

# **Spectrum Required for HF Broadcasting**

**James Washburn  
Gregory Hand  
Les Berry  
Jeanne Ratzloff**



**U.S. DEPARTMENT OF COMMERCE  
Robert A. Mosbacher, Secretary**

Janice Obuchowski, Assistant Secretary  
for Communications and Information

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## LIST OF ABBREVIATIONS AND SYMBOLS

BBR	Basic broadcast reliability
BIB	Board for International Broadcasting
CIRAF	Conference International Radiodiffusion Altos Frecuencias
dB	Decibel
DSB	Double-sideband
GGIR	Greatest group of incompatible requirements
HF	High-frequency
HFBC	High-frequency broadcasting conference
HFSUM	High-frequency spectrum use model
IFRB	International Frequency Registration Board
ITS	Institute for Telecommunication Sciences
ITU	International Telecommunication Union
J90	Designation for the June, 1990 high-frequency broadcast season
kHz	Kilohertz
MHz	Megahertz
NTIA	National Telecommunications and Information Administration
NTIS	National Technical Information Service
RFPR	Radio frequency protection ratio
rms	Root-mean-square
SSB	Single-sideband
SSN	Sunspot number
VOA	Voice of America
WARC	World Administrative Radio Conference

## GLOSSARY OF TERMS

Appropriate frequency band: The appropriate band for a requirement is the band which will ensure the continuity in the use of the same frequency during the longest possible period of operation, with the best possible values of BBR, taking into account of propagation conditions, operational limitations, and equipment availability and constraints.

Band types: Band types are assigned to a HF broadcast requirement based on a ratio of predicted to minimum usable field strengths at each test point in a service area. Band types are: type A (desirable); type B (good); type C (marginal); type D (poor).

BBR (Basic Broadcast Reliability): Probability for a service area that a specified performance is achieved in the presence of atmospheric noise, taking into account all transmitted frequencies.

dB (Decibel): A logarithmic unit used to express the magnitude of a change in level of power, voltage, current, or sound intensity (e.g.,  $dB = 20\log_{10}N$  for voltages).

Frequency hours: A measure of use of the HF broadcast bands equal to the summation of all broadcast hours in the band (e.g., one channel for one hour is one frequency hour).

GGIR (Greatest Group of Incompatible Requirements): The group of incompatible requirements, i.e. a set of requirements, each of which is incompatible with all other requirements in the set, with the largest number of members.

RFPR (Radio-frequency protection ratio): The ratio (expressed in dB) of the radio-frequency voltage of the wanted signal to that of the interfering signal(s), measured at the receiver input, required for satisfactory service.

Peak envelope power: The power rating for a SSB system with an attenuated or completely eliminated carrier.

Peak radiated power: The power rating for a DSB system when the carrier and both sidebands are in phase.

rms (Root-mean-square): The square root of the arithmetic mean of the squares of a set of numbers.

SSB suppressed carrier: A SSB system in which one sideband is eliminated and the carrier is suppressed to a desired level. The suppressed carrier is then used at the receiver for a reference.

GLOSSARY OF TERMS (continued)

Type-1 frequency continuity: Type-1 continuity is the continuity in the use of the same frequency within an hour or from one hour to the following hour for one requirement.



## EXECUTIVE SUMMARY

An analysis has been performed to estimate the minimum amount of spectrum required in the high-frequency (HF) bands for satisfying the worldwide broadcasting requirements defined in the International Frequency Registration Board's (IFRB) tentative HF broadcasting schedule for the J90 season. This analysis provides technical bases for the U.S. allocation proposals being developed in preparations for two World Administrative Radio Conferences (WARCs) to be held in 1992 and 1993. The first of these conferences (WARC-92) is a limited reallocation conference and will include considerations for reallocating spectrum for HF broadcasting (HFBC). The second conference (WARC HFBC-93) will consider adopting the proposed Improved HFBC Planning System for the spectrum allocated for HF broadcasting.

This study used the capabilities of the HF spectrum use model (HFSUM) developed by the Institute for Telecommunication Sciences (ITS) of the National Telecommunications and Information Administration (NTIA). HFSUM computed the minimum amount of spectrum required to assure specified levels of broadcast quality (e.g., signal-to-interference ratios of 27, 20, and 17 dB) for both the existing double-sideband (DSB) systems and the proposed compatible single-sideband (SSB) systems. HFSUM produced definitive results for the existing DSB systems; however, because of the proposed compatible SSB system's nonsymmetric power spectrum, HFSUM only produced upper and lower bounds (designated as SSB+ and SSB-) for the spectrum needs of these systems.

Three important results are obtained from this analysis of the J90 requirements when considering all HF bands. First, the DSB system needs approximately three to four times as much HF spectrum as that currently allocated to broadcasting. Second, the proposed compatible SSB system needs approximately two to three times the currently allocated spectrum. And third, there exists a significant likelihood that time-sharing of the HF bands between broadcast and nonbroadcast services is feasible on a noninterfering basis.



## SPECTRUM REQUIRED FOR HF BROADCASTING

J. Washburn, G. Hand, L. Berry, and J. Ratzloff<sup>1</sup>

The minimum amount of spectrum to satisfy worldwide broadcasting requirements in the high-frequency (HF) bands is estimated. This analysis provides technical bases for the U.S. allocation proposals being developed in preparations for the World Administrative Radio Conferences (WARCs) to be held in 1992 and 1993. The analysis applies the ITS-developed HF spectrum use model (HFSUM) software to compute the minimum number of channels to assure specified levels of broadcast quality for both the existing double-sideband (DSB) and the proposed compatible single-sideband (SSB) systems. HFSUM produces definitive results for the existing DSB systems and for the spectrum needs of the proposed compatible SSB systems. The results obtained in this analysis indicate that 1) the existing DSB system needs approximately three to four times as much HF spectrum as that currently allocated to broadcasting; 2) the proposed compatible SSB system needs approximately two to three times the currently allocated spectrum; and 3) there exists a good likelihood that time-sharing of the HF bands between broadcast and nonbroadcast services is feasible.

Key words: HFSUM; IFRB; likelihood estimates for time-sharing; limited reallocation WARC; minimum amount of HF spectrum required; WARC for HF broadcasting

### 1. INTRODUCTION

The International Telecommunication Union (ITU) has scheduled two World Administrative Radio Conferences (WARCs) for the near future. The first conference scheduled will consider allocating additional high-frequency (HF) spectrum to broadcasting, and the second conference scheduled will consider worldwide application of a proposed planning system for assigning frequencies to HF broadcasts. The first will be held in Spain beginning the first Monday in February, 1992 and continue for 30 days. It is referred to as WARC-92. The second will be held in Geneva, Switzerland

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<sup>1</sup> The authors are with the Institute for Telecommunication Sciences, National Telecommunications and Information Administration, U.S. Department of Commerce, Boulder, CO 80303-3328.

sometime during the first quarter of 1993. It is referred to as WARC HFBC-93. The WARCs for HF Broadcasting held in 1984 and 1987 will be referred to as WARC HFBC-84 and WARC HFBC-87, respectively.

The planning system referred to above is known as the Improved HFBC Planning System and will herein be referred to as the improved planning system. The principles for planning and technical standards used in this system were defined by the ITU (1984, 1987). WARC HFBC-87 did not adopt a previously-defined planning system (Washburn, J., et al. 1987) for global application, because of deficiencies in that system. Instead, WARC HFBC-87 clarified and augmented the technical standards for the planning system to guarantee each requirement a frequency, under normal circumstances, and to insure continuous operations of broadcasts on the assigned frequencies for a requirement's duration. Further consideration for adopting any planning system was postponed until the software for the improved planning system could be developed and tested by the International Frequency Registration Board (IFRB) and a WARC convened to consider allocating additional HF spectrum to broadcasting (i.e., WARC-92).

The National Telecommunications and Information Administration (NTIA), the Voice of America (VOA) and the Board for International Broadcasting (BIB) identified an urgent need to obtain estimates of the minimum amount of HF spectrum required and to estimate the potential for time-sharing this spectrum with nonbroadcast services. These estimates are required to provide technically-sound bases for the draft HF allocation proposals now under consideration as U.S. positions for WARC-92. BIB and VOA provided the funds to NTIA to conduct this study.

The Institute for Telecommunication Sciences (ITS) of NTIA has developed a computer model that emulates the IFRB's development of the improved planning system. The ITS model is called the high-frequency spectrum use model (HFSUM) (Rush, C., et al. 1988). The IFRB has not completed all the changes that the WARC HFBC-87 specified for the improved planning system, but enough system components exist at this time to undertake a minimum-amount-of-spectrum-required study, and a time-sharing-likelihood study. Consequently, to achieve this aim it has been proposed to obtain

estimates of required spectrum by using HFSUM to process the IFRB's tentative HF broadcasting schedule published for June, 1990 (J90). Also, these results are used to estimate the likelihood of time-sharing frequencies with nonbroadcast services.

This report describes the results of using HFSUM to make the minimum-amount-of-spectrum-required estimates and time-sharing potential using J90 data. Section 2 describes the study methodology including the assumptions, the technical standards used, the facts bearing on the study, and the methods used to obtain the solutions. Section 3 describes the results of estimating the minimum amount of spectrum required by applying the technical standards for the currently used double-sideband (DSB) system with 10 kHz channel spacing through HFSUM. This analysis includes estimating spectrum requirements for the cases with and without type-1 continuity (IFRB, 1989), and using co-channel radio frequency protection ratios (RFPR's) of 27 dB, 20 dB, and 17 dB.

Section 4 describes the results of applying HFSUM to estimate the minimum amount of spectrum needed when using the proposed compatible SSB system to satisfy the requirements defined in the J90 schedule. The applicable technical standards for this proposed system are defined in Appendix 45 of the ITU Radio Regulations (duplicated in Appendix D of this report). The specific relative RFPR's (which define the expected performance of the receiver) used in this study are shown in Figure 3. To compute the minimum spectrum needed, the following parameters were used: 1) the carrier is suppressed by 12 db; 2) the adjacent carriers are spaced at 5 kHz intervals; 3) frequency continuity of type-1 is applied; and 4) RFPR's of 27 dB, 20 dB, and 17 dB are used. Although the performance characteristics of the receiver defined in Figure 3 are used in this analysis, the study of compatible SSB systems uses the same propagation database as is used in study of DSB systems; therefore, all references in this report to compatible SSB systems will be understood to refer to a theoretical system rather than one that has actually been implemented. Also because of the nonsymmetric power spectrum exhibited by the proposed compatible SSB system and because the current version of HFSUM is limited to analysis of only symmetric power spectra, the study of compatible SSB systems

can only produce bounds on the spectrum needed. The methodologies used in defining these bounds are discussed in Section 4. Section 5 compares DSB results with those of the compatible SSB.

Section 6 describes the results of the likelihood estimates for time-sharing frequencies between HF broadcasters and nonbroadcast services. The techniques used are discussed, as well as the performance measures. The "free" areas, or channels and hours where the HF broadcast service could, in fact, share with nonbroadcast services on a noninterfering basis are plotted. In addition there is an analysis for estimating such time-sharing at 4 test points within the contiguous U.S. as well as 1 test point near Moscow in the USSR.

Section 7 is a discussion of the observations of the nature of the J90 data and the results of this study. Section 8 provides a reference list and the Appendices provide the intermediate computer results from which this study is based, and necessary reference material from ITU publications.

Several tables and figures in this report allude to "allocated spectrum." For our purposes, allocated spectrum shall include the spectrum currently allocated to the HF broadcasting service plus the expansion bands approved by the WARC-79 but not as yet implemented. The convention is to include these expansion bands where practical for comparison purposes.

## 2. TECHNICAL STANDARDS, PREPARATIONS, AND METHODS

This study will follow the technical standards specified in the ITU Radio Regulations, ITU(1984), ITU(1987), and IFRB(1989) insofar as they affect and pertain to the improved planning system and HFSUM.

The J90 tentative schedule was selected as the data set to determine the minimum amount of spectrum needed to satisfy HF broadcast requirements under the improved planning system. Elements of the tentative schedule are notifications for broadcasting and consist of the transmitter location, the frequency of transmission, the peak radiated power of the broadcast, its duration, other antenna data, and the designated service area. HF broadcast requirements, on the other hand, are of a more detailed and technical nature to allow for the planning aspects described in IFRB(1989). To complete the conversion of the notifications to requirements, the HF band of a notification's listed frequency is taken as the requirement's appropriate band.

Computer software developed by the European Broadcasting Union (EBU) (obtained from the EBU by Schroeder, N., VOA/E, private communication) was used to process the antenna information of each notification and convert it to one of the 25 standard antenna types specified in IFRB (1989). A check of the notifications for VOA's Greenville, North Carolina transmitter locations showed the antenna types deduced by the EBU software were adequate for the purposes of this test (Schroeder, N. and P. Goodwin, VOA/E, private communication).

The service areas specified in the notifications were the same as those needed for requirements, with one exception. When the service area was an entire country it was denoted by the ITU letter code for the country (e.g., B for Brazil) and indicated a national service. Computer software converted the country code to the corresponding CIRAF<sup>1</sup> test points (IFRB, 1989) falling within that country's political boundaries. With these changes the notifica-

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<sup>1</sup> CIRAF is an acronym for Conference International Radiodiffusion des Altos Frequencies.

tions for J90 were converted to requirements for J90, ready for input to HFSUM.

Figure 1 provides a flowchart of the steps by which HFSUM processed the requirements for J90. After the necessary steps to convert notifications to requirements, a propagation database was created using the WARC HFBC-84 propagation model (ITU, 1987). There are 7,121 requirements for J90 amounting to 29,275.5 frequency hours of broadcasting. There are 410 unique geographic locations used for the transmitters and 911 test points resulting in 373,510 circuits computed for the propagation database for each of 24 hours. The sunspot number (SSN) used was 160, the number specified on the cover of the J90 tentative schedule.



Spectrum Studies for HF Broadcasting  
Processing J90 Notifications using HFSUM

## FLOWCHART

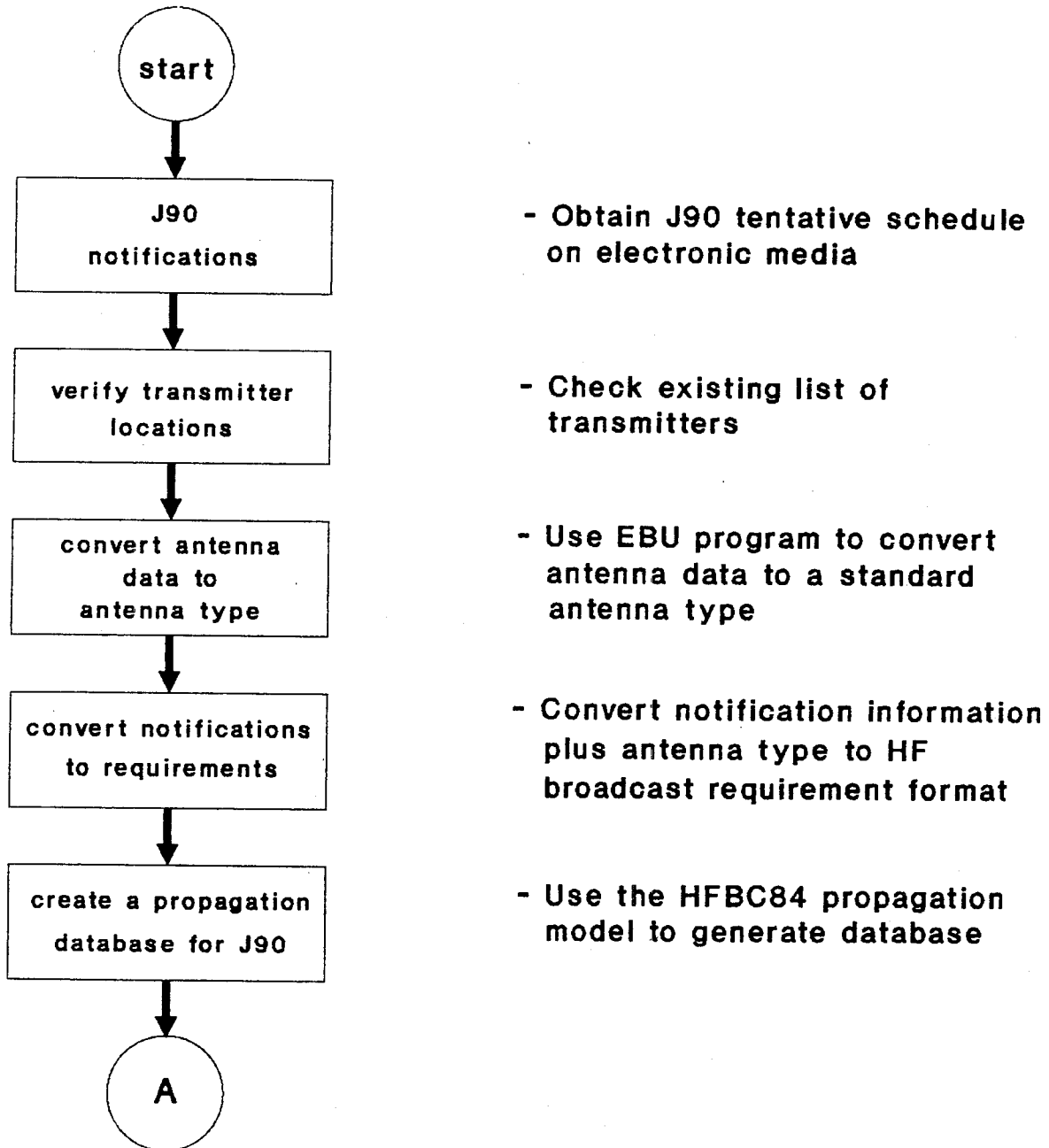


Figure 1. Flowchart of the method to determine the minimum amount of required HF spectrum for compatible operation of J90 requirements using HFSUM.

Spectrum Studies for HF Broadcasting  
Processing J90 Notifications using HFSUM

**FLOWCHART (continued)**

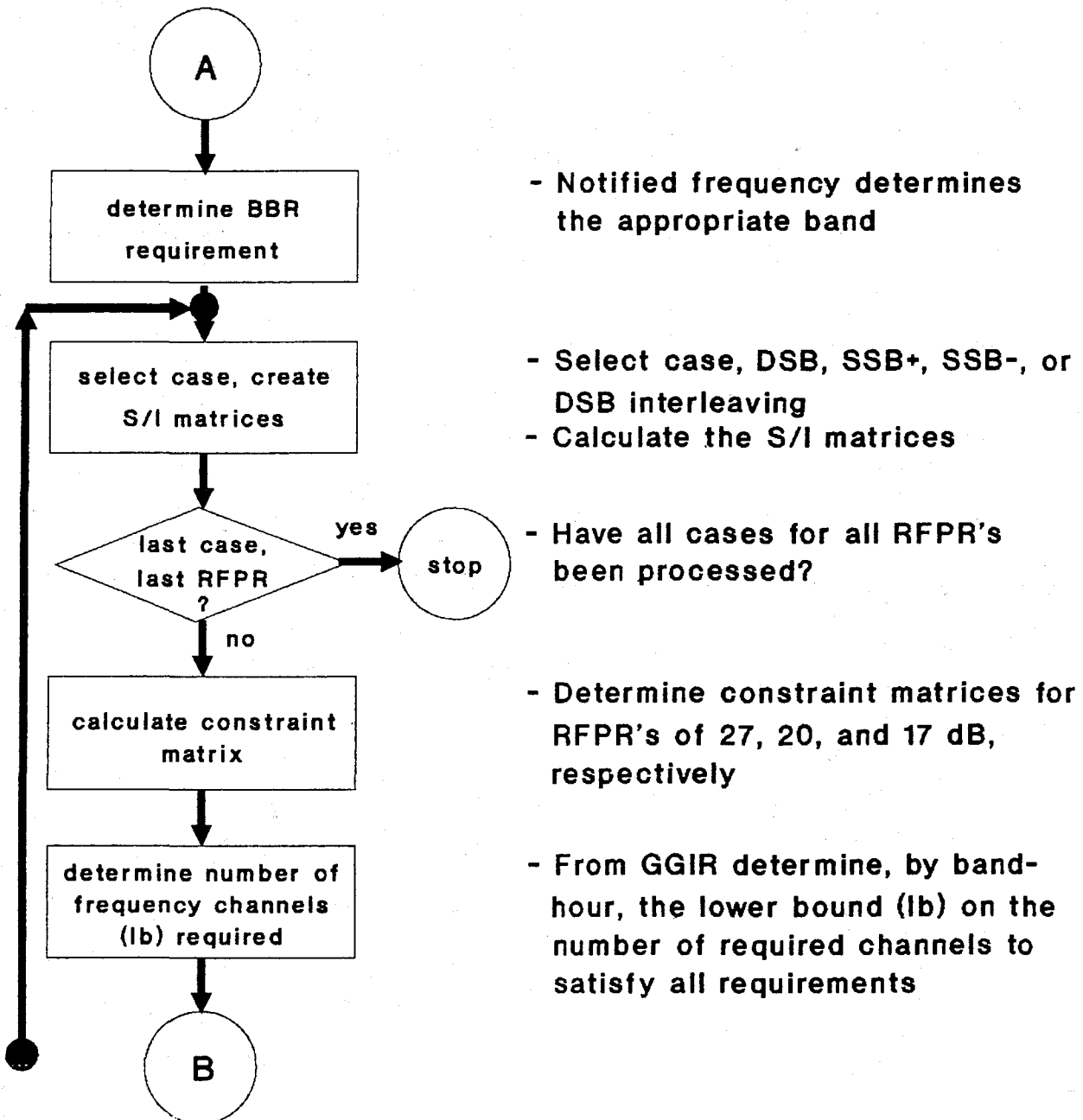


Figure 1 (continued). Flowchart of the method to determine the minimum amount of HF spectrum required for compatible operation of J90 requirements using HFSUM.

Spectrum Studies for HF Broadcasting  
Processing J90 Notifications using HFSUM

**FLOWCHART (continued)**

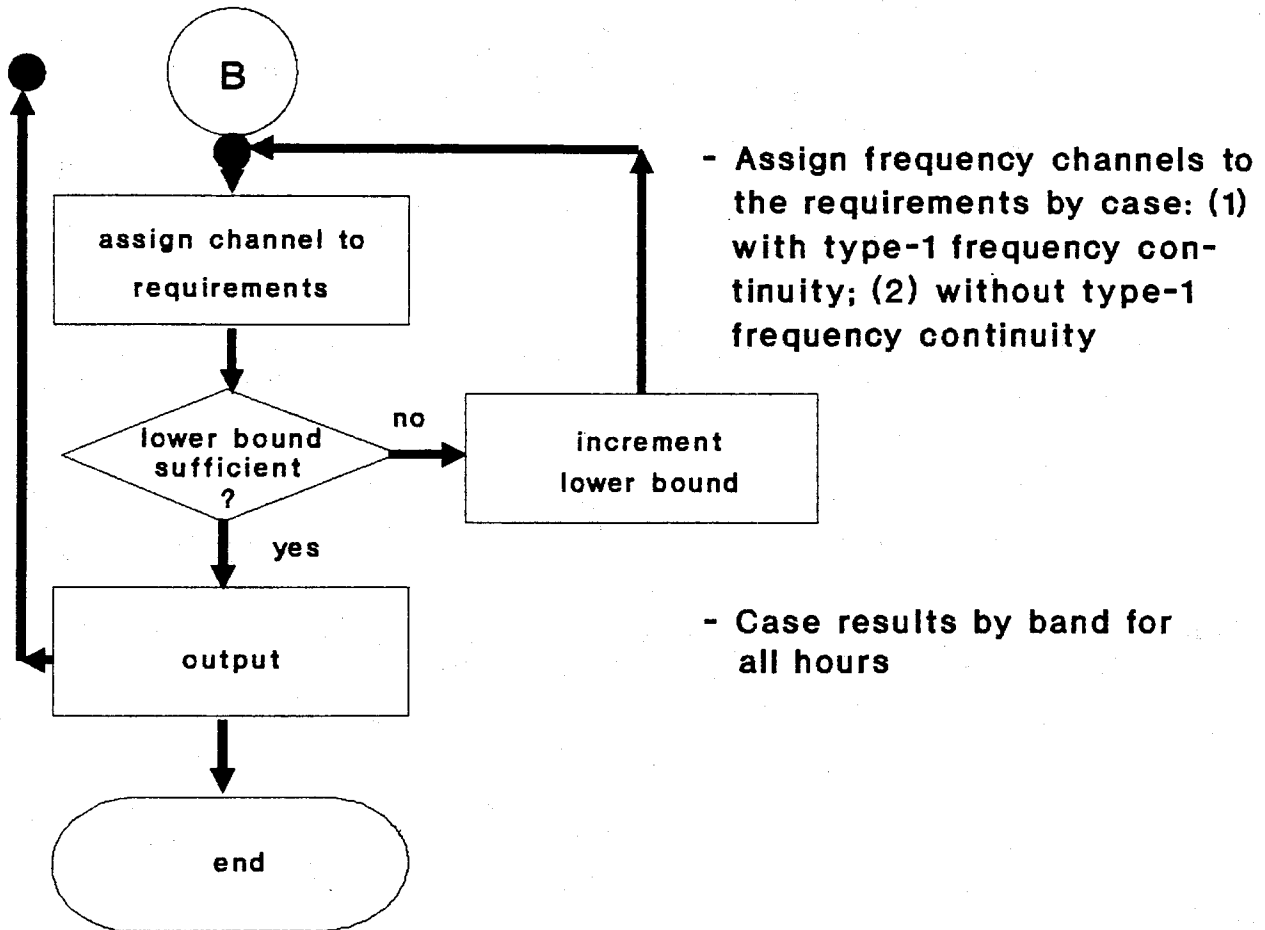


Figure 1 (continued). Flowchart of the method to determine the minimum amount of HF spectrum required for compatible operation of J90 requirements using HFSUM.

Once the propagation database was computed then the basic broadcast reliabilities (BBR) and band types (IFRB, 1989 or Washburn, J., et al. 1989) were analyzed. Figure 2 shows the results of this analysis. It is important to point out on this figure, that there are several notifications that have type B bands (IFRB, 1989), with BBR's less than 50%, and type C and D bands. This is apparent from the large number of requirement hours with BBR's less than 50% and indicates that notified service areas were not being adequately covered in the presence of atmospheric noise. This indicates that the frequency in the notification will not provide satisfactory service as defined by the improved planning system.

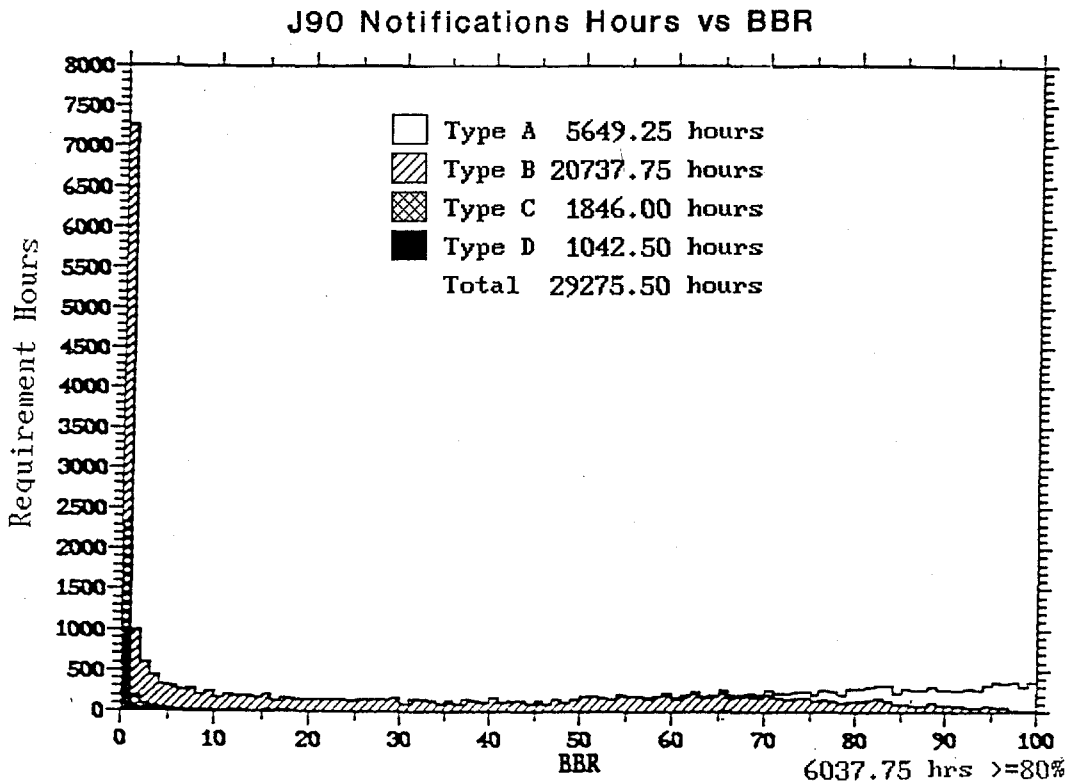
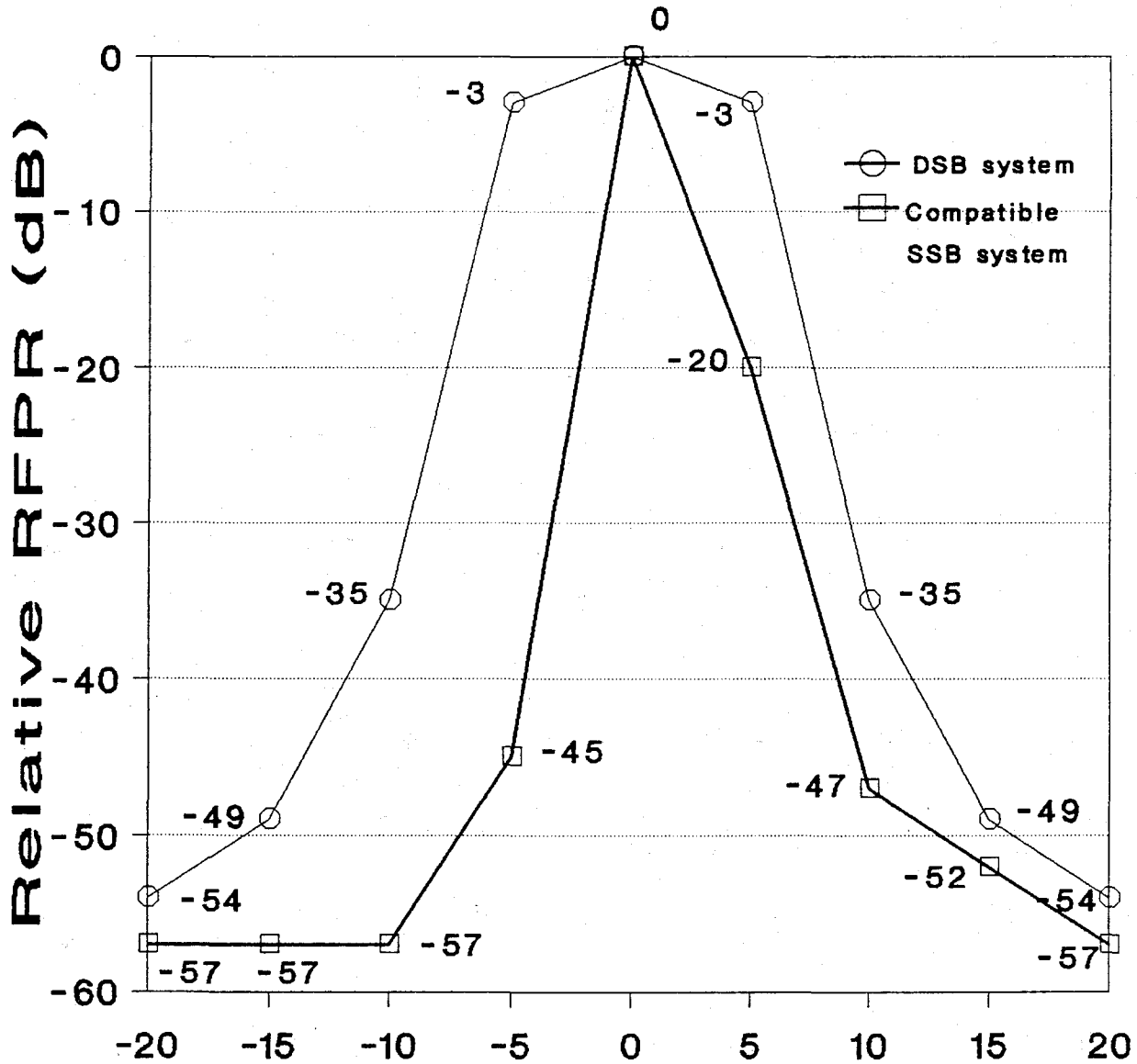


Figure 2. BBR analysis for J90 requirements.

The process continues as shown in Figure 1 by computing the signal-to-interference (S/I) matrices, one for each hour in each band (i.e., hour-band). For a S/I matrix each requirement is taken as wanted in its turn with all others considered as interferers. Once the S/I matrices have been computed a system is selected from the choice of DSB and two SSB systems (defined below). The system chosen determines the RFPR values used in creating the constraint matrices from the S/I matrices by hour-band (IFRB, 1989). The DSB system uses 10-kHz channel spacing and a relative first adjacent-channel RFPR of -35 dB as shown in Figure 3. The source material for the DSB relative RFPR's comes from ITU(1984) (Appendix F). The compatible SSB systems use 5-kHz channel spacing and the relative adjacent-channel RFPR's as shown in Figure 3. The source material for the compatible SSB relative RFPR's can be found in ITU(1987) and appears in Appendix E of this report. The SSB+ system uses -20 dB and -47 dB for the first and second adjacent-channel relative RFPR's, respectively, while the SSB- system uses -45 and -57 dB for these same RFPR's. The reason for processing the compatible SSB system using two sets of relative RFPR's is because HFSUM requires that the relative RFPR's be symmetric about the center frequency. This is not realistic for compatible SSB so the requirements are processed using first one compatible SSB system (SSB+) and then again, using the other (SSB-) knowing that the solution for the compatible SSB system would be bounded by the two results. An exact solution is impossible so SSB+ will be used for comparison purposes because it will yield results for the worst case, i.e., more required spectrum or channels to satisfy the requirements but less interference.

Spectrum Studies for HF Broadcasting  
 Relative RFPR values with reference to  
 the co-channel RFPR



△ F-Carrier Frequency Separation (kHz)

Figure 3. Relative RFPRs for HF broadcast systems.

From Figure 1, once the constraint matrices have been created for a given system, the greatest group of incompatible requirements (GGIR) (IFRB, 1989) is determined for each hour of each band. The GGIR consists of all requirements that are incompatible with each other. The number of members in this group represents a lower bound on the number of channels required to satisfy requirements in the constraint matrix being considered. We call this number R. The frequency assignment software processes the requirements in the hour-band to iteratively assign the requirements to R channels. If the algorithm succeeds, then for this hour-band we have the minimum number of channels to satisfy all the requirements. If not, R is redefined by incrementing it by 1 and the frequency algorithm again tries to assign all requirements to R channels. This iteration continues until all requirements are assigned a channel and the latest value for R is the number of channels required to satisfy all requirements for the hour-band under consideration.

This last process of assigning requirements to a channel includes the assignment of channels with and without type-1 frequency continuity. WARC HFBC-87 defined type-1 frequency continuity as "... continuity of use of the same frequency within an hour or from one hour to the following hour for one requirement." The improved planning system first assigns channels to the requirements in the most-congested hour. Thereafter, the hour count is incremented and channels are assigned to the requirements in the J90 schedule while providing type-1 continuity. This process continues until requirements for all 24 hours for the given band are assigned channels.

Assigning channels without the constraint of type-1 continuity started at hour 1 for the band under consideration and proceeded consecutively. It is interesting to note that the maximum number of channels will be associated with the most-congested hour. This implies that for either with or without type-1 frequency continuity the minimum number of required channels will be the same.

The results of the methods to determine the minimum amount of HF spectrum used to satisfy the J90 requirements under the various scenarios were then stored for analysis and printed out. The

printed results for the DSB study appear in Appendix A and those for the compatible SSB study appear in Appendix B.

Methods used to determine the likelihood estimates for time-sharing with nonbroadcast services are discussed in Section 6. Only the results of processing the J90 requirements are used in this study but the method is simple and easy to apply to any seasonal HF plan. The results can then be plotted in a grid, by HF band to show the availability of channel-hours for nonbroadcast services on a noninterfering basis. The results of this likelihood estimate study are in Appendix C.



### 3. ESTIMATES OF THE MINIMUM REQUIRED CHANNELS FOR DSB SYSTEMS

Following the methods described above the J90 requirements were processed for 10-kHz channel spacing, RFPR's of 27, 20, and 17 dB, and with and without type-1 frequency continuity. The full hour-band results appear in Appendix A. Table 1 provides a summary list of the channels needed to satisfy the J90 requirements by HF band for the most and least-congested hours for each RFPR used. For example, Table 1 shows, for the 6 MHz band, the most-congested hour needs 188 10-kHz channels to satisfy the requirements for a RFPR of 27 dB without the constraint of type-1 frequency continuity. The least-congested hour for this band and RFPR requires 39 10-kHz channels to satisfy its requirements. Further information can be found in Appendix A regarding the total number of requirements in the hour-bands, and the actual number of channels that were used for assignments.

Table 1 also displays the number of currently-allocated channels to the bands used exclusively by the HF broadcast services plus those bands designated as expansion bands for this same service by the WARC of 1979 (WARC-79). Since the number of channels required to satisfy requirements for the most-congested hour represents the maximum number of channels needed for any 24-hour period, this number can be used by spectrum planners as the minimum number of channels required to satisfy J90 requirements for a specific HF band. The results are independent of type-1 continuity because frequency continuity starts with the most congested hour in a given band. Thus, with or without type-1 frequency continuity, the minimum number of required channels is the number of required channels needed to satisfy the most congested hour for a given band. One can compare the minimum number of required channels by co-channel RFPR to the allocated channels and determine factors ranging from 3 to 4 for required channels over allocated channels.

Type-1 frequency continuity is an element of the technical standards for the improved planning system. The DSB minimum required channel study summarized in Table 1 establishes the fact that there are the same minimum number of channels with frequency

continuity as without, for a given frequency band. Therefore, no further consideration will be given in the analysis where type-1 frequency continuity is not applied.

Table 1. Minimum Number of required 10-kHz Channels to Satisfy J90 Requirements by HF Band and RFPR for Most and Least-Congested Hours

HF Band (MHz)	DSB						ALLOCATED CHANNELS*
	CO-CHANNEL		RFPR				
	27 dB	20 dB	20 dB	17 dB	17 dB		
	-----						
	CONGESTED HOUR						
	MOST	LEAST	MOST	LEAST	MOST	LEAST	
	(without type-1 continuity)						
6	188	39	154	29	138	27	25
7	157	21	131	18	120	18	20
9	208	58	185	48	172	45	40
11	217	64	188	51	180	50	40
13							20
15	211	87	192	78	180	72	50
17	122	49	107	40	96	35	35
21	94	13	82	12	74	11	40
26	9	1	6	1	6	1	43
	(with type-1 continuity)						
6	188	179	154	152	138	126	25
7	157	150	131	127	120	104	20
9	208	208	185	153	172	149	40
11	217	200	188	183	180	163	40
13							20
15	211	208	192	190	180	172	50
17	122	94	107	81	96	93	35
21	94	92	82	33	76	32	40
26	9	-	7	-	6	-	43

\* Allocated HF bands plus WARC-79 expansion bands

#### 4. ESTIMATES OF THE MINIMUM REQUIRED CHANNELS FOR SSB SYSTEMS

Following the methods described above, the J90 requirements were analyzed for a compatible SSB system with 5-kHz channel spacing, co-channel RFPR's of 27, 20, and 17 dB, with type-1 frequency continuity. The full hour-band results appear in Appendix B. Table 2 lists the minimum number of channels required by band for each RFPR used for SSB+ and SSB-. For example, Table 2 shows that for a co-channel RFPR of 27 dB the compatible SSB+ system required 211 5-kHz channels and the compatible SSB- system required 186 5-kHz channels. The true minimum number of channels lies somewhere between these two numbers. For purposes of discussion the values derived for the compatible SSB+ system will be used when comparing the compatible SSB system to the DSB system. This gives the worst case for the minimum number of required channels which provides the least amount of interference to requirements in the assigned channels. The comparative values shown in Table 2 are graphically displayed in Figure 4 along with the amount of spectrum allocated in each band. The required spectrum exceeds the allocated spectrum in all but the highest bands.

Table 2. Minimum Number of Required 5-kHz Channels to Satisfy J90 Requirements by HF Band and RFPR for the Most-Congested Hour

## Compatible SSB+ & SSB-

HF Band (MHz)	CO-CHANNEL RFPR				ALLOCATED CHANNELS*		
	27 dB	20 dB	17 dB	17 dB			
----- MOST CONGESTED HOUR -----							
	SSB+	SSB-	SSB+	SSB-	SSB+	SSB-	
	(with type-1 continuity)						
6	211	186	166	153	148	137	50
7	209	157	152	131	131	120	40
9	285	209	190	185	179	171	80
11	289	205	195	188	192	177	80
13							40
15	281	209	202	192	195	179	100
17	154	121	116	106	106	94	70
21	109	94	86	80	76	73	80
26	9	9	7	6	7	6	86

\* Allocated HF bands plus WARC-79 expansion bands

## Spectrum Studies for HF Broadcasting Required Spectrum for Compatible SSB+ and SSB- Systems for J90 Requirements

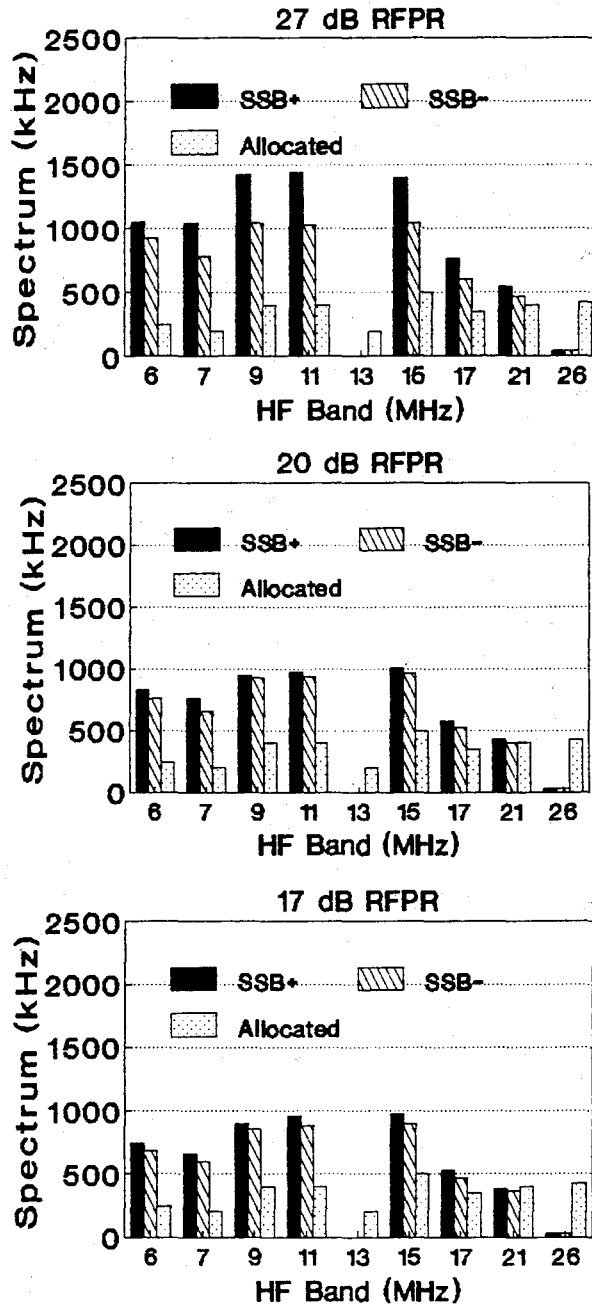


Figure 4. Comparison of the minimum amount of HF spectrum required by the compatible SSB+ and SSB- systems for operation of J90 requirements.

## 5. COMPARISON OF DSB AND SSB RESULTS

Table 3 provides a comparison between the DSB and SSB results. The values found in the Table assume type-1 frequency continuity and only the values for the compatible SSB+ are used as representing the compatible SSB system discussed in Section 2. Due to differences in channel size between the two systems the minimum number of channels is represented as a continuum of spectrum. The comparisons are in terms of kHz of spectrum. The comparative values for each RFPR and HF band are shown in Table 3 and are graphically displayed in Figure 5. The conclusion that is readily apparent, and expected, is that the compatible SSB requires less spectrum compared to DSB but more than is allocated.

Figure 6 is in three sections illustrating the system aggregates for minimum amount of spectrum for all bands, except the 21 and 26 Mhz bands, and all bands below 10 MHz. The ordinate scale for each chart is 27 MHz which represents the band width of the entire HF band. Figure 6a provides a summary of total minimum spectrum by system compared to the allocated spectrum. The approximate ratios of minimum amount of spectrum to allocated spectrum for DSB and compatible SSB systems are 4.0:1 and 2.5:1 for 27 dB co-channel RFPR; 3.3:1 and 1.8:1 for 20 dB RFPR; and 3.1:1 and 1.7:1 for 17 dB RFPR.

It was noted in Section 4 that the amount of spectrum required exceeds the allocated spectrum in all but the highest bands. Figure 6b shows a summary of the aggregates for all bands except the two highest bands. In this case the ratios of the minimum amount of spectrum to the allocated spectrum for DSB and compatible SSB systems are 5.1:1 and 3.1:1 for 27 dB co-channel RFPR; 4.2:1 and 2.2:1 for 20 dB RFPR; and 3.8:1 and 2.1:1 for 17 dB. The greater ratios indicate the 21 and 26 MHz bands were underused for J90, a high-sunspot season.

An analysis of aggregates would not be complete unless it included one of the minimum amount of spectrum required below 10 MHz. Figure 6c provides a summary of total spectrum by system compared to the allocated spectrum. Again, the approximate ratios of needed spectrum to allocated spectrum for DSB and compatible SSB

Table 3. Comparison Between DSB and Compatible SSB Systems for Required Spectrum (kHz) Using J90 Data

## DSB vs Compatible SSB

HF Band (MHz)	CO-CHANNEL RFPR						ALLOCATED SPECTRUM*
	27 dB		20 dB		17 dB		
	MOST CONGESTED HOUR						
	DSB	SSB+	DSB	SSB+	DSB	SSB+	
	(with type-1 continuity)						
6	1880	1055	1540	830	1380	740	250
7	1570	1045	1310	760	1200	655	200
9	2080	1425	1850	950	1720	895	400
11	2170	1445	1880	975	1800	960	400
13							200
15	2110	1405	1920	1010	1800	975	500
17	1220	770	1070	580	960	530	450
21	940	545	820	430	760	380	400
26	90	45	70	40	60	35	430

\* Allocated HF bands plus WARC-79 expansion bands



## Spectrum Studies for HF Broadcasting Required Spectrum for DSB and Compatible SSB Systems for J90 Requirements

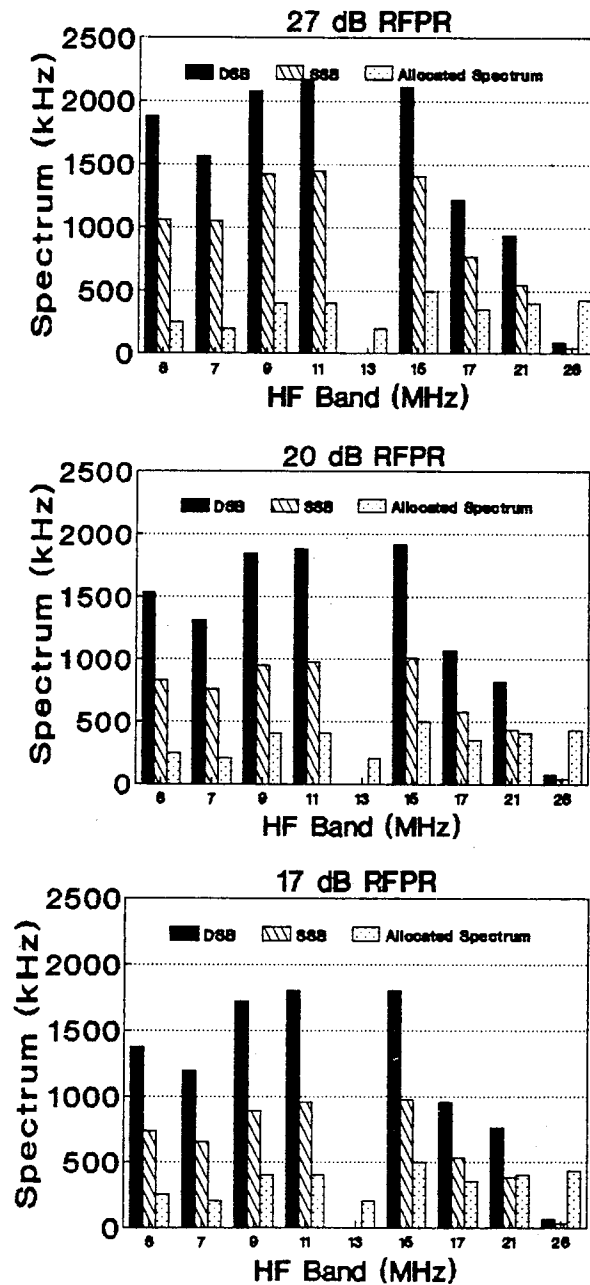


Figure 5. Comparison of the minimum amount of HF spectrum required by DSB and compatible SSB systems for operation of J90 requirements.

