1978 AWARC FCC Docket No. 20290

Resolution Aer 3—SUP

Reason: Should be overtaken by events as result of 1978 AWARC

Resolution Aer 4—SUP

Reason: Replace with ADD Resolution Aer 2-(F) as stated in proposals for 1978 AWARC FCC Docket No. 20290

Resolution Aer 5—SUP

Reason: Replace with ADD Resolution Aer 2-(G) as stated in proposals for 1978 AWARC FCC Docket No. 20290

Resolution Aer 6—SUP

Reason: Replace with ADD Resolution Aer 2-(H) as stated in proposals for 1978 AWARC FCC Docket No. 20290

Resolution Mar 3—

Reason: Abrogated by Resolution Mar 2-1

Resolution Mar 4—SUP

Reason: By 1979, this Resolution will have been overtaken by events and will no longer be applicable

Resolution Mar 5—

Reason: Reviewed; see narrative par. 205

Resolution Mar 6—

Reason: Abrogated by Resolution Mar 2-1

Resolution Mar 7—NOC

Reason: This Resolution is still applicable

Resolution Mar 8—

Reason: Abrogated by Resolution Mar 2-1

Resolution Mar 9

Reason: Abrogated by Resolution Mar 2-1

Resolution Mar 10

Reason: Abrogated by Resolution Mar 2-1

Resolution Mar 11—SUP

Reason: This Resolution has been overtaken by events and is no longer applicable

Resolution Mar 12

Reason: Abrogated by Resolution Mar 2-1

Resolution Mar 13

Reason: Abrogated by Resolution Mar 2-1

Resolution Mar 14

Reason: Abrogated by Resolution Mar 2-1

Resolution Mar 15—SUP

Reason: This Resolution has been overtaken by events and is no longer applicable

Resolution Mar 16

Reason: Abrogated by Resolution Mar 2-1

NOTICES

- Resolution Mar 18
Reason: Abrogated by Resolution Mar 2-1
- Resolution Spa 2-3—NOC
Reason: This Resolution is still applicable
- Resolution Spa 2-5
Reason: Abrogated by Resolution Mar 2-1
- Resolution Mar 2-2—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-3—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-4—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-5—SUP
Reason: By 1979, the necessary actions should have been completed, and this Resolution should no longer be applicable; see narrative par. 206
- Resolution Mar 2-6—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-7—NOC
Reason: Since there will not have been enough experience by 1979 with the type of operation, a future Maritime WARC should complete the actions envisioned by this Resolution
- Resolution Mar 2-8—NOC
Reason: Since there will not have been enough experience by 1979 with the type of operation, a future Maritime WARC should complete the actions envisioned by this Resolution
- Resolution Mar 2-9—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-10—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-11—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-12—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-13—SUP
Reason: By 1979, the necessary actions will have been completed, and this Resolution will no longer be applicable
- Resolution Mar 2-14—NOC
Reason: This Resolution is still applicable. It deals with the narrowing of VHF channel spacing and the associated transition schedule; the U.S. has been generally ahead of the stated schedule.
- Resolution Mar 2-15—NOC
Reason: This Resolution is still applicable
- Resolution Mar 2-20—
Reason: Reviewed; see narrative par. 206
- Resolution Mar 2-21—NOC
Reason: This Resolution is still applicable

Recommendations

- Recommendation 10—NOC
Reason: This Recommendation is still applicable

- Recommendation 11—NOC
Reason: This Recommendation is still applicable
- Recommendation 14
Reason: Reviewed; no action proposed
- Recommendation 15
Reason: Reviewed; no action proposed
- Recommendation 20—NOC
Reason: This Recommendation is still applicable; there is still an obligation to provide for an aviation collision avoidance system
- Recommendation 21
Reason: Reviewed; no action proposed
- Recommendation 22
Reason: Abrogated by Resolution Mar 1
- Recommendation 23
Reason: Abrogated by Resolution Mar 1
- Recommendation 24
Reason: Abrogated by Resolution Mar 1
- Recommendation 25
Reason: Abrogated by Resolution Mar 1
- Recommendation 26
Reason: Abrogated by Resolution Mar 1
- Recommendation 27
Reason: Abrogated by Resolution Mar 1
- Recommendation 28
Reason: Abrogated by Resolution Mar 1
- Recommendation 30
Reason: Abrogated by Resolution Mar 1
- Recommendation 31—NOC
Reason: This Recommendation is still applicable; see narrative par. 207
- Recommendation 32—SUP
Reason: This Recommendation has been overtaken by events and is no longer applicable
- Recommendation 33
Reason: Reviewed; no action proposed
- Recommendation 36
Reason: Abrogated by Resolution Spa 2-8
- Recommendation 37—SUP
Reason: This Recommendation has been overtaken by events and is no longer applicable; see narrative par. 203
- Recommendation Spa 1
Reason: Abrogated by Resolution Spa 2-8
- Recommendation Spa 2
Reason: Abrogated by Resolution Spa 2-8
- Recommendation Spa 3
Reason: Abrogated by Resolution Spa 2-8
- Recommendation Spa 5—MOD

RECOMMENDATION NO. SPA 5

to the C.C.I.R. Relating to the Broadcasting-Satellite Service
The Extraordinary Administrative Radio Conference, Geneva, 1963, considering

a) that the use of satellite transmissions for direct reception by the general public of sound and television broadcasts may be possible in the future;

b) that the C.C.I.R. is studying the technical feasibility of sound and television broadcasting from satellites, the technically suitable frequency bands for such a service, including the possibility of sharing with terrestrial services;

recommends that the C.C.I.R. expedite its studies and make early recommendations on Question [241 (IV)] 5-2/11 Geneva, [1963] 1974, in particular, regarding those parts of the question relating to the technical feasibility of broadcasting from satellites, the optimum technical characteristics of the systems to be used, what bands would be technically suitable and whether and

under what conditions those bands could be shared between the broadcasting-satellite and terrestrial services.

- Reason: This Recommendation is modified in order to make it current.
- Recommendation Spa 6
Reason: Abrogated by Resolution Spa 2-8
- Recommendation Spa 7
Reason: Reviewed; no action proposed
- Recommendation Spa 8—NOC
Reason: This Recommendation is still applicable
- Recommendation Spa 11—NOC
Reason: This Recommendation is still applicable
- Recommendation Aer 1—SUP
Reason: Replace with ADD Recommendation Aer 2-(B) as stated in proposals for 1978 AWARC FCC Docket No. 40290
- Recommendation Mar 1
Reason: Abrogated by Resolution Mar 2-1
- Recommendation Mar 4
Reason: Abrogated by Resolution Mar 2-1
- Recommendation Mar 5
Reason: Reviewed; no action proposed
- Recommendation Mar 6—SUP
Reason: By 1979, this Recommendation will have been overtaken by events and will no longer be applicable
- Recommendation Mar 7
Reason: Abrogated by Resolution Mar 2-1
- Recommendation Mar 8
Reason: Abrogated by Resolution Mar 2-1
- Recommendation Mar 2-1
Reason: Reviewed; see narrative par. 208
- Recommendation Mar 2-2—SUP
Reason: The concept of separation of calling channels from distress channels is not appropriate (Draft CCIR SG8 report supports this reason.)
- Recommendation Mar 2-3—SUP
Reason: The need for common channels to avoid new crystallization of equipment for international voyages will diminish with the increased use of synthesizers
- Recommendation Mar 2-7—NOC
Reason: This Recommendation is still applicable
- Recommendation Mar 2-8—NOC
Reason: This Recommendation is still applicable; see narrative par. 209
- Recommendation Mar 2-9
Reason: Reviewed; see narrative par. 209
- Recommendation Mar 2-11
Reason: Reviewed; see narrative par. 210
- Recommendation Spa 2-1
Reason: Reviewed; see narrative par. 211
- Recommendation Spa 2-3
Reason: Reviewed; see narrative par. 212
- Recommendation Spa 2-4
Reason: Reviewed; see narrative par. 212
- Recommendation Spa 2-5
Reason: Reviewed; see narrative par. 212
- Recommendation Spa 2-6
Reason: Reviewed; no action proposed
- Recommendation Spa 2-7
Reason: Reviewed; see narrative par. 213

APPENDIX 5.—EVALUATION OF THE IMPACT OF PROPOSED FIXED SATELLITE ALLOCATIONS

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SECTION 1. INTRODUCTION

1.1. Background. Projections in growth of civilian use of the satellite service is expected to increase by a factor of 8 within the next 25 years. Some of the expansion may be absorbed by using the 12/14 GHz and 17.7/27.5 GHz frequency bands. However, due to economic considerations associated with maximum utilization of existing hardware, use of the spectrum below 10 GHz is highly desirable. The bands presently used by INTELSAT are uplink of 5.925-6.425 GHz and downlink of 3.7-4.2 GHz. Internationally, the following bands are also allocated worldwide for the Fixed Satellite service: 3.4-3.7 GHz (downlink) and 4.4-4.7 GHz (uplink). In Region 1, the band 5.725-5.925 GHz and in Region 3, the band 5.850-5.925 GHz are allocated to the fixed satellite service. The present fixed satellite international allocations and a system summary for all the bands between 2.5-10.0 GHz are provided in table 1.1. Nationally the 3.3-3.7

GHz, 4.4-4.9 GHz and 5.85-5.925 GHz bands are allocated to the Government on a primary basis for: radiolocation, aeronautical radiolocation and fixed and mobile. The government is projecting a steady growth in the use of all three bands over the next twenty years.

The Third Notice of Inquiry (3rd NOI) suggested the following additional bands for the non-Government fixed satellite service: 4.7-4.9 GHz, 5.825-5.925 GHz and 6.425-6.925 GHz. As mentioned above, the first two bands are allocated to the Government on a primary basis. The 4.4-4.9 GHz frequency band is allocated to the fixed and mobile services and the 5.850-5.925 GHz frequency band is allocated to the radiolocation service.

The fixed satellite service frequency pairing resulting from the allocation suggested in the 3rd NOI would be:

(a) 5.825-5.925 GHz (uplink) and 3.4-3.7 GHz (downlink). Effectively, this would allow these bands to be paired with existing fixed satellite bands so that the combined bands would be 5.825-6.425 GHz (uplink) and 3.4-4.2 GHz (downlink).

(b) 6.425-6.925 GHz (uplink) and 4.4-4.9 GHz (downlink). As shown, these proposed allocations would benefit the non-Government fixed satellite service at the expense of less of spectrum to the Government users or at least limitations on the current access to the present spectrum space. Thus, 2.0 GHz or 25% of the spectrum below 10 GHz would be available to non-Government fixed satellite use. The Office of Telecommunications Policy (OTP) considers this problem to be one of the major issues confronting current WARC deliberations in view of the national economic and operational considerations involved.

TABLE 1.1

Present Fixed Satellite International Allocations and Usage in the Bands Between 2.5 and 10.0 GHz

FREQUENCY BAND, GHz	REGIONS	LINK	PRESENT SYSTEMS
2.5-2.535	2,3	dwn	NONE KNOWN
2.655-2.69	2,3	up	ATS.6 (experimental TV down link)
3.4-3.5	1,2,3	dwn	MOLNIA, STATIONAR
3.5-3.7	1,2,3	dwn	MOLNIA, STATIONAR
3.7-4.2	1,2,3	dwn	ATS.6, ANIK, COMSTAR, INTELSAT, MARISAT, MOLNIA, MOLNIYA, PALAPA, SATCOM, STATIONAR, SYMPHONIE, WESTAR
4.4-4.7	1,2,3	up	NONE KNOWN
5.725-5.89	1	up	MOLNIA, STATIONAR
5.85-5.925	1,3	up	MOLNIA, STATIONAR
5.925-6.425	1,2,3	up	ATS-6, ANIK, COMSTAR, INTELSAT, MARISAT, MOLNIA, MOLNIYA, PALAPA, SATCOM, STATIONAR, SYMPHONIE, WESTAR
7.25-7.75	1,2,3	dwn	DCS, NATO, UK SKYNET
7.9-8.4	1,2,3	up	DCS, NATO, UK SKYNET

In addition to the fixed satellite allocation, the 3rd NOI also suggested the addition of the non-Government fixed service in the 3.3-3.4 GHz sub-band.

1.2. Objective. The objective of this task is to evaluate the impact on the Federal Government operation of non-Government fixed satellite use in the bands: 3.4-3.7 GHz, 5.8-5.9 GHz and 4.4-4.9 GHz and fixed service in the band 3.3-3.4 GHz.

1.3. Approach. This study provides an assessment, based upon presently available information, of the Government equipment currently used or planned for near future use in the frequency bands previously discussed. Also, expansion of the IBM allocation (wireless transmission of power) has been considered. A review of the sharing studies performed by the non-Government Fixed Satellite groups and the military has been made. Also, preliminary Government resource as-

essments and sharing analyses were made. The assessment and sharing analyses information was used to evaluate the impact of allocating the non-Government fixed satellite and fixed services in Government bands. Various Federal Government major system files, frequency files and planning documentation were used to obtain assessment information for the above-mentioned bands.

SECTION 2.—INITIAL FINDINGS

2.1. Introduction. A summary of the initial findings for the 3.3-3.7 GHz, 4.4-4.9 GHz and 5.825-5.925 GHz frequency bands are provided in this section. The findings are supported by the allocation and assessment information given in Sections 3 through 5 and the compatibility analysis given in Section 6. A further review of Sections 3 through 6 is suggested in order to obtain a more comprehensive understanding of band

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A FFD of -178 dBW/m²/4 kHz would reduce the INR to -10dB and is probably an acceptable limit.

The coordination distance separation between troposcatter systems and satellite earth stations are approximately 300 miles. The required coordination distance between aeronautical mobile stations and satellite earth stations is about 300 miles.

The fixed satellite (downlink) and radio astronomy service are incompatible. In-band emissions from the satellite would cause harmful interference to the radio astronomy service.

5.825-5.925 GHz Bands—Utilization. The military has six operational systems in these bands. Two of these systems, one Air Force and one Navy, each employs a large number of equipments. The Air Force has over 70 weather radars operating in bands 5.45 and 5.85 GHz. The Navy has about 600 shipboard equipments operating in the bands between 5.4-5.9 GHz.

A summary of the total military equipment which includes all systems shows that the Air Force has approximately 200 radars capable of operating in the bands between 5.825-5.925 GHz. The Navy has over 600 shipboard radars capable of operating in these bands. All of the radars operating above 5.8

The assignment records reflect over 600 assignments in these bands. Of this total, 529 are military and 71 are Commerce. These assignments are used for air defense, testing and training purposes and for weather radars. The 71 Commerce assignments are in support of the National Weather Service weather network. The Commerce assignments are made in the sub-band 5.8-5.85 GHz. There are about 150 assignments in the sub-band between 5.825-5.925 GHz. Only 12 of these assignments reflect fixed tuned equipments.

In addition to the above utilization, NASA has proposed Wireless Transmission of Power in the band 5800 ±50 MHz.

EMC Considerations. Weather and radiolocation radars are not compatible with the proposed fixed satellite (uplink) allocation. The INR during periods of radar mainbeam coupling would be 30 dB or greater.

The Wireless Transmission of Power system does not appear to be compatible with the proposed fixed satellite (uplink) allocation. Consideration was only given to the space-to-earth link since this is the most desirable mode of operation.

SECTION 3.—ALLOCATION AND ASSESSMENT OF THE 3.3-3.7 GHz BANDS

pliable footnotes. Under the National Provisions, the primary services and their associated bands are:

Radiolocation 3.3-3.7 GHz
Aeronautical radiolocation (ground-based) 3.6-3.7 GHz

In the 2.3-3.5 GHz band, Government radiolocation is primary and limited to the military agencies (G1). Survey operations are authorized for Government and non-Government use on a secondary basis (US 108). Non-Government radiolocation and ancillary services are secondary services.

In the 3.5-3.7 GHz band, Government radiolocation and ground-based aeronautical radiolocation are primary services. Non-military radiolocation is secondary to the military service (G59). Non-Government radiolocation is a secondary service (US 110).

The International Provisions differ from the U.S. in that these provisions allow the fixed, fixed satellite, and mobile services to operate in the 3.3-3.7 GHz bands. The services and International Regions associated with each of the frequency bands are:

1. The radiolocation service is allocated on a primary basis worldwide.
2. In Region 1, the radiolocation service

- 3. ALLOCATION AND ASSESSMENT OF THE 3.3-3.7 GHz BANDS:
 - 3.1 Present Frequency Allocation.
 - 3.2 Proposed Changes to Present Allocations.
 - 3.3 Military Systems Operating in the Band.
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 - 3.5 Government Usage of Bands within the US.
- 4. ALLOCATION AND ASSESSMENT OF THE 4.4-4.9 GHz BANDS:
 - 4.1 Present Frequency Allocation.
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 - 4.3 Military Systems Operating in the Band.
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- 5. ALLOCATION AND ASSESSMENT OF THE 5.625-5.925 GHz BANDS:
 - 5.1 Present Frequency Allocations.
 - 5.2 Proposed Changes to Present Allocations.
 - 5.3 Military Systems Operating in the Band.
 - 5.4 Military Equipment Summary.
 - 5.5 Government Usage of Bands within the US.
- 6. EMC CONSIDERATIONS:
 - 6.1 Introduction.
 - 6.2 Analysis Parameters.
 - 6.3 EMC Analysis in the 3.3-3.7 GHz Bands.
 - 6.4 EMC Analysis in the 4.4-4.9 GHz Band.
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- 3.1 Frequency Allocation for the 3.3-3.7 GHz Bands.
- 3.2 Frequency Assignment Distribution for the 3.3-3.7 GHz Bands.
- 4.1 Frequency Allocation for the 4.4-4.9 GHz Band.
- 4.2 Frequency Assignment Distribution for the 4.4-4.9 GHz Band.
- 4.3 Distribution of Frequency Assignments having High Transmit Power (>1 kW).
- 5.1 Frequency Allocation for the 5.6-5.925 GHz Bands.
- 5.2 Frequency Assignment Distribution for the 5.6-5.925 GHz Bands.
- 6.1 Equipment Characteristics.

SECTION 1. INTRODUCTION

1.1 *Background.* Projections in growth of civilian use of the satellite service is expected to increase by a factor of 8 within the next 25 years. Some of the expansion may be absorbed by using the 12/14 GHz and 17.7/27.5 GHz frequency bands. However, due to economic considerations associated with maximum utilization of existing hardware, use of the spectrum below 10 GHz is highly desirable. The bands presently used by INTELSAT are: uplink of 5.925-6.425 GHz and downlink of 3.7-4.2 GHz. Internationally, the following bands are also allocated worldwide for the Fixed Satellite service: 3.4-3.7 GHz (downlink) and 4.4-4.7 GHz (uplink). In Region 1, the band 5.725-5.925 GHz and in Region 3, the band 5.850-5.925 GHz are allocated to the fixed satellite service. The present fixed satellite international allocations and a system summary for all the bands between 2.5-10.0 GHz are provided in table 1.1. Nationally the 3.3-3.7

GHz, 4.4-4.9 GHz and 5.65-5.925 GHz bands are allocated to the Government on a primary basis for: radiolocation, aeronautical radionavigation and fixed and mobile. The government is projecting a steady growth in the use of all three bands over the next twenty years.

The Third Notice of Inquiry (3rd NOI) suggested the following additional bands for the non-Government fixed satellite service: 4.7-4.9 GHz, 5.625-5.925 GHz and 6.425-6.925 GHz. As mentioned above, the first two bands are allocated to the Government on a primary basis. The 4.4-4.9 GHz frequency band is allocated to the fixed and mobile services and the 5.650-5.925 GHz frequency band is allocated to the radiolocation service.

The fixed satellite service frequency pairing resulting from the allocation suggested in the 3rd NOI would be:

(a) 5.625-5.925 GHz (uplink) and 3.4-3.7 GHz (downlink). Effectively, this would allow these bands to be paired with existing fixed satellite bands so that the combined bands would be 5.625-6.425 GHz (uplink) and 3.4-4.2 GHz (downlink).

(b) 6.425-6.925 GHz (uplink) and 4.4-4.9 GHz (downlink). As shown, these proposed allocations would benefit the non-Government fixed satellite service at the expense of loss of spectrum to the Government users or at least limitations on the current access to the present spectrum space. Thus, 2.6 GHz or 26% of the spectrum below 10 GHz would be available to non-Government fixed satellite use. The Office of Telecommunications Policy (OTP) considers this problem to be one of the major issues confronting current WARC deliberations in view of the national economic and operational considerations involved.