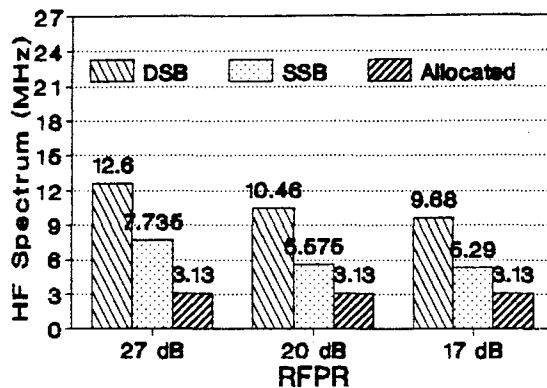


Figure 6a. Total minimum amount of HF spectrum required by HF broadcast systems for compatible operation of J90 requirements (all bands).

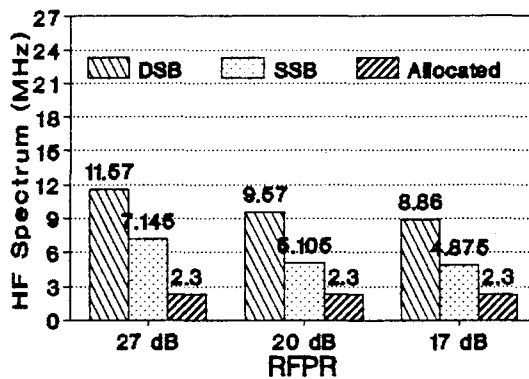


Figure 6b. Total minimum amount of HF spectrum required by HF broadcast systems for compatible operation of J90 requirements (21 and 26 MHz bands omitted).

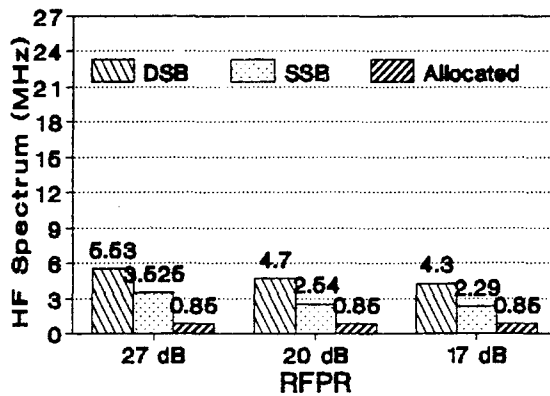


Figure 6c. Total minimum amount of HF spectrum required by HF broadcast systems for compatible operation of J90 requirements (bands below 10 MHz).

systems are 6.5:1 and 4.1:1 for 27 dB co-channel RFPR; 5.5:1 and 2.9:1 for 20 dB RFPR; and 5.0:1 and 2.7:1 for 17 dB. The demand for spectrum in the 6, 7, and 9 MHz bands is the reason for the greater ratios.

The ratios of DSB to SSB minimum amount of spectrum by RFPR from Figure 6a and 6b are approximately the same. This ratio is 1.6:1 for 27 dB RFPR; 1.9:1 for 20 dB; and 1.8:1 for 17 dB. The expected ratio of 2:1 was not reached, which demonstrates to broadcast planners how sensitive the SSB+ system is to the first-adjacent-channel RFPR. The value of -20 dB used in this report remains tentative until further verification occurs.

## 6. LIKELIHOOD ESTIMATES FOR TIME-SHARING

Once the minimum amounts of HF spectrum needed to satisfy the J90 requirements are established then it is possible to determine what parts of the HF broadcast spectrum could be available for time-sharing with nonbroadcast services on a noninterfering basis. The approach assumed only type-1 frequency continuity and was two-fold in nature. The first approach was to analyze the channel assignments versus the hours of operation on a global basis. If requirements are assigned channels for a given hour by band and RFPR, then that channel hour is occupied. If not, then that channel hour is not occupied and is a candidate for time-sharing with nonbroadcast services. Unoccupied channel hours will be referred to as "free" channel hours.

The second approach used to estimate the likelihood that HF broadcast spectrum is available for time-sharing was to concentrate on a geographic location or test point as defined by the IFRB-(1989). Since channels for this study were assigned on the basis of minimum number of channels needed to satisfy the J90 HF broadcast requirements under 3 different RFPRs, the results are presented by test point, RFPR, and HF band. Results are also presented in a grid format where slots, i.e., channel hours, are represented as occupied if the root-mean-square (rms) sum of all significant field strengths of requirements assigned to that slot and all significant field strengths of requirements in adjacent channel slots do not exceed  $E_{\min}$ .  $E_{\min}$  is a nominal value of field strength required for a signal to achieve "good" reception at a test point in a service area.  $E_{\min}$  is high enough to protect against the predicted median effects of atmospheric, man-made, and intrinsic receiver noise. If the rms value does not exceed  $E_{\min}$  for the particular channel hour then that slot is unoccupied and is represented as being free, a white space, in the grid. The white spaces are the candidates for time-sharing with nonbroadcast services on a noninterfering basis. Figure 7 shows the

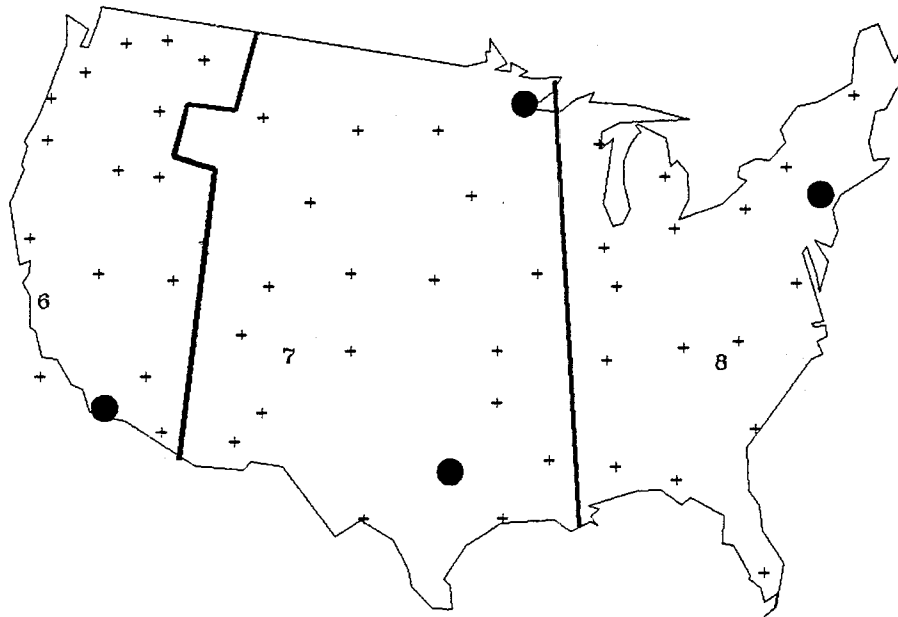


Figure 7. Distribution of test points for the contiguous United States showing the 4 points used for the time-sharing study.

distribution of test points in the CIRAF zones associated with the improved planning system for the contiguous United States. The 4 test points chosen for the time-sharing study are represented as filled dark circles. The test point associated with Moscow, USSR was used as a control or contrast to the results of the U.S. test points.

Appendix C provides a complete set of plots for this study depicting both approaches. The plots are grouped by co-channel RFPR. Each page represents the results for the given HF band. Six grids appear on a page with the channel assignment grid in the upper left-hand corner. The time-sharing likelihood grids associated with each test point fill the remainder of the page. Summary statistics are given showing the number of free spaces as well as the number of occupied spaces and the percentage of free spaces. Free space in the channel assignment grid means no requirement was assigned to that channel for that hour. Free space for the test points analyzed means occupancy is based on co- and adjacent channel assignments' combined signal strengths relative to the threshold  $E_{\min}$ . If  $E_{\min}$  is exceeded then the channel hour is occupied; otherwise, it is free.

Figure 8 provides a graphical representation of the percentage of time the HF band channels are free to be shared with nonbroadcast services on a noninterfering basis for the test points studied and, presumably, in the immediate geographical region about the test point. Table 4 provides the averages and standard deviations by HF band of the time periods for the potential for sharing HF broadcasting frequencies. The variability suggests that some channels are more occupied than others but there is a potential for sharing as stipulated even in heavily-targeted areas such as Moscow.

# Time-sharing Likelihood with Nonbroadcast Services At 5 CIRAF Test Point Locations

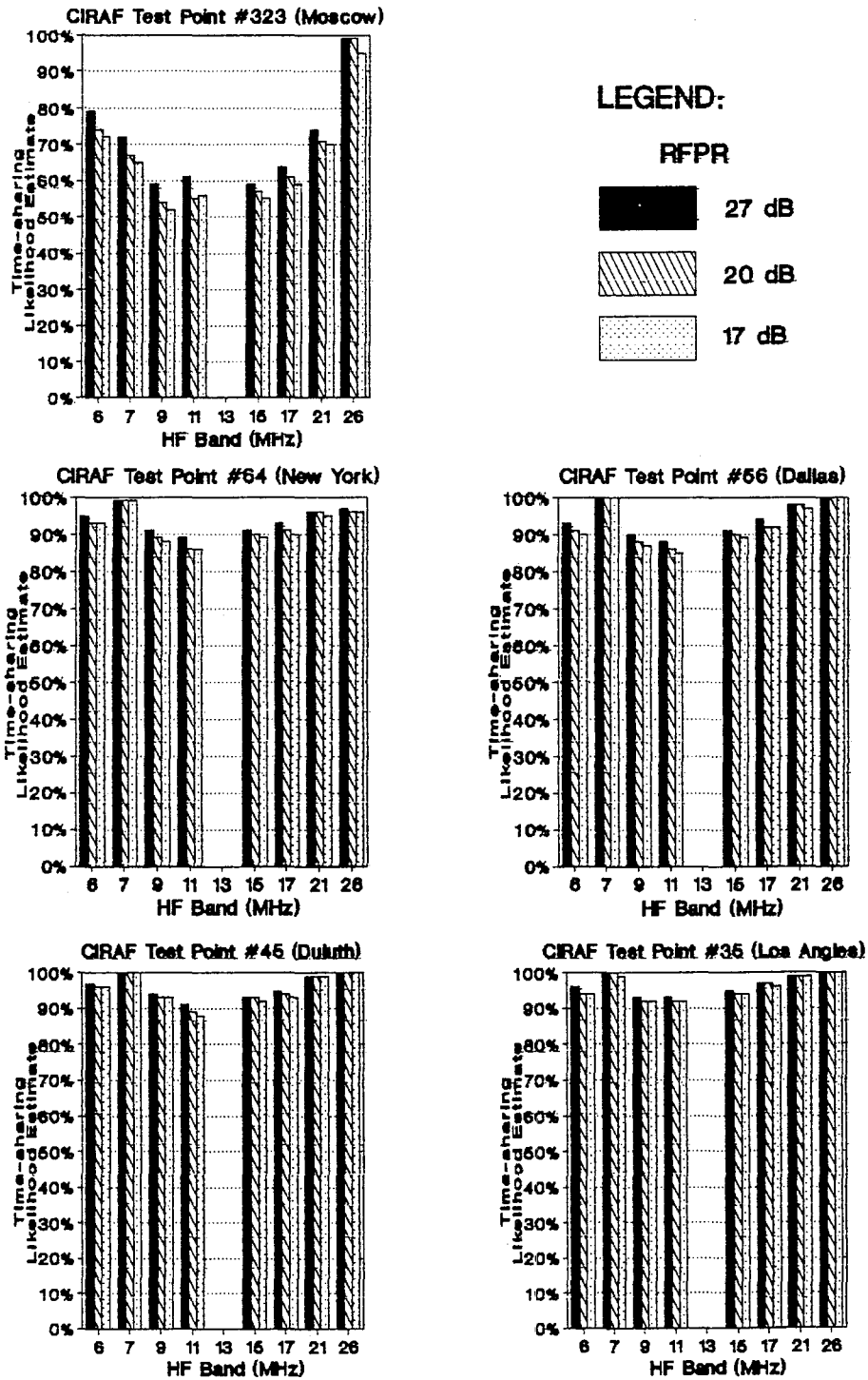


Figure 8. Comparison of likelihood estimates by test point.

Table 4. Averages and Standard Deviations (hours) of the Periods for Potential Use of HF Broadcasting Frequencies by Nonbroadcast Services at Selected Test Points

RFPR 27 dB

6 MHz		7 MHz		9 MHz		11 MHz		15 MHz		17 MHz		21 MHz		26 MHz		
22.1	4.3	23.8	1.5	19.1	7.4	18.8	7.5	20.7	6.1	22.8	3.9	23.8	.7	24.0	.0	= # 35 (Los Angeles)
22.9	3.4	24.0	.2	20.5	6.2	18.0	7.8	19.4	7.0	21.4	5.6	23.9	.6	24.0	.0	= # 45 (Duluth)
19.8	6.8	23.9	.3	17.9	7.8	16.8	8.3	18.2	7.6	20.3	6.7	22.8	3.7	24.0	.0	= # 56 (Dallas)
20.3	6.5	23.9	.6	18.5	7.3	17.1	8.0	17.7	8.0	19.2	7.3	23.1	1.7	23.3	1.3	= # 64 (New York)
12.3	8.4	11.8	8.6	7.9	6.9	8.1	7.2	7.3	7.2	8.3	7.4	11.7	8.2	23.7	.7	= #323 (Moscow)

RFPR 20 dB

6 MHz		7 MHz		9 MHz		11 MHz		15 MHz		17 MHz		21 MHz		26 MHz		
20.6	6.0	23.7	2.0	18.1	8.0	18.6	7.4	20.4	6.6	21.8	5.5	23.8	.8	24.0	.0	= # 35 (Los Angeles)
22.8	3.0	24.0	.2	19.9	6.6	17.1	8.1	19.2	7.3	20.3	6.8	23.8	.8	24.0	.0	= # 45 (Duluth)
18.6	7.4	23.7	2.0	16.1	8.6	15.7	8.4	18.2	7.6	19.3	7.5	22.6	3.9	24.0	.0	= # 56 (Dallas)
19.3	7.1	23.8	.7	17.5	7.7	16.0	8.6	17.1	8.2	17.3	8.4	21.7	5.1	20.3	7.7	= # 64 (New York)
11.1	8.0	10.4	8.1	7.2	6.5	7.1	6.2	7.4	7.1	7.9	7.3	12.1	8.3	23.7	.8	= #323 (Moscow)

RFPR 17 dB

6 MHz		7 MHz		9 MHz		11 MHz		15 MHz		17 MHz		21 MHz		26 MHz		
20.7	6.0	23.9	.4	17.4	8.4	17.6	8.1	20.1	7.0	21.1	6.2	23.4	2.6	24.0	.0	= # 35 (Los Angeles)
21.7	5.1	24.0	.2	19.8	6.7	15.9	8.6	18.0	8.0	19.2	7.3	23.8	.9	24.0	.0	= # 45 (Duluth)
17.8	7.9	23.9	.4	15.9	8.6	15.4	8.7	17.1	8.4	18.2	8.0	22.0	4.9	24.0	.0	= # 56 (Dallas)
19.0	7.2	23.4	2.9	16.6	8.3	15.6	8.5	15.6	8.8	16.9	8.4	19.7	7.1	19.7	8.1	= # 64 (New York)
10.1	7.9	10.1	7.9	7.1	6.7	7.7	6.7	7.0	7.1	7.5	6.9	11.1	8.5	19.6	8.5	= #323 (Moscow)



## 7. DISCUSSION

This study found answers to the following two related questions of concern in HF broadcast planning. First, what is the minimum spectrum required to satisfy a given set of HF broadcast requirements for varying RFPR's using a DSB system employing the technical standards of the improved planning system? Second, what is the likelihood of sharing this minimum amount of spectrum on a noninterfering basis with nonbroadcast services?

The solution to the first question was found by using the notifications for the J90 season, converting them to requirements and processing these using HFSUM according to the technical standards of the improved planning system. The final acts of WARC HFBC-87 specified a transition to SSB by the year 2016. HF broadcast planners are also interested in minimum spectrum requirements under a SSB system. Therefore, two studies were completed, both based on the technical standards defined by the ITU(1984, 1987).

The DSB system relative RFPR's have been before planners for a number of years and appear to be accepted values. The SSB system relative RFPR's have not been before planners very long and therefore are considered experimental, or tentative, for the purposes of this report. Nevertheless, the results of comparing the minimum spectrum required between the two systems are interesting and worthy of consideration by HF broadcast planners as they prepare for the conferences.

The answer to the second question (likelihood of time-sharing spectrum) is directly dependent on the answer to the first question (spectrum needs). The operation of only the existing DSB system was examined here in estimating the feasibility of broadcast and nonbroadcast services sharing given spectrum, however, the methodology used could readily be applied to the operation of the proposed compatible SSB systems as well.

The results presented in Appendix C indicate that there is a significant likelihood that time-sharing between broadcast and nonbroadcast services is feasible. But it must be noted that the results presented in Appendix C define the feasibility of time-

sharing in the "ideal case" where all of the needed spectrum is available. Should less than this total needed spectrum be available, then the likelihood of sharing this spectrum is reduced.

Conversely, when the assignments for broadcast operations are distributed across wider portions of the spectrum, increased opportunities (holes in the broadcast schedule) for time-sharing are produced. Therefore, increased allocations for broadcasting result in increased likelihood that the spectrum could be time-shared between broadcast and nonbroadcast services.

## 8. REFERENCES

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APPENDIX A: DATA FOR THE STUDY TO DETERMINE THE MINIMUM  
REQUIRED CHANNELS FOR DSB

Key:

DSB - Double-sideband.

RFPR - Co-channel radio frequency protection ratio.

Continuity - Type-1 frequency continuity means continuity of use of the same frequency within an hour or from one hour to the following hour for one requirement.

Frequency - One per HF band provides frequency at which the HF propagation predictions were made for the broadcast requirements in that band, and denotes the band.

fasHH.B - Frequency assignment file name for hour HH and band B.

NNN req - Number of requirements assigned channels for HH.B

UUU/MMM - UUU channels actually assigned in a span of MMM required channels.



DSB RFR=17dB Type-1 Continuity=No

Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
fas01.1	301 req	130/130 channels	fas01.2	107 req	49/ 49 channels	fas01.3	258 req	122/122 channels	fas01.4	235 req	125/125 channels
*fas02.1	302 req	138/138 channels	fas02.2	114 req	54/ 54 channels	fas02.3	267 req	125/125 channels	fas02.4	221 req	119/119 channels
fas03.1	334 req	128/128 channels	fas03.2	136 req	59/ 59 channels	fas03.3	292 req	132/132 channels	fas03.4	237 req	125/125 channels
fas04.1	324 req	89/ 89 channels	fas04.2	153 req	64/ 64 channels	fas04.3	283 req	104/104 channels	fas04.4	222 req	103/103 channels
fas05.1	315 req	75/ 75 channels	fas05.2	172 req	58/ 58 channels	fas05.3	296 req	102/102 channels	fas05.4	228 req	103/103 channels
fas06.1	261 req	60/ 60 channels	fas06.2	162 req	42/ 42 channels	fas06.3	266 req	79/ 79 channels	fas06.4	201 req	84/ 84 channels
fas07.1	211 req	36/ 36 channels	fas07.2	165 req	33/ 33 channels	fas07.3	226 req	68/ 68 channels	fas07.4	179 req	55/ 55 channels
fas08.1	185 req	27/ 27 channels	fas08.2	154 req	27/ 27 channels	fas08.3	217 req	59/ 59 channels	fas08.4	169 req	53/ 53 channels
fas09.1	203 req	40/ 40 channels	fas09.2	142 req	18/ 18 channels	fas09.3	222 req	46/ 46 channels	fas09.4	179 req	50/ 50 channels
fas10.1	232 req	51/ 51 channels	fas10.2	143 req	18/ 18 channels	fas10.3	230 req	45/ 45 channels	fas10.4	216 req	57/ 57 channels
fas11.1	280 req	48/ 48 channels	fas11.2	167 req	26/ 26 channels	fas11.3	243 req	60/ 60 channels	fas11.4	228 req	71/ 71 channels
fas12.1	338 req	61/ 61 channels	fas12.2	175 req	37/ 37 channels	fas12.3	271 req	79/ 79 channels	fas12.4	245 req	80/ 80 channels
fas13.1	338 req	72/ 72 channels	fas13.2	164 req	50/ 50 channels	fas13.3	283 req	75/ 75 channels	fas13.4	258 req	85/ 85 channels
fas14.1	363 req	84/ 84 channels	fas14.2	179 req	57/ 57 channels	fas14.3	286 req	85/ 85 channels	fas14.4	263 req	94/ 94 channels
fas15.1	349 req	73/ 73 channels	fas15.2	181 req	63/ 63 channels	fas15.3	286 req	84/ 84 channels	fas15.4	269 req	101/101 channels
fas16.1	344 req	58/ 58 channels	fas16.2	170 req	58/ 58 channels	fas16.3	286 req	98/ 98 channels	fas16.4	271 req	133/133 channels
fas17.1	329 req	69/ 69 channels	fas17.2	153 req	65/ 65 channels	fas17.3	278 req	129/129 channels	fas17.4	270 req	157/157 channels
fas18.1	311 req	113/113 channels	fas18.2	159 req	101/101 channels	fas18.3	286 req	169/169 channels	fas18.4	258 req	167/167 channels
fas19.1	300 req	123/123 channels	fas19.2	163 req	118/118 channels	*fas19.3	273 req	172/172 channels	*fas19.4	252 req	180/180 channels
fas20.1	298 req	123/123 channels	*fas20.2	175 req	120/120 channels	fas20.3	262 req	157/157 channels	fas20.4	250 req	173/173 channels
fas21.1	319 req	125/125 channels	fas21.2	170 req	115/115 channels	fas21.3	251 req	142/142 channels	fas21.4	239 req	158/158 channels
fas22.1	321 req	114/114 channels	fas22.2	152 req	95/ 95 channels	fas22.3	262 req	144/144 channels	fas22.4	249 req	155/155 channels
fas23.1	308 req	104/104 channels	fas23.2	121 req	64/ 64 channels	fas23.3	258 req	126/126 channels	fas23.4	240 req	141/141 channels
fas24.1	306 req	119/119 channels	fas24.2	115 req	54/ 54 channels	fas24.3	256 req	123/123 channels	fas24.4	248 req	130/130 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	107/107 channels	fas01.6	77 req	42/ 42 channels	fas01.7	19 req	14/ 14 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	84/ 84 channels	fas02.6	67 req	35/ 35 channels	fas02.7	17 req	14/ 14 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	84/ 84 channels	fas03.6	67 req	37/ 37 channels	fas03.7	20 req	16/ 16 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	82/ 82 channels	fas04.6	72 req	36/ 36 channels	fas04.7	22 req	15/ 15 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	84/ 84 channels	fas05.6	82 req	40/ 40 channels	fas05.7	32 req	21/ 21 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	95/ 95 channels	fas06.6	82 req	43/ 43 channels	fas06.7	43 req	30/ 30 channels	fas06.8	2 req	2/ 2 channels
fas07.5	174 req	87/ 87 channels	fas07.6	83 req	47/ 47 channels	fas07.7	65 req	42/ 42 channels	fas07.8	3 req	3/ 3 channels
fas08.5	173 req	76/ 76 channels	fas08.6	105 req	58/ 58 channels	fas08.7	87 req	54/ 54 channels	fas08.8	4 req	3/ 3 channels
fas09.5	173 req	72/ 72 channels	fas09.6	108 req	54/ 54 channels	fas09.7	93 req	57/ 57 channels	fas09.8	5 req	3/ 3 channels
fas10.5	195 req	74/ 74 channels	fas10.6	128 req	59/ 59 channels	fas10.7	102 req	56/ 56 channels	fas10.8	5 req	4/ 4 channels
fas11.5	208 req	82/ 82 channels	fas11.6	123 req	60/ 60 channels	fas11.7	102 req	59/ 59 channels	*fas11.8	9 req	6/ 6 channels
fas12.5	238 req	86/ 86 channels	fas12.6	145 req	70/ 70 channels	fas12.7	102 req	63/ 63 channels	fas12.8	8 req	5/ 5 channels
fas13.5	259 req	107/107 channels	fas13.6	142 req	75/ 75 channels	fas13.7	101 req	64/ 64 channels	*fas13.8	10 req	6/ 6 channels
fas14.5	270 req	121/121 channels	fas14.6	151 req	87/ 87 channels	*fas14.7	109 req	74/ 74 channels	fas14.8	8 req	5/ 5 channels
fas15.5	282 req	143/143 channels	fas15.6	148 req	95/ 95 channels	*fas15.7	102 req	74/ 74 channels	fas15.8	6 req	4/ 4 channels
fas16.5	261 req	155/155 channels	fas16.6	147 req	94/ 94 channels	fas16.7	78 req	55/ 55 channels	fas16.8	6 req	5/ 5 channels
fas17.5	271 req	176/176 channels	fas17.6	137 req	92/ 92 channels	fas17.7	80 req	63/ 63 channels	fas17.8	3 req	3/ 3 channels
fas18.5	247 req	165/165 channels	*fas18.6	127 req	96/ 96 channels	fas18.7	56 req	42/ 42 channels	fas18.8	4 req	3/ 3 channels
*fas19.5	254 req	180/180 channels	fas19.6	119 req	93/ 93 channels	fas19.7	46 req	36/ 36 channels	fas19.8	2 req	1/ 1 channels
fas20.5	235 req	164/164 channels	fas20.6	104 req	79/ 79 channels	fas20.7	40 req	36/ 36 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	150/150 channels	fas21.6	96 req	69/ 69 channels	fas21.7	35 req	32/ 32 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	151/151 channels	fas22.6	97 req	61/ 61 channels	fas22.7	25 req	22/ 22 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	126/126 channels	fas23.6	91 req	54/ 54 channels	fas23.7	14 req	11/ 11 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	114/114 channels	fas24.6	85 req	51/ 51 channels	fas24.7	14 req	12/ 12 channels	fas24.8	0 req	0/ 0 channels

DSB RFRP=20dB Type-1 Continuity=No

Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
fas01.1	301 req	141/141 channels	fas01.2	107 req	52/ 52 channels	fas01.3	258 req	139/139 channels	fas01.4	235 req	139/139 channels
*fas02.1	302 req	154/154 channels	fas02.2	114 req	56/ 56 channels	fas02.3	267 req	142/142 channels	fas02.4	221 req	131/131 channels
fas03.1	334 req	144/144 channels	fas03.2	136 req	62/ 62 channels	fas03.3	292 req	146/146 channels	fas03.4	237 req	140/140 channels
fas04.1	324 req	108/108 channels	fas04.2	153 req	68/ 68 channels	fas04.3	283 req	125/125 channels	fas04.4	222 req	120/120 channels
fas05.1	315 req	87/ 87 channels	fas05.2	172 req	60/ 60 channels	fas05.3	296 req	112/112 channels	fas05.4	228 req	113/113 channels
fas06.1	261 req	60/ 60 channels	fas06.2	162 req	46/ 46 channels	fas06.3	266 req	93/ 93 channels	fas06.4	201 req	89/ 89 channels
fas07.1	211 req	40/ 40 channels	fas07.2	165 req	34/ 34 channels	fas07.3	226 req	71/ 71 channels	fas07.4	179 req	62/ 62 channels
fas08.1	185 req	29/ 29 channels	fas08.2	154 req	27/ 27 channels	fas08.3	217 req	65/ 65 channels	fas08.4	169 req	56/ 56 channels
fas09.1	203 req	42/ 42 channels	fas09.2	142 req	18/ 18 channels	fas09.3	222 req	48/ 48 channels	fas09.4	179 req	51/ 51 channels
fas10.1	232 req	53/ 53 channels	fas10.2	143 req	18/ 18 channels	fas10.3	230 req	52/ 52 channels	fas10.4	216 req	61/ 61 channels
fas11.1	280 req	52/ 52 channels	fas11.2	167 req	28/ 28 channels	fas11.3	243 req	65/ 65 channels	fas11.4	228 req	79/ 79 channels
fas12.1	338 req	70/ 70 channels	fas12.2	175 req	43/ 43 channels	fas12.3	271 req	90/ 90 channels	fas12.4	245 req	88/ 88 channels
fas13.1	338 req	85/ 85 channels	fas13.2	164 req	56/ 56 channels	fas13.3	283 req	81/ 81 channels	fas13.4	258 req	93/ 93 channels
fas14.1	363 req	95/ 95 channels	fas14.2	179 req	68/ 68 channels	fas14.3	286 req	95/ 95 channels	fas14.4	263 req	100/100 channels
fas15.1	349 req	86/ 86 channels	fas15.2	181 req	70/ 70 channels	fas15.3	286 req	95/ 95 channels	fas15.4	269 req	113/113 channels
fas16.1	344 req	71/ 71 channels	fas16.2	170 req	66/ 66 channels	fas16.3	286 req	110/110 channels	fas16.4	271 req	142/142 channels
fas17.1	329 req	80/ 80 channels	fas17.2	153 req	75/ 75 channels	fas17.3	278 req	139/139 channels	fas17.4	270 req	167/167 channels
fas18.1	311 req	124/124 channels	fas18.2	159 req	113/113 channels	fas18.3	286 req	180/180 channels	fas18.4	258 req	176/176 channels
fas19.1	300 req	134/134 channels	fas19.2	163 req	129/129 channels	*fas19.3	273 req	185/185 channels	*fas19.4	252 req	188/188 channels
fas20.1	298 req	129/129 channels	*fas20.2	175 req	131/131 channels	fas20.3	262 req	174/174 channels	fas20.4	250 req	182/182 channels
fas21.1	319 req	133/133 channels	fas21.2	170 req	123/123 channels	fas21.3	251 req	162/162 channels	fas21.4	239 req	171/171 channels
fas22.1	321 req	121/121 channels	fas22.2	152 req	105/105 channels	fas22.3	262 req	165/165 channels	fas22.4	249 req	177/177 channels
fas23.1	308 req	115/115 channels	fas23.2	121 req	71/ 71 channels	fas23.3	258 req	147/147 channels	fas23.4	240 req	160/160 channels
fas24.1	306 req	131/131 channels	fas24.2	115 req	59/ 59 channels	fas24.3	256 req	141/141 channels	fas24.4	248 req	151/151 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	117/117 channels	fas01.6	77 req	47/ 47 channels	fas01.7	19 req	17/ 17 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	96/ 96 channels	fas02.6	67 req	41/ 41 channels	fas02.7	17 req	15/ 15 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	97/ 97 channels	fas03.6	67 req	40/ 40 channels	fas03.7	20 req	17/ 17 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	90/ 90 channels	fas04.6	72 req	42/ 42 channels	fas04.7	22 req	16/ 16 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	93/ 93 channels	fas05.6	82 req	44/ 44 channels	fas05.7	32 req	24/ 24 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	101/101 channels	fas06.6	82 req	48/ 48 channels	fas06.7	43 req	31/ 31 channels	fas06.8	2 req	2/ 2 channels
fas07.5	174 req	91/ 91 channels	fas07.6	83 req	49/ 49 channels	fas07.7	65 req	45/ 45 channels	fas07.8	3 req	3/ 3 channels
fas08.5	173 req	83/ 83 channels	fas08.6	105 req	62/ 62 channels	fas08.7	87 req	60/ 60 channels	fas08.8	4 req	3/ 3 channels
fas09.5	173 req	78/ 78 channels	fas09.6	108 req	60/ 60 channels	fas09.7	93 req	66/ 66 channels	fas09.8	5 req	4/ 4 channels
fas10.5	195 req	78/ 78 channels	fas10.6	128 req	66/ 66 channels	fas10.7	102 req	65/ 65 channels	fas10.8	5 req	4/ 4 channels
fas11.5	208 req	89/ 89 channels	fas11.6	123 req	66/ 66 channels	fas11.7	102 req	66/ 66 channels	*fas11.8	9 req	6/ 6 channels
fas12.5	238 req	90/ 90 channels	fas12.6	145 req	79/ 79 channels	fas12.7	102 req	71/ 71 channels	fas12.8	8 req	5/ 5 channels
fas13.5	259 req	111/111 channels	fas13.6	142 req	82/ 82 channels	fas13.7	101 req	74/ 74 channels	*fas13.8	10 req	6/ 6 channels
fas14.5	270 req	129/129 channels	fas14.6	151 req	97/ 97 channels	*fas14.7	109 req	82/ 82 channels	*fas14.8	8 req	6/ 6 channels
fas15.5	282 req	160/160 channels	fas15.6	148 req	104/104 channels	fas15.7	102 req	76/ 76 channels	fas15.8	6 req	5/ 5 channels
fas16.5	261 req	171/171 channels	*fas16.6	147 req	107/107 channels	fas16.7	78 req	61/ 61 channels	fas16.8	6 req	5/ 5 channels
fas17.5	271 req	190/190 channels	fas17.6	137 req	103/103 channels	fas17.7	80 req	66/ 66 channels	fas17.8	3 req	3/ 3 channels
fas18.5	247 req	180/180 channels	fas18.6	127 req	101/101 channels	fas18.7	56 req	42/ 42 channels	fas18.8	4 req	3/ 3 channels
*fas19.5	254 req	192/192 channels	fas19.6	119 req	99/ 99 channels	fas19.7	46 req	39/ 39 channels	fas19.8	2 req	1/ 1 channels
fas20.5	235 req	173/173 channels	fas20.6	104 req	85/ 85 channels	fas20.7	40 req	37/ 37 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	161/161 channels	fas21.6	96 req	73/ 73 channels	fas21.7	35 req	33/ 33 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	166/166 channels	fas22.6	97 req	70/ 70 channels	fas22.7	25 req	22/ 22 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	141/141 channels	fas23.6	91 req	59/ 59 channels	fas23.7	14 req	12/ 12 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	131/131 channels	fas24.6	85 req	55/ 55 channels	fas24.7	14 req	12/ 12 channels	fas24.8	0 req	0/ 0 channels



Frequency= 6.075 MHz

fas01.1	301 req	169/170 channels
fas02.1	302 req	186/187 channels
*fas03.1	334 req	187/188 channels
fas04.1	324 req	147/148 channels
fas05.1	315 req	124/124 channels
fas06.1	261 req	74/ 74 channels
fas07.1	211 req	49/ 49 channels
fas08.1	185 req	39/ 39 channels
fas09.1	203 req	45/ 45 channels
fas10.1	232 req	55/ 55 channels
fas11.1	280 req	66/ 66 channels
fas12.1	338 req	102/102 channels
fas13.1	338 req	102/102 channels
fas14.1	363 req	116/116 channels
fas15.1	349 req	107/107 channels
fas16.1	344 req	94/ 94 channels
fas17.1	329 req	105/105 channels
fas18.1	311 req	145/145 channels
fas19.1	300 req	154/154 channels
fas20.1	298 req	153/153 channels
fas21.1	319 req	166/166 channels
fas22.1	321 req	148/148 channels
fas23.1	308 req	151/151 channels
fas24.1	306 req	163/163 channels

Frequency= 7.200 MHz

fas01.2	107 req	64/ 64 channels
fas02.2	114 req	63/ 63 channels
fas03.2	136 req	74/ 74 channels
fas04.2	153 req	71/ 71 channels
fas05.2	172 req	67/ 67 channels
fas06.2	162 req	55/ 55 channels
fas07.2	165 req	40/ 40 channels
fas08.2	154 req	32/ 32 channels
fas09.2	142 req	22/ 22 channels
fas10.2	143 req	21/ 21 channels
fas11.2	167 req	38/ 38 channels
fas12.2	175 req	56/ 56 channels
fas13.2	164 req	69/ 69 channels
fas14.2	179 req	78/ 78 channels
fas15.2	181 req	81/ 81 channels
fas16.2	170 req	81/ 81 channels
fas17.2	153 req	94/ 94 channels
fas18.2	159 req	126/126 channels
fas19.2	163 req	148/149 channels
*fas20.2	175 req	157/157 channels
fas21.2	170 req	150/150 channels
fas22.2	152 req	135/135 channels
fas23.2	121 req	98/ 98 channels
fas24.2	115 req	72/ 72 channels

Frequency= 9.700 MHz

fas01.3	258 req	168/168 channels
fas02.3	267 req	166/166 channels
fas03.3	292 req	176/176 channels
fas04.3	283 req	156/156 channels
fas05.3	296 req	146/148 channels
fas06.3	266 req	105/105 channels
fas07.3	226 req	81/ 81 channels
fas08.3	217 req	69/ 69 channels
fas09.3	222 req	58/ 58 channels
fas10.3	230 req	69/ 69 channels
fas11.3	243 req	83/ 83 channels
fas12.3	271 req	113/113 channels
fas13.3	283 req	100/100 channels
fas14.3	286 req	115/115 channels
fas15.3	286 req	119/119 channels
fas16.3	286 req	134/135 channels
fas17.3	278 req	164/164 channels
fas18.3	286 req	202/202 channels
fas19.3	273 req	206/206 channels
fas20.3	262 req	196/196 channels
fas21.3	251 req	183/183 channels
*fas22.3	262 req	208/208 channels
fas23.3	258 req	189/189 channels
fas24.3	256 req	173/173 channels

Frequency=11.850 MHz

fas01.4	235 req	167/169 channels
fas02.4	221 req	152/152 channels
fas03.4	237 req	162/162 channels
fas04.4	222 req	146/148 channels
fas05.4	228 req	141/143 channels
fas06.4	201 req	106/106 channels
fas07.4	179 req	76/ 76 channels
fas08.4	169 req	69/ 69 channels
fas09.4	179 req	63/ 64 channels
fas10.4	216 req	76/ 76 channels
fas11.4	228 req	93/ 93 channels
fas12.4	245 req	109/109 channels
fas13.4	258 req	111/111 channels
fas14.4	263 req	111/111 channels
fas15.4	269 req	141/141 channels
fas16.4	271 req	167/167 channels
fas17.4	270 req	189/189 channels
fas18.4	258 req	192/192 channels
fas19.4	252 req	203/203 channels
fas20.4	250 req	200/200 channels
fas21.4	239 req	203/203 channels
*fas22.4	249 req	217/217 channels
fas23.4	240 req	195/195 channels
fas24.4	248 req	188/190 channels

Frequency=15.350 MHz

fas01.5	188 req	146/147 channels
fas02.5	161 req	121/121 channels
fas03.5	172 req	117/118 channels
fas04.5	167 req	115/115 channels
fas05.5	176 req	114/114 channels
fas06.5	181 req	115/115 channels
fas07.5	174 req	102/102 channels
fas08.5	173 req	95/ 95 channels
fas09.5	173 req	88/ 88 channels
fas10.5	195 req	87/ 87 channels
fas11.5	208 req	99/100 channels
fas12.5	238 req	112/112 channels
fas13.5	259 req	138/138 channels
fas14.5	270 req	162/162 channels
fas15.5	282 req	190/195 channels
fas16.5	261 req	189/189 channels
fas17.5	271 req	208/208 channels
fas18.5	247 req	194/194 channels
*fas19.5	254 req	211/211 channels
fas20.5	235 req	191/191 channels
fas21.5	211 req	179/179 channels
fas22.5	226 req	198/198 channels
fas23.5	208 req	165/165 channels
fas24.5	196 req	158/158 channels

Frequency=17.725 MHz

fas01.6	77 req	62/ 62 channels
fas02.6	67 req	55/ 55 channels
fas03.6	67 req	53/ 53 channels
fas04.6	72 req	49/ 49 channels
fas05.6	82 req	56/ 57 channels
fas06.6	82 req	57/ 57 channels
fas07.6	83 req	58/ 58 channels
fas08.6	105 req	70/ 70 channels
fas09.6	108 req	73/ 73 channels
fas10.6	128 req	81/ 81 channels
fas11.6	123 req	78/ 78 channels
fas12.6	145 req	93/ 93 channels
fas13.6	142 req	103/103 channels
fas14.6	151 req	114/114 channels
fas15.6	148 req	119/119 channels
*fas16.6	147 req	122/122 channels
fas17.6	137 req	116/116 channels
fas18.6	127 req	114/114 channels
fas19.6	119 req	108/108 channels
fas20.6	104 req	90/ 90 channels
fas21.6	96 req	83/ 84 channels
fas22.6	97 req	86/ 86 channels
fas23.6	91 req	75/ 76 channels
fas24.6	85 req	72/ 73 channels

Frequency=21.650 MHz

fas01.7	19 req	19/ 19 channels
fas02.7	17 req	17/ 17 channels
fas03.7	20 req	19/ 19 channels
fas04.7	22 req	18/ 18 channels
fas05.7	32 req	28/ 28 channels
fas06.7	43 req	35/ 35 channels
fas07.7	65 req	54/ 54 channels
fas08.7	87 req	75/ 75 channels
fas09.7	93 req	81/ 81 channels
fas10.7	102 req	86/ 86 channels
fas11.7	102 req	86/ 86 channels
fas12.7	102 req	88/ 88 channels
fas13.7	101 req	86/ 86 channels
*fas14.7	109 req	94/ 94 channels
fas15.7	102 req	88/ 88 channels
fas16.7	78 req	69/ 69 channels
fas17.7	80 req	72/ 72 channels
fas18.7	56 req	51/ 51 channels
fas19.7	46 req	43/ 43 channels
fas20.7	40 req	38/ 38 channels
fas21.7	35 req	33/ 33 channels
fas22.7	25 req	24/ 24 channels
fas23.7	14 req	13/ 13 channels
fas24.7	14 req	14/ 14 channels

Frequency=25.885 MHz

fas01.8	0 req	0/ 0 channels
fas02.8	0 req	0/ 0 channels
fas03.8	0 req	0/ 0 channels
fas04.8	0 req	0/ 0 channels
fas05.8	0 req	0/ 0 channels
fas06.8	2 req	2/ 3 channels
fas07.8	3 req	3/ 4 channels
fas08.8	4 req	4/ 4 channels
fas09.8	5 req	5/ 5 channels
fas10.8	5 req	5/ 5 channels
fas11.8	9 req	8/ 8 channels
fas12.8	8 req	8/ 8 channels
*fas13.8	10 req	9/ 9 channels
fas14.8	8 req	7/ 7 channels
fas15.8	6 req	5/ 5 channels
fas16.8	6 req	6/ 6 channels
fas17.8	3 req	3/ 3 channels
fas18.8	4 req	3/ 4 channels
fas19.8	2 req	1/ 1 channels
fas20.8	1 req	1/ 1 channels
fas21.8	1 req	1/ 1 channels
fas22.8	1 req	1/ 1 channels
fas23.8	1 req	1/ 1 channels
fas24.8	0 req	0/ 0 channels

Frequency= 6.075 MHz

*fas01.1	301 req	132/138 channels
*fas02.1	302 req	138/138 channels
*fas03.1	334 req	138/138 channels
*fas04.1	324 req	118/138 channels
*fas05.1	315 req	111/138 channels
fas06.1	261 req	94/137 channels
fas07.1	211 req	71/137 channels
fas08.1	185 req	64/137 channels
fas09.1	203 req	70/137 channels
fas10.1	232 req	72/137 channels
fas11.1	280 req	72/137 channels
fas12.1	338 req	90/137 channels
fas13.1	338 req	91/137 channels
fas14.1	363 req	91/127 channels
fas15.1	349 req	91/127 channels
fas16.1	344 req	90/126 channels
fas17.1	329 req	91/126 channels
fas18.1	311 req	112/126 channels
fas19.1	300 req	121/126 channels
fas20.1	298 req	123/129 channels
fas21.1	319 req	125/129 channels
*fas22.1	321 req	126/138 channels
*fas23.1	308 req	123/138 channels
*fas24.1	306 req	124/138 channels

Frequency= 7.200 MHz

fas01.2	107 req	56/104 channels
fas02.2	114 req	56/104 channels
fas03.2	136 req	65/114 channels
fas04.2	153 req	69/114 channels
fas05.2	172 req	69/114 channels
fas06.2	162 req	60/114 channels
fas07.2	165 req	59/114 channels
fas08.2	154 req	55/114 channels
fas09.2	142 req	51/114 channels
fas10.2	143 req	49/114 channels
fas11.2	167 req	54/114 channels
*fas12.2	175 req	60/120 channels
*fas13.2	164 req	62/120 channels
*fas14.2	179 req	69/120 channels
*fas15.2	181 req	72/120 channels
*fas16.2	170 req	81/120 channels
*fas17.2	153 req	82/120 channels
*fas18.2	159 req	101/120 channels
*fas19.2	163 req	110/120 channels
*fas20.2	175 req	120/120 channels
fas21.2	170 req	113/119 channels
fas22.2	152 req	95/119 channels
fas23.2	121 req	70/118 channels
fas24.2	115 req	63/107 channels

Frequency= 9.700 MHz

fas01.3	258 req	128/149 channels
fas02.3	267 req	127/149 channels
fas03.3	292 req	137/149 channels
fas04.3	283 req	129/149 channels
fas05.3	296 req	123/157 channels
fas06.3	266 req	104/157 channels
fas07.3	226 req	87/157 channels
fas08.3	217 req	79/157 channels
fas09.3	222 req	71/157 channels
fas10.3	230 req	71/157 channels
fas11.3	243 req	71/157 channels
fas12.3	271 req	85/157 channels
fas13.3	283 req	97/157 channels
fas14.3	286 req	94/157 channels
fas15.3	286 req	103/165 channels
*fas16.3	286 req	118/172 channels
*fas17.3	278 req	134/172 channels
*fas18.3	286 req	152/172 channels
*fas19.3	273 req	172/172 channels
fas20.3	262 req	163/171 channels
fas21.3	251 req	157/171 channels
fas22.3	262 req	156/168 channels
fas23.3	258 req	138/167 channels
fas24.3	256 req	130/167 channels

Frequency=11.850 MHz

fas01.4	235 req	140/165 channels
fas02.4	221 req	134/165 channels
fas03.4	237 req	137/165 channels
fas04.4	222 req	126/165 channels
fas05.4	228 req	124/163 channels
fas06.4	201 req	105/163 channels
fas07.4	179 req	86/163 channels
fas08.4	169 req	79/163 channels
fas09.4	179 req	75/163 channels
fas10.4	216 req	77/163 channels
fas11.4	228 req	84/163 channels
fas12.4	245 req	95/163 channels
fas13.4	258 req	99/165 channels
fas14.4	263 req	99/165 channels
fas15.4	269 req	115/174 channels
fas16.4	271 req	133/174 channels
*fas17.4	270 req	153/180 channels
*fas18.4	258 req	161/180 channels
*fas19.4	252 req	180/180 channels
*fas20.4	250 req	174/180 channels
fas21.4	239 req	166/179 channels
fas22.4	249 req	163/173 channels
fas23.4	240 req	149/171 channels
fas24.4	248 req	148/165 channels

Frequency=15.350 MHz

fas01.5	188 req	116/172 channels
fas02.5	161 req	103/172 channels
fas03.5	172 req	104/172 channels
fas04.5	167 req	99/172 channels
fas05.5	176 req	100/172 channels
fas06.5	181 req	108/172 channels
fas07.5	174 req	99/172 channels
fas08.5	173 req	95/172 channels
fas09.5	173 req	90/172 channels
*fas10.5	195 req	91/180 channels
*fas11.5	208 req	101/180 channels
*fas12.5	238 req	103/180 channels
*fas13.5	259 req	119/180 channels
*fas14.5	270 req	135/180 channels
*fas15.5	282 req	150/180 channels
*fas16.5	261 req	153/180 channels
*fas17.5	271 req	165/180 channels
*fas18.5	247 req	166/180 channels
*fas19.5	254 req	180/180 channels
*fas20.5	235 req	165/180 channels
fas21.5	211 req	149/179 channels
fas22.5	226 req	153/179 channels
fas23.5	208 req	131/176 channels
fas24.5	196 req	125/172 channels

Frequency=17.725 MHz

fas01.6	77 req	52/ 93 channels
fas02.6	67 req	47/ 93 channels
fas03.6	67 req	46/ 93 channels
fas04.6	72 req	43/ 93 channels
fas05.6	82 req	50/ 93 channels
fas06.6	82 req	48/ 93 channels
fas07.6	83 req	50/ 93 channels
fas08.6	105 req	61/ 93 channels
fas09.6	108 req	59/ 93 channels
fas10.6	128 req	64/ 93 channels
fas11.6	123 req	64/ 93 channels
fas12.6	145 req	76/ 93 channels
fas13.6	142 req	80/ 93 channels
fas14.6	151 req	85/ 93 channels
*fas15.6	148 req	92/ 96 channels
*fas16.6	147 req	91/ 96 channels
*fas17.6	137 req	94/ 96 channels
*fas18.6	127 req	96/ 96 channels
*fas19.6	119 req	95/ 96 channels
fas20.6	104 req	78/ 95 channels
fas21.6	96 req	70/ 95 channels
fas22.6	97 req	70/ 95 channels
fas23.6	91 req	58/ 95 channels
fas24.6	85 req	55/ 93 channels

Frequency=21.650 MHz

fas01.7	19 req	15/ 32 channels
fas02.7	17 req	15/ 32 channels
fas03.7	20 req	17/ 32 channels
fas04.7	22 req	16/ 32 channels
fas05.7	32 req	22/ 34 channels
fas06.7	43 req	29/ 56 channels
fas07.7	65 req	43/ 71 channels
fas08.7	87 req	58/ 72 channels
fas09.7	93 req	63/ 72 channels
fas10.7	102 req	64/ 74 channels
fas11.7	102 req	64/ 74 channels
fas12.7	102 req	61/ 74 channels
fas13.7	101 req	65/ 74 channels
fas14.7	109 req	74/ 74 channels
*fas15.7	102 req	76/ 76 channels
fas16.7	78 req	58/ 75 channels
fas17.7	80 req	65/ 75 channels
fas18.7	56 req	45/ 71 channels
fas19.7	46 req	39/ 65 channels
fas20.7	40 req	36/ 64 channels
fas21.7	35 req	32/ 64 channels
fas22.7	25 req	22/ 39 channels
fas23.7	14 req	12/ 39 channels
fas24.7	14 req	13/ 39 channels