TABLE 1.1

Present Fixed Satellite International Allocations and Usage in the Bands Between 2.5 and 10.0 GHz

FREQUENCY BAND, GHZ	REGIONS	LINK	PRESENT SYSTEMS
2.5-2.535	2,3	dwn	NONE KNOWN
2.655-2.69	2,3	up	ATS.6 (experimental TV down link)
3.4-3.5	1,2,3	dwn	MOLNIA, STATIONAR
3.5-3.7	1,2,3	dwn	MOLNIA, STATIONAR
3.7-4.2	1,2,3	dwn	ATS,6, ANIK, COMSTAR, INTELSAT, MARISAT, MOLNIA, MOLNIYA, PALAPA, SATCOM, STATIONAR, SYMPHONIE, WESTAR
4.4-4.7	1,2,3	up	NONE KNOWN
5.725-5.83	1	up	MOLNIA, STATIONAR
5.85-5.925	1,3	up	MOLNIA, STATIONAR
5.925-6.425	1,2,3	up	ATS-6, ANIK, COMSTAR, INTELSAT, MARISAT, MOLNIA, MOLNIYA, PALAPA, SATCOM, STATIONAR, SYMPHONIE, WESTAR
7.25-7.75	1,2,3	dwn	DSCS, NATO, UK SKYNET
7.9-8.4	1,2,3	up	DSCS, NATO, UK SKYNET

In addition to the fixed satellite allocation, the 3rd NOI also suggested the addition of the non-Government fixed service in the 3.3-3.4 GHz sub-band.

1.2 *Objective.* The objective of this task is to evaluate the impact on the Federal Government operation of non-Government fixed satellite use in the bands: 3.4-3.7 GHz, 5.6-5.9 GHz and 4.4-4.9 GHz and fixed service in the band 3.3-3.4 GHz.

1.3 *Approach.* This study provides an assessment, based upon presently available information, of the Government equipment currently used or planned for near future use in the frequency bands previously discussed. Also, expansion of the ISM allocation (wireless transmission of power) has been considered. A review of the sharing studies performed by the non-Government Fixed Satellite groups and the military has been made. Also, preliminary Government resource as-

sessments and sharing analysis made. The assessment and sharing information was used to evaluate the impact of allocating the non-Government fixed satellite and fixed service in the Government bands. Various Federal Government major system files, frequency files and planning documentation were used to obtain assessment information for the above-mentioned bands.

SECTION 2.—INITIAL FINDINGS

2.1 *Introduction.* A summary of the initial findings for the 3.3-3.7 GHz, 4.4-4.9 GHz and 5.625-5.925 GHz frequency bands are provided in this section. The findings are supported by the allocation and assessment information given in Sections 3 through 5 and the compatibility analysis given in Section 6. A further review of Sections 3 through 6 is suggested in order to obtain a more comprehensive understanding of band

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utilization and the limitations of the electromagnetic compatibility (EMC) analysis.

3.2 Initial Findings. The results of the initial findings indicate that allocation of the proposed fixed satellite service in all of the three overall bands would have a dramatic national economic and performance impact upon the Government services. It appears that some spectrum could be made available with limited impact for use by the fixed satellite service. The bands and the spectrum space are:

Approximately 100 MHz of spectrum in the 3.5-3.7 GHz appears to be lightly occupied at present by land and shipboard radars. Potentially, there may be about 200 airborne radars operating in these bands; however, the equipments may operate below 3.5 GHz. The Navy operates a small quantity of safety of life services equipments in the sub-bands 3.55-3.70 GHz and the FAA is planning to use this band for ASR's. Thus, overall sharing procedures will be quite complex and must be developed before considering the fixed satellite allocation.

The 5825-5925 MHz band is heavily occupied by high powered radars which perform a variety of functions.

The band 4.4-4.9 GHz is one of the few bands allocated to the fixed and mobile services which are generally available to the military in all nations with which the U.S. is allied militarily. As such, this band is considered critical to inter-operability among tactical forces. Additionally, this band is used Nationally by high powered troposcatter and airborne mobile systems. Consequently, accommodation of the proposed fixed satellite allocation in the band 4.4-4.9 GHz, on a national basis, does not appear feasible.

The proposed fixed service allocations, as proposed on a secondary basis, would have a lesser impact upon operation of the radiolocation service. If the fixed service is allocated on a primary basis, it may place unacceptable operational constraints upon systems being developed for use in the 3.3-3.4 GHz sub-band.

A summary of the findings for each of the three bands follows:

3.3-3.7 GHz Bands—Utilization. There are operational military systems in these bands. New military major systems are being developed by the Air Force, Army and Navy. All of these systems are capable of operating in the bands below 3.5 GHz.

A review of the military equipment quantities shows there are several hundred Army ground-based radars, over 500 Air Force airborne radars and under 50 Navy shipboard radars capable of operating in these bands. The ground-based radars operate in the bands below 3.5 GHz. The airborne radars operate in the bands between 3.3-3.7 GHz. A portion of the shipboard radars are capable of operating above 3.6 GHz.

The assignment records¹ indicate that of the total assignments, 95% are military used principally for tactical, training and experimental purposes. A distribution of the frequency assignments shows that the 3.5-3.7 GHz band may not be heavily occupied on land within the continental U.S. The mobile radars (shipboard) operate within interference range of all coastal areas.

The FAA is the only non-military agency with significant present or planned use of the 3.3-3.7 GHz bands. Specifically, the FAA is planning to utilize the 3.5-3.7 GHz band for operation of low cost ASR's.

¹The number of frequency assignments may not be necessarily equated to the number of equipments, since a single assignment may represent a large number of equipments.

EMC Considerations. The proposed fixed satellite service (downlink) can cause interference to ground-based and shipboard radars if the maximum power flux density (PFD) limits of $-152 \text{ dBW/m}^2/4 \text{ kHz}$ are assumed. Preliminary analysis indicates that a 20 dB reduction in PFD would probably be an acceptable limit to preclude interference to radars.

Representative, preliminary coordination distances required to allow sharing between the existing and proposed services are:

Approximately 300 statute miles separation between terrestrial radiolocation and radionavigation service and satellite earth stations may be required to achieve the fixed satellite service performance criteria.

Distances of 250 miles between airborne radars² and earth stations (earth station mainbeam coupling does not occur) will be required.

The coordination distance between airborne radars² and the fixed service will vary from a maximum of 250 miles (low probability mainbeam coupling case) to about 10 miles (sidelobe coupling).

Coordination distances of up to 210 miles between terrestrial radars and fixed stations are required for the extreme case of mainbeam/mainbeam coupling. The distance is reduced to less than 85 miles for mainbeam/sidelobe coupling.

It is evident from the above coordination distances that Federal Government operations in the band between 3.3-3.7 GHz would be severely restricted if a large number of earth stations or fixed stations operated within the continental U.S.

4.4-4.9 GHz Band—Utilization. Military systems in this band consist of six operational or acquisition stage systems and nine developmental systems. It is intended that most of the system equipment can operate throughout the 4.4-4.9 GHz band. Two of the developmental systems use troposcatter equipment. One of these systems will contain 400 equipments that may operate in the troposcatter mode. Six of the developmental systems will use equipment within the mobile service that are air deployed.

Preliminary military equipment quantity information shows that the Army has over 1000 equipments capable of operating in this band. The Air Force has about 50 nomenclatured equipments listed which also indicates heavy use of this band. Navy information shows there are over 100 land mobile equipments in the bands between 4.4-4.9 GHz.

The assignment records reflect approximately 1250 military assignments within the US. These assignments are generally used for tactical and training purposes, data transmission, and a variety of testing and experimental purposes. The assignments, including those with high power, are evenly distributed across the 500 MHz of spectrum.

In addition to the above usage, the radio astronomy service observes the formaldehyde line frequency in the sub-band 4.825-4.835 GHz.

EMC Considerations. Emissions by the satellite (fixed satellite downlink) can cause interference to troposcatter systems if the troposcatter antennas point toward the geostationary orbit. Three general cases of PFD limits and restrictions upon the troposcatter pointing angles are:

± 4 degrees for a PFD of $-152 \text{ dBW/m}^2/4 \text{ kHz}$

± 2 degrees for a PFD of $-160 \text{ dBW/m}^2/4 \text{ kHz}$

²The distances do not include consideration of newly developed radars that may operate in these bands.

A PFD of -173 dBw/m²/4 kHz would reduce the INR to -10dB and is probably an acceptable limit.

The coordination distance separation between troposcatter systems and satellite earth stations are approximately 300 miles.

The required coordination distance between aeronautical mobile stations and satellite earth stations is about 350 miles.

The fixed satellite (downlink) and radio astronomy service are incompatible. In-band emissions from the satellite would cause harmful interference to the radio astronomy service.

5.625-5.925 GHz Bands—Utilization. The military has six operational systems in these bands. Two of these systems, one Air Force and one Navy, each employs a large number of equipments. The Air Force has over 70 weather radars operating in bands 5.45 and 5.65 GHz. The Navy has about 600 shipboard equipments operating in the bands between 5.4-5.9 GHz.

A summary of the total military equipment which includes all systems shows that the Air Force has approximately 200 radars capable of operating in the bands between 5.625-5.925 GHz. The Navy has over 600 shipboard radars capable of operating in these bands. All of the radars operating above 5.8 GHz appear to be tunable. The Army is developing a large system for operation in the bands below 5.8 GHz. In addition, the Army operates on its test ranges, precision tracking radars with assignments up to 5.925 GHz.

The assignment records reflect over 600 assignments in these bands. Of this total, 529 are military and 71 are Commerce. These assignments are used for air defense, testing and training purposes and for weather radars. The 71 Commerce assignments are in support of the National Weather Service weather network. The Commerce assignments are made in the sub-band 5.6-5.65 GHz. There are about 150 assignments in the sub-band between 5.825-5.925 GHz. Only 12 of these assignments reflect fixed tuned equipments.

In addition to the above utilization, NASA has proposed Wireless Transmission of Power in the band 5800 ± 50 MHz.

EMC Considerations. Weather and radiolocation radars are not compatible with the proposed fixed satellite (uplink) allocation. The INR during periods of radar mainbeam coupling would be 30 dB or greater.

The Wireless Transmission of Power system does not appear to be compatible with the proposed fixed satellite (uplink) allocation. Consideration was only given to the space-to-earth link since this is the most desirable mode of operation.