Frequency=25.885 MHz

fas01.8	0 req	0/ 0 channels
fas02.8	0 req	0/ 0 channels
fas03.8	0 req	0/ 0 channels
fas04.8	0 req	0/ 0 channels
fas05.8	0 req	0/ 0 channels
fas06.8	2 req	2/ 5 channels
fas07.8	3 req	3/ 5 channels
fas08.8	4 req	3/ 5 channels
fas09.8	5 req	3/ 5 channels
*fas10.8	5 req	4/ 6 channels
*fas11.8	9 req	6/ 6 channels
*fas12.8	8 req	6/ 6 channels
*fas13.8	10 req	6/ 6 channels
*fas14.8	8 req	5/ 6 channels
*fas15.8	6 req	5/ 6 channels
*fas16.8	6 req	5/ 6 channels
fas17.8	3 req	3/ 3 channels
fas18.8	4 req	3/ 3 channels
fas19.8	2 req	2/ 2 channels
fas20.8	1 req	1/ 1 channels
fas21.8	1 req	1/ 1 channels
fas22.8	1 req	1/ 1 channels
fas23.8	1 req	1/ 1 channels
fas24.8	0 req	0/ 0 channels

DSB RFPR=20dB Type-1 Continuity=Yes

Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
*fas01.1	301 req	147/154 channels	fas01.2	107 req	63/127 channels	fas01.3	258 req	142/159 channels	fas01.4	235 req	157/185 channels
*fas02.1	302 req	154/154 channels	fas02.2	114 req	63/127 channels	fas02.3	267 req	143/159 channels	fas02.4	221 req	149/185 channels
fas03.1	334 req	153/153 channels	fas03.2	136 req	72/127 channels	fas03.3	292 req	154/159 channels	fas03.4	237 req	153/185 channels
fas04.1	324 req	135/153 channels	*fas04.2	153 req	74/131 channels	fas04.3	283 req	142/159 channels	fas04.4	222 req	141/185 channels
fas05.1	315 req	124/152 channels	*fas05.2	172 req	72/131 channels	fas05.3	296 req	132/159 channels	fas05.4	228 req	139/185 channels
fas06.1	261 req	97/152 channels	*fas06.2	162 req	67/131 channels	fas06.3	266 req	114/159 channels	fas06.4	201 req	118/185 channels
fas07.1	211 req	73/152 channels	*fas07.2	165 req	64/131 channels	fas07.3	226 req	94/159 channels	fas07.4	179 req	92/185 channels
fas08.1	185 req	64/152 channels	*fas08.2	154 req	62/131 channels	fas08.3	217 req	87/159 channels	fas08.4	169 req	82/185 channels
fas09.1	203 req	70/152 channels	*fas09.2	142 req	58/131 channels	fas09.3	222 req	80/159 channels	fas09.4	179 req	78/185 channels
fas10.1	232 req	68/152 channels	*fas10.2	143 req	55/131 channels	fas10.3	230 req	76/153 channels	fas10.4	216 req	80/185 channels
fas11.1	280 req	74/152 channels	*fas11.2	167 req	60/131 channels	fas11.3	243 req	79/153 channels	fas11.4	228 req	84/185 channels
fas12.1	338 req	94/152 channels	*fas12.2	175 req	63/131 channels	fas12.3	271 req	98/175 channels	fas12.4	245 req	100/185 channels
fas13.1	338 req	97/152 channels	*fas13.2	164 req	68/131 channels	fas13.3	283 req	100/178 channels	fas13.4	258 req	106/185 channels
fas14.1	363 req	101/152 channels	*fas14.2	179 req	73/131 channels	fas14.3	286 req	106/178 channels	fas14.4	263 req	110/185 channels
fas15.1	349 req	99/152 channels	*fas15.2	181 req	74/131 channels	*fas15.3	286 req	114/185 channels	fas15.4	269 req	125/185 channels
fas16.1	344 req	96/152 channels	*fas16.2	170 req	85/131 channels	*fas16.3	286 req	127/185 channels	fas16.4	271 req	147/185 channels
fas17.1	329 req	99/152 channels	*fas17.2	153 req	89/131 channels	*fas17.3	278 req	147/185 channels	*fas17.4	270 req	165/188 channels
fas18.1	311 req	113/152 channels	*fas18.2	159 req	109/131 channels	*fas18.3	286 req	164/185 channels	*fas18.4	258 req	171/188 channels
fas19.1	300 req	124/152 channels	*fas19.2	163 req	122/131 channels	*fas19.3	273 req	185/185 channels	*fas19.4	252 req	188/188 channels
fas20.1	298 req	126/152 channels	*fas20.2	175 req	131/131 channels	*fas20.3	262 req	177/185 channels	fas20.4	250 req	184/187 channels
fas21.1	319 req	128/152 channels	*fas21.2	170 req	127/131 channels	*fas21.3	251 req	165/185 channels	fas21.4	239 req	175/187 channels
fas22.1	321 req	130/152 channels	*fas22.2	152 req	111/131 channels	fas22.3	262 req	167/181 channels	fas22.4	249 req	184/184 channels
fas23.1	308 req	134/152 channels	*fas23.2	121 req	84/131 channels	fas23.3	258 req	153/176 channels	fas23.4	240 req	168/183 channels
*fas24.1	306 req	139/154 channels	fas24.2	115 req	71/127 channels	fas24.3	256 req	140/176 channels	fas24.4	248 req	168/185 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	132/190 channels	fas01.6	77 req	59/ 85 channels	fas01.7	19 req	18/ 33 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	114/190 channels	fas02.6	67 req	54/ 81 channels	fas02.7	17 req	17/ 33 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	120/190 channels	fas03.6	67 req	52/ 81 channels	fas03.7	20 req	18/ 33 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	115/190 channels	fas04.6	72 req	53/ 81 channels	fas04.7	22 req	16/ 33 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	115/190 channels	fas05.6	82 req	59/ 93 channels	fas05.7	32 req	23/ 59 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	121/190 channels	fas06.6	82 req	57/ 93 channels	fas06.7	43 req	33/ 73 channels	fas06.8	2 req	2/ 5 channels
fas07.5	174 req	111/190 channels	fas07.6	83 req	58/ 94 channels	fas07.7	65 req	50/ 73 channels	fas07.8	3 req	3/ 5 channels
fas08.5	173 req	107/190 channels	fas08.6	105 req	69/106 channels	fas08.7	87 req	65/ 75 channels	fas08.8	4 req	3/ 5 channels
fas09.5	173 req	99/190 channels	fas09.6	108 req	69/106 channels	fas09.7	93 req	68/ 75 channels	*fas09.8	5 req	4/ 7 channels
*fas10.5	195 req	99/192 channels	fas10.6	128 req	76/106 channels	fas10.7	102 req	68/ 75 channels	*fas10.8	5 req	4/ 7 channels
*fas11.5	208 req	110/192 channels	fas11.6	123 req	78/106 channels	fas11.7	102 req	67/ 75 channels	fas11.8	9 req	6/ 6 channels
*fas12.5	238 req	112/192 channels	fas12.6	145 req	87/106 channels	fas12.7	102 req	69/ 75 channels	fas12.8	8 req	6/ 6 channels
*fas13.5	259 req	130/192 channels	fas13.6	142 req	91/106 channels	fas13.7	101 req	72/ 78 channels	fas13.8	10 req	6/ 6 channels
*fas14.5	270 req	141/192 channels	fas14.6	151 req	98/106 channels	*fas14.7	109 req	82/ 82 channels	fas14.8	8 req	5/ 6 channels
*fas15.5	282 req	167/192 channels	fas15.6	148 req	102/106 channels	*fas15.7	102 req	81/ 82 channels	fas15.8	6 req	5/ 6 channels
*fas16.5	261 req	172/192 channels	*fas16.6	147 req	107/107 channels	*fas16.7	78 req	61/ 82 channels	fas16.8	6 req	5/ 6 channels
*fas17.5	271 req	179/192 channels	fas17.6	137 req	105/105 channels	*fas17.7	80 req	69/ 82 channels	fas17.8	3 req	3/ 3 channels
*fas18.5	247 req	171/192 channels	fas18.6	127 req	105/105 channels	*fas18.7	56 req	48/ 82 channels	fas18.8	4 req	3/ 3 channels
*fas19.5	254 req	192/192 channels	fas19.6	119 req	102/104 channels	*fas19.7	46 req	42/ 82 channels	fas19.8	2 req	2/ 2 channels
*fas20.5	235 req	178/192 channels	fas20.6	104 req	87/103 channels	fas20.7	40 req	37/ 62 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	160/191 channels	fas21.6	96 req	76/103 channels	fas21.7	35 req	33/ 62 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	164/191 channels	fas22.6	97 req	78/ 98 channels	fas22.7	25 req	23/ 42 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	143/190 channels	fas23.6	91 req	66/ 85 channels	fas23.7	14 req	12/ 42 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	143/190 channels	fas24.6	85 req	65/ 85 channels	fas24.7	14 req	13/ 42 channels	fas24.8	0 req	0/ 0 channels

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Frequency= 6.075 MHz

fas01.1	301	req	165/179	channels
fas02.1	302	req	180/186	channels
*fas03.1	334	req	187/188	channels
*fas04.1	324	req	170/188	channels
*fas05.1	315	req	157/188	channels
fas06.1	261	req	119/186	channels
fas07.1	211	req	88/186	channels
fas08.1	185	req	73/186	channels
fas09.1	203	req	77/186	channels
fas10.1	232	req	80/186	channels
fas11.1	280	req	94/186	channels
fas12.1	338	req	124/184	channels
fas13.1	338	req	125/184	channels
fas14.1	363	req	129/184	channels
fas15.1	349	req	123/184	channels
fas16.1	344	req	120/184	channels
fas17.1	329	req	124/184	channels
fas18.1	311	req	141/184	channels
fas19.1	300	req	146/184	channels
fas20.1	298	req	145/184	channels
fas21.1	319	req	152/184	channels
fas22.1	321	req	157/184	channels
fas23.1	308	req	158/184	channels
fas24.1	306	req	163/184	channels

Frequency= 7.200 MHz

fas01.2	107	req	72/154	channels
fas02.2	114	req	75/154	channels
fas03.2	136	req	80/150	channels
fas04.2	153	req	88/150	channels
fas05.2	172	req	88/155	channels
fas06.2	162	req	79/155	channels
fas07.2	165	req	75/155	channels
fas08.2	154	req	72/155	channels
fas09.2	142	req	64/155	channels
fas10.2	143	req	61/155	channels
fas11.2	167	req	71/155	channels
fas12.2	175	req	77/155	channels
fas13.2	164	req	81/155	channels
fas14.2	179	req	88/155	channels
fas15.2	181	req	94/155	channels
*fas16.2	170	req	109/157	channels
*fas17.2	153	req	108/157	channels
*fas18.2	159	req	132/157	channels
*fas19.2	163	req	142/157	channels
*fas20.2	175	req	157/157	channels
*fas21.2	170	req	154/157	channels
*fas22.2	152	req	138/157	channels
*fas23.2	121	req	102/157	channels
fas24.2	115	req	82/154	channels

Frequency= 9.700 MHz

*fas01.3	258	req	178/208	channels
*fas02.3	267	req	177/208	channels
*fas03.3	292	req	188/208	channels
*fas04.3	283	req	174/208	channels
*fas05.3	296	req	171/208	channels
*fas06.3	266	req	139/208	channels
*fas07.3	226	req	114/208	channels
*fas08.3	217	req	106/208	channels
*fas09.3	222	req	99/208	channels
*fas10.3	230	req	100/208	channels
*fas11.3	243	req	106/208	channels
*fas12.3	271	req	135/208	channels
*fas13.3	283	req	135/208	channels
*fas14.3	286	req	139/208	channels
*fas15.3	286	req	145/208	channels
*fas16.3	286	req	162/208	channels
*fas17.3	278	req	170/208	channels
*fas18.3	286	req	186/208	channels
*fas19.3	273	req	187/208	channels
*fas20.3	262	req	188/208	channels
*fas21.3	251	req	182/208	channels
*fas22.3	262	req	208/208	channels
*fas23.3	258	req	194/208	channels
*fas24.3	256	req	178/208	channels

Frequency=11.850 MHz

*fas01.4	235	req	186/217	channels
*fas02.4	221	req	176/217	channels
*fas03.4	237	req	177/217	channels
*fas04.4	222	req	164/217	channels
*fas05.4	228	req	162/217	channels
*fas06.4	201	req	133/217	channels
fas07.4	179	req	107/203	channels
fas08.4	169	req	95/200	channels
fas09.4	179	req	97/200	channels
fas10.4	216	req	104/200	channels
fas11.4	228	req	114/200	channels
fas12.4	245	req	127/213	channels
fas13.4	258	req	137/213	channels
fas14.4	263	req	139/213	channels
fas15.4	269	req	154/213	channels
fas16.4	271	req	166/213	channels
*fas17.4	270	req	176/217	channels
*fas18.4	258	req	179/217	channels
*fas19.4	252	req	186/217	channels
*fas20.4	250	req	191/217	channels
*fas21.4	239	req	190/217	channels
*fas22.4	249	req	217/217	channels
*fas23.4	240	req	202/217	channels
*fas24.4	248	req	200/217	channels

Frequency=15.350 MHz

fas01.5	188	req	153/209	channels
fas02.5	161	req	134/209	channels
fas03.5	172	req	137/208	channels
fas04.5	167	req	132/208	channels
fas05.5	176	req	131/208	channels
fas06.5	181	req	131/208	channels
fas07.5	174	req	118/208	channels
fas08.5	173	req	118/208	channels
fas09.5	173	req	111/208	channels
fas10.5	195	req	113/208	channels
fas11.5	208	req	120/208	channels
fas12.5	238	req	124/209	channels
fas13.5	259	req	148/209	channels
fas14.5	270	req	165/209	channels
fas15.5	282	req	185/209	channels
fas16.5	261	req	180/209	channels
fas17.5	271	req	189/209	channels
fas18.5	247	req	184/209	channels
*fas19.5	254	req	211/211	channels
*fas20.5	235	req	193/211	channels
*fas21.5	211	req	174/211	channels
*fas22.5	226	req	189/211	channels
*fas23.5	208	req	167/211	channels
fas24.5	196	req	162/209	channels

Frequency=17.725 MHz

fas01.6	77	req	69/ 94	channels
fas02.6	67	req	62/ 94	channels
fas03.6	67	req	62/ 94	channels
fas04.6	72	req	60/ 75	channels
fas05.6	82	req	66/101	channels
fas06.6	82	req	64/108	channels
fas07.6	83	req	65/108	channels
fas08.6	105	req	79/109	channels
fas09.6	108	req	81/109	channels
*fas10.6	128	req	91/122	channels
*fas11.6	123	req	88/122	channels
*fas12.6	145	req	104/122	channels
*fas13.6	142	req	110/122	channels
*fas14.6	151	req	109/122	channels
*fas15.6	148	req	111/122	channels
*fas16.6	147	req	122/122	channels
fas17.6	137	req	114/120	channels
fas18.6	127	req	115/120	channels
fas19.6	119	req	109/120	channels
fas20.6	104	req	92/120	channels
fas21.6	96	req	80/120	channels
fas22.6	97	req	82/120	channels
fas23.6	91	req	74/120	channels
fas24.6	85	req	75/120	channels

Frequency=21.650 MHz

fas01.7	19	req	19/ 92	channels
fas02.7	17	req	17/ 92	channels
fas03.7	20	req	20/ 92	channels
fas04.7	22	req	21/ 92	channels
fas05.7	32	req	30/ 92	channels
fas06.7	43	req	39/ 92	channels
fas07.7	65	req	55/ 92	channels
fas08.7	87	req	73/ 92	channels
fas09.7	93	req	79/ 92	channels
fas10.7	102	req	79/ 92	channels
fas11.7	102	req	82/ 92	channels
*fas12.7	102	req	86/ 94	channels
*fas13.7	101	req	85/ 94	channels
*fas14.7	109	req	94/ 94	channels
fas15.7	102	req	90/ 93	channels
fas16.7	78	req	71/ 93	channels
fas17.7	80	req	74/ 93	channels
fas18.7	56	req	52/ 93	channels
fas19.7	46	req	43/ 93	channels
fas20.7	40	req	38/ 92	channels
fas21.7	35	req	33/ 92	channels
fas22.7	25	req	23/ 92	channels
fas23.7	14	req	13/ 92	channels
fas24.7	14	req	14/ 92	channels

Frequency=25.885 MHz

fas01.8	0	req	0/ 0	channels
fas02.8	0	req	0/ 0	channels
fas03.8	0	req	0/ 0	channels
fas04.8	0	req	0/ 0	channels
fas05.8	0	req	0/ 0	channels
fas06.8	2	req	2/ 5	channels
fas07.8	3	req	3/ 5	channels
fas08.8	4	req	4/ 5	channels
fas09.8	5	req	5/ 7	channels
fas10.8	5	req	5/ 8	channels
*fas11.8	9	req	8/ 9	channels
*fas12.8	8	req	8/ 9	channels
*fas13.8	10	req	9/ 9	channels
fas14.8	8	req	7/ 8	channels
fas15.8	6	req	5/ 8	channels
fas16.8	6	req	6/ 8	channels
fas17.8	3	req	3/ 5	channels
fas18.8	4	req	3/ 5	channels
fas19.8	2	req	2/ 3	channels
fas20.8	1	req	1/ 1	channels
fas21.8	1	req	1/ 1	channels
fas22.8	1	req	1/ 1	channels
fas23.8	1	req	1/ 1	channels
fas24.8	0	req	0/ 0	channels

APPENDIX B: DATA FOR THE STUDY TO DETERMINE THE MINIMUM  
REQUIRED CHANNELS FOR SSB

Key:

SSB - Single-sideband; "+" indicates use of relative RFPR's of -20, -47, -52 dB at +5, +10, and +15 kHz frequency separation, respectively, from the co-channel; "-" indicates use of -45, -57, -57 dB at -5, -10, and -15 kHz frequency separation, respectively, from the co-channel.

RFPR - Co-channel radio frequency protection ratio.

Continuity - Type-1 frequency continuity means continuity of use of the same frequency within an hour or from one hour to the following hour for one requirement.

Frequency - One per HF band provides frequency at which the HF propagation predictions were made for the broadcast requirements in that band and denotes the band.

fasHH.B - Frequency assignment file name for hour HH and band B.

NNN req - Number of requirements assigned channels for HH.B.

UUU/MMM - UUU channels actually assigned in a span of MMM required channels.



SSB+ RFRP=17dB Type-1 Continuity=No

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Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
fas01.1	301 req	134/139 channels	fas01.2	107 req	50/ 51 channels	fas01.3	258 req	132/133 channels	fas01.4	235 req	135/135 channels
*fas02.1	302 req	144/148 channels	fas02.2	114 req	56/ 57 channels	fas02.3	267 req	133/133 channels	fas02.4	221 req	129/130 channels
fas03.1	334 req	135/141 channels	fas03.2	136 req	63/ 66 channels	fas03.3	292 req	142/144 channels	fas03.4	237 req	141/147 channels
fas04.1	324 req	102/103 channels	fas04.2	153 req	67/ 68 channels	fas04.3	283 req	125/127 channels	fas04.4	222 req	118/119 channels
fas05.1	315 req	94/ 94 channels	fas05.2	172 req	65/ 79 channels	fas05.3	296 req	114/114 channels	fas05.4	228 req	110/110 channels
fas06.1	261 req	72/ 83 channels	fas06.2	162 req	50/ 56 channels	fas06.3	266 req	90/ 90 channels	fas06.4	201 req	86/ 89 channels
fas07.1	211 req	45/ 50 channels	fas07.2	165 req	38/ 43 channels	fas07.3	226 req	73/ 83 channels	fas07.4	179 req	64/ 64 channels
fas08.1	185 req	34/ 38 channels	fas08.2	154 req	30/ 30 channels	fas08.3	217 req	63/ 71 channels	fas08.4	169 req	57/ 66 channels
fas09.1	203 req	41/ 42 channels	fas09.2	142 req	22/ 22 channels	fas09.3	222 req	53/ 54 channels	fas09.4	179 req	51/ 51 channels
fas10.1	232 req	51/ 53 channels	fas10.2	143 req	26/ 26 channels	fas10.3	230 req	56/ 57 channels	fas10.4	216 req	61/ 61 channels
fas11.1	280 req	52/ 55 channels	fas11.2	167 req	32/ 33 channels	fas11.3	243 req	66/ 66 channels	fas11.4	228 req	81/ 81 channels
fas12.1	338 req	70/ 71 channels	fas12.2	175 req	41/ 41 channels	fas12.3	271 req	89/ 89 channels	fas12.4	245 req	89/ 89 channels
fas13.1	338 req	75/ 79 channels	fas13.2	164 req	57/ 62 channels	fas13.3	283 req	78/ 78 channels	fas13.4	258 req	95/ 95 channels
fas14.1	363 req	88/ 91 channels	fas14.2	179 req	61/ 62 channels	fas14.3	286 req	90/ 92 channels	fas14.4	263 req	96/ 97 channels
fas15.1	349 req	79/ 80 channels	fas15.2	181 req	64/ 65 channels	fas15.3	286 req	91/ 91 channels	fas15.4	269 req	115/115 channels
fas16.1	344 req	62/ 63 channels	fas16.2	170 req	62/ 63 channels	fas16.3	286 req	108/108 channels	fas16.4	271 req	139/141 channels
fas17.1	329 req	78/ 78 channels	fas17.2	153 req	72/ 76 channels	fas17.3	278 req	134/135 channels	fas17.4	270 req	163/167 channels
fas18.1	311 req	116/120 channels	fas18.2	159 req	104/104 channels	fas18.3	286 req	177/178 channels	fas18.4	258 req	173/174 channels
fas19.1	300 req	124/126 channels	*fas19.2	163 req	124/131 channels	*fas19.3	273 req	176/179 channels	*fas19.4	252 req	187/192 channels
fas20.1	298 req	124/129 channels	fas20.2	175 req	127/127 channels	fas20.3	262 req	161/169 channels	fas20.4	250 req	178/181 channels
fas21.1	319 req	126/130 channels	fas21.2	170 req	119/120 channels	fas21.3	251 req	149/154 channels	fas21.4	239 req	161/161 channels
fas22.1	321 req	117/118 channels	fas22.2	152 req	96/ 98 channels	fas22.3	262 req	154/154 channels	fas22.4	249 req	169/169 channels
fas23.1	308 req	111/111 channels	fas23.2	121 req	69/ 71 channels	fas23.3	258 req	137/137 channels	fas23.4	240 req	153/155 channels
fas24.1	306 req	124/124 channels	fas24.2	115 req	54/ 54 channels	fas24.3	256 req	134/135 channels	fas24.4	248 req	143/145 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	111/114 channels	fas01.6	77 req	48/ 48 channels	fas01.7	19 req	17/ 17 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	90/ 91 channels	fas02.6	67 req	45/ 45 channels	fas02.7	17 req	16/ 16 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	93/ 94 channels	fas03.6	67 req	43/ 43 channels	fas03.7	20 req	17/ 18 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	89/ 89 channels	fas04.6	72 req	39/ 39 channels	fas04.7	22 req	17/ 17 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	89/ 89 channels	fas05.6	82 req	42/ 42 channels	fas05.7	32 req	22/ 22 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	98/101 channels	fas06.6	82 req	48/ 48 channels	fas06.7	43 req	32/ 32 channels	fas06.8	2 req	2/ 3 channels
fas07.5	174 req	90/ 93 channels	fas07.6	83 req	49/ 51 channels	fas07.7	65 req	46/ 46 channels	fas07.8	3 req	3/ 4 channels
fas08.5	173 req	81/ 81 channels	fas08.6	105 req	62/ 62 channels	fas08.7	87 req	59/ 61 channels	fas08.8	4 req	3/ 3 channels
fas09.5	173 req	76/ 76 channels	fas09.6	108 req	59/ 59 channels	fas09.7	93 req	62/ 63 channels	fas09.8	5 req	4/ 5 channels
fas10.5	195 req	76/ 77 channels	fas10.6	128 req	62/ 62 channels	fas10.7	102 req	61/ 64 channels	fas10.8	5 req	4/ 5 channels
fas11.5	208 req	83/ 83 channels	fas11.6	123 req	63/ 65 channels	fas11.7	102 req	61/ 61 channels	*fas11.8	9 req	7/ 7 channels
fas12.5	238 req	91/ 91 channels	fas12.6	145 req	75/ 75 channels	fas12.7	102 req	65/ 67 channels	fas12.8	8 req	6/ 6 channels
fas13.5	259 req	112/113 channels	fas13.6	142 req	78/ 79 channels	fas13.7	101 req	68/ 70 channels	*fas13.8	10 req	7/ 7 channels
fas14.5	270 req	132/136 channels	fas14.6	151 req	92/ 93 channels	*fas14.7	109 req	76/ 76 channels	fas14.8	8 req	6/ 6 channels
fas15.5	282 req	153/154 channels	fas15.6	148 req	101/103 channels	fas15.7	102 req	75/ 75 channels	fas15.8	6 req	5/ 5 channels
fas16.5	261 req	169/176 channels	fas16.6	147 req	102/105 channels	fas16.7	78 req	58/ 58 channels	fas16.8	6 req	5/ 6 channels
fas17.5	271 req	184/186 channels	*fas17.6	137 req	102/106 channels	fas17.7	80 req	66/ 67 channels	fas17.8	3 req	3/ 3 channels
fas18.5	247 req	172/174 channels	fas18.6	127 req	101/101 channels	fas18.7	56 req	43/ 44 channels	fas18.8	4 req	3/ 5 channels
*fas19.5	254 req	189/195 channels	fas19.6	119 req	99/102 channels	fas19.7	46 req	39/ 42 channels	fas19.8	2 req	1/ 1 channels
fas20.5	235 req	168/168 channels	fas20.6	104 req	84/ 87 channels	fas20.7	40 req	37/ 38 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	156/156 channels	fas21.6	96 req	71/ 71 channels	fas21.7	35 req	32/ 32 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	166/167 channels	fas22.6	97 req	65/ 65 channels	fas22.7	25 req	22/ 23 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	136/142 channels	fas23.6	91 req	60/ 61 channels	fas23.7	14 req	12/ 12 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	127/127 channels	fas24.6	85 req	56/ 57 channels	fas24.7	14 req	12/ 12 channels	fas24.8	0 req	0/ 0 channels

SSB+ RFPR=20dB Type-1 Continuity=No

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Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
fas01.1	301 req	152/153 channels	fas01.2	107 req	56/ 56 channels	fas01.3	258 req	153/159 channels	fas01.4	235 req	151/152 channels
fas02.1	302 req	161/162 channels	fas02.2	114 req	64/ 66 channels	fas02.3	267 req	151/151 channels	fas02.4	221 req	143/147 channels
*fas03.1	334 req	161/166 channels	fas03.2	136 req	71/ 77 channels	fas03.3	292 req	159/159 channels	fas03.4	237 req	154/156 channels
fas04.1	324 req	122/126 channels	fas04.2	153 req	74/ 86 channels	fas04.3	283 req	142/143 channels	fas04.4	222 req	133/136 channels
fas05.1	315 req	110/110 channels	fas05.2	172 req	77/ 80 channels	fas05.3	296 req	133/135 channels	fas05.4	228 req	130/131 channels
fas06.1	261 req	83/ 93 channels	fas06.2	162 req	57/ 61 channels	fas06.3	266 req	107/109 channels	fas06.4	201 req	96/ 96 channels
fas07.1	211 req	53/ 55 channels	fas07.2	165 req	44/ 49 channels	fas07.3	226 req	86/ 91 channels	fas07.4	179 req	70/ 71 channels
fas08.1	185 req	45/ 50 channels	fas08.2	154 req	34/ 37 channels	fas08.3	217 req	73/ 78 channels	fas08.4	169 req	66/ 71 channels
fas09.1	203 req	43/ 45 channels	fas09.2	142 req	24/ 25 channels	fas09.3	222 req	57/ 62 channels	fas09.4	179 req	63/ 71 channels
fas10.1	232 req	55/ 58 channels	fas10.2	143 req	26/ 26 channels	fas10.3	230 req	63/ 65 channels	fas10.4	216 req	78/ 83 channels
fas11.1	280 req	60/ 60 channels	fas11.2	167 req	36/ 36 channels	fas11.3	243 req	74/ 74 channels	fas11.4	228 req	87/ 88 channels
fas12.1	338 req	80/ 80 channels	fas12.2	175 req	49/ 54 channels	fas12.3	271 req	103/103 channels	fas12.4	245 req	100/100 channels
fas13.1	338 req	90/ 99 channels	fas13.2	164 req	61/ 61 channels	fas13.3	283 req	91/ 92 channels	fas13.4	258 req	104/105 channels
fas14.1	363 req	101/109 channels	fas14.2	179 req	71/ 73 channels	fas14.3	286 req	100/100 channels	fas14.4	263 req	108/110 channels
fas15.1	349 req	93/ 98 channels	fas15.2	181 req	73/ 74 channels	fas15.3	286 req	104/109 channels	fas15.4	269 req	136/139 channels
fas16.1	344 req	76/ 77 channels	fas16.2	170 req	72/ 72 channels	fas16.3	286 req	124/127 channels	fas16.4	271 req	159/163 channels
fas17.1	329 req	92/ 96 channels	fas17.2	153 req	83/ 87 channels	fas17.3	278 req	153/157 channels	fas17.4	270 req	178/181 channels
fas18.1	311 req	128/129 channels	fas18.2	159 req	119/120 channels	*fas18.3	286 req	189/190 channels	fas18.4	258 req	183/188 channels
fas19.1	300 req	139/141 channels	fas19.2	163 req	139/143 channels	*fas19.3	273 req	190/190 channels	fas19.4	252 req	194/194 channels
fas20.1	298 req	140/153 channels	*fas20.2	175 req	144/152 channels	fas20.3	262 req	180/182 channels	fas20.4	250 req	188/192 channels
fas21.1	319 req	144/156 channels	fas21.2	170 req	132/144 channels	fas21.3	251 req	170/171 channels	fas21.4	239 req	177/177 channels
fas22.1	321 req	135/136 channels	fas22.2	152 req	115/115 channels	fas22.3	262 req	176/176 channels	*fas22.4	249 req	195/195 channels
fas23.1	308 req	124/124 channels	fas23.2	121 req	76/ 76 channels	fas23.3	258 req	164/164 channels	fas23.4	240 req	172/179 channels
fas24.1	306 req	136/136 channels	fas24.2	115 req	61/ 62 channels	fas24.3	256 req	152/155 channels	fas24.4	248 req	170/172 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	128/130 channels	fas01.6	77 req	54/ 57 channels	fas01.7	19 req	18/ 19 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	106/109 channels	fas02.6	67 req	53/ 53 channels	fas02.7	17 req	16/ 16 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	110/118 channels	fas03.6	67 req	45/ 49 channels	fas03.7	20 req	19/ 20 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	104/106 channels	fas04.6	72 req	45/ 45 channels	fas04.7	22 req	19/ 20 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	100/102 channels	fas05.6	82 req	49/ 51 channels	fas05.7	32 req	28/ 29 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	112/118 channels	fas06.6	82 req	53/ 54 channels	fas06.7	43 req	35/ 36 channels	fas06.8	2 req	2/ 3 channels
fas07.5	174 req	97/ 99 channels	fas07.6	83 req	56/ 56 channels	fas07.7	65 req	51/ 53 channels	fas07.8	3 req	3/ 5 channels
fas08.5	173 req	89/ 91 channels	fas08.6	105 req	68/ 68 channels	fas08.7	87 req	64/ 66 channels	fas08.8	4 req	3/ 3 channels
fas09.5	173 req	84/ 89 channels	fas09.6	108 req	65/ 67 channels	fas09.7	93 req	70/ 72 channels	fas09.8	5 req	4/ 5 channels
fas10.5	195 req	82/ 85 channels	fas10.6	128 req	69/ 70 channels	fas10.7	102 req	74/ 75 channels	fas10.8	5 req	5/ 6 channels
fas11.5	208 req	91/ 91 channels	fas11.6	123 req	71/ 71 channels	fas11.7	102 req	74/ 77 channels	*fas11.8	9 req	7/ 7 channels
fas12.5	238 req	105/111 channels	fas12.6	145 req	85/ 85 channels	fas12.7	102 req	74/ 78 channels	fas12.8	8 req	6/ 6 channels
fas13.5	259 req	124/131 channels	fas13.6	142 req	92/ 96 channels	fas13.7	101 req	77/ 78 channels	*fas13.8	10 req	7/ 7 channels
fas14.5	270 req	144/153 channels	fas14.6	151 req	104/105 channels	fas14.7	109 req	85/ 85 channels	fas14.8	8 req	6/ 6 channels
fas15.5	282 req	174/176 channels	*fas15.6	148 req	111/116 channels	*fas15.7	102 req	83/ 86 channels	fas15.8	6 req	5/ 6 channels
fas16.5	261 req	183/191 channels	fas16.6	147 req	115/115 channels	fas16.7	78 req	63/ 66 channels	*fas16.8	6 req	5/ 7 channels
*fas17.5	271 req	198/202 channels	*fas17.6	137 req	112/116 channels	fas17.7	80 req	71/ 72 channels	fas17.8	3 req	3/ 4 channels
fas18.5	247 req	185/185 channels	fas18.6	127 req	110/114 channels	fas18.7	56 req	48/ 55 channels	fas18.8	4 req	3/ 5 channels
fas19.5	254 req	195/196 channels	fas19.6	119 req	103/106 channels	fas19.7	46 req	42/ 44 channels	fas19.8	2 req	1/ 1 channels
fas20.5	235 req	183/184 channels	fas20.6	104 req	85/ 88 channels	fas20.7	40 req	37/ 37 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	168/169 channels	fas21.6	96 req	78/ 80 channels	fas21.7	35 req	33/ 35 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	184/187 channels	fas22.6	97 req	76/ 76 channels	fas22.7	25 req	22/ 26 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	157/159 channels	fas23.6	91 req	66/ 70 channels	fas23.7	14 req	13/ 13 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	145/153 channels	fas24.6	85 req	58/ 63 channels	fas24.7	14 req	14/ 15 channels	fas24.8	0 req	0/ 0 channels



## SSB+ RFPF=27dB Type-1 Continuity=No

Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
*fas01.1	301 req	186/211 channels	fas01.2	107 req	70/ 85 channels	fas01.3	258 req	183/190 channels	fas01.4	235 req	185/211 channels
fas02.1	302 req	195/196 channels	fas02.2	114 req	75/ 88 channels	fas02.3	267 req	185/197 channels	fas02.4	221 req	166/195 channels
fas03.1	334 req	199/208 channels	fas03.2	136 req	82/100 channels	fas03.3	292 req	198/201 channels	fas03.4	237 req	183/202 channels
fas04.1	324 req	162/170 channels	fas04.2	153 req	83/112 channels	fas04.3	283 req	172/185 channels	fas04.4	222 req	164/175 channels
fas05.1	315 req	146/149 channels	fas05.2	172 req	87/108 channels	fas05.3	296 req	169/179 channels	fas05.4	228 req	158/162 channels
fas06.1	261 req	102/108 channels	fas06.2	162 req	74/ 84 channels	fas06.3	266 req	138/140 channels	fas06.4	201 req	117/130 channels
fas07.1	211 req	62/ 70 channels	fas07.2	165 req	57/ 63 channels	fas07.3	226 req	102/119 channels	fas07.4	179 req	90/101 channels
fas08.1	185 req	50/ 56 channels	fas08.2	154 req	45/ 47 channels	fas08.3	217 req	88/ 99 channels	fas08.4	169 req	78/ 96 channels
fas09.1	203 req	50/ 53 channels	fas09.2	142 req	31/ 31 channels	fas09.3	222 req	74/ 78 channels	fas09.4	179 req	83/ 91 channels
fas10.1	232 req	67/ 78 channels	fas10.2	143 req	34/ 35 channels	fas10.3	230 req	80/ 82 channels	fas10.4	216 req	98/104 channels
fas11.1	280 req	76/ 77 channels	fas11.2	167 req	48/ 49 channels	fas11.3	243 req	92/ 92 channels	fas11.4	228 req	108/114 channels
fas12.1	338 req	110/114 channels	fas12.2	175 req	63/ 67 channels	fas12.3	271 req	133/133 channels	fas12.4	245 req	127/131 channels
fas13.1	338 req	108/109 channels	fas13.2	164 req	79/ 84 channels	fas13.3	283 req	113/114 channels	fas13.4	258 req	131/143 channels
fas14.1	363 req	126/132 channels	fas14.2	179 req	81/ 84 channels	fas14.3	286 req	127/132 channels	fas14.4	263 req	143/150 channels
fas15.1	349 req	114/115 channels	fas15.2	181 req	91/ 98 channels	fas15.3	286 req	140/152 channels	fas15.4	269 req	170/170 channels
fas16.1	344 req	101/103 channels	fas16.2	170 req	93/ 93 channels	fas16.3	286 req	161/167 channels	fas16.4	271 req	192/198 channels
fas17.1	329 req	113/113 channels	fas17.2	153 req	106/110 channels	fas17.3	278 req	180/211 channels	fas17.4	270 req	205/249 channels
fas18.1	311 req	155/181 channels	fas18.2	159 req	139/170 channels	fas18.3	286 req	213/278 channels	fas18.4	258 req	199/270 channels
fas19.1	300 req	164/204 channels	fas19.2	163 req	154/206 channels	*fas19.3	273 req	214/285 channels	*fas19.4	252 req	214/289 channels
fas20.1	298 req	164/193 channels	*fas20.2	175 req	162/209 channels	fas20.3	262 req	204/262 channels	fas20.4	250 req	215/284 channels
fas21.1	319 req	175/203 channels	fas21.2	170 req	158/200 channels	fas21.3	251 req	204/236 channels	fas21.4	239 req	218/262 channels
fas22.1	321 req	182/189 channels	fas22.2	152 req	139/159 channels	fas22.3	262 req	224/234 channels	fas22.4	249 req	233/269 channels
fas23.1	308 req	176/178 channels	fas23.2	121 req	103/107 channels	fas23.3	258 req	204/204 channels	fas23.4	240 req	209/218 channels
fas24.1	306 req	179/196 channels	fas24.2	115 req	80/ 86 channels	fas24.3	256 req	191/191 channels	fas24.4	248 req	211/218 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	164/172 channels	fas01.6	77 req	69/ 72 channels	fas01.7	19 req	19/ 22 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	135/136 channels	fas02.6	67 req	58/ 59 channels	fas02.7	17 req	17/ 21 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	139/148 channels	fas03.6	67 req	63/ 64 channels	fas03.7	20 req	20/ 27 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	126/132 channels	fas04.6	72 req	62/ 63 channels	fas04.7	22 req	20/ 22 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	129/133 channels	fas05.6	82 req	68/ 72 channels	fas05.7	32 req	30/ 31 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	136/157 channels	fas06.6	82 req	71/ 77 channels	fas06.7	43 req	41/ 46 channels	fas06.8	2 req	2/ 3 channels
fas07.5	174 req	126/145 channels	fas07.6	83 req	71/ 81 channels	fas07.7	65 req	60/ 66 channels	fas07.8	3 req	3/ 5 channels
fas08.5	173 req	119/130 channels	fas08.6	105 req	85/ 93 channels	fas08.7	87 req	79/ 86 channels	fas08.8	4 req	4/ 4 channels
fas09.5	173 req	116/123 channels	fas09.6	108 req	85/ 90 channels	fas09.7	93 req	84/ 86 channels	fas09.8	5 req	5/ 5 channels
fas10.5	195 req	117/119 channels	fas10.6	128 req	96/ 99 channels	fas10.7	102 req	94/ 97 channels	fas10.8	5 req	5/ 7 channels
fas11.5	208 req	128/136 channels	fas11.6	123 req	98/101 channels	fas11.7	102 req	97/106 channels	fas11.8	9 req	8/ 8 channels
fas12.5	238 req	146/157 channels	fas12.6	145 req	114/116 channels	fas12.7	102 req	94/102 channels	fas12.8	8 req	8/ 8 channels
fas13.5	259 req	169/174 channels	fas13.6	142 req	116/120 channels	fas13.7	101 req	96/102 channels	*fas13.8	10 req	9/ 9 channels
fas14.5	270 req	194/203 channels	fas14.6	151 req	128/132 channels	*fas14.7	109 req	103/109 channels	fas14.8	8 req	8/ 8 channels
fas15.5	282 req	210/223 channels	fas15.6	148 req	131/147 channels	fas15.7	102 req	97/103 channels	fas15.8	6 req	5/ 5 channels
fas16.5	261 req	205/241 channels	fas16.6	147 req	131/150 channels	fas16.7	78 req	74/ 90 channels	fas16.8	6 req	6/ 7 channels
fas17.5	271 req	220/275 channels	fas17.6	137 req	123/148 channels	fas17.7	80 req	77/100 channels	fas17.8	3 req	3/ 4 channels
fas18.5	247 req	202/254 channels	*fas18.6	127 req	121/154 channels	fas18.7	56 req	54/ 67 channels	fas18.8	4 req	3/ 5 channels
*fas19.5	254 req	219/281 channels	fas19.6	119 req	116/149 channels	fas19.7	46 req	44/ 60 channels	fas19.8	2 req	1/ 1 channels
fas20.5	235 req	203/263 channels	fas20.6	104 req	99/123 channels	fas20.7	40 req	40/ 50 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	189/245 channels	fas21.6	96 req	89/115 channels	fas21.7	35 req	35/ 46 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	205/243 channels	fas22.6	97 req	88/ 98 channels	fas22.7	25 req	25/ 29 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	181/195 channels	fas23.6	91 req	83/ 87 channels	fas23.7	14 req	14/ 19 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	174/186 channels	fas24.6	85 req	75/ 83 channels	fas24.7	14 req	14/ 16 channels	fas24.8	0 req	0/ 0 channels

Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
fas01.1	301 req	138/146 channels	fas01.2	107 req	61/ 95 channels	fas01.3	258 req	141/171 channels	fas01.4	235 req	155/179 channels
fas02.1	302 req	144/148 channels	fas02.2	114 req	64/ 74 channels	fas02.3	267 req	142/171 channels	fas02.4	221 req	146/179 channels
*fas03.1	334 req	146/155 channels	fas03.2	136 req	69/108 channels	fas03.3	292 req	150/171 channels	fas03.4	237 req	151/179 channels
fas04.1	324 req	128/152 channels	fas04.2	153 req	79/114 channels	fas04.3	283 req	138/151 channels	fas04.4	222 req	141/179 channels
fas05.1	315 req	119/152 channels	fas05.2	172 req	80/114 channels	fas05.3	296 req	135/166 channels	fas05.4	228 req	138/182 channels
fas06.1	261 req	99/150 channels	fas06.2	162 req	68/114 channels	fas06.3	266 req	117/166 channels	fas06.4	201 req	117/182 channels
fas07.1	211 req	80/150 channels	fas07.2	165 req	63/115 channels	fas07.3	226 req	101/166 channels	fas07.4	179 req	91/182 channels
fas08.1	185 req	73/150 channels	fas08.2	154 req	62/115 channels	fas08.3	217 req	93/166 channels	fas08.4	169 req	87/182 channels
fas09.1	203 req	78/148 channels	fas09.2	142 req	54/115 channels	fas09.3	222 req	85/166 channels	fas09.4	179 req	81/182 channels
fas10.1	232 req	81/148 channels	fas10.2	143 req	53/115 channels	fas10.3	230 req	79/166 channels	fas10.4	216 req	87/182 channels
fas11.1	280 req	87/148 channels	fas11.2	167 req	58/115 channels	fas11.3	243 req	78/166 channels	fas11.4	228 req	94/182 channels
fas12.1	338 req	100/148 channels	fas12.2	175 req	59/115 channels	fas12.3	271 req	97/166 channels	fas12.4	245 req	101/182 channels
fas13.1	338 req	103/148 channels	fas13.2	164 req	64/115 channels	*fas13.3	283 req	99/179 channels	fas13.4	258 req	111/182 channels
fas14.1	363 req	103/127 channels	fas14.2	179 req	70/115 channels	*fas14.3	286 req	101/179 channels	fas14.4	263 req	114/182 channels
fas15.1	349 req	104/127 channels	fas15.2	181 req	76/115 channels	*fas15.3	286 req	107/179 channels	fas15.4	269 req	134/191 channels
fas16.1	344 req	104/127 channels	fas16.2	170 req	82/115 channels	*fas16.3	286 req	123/179 channels	fas16.4	271 req	148/191 channels
fas17.1	329 req	107/127 channels	fas17.2	153 req	86/115 channels	*fas17.3	278 req	144/179 channels	fas17.4	270 req	165/191 channels
fas18.1	311 req	118/127 channels	fas18.2	159 req	109/131 channels	*fas18.3	286 req	158/179 channels	fas18.4	258 req	168/192 channels
fas19.1	300 req	123/127 channels	fas19.2	163 req	124/131 channels	*fas19.3	273 req	176/179 channels	fas19.4	252 req	187/192 channels
fas20.1	298 req	129/134 channels	*fas20.2	175 req	131/136 channels	fas20.3	262 req	170/177 channels	*fas20.4	250 req	187/194 channels
fas21.1	319 req	128/133 channels	*fas21.2	170 req	126/136 channels	fas21.3	251 req	160/177 channels	fas21.4	239 req	178/192 channels
fas22.1	321 req	130/133 channels	*fas22.2	152 req	109/136 channels	fas22.3	262 req	163/173 channels	fas22.4	249 req	179/191 channels
fas23.1	308 req	127/146 channels	fas23.2	121 req	78/134 channels	fas23.3	258 req	149/171 channels	fas23.4	240 req	164/191 channels
fas24.1	306 req	129/146 channels	fas24.2	115 req	64/106 channels	fas24.3	256 req	144/171 channels	fas24.4	248 req	168/179 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	136/183 channels	*fas01.6	77 req	56/114 channels	fas01.7	19 req	17/ 26 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	118/183 channels	*fas02.6	67 req	52/114 channels	fas02.7	17 req	16/ 26 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	121/183 channels	*fas03.6	67 req	52/114 channels	fas03.7	20 req	18/ 20 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	112/183 channels	fas04.6	72 req	49/ 87 channels	fas04.7	22 req	18/ 23 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	111/183 channels	fas05.6	82 req	53/ 87 channels	fas05.7	32 req	25/ 63 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	116/183 channels	fas06.6	82 req	55/ 87 channels	fas06.7	43 req	37/ 63 channels	fas06.8	2 req	2/ 3 channels
fas07.5	174 req	104/183 channels	fas07.6	83 req	59/ 87 channels	fas07.7	65 req	50/ 68 channels	fas07.8	3 req	3/ 4 channels
fas08.5	173 req	100/183 channels	fas08.6	105 req	70/ 87 channels	fas08.7	87 req	64/ 75 channels	fas08.8	4 req	4/ 4 channels
fas09.5	173 req	98/183 channels	fas09.6	108 req	67/ 87 channels	fas09.7	93 req	69/ 75 channels	fas09.8	5 req	5/ 6 channels
fas10.5	195 req	101/187 channels	fas10.6	128 req	70/ 87 channels	fas10.7	102 req	72/ 75 channels	fas10.8	5 req	5/ 6 channels
fas11.5	208 req	106/187 channels	fas11.6	123 req	73/ 87 channels	fas11.7	102 req	70/ 75 channels	*fas11.8	9 req	6/ 7 channels
fas12.5	238 req	113/187 channels	fas12.6	145 req	83/101 channels	fas12.7	102 req	67/ 75 channels	*fas12.8	8 req	6/ 7 channels
fas13.5	259 req	134/187 channels	fas13.6	142 req	88/101 channels	fas13.7	101 req	69/ 75 channels	*fas13.8	10 req	7/ 7 channels
fas14.5	270 req	152/187 channels	fas14.6	151 req	94/101 channels	fas14.7	109 req	76/ 76 channels	*fas14.8	8 req	7/ 7 channels
fas15.5	282 req	165/187 channels	fas15.6	148 req	96/102 channels	*fas15.7	102 req	78/ 78 channels	fas15.8	6 req	6/ 6 channels
*fas16.5	261 req	163/195 channels	fas16.6	147 req	96/106 channels	*fas16.7	78 req	62/ 78 channels	fas16.8	6 req	5/ 6 channels
*fas17.5	271 req	176/195 channels	fas17.6	137 req	102/106 channels	*fas17.7	80 req	67/ 78 channels	fas17.8	3 req	3/ 6 channels
*fas18.5	247 req	175/195 channels	*fas18.6	127 req	104/114 channels	*fas18.7	56 req	49/ 78 channels	fas18.8	4 req	3/ 6 channels
*fas19.5	254 req	189/195 channels	*fas19.6	119 req	102/114 channels	fas19.7	46 req	43/ 77 channels	fas19.8	2 req	2/ 6 channels
fas20.5	235 req	172/193 channels	*fas20.6	104 req	87/114 channels	fas20.7	40 req	37/ 72 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	157/193 channels	*fas21.6	96 req	76/114 channels	fas21.7	35 req	33/ 72 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	163/186 channels	*fas22.6	97 req	74/114 channels	fas22.7	25 req	23/ 61 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	148/183 channels	*fas23.6	91 req	65/114 channels	fas23.7	14 req	13/ 61 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	144/183 channels	*fas24.6	85 req	61/114 channels	fas24.7	14 req	14/ 61 channels	fas24.8	0 req	0/ 0 channels

Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
*fas01.1	301 req	152/166 channels	fas01.2	107 req	70/134 channels	fas01.3	258 req	154/190 channels	fas01.4	235 req	173/192 channels
*fas02.1	302 req	156/166 channels	fas02.2	114 req	73/102 channels	fas02.3	267 req	152/190 channels	fas02.4	221 req	161/192 channels
*fas03.1	334 req	161/166 channels	fas03.2	136 req	82/151 channels	fas03.3	292 req	165/190 channels	fas03.4	237 req	168/191 channels
*fas04.1	324 req	149/166 channels	fas04.2	153 req	85/151 channels	fas04.3	283 req	156/190 channels	fas04.4	222 req	154/191 channels
fas05.1	315 req	145/164 channels	fas05.2	172 req	83/151 channels	fas05.3	296 req	154/190 channels	fas05.4	228 req	148/189 channels
fas06.1	261 req	119/153 channels	fas06.2	162 req	75/151 channels	fas06.3	266 req	135/190 channels	fas06.4	201 req	123/185 channels
fas07.1	211 req	89/153 channels	fas07.2	165 req	71/151 channels	fas07.3	226 req	115/190 channels	fas07.4	179 req	101/185 channels
fas08.1	185 req	83/153 channels	fas08.2	154 req	62/151 channels	fas08.3	217 req	104/190 channels	fas08.4	169 req	94/173 channels
fas09.1	203 req	84/153 channels	fas09.2	142 req	58/151 channels	fas09.3	222 req	98/190 channels	fas09.4	179 req	98/176 channels
fas10.1	232 req	86/153 channels	fas10.2	143 req	58/151 channels	fas10.3	230 req	95/190 channels	fas10.4	216 req	107/176 channels
fas11.1	280 req	94/153 channels	fas11.2	167 req	65/151 channels	fas11.3	243 req	98/190 channels	fas11.4	228 req	113/182 channels
fas12.1	338 req	113/153 channels	fas12.2	175 req	70/151 channels	fas12.3	271 req	113/190 channels	fas12.4	245 req	118/182 channels
fas13.1	338 req	113/153 channels	fas13.2	164 req	73/151 channels	fas13.3	283 req	118/190 channels	fas13.4	258 req	126/183 channels
fas14.1	363 req	114/153 channels	fas14.2	179 req	80/151 channels	fas14.3	286 req	123/190 channels	fas14.4	263 req	128/183 channels
fas15.1	349 req	113/153 channels	fas15.2	181 req	89/151 channels	fas15.3	286 req	129/190 channels	fas15.4	269 req	147/183 channels
fas16.1	344 req	112/153 channels	fas16.2	170 req	94/151 channels	fas16.3	286 req	139/189 channels	fas16.4	271 req	168/185 channels
fas17.1	329 req	116/153 channels	fas17.2	153 req	98/151 channels	fas17.3	278 req	159/189 channels	fas17.4	270 req	179/191 channels
fas18.1	311 req	130/153 channels	fas18.2	159 req	119/151 channels	fas18.3	286 req	189/190 channels	fas18.4	258 req	174/198 channels
fas19.1	300 req	142/154 channels	fas19.2	163 req	129/151 channels	fas19.3	273 req	195/204 channels	*fas19.4	252 req	187/208 channels
fas20.1	298 req	142/164 channels	*fas20.2	175 req	144/152 channels	*fas20.3	262 req	191/206 channels	fas20.4	250 req	182/200 channels
fas21.1	319 req	143/164 channels	*fas21.2	170 req	138/152 channels	fas21.3	251 req	183/203 channels	fas21.4	239 req	174/200 channels
fas22.1	321 req	145/164 channels	*fas22.2	152 req	123/152 channels	fas22.3	262 req	192/201 channels	fas22.4	249 req	195/195 channels
*fas23.1	308 req	141/166 channels	fas23.2	121 req	91/139 channels	fas23.3	258 req	172/201 channels	fas23.4	240 req	187/195 channels
*fas24.1	306 req	140/166 channels	fas24.2	115 req	77/134 channels	fas24.3	256 req	156/190 channels	fas24.4	248 req	186/192 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	145/207 channels	fas01.6	77 req	64/110 channels	fas01.7	19 req	19/ 85 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	127/207 channels	fas02.6	67 req	60/ 98 channels	fas02.7	17 req	17/ 85 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	130/207 channels	fas03.6	67 req	58/ 98 channels	fas03.7	20 req	18/ 78 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	122/207 channels	fas04.6	72 req	56/ 98 channels	fas04.7	22 req	19/ 78 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	124/207 channels	fas05.6	82 req	58/ 98 channels	fas05.7	32 req	29/ 78 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	126/207 channels	fas06.6	82 req	62/ 98 channels	fas06.7	43 req	38/ 78 channels	fas06.8	2 req	2/ 3 channels
fas07.5	174 req	113/207 channels	fas07.6	83 req	64/ 98 channels	fas07.7	65 req	55/ 78 channels	fas07.8	3 req	3/ 5 channels
fas08.5	173 req	117/207 channels	fas08.6	105 req	80/106 channels	fas08.7	87 req	70/ 78 channels	fas08.8	4 req	4/ 5 channels
fas09.5	173 req	112/207 channels	fas09.6	108 req	81/106 channels	*fas09.7	93 req	76/ 86 channels	fas09.8	5 req	4/ 5 channels
fas10.5	195 req	116/207 channels	fas10.6	128 req	89/106 channels	*fas10.7	102 req	81/ 86 channels	fas10.8	5 req	3/ 5 channels
fas11.5	208 req	123/207 channels	fas11.6	123 req	87/106 channels	*fas11.7	102 req	80/ 86 channels	*fas11.8	9 req	6/ 7 channels
fas12.5	238 req	126/207 channels	fas12.6	145 req	97/106 channels	*fas12.7	102 req	78/ 86 channels	*fas12.8	8 req	6/ 7 channels
fas13.5	259 req	152/201 channels	fas13.6	142 req	100/106 channels	*fas13.7	101 req	80/ 86 channels	*fas13.8	10 req	7/ 7 channels
fas14.5	270 req	166/201 channels	fas14.6	151 req	96/106 channels	*fas14.7	109 req	80/ 86 channels	*fas14.8	8 req	7/ 7 channels
fas15.5	282 req	184/201 channels	fas15.6	148 req	111/116 channels	*fas15.7	102 req	83/ 86 channels	fas15.8	6 req	6/ 6 channels
fas16.5	261 req	182/204 channels	fas16.6	147 req	117/122 channels	*fas16.7	78 req	66/ 86 channels	*fas16.8	6 req	5/ 7 channels
fas17.5	271 req	198/202 channels	fas17.6	137 req	113/120 channels	*fas17.7	80 req	72/ 86 channels	*fas17.8	3 req	3/ 7 channels
fas18.5	247 req	188/203 channels	fas18.6	127 req	111/124 channels	*fas18.7	56 req	51/ 86 channels	*fas18.8	4 req	3/ 7 channels
*fas19.5	254 req	197/212 channels	*fas19.6	119 req	108/126 channels	*fas19.7	46 req	42/ 86 channels	*fas19.8	2 req	2/ 7 channels
*fas20.5	235 req	184/212 channels	*fas20.6	104 req	91/126 channels	*fas20.7	40 req	37/ 86 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	170/210 channels	*fas21.6	96 req	78/126 channels	*fas21.7	35 req	33/ 86 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	181/210 channels	fas22.6	97 req	82/122 channels	*fas22.7	25 req	23/ 86 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	158/207 channels	fas23.6	91 req	72/116 channels	*fas23.7	14 req	13/ 86 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	154/207 channels	fas24.6	85 req	70/110 channels	fas24.7	14 req	14/ 85 channels	fas24.8	0 req	0/ 0 channels

Frequency= 6.075 MHz

fas01.1	301 req	186/211 channels
*fas02.1	302 req	198/217 channels
*fas03.1	334 req	202/217 channels
fas04.1	324 req	182/211 channels
fas05.1	315 req	176/211 channels
fas06.1	261 req	136/211 channels
fas07.1	211 req	106/192 channels
fas08.1	185 req	93/192 channels
fas09.1	203 req	94/202 channels
fas10.1	232 req	100/202 channels
fas11.1	280 req	114/202 channels
fas12.1	338 req	140/202 channels
fas13.1	338 req	148/202 channels
fas14.1	363 req	148/202 channels
fas15.1	349 req	144/202 channels
fas16.1	344 req	145/202 channels
fas17.1	329 req	151/202 channels
fas18.1	311 req	157/202 channels
fas19.1	300 req	165/202 channels
fas20.1	298 req	158/202 channels
fas21.1	319 req	165/202 channels
fas22.1	321 req	174/202 channels
fas23.1	308 req	170/211 channels
fas24.1	306 req	172/211 channels

Frequency= 7.200 MHz

fas01.2	107 req	80/188 channels
fas02.2	114 req	82/138 channels
fas03.2	136 req	93/164 channels
fas04.2	153 req	96/164 channels
fas05.2	172 req	99/164 channels
fas06.2	162 req	88/164 channels
fas07.2	165 req	83/164 channels
fas08.2	154 req	75/164 channels
fas09.2	142 req	67/164 channels
fas10.2	143 req	66/164 channels
fas11.2	167 req	76/181 channels
fas12.2	175 req	85/181 channels
fas13.2	164 req	85/181 channels
fas14.2	179 req	92/181 channels
fas15.2	181 req	102/181 channels
*fas16.2	170 req	108/209 channels
*fas17.2	153 req	106/209 channels
*fas18.2	159 req	133/209 channels
*fas19.2	163 req	139/209 channels
*fas20.2	175 req	162/209 channels
*fas21.2	170 req	158/209 channels
*fas22.2	152 req	140/209 channels
*fas23.2	121 req	111/209 channels
fas24.2	115 req	94/199 channels

Frequency= 9.700 MHz

fas01.3	258 req	194/267 channels
fas02.3	267 req	189/267 channels
fas03.3	292 req	197/273 channels
fas04.3	283 req	185/273 channels
fas05.3	296 req	187/273 channels
fas06.3	266 req	158/273 channels
fas07.3	226 req	130/273 channels
fas08.3	217 req	122/273 channels
fas09.3	222 req	111/273 channels
fas10.3	230 req	109/273 channels
fas11.3	243 req	113/273 channels
fas12.3	271 req	138/273 channels
fas13.3	283 req	138/273 channels
fas14.3	286 req	145/273 channels
fas15.3	286 req	158/277 channels
fas16.3	286 req	167/277 channels
fas17.3	278 req	183/277 channels
fas18.3	286 req	197/279 channels
*fas19.3	273 req	214/285 channels
*fas20.3	262 req	206/285 channels
*fas21.3	251 req	201/285 channels
fas22.3	262 req	213/277 channels
fas23.3	258 req	203/267 channels
fas24.3	256 req	196/267 channels

Frequency=11.850 MHz

fas01.4	235 req	198/279 channels
fas02.4	221 req	183/279 channels
fas03.4	237 req	190/279 channels
fas04.4	222 req	178/279 channels
fas05.4	228 req	175/279 channels
fas06.4	201 req	149/279 channels
fas07.4	179 req	117/279 channels
fas08.4	169 req	108/280 channels
fas09.4	179 req	109/280 channels
fas10.4	216 req	121/280 channels
fas11.4	228 req	128/280 channels
fas12.4	245 req	143/280 channels
fas13.4	258 req	152/289 channels
fas14.4	263 req	159/289 channels
fas15.4	269 req	169/289 channels
fas16.4	271 req	185/289 channels
fas17.4	270 req	193/289 channels
fas18.4	258 req	198/289 channels
fas19.4	252 req	214/289 channels
*fas20.4	250 req	214/302 channels
*fas21.4	239 req	209/302 channels
*fas22.4	249 req	222/302 channels
fas23.4	240 req	207/289 channels
fas24.4	248 req	209/279 channels

Frequency=15.350 MHz

fas01.5	188 req	165/248 channels
fas02.5	161 req	146/248 channels
fas03.5	172 req	155/248 channels
fas04.5	167 req	144/248 channels
fas05.5	176 req	143/262 channels
fas06.5	181 req	147/262 channels
fas07.5	174 req	136/277 channels
fas08.5	173 req	134/277 channels
fas09.5	173 req	131/277 channels
fas10.5	195 req	137/281 channels
fas11.5	208 req	152/281 channels
fas12.5	238 req	162/281 channels
fas13.5	259 req	185/281 channels
fas14.5	270 req	198/281 channels
fas15.5	282 req	208/281 channels
fas16.5	261 req	205/281 channels
*fas17.5	271 req	213/289 channels
*fas18.5	247 req	205/289 channels
fas19.5	254 req	219/281 channels
fas20.5	235 req	200/281 channels
fas21.5	211 req	185/279 channels
fas22.5	226 req	201/279 channels
fas23.5	208 req	178/274 channels
fas24.5	196 req	174/262 channels

Frequency=17.725 MHz

fas01.6	77 req	71/152 channels
fas02.6	67 req	66/152 channels
fas03.6	67 req	66/152 channels
fas04.6	72 req	66/152 channels
fas05.6	82 req	73/154 channels
fas06.6	82 req	72/154 channels
fas07.6	83 req	69/154 channels
fas08.6	105 req	88/154 channels
fas09.6	108 req	88/154 channels
fas10.6	128 req	100/154 channels
fas11.6	123 req	100/154 channels
fas12.6	145 req	118/154 channels
fas13.6	142 req	119/154 channels
fas14.6	151 req	123/158 channels
*fas15.6	148 req	121/167 channels
*fas16.6	147 req	119/167 channels
*fas17.6	137 req	117/167 channels
fas18.6	127 req	121/154 channels
fas19.6	119 req	115/159 channels
fas20.6	104 req	99/159 channels
fas21.6	96 req	89/159 channels
fas22.6	97 req	90/154 channels
fas23.6	91 req	83/154 channels
fas24.6	85 req	76/154 channels

Frequency=21.650 MHz

fas01.7	19 req	19/ 83 channels
fas02.7	17 req	17/ 83 channels
fas03.7	20 req	20/ 83 channels
fas04.7	22 req	20/ 83 channels
fas05.7	32 req	29/ 83 channels
fas06.7	43 req	40/101 channels
fas07.7	65 req	61/108 channels
fas08.7	87 req	79/108 channels
fas09.7	93 req	86/109 channels
fas10.7	102 req	88/109 channels
fas11.7	102 req	90/109 channels
fas12.7	102 req	89/109 channels
fas13.7	101 req	91/109 channels
fas14.7	109 req	103/109 channels
*fas15.7	102 req	96/118 channels
fas16.7	78 req	74/117 channels
fas17.7	80 req	77/117 channels
fas18.7	56 req	53/117 channels
fas19.7	46 req	44/109 channels
fas20.7	40 req	37/109 channels
fas21.7	35 req	33/109 channels
fas22.7	25 req	23/109 channels
fas23.7	14 req	13/109 channels
fas24.7	14 req	14/ 83 channels

Frequency=25.885 MHz

fas01.8	0 req	0/ 0 channels
fas02.8	0 req	0/ 0 channels
fas03.8	0 req	0/ 0 channels
fas04.8	0 req	0/ 0 channels
fas05.8	0 req	0/ 0 channels
*fas06.8	2 req	2/ 9 channels
*fas07.8	3 req	3/ 9 channels
*fas08.8	4 req	4/ 9 channels
*fas09.8	5 req	5/ 9 channels
*fas10.8	5 req	5/ 9 channels
*fas11.8	9 req	8/ 9 channels
*fas12.8	8 req	8/ 9 channels
*fas13.8	10 req	9/ 9 channels
fas14.8	8 req	7/ 8 channels
fas15.8	6 req	5/ 7 channels
*fas16.8	6 req	6/ 9 channels
*fas17.8	3 req	3/ 9 channels
*fas18.8	4 req	3/ 9 channels
fas19.8	2 req	2/ 3 channels
fas20.8	1 req	1/ 1 channels
fas21.8	1 req	1/ 1 channels
fas22.8	1 req	1/ 1 channels
fas23.8	1 req	1/ 1 channels
fas24.8	0 req	0/ 0 channels

SSB- RFPR=17dB Type-1 Continuity=No

Frequency= 6.075 MHz

fas01.1	301 req	128/128 channels
*fas02.1	302 req	137/137 channels
fas03.1	334 req	128/128 channels
fas04.1	324 req	89/ 89 channels
fas05.1	315 req	75/ 75 channels
fas06.1	261 req	60/ 60 channels
fas07.1	211 req	36/ 36 channels
fas08.1	185 req	27/ 27 channels
fas09.1	203 req	40/ 40 channels
fas10.1	232 req	51/ 51 channels
fas11.1	280 req	47/ 47 channels
fas12.1	338 req	63/ 63 channels
fas13.1	338 req	72/ 72 channels
fas14.1	363 req	84/ 84 channels
fas15.1	349 req	73/ 73 channels
fas16.1	344 req	56/ 56 channels
fas17.1	329 req	69/ 69 channels
fas18.1	311 req	113/113 channels
fas19.1	300 req	122/122 channels
fas20.1	298 req	123/123 channels
fas21.1	319 req	125/125 channels
fas22.1	321 req	114/114 channels
fas23.1	308 req	104/104 channels
fas24.1	306 req	118/118 channels

Frequency= 7.200 MHz

fas01.2	107 req	49/ 49 channels
fas02.2	114 req	54/ 54 channels
fas03.2	136 req	59/ 59 channels
fas04.2	153 req	64/ 64 channels
fas05.2	172 req	58/ 58 channels
fas06.2	162 req	42/ 42 channels
fas07.2	165 req	33/ 33 channels
fas08.2	154 req	27/ 27 channels
fas09.2	142 req	18/ 18 channels
fas10.2	143 req	18/ 18 channels
fas11.2	167 req	25/ 25 channels
fas12.2	175 req	36/ 36 channels
fas13.2	164 req	50/ 50 channels
fas14.2	179 req	57/ 57 channels
fas15.2	181 req	64/ 64 channels
fas16.2	170 req	58/ 58 channels
fas17.2	153 req	65/ 65 channels
fas18.2	159 req	101/101 channels
fas19.2	163 req	118/118 channels
*fas20.2	175 req	120/120 channels
fas21.2	170 req	115/115 channels
fas22.2	152 req	95/ 95 channels
fas23.2	121 req	64/ 64 channels
fas24.2	115 req	54/ 54 channels

Frequency= 9.700 MHz

fas01.3	258 req	121/121 channels
fas02.3	267 req	125/125 channels
fas03.3	292 req	130/130 channels
fas04.3	283 req	104/104 channels
fas05.3	296 req	102/102 channels
fas06.3	266 req	78/ 78 channels
fas07.3	226 req	68/ 68 channels
fas08.3	217 req	59/ 59 channels
fas09.3	222 req	46/ 46 channels
fas10.3	230 req	45/ 45 channels
fas11.3	243 req	59/ 59 channels
fas12.3	271 req	78/ 78 channels
fas13.3	283 req	75/ 75 channels
fas14.3	286 req	84/ 84 channels
fas15.3	286 req	83/ 83 channels
fas16.3	286 req	97/ 97 channels
fas17.3	278 req	129/129 channels
fas18.3	286 req	169/169 channels
*fas19.3	273 req	171/171 channels
fas20.3	262 req	157/157 channels
fas21.3	251 req	141/141 channels
fas22.3	262 req	144/144 channels
fas23.3	258 req	125/125 channels
fas24.3	256 req	122/122 channels

Frequency=11.850 MHz

fas01.4	235 req	123/123 channels
fas02.4	221 req	119/119 channels
fas03.4	237 req	125/125 channels
fas04.4	222 req	103/103 channels
fas05.4	228 req	99/ 99 channels
fas06.4	201 req	82/ 82 channels
fas07.4	179 req	55/ 55 channels
fas08.4	169 req	52/ 52 channels
fas09.4	179 req	49/ 49 channels
fas10.4	216 req	58/ 58 channels
fas11.4	228 req	69/ 69 channels
fas12.4	245 req	80/ 80 channels
fas13.4	258 req	86/ 86 channels
fas14.4	263 req	92/ 92 channels
fas15.4	269 req	99/ 99 channels
fas16.4	271 req	133/133 channels
fas17.4	270 req	157/157 channels
fas18.4	258 req	166/166 channels
*fas19.4	252 req	177/177 channels
fas20.4	250 req	169/169 channels
fas21.4	239 req	157/157 channels
fas22.4	249 req	155/155 channels
fas23.4	240 req	138/138 channels
fas24.4	248 req	129/129 channels

Frequency=15.350 MHz

fas01.5	188 req	104/104 channels
fas02.5	161 req	82/ 82 channels
fas03.5	172 req	84/ 84 channels
fas04.5	167 req	80/ 80 channels
fas05.5	176 req	82/ 82 channels
fas06.5	181 req	93/ 93 channels
fas07.5	174 req	87/ 87 channels
fas08.5	173 req	76/ 76 channels
fas09.5	173 req	72/ 72 channels
fas10.5	195 req	73/ 73 channels
fas11.5	208 req	82/ 82 channels
fas12.5	238 req	86/ 86 channels
fas13.5	259 req	106/106 channels
fas14.5	270 req	120/120 channels
fas15.5	282 req	140/140 channels
fas16.5	261 req	151/151 channels
fas17.5	271 req	174/174 channels
fas18.5	247 req	164/164 channels
*fas19.5	254 req	179/179 channels
fas20.5	235 req	162/162 channels
fas21.5	211 req	150/150 channels
fas22.5	226 req	148/148 channels
fas23.5	208 req	116/116 channels
fas24.5	196 req	111/111 channels

Frequency=17.725 MHz

fas01.6	77 req	40/ 40 channels
fas02.6	67 req	35/ 35 channels
fas03.6	67 req	34/ 34 channels
fas04.6	72 req	35/ 35 channels
fas05.6	82 req	40/ 40 channels
fas06.6	82 req	43/ 43 channels
fas07.6	83 req	47/ 47 channels
fas08.6	105 req	58/ 58 channels
fas09.6	108 req	54/ 54 channels
fas10.6	128 req	57/ 57 channels
fas11.6	123 req	58/ 58 channels
fas12.6	145 req	69/ 69 channels
fas13.6	142 req	74/ 74 channels
fas14.6	151 req	86/ 86 channels
fas15.6	148 req	92/ 92 channels
*fas16.6	147 req	94/ 94 channels
fas17.6	137 req	91/ 91 channels
*fas18.6	127 req	94/ 94 channels
fas19.6	119 req	92/ 92 channels
fas20.6	104 req	79/ 79 channels
fas21.6	96 req	67/ 67 channels
fas22.6	97 req	61/ 61 channels
fas23.6	91 req	52/ 52 channels
fas24.6	85 req	49/ 49 channels

Frequency=21.650 MHz

fas01.7	19 req	14/ 14 channels
fas02.7	17 req	14/ 14 channels
fas03.7	20 req	16/ 16 channels
fas04.7	22 req	15/ 15 channels
fas05.7	32 req	21/ 21 channels
fas06.7	43 req	29/ 29 channels
fas07.7	65 req	41/ 41 channels
fas08.7	87 req	54/ 54 channels
fas09.7	93 req	57/ 57 channels
fas10.7	102 req	53/ 53 channels
fas11.7	102 req	57/ 57 channels
fas12.7	102 req	63/ 63 channels
fas13.7	101 req	64/ 64 channels
*fas14.7	109 req	73/ 73 channels
fas15.7	102 req	72/ 72 channels
fas16.7	78 req	55/ 55 channels
fas17.7	80 req	63/ 63 channels
fas18.7	56 req	42/ 42 channels
fas19.7	46 req	36/ 36 channels
fas20.7	40 req	35/ 35 channels
fas21.7	35 req	32/ 32 channels
fas22.7	25 req	21/ 21 channels
fas23.7	14 req	11/ 11 channels
fas24.7	14 req	12/ 12 channels

Frequency=25.885 MHz

fas01.8	0 req	0/ 0 channels
fas02.8	0 req	0/ 0 channels
fas03.8	0 req	0/ 0 channels
fas04.8	0 req	0/ 0 channels
fas05.8	0 req	0/ 0 channels
fas06.8	2 req	2/ 2 channels
fas07.8	3 req	3/ 3 channels
fas08.8	4 req	3/ 3 channels
fas09.8	5 req	3/ 3 channels
fas10.8	5 req	4/ 4 channels
*fas11.8	9 req	6/ 6 channels
fas12.8	8 req	5/ 5 channels
*fas13.8	10 req	6/ 6 channels
fas14.8	8 req	5/ 5 channels
fas15.8	6 req	4/ 4 channels
fas16.8	6 req	5/ 5 channels
fas17.8	3 req	3/ 3 channels
fas18.8	4 req	3/ 3 channels
fas19.8	2 req	1/ 1 channels
fas20.8	1 req	1/ 1 channels
fas21.8	1 req	1/ 1 channels
fas22.8	1 req	1/ 1 channels
fas23.8	1 req	1/ 1 channels
fas24.8	0 req	0/ 0 channels

## Frequency= 6.075 MHz

fas01.1 301 req 139/139 channels  
 \*fas02.1 302 req 153/153 channels  
 fas03.1 334 req 143/143 channels  
 fas04.1 324 req 108/108 channels  
 fas05.1 315 req 86/ 86 channels  
 fas06.1 261 req 61/ 61 channels  
 fas07.1 211 req 40/ 40 channels  
 fas08.1 185 req 29/ 29 channels  
 fas09.1 203 req 42/ 42 channels  
 fas10.1 232 req 53/ 53 channels  
 fas11.1 280 req 50/ 50 channels  
 fas12.1 338 req 69/ 69 channels  
 fas13.1 338 req 85/ 85 channels  
 fas14.1 363 req 95/ 95 channels  
 fas15.1 349 req 86/ 86 channels  
 fas16.1 344 req 68/ 68 channels  
 fas17.1 329 req 80/ 80 channels  
 fas18.1 311 req 124/124 channels  
 fas19.1 300 req 134/134 channels  
 fas20.1 298 req 129/129 channels  
 fas21.1 319 req 133/133 channels  
 fas22.1 321 req 120/120 channels  
 fas23.1 308 req 114/114 channels  
 fas24.1 306 req 131/131 channels

## Frequency= 7.200 MHz

fas01.2 107 req 52/ 52 channels  
 fas02.2 114 req 56/ 56 channels  
 fas03.2 136 req 62/ 62 channels  
 fas04.2 153 req 68/ 68 channels  
 fas05.2 172 req 60/ 60 channels  
 fas06.2 162 req 46/ 46 channels  
 fas07.2 165 req 34/ 34 channels  
 fas08.2 154 req 27/ 27 channels  
 fas09.2 142 req 18/ 18 channels  
 fas10.2 143 req 18/ 18 channels  
 fas11.2 167 req 27/ 27 channels  
 fas12.2 175 req 42/ 42 channels  
 fas13.2 164 req 56/ 56 channels  
 fas14.2 179 req 68/ 68 channels  
 fas15.2 181 req 70/ 70 channels  
 fas16.2 170 req 64/ 64 channels  
 fas17.2 153 req 74/ 74 channels  
 fas18.2 159 req 113/113 channels  
 fas19.2 163 req 127/127 channels  
 \*fas20.2 175 req 131/131 channels  
 fas21.2 170 req 123/123 channels  
 fas22.2 152 req 103/103 channels  
 fas23.2 121 req 70/ 70 channels  
 fas24.2 115 req 59/ 59 channels

## Frequency= 9.700 MHz

fas01.3 258 req 137/137 channels  
 fas02.3 267 req 138/138 channels  
 fas03.3 292 req 143/143 channels  
 fas04.3 283 req 122/122 channels  
 fas05.3 296 req 111/111 channels  
 fas06.3 266 req 91/ 91 channels  
 fas07.3 226 req 71/ 71 channels  
 fas08.3 217 req 63/ 63 channels  
 fas09.3 222 req 47/ 47 channels  
 fas10.3 230 req 51/ 51 channels  
 fas11.3 243 req 65/ 65 channels  
 fas12.3 271 req 90/ 90 channels  
 fas13.3 283 req 81/ 81 channels  
 fas14.3 286 req 92/ 92 channels  
 fas15.3 286 req 93/ 93 channels  
 fas16.3 286 req 106/106 channels  
 fas17.3 278 req 136/136 channels  
 fas18.3 286 req 179/179 channels  
 \*fas19.3 273 req 185/185 channels  
 fas20.3 262 req 174/174 channels  
 fas21.3 251 req 161/161 channels  
 fas22.3 262 req 163/163 channels  
 fas23.3 258 req 146/146 channels  
 fas24.3 256 req 140/140 channels

## Frequency=11.850 MHz

fas01.4 235 req 137/137 channels  
 fas02.4 221 req 130/130 channels  
 fas03.4 237 req 138/138 channels  
 fas04.4 222 req 119/119 channels  
 fas05.4 228 req 111/111 channels  
 fas06.4 201 req 89/ 89 channels  
 fas07.4 179 req 62/ 62 channels  
 fas08.4 169 req 55/ 55 channels  
 fas09.4 179 req 51/ 51 channels  
 fas10.4 216 req 59/ 59 channels  
 fas11.4 228 req 77/ 77 channels  
 fas12.4 245 req 87/ 87 channels  
 fas13.4 258 req 94/ 94 channels  
 fas14.4 263 req 100/100 channels  
 fas15.4 269 req 112/112 channels  
 fas16.4 271 req 140/140 channels  
 fas17.4 270 req 165/165 channels  
 fas18.4 258 req 175/175 channels  
 \*fas19.4 252 req 188/188 channels  
 fas20.4 250 req 181/181 channels  
 fas21.4 239 req 169/169 channels  
 fas22.4 249 req 175/175 channels  
 fas23.4 240 req 158/158 channels  
 fas24.4 248 req 148/148 channels

## Frequency=15.350 MHz

fas01.5 188 req 117/117 channels  
 fas02.5 161 req 94/ 94 channels  
 fas03.5 172 req 96/ 96 channels  
 fas04.5 167 req 90/ 90 channels  
 fas05.5 176 req 90/ 90 channels  
 fas06.5 181 req 102/102 channels  
 fas07.5 174 req 91/ 91 channels  
 fas08.5 173 req 83/ 83 channels  
 fas09.5 173 req 77/ 77 channels  
 fas10.5 195 req 77/ 77 channels  
 fas11.5 208 req 86/ 86 channels  
 fas12.5 238 req 90/ 90 channels  
 fas13.5 259 req 110/110 channels  
 fas14.5 270 req 127/127 channels  
 fas15.5 282 req 157/157 channels  
 fas16.5 261 req 170/170 channels  
 fas17.5 271 req 189/189 channels  
 fas18.5 247 req 179/179 channels  
 \*fas19.5 254 req 192/192 channels  
 fas20.5 235 req 173/173 channels  
 fas21.5 211 req 159/159 channels  
 fas22.5 226 req 162/162 channels  
 fas23.5 208 req 141/141 channels  
 fas24.5 196 req 131/131 channels

## Frequency=17.725 MHz

fas01.6 77 req 47/ 47 channels  
 fas02.6 67 req 39/ 39 channels  
 fas03.6 67 req 40/ 40 channels  
 fas04.6 72 req 42/ 42 channels  
 fas05.6 82 req 44/ 44 channels  
 fas06.6 82 req 47/ 47 channels  
 fas07.6 83 req 49/ 49 channels  
 fas08.6 105 req 62/ 62 channels  
 fas09.6 108 req 60/ 60 channels  
 fas10.6 128 req 65/ 65 channels  
 fas11.6 123 req 64/ 64 channels  
 fas12.6 145 req 76/ 76 channels  
 fas13.6 142 req 80/ 80 channels  
 fas14.6 151 req 95/ 95 channels  
 fas15.6 148 req 102/102 channels  
 \*fas16.6 147 req 106/106 channels  
 fas17.6 137 req 103/103 channels  
 fas18.6 127 req 101/101 channels  
 fas19.6 119 req 98/ 98 channels  
 fas20.6 104 req 83/ 83 channels  
 fas21.6 96 req 73/ 73 channels  
 fas22.6 97 req 71/ 71 channels  
 fas23.6 91 req 59/ 59 channels  
 fas24.6 85 req 55/ 55 channels

## Frequency=21.650 MHz

fas01.7 19 req 17/ 17 channels  
 fas02.7 17 req 15/ 15 channels  
 fas03.7 20 req 17/ 17 channels  
 fas04.7 22 req 16/ 16 channels  
 fas05.7 32 req 23/ 23 channels  
 fas06.7 43 req 31/ 31 channels  
 fas07.7 65 req 45/ 45 channels  
 fas08.7 87 req 60/ 60 channels  
 fas09.7 93 req 65/ 65 channels  
 fas10.7 102 req 65/ 65 channels  
 fas11.7 102 req 66/ 66 channels  
 fas12.7 102 req 68/ 68 channels  
 fas13.7 101 req 71/ 71 channels  
 \*fas14.7 109 req 80/ 80 channels  
 fas15.7 102 req 76/ 76 channels  
 fas16.7 78 req 60/ 60 channels  
 fas17.7 80 req 66/ 66 channels  
 fas18.7 56 req 42/ 42 channels  
 fas19.7 46 req 39/ 39 channels  
 fas20.7 40 req 37/ 37 channels  
 fas21.7 35 req 33/ 33 channels  
 fas22.7 25 req 21/ 21 channels  
 fas23.7 14 req 12/ 12 channels  
 fas24.7 14 req 12/ 12 channels

## Frequency=25.885 MHz

fas01.8 0 req 0/ 0 channels  
 fas02.8 0 req 0/ 0 channels  
 fas03.8 0 req 0/ 0 channels  
 fas04.8 0 req 0/ 0 channels  
 fas05.8 0 req 0/ 0 channels  
 fas06.8 2 req 2/ 2 channels  
 fas07.8 3 req 3/ 3 channels  
 fas08.8 4 req 3/ 3 channels  
 fas09.8 5 req 4/ 4 channels  
 fas10.8 5 req 4/ 4 channels  
 \*fas11.8 9 req 6/ 6 channels  
 fas12.8 8 req 5/ 5 channels  
 \*fas13.8 10 req 6/ 6 channels  
 \*fas14.8 8 req 6/ 6 channels  
 fas15.8 6 req 5/ 5 channels  
 fas16.8 6 req 5/ 5 channels  
 fas17.8 3 req 3/ 3 channels  
 fas18.8 4 req 3/ 3 channels  
 fas19.8 2 req 1/ 1 channels  
 fas20.8 1 req 1/ 1 channels  
 fas21.8 1 req 1/ 1 channels  
 fas22.8 1 req 1/ 1 channels  
 fas23.8 1 req 1/ 1 channels  
 fas24.8 0 req 0/ 0 channels

Frequency= 6.075 MHz

fas01.1	301 req	167/167 channels
*fas02.1	302 req	186/186 channels
*fas03.1	334 req	186/186 channels
fas04.1	324 req	144/144 channels
fas05.1	315 req	123/123 channels
fas06.1	261 req	75/ 75 channels
fas07.1	211 req	49/ 49 channels
fas08.1	185 req	38/ 38 channels
fas09.1	203 req	45/ 45 channels
fas10.1	232 req	55/ 55 channels
fas11.1	280 req	64/ 64 channels
fas12.1	338 req	93/ 93 channels
fas13.1	338 req	101/101 channels
fas14.1	363 req	116/116 channels
fas15.1	349 req	107/107 channels
fas16.1	344 req	92/ 92 channels
fas17.1	329 req	102/102 channels
fas18.1	311 req	145/145 channels
fas19.1	300 req	154/154 channels
fas20.1	298 req	153/153 channels
fas21.1	319 req	164/164 channels
fas22.1	321 req	147/147 channels
fas23.1	308 req	146/146 channels
fas24.1	306 req	162/162 channels

Frequency= 7.200 MHz

fas01.2	107 req	64/ 64 channels
fas02.2	114 req	59/ 59 channels
fas03.2	136 req	73/ 73 channels
fas04.2	153 req	71/ 71 channels
fas05.2	172 req	67/ 67 channels
fas06.2	162 req	55/ 55 channels
fas07.2	165 req	40/ 40 channels
fas08.2	154 req	32/ 32 channels
fas09.2	142 req	22/ 22 channels
fas10.2	143 req	20/ 20 channels
fas11.2	167 req	38/ 38 channels
fas12.2	175 req	56/ 56 channels
fas13.2	164 req	69/ 69 channels
fas14.2	179 req	78/ 78 channels
fas15.2	181 req	81/ 81 channels
fas16.2	170 req	81/ 81 channels
fas17.2	153 req	94/ 94 channels
fas18.2	159 req	126/126 channels
fas19.2	163 req	148/148 channels
*fas20.2	175 req	157/157 channels
fas21.2	170 req	149/149 channels
*fas22.2	152 req	134/134 channels
fas23.2	121 req	97/ 97 channels
fas24.2	115 req	71/ 71 channels

Frequency= 9.700 MHz

fas01.3	258 req	165/165 channels
fas02.3	267 req	166/166 channels
fas03.3	292 req	174/174 channels
fas04.3	283 req	154/154 channels
fas05.3	296 req	140/140 channels
fas06.3	266 req	104/104 channels
fas07.3	226 req	81/ 81 channels
fas08.3	217 req	68/ 68 channels
fas09.3	222 req	58/ 58 channels
fas10.3	230 req	67/ 67 channels
fas11.3	243 req	81/ 81 channels
fas12.3	271 req	112/112 channels
fas13.3	283 req	97/ 97 channels
fas14.3	286 req	113/113 channels
fas15.3	286 req	118/118 channels
fas16.3	286 req	131/131 channels
fas17.3	278 req	161/161 channels
fas18.3	286 req	202/202 channels
fas19.3	273 req	206/206 channels
fas20.3	262 req	195/195 channels
fas21.3	251 req	184/184 channels
*fas22.3	262 req	209/209 channels
fas23.3	258 req	188/188 channels
fas24.3	256 req	171/171 channels

Frequency=11.850 MHz

fas01.4	235 req	167/167 channels
fas02.4	221 req	152/152 channels
fas03.4	237 req	159/159 channels
fas04.4	222 req	147/147 channels
fas05.4	228 req	141/141 channels
fas06.4	201 req	106/106 channels
fas07.4	179 req	76/ 76 channels
fas08.4	169 req	67/ 67 channels
fas09.4	179 req	61/ 61 channels
fas10.4	216 req	74/ 74 channels
fas11.4	228 req	91/ 91 channels
fas12.4	245 req	108/108 channels
fas13.4	258 req	111/111 channels
fas14.4	263 req	111/111 channels
fas15.4	269 req	136/136 channels
fas16.4	271 req	167/167 channels
fas17.4	270 req	188/188 channels
fas18.4	258 req	192/192 channels
fas19.4	252 req	205/205 channels
fas20.4	250 req	199/199 channels
fas21.4	239 req	201/201 channels
*fas22.4	249 req	217/217 channels
fas23.4	240 req	195/195 channels
fas24.4	248 req	186/186 channels

Frequency=15.350 MHz

fas01.5	188 req	145/145 channels
fas02.5	161 req	121/121 channels
fas03.5	172 req	117/117 channels
fas04.5	167 req	113/113 channels
fas05.5	176 req	111/111 channels
fas06.5	181 req	112/112 channels
fas07.5	174 req	102/102 channels
fas08.5	173 req	92/ 92 channels
fas09.5	173 req	86/ 86 channels
fas10.5	195 req	88/ 88 channels
fas11.5	208 req	99/ 99 channels
fas12.5	238 req	108/108 channels
fas13.5	259 req	134/134 channels
fas14.5	270 req	158/158 channels
fas15.5	282 req	188/188 channels
fas16.5	261 req	188/188 channels
fas17.5	271 req	207/207 channels
fas18.5	247 req	194/194 channels
*fas19.5	254 req	209/209 channels
fas20.5	235 req	189/189 channels
fas21.5	211 req	178/178 channels
fas22.5	226 req	196/196 channels
fas23.5	208 req	166/166 channels
fas24.5	196 req	158/158 channels

Frequency=17.725 MHz

fas01.6	77 req	59/ 59 channels
fas02.6	67 req	53/ 53 channels
fas03.6	67 req	51/ 51 channels
fas04.6	72 req	49/ 49 channels
fas05.6	82 req	56/ 56 channels
fas06.6	82 req	56/ 56 channels
fas07.6	83 req	57/ 57 channels
fas08.6	105 req	69/ 69 channels
fas09.6	108 req	70/ 70 channels
fas10.6	128 req	78/ 78 channels
fas11.6	123 req	77/ 77 channels
fas12.6	145 req	92/ 92 channels
fas13.6	142 req	101/101 channels
fas14.6	151 req	113/113 channels
fas15.6	148 req	117/117 channels
*fas16.6	147 req	121/121 channels
fas17.6	137 req	115/115 channels
fas18.6	127 req	114/114 channels
fas19.6	119 req	108/108 channels
fas20.6	104 req	90/ 90 channels
fas21.6	96 req	83/ 83 channels
fas22.6	97 req	85/ 85 channels
fas23.6	91 req	75/ 75 channels
fas24.6	85 req	70/ 70 channels

Frequency=21.650 MHz

fas01.7	19 req	19/ 19 channels
fas02.7	17 req	17/ 17 channels
fas03.7	20 req	18/ 18 channels
fas04.7	22 req	18/ 18 channels
fas05.7	32 req	27/ 27 channels
fas06.7	43 req	36/ 36 channels
fas07.7	65 req	53/ 53 channels
fas08.7	87 req	75/ 75 channels
fas09.7	93 req	80/ 80 channels
fas10.7	102 req	85/ 85 channels
fas11.7	102 req	81/ 81 channels
fas12.7	102 req	87/ 87 channels
fas13.7	101 req	87/ 87 channels
*fas14.7	109 req	94/ 94 channels
fas15.7	102 req	87/ 87 channels
fas16.7	78 req	69/ 69 channels
fas17.7	80 req	72/ 72 channels
fas18.7	56 req	51/ 51 channels
fas19.7	46 req	43/ 43 channels
fas20.7	40 req	38/ 38 channels
fas21.7	35 req	33/ 33 channels
fas22.7	25 req	24/ 24 channels
fas23.7	14 req	13/ 13 channels
fas24.7	14 req	14/ 14 channels

Frequency=25.885 MHz

fas01.8	0 req	0/ 0 channels
fas02.8	0 req	0/ 0 channels
fas03.8	0 req	0/ 0 channels
fas04.8	0 req	0/ 0 channels
fas05.8	0 req	0/ 0 channels
fas06.8	2 req	2/ 2 channels
fas07.8	3 req	3/ 3 channels
fas08.8	4 req	4/ 4 channels
fas09.8	5 req	5/ 5 channels
fas10.8	5 req	5/ 5 channels
fas11.8	9 req	8/ 8 channels
fas12.8	8 req	8/ 8 channels
*fas13.8	10 req	9/ 9 channels
fas14.8	8 req	7/ 7 channels
fas15.8	6 req	5/ 5 channels
fas16.8	6 req	6/ 6 channels
fas17.8	3 req	3/ 3 channels
fas18.8	4 req	3/ 3 channels
fas19.8	2 req	1/ 1 channels
fas20.8	1 req	1/ 1 channels
fas21.8	1 req	1/ 1 channels
fas22.8	1 req	1/ 1 channels
fas23.8	1 req	1/ 1 channels
fas24.8	0 req	0/ 0 channels



Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
*fas01.1	301 req	135/137 channels	fas01.2	107 req	55/105 channels	fas01.3	258 req	125/145 channels	fas01.4	235 req	134/159 channels
*fas02.1	302 req	137/137 channels	fas02.2	114 req	59/105 channels	fas02.3	267 req	126/145 channels	fas02.4	221 req	132/159 channels
*fas03.1	334 req	137/137 channels	fas03.2	136 req	63/ 96 channels	fas03.3	292 req	134/145 channels	fas03.4	237 req	135/169 channels
*fas04.1	324 req	122/137 channels	fas04.2	153 req	72/ 96 channels	fas04.3	283 req	125/145 channels	fas04.4	222 req	128/169 channels
*fas05.1	315 req	114/137 channels	fas05.2	172 req	71/103 channels	fas05.3	296 req	120/145 channels	fas05.4	228 req	125/169 channels
fas06.1	261 req	94/136 channels	fas06.2	162 req	63/103 channels	fas06.3	266 req	108/145 channels	fas06.4	201 req	102/169 channels
fas07.1	211 req	76/131 channels	fas07.2	165 req	61/103 channels	fas07.3	226 req	96/148 channels	fas07.4	179 req	83/169 channels
fas08.1	185 req	68/131 channels	fas08.2	154 req	58/103 channels	fas08.3	217 req	87/148 channels	fas08.4	169 req	78/169 channels
fas09.1	203 req	74/131 channels	fas09.2	142 req	54/103 channels	fas09.3	222 req	83/148 channels	fas09.4	179 req	76/169 channels
fas10.1	232 req	75/131 channels	fas10.2	143 req	53/103 channels	fas10.3	230 req	82/148 channels	fas10.4	216 req	78/169 channels
fas11.1	280 req	83/131 channels	fas11.2	167 req	60/103 channels	fas11.3	243 req	84/148 channels	fas11.4	228 req	88/169 channels
fas12.1	338 req	107/131 channels	fas12.2	175 req	66/103 channels	fas12.3	271 req	100/148 channels	fas12.4	245 req	98/169 channels
fas13.1	338 req	113/131 channels	fas13.2	164 req	69/103 channels	fas13.3	283 req	100/148 channels	fas13.4	258 req	98/169 channels
fas14.1	363 req	117/131 channels	fas14.2	179 req	73/103 channels	fas14.3	286 req	105/162 channels	fas14.4	263 req	104/169 channels
fas15.1	349 req	117/131 channels	fas15.2	181 req	74/103 channels	fas15.3	286 req	114/167 channels	*fas15.4	269 req	119/177 channels
fas16.1	344 req	113/129 channels	fas16.2	170 req	81/110 channels	fas16.3	286 req	121/167 channels	*fas16.4	271 req	132/177 channels
fas17.1	329 req	118/129 channels	fas17.2	153 req	81/110 channels	fas17.3	278 req	135/167 channels	*fas17.4	270 req	149/177 channels
fas18.1	311 req	123/129 channels	fas18.2	159 req	101/118 channels	*fas18.3	286 req	152/171 channels	*fas18.4	258 req	156/177 channels
fas19.1	300 req	124/129 channels	fas19.2	163 req	113/118 channels	*fas19.3	273 req	171/171 channels	*fas19.4	252 req	177/177 channels
fas20.1	298 req	127/135 channels	*fas20.2	175 req	120/120 channels	*fas20.3	262 req	163/171 channels	*fas20.4	250 req	173/177 channels
fas21.1	319 req	127/135 channels	*fas21.2	170 req	115/120 channels	*fas21.3	251 req	152/171 channels	*fas21.4	239 req	163/177 channels
fas22.1	321 req	128/135 channels	*fas22.2	152 req	98/120 channels	*fas22.3	262 req	153/171 channels	*fas22.4	249 req	161/177 channels
fas23.1	308 req	130/136 channels	fas23.2	121 req	76/115 channels	fas23.3	258 req	132/166 channels	*fas23.4	240 req	149/177 channels
fas24.1	306 req	132/136 channels	fas24.2	115 req	65/113 channels	fas24.3	256 req	130/165 channels	fas24.4	248 req	145/176 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	114/164 channels	fas01.6	77 req	51/ 91 channels	fas01.7	19 req	15/ 71 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	100/164 channels	fas02.6	67 req	50/ 91 channels	fas02.7	17 req	15/ 71 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	101/164 channels	fas03.6	67 req	46/ 91 channels	fas03.7	20 req	16/ 34 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	96/164 channels	fas04.6	72 req	46/ 90 channels	fas04.7	22 req	17/ 34 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	100/164 channels	fas05.6	82 req	52/ 94 channels	fas05.7	32 req	22/ 56 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	105/164 channels	fas06.6	82 req	51/ 94 channels	fas06.7	43 req	31/ 56 channels	fas06.8	2 req	2/ 4 channels
fas07.5	174 req	98/164 channels	fas07.6	83 req	55/ 94 channels	fas07.7	65 req	44/ 64 channels	fas07.8	3 req	3/ 4 channels
fas08.5	173 req	94/164 channels	fas08.6	105 req	66/ 94 channels	fas08.7	87 req	56/ 71 channels	fas08.8	4 req	3/ 4 channels
fas09.5	173 req	92/164 channels	fas09.6	108 req	66/ 94 channels	fas09.7	93 req	60/ 71 channels	fas09.8	5 req	3/ 4 channels
fas10.5	195 req	91/164 channels	fas10.6	128 req	71/ 94 channels	fas10.7	102 req	61/ 71 channels	fas10.8	5 req	4/ 5 channels
fas11.5	208 req	100/164 channels	fas11.6	123 req	72/ 94 channels	fas11.7	102 req	62/ 72 channels	*fas11.8	9 req	6/ 6 channels
fas12.5	238 req	100/176 channels	fas12.6	145 req	82/ 94 channels	fas12.7	102 req	64/ 72 channels	*fas12.8	8 req	6/ 6 channels
fas13.5	259 req	119/176 channels	fas13.6	142 req	84/ 94 channels	fas13.7	101 req	65/ 72 channels	*fas13.8	10 req	6/ 6 channels
fas14.5	270 req	130/176 channels	fas14.6	151 req	85/ 94 channels	*fas14.7	109 req	73/ 73 channels	*fas14.8	8 req	5/ 6 channels
fas15.5	282 req	148/176 channels	fas15.6	148 req	93/ 94 channels	*fas15.7	102 req	73/ 73 channels	*fas15.8	6 req	5/ 6 channels
fas16.5	261 req	147/176 channels	fas16.6	147 req	94/ 94 channels	fas16.7	78 req	57/ 72 channels	*fas16.8	6 req	5/ 6 channels
*fas17.5	271 req	160/179 channels	*fas17.6	137 req	96/ 96 channels	fas17.7	80 req	66/ 72 channels	fas17.8	3 req	3/ 3 channels
*fas18.5	247 req	164/179 channels	*fas18.6	127 req	96/ 96 channels	fas18.7	56 req	47/ 71 channels	fas18.8	4 req	3/ 3 channels
*fas19.5	254 req	179/179 channels	fas19.6	119 req	93/ 94 channels	fas19.7	46 req	41/ 71 channels	fas19.8	2 req	2/ 3 channels
fas20.5	235 req	165/177 channels	fas20.6	104 req	80/ 94 channels	fas20.7	40 req	37/ 71 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	146/175 channels	fas21.6	96 req	69/ 94 channels	fas21.7	35 req	32/ 71 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	151/173 channels	fas22.6	97 req	63/ 94 channels	fas22.7	25 req	23/ 71 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	132/166 channels	fas23.6	91 req	57/ 94 channels	fas23.7	14 req	14/ 71 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	124/164 channels	fas24.6	85 req	57/ 94 channels	fas24.7	14 req	14/ 71 channels	fas24.8	0 req	0/ 0 channels