SECTION 3.—ALLOCATION AND ASSESSMENT OF THE 3.3-3.7 GHz BANDS

3.1 Present Frequency Allocation. The existing International Frequency Allocation and National Provisions for the 3.3-3.7 GHz bands are provided in table 3.1. The National Provisions include the Governmental allocations, non-Government allocations and ap-

plicable footnotes. Under the National Provisions, the primary services and their associated bands are:

- Radiolocation ----- 3.3-3.7 GHz
- Aeronautical radionavigation (ground-based) ----- 3.5-3.7 GHz

In the 3.3-3.5 GHz band, Government radiolocation is primary and limited to the military agencies (G31). Survey operations are authorized for Government and non-Government use on a secondary basis (US 108). Non-Government radiolocation and amateur services are secondary services.

In the 3.5-3.7 GHz band, Government radiolocation and ground-based aeronautical radionavigation are primary services. Non-military radiolocation is secondary to the military service (G59). Non-Government radiolocation is a secondary service (US 110).

The International Provisions differ from the U.S. in that these provisions allow the fixed, fixed satellite, and mobile services to operate in the 3.3-3.7 GHz bands. The services and International Regions associated with each of the frequency bands are:

- a. 3.3-3.4 GHz:
 1. The radiolocation service is allocated on a primary basis worldwide.
 2. In Region 1, the radionavigation service is also allocated (370).
 3. The fixed and mobile services are also allocated in some countries (371).
 4. The amateur service is allocated on a secondary basis in Regions 2 and 3.

Table 3.1 Frequency Allocation for the 3.3-3.7 GHz Bands

INTERNATIONAL			UNITED STATES				Remarks
Region 1 MHz	Region 2 MHz	Region 3 MHz	Band MHz	National Provisions	Government Allocation	Non-Government Allocation	
			1	2	3	4	5
3300-3400 RADIOLOCATION	3300-3400 RADIOLOCATION Amateur 376		3300-3500	G, NG US108	RADIOLOCATION	Amateur Radiolocation	Although the band 10000-10300 MHz presently seems most suitable as a common frequency band for such survey operations in different countries, future development, if required, should be directed to the band 34.0-35.6 GHz, within the overall band 33.4-36.0 GHz, with no new development below 10000 MHz.
370 371 3400-3600 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE Radiolocation	3400-3500 FIXED-SATELLITE (Space-to-Earth) RADIOLOCATION Amateur 376				G31		
372 373 374 375 3600-4200 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE	3500-3700 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE RADIOLOCATION	3500-3700 FIXED-SATELLITE (Space-to-Earth) RADIOLOCATION Fixed Mobile 377 378	3500-3700	G, NG US110	AERONAUTICAL RADIO NAVIGATION (Ground-based) RADIOLOCATION	Radiolocation	
374	3700-4200 FIXED FIXED-SATELLITE (Space-to-Earth) MOBILE 379		3700-4200	NG	G59 G110	FIXED FIXED-SATELLITE (Space-to-Earth) NC41	

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Government (G) Footnotes

(These footnotes, each consisting of the letter "G" followed by one or more digits, denote stipulations applicable only to the Government.)

- G31** In the band 3300-3500 MHz, the Government radiolocation is limited to the military services, except as provided by footnote US108.
- G59** In the bands 902-928 MHz, 3100-3300 MHz, 3500-3700 MHz, 5250-5350 MHz, 8500-9000 MHz, 9200-9300 MHz, 13.4-14.0 GHz, 15.7-17.7 GHz and 24.05-24.25 GHz, all Government non-military radiolocation shall be secondary to military radiolocation, except in the sub-band 15.7-16.2 GHz airport surface detection equipment (ASDE) is permitted on a coequal basis subject to coordination with the military departments.
- G110** Government ground-based stations in the aeronautical radionavigation service may be authorized between 3500 and 3700 MHz where accommodation in the 2700-2900 MHz band is not technically and/or economically feasible.

US Footnotes

(These footnotes, each consisting of the letters US followed by one or more digits, denote stipulations applicable to both Government and non-Government stations.)

- US108** Within the bands 3300-3500 MHz and 10000-10500 MHz, survey operations, using transmitters with a peak power not to exceed five watts into the antenna, may be authorized for Government and non-Government use on a secondary basis to other Government radiolocation operations.
- US110** In the frequency bands 3100-3300 MHz, 3500-3700 MHz, 5250-5350 MHz, 8500-9000 MHz, 9200-9300 MHz, 9500-10000 MHz, 13.4-14.0 GHz, 15.7-17.7 GHz, 24.05-24.25 GHz and 33.4-36 GHz, the non-Government radiolocation service shall be secondary to the Government radiolocation service and to airborne doppler radars at 8800 MHz, and shall provide protection to airborne surface detection equipment (ASDE) operating between 15.7-16.2 GHz.

International Footnotes

(These footnotes come from the Radio Regulations, Geneva, 1959, the Final Acts of the Space EARC, Geneva, 1963, the Final Acts of the Maritime Mobile WARC, Geneva, 1967, or the Final Acts of the Space WARC, Geneva, 1971.)

- 370** In Albania, Austria, Bulgaria, Hungary, Poland, Portugal, Roumania, Switzerland, Czechoslovakia and the U.S.S.R., the band 3 300-3 400 MHz is also allocated to the radionavigation service.
- 371** In Austria, Greece, Norway, the Netherlands, Portugal and Sweden, the band 3 300-3 400 MHz is also allocated to the fixed and mobile services.
- 372** In Austria, the band 3 400-3 600 MHz is also allocated to the radionavigation service.
- 373** In Denmark, Norway, Sweden and Switzerland, the fixed, mobile, radiolocation and fixed-satellite services operate on a basis of equality of rights in the band 3 400-3 600 MHz.
- 374** In the United Kingdom, the band 3 400-3 770 MHz is allocated to the radiolocation service.
- 375** In Austria, Israel, Netherlands, F. R. of Germany and the United Kingdom, the band 3 400-3 475 MHz is also allocated, on a secondary basis, to the amateur service.
- 376** In China, India, Indonesia, Japan and Pakistan the band 3 300-3 500 MHz is also allocated to the fixed and mobile services.
- 377** In China and Japan the band 3 500-3 700 MHz is also allocated to the fixed and mobile services.
- 378** In Japan, in the band 3 620-3 700 MHz, the radiolocation service is excluded.

NOTICES

b. 3.4-3.5 GHz:

1. The radiolocation service is allocated on a primary basis in Regions 2 and 3 and on a secondary basis in Region 1.

2. The fixed-satellite service is allocated on a primary basis worldwide.

3. In Austria, the radionavigation service is also allocated in the band 3.4-3.6 GHz (372).

4. The fixed and mobile services are also allocated in Region 1 (373) and Regions 2 and 3 (376).

5. The amateur service is allocated on a secondary basis in Regions 2 and 3.

c. 3.5-3.7 GHz:

1. The radiolocation service is allocated on a primary basis in Regions 2 and 3 (except Japan (376)).

2. The fixed-satellite service is allocated on a primary basis worldwide.

3. The fixed service is allocated on a primary basis in Regions 1 and 2 and on a secondary basis in Region 3.

4. The mobile service is allocated on a primary basis in Region 2 and on a secondary basis in Regions 1 and 3.

5. In Austria, the radionavigation service is also allocated in the band 3.4-3.6 GHz.

3.2 *Proposed Changes to the Present Allocations.* The 3rd NOI contained proposals for the addition of several services in portions of the spectrum between 3.3-3.7 GHz. The proposed additions, as provided by the Table of Allocations, are:

1. In Region 2, the addition of the fixed service on a secondary basis in the band 3.3-3.4 GHz.

2. In Region 1, the addition of the amateur service on a secondary basis in the band 3.4-3.41 GHz.

3. Worldwide addition of the amateur-satellite service on a secondary basis in the band 3.4-3.41 GHz.

4. In Region 2, the addition of the aeronautical radionavigation service on a primary basis in the band 3.5-3.7 GHz.

In addition to the proposals set forth above, the 3rd NOI also contained discussions on spectrum expansion requirements of the commercial fixed-satellite service. The attempt to obtain a fixed satellite downlink allocation in the band 3.4-3.7 GHz was briefly discussed. This proposed downlink would be paired with a proposed uplink in the band 5.625-5.925 GHz.

3.3 *Military Systems Operating in the Band.* The military (Air Force, Army and Navy) have several radar systems that currently operate or are being developed to operate in the bands 3.3-3.7 GHz. Classified information concerning these systems has been made available to the FCC staff. A brief functional description and operational status of some Air Force and Army systems follows:

Air Force. The equipments functioning as part of the Air Force systems do not operate above 3.5 GHz. One of these systems uses electronic warfare simulators in all types of aircraft. Bomb directed controls are also employed. This system is presently operational.

The SAC Automated Command Control System (SACCS) transmits, collects, processes and displays data to assist CINCSAC in command and control of armed forces. The system is presently operational.

Army. The Army system with equipment capable of operating in this band is used to provide defense against aircraft and missiles. Training sites exist in Florida and Texas. The system equipment does not tune above 3.5 GHz.

Navy. Navy systems provide search, tracking, and navigation functions. Due to the

various functions performed, capability and flexibility to operate throughout the band is critical to successful shipboard electromagnetic compatibility.

3.4 *Military Equipment Summary.* Information on Air Force, Army and Navy present and planned worldwide utilization of the 3.3-3.7 GHz band is provided in this section.

Air Force. A list of the Communication-Electronic (C-E) equipment indicates that the Air Force has 9 types of nomenclatured equipments capable of operating in bands 3.3-3.7 GHz. A few of these equipments are ground-based radars; however, over 500 are airborne radionavigation radars. Approximately 50% of these airborne radars tune across the band 3.4-3.7 GHz. The remaining 50% of the airborne radars tune in band 3.3-3.6 GHz.

Army. An Army C-E equipment list contains three types of nomenclatured equipments capable of operating in 3.1-3.5 GHz bands. These represent a radar with planned operational availability beginning in 1980, and a total of approximately 300 operational radars. The operational availability of the present operational radars extend to 1985.

Navy. A Navy equipment inventory list indicates that there are five types of shipboard radars capable of operating in the 3.3-3.7 GHz bands. These five nomenclatures

represent equipments that are shipboard search, tracking or navigation radars. The search/tracking radars are tunable with a maximum operational frequency of 3.6 GHz. The navigation radars operate within the sub-band 3.55-3.7 GHz.