Frequency= 6.075 MHz			Frequency= 7.200 MHz			Frequency= 9.700 MHz			Frequency=11.850 MHz		
*fas01.1	301 req	149/153 channels	fas01.2	107 req	63/129 channels	fas01.3	258 req	140/184 channels	fas01.4	235 req	147/177 channels
*fas02.1	302 req	153/153 channels	fas02.2	114 req	62/129 channels	fas02.3	267 req	143/184 channels	fas02.4	221 req	142/177 channels
fas03.1	334 req	152/152 channels	fas03.2	136 req	73/119 channels	fas03.3	292 req	151/184 channels	fas03.4	237 req	148/178 channels
fas04.1	324 req	134/152 channels	fas04.2	153 req	76/119 channels	fas04.3	283 req	142/184 channels	fas04.4	222 req	140/178 channels
fas05.1	315 req	121/150 channels	fas05.2	172 req	75/119 channels	fas05.3	296 req	136/184 channels	fas05.4	228 req	135/178 channels
fas06.1	261 req	97/150 channels	fas06.2	162 req	68/119 channels	fas06.3	266 req	121/184 channels	fas06.4	201 req	115/178 channels
fas07.1	211 req	79/150 channels	fas07.2	165 req	66/119 channels	fas07.3	226 req	97/184 channels	fas07.4	179 req	91/178 channels
fas08.1	185 req	69/150 channels	fas08.2	154 req	61/119 channels	fas08.3	217 req	86/184 channels	fas08.4	169 req	86/178 channels
fas09.1	203 req	76/150 channels	fas09.2	142 req	59/119 channels	fas09.3	222 req	77/184 channels	fas09.4	179 req	81/178 channels
fas10.1	232 req	78/150 channels	fas10.2	143 req	59/119 channels	fas10.3	230 req	76/184 channels	fas10.4	216 req	86/178 channels
fas11.1	280 req	90/150 channels	fas11.2	167 req	63/119 channels	fas11.3	243 req	78/184 channels	fas11.4	228 req	96/178 channels
fas12.1	338 req	116/150 channels	fas12.2	175 req	69/119 channels	fas12.3	271 req	100/184 channels	fas12.4	245 req	106/178 channels
fas13.1	338 req	122/150 channels	fas13.2	164 req	73/119 channels	fas13.3	283 req	103/184 channels	fas13.4	258 req	113/178 channels
fas14.1	363 req	127/150 channels	fas14.2	179 req	78/119 channels	fas14.3	286 req	109/184 channels	fas14.4	263 req	111/178 channels
fas15.1	349 req	127/150 channels	fas15.2	181 req	81/119 channels	fas15.3	286 req	120/184 channels	fas15.4	269 req	127/185 channels
fas16.1	344 req	124/150 channels	fas16.2	170 req	85/119 channels	fas16.3	286 req	127/184 channels	fas16.4	271 req	141/185 channels
fas17.1	329 req	126/150 channels	fas17.2	153 req	92/120 channels	fas17.3	278 req	138/184 channels	fas17.4	270 req	163/187 channels
fas18.1	311 req	134/150 channels	fas18.2	159 req	111/124 channels	fas18.3	286 req	169/184 channels	fas18.4	258 req	169/187 channels
fas19.1	300 req	135/150 channels	fas19.2	163 req	122/127 channels	*fas19.3	273 req	185/185 channels	*fas19.4	252 req	188/188 channels
fas20.1	298 req	137/150 channels	*fas20.2	175 req	131/131 channels	fas20.3	262 req	178/184 channels	fas20.4	250 req	182/186 channels
fas21.1	319 req	139/151 channels	*fas21.2	170 req	126/131 channels	fas21.3	251 req	163/184 channels	fas21.4	239 req	174/186 channels
fas22.1	321 req	142/151 channels	*fas22.2	152 req	114/131 channels	fas22.3	262 req	170/184 channels	fas22.4	249 req	180/186 channels
fas23.1	308 req	142/152 channels	fas23.2	121 req	86/129 channels	fas23.3	258 req	153/184 channels	fas23.4	240 req	167/186 channels
*fas24.1	306 req	143/153 channels	fas24.2	115 req	72/129 channels	fas24.3	256 req	145/170 channels	fas24.4	248 req	163/184 channels
Frequency=15.350 MHz			Frequency=17.725 MHz			Frequency=21.650 MHz			Frequency=25.885 MHz		
fas01.5	188 req	127/189 channels	fas01.6	77 req	57/101 channels	fas01.7	19 req	18/ 71 channels	fas01.8	0 req	0/ 0 channels
fas02.5	161 req	110/189 channels	fas02.6	67 req	53/101 channels	fas02.7	17 req	17/ 71 channels	fas02.8	0 req	0/ 0 channels
fas03.5	172 req	114/189 channels	fas03.6	67 req	53/101 channels	fas03.7	20 req	18/ 71 channels	fas03.8	0 req	0/ 0 channels
fas04.5	167 req	109/189 channels	fas04.6	72 req	50/101 channels	fas04.7	22 req	18/ 71 channels	fas04.8	0 req	0/ 0 channels
fas05.5	176 req	112/189 channels	fas05.6	82 req	55/102 channels	fas05.7	32 req	23/ 71 channels	fas05.8	0 req	0/ 0 channels
fas06.5	181 req	119/189 channels	fas06.6	82 req	56/102 channels	fas06.7	43 req	32/ 71 channels	fas06.8	2 req	2/ 3 channels
fas07.5	174 req	105/190 channels	fas07.6	83 req	56/102 channels	fas07.7	65 req	49/ 71 channels	fas07.8	3 req	3/ 3 channels
fas08.5	173 req	103/190 channels	fas08.6	105 req	70/104 channels	fas08.7	87 req	61/ 71 channels	fas08.8	4 req	3/ 3 channels
fas09.5	173 req	97/190 channels	fas09.6	108 req	71/104 channels	fas09.7	93 req	66/ 71 channels	fas09.8	5 req	4/ 4 channels
fas10.5	195 req	97/190 channels	fas10.6	128 req	75/104 channels	*fas10.7	102 req	67/ 80 channels	*fas10.8	5 req	4/ 6 channels
fas11.5	208 req	103/190 channels	fas11.6	123 req	78/104 channels	*fas11.7	102 req	66/ 80 channels	*fas11.8	9 req	6/ 6 channels
fas12.5	238 req	106/190 channels	fas12.6	145 req	88/104 channels	*fas12.7	102 req	69/ 80 channels	*fas12.8	8 req	6/ 6 channels
fas13.5	259 req	126/190 channels	fas13.6	142 req	92/104 channels	*fas13.7	101 req	75/ 80 channels	*fas13.8	10 req	6/ 6 channels
fas14.5	270 req	137/190 channels	fas14.6	151 req	99/104 channels	*fas14.7	109 req	80/ 80 channels	*fas14.8	8 req	5/ 6 channels
fas15.5	282 req	157/190 channels	fas15.6	148 req	98/105 channels	*fas15.7	102 req	79/ 80 channels	*fas15.8	6 req	5/ 6 channels
fas16.5	261 req	164/190 channels	*fas16.6	147 req	106/106 channels	*fas16.7	78 req	63/ 80 channels	*fas16.8	6 req	5/ 6 channels
fas17.5	271 req	175/190 channels	*fas17.6	137 req	103/106 channels	*fas17.7	80 req	68/ 80 channels	fas17.8	3 req	3/ 3 channels
*fas18.5	247 req	167/192 channels	*fas18.6	127 req	102/106 channels	fas18.7	56 req	48/ 78 channels	fas18.8	4 req	3/ 3 channels
*fas19.5	254 req	192/192 channels	*fas19.6	119 req	99/106 channels	fas19.7	46 req	40/ 78 channels	fas19.8	2 req	2/ 3 channels
*fas20.5	235 req	178/192 channels	*fas20.6	104 req	84/106 channels	fas20.7	40 req	36/ 46 channels	fas20.8	1 req	1/ 1 channels
fas21.5	211 req	159/189 channels	*fas21.6	96 req	74/106 channels	fas21.7	35 req	32/ 46 channels	fas21.8	1 req	1/ 1 channels
fas22.5	226 req	166/189 channels	*fas22.6	97 req	76/106 channels	fas22.7	25 req	22/ 37 channels	fas22.8	1 req	1/ 1 channels
fas23.5	208 req	146/189 channels	*fas23.6	91 req	64/106 channels	fas23.7	14 req	11/ 37 channels	fas23.8	1 req	1/ 1 channels
fas24.5	196 req	137/182 channels	fas24.6	85 req	63/102 channels	fas24.7	14 req	12/ 71 channels	fas24.8	0 req	0/ 0 channels

SSB- RFPR=27dB Type-1 Continuity=Yes

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Frequency= 6.075 MHz				Frequency= 7.200 MHz				Frequency= 9.700 MHz				Frequency=11.850 MHz							
fas01.1	301	req	171/186	channels	fas01.2	107	req	76/148	channels	fas01.3	258	req	173/208	channels	fas01.4	235	req	175/212	channels
fas02.1	302	req	186/186	channels	fas02.2	114	req	74/132	channels	fas02.3	267	req	172/208	channels	fas02.4	221	req	168/212	channels
*fas03.1	334	req	191/191	channels	fas03.2	136	req	81/132	channels	fas03.3	292	req	182/207	channels	fas03.4	237	req	170/212	channels
*fas04.1	324	req	173/191	channels	fas04.2	153	req	89/150	channels	fas04.3	283	req	164/207	channels	fas04.4	222	req	163/212	channels
fas05.1	315	req	157/190	channels	fas05.2	172	req	87/150	channels	fas05.3	296	req	160/207	channels	fas05.4	228	req	161/210	channels
fas06.1	261	req	123/190	channels	fas06.2	162	req	77/150	channels	fas06.3	266	req	133/207	channels	fas06.4	201	req	134/210	channels
fas07.1	211	req	92/190	channels	fas07.2	165	req	76/150	channels	fas07.3	226	req	108/207	channels	fas07.4	179	req	104/204	channels
fas08.1	185	req	77/190	channels	fas08.2	154	req	70/150	channels	fas08.3	217	req	98/207	channels	fas08.4	169	req	95/204	channels
fas09.1	203	req	79/190	channels	fas09.2	142	req	67/150	channels	fas09.3	222	req	96/207	channels	fas09.4	179	req	97/204	channels
fas10.1	232	req	83/190	channels	fas10.2	143	req	64/150	channels	fas10.3	230	req	93/207	channels	fas10.4	216	req	101/204	channels
fas11.1	280	req	94/190	channels	fas11.2	167	req	70/150	channels	fas11.3	243	req	98/207	channels	fas11.4	228	req	111/204	channels
fas12.1	338	req	114/190	channels	fas12.2	175	req	77/150	channels	fas12.3	271	req	130/207	channels	fas12.4	245	req	122/204	channels
fas13.1	338	req	116/190	channels	fas13.2	164	req	84/156	channels	fas13.3	283	req	128/207	channels	fas13.4	258	req	130/212	channels
fas14.1	363	req	120/190	channels	fas14.2	179	req	91/156	channels	fas14.3	286	req	134/207	channels	fas14.4	263	req	129/212	channels
fas15.1	349	req	118/190	channels	fas15.2	181	req	95/156	channels	fas15.3	286	req	142/207	channels	fas15.4	269	req	144/212	channels
fas16.1	344	req	115/186	channels	fas16.2	170	req	104/156	channels	fas16.3	286	req	149/207	channels	fas16.4	271	req	163/214	channels
fas17.1	329	req	115/186	channels	fas17.2	153	req	102/156	channels	fas17.3	278	req	163/207	channels	fas17.4	270	req	181/214	channels
fas18.1	311	req	135/180	channels	*fas18.2	159	req	121/157	channels	fas18.3	286	req	187/207	channels	fas18.4	258	req	180/214	channels
fas19.1	300	req	145/180	channels	*fas19.2	163	req	140/157	channels	fas19.3	273	req	184/207	channels	fas19.4	252	req	183/214	channels
fas20.1	298	req	147/180	channels	*fas20.2	175	req	157/157	channels	fas20.3	262	req	183/207	channels	*fas20.4	250	req	189/217	channels
fas21.1	319	req	156/185	channels	fas21.2	170	req	153/156	channels	fas21.3	251	req	184/207	channels	*fas21.4	239	req	190/217	channels
fas22.1	321	req	159/185	channels	fas22.2	152	req	135/156	channels	*fas22.3	262	req	209/209	channels	*fas22.4	249	req	217/217	channels
fas23.1	308	req	163/185	channels	fas23.2	121	req	102/156	channels	fas23.3	258	req	193/208	channels	fas23.4	240	req	201/216	channels
fas24.1	306	req	164/185	channels	fas24.2	115	req	85/156	channels	fas24.3	256	req	177/208	channels	fas24.4	248	req	193/212	channels
Frequency=15.350 MHz				Frequency=17.725 MHz				Frequency=21.650 MHz				Frequency=25.885 MHz							
*fas01.5	188	req	151/209	channels	fas01.6	77	req	66/ 93	channels	fas01.7	19	req	19/ 56	channels	fas01.8	0	req	0/ 0	channels
*fas02.5	161	req	133/209	channels	fas02.6	67	req	61/ 93	channels	fas02.7	17	req	17/ 56	channels	fas02.8	0	req	0/ 0	channels
*fas03.5	172	req	136/209	channels	fas03.6	67	req	60/ 93	channels	fas03.7	20	req	19/ 56	channels	fas03.8	0	req	0/ 0	channels
*fas04.5	167	req	136/209	channels	fas04.6	72	req	59/ 93	channels	fas04.7	22	req	19/ 56	channels	fas04.8	0	req	0/ 0	channels
*fas05.5	176	req	133/209	channels	fas05.6	82	req	64/109	channels	fas05.7	32	req	28/ 56	channels	fas05.8	0	req	0/ 0	channels
*fas06.5	181	req	136/209	channels	fas06.6	82	req	61/109	channels	fas06.7	43	req	36/ 77	channels	*fas06.8	2	req	2/ 9	channels
*fas07.5	174	req	123/209	channels	fas07.6	83	req	62/109	channels	fas07.7	65	req	55/ 91	channels	*fas07.8	3	req	3/ 9	channels
*fas08.5	173	req	118/209	channels	*fas08.6	105	req	75/121	channels	fas08.7	87	req	71/ 91	channels	*fas08.8	4	req	4/ 9	channels
*fas09.5	173	req	112/209	channels	*fas09.6	108	req	76/121	channels	fas09.7	93	req	79/ 91	channels	*fas09.8	5	req	5/ 9	channels
*fas10.5	195	req	112/209	channels	*fas10.6	128	req	85/121	channels	fas10.7	102	req	81/ 91	channels	*fas10.8	5	req	5/ 9	channels
*fas11.5	208	req	118/209	channels	*fas11.6	123	req	83/121	channels	fas11.7	102	req	82/ 91	channels	*fas11.8	9	req	8/ 9	channels
*fas12.5	238	req	125/209	channels	*fas12.6	145	req	95/121	channels	fas12.7	102	req	82/ 91	channels	*fas12.8	8	req	8/ 9	channels
*fas13.5	259	req	148/209	channels	*fas13.6	142	req	102/121	channels	fas13.7	101	req	83/ 91	channels	*fas13.8	10	req	9/ 9	channels
*fas14.5	270	req	163/209	channels	*fas14.6	151	req	106/121	channels	*fas14.7	109	req	94/ 94	channels	fas14.8	8	req	7/ 7	channels
*fas15.5	282	req	184/209	channels	*fas15.6	148	req	109/121	channels	fas15.7	102	req	89/ 93	channels	fas15.8	6	req	5/ 7	channels
*fas16.5	261	req	174/209	channels	*fas16.6	147	req	121/121	channels	fas16.7	78	req	69/ 93	channels	fas16.8	6	req	6/ 7	channels
*fas17.5	271	req	182/209	channels	fas17.6	137	req	114/119	channels	fas17.7	80	req	72/ 93	channels	fas17.8	3	req	3/ 5	channels
*fas18.5	247	req	183/209	channels	fas18.6	127	req	114/119	channels	fas18.7	56	req	53/ 93	channels	fas18.8	4	req	3/ 5	channels
*fas19.5	254	req	209/209	channels	fas19.6	119	req	108/119	channels	fas19.7	46	req	44/ 93	channels	fas19.8	2	req	2/ 5	channels
*fas20.5	235	req	189/209	channels	fas20.6	104	req	89/118	channels	fas20.7	40	req	38/ 67	channels	fas20.8	1	req	1/ 1	channels
*fas21.5	211	req	172/209	channels	fas21.6	96	req	78/118	channels	fas21.7	35	req	33/ 67	channels	fas21.8	1	req	1/ 1	channels
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*fas23.5	208	req	166/209	channels	fas23.6	91	req	73/ 93	channels	fas23.7	14	req	13/ 56	channels	fas23.8	1	req	1/ 1	channels
*fas24.5	196	req	159/209	channels	fas24.6	85	req	73/ 93	channels	fas24.7	14	req	14/ 56	channels	fas24.8	0	req	0/ 0	channels

APPENDIX C: RESULTS OF THE LIKELIHOOD ESTIMATION STUDY

Key:

Channel Assignment - Grid which uses black to indicate the occupancy of channel-hours and white space to indicate channel-hour is free from HF channel assignment.

test point #NN - Provides the IFRB test point number used for the time-sharing study grids.

X MHz Band - HF band for which channels were assigned based on a frequency within the band for which field strengths were predicted. (X = 6, 7, 9, 11, 15, 17, 21, and 26)

DSB - Double-sideband HF broadcast system

NN dB RFPR - Co-channel radio frequency protection ratio. (NN = 27, 20, and 17)

XXXX Requirements - The XXXX number of HF broadcast requirements determined from the notifications for the J90 tentative high-frequency broadcasting schedule, for which channels are assigned in the current grid plot.

Reqs - Number of requirement hours represented either by hour or in total.

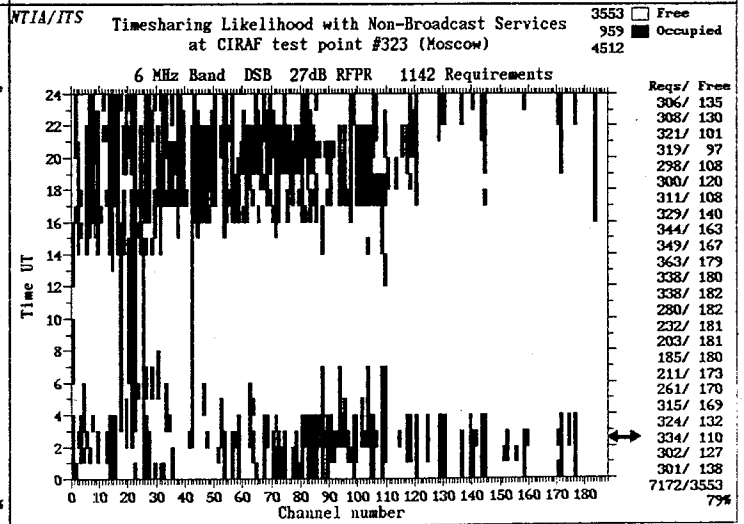
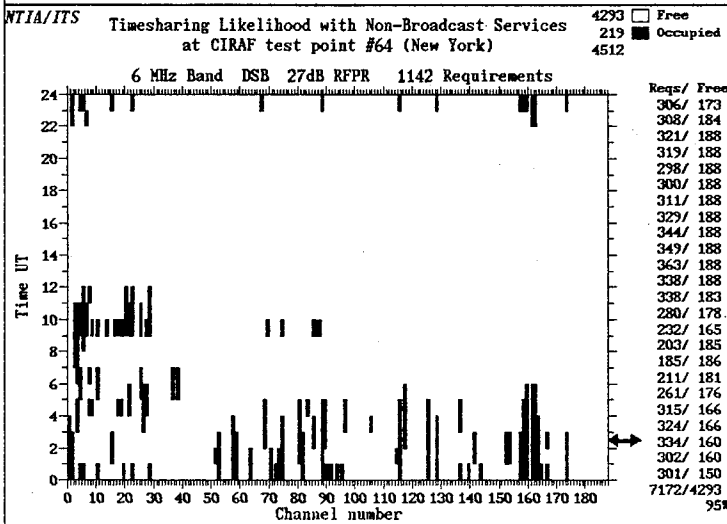
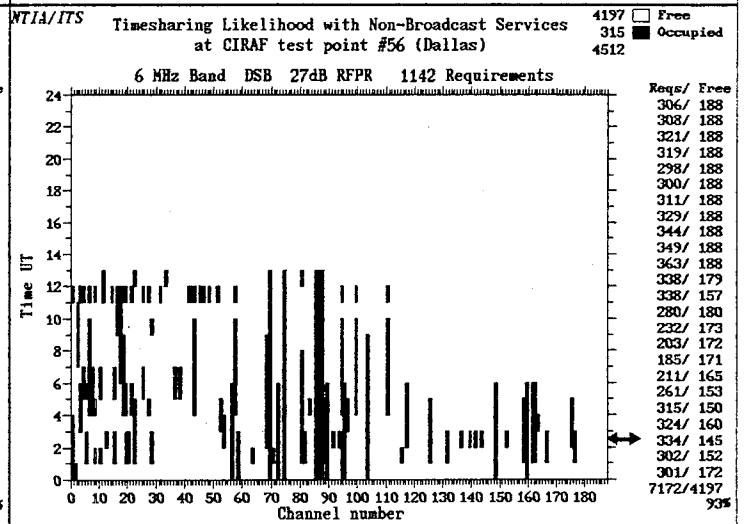
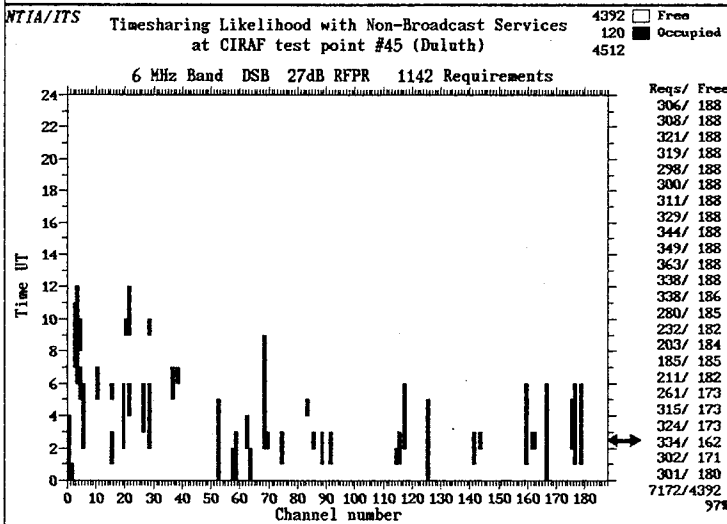
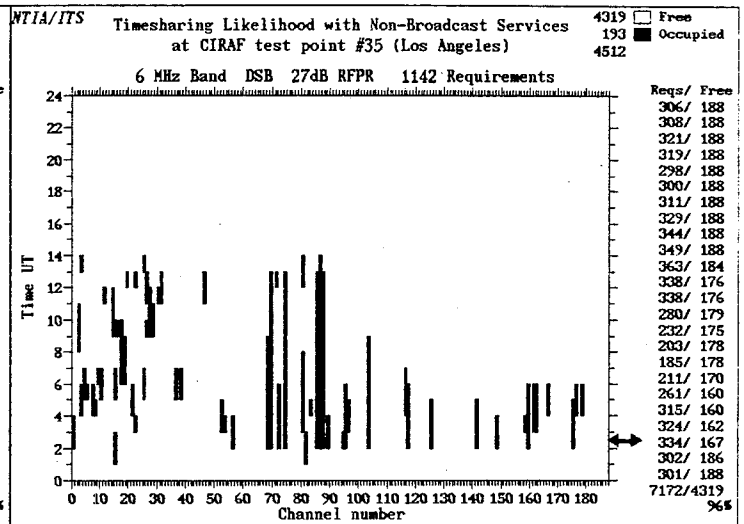
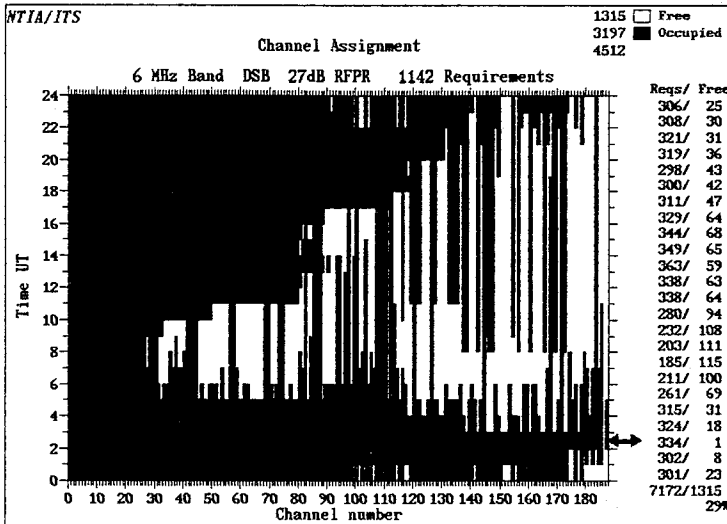
Free - Number of channel hours which could possibly be used for time-sharing by nonbroadcast services on a noninterfering basis either by hour or in total which is also represented as a percentage of the channel hours available.

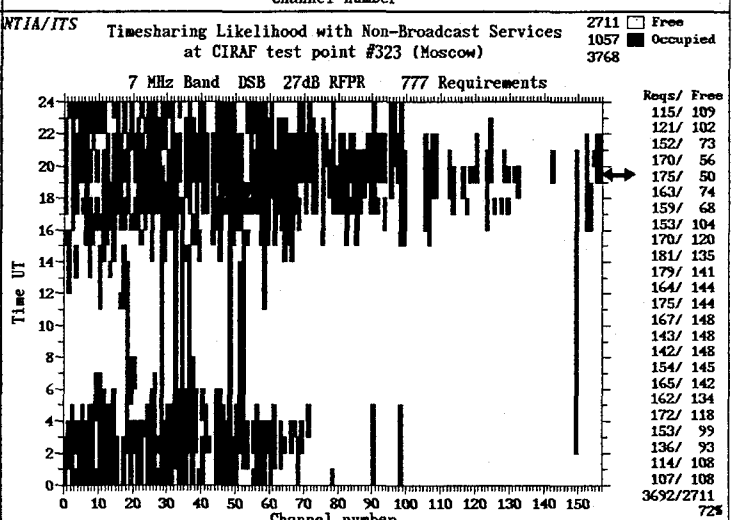
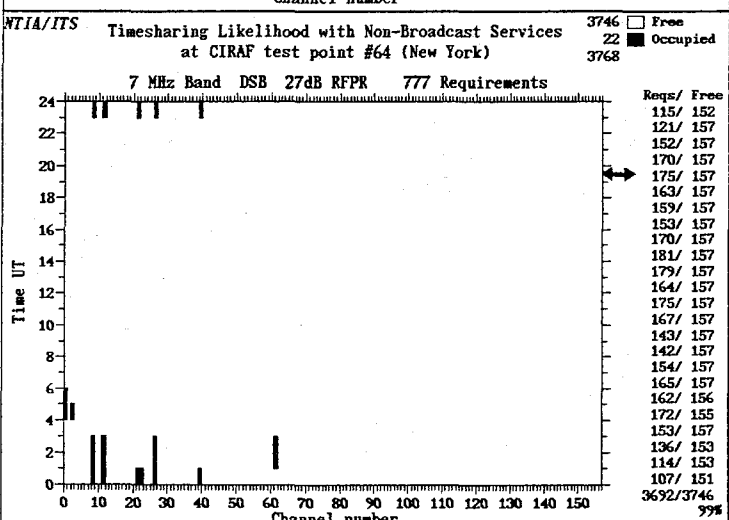
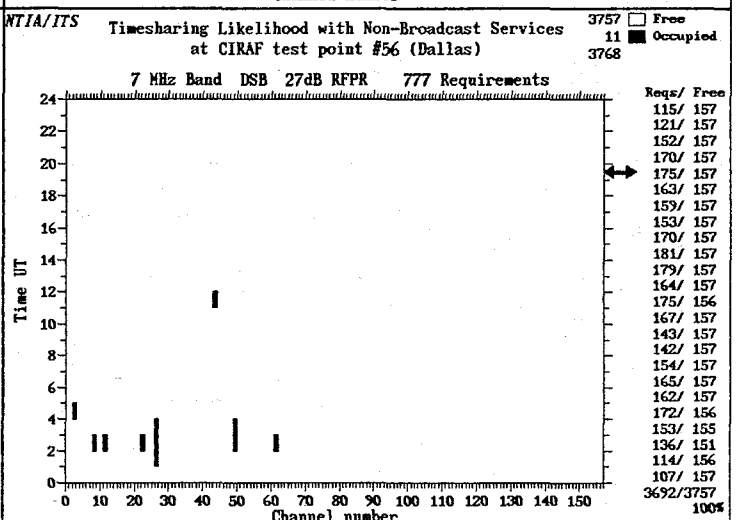
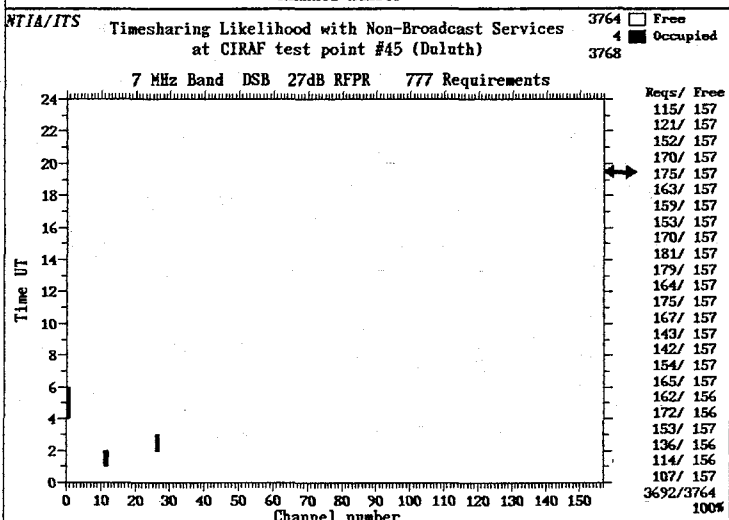
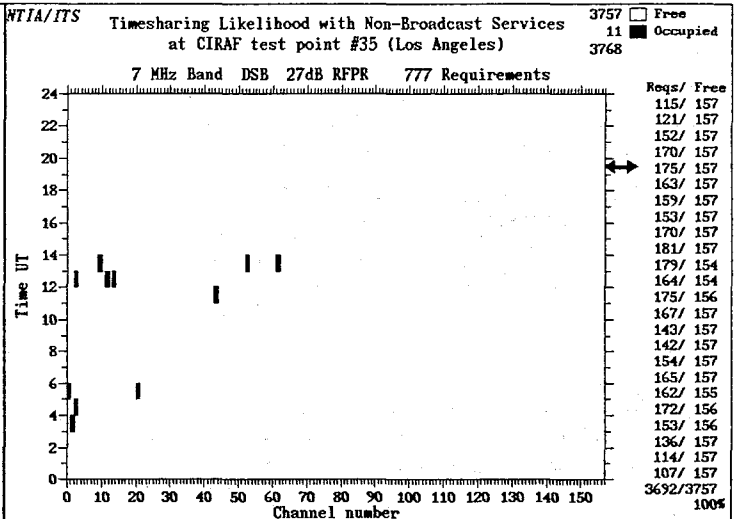
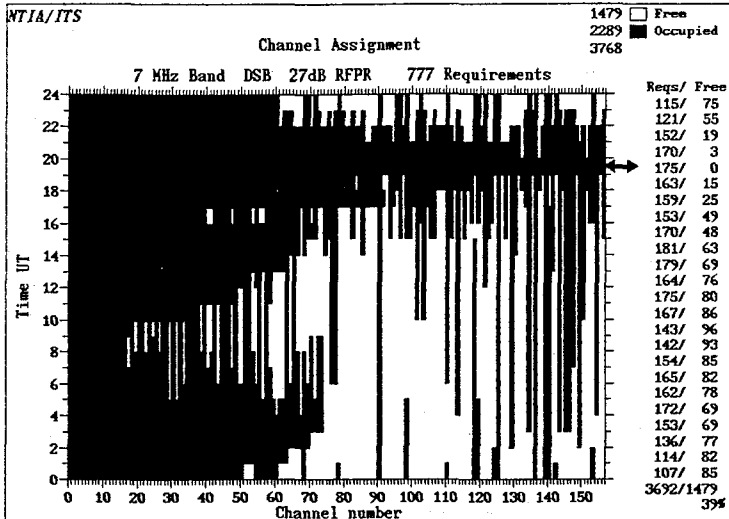
<-> - Indicates most congested hour (free space may appear for this hour based on frequency continuity constraints for requirements in some other hour).

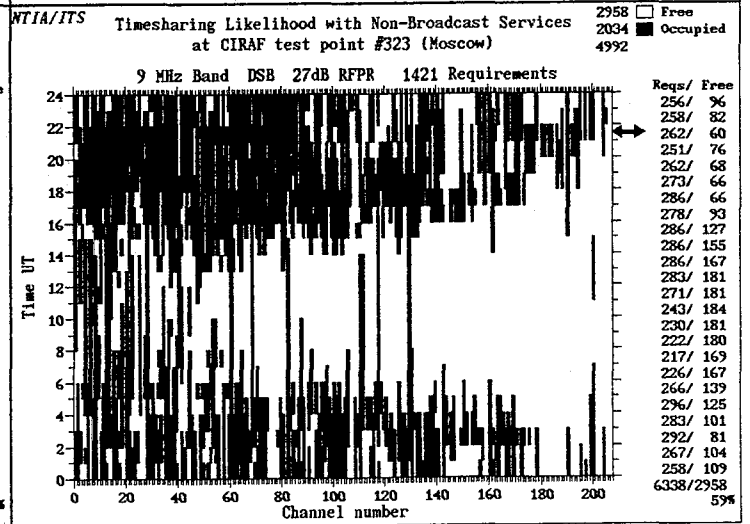
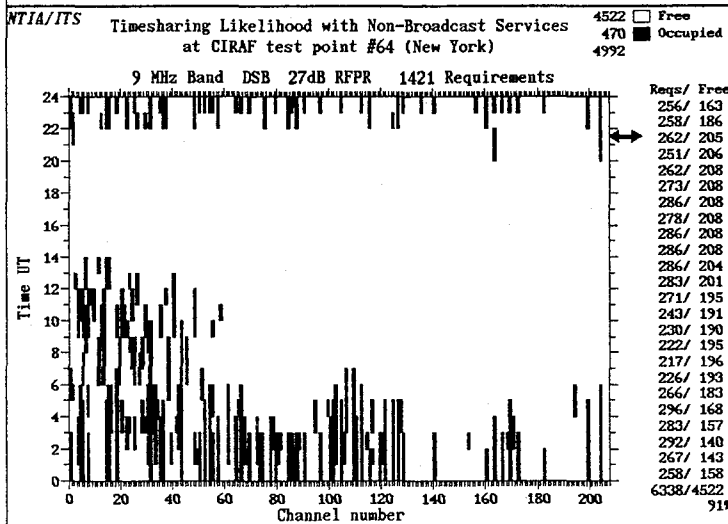
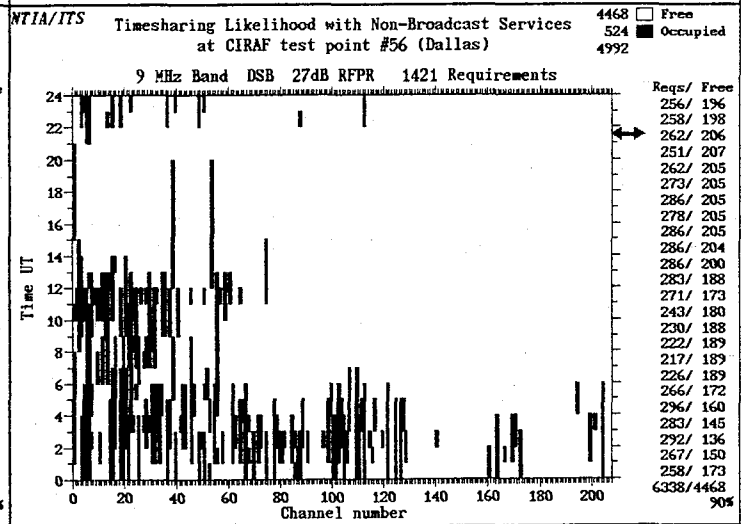
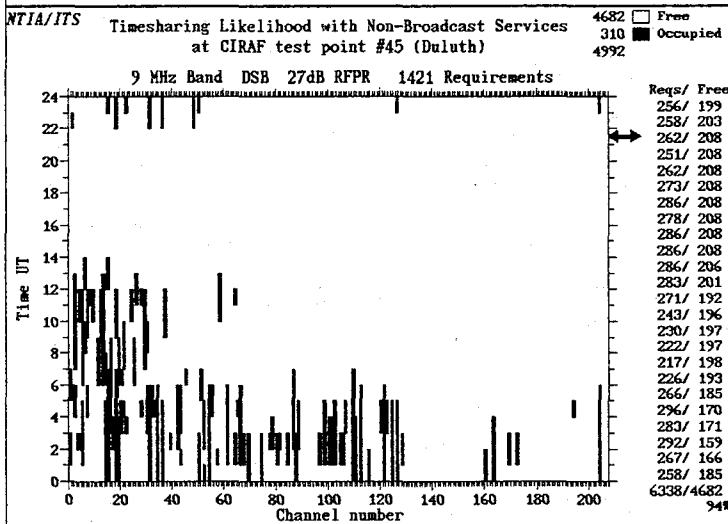
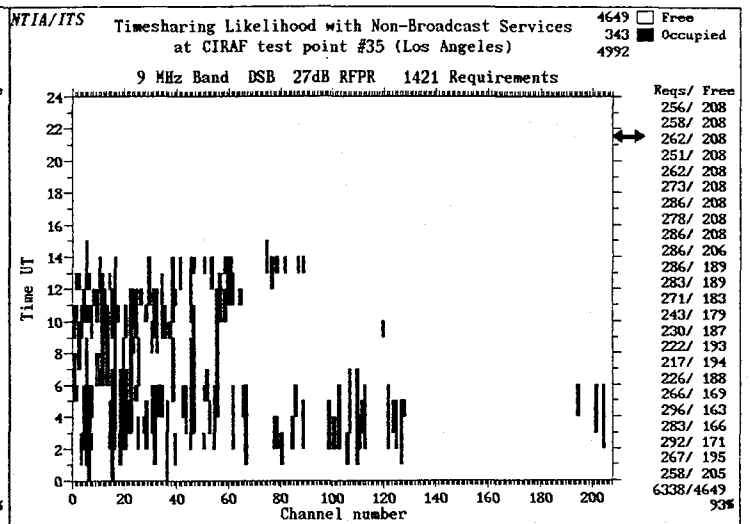
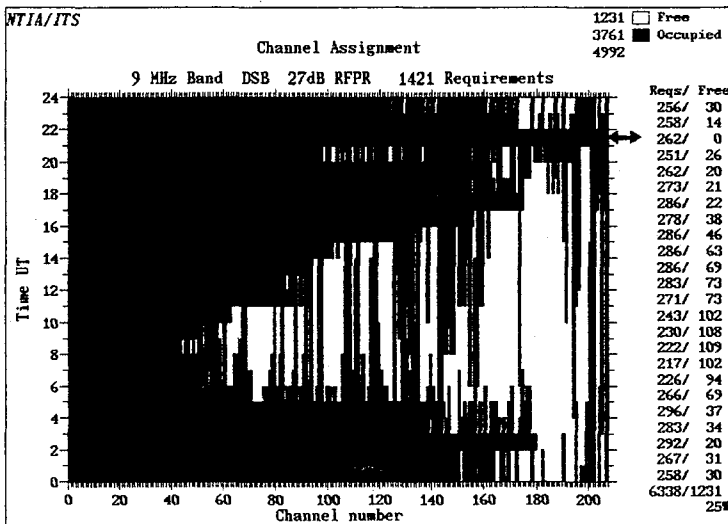
X % - Percentage of free space to total space available.

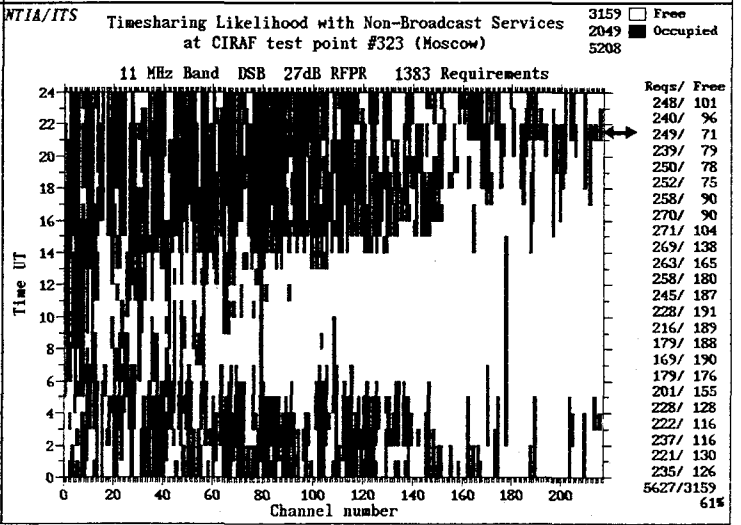
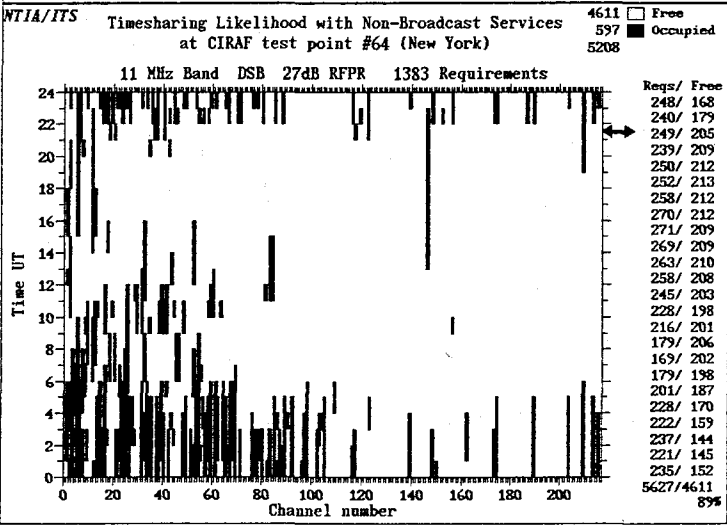
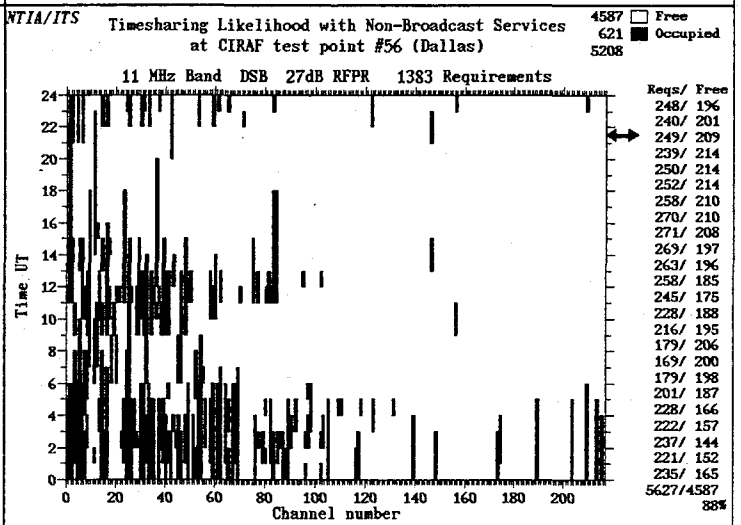
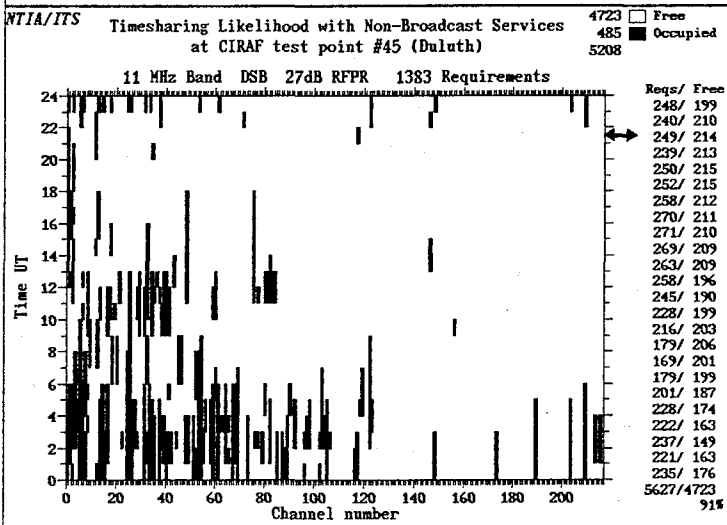
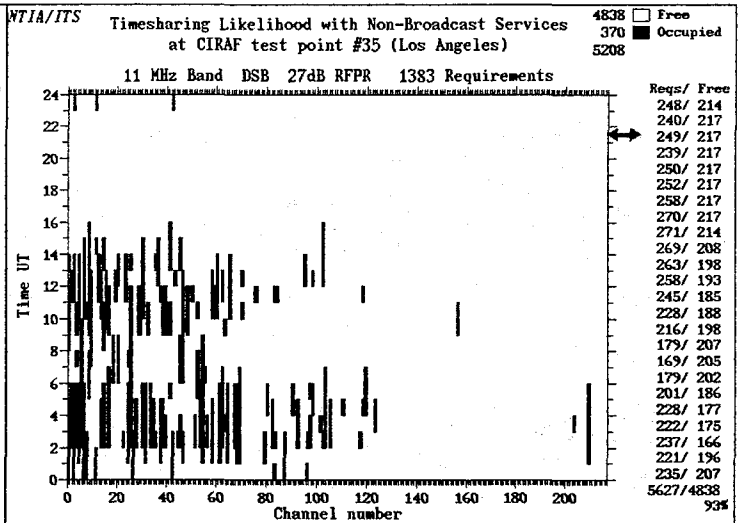
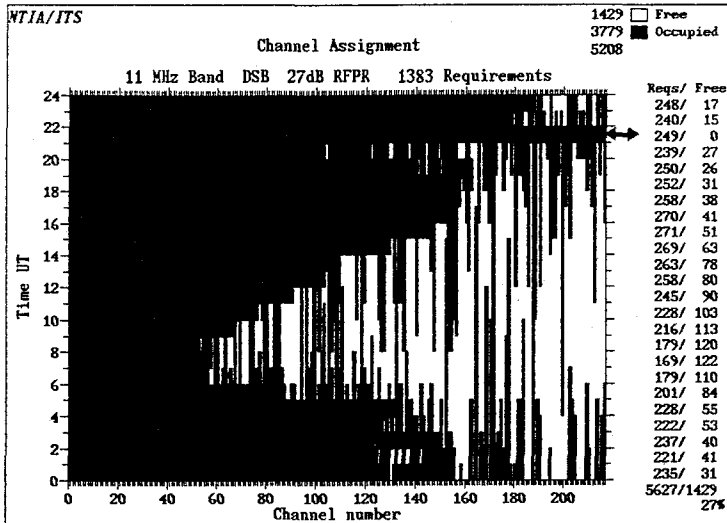
Note: The number of requirements assigned in a channel hour may appear if space permits.