3.5 *Government usage of bands within the U.S.* The frequency records contain over 60 frequency assignments in the 3.3-3.7 GHz bands. Of this total, one is a National Aeronautics and Space Administration (NASA) assignment and the remainder are military. The station class associated with these assignments are radiolocation land and mobile stations and experimental stations. The four Government agencies currently using the bands 3.3-3.7 GHz and their approximate percentage of frequency assignments are:

Agencies:	Percent of total
Air Force.....	39
Army.....	20
Navy.....	39
NASA.....	< 2

A distribution of frequency assignments for each 100 MHz of spectrum in the bands between 3.3 to 3.7 GHz is provided in table 3.2. The number of assignments associated with each agency are also given. Many of the equipments tune across several bands, thus, table 3.2 does not provide the exact number of records.

Table 3.2 Frequency Assignment* Distribution for the 3.3-3.7 GHz Bands

AGENCY	FREQUENCY SUB-BAND, GHz			
	3.3-3.4	3.4-3.5	3.5-3.61	3.6-3.71
AF	21	19	9	11
AR	11	11	1	1
N	13	17	7	2
NASA	1	1		
Total	46	48	17	14

NOTE:

1. The FAA is planning to use the band 3.5-3.7 GHz for low cost ASR's in the future.

* / Does not necessarily indicate the number of equipments or systems operating in a frequency subband.

The assignments were used to obtain data on band usage for each of the Government agencies within the US. A summary of the usage for each of the four agencies, as well as FAA planned usage of the 3.5-3.7 GHz band, is provided in this sub-section.

Air Force. The Air Force uses this band for tactical, testing, evaluation and experimental purposes. The Air Force currently has assignments in the 3.3-3.7 GHz bands that are distributed in 11 states. Of these assignments, the majority have experimental station classes. The remaining assignments are radio-location, land and mobile stations. Most of these assignments are land-based stations used for testing. The remainder concern an airborne tactical radar that may be deployed anywhere within the US.

Army. The Army uses this band for operation of air defense radars and for experimental testing. The transmitter locations associated with these assignments are Alaska, Alabama, California, Florida, New Mexico and Utah. Of the assignments, the majority are radiolocation land stations and the remainder are experimental stations.

Federal Aviation Administration (FAA). The FAA plans to develop low cost Airport Surveillance Radars (ASR) in the 3.5-3.7 GHz band. Projected plans indicated that there will be at least 40 ASR's in operation within the next ten years. These radars would employ coaxial magnetrons or klystron power amplifiers with a peak power of 50 kW to 100 kW and would operate in conjunction with a frequency scanning antenna.

Navy. The Navy uses the 3.3-3.7 GHz bands for operation of shipboard radars, training and testing of developmental radar systems. The station classes associated with these assignments are radiolocation land station, radiolocation mobile station and experimental stations.

The radiolocation land stations and experimental stations are located in California, Florida, Maryland, New Mexico, Puerto Rico, Tennessee, Virginia, Virgin Islands, and Washington. These stations are used for training and testing purposes.

The remaining assignments are radiolocation mobile stations that are shipboard radars representing several equipments. The shipboard radars may operate within the coastal areas of the US.

National Aeronautics and Space Administration (NASA). NASA has one experimental radar capable of operating in the 3.1-3.5 GHz bands. The radar is used for tracking V/STOL vehicles in California.

SECTION 4. ALLOCATION AND ASSESSMENT OF THE 4.4-4.99 GHz BAND

4.1 Present Frequency Allocation. The existing International Frequency Allocation and National Provisions for the 4.4-4.99 GHz band are given in table 4.1.

The National Provisions allocate the fixed and mobile services, on a primary basis. In the band 4.825-4.835 GHz, every practical effort will be made to avoid assignment of frequencies in the fixed and mobile service (US203) due to radio astronomy observation.

The International Provisions allocate the fixed and mobile services on a primary basis in the 4.4-4.99 GHz band. The International Provisions also allocate the fixed-satellite service (earth-to-space), on a primary basis, in the band 4.4-4.7 GHz. All of the international footnotes (233B, 354, 382A and 382B) pertain to consideration of radio astronomy operations in the band 4.7-5.0 GHz.

4.2 Proposed Changes to the Present Allocations. The 3rd NOI contained discussions pertaining to the accommodation of the fixed satellite and radio astronomy proposed allocation within the band 4.4-4.9 GHz. Neither of these proposed allocations was provided in the Table of Allocations. However, a proposal was included to allocate Radio Astronomy as a primary service in the 4.95-4.99 GHz portion of the band.

The radio astronomers have expressed a desire to upgrade the band 4825-4835 MHz to table status. The radio astronomy service uses this band for observation of the formaldehyde line.

A proposal that would provide additional spectrum for the non-Government fixed satellite service in the band 4.4-4.9 GHz was briefly discussed in the 3rd NOI. This proposed fixed satellite allocation would be used for fixed satellite downlink purposes. A companion uplink would be provided by the bands 6.425-6.925 GHz which are presently allocated for non-Government purposes by the National Provisions.

TABLE 4.1
Frequency Allocation for the 4.4-4.9 GHz Band

INTERNATIONAL			UNITED STATES				Remarks
Region 1 MHz	Region 2 MHz	Region 3 MHz	Band MHz 1	National Provisions 2	Government Allocation 3	Non-Government Allocation 4	
4400-4700			4400-4990	G US203	FIXED MOBILE		Unprotected radio astronomy observations are being carried out in the band 4950-4990 MHz. Users should, where possible, bear in mind the needs of the radio astronomy service in their future planning for the use of this part of the band.
	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE						
4700-4990							
	FIXED MOBILE 233B 354 382A 382B						

Footnotes

(These footnotes, each consisting of the letters US followed by one or more digits, denote stipulations applicable to both Government and non-Government stations.)

W2023 Government and non-Government radio astronomy observations of the formaldehyde line frequencies 4825-4835 MHz and 14,485-14,515 GHz may be made at certain Radio Astronomy Observatories as indicated below:

4 GHz	14 GHz	Observatory
X	X	National Radio Astronomy Observatory Green Bank, W. Va.
X	X	Tucson (Kit Peak), Ariz.
X	X	Naval Research Laboratory Maryland Point, Md.
X	X	Hot Creek Observatory (U of Calif.) Hot Creek, California
X	X	Haystack Facility (MIT-Lincoln Lab) Tyrone, Mass.
X		Agassiz Station (Harvard College) Harvard, Mass.
X	X	Owens Valley Radio Observatory (Cal. Tech.) Owens Valley, California
X		University of Michigan Dexter, Michigan
X		Harvard Observatory Pt. Davis, Texas
	X	University of Texas Pt. Davis, Texas
	X	Aerospace Corp. El Segundo, California (to be moved to Owens Valley)

Every practicable effort will be made to avoid the assignment of frequencies to stations in the fixed or mobile services in these bands. Should such assignments result in harmful interference to these observations, the situation will be remedied to the extent practicable.

International Footnotes

(These footnotes come from the Radio Regulations, Geneva, 1959, the Final Acts of the Space WARC, Geneva, 1963, the Final Acts of the Maritime Mobile WARC, Geneva, 1967, or the Final Acts of the Space WARC, Geneva, 1971.)

- 233A In Argentina and Uruguay, the bands 36.65-36.85 MHz, 41.15-41.35 MHz and 45.65-45.85 MHz, and in Argentina, Brazil and Uruguay the band 170.55-170.95 MHz, are allocated to the radio astronomy service and no assignments shall be made to the fixed and mobile services in these bands.
- 354 In Albania, Bulgaria, Hungary, Poland, Roumania, Czechoslovakia and the U.S.S.R., the bands 1 660-1 690 MHz, 3 165-3 195 MHz, 4 800-4 810 MHz, 5 800-5 815 MHz and 8 680-8 700 MHz are also used for radio astronomy observations.
- 382A Radio astronomy observations on the formaldehyde line (rest frequency 4 829.649 MHz) are being carried out in a number of countries under national arrangements. Administrations should bear in mind the needs of the radio astronomy service in their future planning of the band 4 825-4 835 MHz.
- 382B Radio astronomy observations in the band 4 950-4 990 MHz are being carried out in a number of countries under national arrangements. Administrations should bear in mind the needs of the radio astronomy service in their future planning of this band.

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4.3 Military Systems Operating in the Band. The Military (Air Force, Army and Navy) have a large number of operational and developmental communication systems with equipment capable of operation in the band 4.4-4.9 GHz. Classified information concerning these systems has been made available to the FCC staff. Most of the nonmanufactured equipments functioning as part of these systems have the capability of tuning from 4.4 to 4.9 GHz. Brief functional description of most of these systems is discussed herein.

Air Force. The Air Force systems are summarized below:
A system designed to provide, via relay pods carrier aboard an aircraft, command to a Remotely Piloted Vehicle (RPV) plus telemetry and video information from the RPV, is in the developmental stage.

The BARBAGE system is a concept designed to rapidly deploy a tactical operation to an airstrip. The equipment that is used will depend on where BARBAGE is deployed and which Air Force units will provide the support. This system is presently operational.

A system that will enable reconnaissance aircraft to relay infrared sensor data to remote ground terminals is in the research/development stage.

The Tactical Air Control System (TACS) provides a transportable tactical control system capable of directing and controlling all tactical air operations. The TACS consists of 4 super systems. Two of these systems, the Air Force Component Command Post (AFOCCP) and Forward Air Control Post, have equipment that operates in this band. This system is presently in the operational and acquisition phase.

The Television Ordnance Scoring System (TOSS) is an ordnance scoring system that locates the impact point of ordnance dropped from aircraft in a training or operational test environment. This system is in the procurement stage.

The WHITE ALICE is a transponder and microwave system that provides communications throughout Alaska. This system has been an operational system for several years and may be phased out in the near future.

A family of high speed digital transponder radios are being developed to help satisfy the communications requirements of tactical forces in 1980-1990. These sets will be capable of providing reliable communications over ranges up to 200 miles in the transponder mode and shall also be capable of operating as line of sight equipment. Approximately 400 units of these pre-developmental systems are planned for worldwide tactical deployment.

The Army systems that have the capability of operating in this band are the Army Area Communications (AACOM) system, the AQUILA RPV system and an Area Wideband System.

The AACOM is an integrated communications system used to provide secure multi-channel communications for Tactical Field Army Units. This system is in the acquisition stage.

The AQUILA RPV system is used to develop and test technology, perform real time surveillance, artillery adjustments, target location, acquisition and designation. The system is in the developmental stage.

An Area Wideband System will serve communications information transfer needs in an interconnected network. This system will provide digital high rate information transfer systems among multiple users. Planned initial operation of this system is 1978.

Marine Corps. The Marine Corps system is the Marine Air Command and Control System (MAOCS). The MAOCS permits centralized coordination and supervision of air

operations by the Marine Air Force (MAOFT) aviation commander. The major MAOCS are: Tactical Air Control (TACOC), Tactical Air Operations (TAOC), Direct Air Support Air Support Radar Team (ASRT), Air Control Parties (TACTP), Air Traffic Control Units (ATCU) in operational with additional development, test and evaluation undertaken. Certain links are also capable of operating in mode.

Navy. The Navy systems are the Navy Multipurpose System, the Integrated Target Cell (ITC).

The LAMPS provides to spotting, air to sea rescue. The developmental stage.

The ITCS is a drone control for control of various stages system is in the development stage. The system is in the operational stage.

4.4 Military Equipment. Primary information on Air Navy present and planned Navy use of the 4.4-4.9 GHz is contained in this section.

Air Force. The list of C-E rates that the Air Force has of nonmanufactured equipment existing in this band. These used for microwave relay, transmissions, drone control, telemetry. Approximately 20 different equipments may be

located in the band 4.4-4.9 GHz. The equipment is in the developmental stage. The equipment is in the developmental stage.

The equipment is in the developmental stage. The equipment is in the developmental stage.

The equipment is in the developmental stage. The equipment is in the developmental stage.

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The equipment is in the developmental stage. The equipment is in the developmental stage.

The equipment is in the developmental stage. The equipment is in the developmental stage.

The equipment is in the developmental stage. The equipment is in the developmental stage.

Agency:

- Air Force (AF).....
- Army (AR).....
- Commerce (C).....
- Energy Research and Administration (ER).....
- Navy (N).....
- National Aeronautics and Administration (NASA).....

A distribution of frequency for each 100 MHz of the 4.4-4.9 GHz and each agency.

4.3. The assignment total for

NASA. Most NASA assignments in the 4.4-4.9 GHz band (of which there are less than ten) are associated with a point-to-point relay network centered in California. NASA has had one assignment for experimental research and one area-wide assignment for a flight telemetering station.

Section 5.—Allocation and Assignment of the 5.6-5.925 GHz Band

5.1 Present Frequency Allocation. The existing International Frequency Allocation and the National Provisions for the 5.6-5.925 GHz frequency bands are provided in table 5.1. The National Provisions include the Departmental allocations, non-Government allocations and applicable footnotes. The primary services and their associated bands for the National Provisions are:

Maritime radiolocation	5.60-5.65
Meteorological aids	5.60-5.65
Radiolocation	5.60-5.925

In the 5.6 to 5.65 GHz band, maritime radiolocation and meteorological aids are primary on an equal basis (847), for both Government and non-Government services. The maritime radiolocation service is limited to shipboard radars (848). Government radiolocation is primarily for the military

services; however, limited secondary use is permitted. Limited secondary use is support of experimentation and research programs (846). Non-Government radiolocation is secondary to Government radiolocation (845).

In the 5.65 to 5.925 GHz band, Government radiolocation is the primary service. Non-Government services are permitted for the following: (C2), Industrial, Scientific and Medical (ISM) equipment operate within 800/775 MHz band segments and the radio communication services must accept any harmful interference that may be received from ISM (841). This includes secondary services in the only non-Government service permitted in this band and it is on a secondary basis (849).

The International Frequency Allocations differ from the U.S. in that these allocations allow fixed, fixed-satellite, mobile, and space services to operate in the portions of these bands. A summary of the International Provisions is tabulated for each frequency band below:

- 1. 5.67-5.65 GHz:
1. Maritime radiolocation is allocated on a primary basis worldwide.
- 2. Radiolocation is allocated as a secondary service worldwide.

Table 5.1 Frequency Allocation for the 5.6-5.925 GHz Band

INTERNATIONAL			UNITED STATES				Remarks
Region 1 MHz	Region 2 MHz	Region 3 MHz	Band MHz	National Provision 2	Government Allocation 3	Non-Government Allocation 4	
			5170-5250	0, 84 850 8545	MARITIME RADIOLOCATION RADIOTELEVISION RADIOTELEPHONE	MARITIME RADIOLOCATION RADIOTELEVISION RADIOTELEPHONE	
			5400-5450	0, 84 347 8551	MARITIME RADIOLOCATION METEOROLOGICAL	MARITIME RADIOLOCATION METEOROLOGICAL	

NOTICES

US Footnotes

(These footnotes, each consisting of the letters US followed by one or more digits, denote stipulations applicable to both Government and non-Government stations.)

US203 Government and non-Government radio astronomy observations of the formaldehyde line frequencies 4825-4835 MHz and 14.485-14.515 GHz may be made at certain Radio Astronomy Observatories as indicated below:

<u>Bands to be Observed</u>		<u>Observatory</u>
<u>4 GHz</u>	<u>14 GHz</u>	
X	X	National Radio Astronomy Observatory Green Bank, W. Va.
X	X	Tucson (Kitt Peak), Ariz.
X	X	Naval Research Laboratory Maryland Point, Md.
X	X	Hat Creek Observatory (U of Calif.) Hat Creek, California
X	X	Haystack Facility (MIT-Lincoln Lab) Tyngsboro, Mass.
X		Agassiz Station (Harvard College) Harvard, Mass.
X	X	Owens Valley Radio Observatory (Cal. Tech.) Owens Valley, California
X		University of Michigan Dexter, Michigan
X		Harvard Observatory Ft. Davis, Texas
	X	University of Texas Ft. Davis, Texas
	X	Aerospace Corp. El Segundo, California (to be moved to Owens Valley)

Every practicable effort will be made to avoid the assignment of frequencies to stations in the fixed or mobile services in these bands. Should such assignments result in harmful interference to these observations, the situation will be remedied to the extent practicable.

International Footnotes

(These footnotes come from the Radio Regulations, Geneva, 1959, the Final Acts of the Space EARC, Geneva, 1963, the Final Acts of the Maritime Mobile WARC, Geneva, 1967, or the Final Acts of the Space WARC, Geneva, 1971.)

- 233A In Argentina and Uruguay, the bands 36.65-36.85 MHz, 41.15-41.35 MHz and 45.65-45.85 MHz, and in Argentina, Brazil and Uruguay the band 170.55-170.95 MHz, are allocated to the radio astronomy service and no assignments shall be made to the fixed and mobile services in these bands.
- 354 In Albania, Bulgaria, Hungary, Poland, Roumania, Czechoslovakia and the U.S.S.R., the bands 1 660-1 690 MHz, 3 165-3 195 MHz, 4 800-4 810 MHz, 5 800-5 815 MHz and 8 680-8 700 MHz are also used for radio astronomy observations.
- 382A Radio astronomy observations on the formaldehyde line (rest frequency 4 829.649 MHz) are being carried out in a number of countries under national arrangements. Administrations should bear in mind the needs of the radio astronomy service in their future planning of the band 4 825-4 835 MHz.
- 382B Radio astronomy observations in the band 4 950-4 990 MHz are being carried out in a number of countries under national arrangements. Administrations should bear in mind the needs of the radio astronomy service in their future planning of this band.

4.3 *Military Systems Operating in the Band.* The military (Air Force, Army and Navy) have a large number of operational and developmental communication systems with equipment capable of operation in the band 4.4-4.9 GHz. Classified information concerning these systems has been made available to the FCC staff. Most of the nomenclatured equipments functioning as part of these systems have the capability of turning from 4.4 to 4.99 GHz. A brief functional description of most of these systems is discussed herein.

Air Force. The Air Force systems are summarized below:

A system designed to provide, via relay pods carrier aboard an aircraft, command to a Remotely Piloted Vehicle (RPV) plus telemetry and video information from the RPV, is in the developmental stage.

The BAREBASE system is a concept designed to rapidly deploy a tactical operation to an airstrip. The equipment that is used will depend on where BAREBASE is deployed and which Air Force units will provide the support. This system is presently operational.

A system that will enable reconnaissance aircraft to relay infrared sensor data to remote ground terminals is in the research/development stage.

The Tactical Air Control System (TACS) provides a transportable tactical air control system capable of directing and controlling all tactical air operations. The TACS consists of 6 super systems. Two of these systems, the Air Force Component Command Post (AFCCP) and Forward Air Control Post, have equipment that operates in this band. This system is presently in the operational and acquisition phase.

The Television Ordnance Scoring System (TOSS) is an ordnance scoring system that locates the impact point of ordnance dropped from aircraft in a training or operational test environment. This system is in the procurement stage.

The WHITE ALICE is a troposcatter and microwave system that provides communications throughout Alaska. This system has been an operational system for several years and may be phased out in the near future.

A family of high speed digital troposcatter radios are being developed to help satisfy the communications requirements of tactical forces in 1980-1990. These sets will be capable of providing reliable communications over ranges up to 200 miles in the troposcatter mode and shall also be capable of operating as line of sight equipment. Approximately 400 units of these predevelopmental systems are planned for worldwide tactical deployment.

Army. The Army systems that have the capability of operating in this band are the Army Area Communications (AACOM) system, the AQUILA RPV system and the Wideband System.

The AACOM is an integrated communications system used to provide channel communications between Field Army Units. This system is in the acquisition stage.

The AQUILA RPV system is used to develop and test technology, provide real time surveillance, artillery adjustments, target location, acquisition and designation. The system is in the developmental stage.

An Area Wideband System will serve communications information transfer needs in an interconnected network. This system will provide digital high rate information transfer systems among multiple users. Planned initial operation of this system is 1978.

Marine Corps. The Marine Corps system is the Marine Air Command and Control System (MACCS). The MACCS permits centralized coordination and supervision of air

operations by the Marine Air Ground Task Force (MAGTF) aviation combat element commander. The major support element of MACCS are: Tactical Air Command Center (TACC), Tactical Air Operations Center (TAOC), Direct Air Support Center (DASC), Air Support Radar Team (ASRT), Tactical Air Control Parties (TACP) and the Marine Air Traffic Control Unit (MATCU). The system is operational with additional research, development, test and evaluation being undertaken. Certain links of this system are also capable of operating in the troposcatter mode.

Navy. The Navy systems are the Light Airborne Multipurpose System (LAMPS) and the Integrated Target Control System (ITCS).

The LAMPS provides various missions, such as anti-submarine warfare, artillery spotting, air to sea rescue. This system is in the developmental stage.

The ITCS is a drone control system used for control of various stages of drones. This system is in the developmental stage.

Air Force, Army, Navy. The TRI TAC systems will provide a compatible Tri service (Air Force, Army and Navy) communications system. The system is in the research/developmental stage.