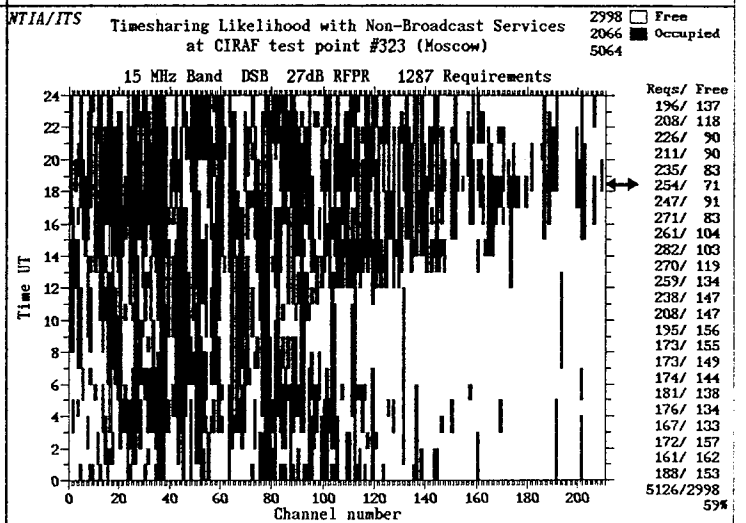
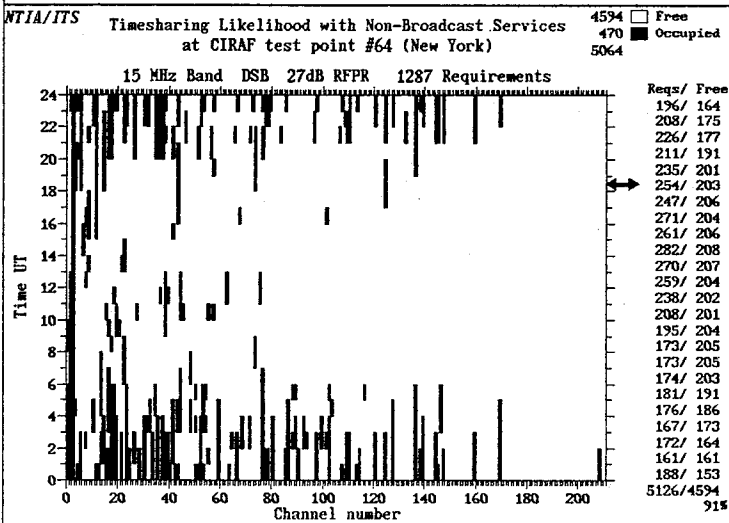
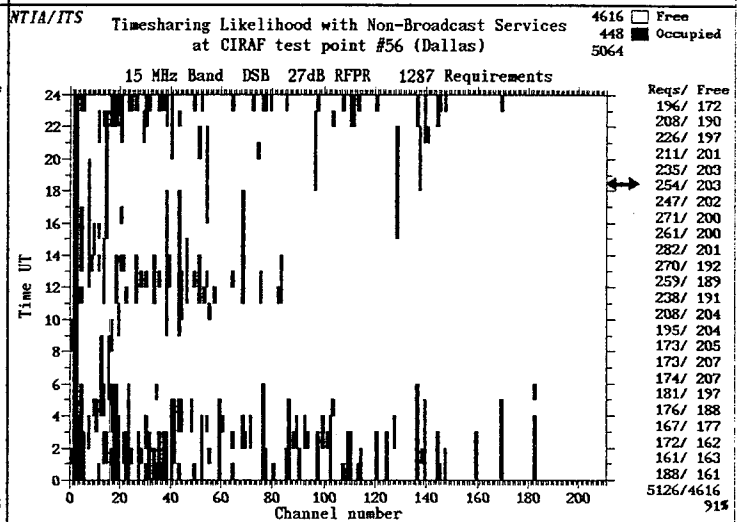
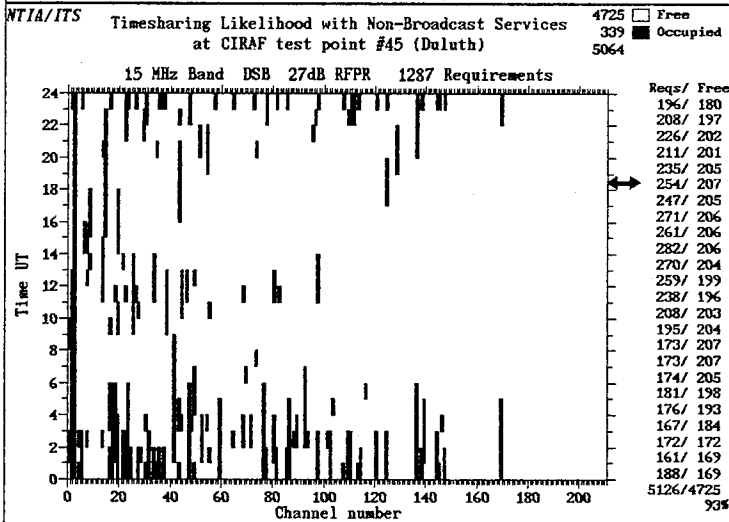
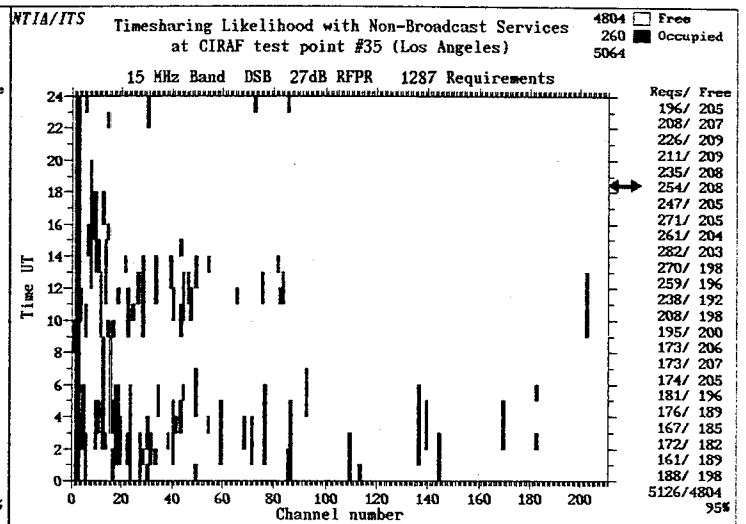
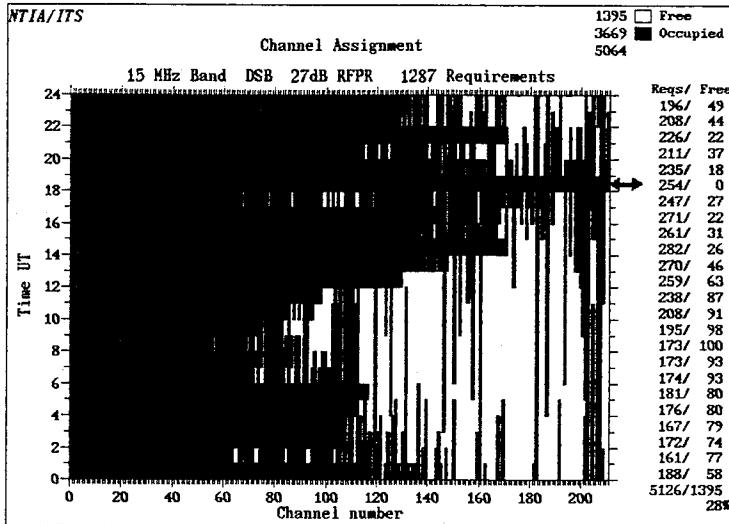


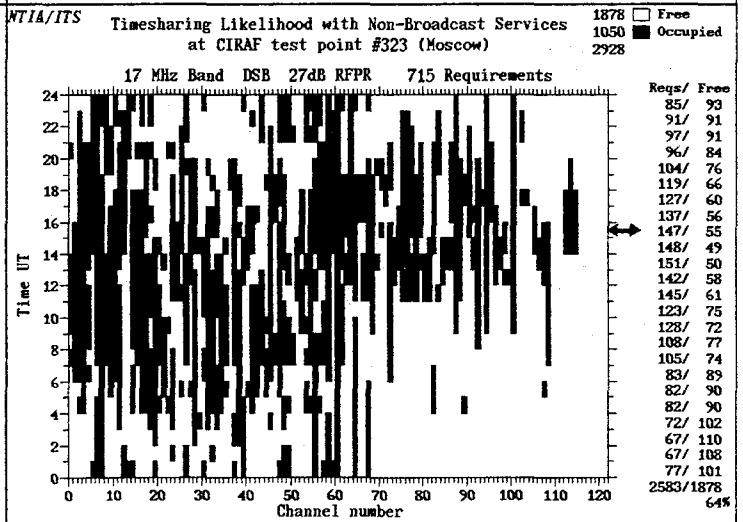
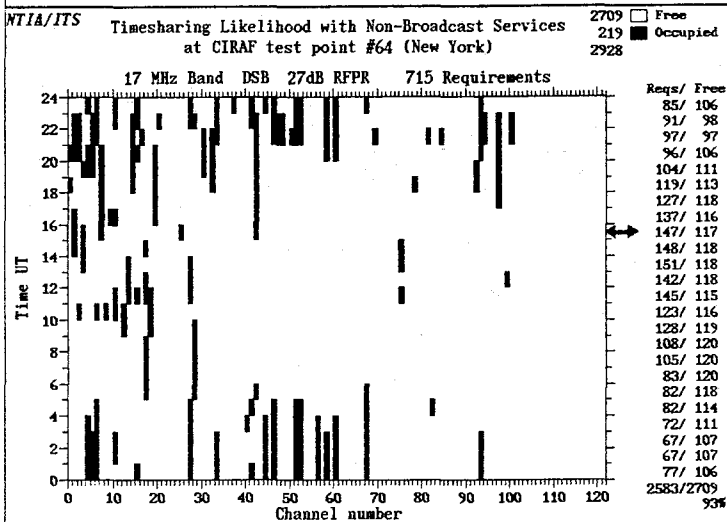
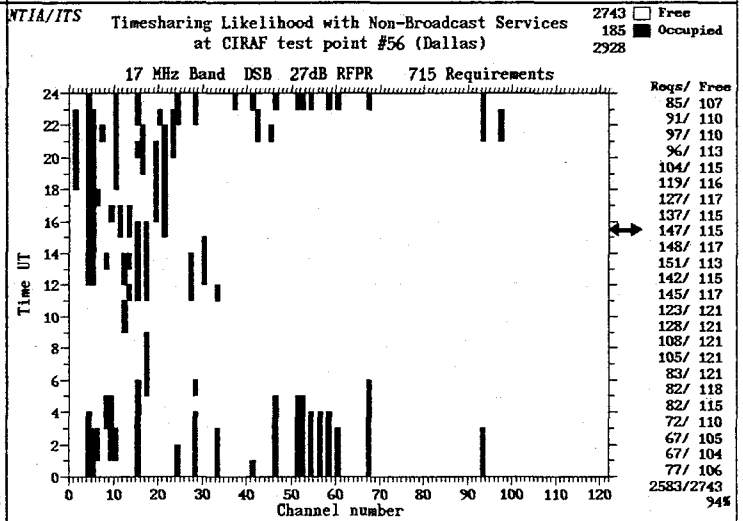
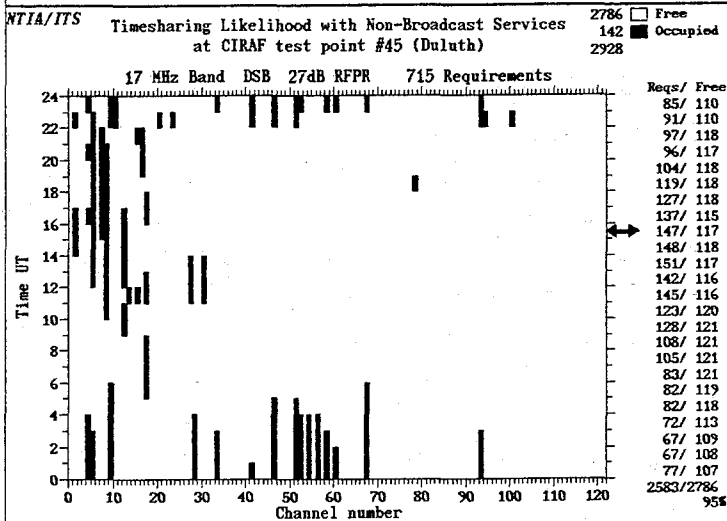
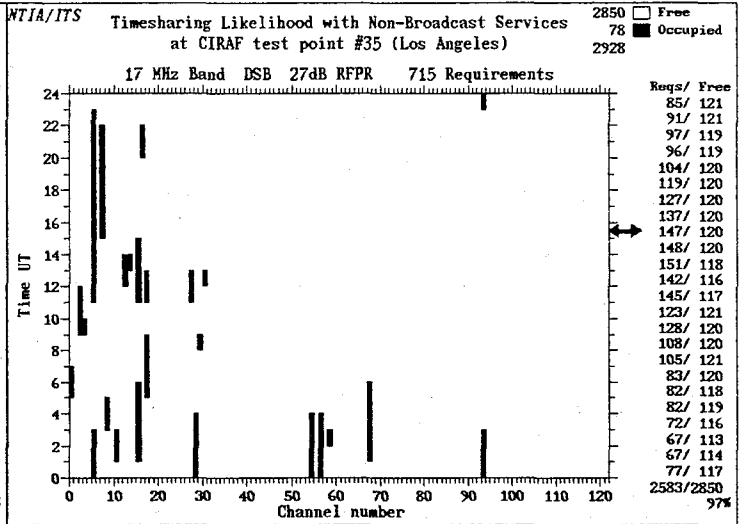
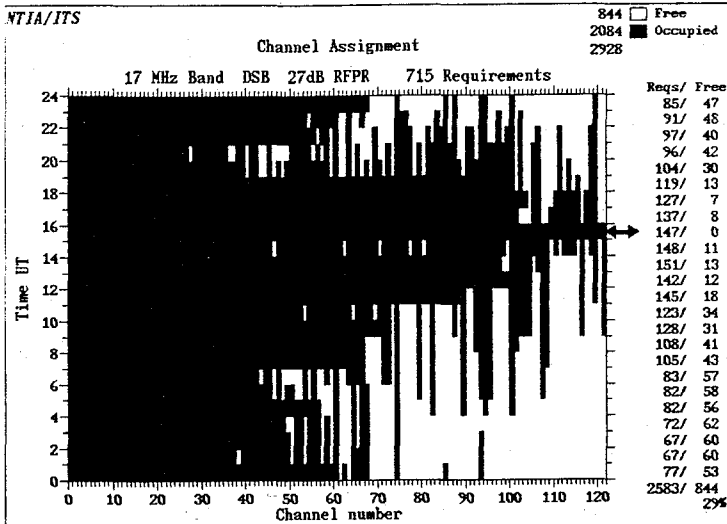


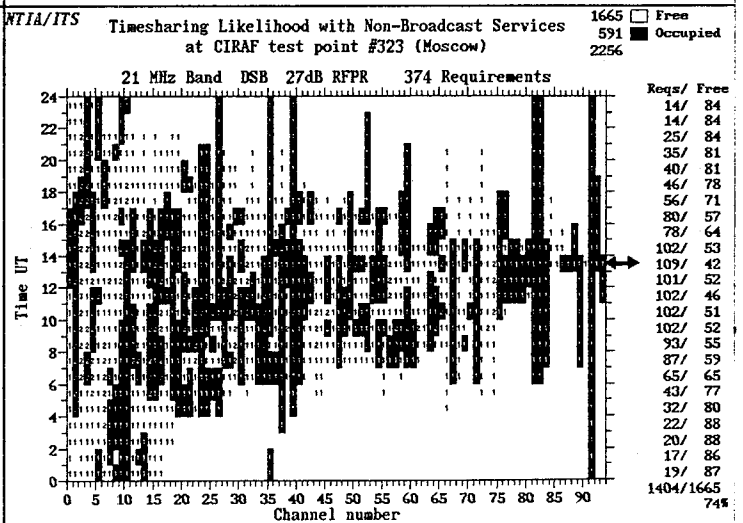
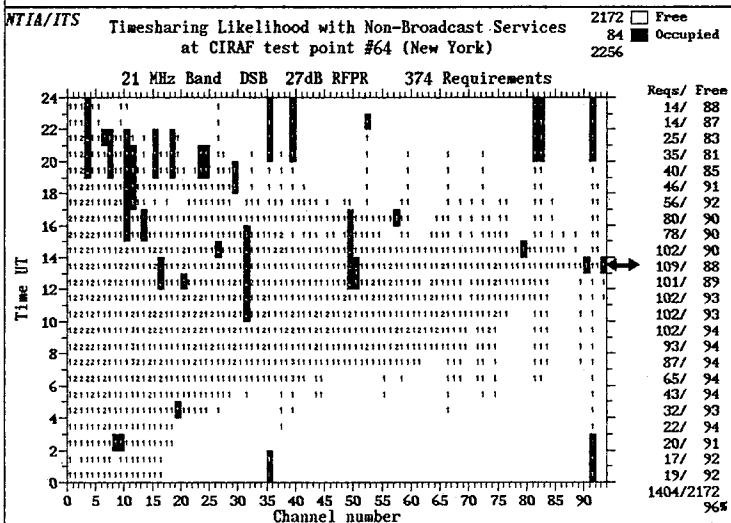
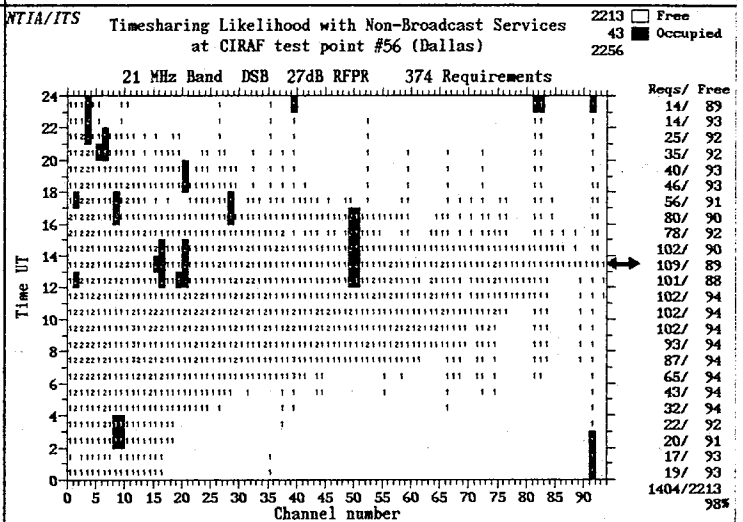
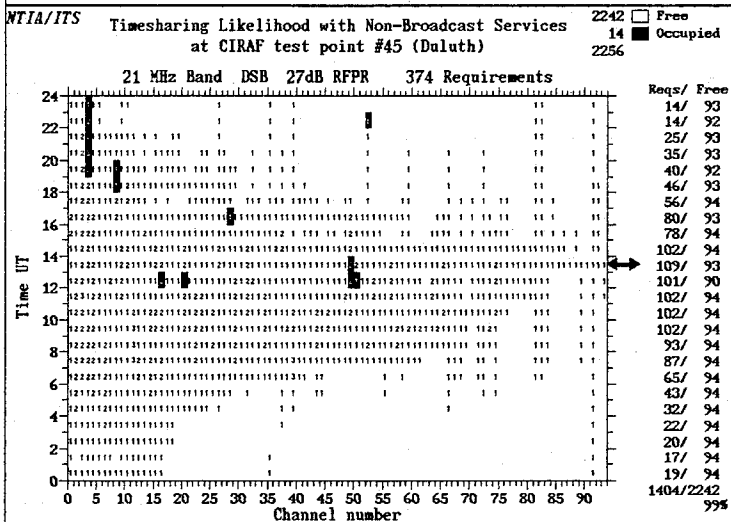
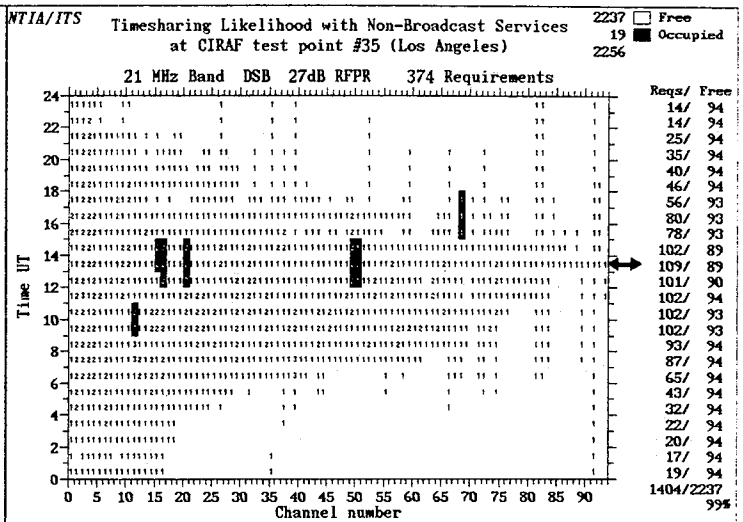
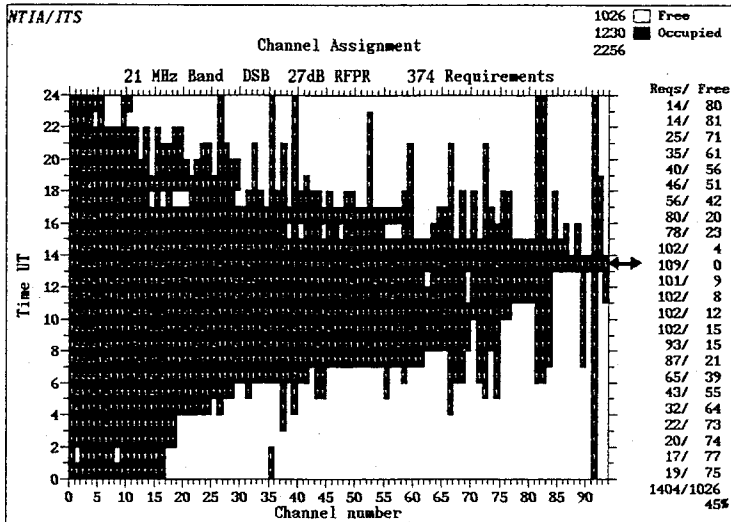


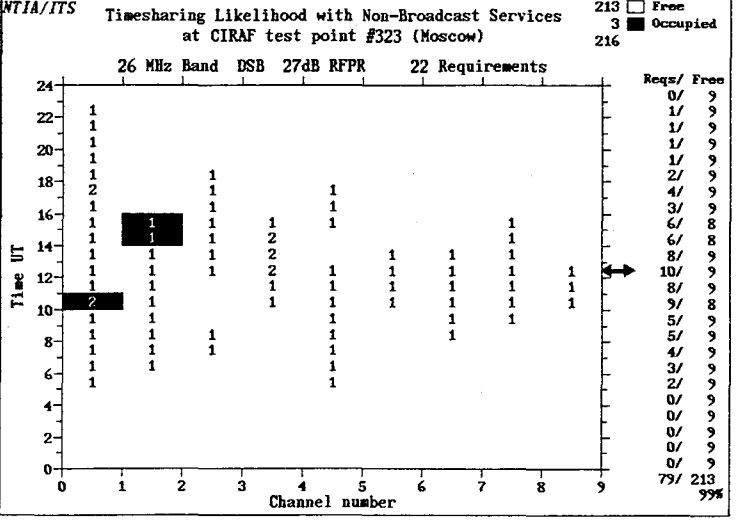
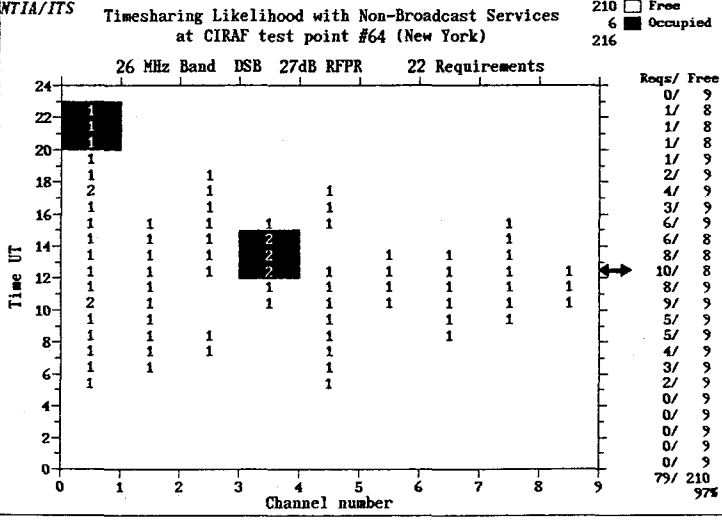
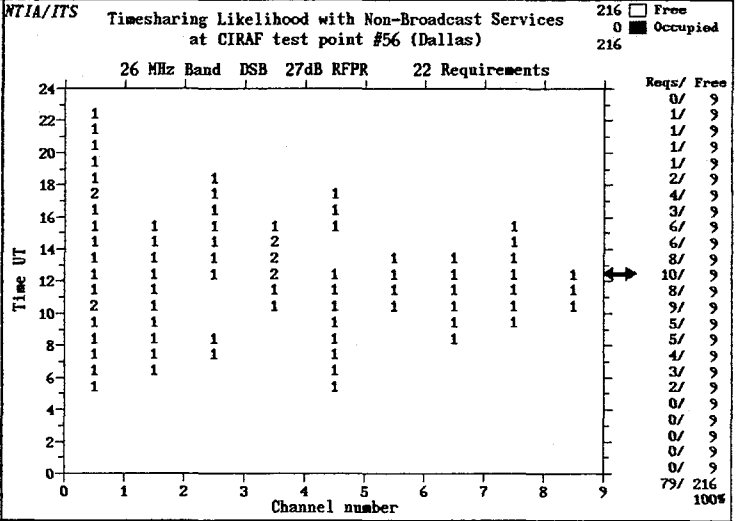
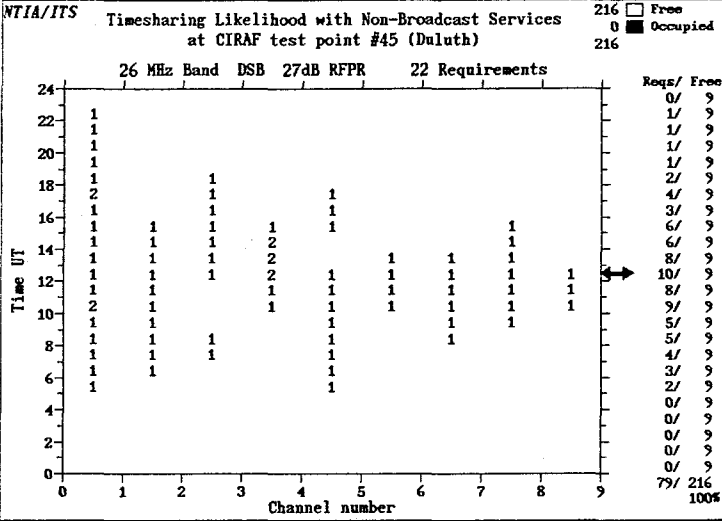
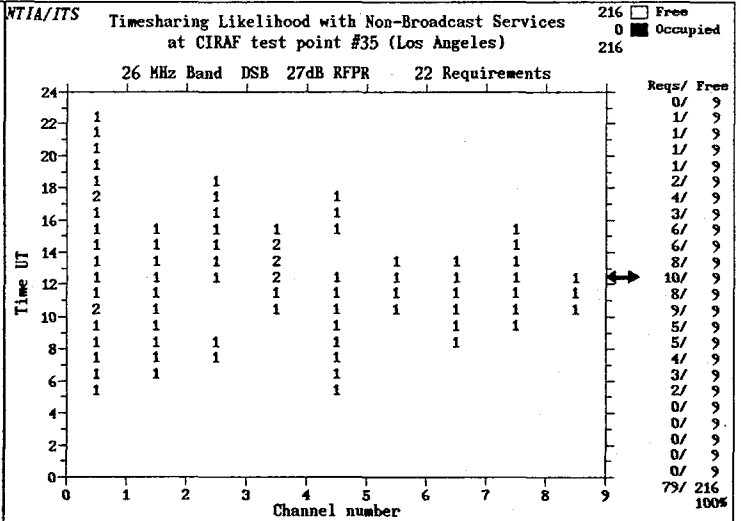
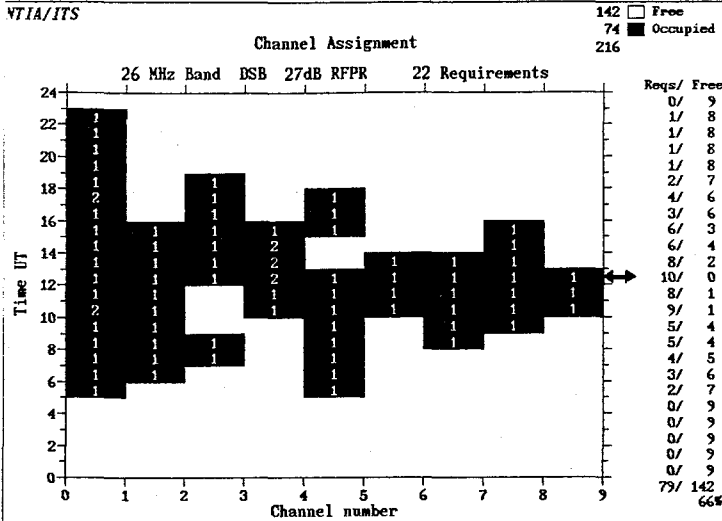


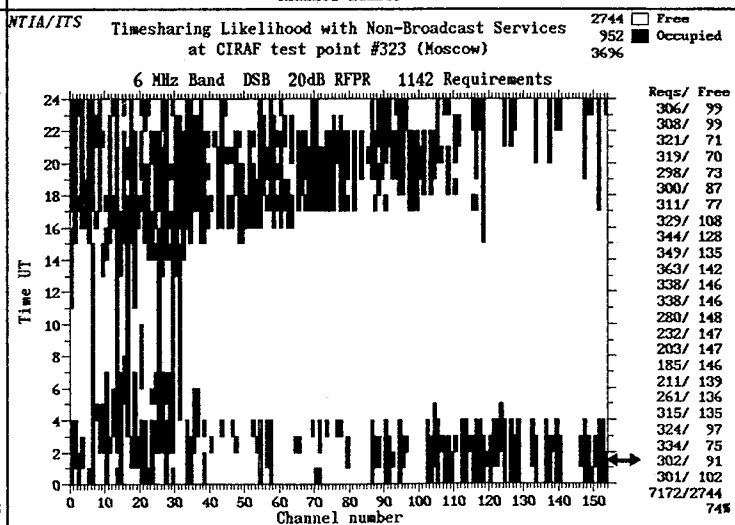
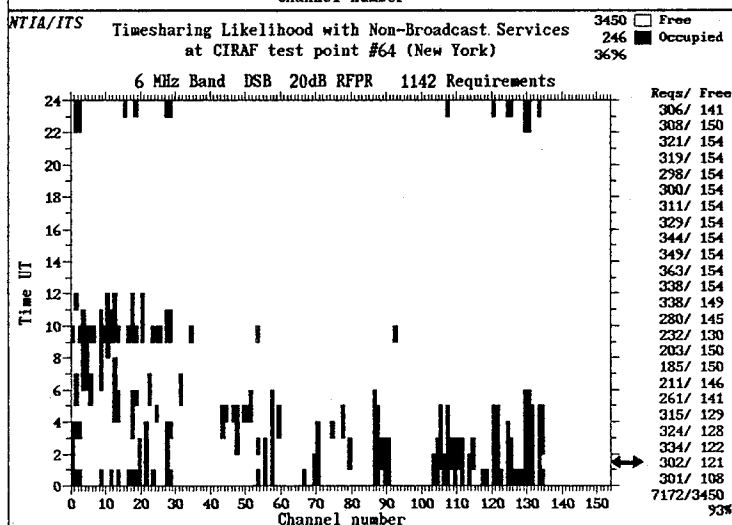
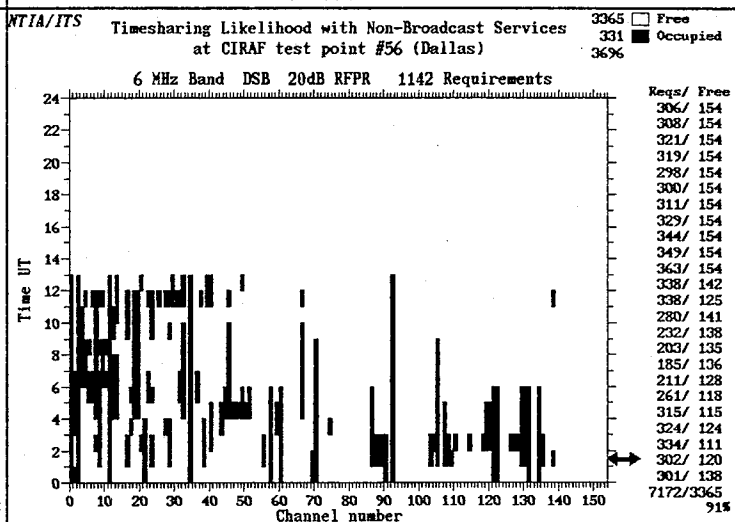
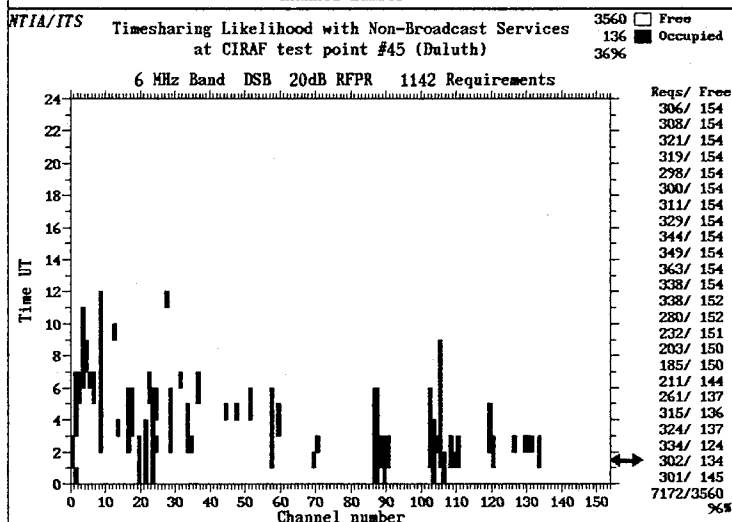
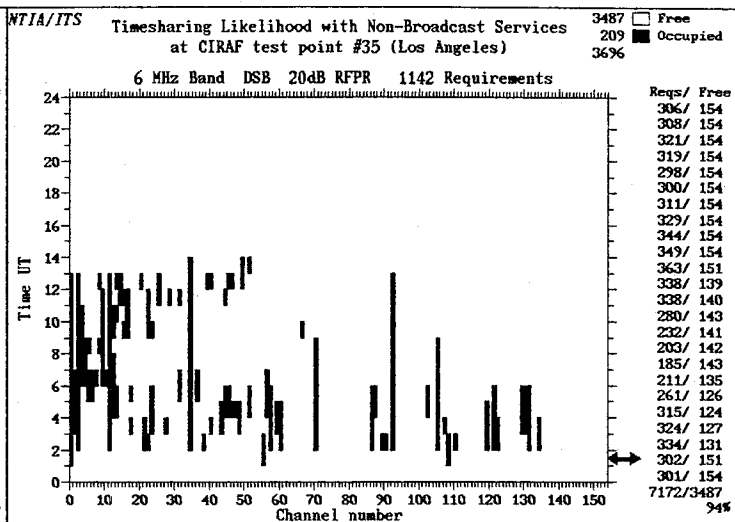
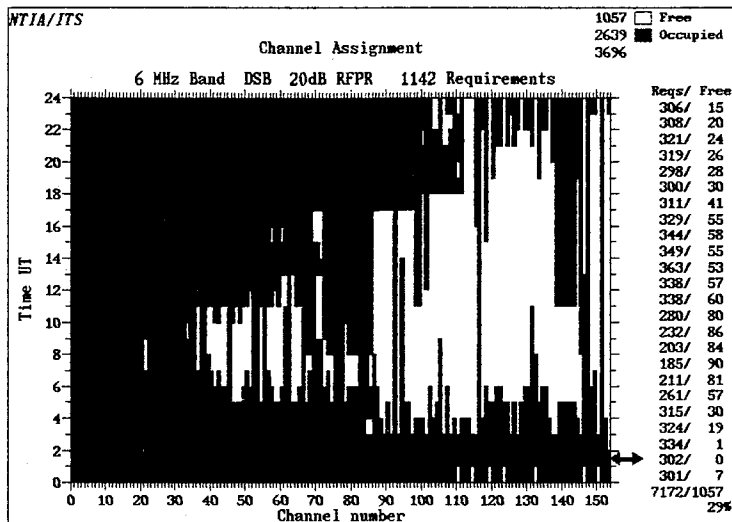


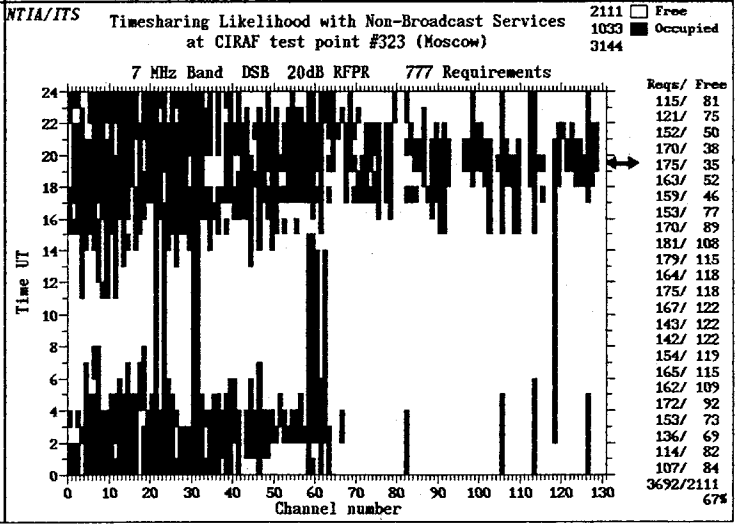
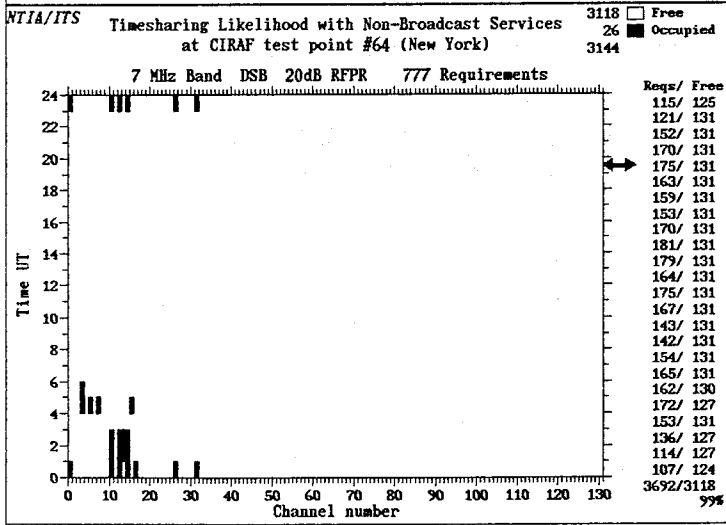
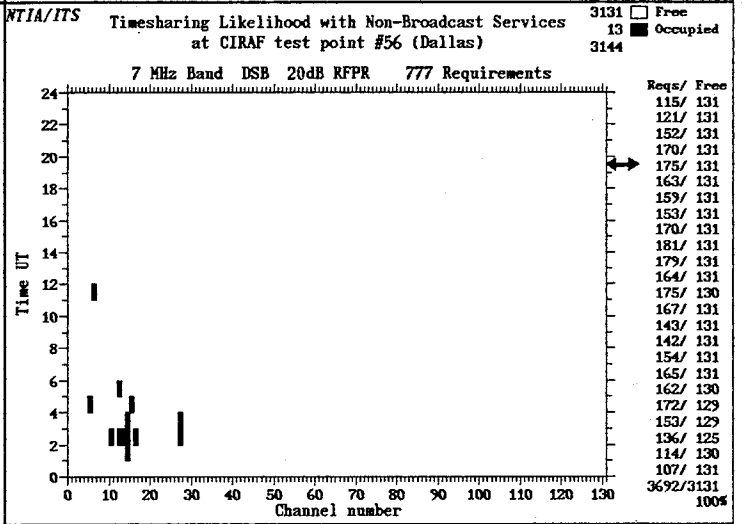
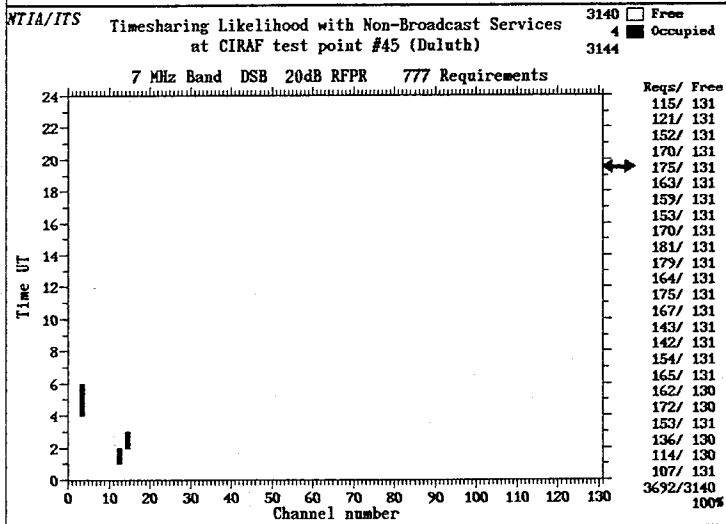
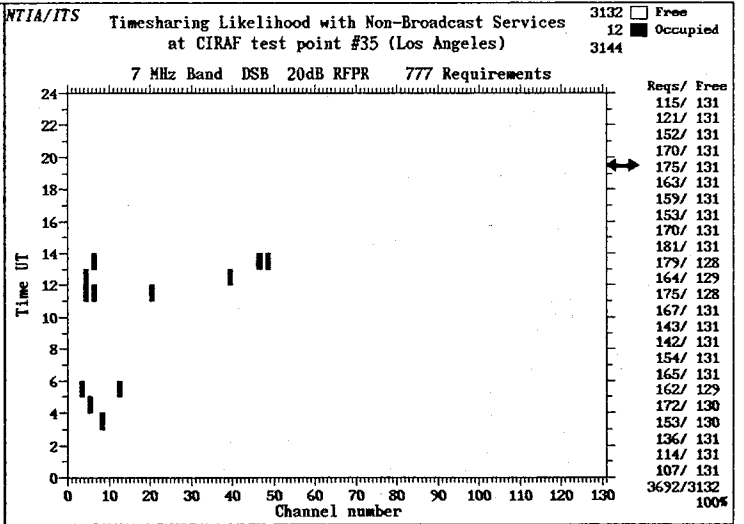
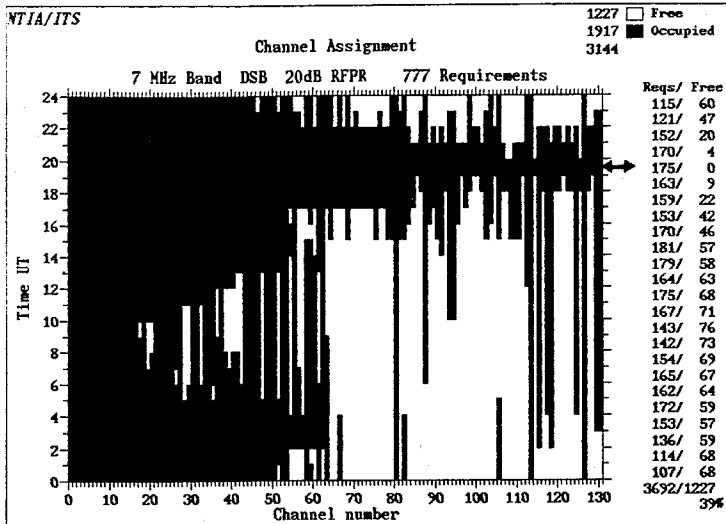


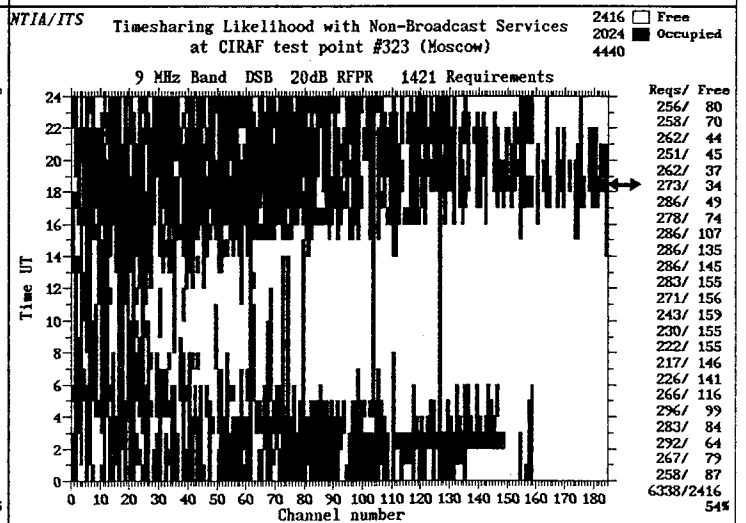
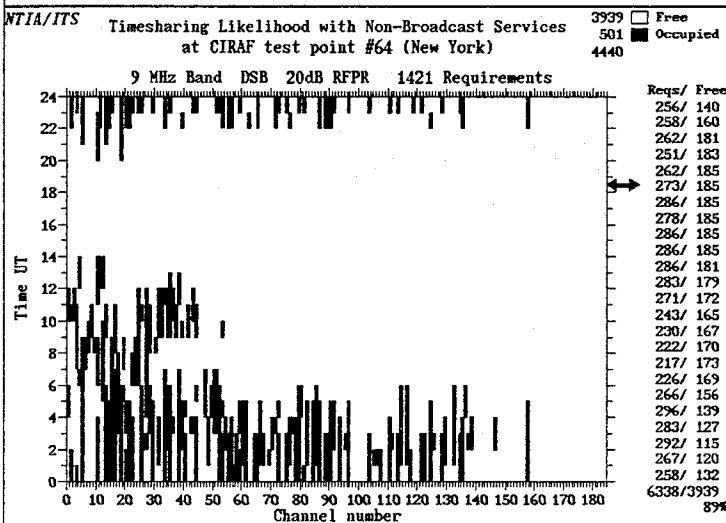
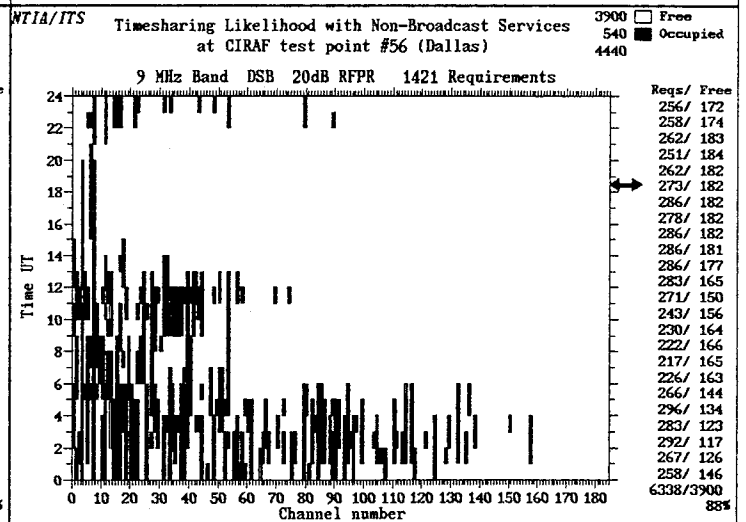
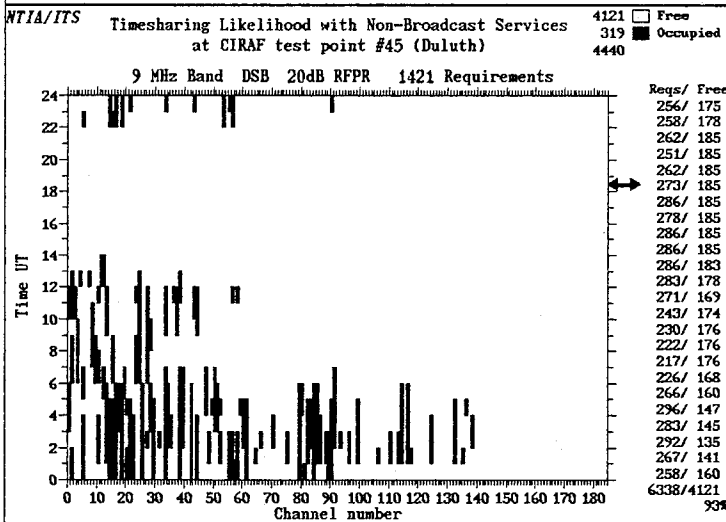
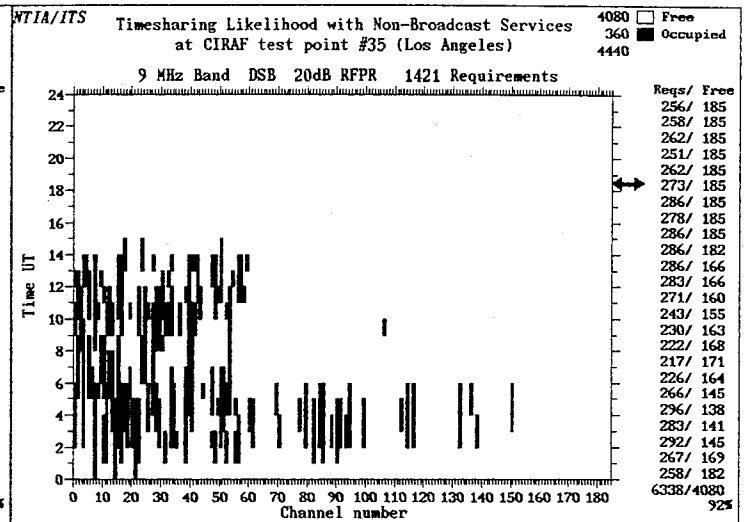
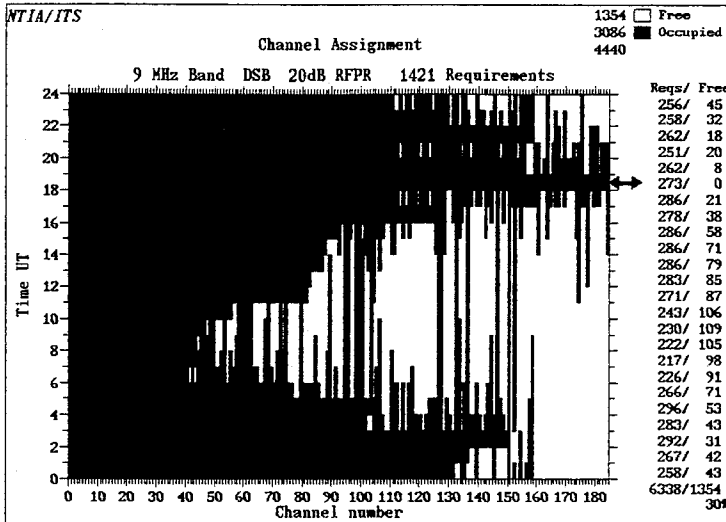


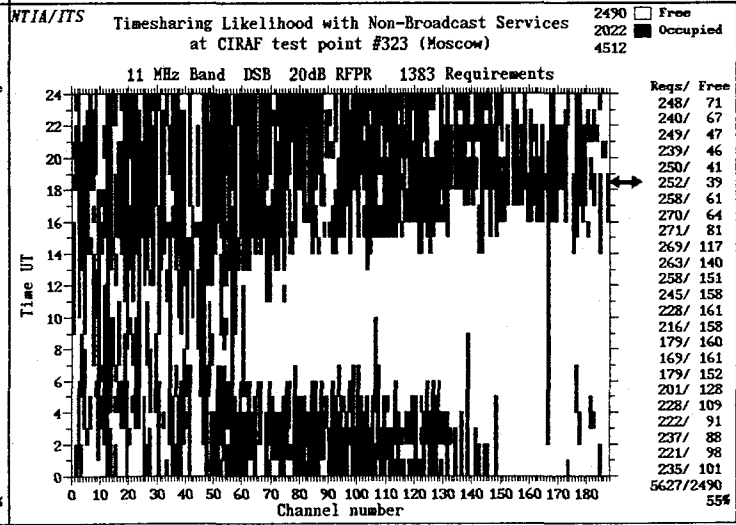
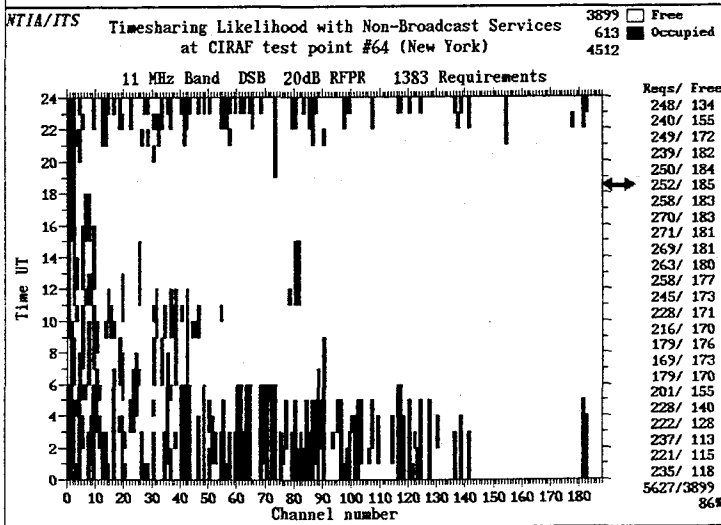
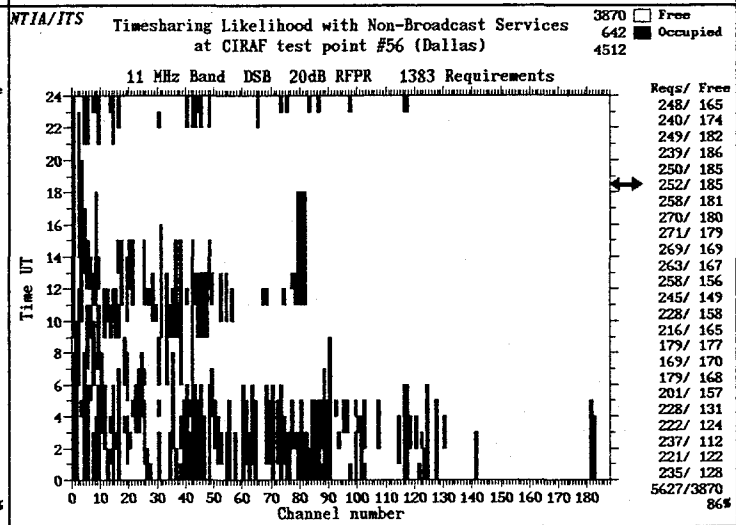
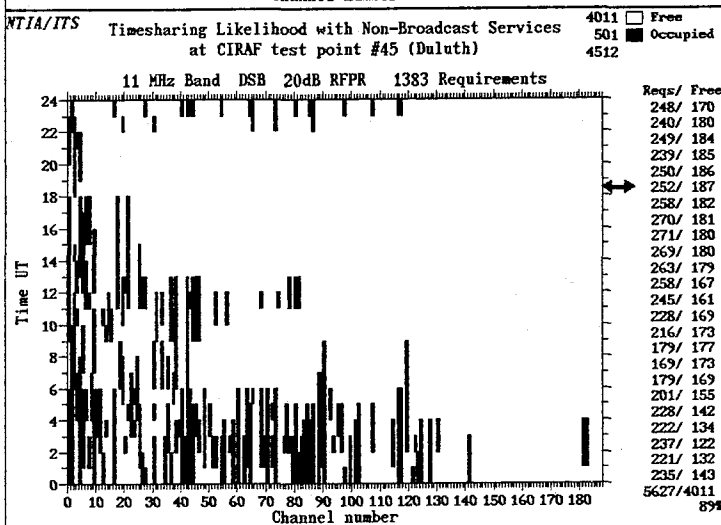
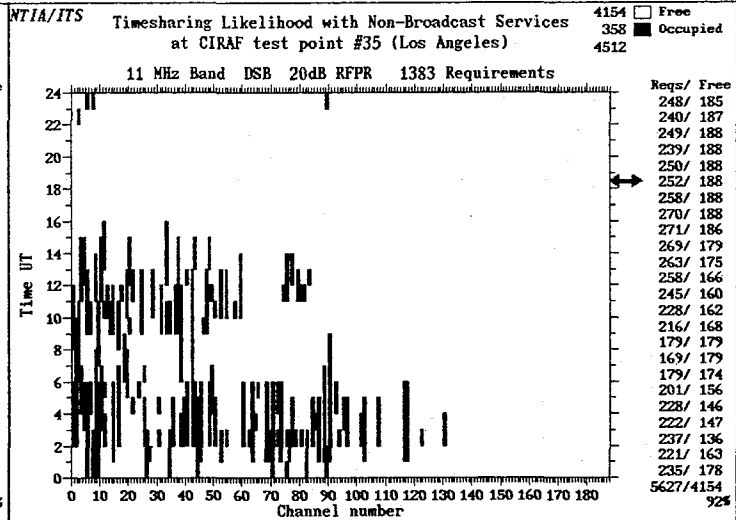
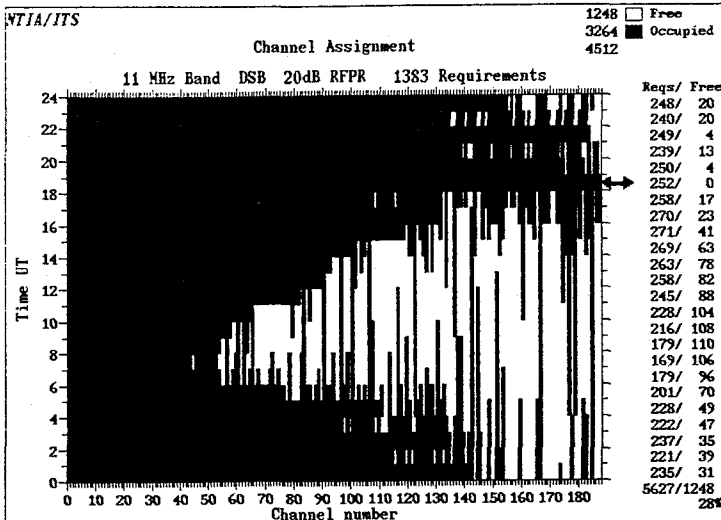




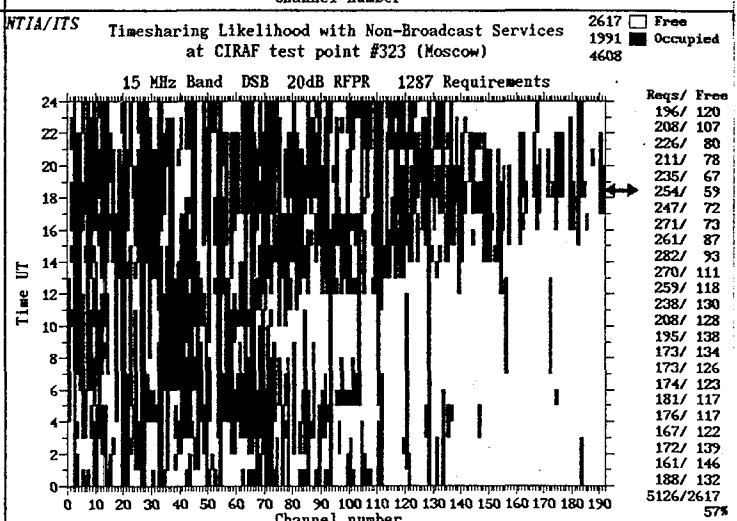
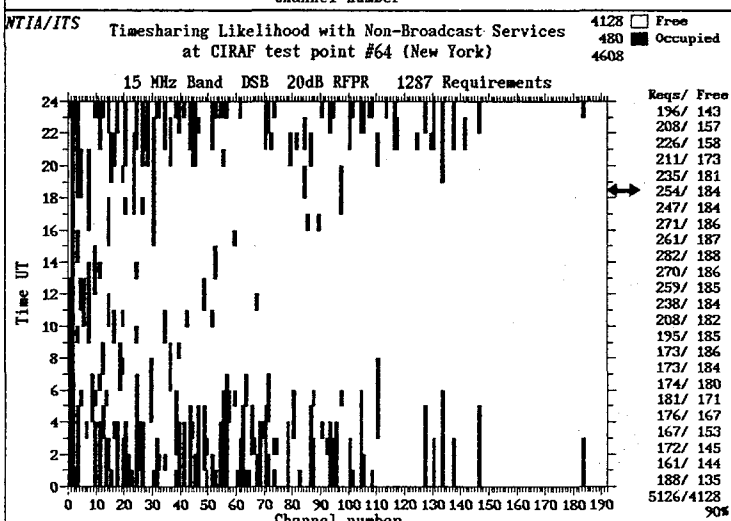
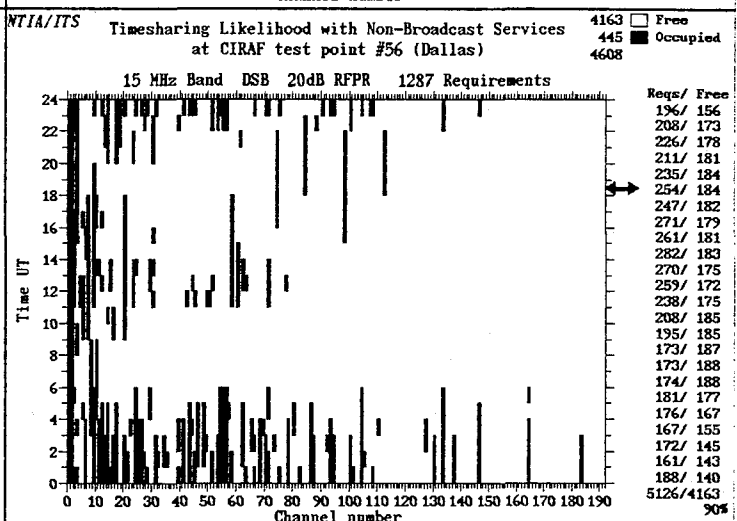
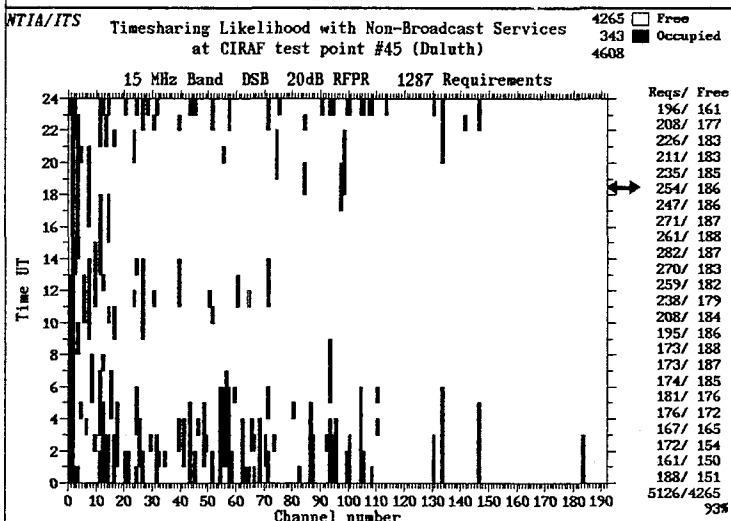
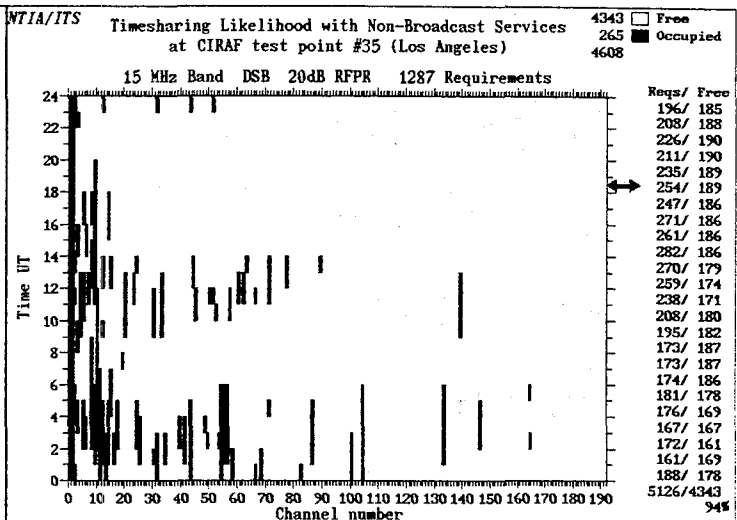
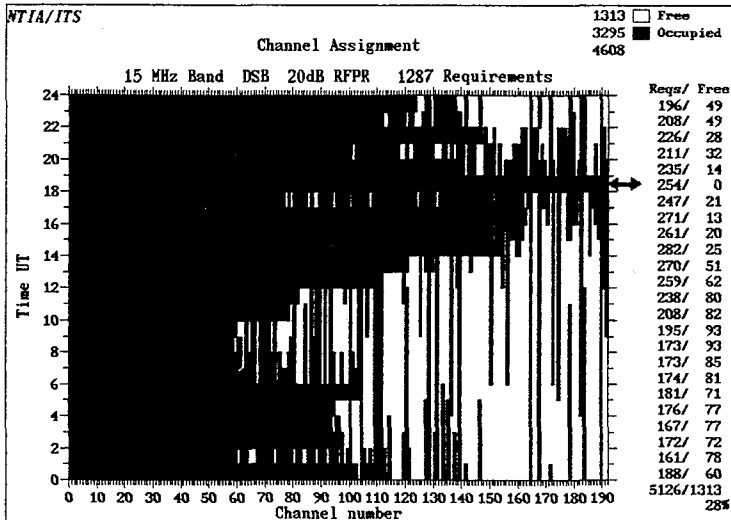


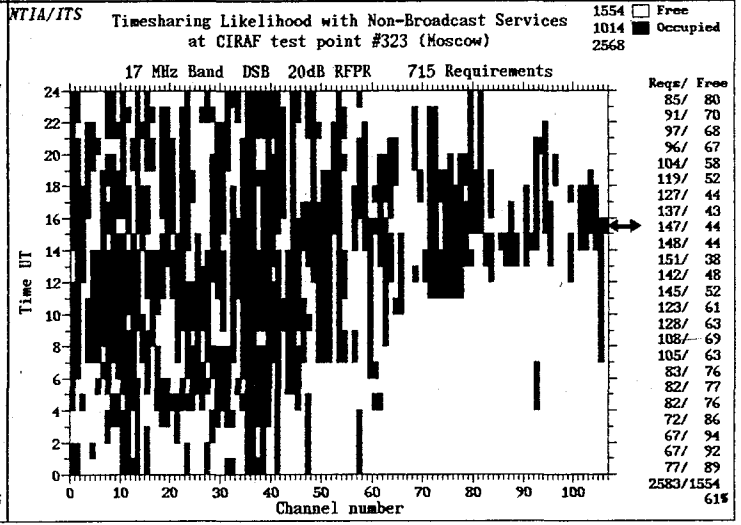
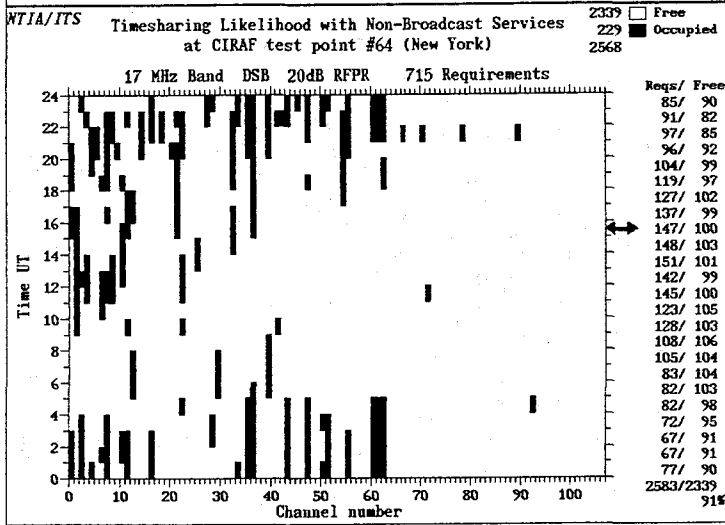
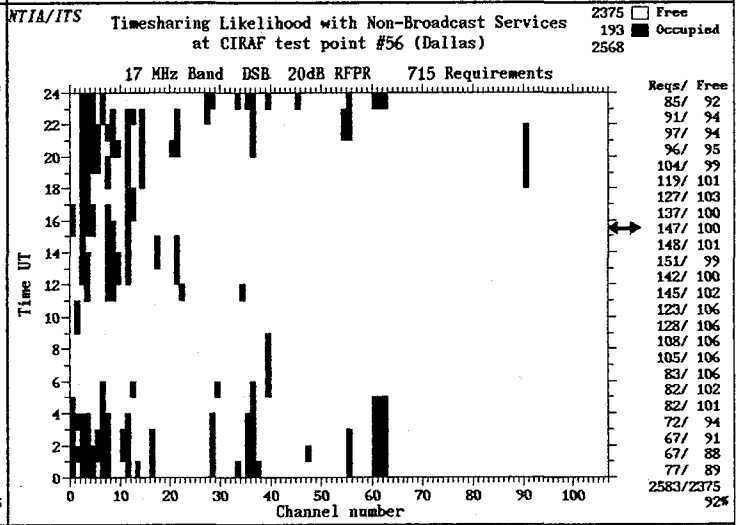
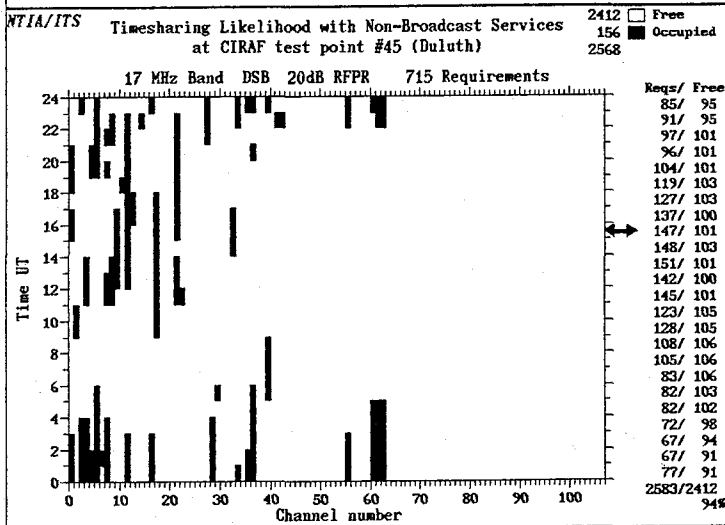
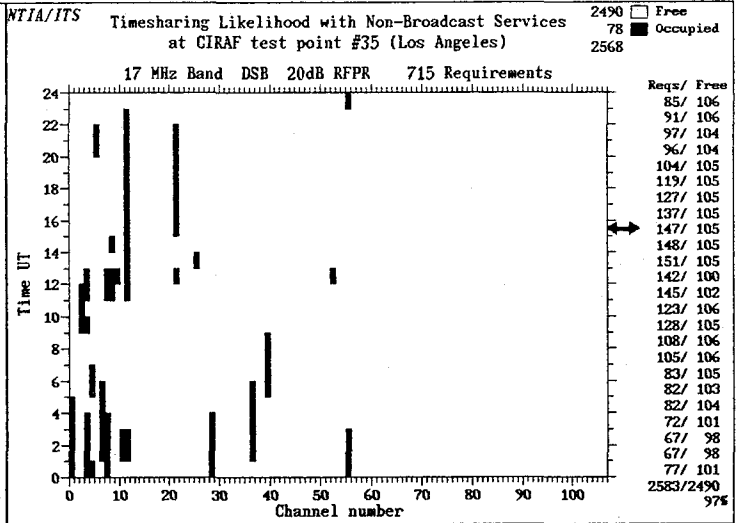
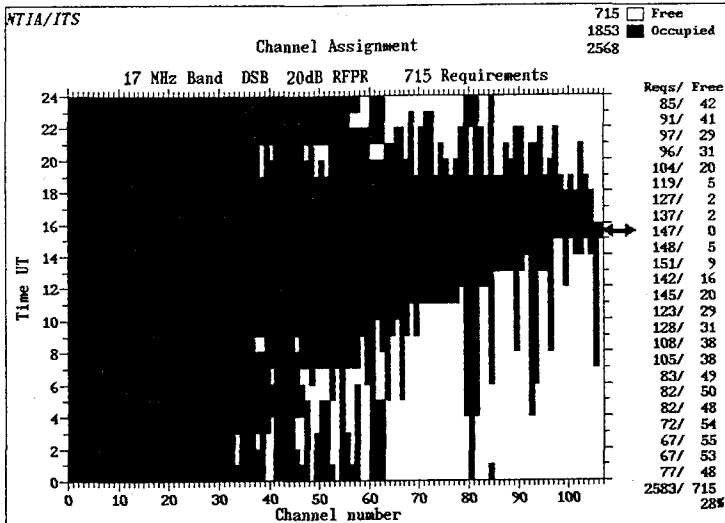


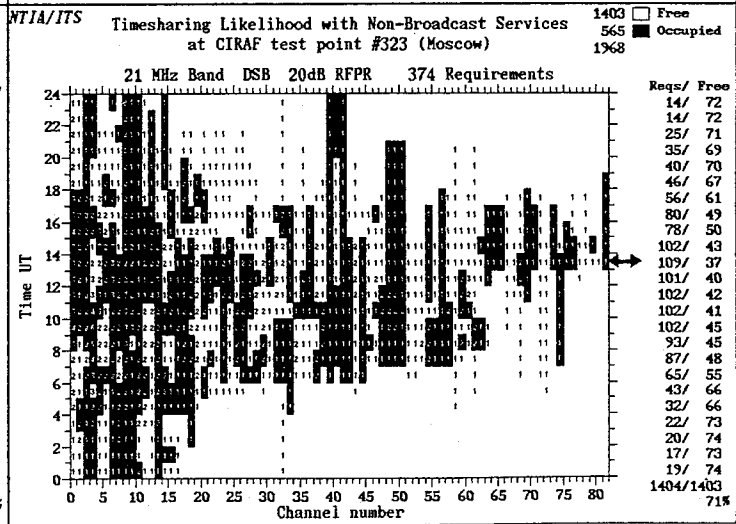
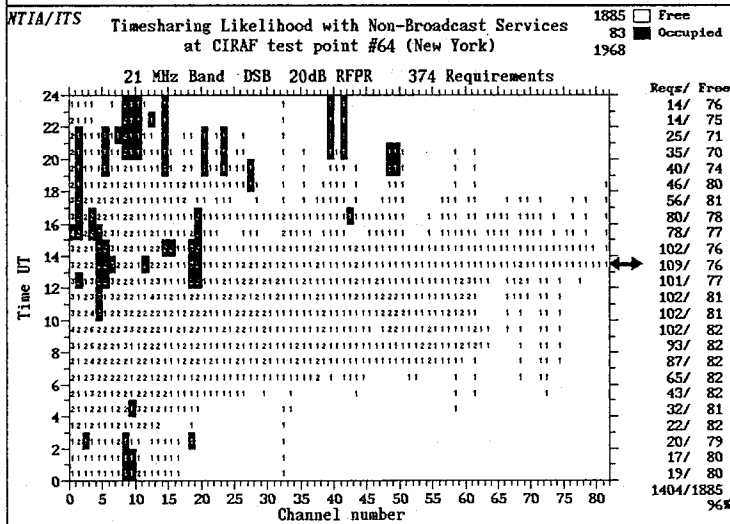
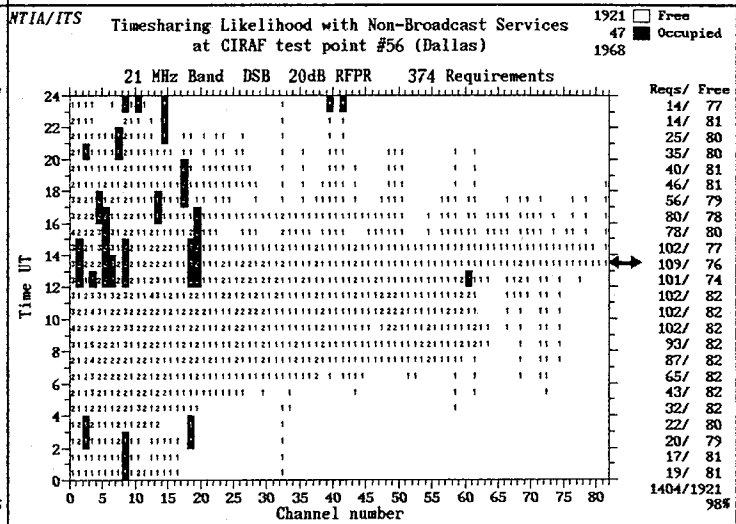
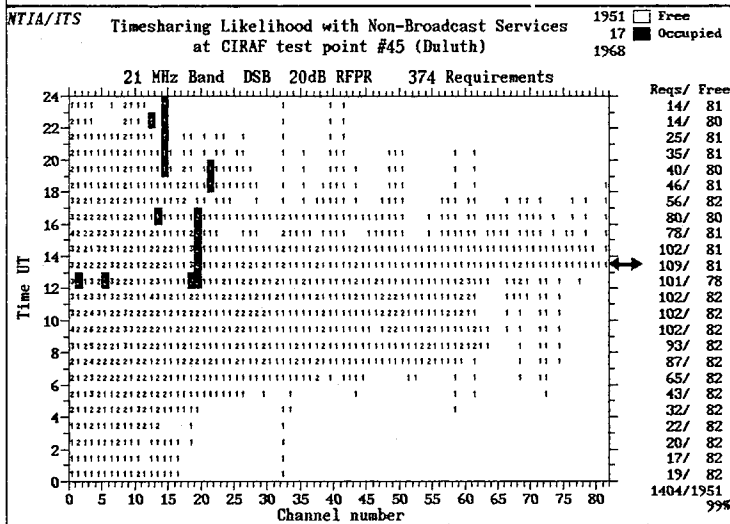
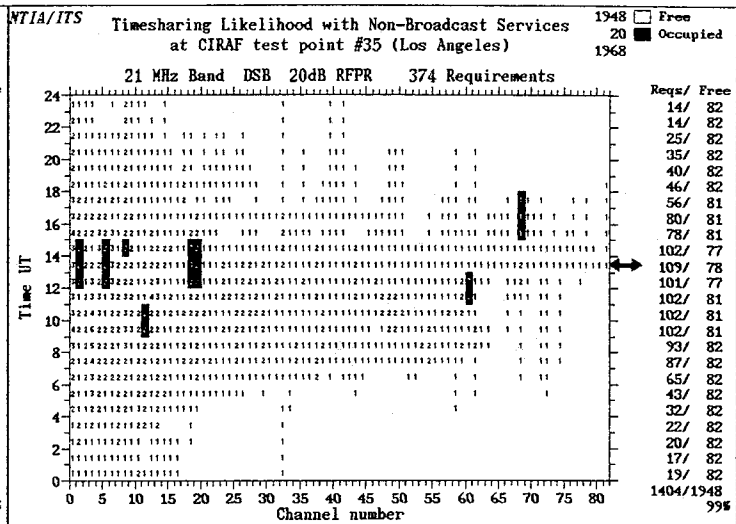
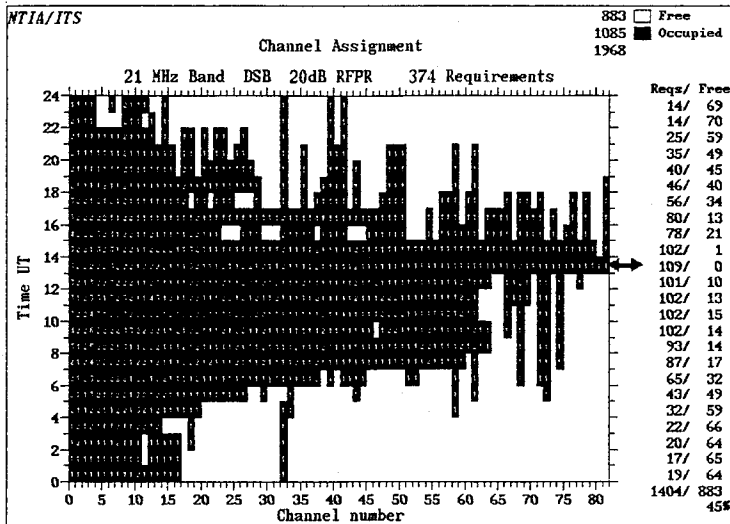


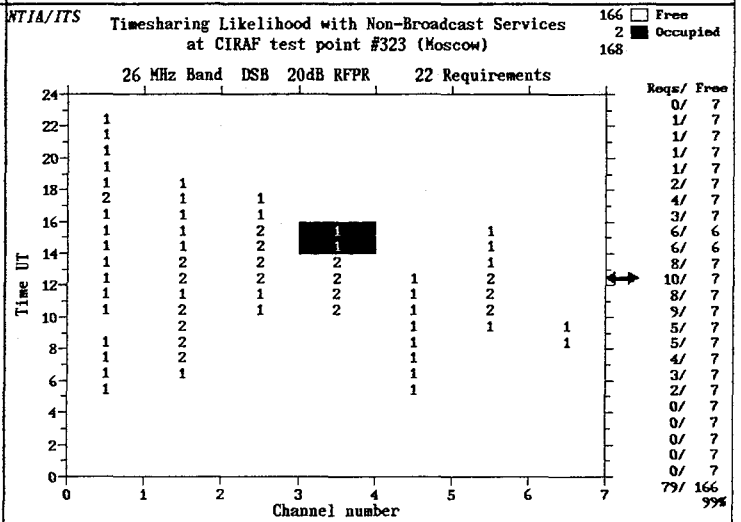
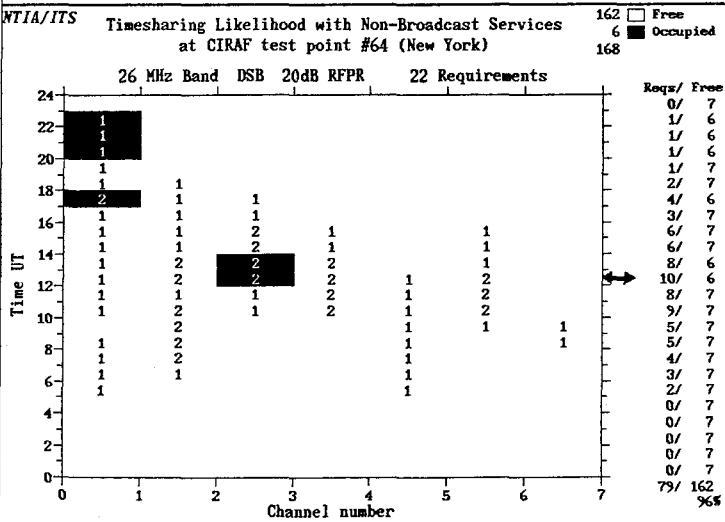
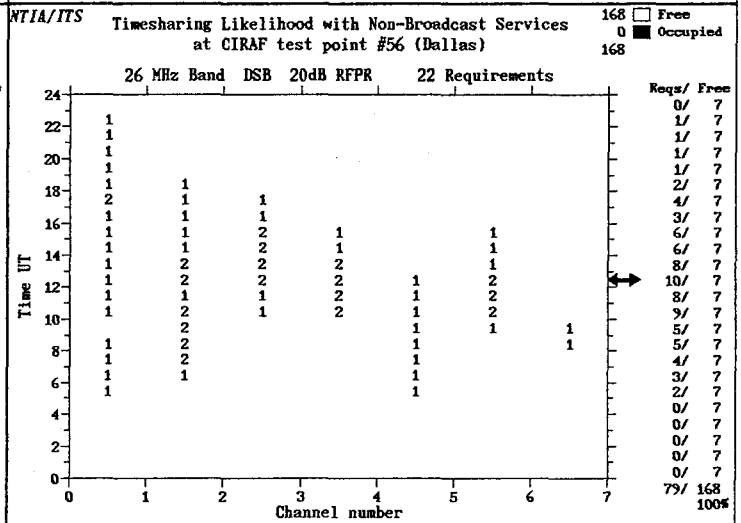
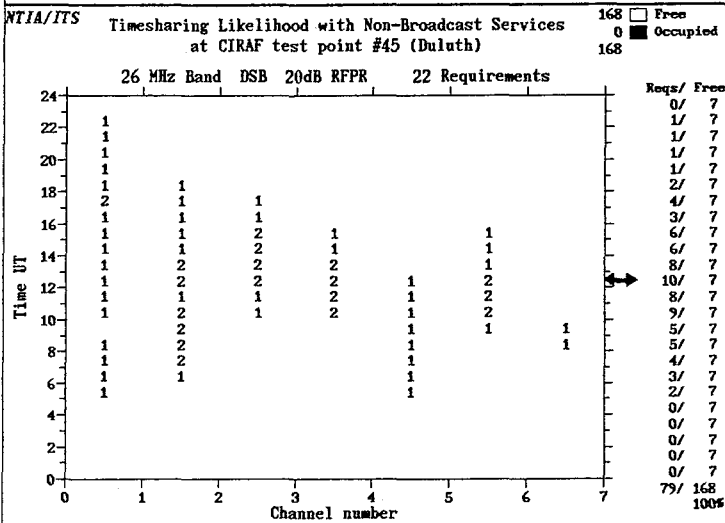
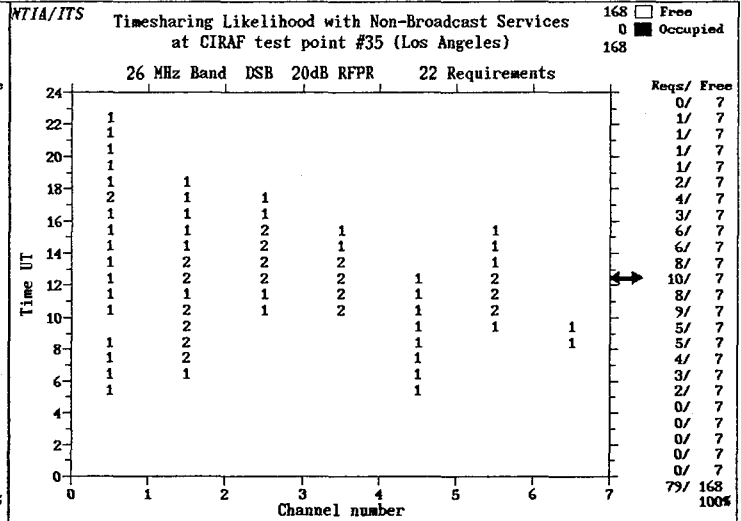
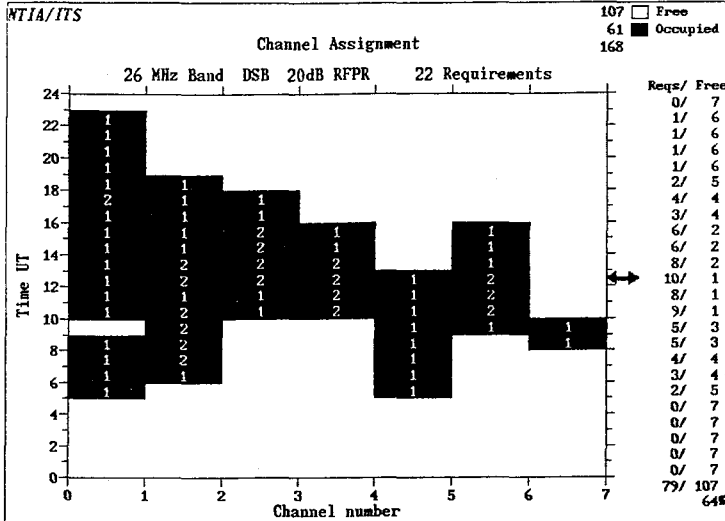


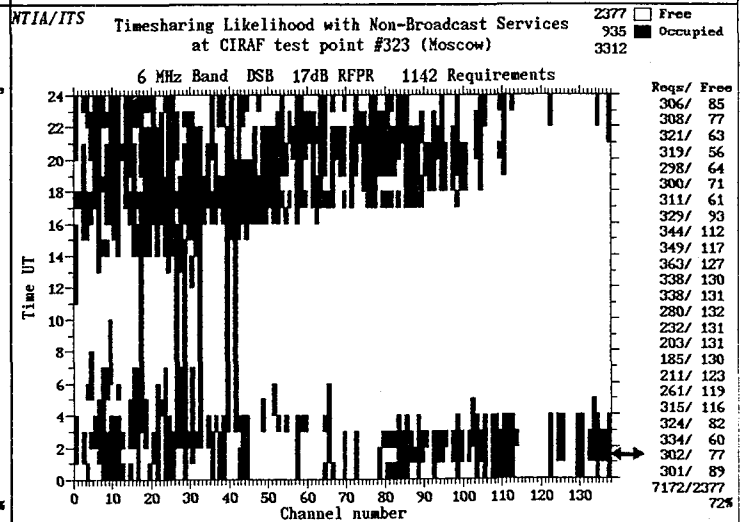
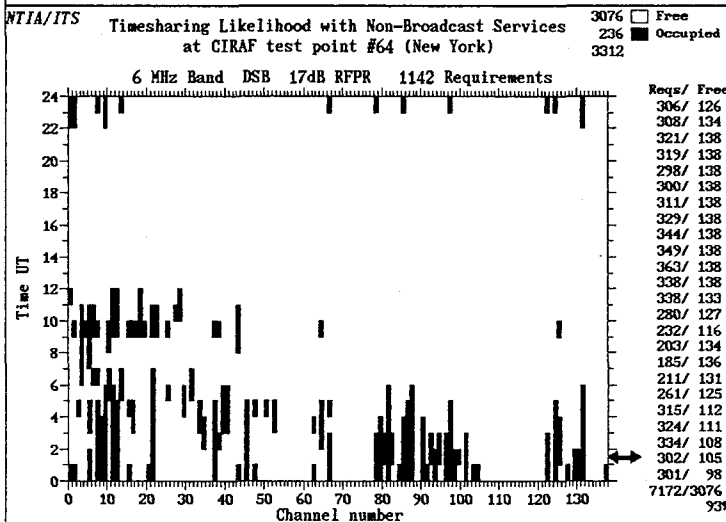
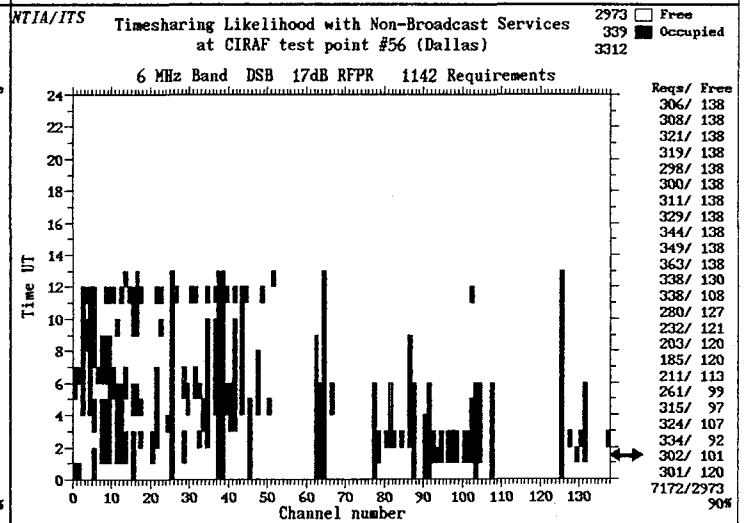
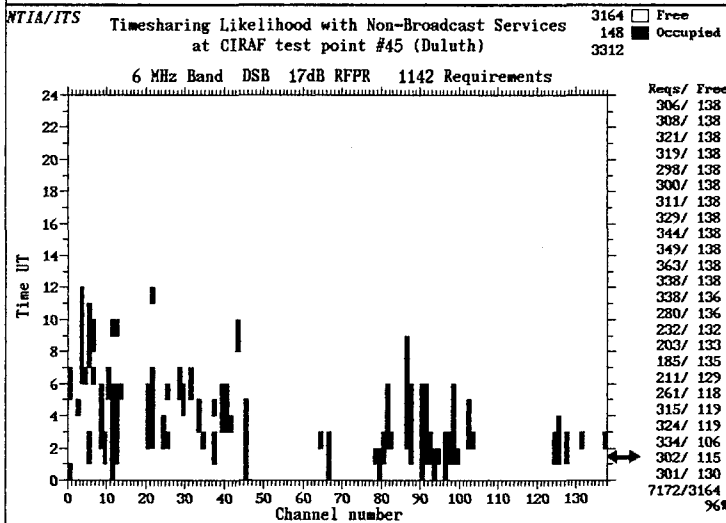
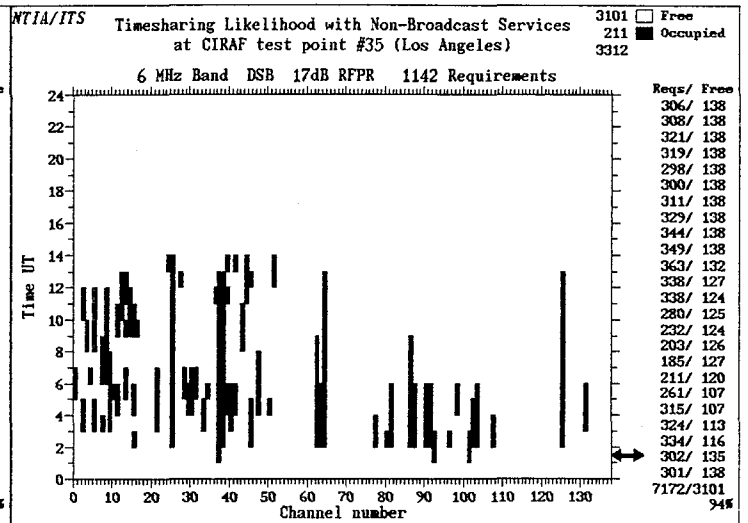
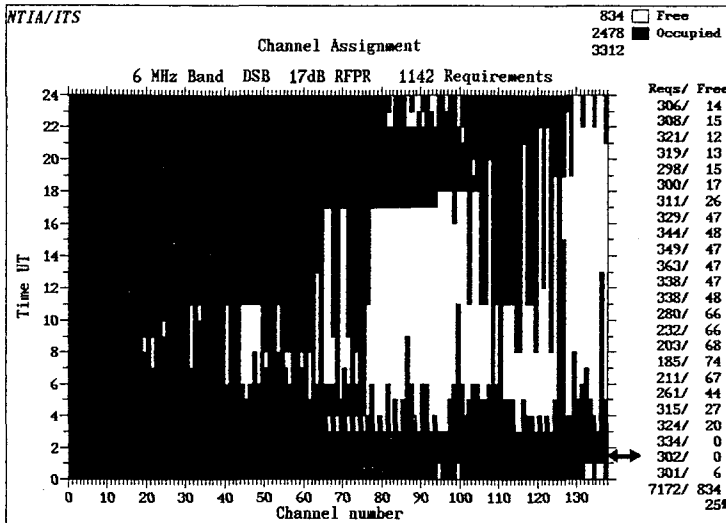


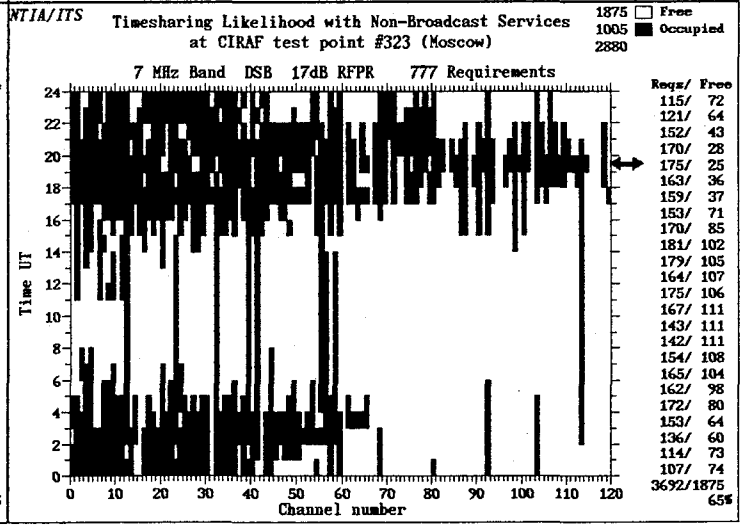
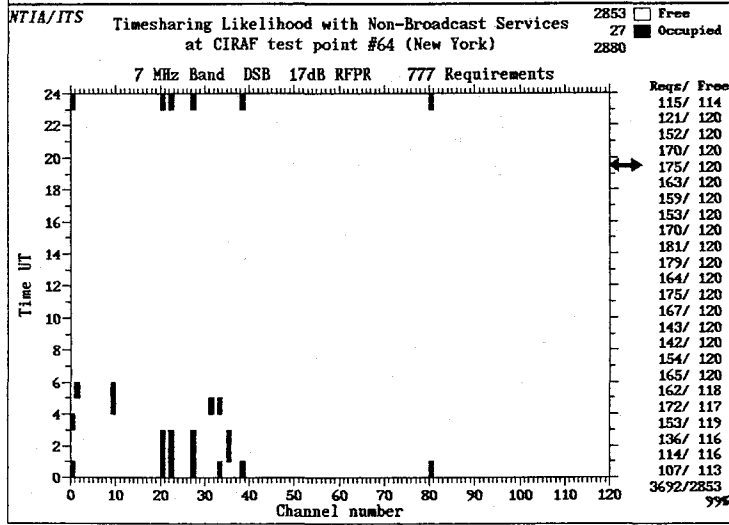
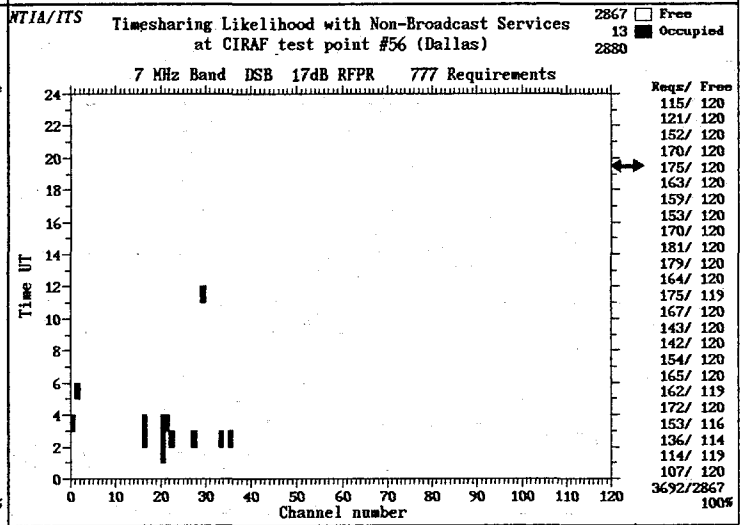
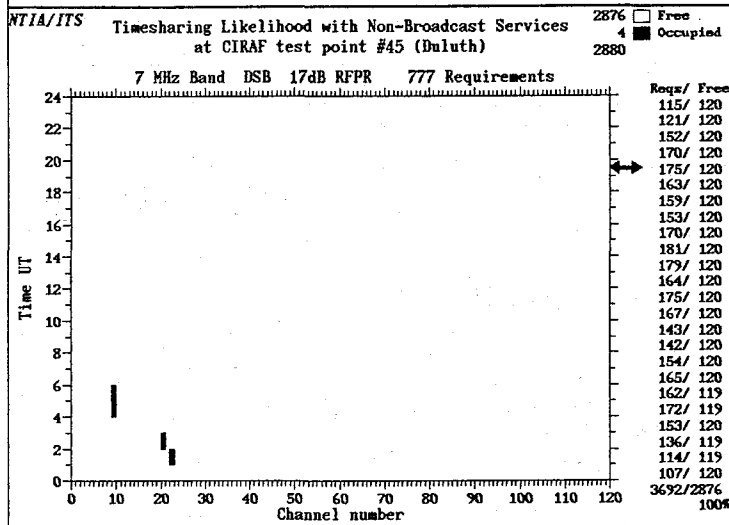
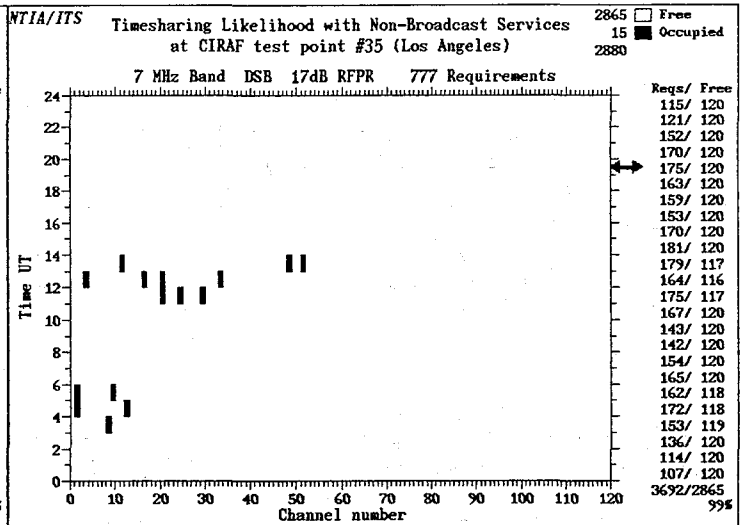
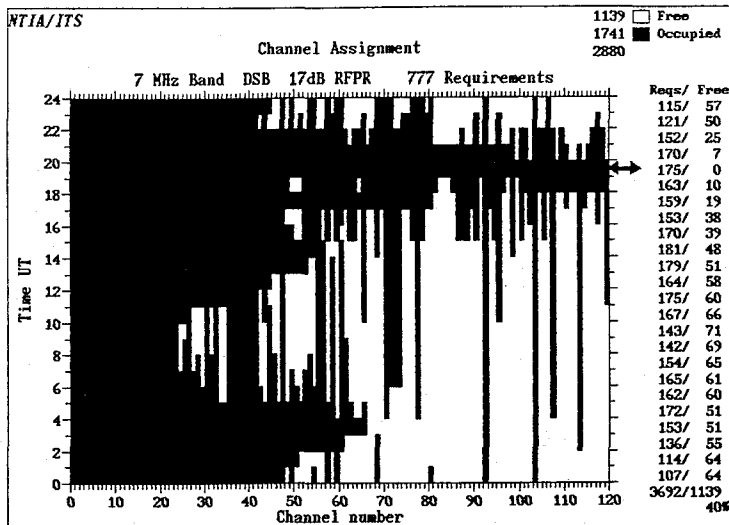