4.4 Military Equipment Summary. Preliminary information on Air Force, Army and Navy present and planned worldwide spectrum usage of the 4.4-4.9 GHz band is summarized in this section.

Air Force. The list of C-E equipment indicates that the Air Force has about 50 types of nomenclature equipments capable of operating in this band. These equipments are used for microwave relay, troposcatter communications, drone control, data relay, and telemetry. Approximately 20% of the nomenclature equipments may be used for troposcatter. Of the total nomenclature equipments, the majority are capable of operating throughout the band 4.4-4.9 GHz.

Army. The list of C-E equipment contains about 10 types of Army nomenclature equipments that are capable of operating in the band 4.4-4.9 GHz. The Army uses these equipments for telemetry, data links, multi-channel radar relay and nontactical command air-to-ground video purposes. Of this total, the majority of the nomenclature equipments may be used as troposcatter systems. The nomenclature equipments represent a quantity in excess of 1000. The planned equipment operational availability extends into the 1990 timeframes.

Navy. Navy information indicates there are 112 land mobile (including airborne) equipments operating in this band.

4.5 Government Usage of Bands Within the U.S. There are 1305 frequency assignments in the 4.4-4.9 GHz band. Of the total assignments, approximately 96% are military and of these, approximately 70% are used for some form of tactical or training operation.

The 1305 frequency assignments are used by six Government agencies. The six agencies and the approximate percentage of frequency assignments for each agency is tabulated as follows:

Agency:	Percent of total
Air Force (AF).....	36
Army (AR).....	18
Commerce (C).....	<1
Energy Research and Development Administration (ERDA).....	3
Navy (N).....	42
National Aeronautics and Space Administration (NASA).....	<1

A distribution of frequency assignments for each 100 MHz of the spectrum between 4.4-4.9 GHz and each agency is given in table 4.2. The assignment total for the 5 sub-bands

does not equal 1305 since some of the assignments tune across several of these sub-bands. For example, the Army has 69 assignments that tune between 4.4 and 4.9 GHz and the Air Force has one assignment that tunes between 4.4 and 4.8 GHz.

The distribution of assignments having high transmit power (≥ 1 kW) is provided in table 4.3. As shown, the assignments with high transmit power characteristics are fairly evenly distributed in the five sub-bands. The station class associated with these high power stations are: fixed stations (FX), land stations of the mobile service (FL), telecommand mobile stations (MOD) and experimental stations (X[]).

The frequency records were used as the primary source to obtain data upon Government usage of the 4.4-4.9 GHz band within the US. A summary of the usage for each of the six Government agencies follows:

Air Force. A large percentage (about 50%) of the Air Force assignments in the 4.4-4.9 GHz band are for tactical and training use. Training activities include both Air National Guard and active duty units and are primarily associated with mobile troposcatter equipment. The balance of the AF assignments are used in a variety of test and developmental activities. These activities appear to be mainly associated with the transmission of wideband video and data links. The data link assignments are air-to-ground.

TABLE 4.3
Frequency Assignment Distribution for the 4.4-4.9 GHz Band

AGENCY	FREQUENCY SUB-BAND GHz				
	4.4-4.5	4.5-4.6	4.6-4.7	4.7-4.8	4.8-4.9
AF	91	120	80	96	90
AR	97	98	83	94	99
C	0	0	0	1	0
ERDA	7	7	10	9	8
N	113	106	127	102	99
NASA	2	1	2	0	2
TOTAL	310	332	302	302	298

TABLE 4.4
Distribution of Frequency Assignments Having High Transmit Power (≥ 1 kW)

FREQUENCY SUB-BAND, GHz	NUMBER OF ASSIGNMENTS
4.4 - 4.5 GHz	149
4.5 - 4.6 GHz	150
4.6 - 4.7 GHz	144
4.7 - 4.8 GHz	148
4.8 - 4.9 GHz	149

Army. Army usage of the 4.4-4.9 GHz band divides into two categories: (1) tactical and training involving troposcatter equipment operating 1 to 10 kW power levels located in 28 States, and (2) operational point-to-point microwave communications equipment operating at low power (approximately 1 watt) levels. The first category represents about 65% of the Army assignments in the band and the second category, about 25%. The re-

maining 10 percent are data links or experimental RFV uplink assignments.

Commerce. The Commerce assignment is a low powered fixed station located in Boulder, Colorado. The fixed station is used for transmission of video information.

ERDA. The ERDA's forty-one assignments in the 4.4-4.9 GHz band are primarily used for telemetry and data relay stations in Nevada but there is a small network in Col-

orado and a point-to-point video link in California. The ERDA is also developing a new emergency system for use in the 4.4-4.9 GHz band. The system is a microwave link used to provide for the remote identification and analysis of nuclear devices. Two systems are being procured, requiring a total of 12 transmitters and 12 receivers. The system will be capable of being transported to any location within the US.

Navy. The majority of the Navy assignments (approximately 85%) are designated for use as tactical and training in accordance with note S189. Most of these assignments also carry the note S017 indicating that the frequencies are being used to train operators in the use of the equipment, such training probably taking place at Marine Corps facilities, and include the troposcatter mode of operation. The balance of the Navy assignments (about 15%) are designated for a variety of uses including communications with drones and aircraft from land-based and ship-based stations, experimental development and testing of systems, and mobile telecommand for drone control. An extremely large number of the Navy assignment contains NRM (number) fields in the remarks column. This indicates that the equipment quantity represented by these assignments are quite large.

NASA. Most NASA assignments in the 4.4-4.9 GHz band (of which there are less than ten) are associated with a point-to-point relay network centered in California. NASA also has one assignment for experimental research and one area wide assignment for a flight telemetering station.

SECTION 5.—ALLOCATION AND ASSESSMENT OF THE 5.6-5.925 GHz BAND

5.1 **Present Frequency Allocation.** The existing International Frequency Allocations and the National Provisions for the 5.6-5.925 GHz frequency bands are provided in table 5.1. The National Provisions include the Government allocations, non-Government allocations and applicable footnotes. The primary service and their associated bands for the National Provisions are:

Maritime radionavigation	-----	Gigahertz
Meteorological aids	-----	5.60-5.65
Radiolocation	-----	5.60-5.65
	-----	5.65-5.925

In the 5.6 to 5.65 GHz band, maritime radionavigation and meteorological aids are primary, on an equal basis (387), for both Government and non-Government agencies. The maritime radionavigation service is limited to shipboard radars (US65). Government radiolocation is primarily for the military

services; however, limited secondary use is permitted by other Governmental agencies in support of experimentation and research programs (G56). Non-Government radiolocation is secondary to Government radiolocation (US51).

In the 5.65 to 5.925 GHz band, Government radiolocation is the primary service; however, this service is limited to the military agencies (G2). Industrial, Scientific and Medical (ISM) equipment operates within 5800±75 MHz band segment and the radio-communication services must accept any harmful interference that may be received from ISM (391). The amateur secondary service is the only non-Government service permitted in this band and it is on a secondary basis (US34).

The International Frequency Allocations differ from the U.S., in that these allocations allow fixed, fixed-satellite, mobile and space research to operate in the portions of these bands. A summary of the International Provisions is tabulated for each frequency band below:

a. 5.47-5.65 GHz:

1. Maritime radionavigation is allocated on a primary basis worldwide.
2. Radiolocation is allocated as a secondary service worldwide.

Table 5.1 Frequency Allocation for the 5.6-5.925 GHz Band

INTERNATIONAL			UNITED STATES				Remarks
Region 1 MHz	Region 2 MHz	Region 3 MHz	Band MHz	National Provisions	Government Allocation	Non-Government Allocation	
			1	2	3	4	5
5470-5650	MARITIME RADIONAVIGATION Radiolocation		5470-5600	G, NG US50 US65	MARITIME RADIONAVIGATION Radiolocation G56	MARITIME RADIONAVIGATION Radiolocation	
			5600-5650	G, NG 387 US51 US65	MARITIME RADIONAVIGATION METEOROLOGICAL AIDS Radiolocation G56	MARITIME RADIONAVIGATION METEOROLOGICAL AIDS Radiolocation	
5650-5670	RADIOLOCATION Amateur 388 389	386 387	5650-5925 (ISM 5800 ± 75 MHz)	G, NG 391 US34 US100	RADIOLOCATION	Amateur	
5670-5725	RADIOLOCATION Amateur Space Research (Deep Space) 388 389 389A						
5725-5850	5725-5850						
FIXED-SATELLITE (Earth-to-Space) RADIOLOCATION Amateur 354 388 390 391 391A	RADIOLOCATION Amateur						
		389 391 391A					
5850-5925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE	5850-5925 RADIOLOCATION Amateur	5850-5925 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE Radiolocation			G2		
391	391	391					

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FOOTNOTES

Government (G) Footnotes

(These footnotes, each consisting of the letter "G" followed by one or more digits, denote stipulations applicable only to the Government.)

- G2** In the bands 216-225, 420-450, 1300-1400, 2300-2450, 2700-2900, 5650-5925 and 9000-9200 MHz, the Government radiolocation is limited to the military services.
- G36** Government radiolocation in the bands 1215-1300, 2900-3100, 5350-5650 and 9300-9500 MHz is primarily for the military services; however, limited secondary use is permitted by other Government agencies in support of experimentation and research programs. In addition, limited secondary use is permitted for survey operations in the band 2900-3100 MHz.

US Footnotes

(These footnotes, each consisting of the letters US followed by one or more digits, denote stipulations applicable to both Government and non-Government stations.)

- US34** The only non-Government service permitted in the bands 220-225 MHz, 1215-1300 MHz, 2300-2450 MHz and 5650-5925 MHz is the amateur service. The amateur service shall not cause harmful interference to the radiolocation service.
- US50** The non-Government radiolocation service may be authorized in the band 5470-5600 MHz on the condition that it does not cause harmful interference to the maritime radionavigation service, or to the Government radiolocation service.
- US51** In the bands 5600-5650 MHz and 9300-9500 MHz, the non-Government radiolocation service shall not cause harmful interference to the Government radiolocation service.
- US65** The use of the band 5460-5650 MHz by the maritime radionavigation service is limited to shipborne radars.
- US100** In the Additional Protocol to the Final Acts of the Space EARC, Geneva, 1963, a declaration on behalf of the USA states that the USA cannot accept any obligation to observe the exception claimed by Cuba in those footnotes to the Table of Frequency Allocations which were adopted by the EARC and which specifically named Cuba.

International Footnotes

(These footnotes come from the Radio Regulations, Geneva, 1959, the Final Acts of the Space RARC, Geneva, 1963, the Final Acts of the Maritime Mobile WARC, Geneva, 1967, or the Final Acts of the Space WARC, Geneva, 1971.)

- 354 In Albania, Bulgaria, Hungary, Poland, Rumania, Czechoslovakia and the U.S.S.R., the bands 1 660-1 690 MHz, 3 161-1 195 MHz, 4 800-4 810 MHz, 5 800-5 815 MHz and 6 680-6 700 MHz are also used for radio astronomy observations.
356 In Albania, Bulgaria, Hungary, Poland, Rumania, Czechoslovakia and the U.S.S.R., the band 3 470-3 650 MHz is also allocated to the aeronautical radionavigation service.
367 Between 5 600-5 650 MHz, ground-based radars used for meteorological purposes are authorized to operate on the basis of equality with stations of the maritime radionavigation service.
388 In the F. R. of Germany, the band 5 650-5 775 MHz is allocated to the amateur service and the band 5 775-5 850 MHz is allocated to the fixed service.
389 In China, India, Indonesia, Japan and Pakistan the band 5 650-5 850 MHz is also allocated to the fixed and mobile services.
389A In Bulgaria, Cuba, Hungary, Poland, Rumania, Czechoslovakia and the U.S.S.R., the space research service is a primary service in the band 5 670-5 725 MHz.
390 In Albania, Bulgaria, Hungary, Poland, Rumania, Czechoslovakia and the U.S.S.R., the band 5 800-5 850 MHz is allocated to the fixed, mobile and fixed-satellite services.
391 The frequency 5 800 MHz is designated for industrial, scientific and medical purposes. Emissions must be confined within the limits of +/- 75 MHz of the frequency. Radiocommunication services operating within these limits must accept any harmful interference that may be experienced from the operation of industrial, scientific and medical equipment.
391A Radio astronomy observations are being carried out in the band 5 750-5 770 MHz and 36.458-36.488 GHz in a number of countries under national arrangements. Administrations are urged to take all practicable steps to protect radio astronomy observations in these bands from harmful interference.

- 3. The aeronautical radionavigation service is also allocated in Soviet Bloc countries (386).
4. In the band 5.6-5.85 GHz, the meteorological aids service is allocated on a co-equal basis with maritime radionavigation (387).
b. 5.65-5.725 GHz:
1. The radiolocation service is allocated on a primary basis worldwide.
2. The amateur service is allocated on a secondary basis worldwide.
3. The fixed and mobile services are also allocated in this band (389).
4. The space research service is allocated in the band 5.67-5.725 GHz, on a primary basis, in some Soviet Bloc countries (389A).
c. 5.725-5.8 GHz:
1. The radiolocation service is allocated on a primary basis worldwide.
2. The fixed-satellite service is allocated on a primary basis in Region 1.
3. The amateur service is allocated on a secondary basis worldwide.
4. The fixed and mobile services are also allocated in this band (388, 389, 390).
5. The frequency 5.8 GHz is designated for ISM purposes worldwide (391).
6. Radio astronomy observations are being carried out in a number of countries (384, 391A) in the bands 5.75-5.77 GHz and 5.8-5.815 GHz.
d. 5.85-5.925 GHz:

- 1. The radiolocation service is allocated on a primary basis in Region 2 and on a secondary basis in Region 3.
2. The fixed, mobile and fixed-satellite services are allocated on a primary basis in Regions 1 and 3.
3. The amateur service is allocated on a secondary basis in Region 2.
5.2 Proposed Changes to the Present Allocation. The 3rd NOI contained discussions proposing the addition of three services and an expansion of ISM equipment within the bands 5.625-5.925 GHz. A summary of these proposed allocations follows:
1. Addition of the Amateur Satellite service on a secondary basis. The frequency limits of allocation would be 5.65-5.67 GHz. This allocation was also proposed in the Table of Allocations.
2. Spectrum for use by the common carrier fixed service in the bands of 5.850-5.925 GHz was requested.
3. The request to obtain spectrum in the 5.625-5.925 GHz bands for use by the commercial fixed satellite service was discussed.
4. Footnote 391A has been proposed in the Table of Allocations to provide for wireless transmission of power. This footnote states:
'The frequencies 2450 MHz and 5600 MHz are designated for the wireless transmission of power. Emissions must be confined within +/- 60 MHz of the frequencies designated. This

electrical energy transfer may be effected from space-to-earth, space-to-space, or point-to-point on the earth.

5.3 Military Systems Operating in the Band. The military has several developmental and operational radar systems with equipment capable of operating in the bands 5.6-5.925 GHz. Classified information concerning these systems has been made available to the FCC staff. A brief description of some of the military systems follows.

Air Force. The Air Force systems include the following systems.

The All Weather System (AWS) is an atmospheric environmental program that is a continuing acquisition and procurement program to improve and modernize the air weather service in support of military operations and command and control systems. The system is presently operational in the US.

Electronic warfare simulators are used in all types of aircraft. Bomb directed controls are also employed. This system is presently operational.

A part of the Air Defense Command and Control Network is a system which provides for surveillance, identification, command and control and interception of hostile airborne targets. With the phase-out of this system, a Joint Surveillance System (JSS) between the FAA, Air Defense Command and Canada will be implemented to perform the US surveillance and precision control missions of detection, identification and interception. The JSS will provide the means for rapid transition of the command, control and surveillance functions.

Navy. Navy systems include the Tartar/Tarrier/Talos system. This system is a surface-to-air and surface-to-surface missile system. The primary role of this system is fleet air defense with a secondary role of anti-missile and anti-ship defense. These systems include search, acquisition, tracking, and navigation functions and are currently operational systems.

5.4 Military Equipment Summary. Information on military present and planned worldwide spectrum utilization of the 5.625-5.925 GHz bands is summarized in this section.

Air Force. A list of the Communications-Electronic (C-E) equipment indicates that the Air Force has about 25 types of non-manufactured equipment capable of operating in this band. Approximately 75% of these non-manufactured equipments tune over the entire frequency band (5.60-5.925 GHz). These equipments are principally used as fixed and mobile ground radars and as pilotless carrier transponders or radars. Information currently available indicates that the non-manufactured equipment represent total equipment quantities in excess of 200 units.

Army. Information of Army C-E equipments indicates about 10 types of non-manufactured equipments are either operating or planned for operation in this band. Some of these non-manufactured equipments will operate in the band below 5.75 GHz. The remainder may operate within the entire band (5.625-5.925 GHz). The operational availability extends to 1990 for a majority of the non-manufactured equipments.

The Army has indicated that the loss of the 5625-5925 MHz band for use by radars at military test ranges would severely reduce the capability of those ranges to support the weapons development programs. Such delays of the weapons development programs across the US will have a serious effect upon the Defense Readiness posture.

Navy. The Navy has about 10 types of non-manufactured equipments representing an equipment quantity of about 800, operating in the 5.625-5.925 GHz band. All of these

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equipments are capable of operating in the frequency ranges. Agency quality technicians are capable of operating in the 5.6-5.925 GHz. It is projected that the number of assignments will increase by 1980.

5.5 Government of the U.S. There are currently 83% of the military (DOD) and used as land and mobile weather radars. The assignments are mobile and expanding. The eight Government frequency assignment

Table 5. Summary of military equipment quantities for each Government. Columns include AGENCY (AF, AR, C, ERDA, I, N, NS, NASA) and Total.

A summary of military equipment quantities for each Government. The Air Force is principally for radar. Other agencies are used for command and control. The radiolocation throughout the US of these stations is defense operations. The radiolocation is employed throughout the Pacific. Primary aircraft radar test and pre-flight test or reentry vehicles transmitters. Many of the radars are capable of operating in the 5.6-5.925 GHz. The weather radars of the continental US and forecasting and weather radars having from 5.45 to 5.8 GHz. Army. The Army band is for radioloc

The non-Government Fixed Satellite Advisory Committee has investigated the following interactions.

- (a) Shipboard radars and fixed satellite in the bands 3.4-3.7 GHz.
(b) Troposcatter system and fixed satellite in the band 4.4-4.9 GHz.
(c) Radiolocation and fixed satellite.

Additional non-Government analysis of radiolocation was sharing with the fixed satellite service in the 3.4-3.7 GHz bands was submitted to a GWARC Ad Hoc committee in January 1977 (GRC 706-III). It is assumed that GRC-706-III supercedes all applicable analyses previously made by the Fixed Satellite Advisory Committee.

The Navy is also investigating the compatibility between the proposed fixed satellite and fixed services and Navy radars operating in the bands 3.4-3.7 GHz and 5.625-5.925 GHz. The Navy study is a Phase I (preliminary) study currently in the review stage. Based upon the initial results of the Phase I report sharing between countries (384, 391A) and fixed services and the radiolocation service may not be possible without restrictions. Phase II (more detailed) sharing analysis efforts have been initiated by the Navy. Previous studies by the non-Government

Generally, the non-Government analyses relied upon existing OCIB reports to evaluate the compatibility between services. Normally, an overall interference probability criteria of 0.01 percent was used. Coordination distances between ground based systems were based upon CCILC report 882.2. This report has the greatest coordination distance is the mode to be taken into account. The Phase I Navy and additional Government analyses are based upon a median (50%) probability criteria. The Federal Government analyses may be divided into two categories:
(a) Determination of a coordination distance between ground and/or air deployed systems.
(b) Whether or not a given INB criteria is exceeded for cases involving satellite interactions.

The coordination distance developed by the Federal Government analyses where DC=duty cycle of interference emission in dB. BW=ratio of the receiver 3-dB filter bandwidth BW_r and the 3-dB emission bandwidth BW_e of the interferer in dB.
BW = 10 log (BW_r / BW_e), BW_r > BW_e
BW = 0, BW_r <= BW_e

The coordination distance was then established by use of the smooth earth propagation model. Satellite Interactions. The satellite is stationary, thus interactions between the satellite and other services are evaluated by:
KMR = I - KTB (50)
Where I and KTB are as previously defined. I is the interference receive power in a reference bandwidth, dB. A test quantity can then be made to determine if the INB ratio exceeds the criteria.

Equipment Characteristics. The equipment characteristics used for the additional Federal Government analyses are given in table

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Table with columns for Agency and Equipment Characteristics. Rows include Airborne Radar, Shipboard Radar, Troposcatter System, Radiolocation, and Fixed Satellite.