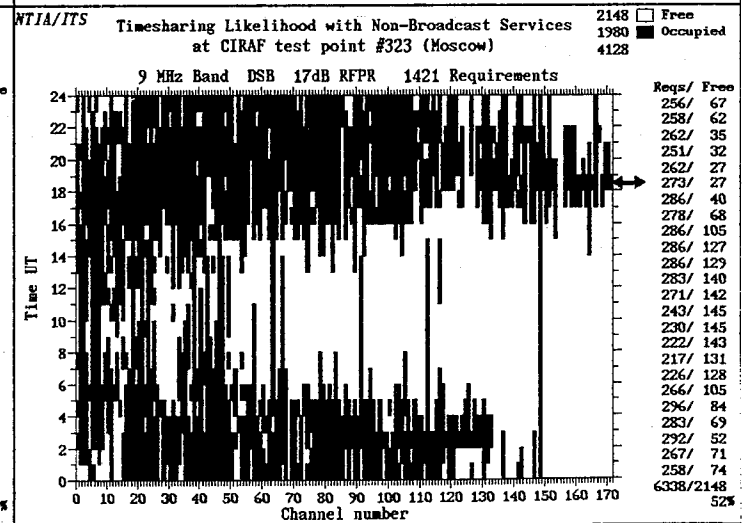
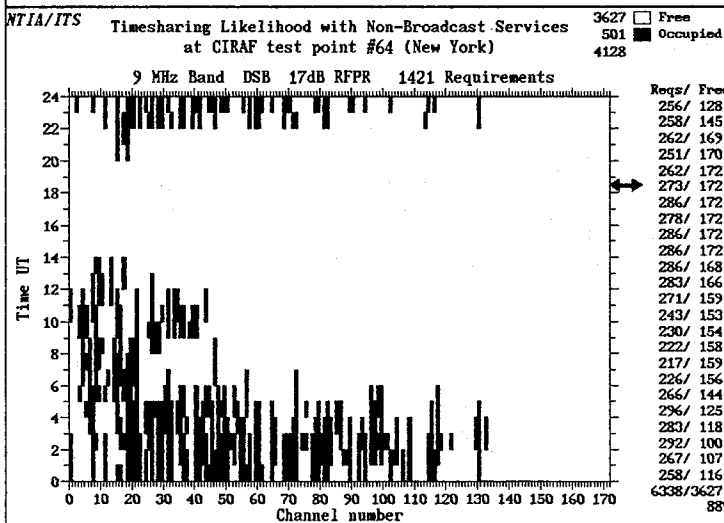
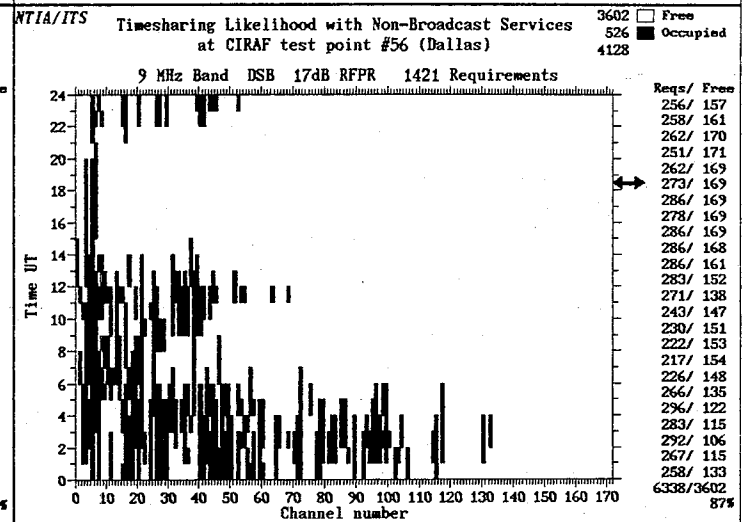
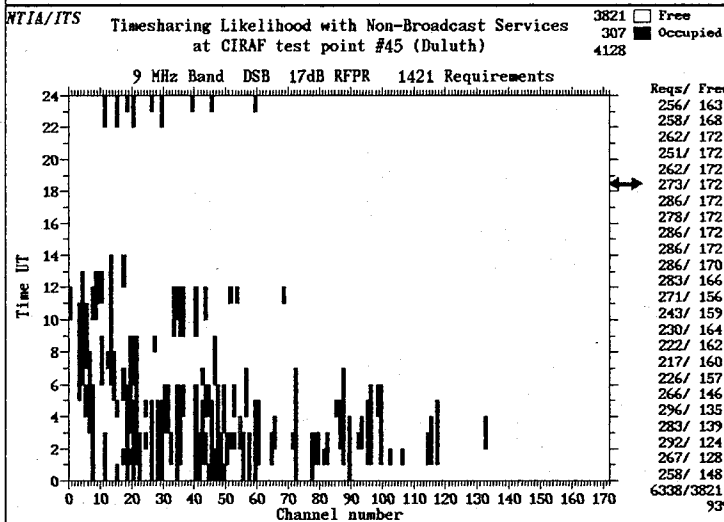
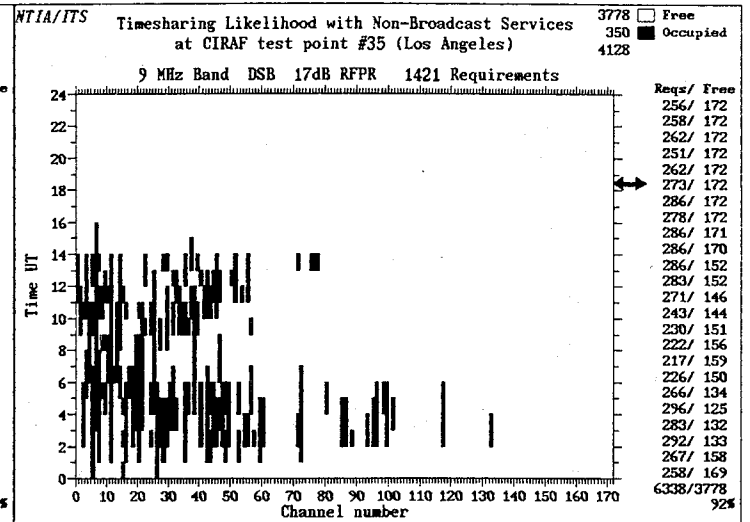
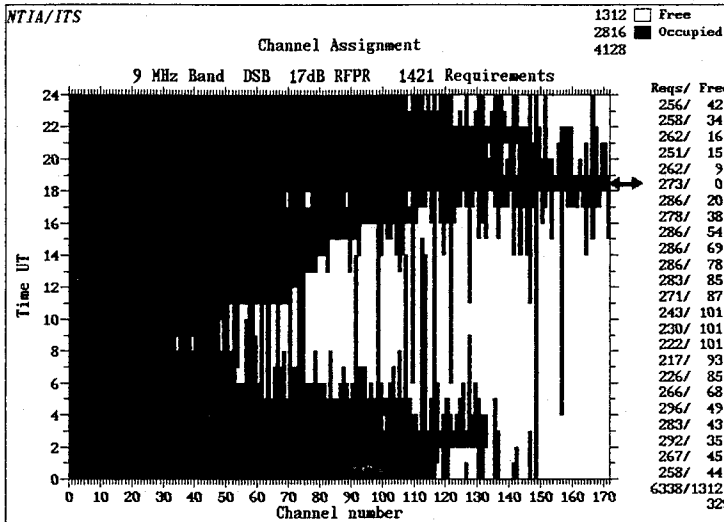


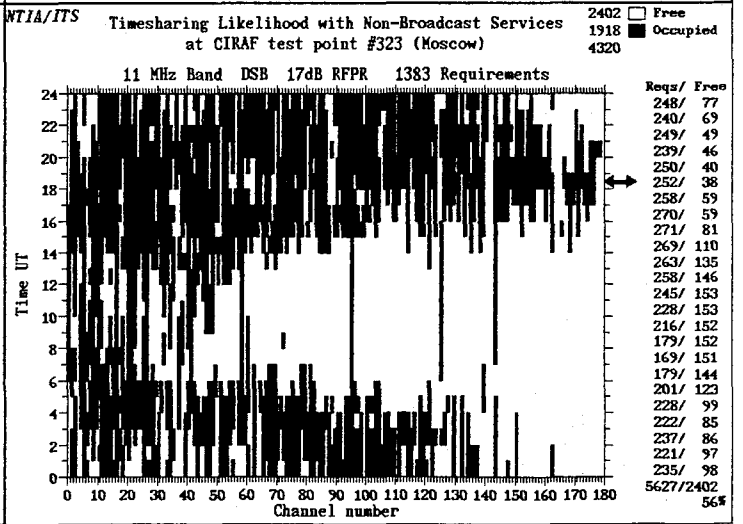
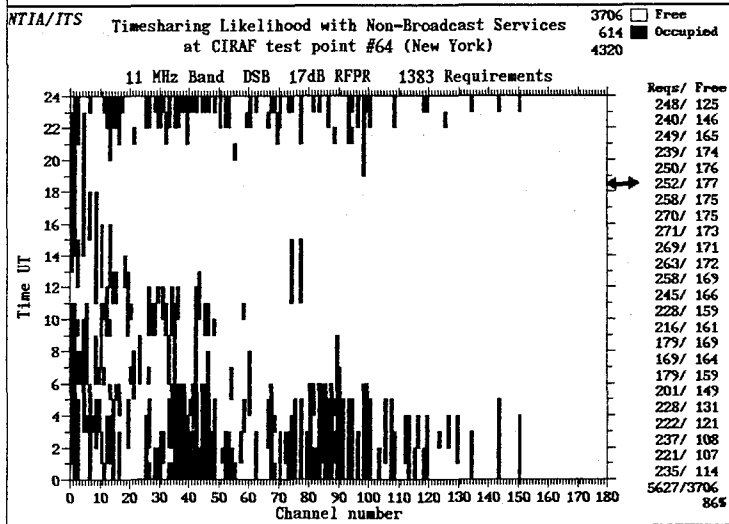
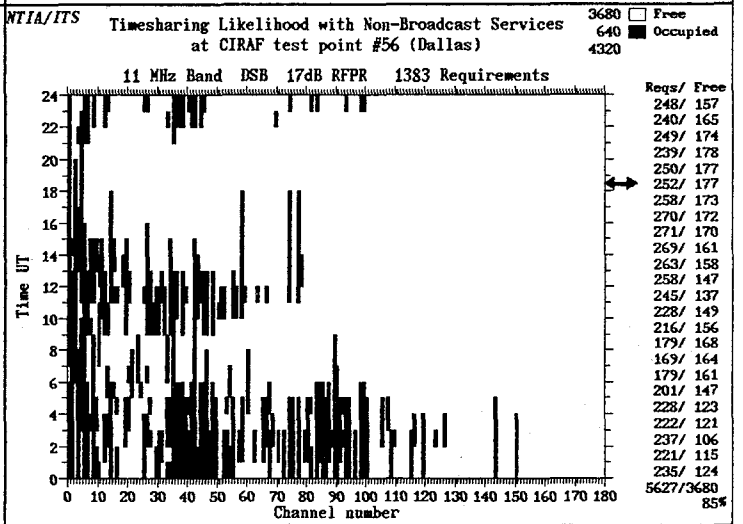
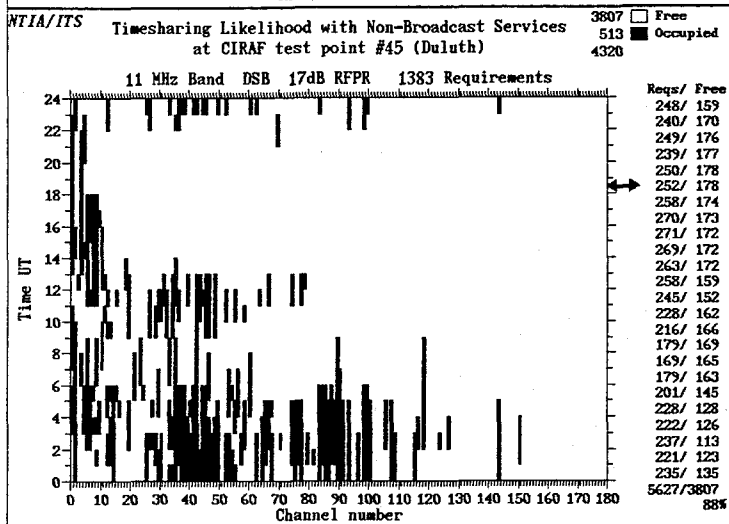
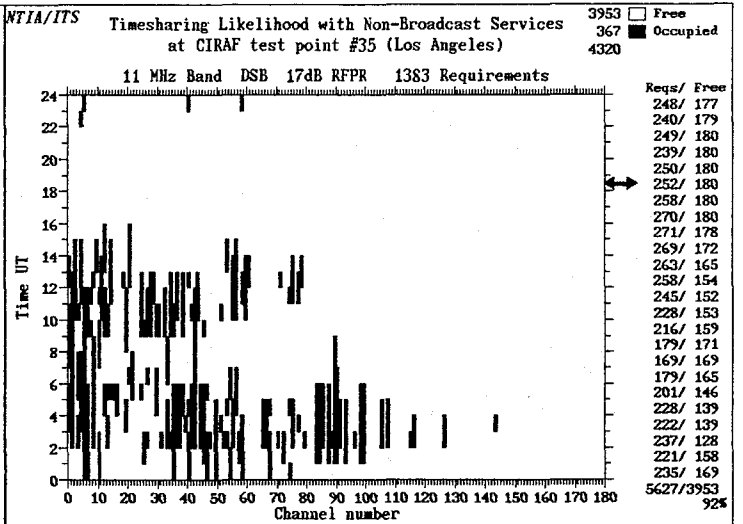
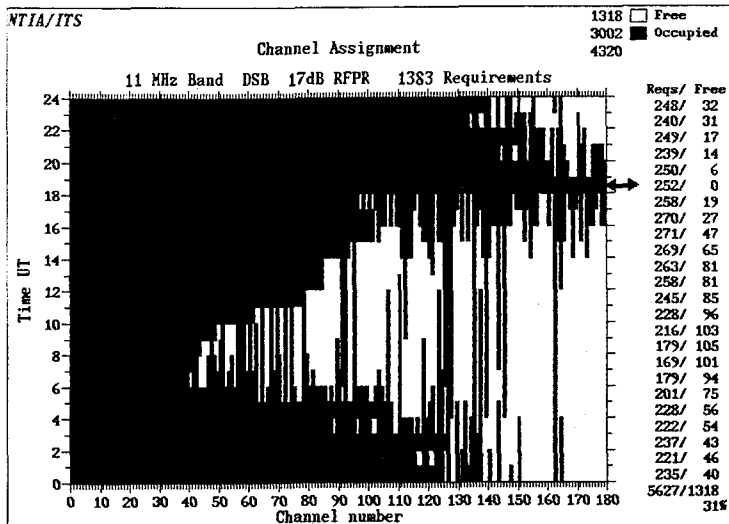




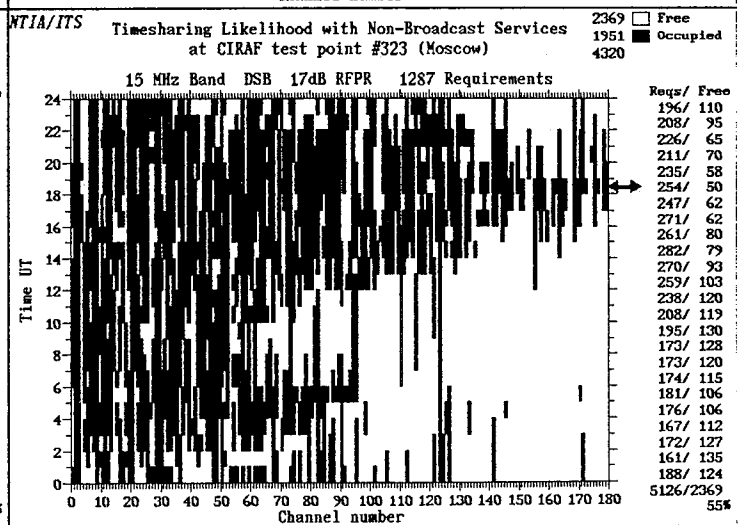
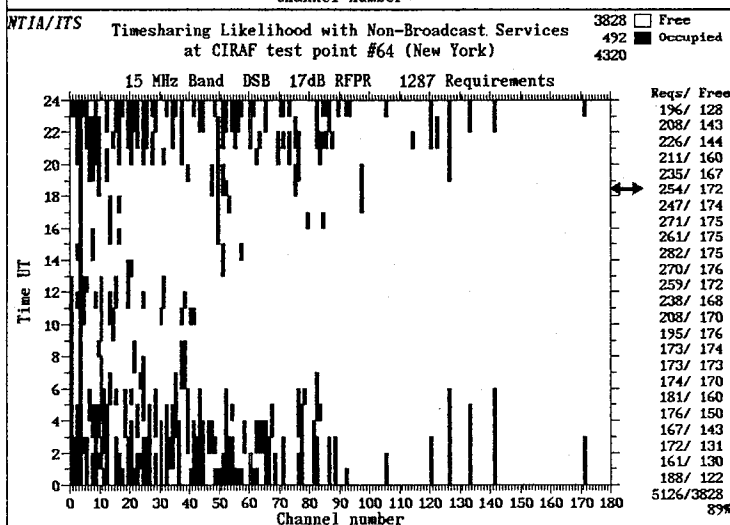
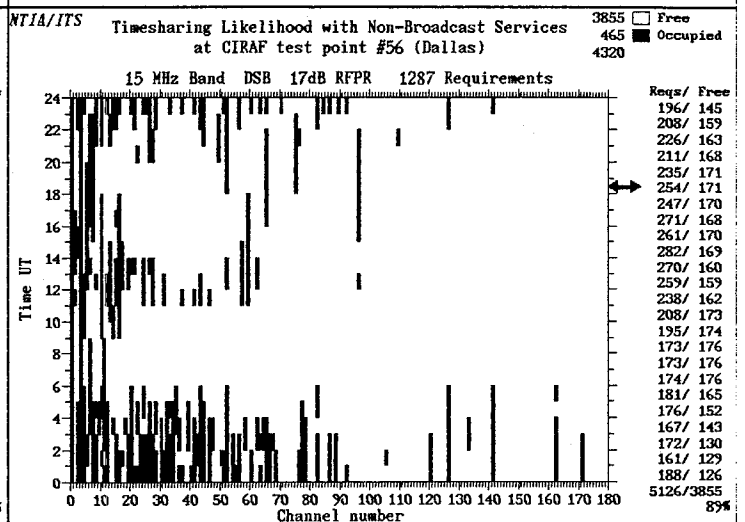
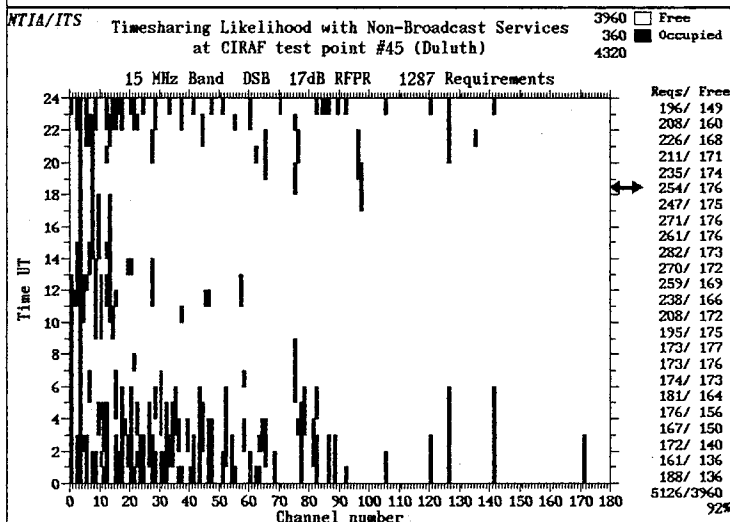
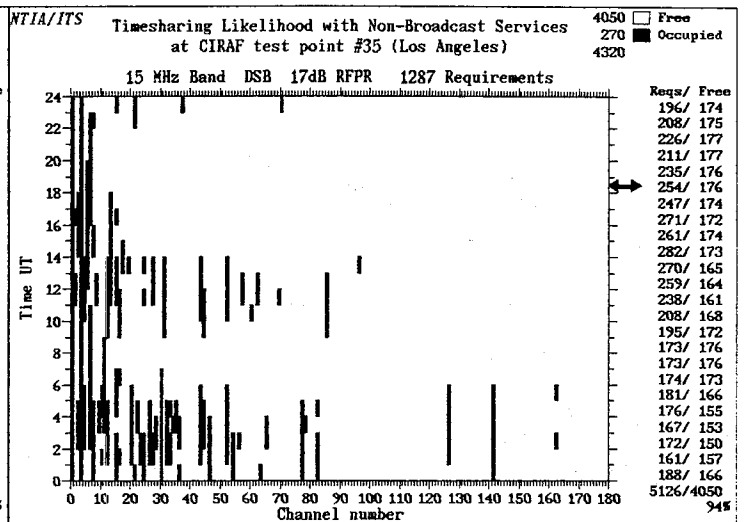
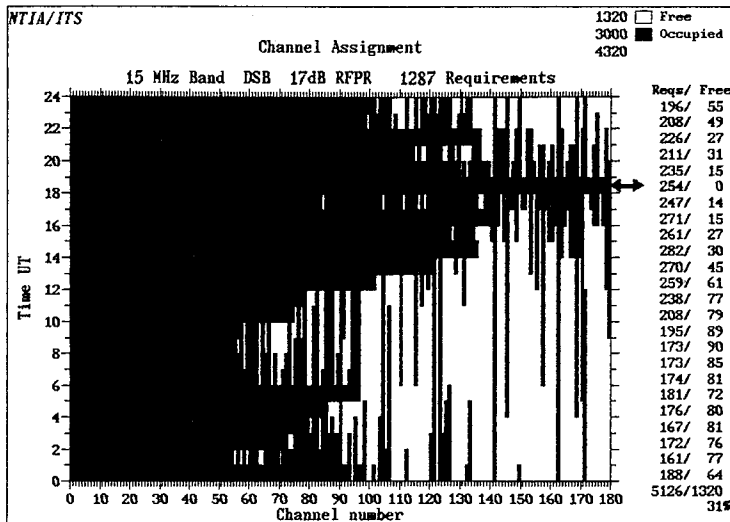


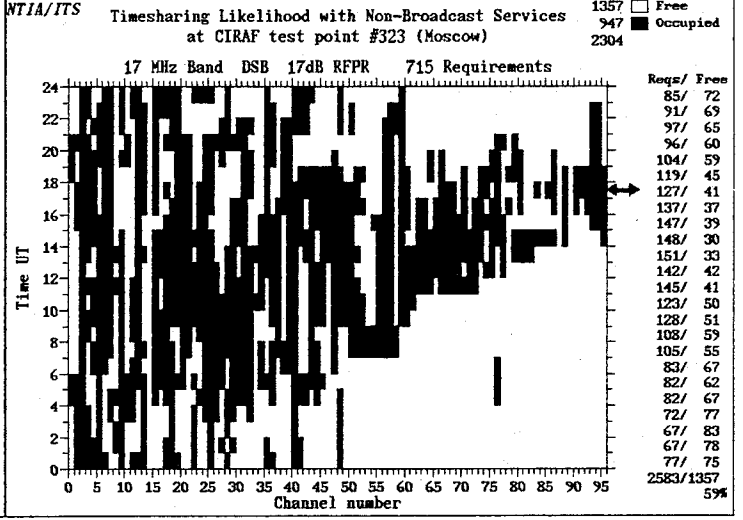
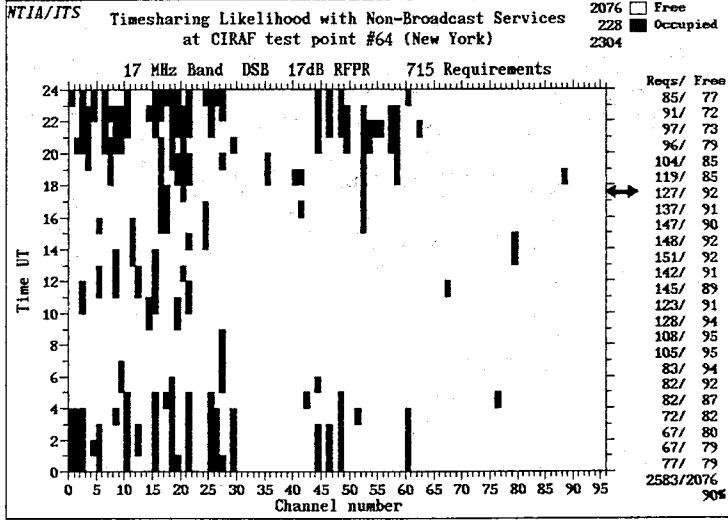
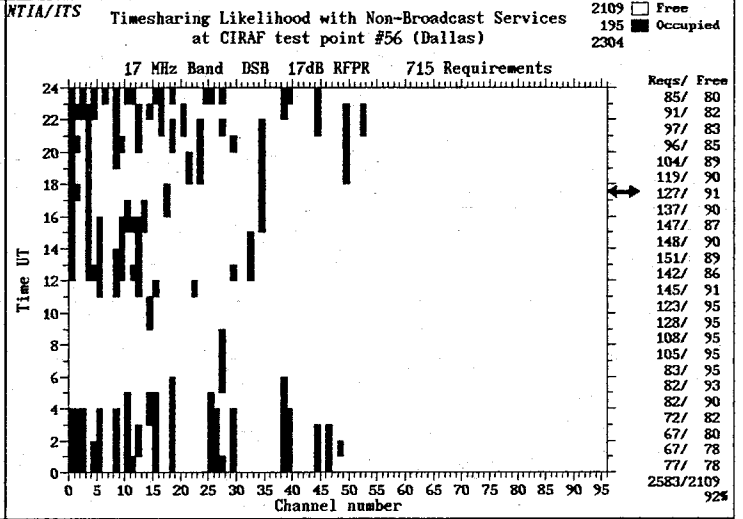
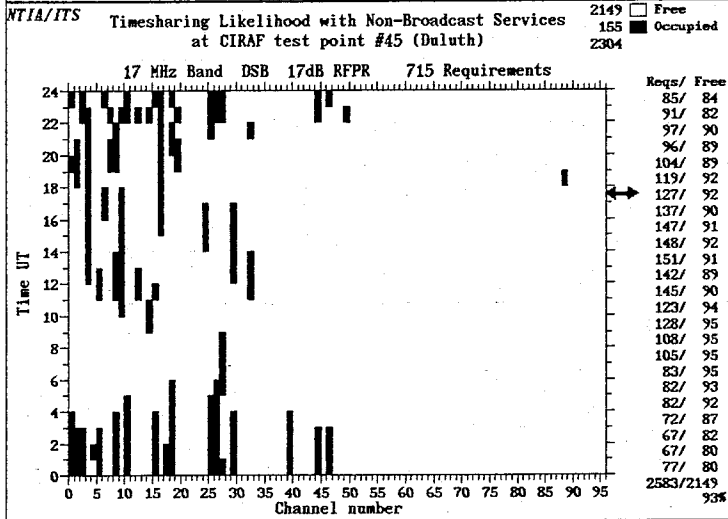
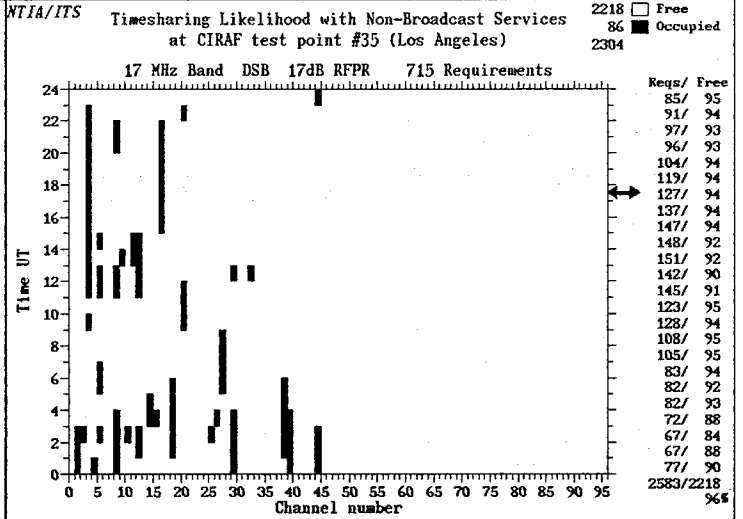
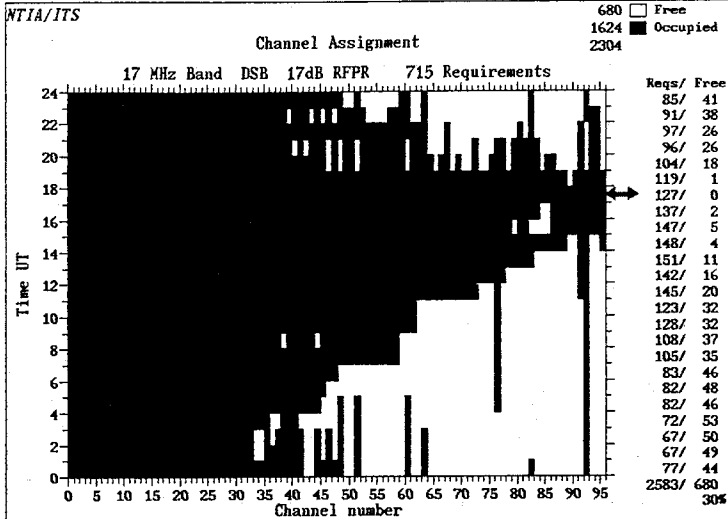


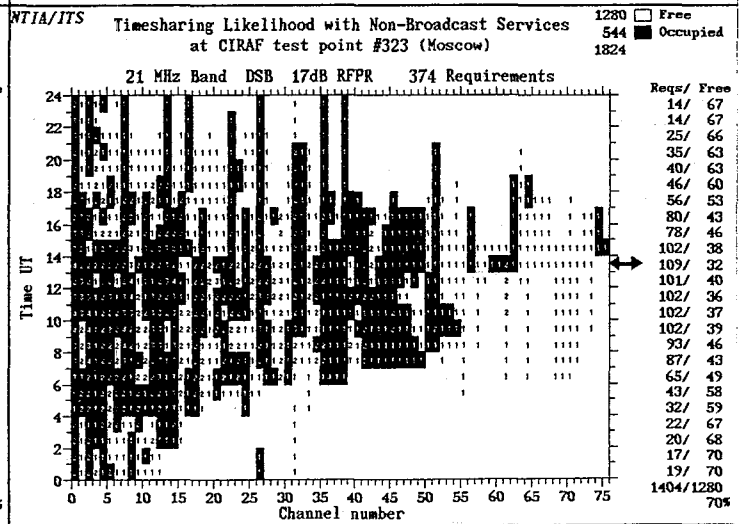
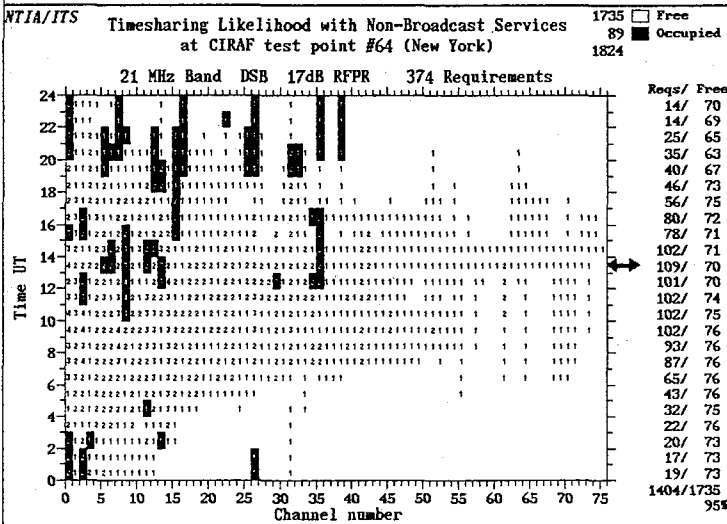
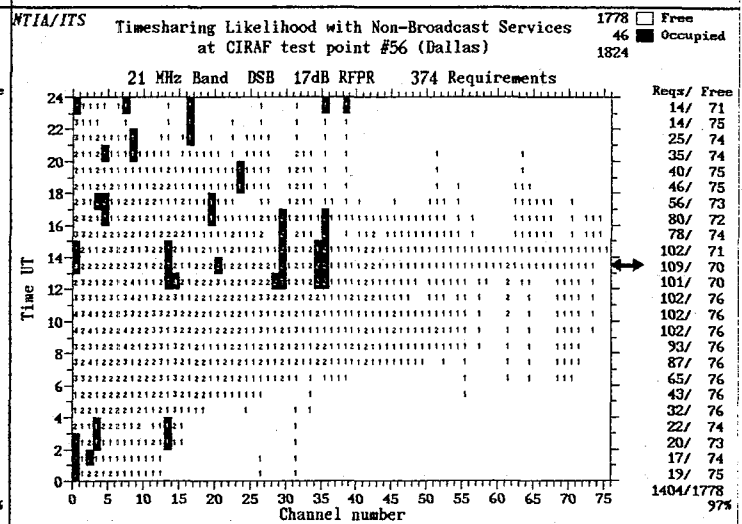
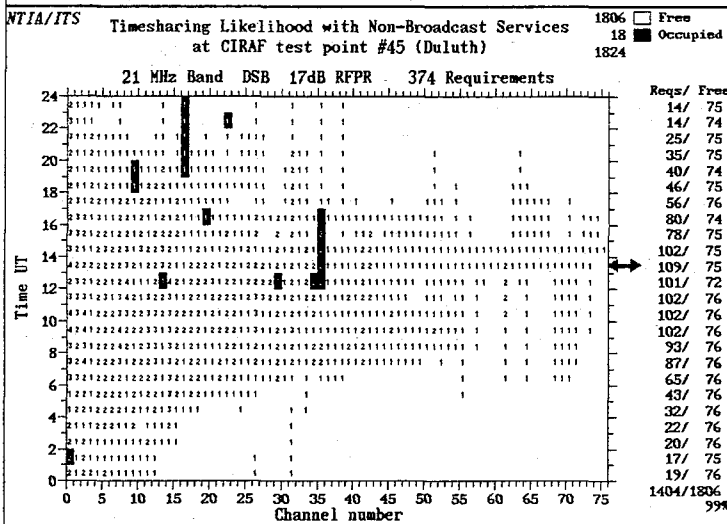
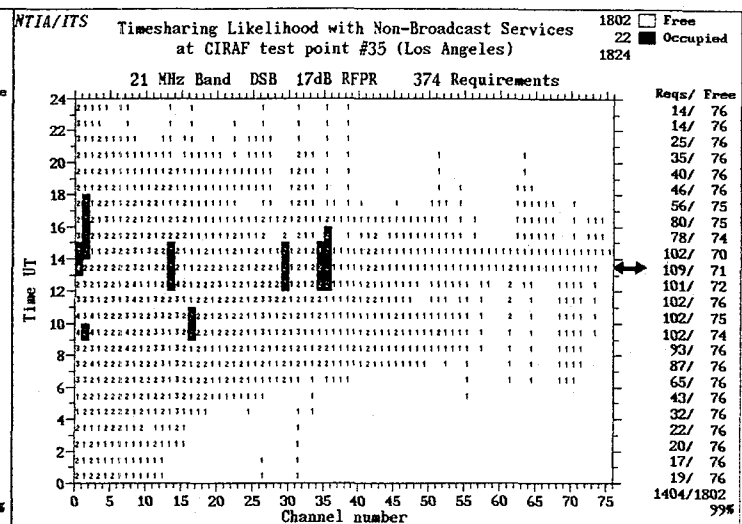
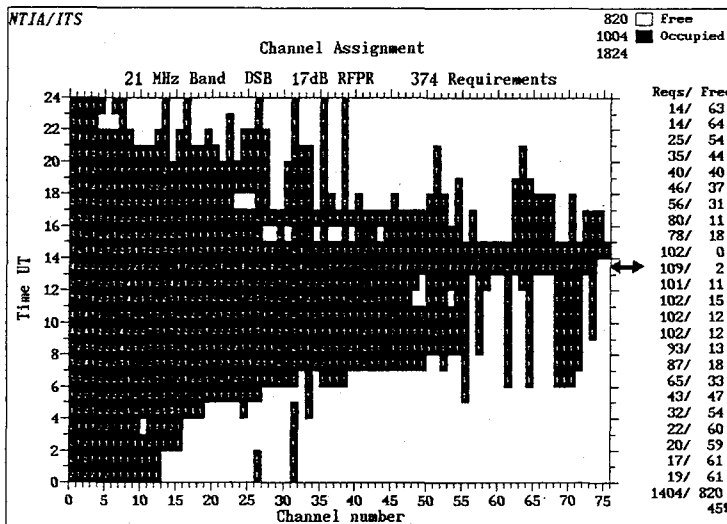


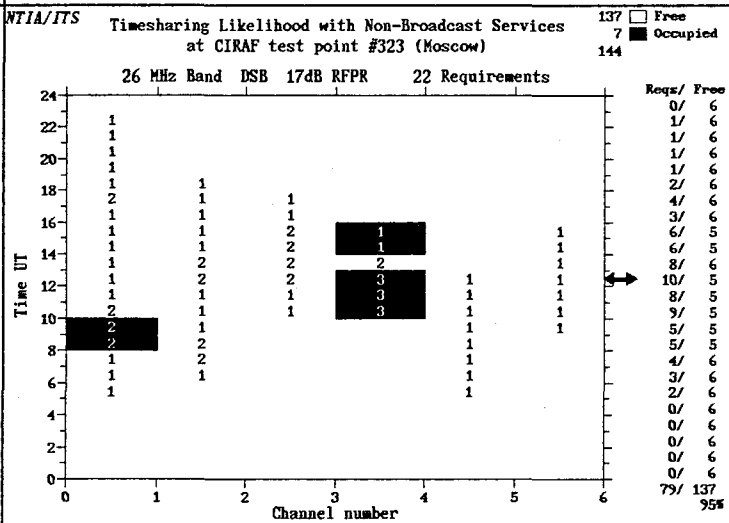
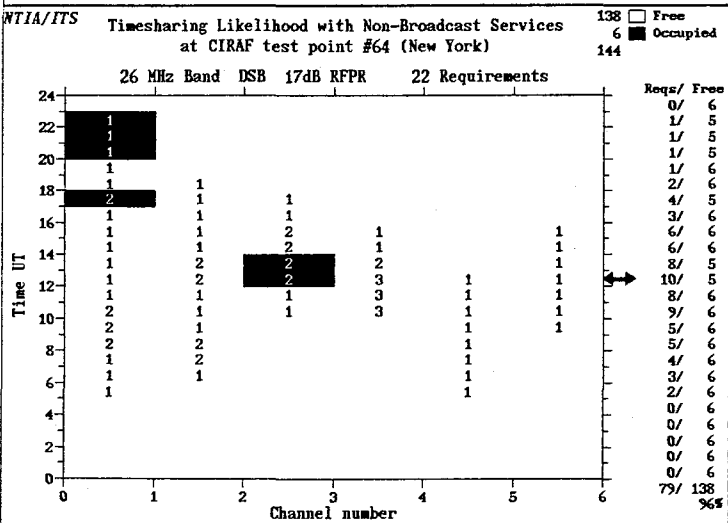
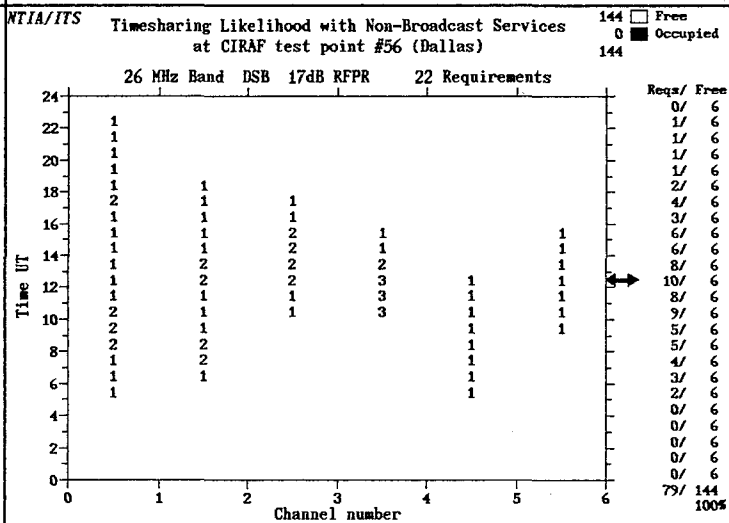
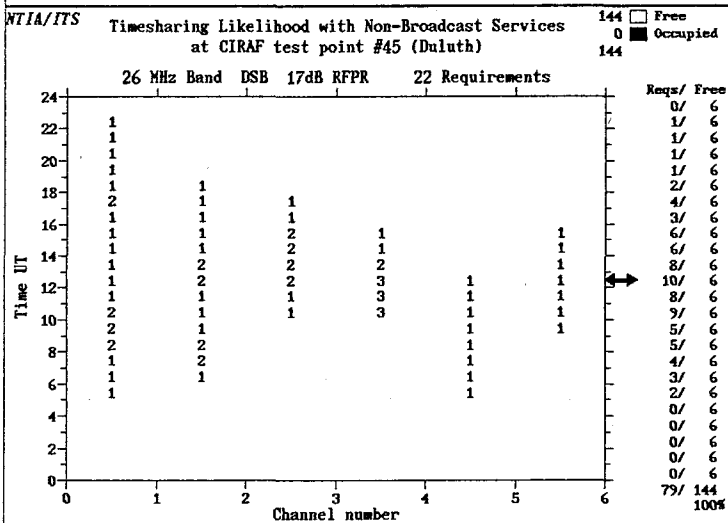
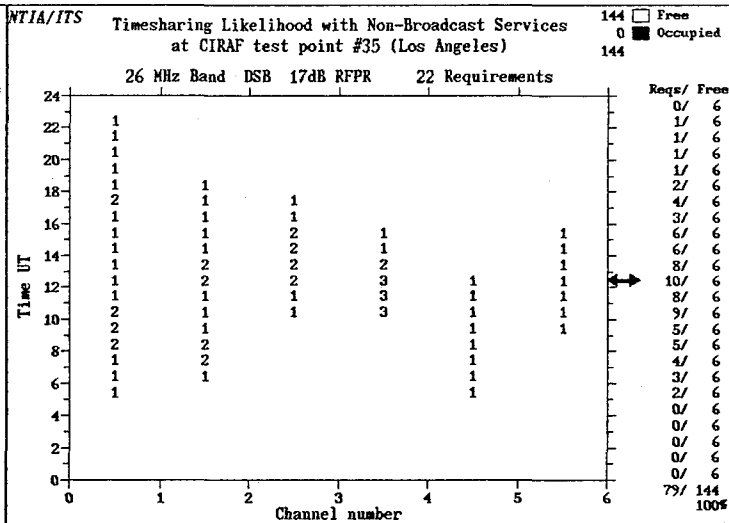
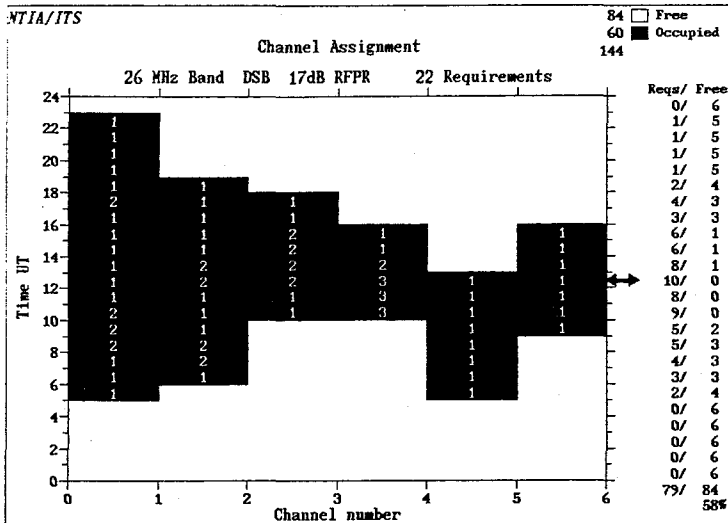












APPENDIX D: APPENDIX OF ITU RADIO REGULATIONS

APPENDIX 45

HFBC-87

**Double-Sideband (DSB) and Single-Sideband (SSB)  
System Specifications in the HF Bands Allocated Exclusively  
to the Broadcasting Service**

PART A

**Double-sideband system (DSB)**

1. *System parameters*

1.1 *Channel spacing*

The nominal spacing for DSB shall be 10 kHz. However, the interleaved channels with a separation of 5 kHz may be used in accordance with the relative protection criteria, provided that the interleaved emission is not to the same geographical area as either of the emissions between which it is interleaved.

2. *Emission characteristics*

2.1 *Nominal carrier frequencies*

Nominal carrier frequencies shall be integral multiples of 5 kHz.

2.2 *Audio-frequency band*

The upper limit of the audio-frequency band (at  $-3$  dB) of the transmitter shall not exceed 4.5 kHz and the lower limit shall be 150 Hz, with lower frequencies attenuated at a slope of 6 dB per octave.

2.3 *Modulation processing*

If audio-frequency signal processing is used, the dynamic range of the modulating signal shall be not less than 20 dB.

2.4 *Necessary bandwidth*

The necessary bandwidth shall not exceed 9 kHz.

**PART B**

**Single-sideband system (SSB)**

1. *Planning parameters*

1.1 *Channel spacing*

During the transition period (see Resolution 517 (HFBC-87)), the channel spacing shall be 10 kHz. In the interest of spectrum conservation, during the transition period, it is also permissible to interleave SSB emissions midway between two adjacent DSB channels, i.e., with 5 kHz separation between carrier frequencies, provided that the interleaved emission is not to the same geographical area as either of the emissions between which it is interleaved.

After the end of the transition period the channel spacing and carrier frequency separation shall be 5 kHz.

1.2 *Equivalent sideband power*

When the carrier reduction relative to peak envelope power is 6 dB, an equivalent SSB emission is one giving the same audio-frequency signal-to-noise ratio at the receiver output as the corresponding DSB

emission, when it is received by a DSB receiver with envelope detection. This is achieved when the sideband power of the SSB emission is 3 dB larger than the total sideband power of the DSB emission. (The peak envelope power of the equivalent SSB emission and the carrier power are the same as that of the DSB emission.)

## 2. *Emission characteristics*

### 2.1 *Nominal carrier frequencies*

Nominal carrier frequencies shall be integral multiples of 5 kHz.

### 2.2 *Frequency tolerance*

The frequency tolerance shall be 10 Hz.<sup>1</sup>

### 2.3 *Audio-frequency band*

The upper limit of the audio-frequency band (at -3 dB) of the transmitter shall not exceed 4.5 kHz with a further slope of attenuation of 35 dB/kHz and the lower limit shall be 150 Hz with lower frequencies attenuated at a slope of 6 dB per octave.

### 2.4 *Modulation processing*

If audio-frequency signal processing is used, the dynamic range of the modulating signal shall be not less than 20 dB.

---

<sup>1</sup> It is suggested that administrations avoid carrier frequency differences of a few hertz, which cause degradations similar to periodic fading. This could be avoided if the frequency tolerance were 0.1 Hz, a tolerance which would be suitable for single-sideband emissions.

*Note:* The single-sideband system adopted for the bands exclusively allocated to HF broadcasting does not require a frequency tolerance less than 10 Hz. The above-mentioned degradation occurs when the ratio of wanted-to-interfering signal is well below the required protection ratio. This remark is equally valid for both double- and single-sideband emissions.

2.5 *Necessary bandwidth*

The necessary bandwidth shall not exceed 4.5 kHz.

2.6 *Carrier reduction (relative to peak envelope power)*

During the transition period the carrier reduction shall be 6 dB to allow SSB emissions to be received by conventional DSB receivers with envelope detection without significant deterioration of the reception quality.

At the end of the transition period, the carrier reduction shall be 12 dB.

2.7 *Sideband to be emitted*

Only the upper sideband shall be used.

2.8 *Attenuation of the unwanted sideband*

The attenuation of the unwanted sideband (lower sideband) and of intermodulation products in that part of the emission spectrum shall be at least 35 dB relative to the wanted sideband signal level. However, since there is in practice a large difference between signal amplitudes in adjacent channels, a greater attenuation is recommended.

3. *Characteristics of the reference receiver*

The reference receiver has the main characteristics as given below. For more detailed characteristics see the relevant CCIR Recommendations.

3.1 *Noise limited sensitivity*

The value of the noise limited sensitivity is equal to or less than 40 dB( $\mu$ /m).



### 3.2 *Demodulator and carrier acquisition*

The reference receiver is equipped with a synchronous demodulator, using for the carrier acquisition a device which regenerates a carrier by means of a suitable control loop which locks the receiver to the incoming carrier. The reference receiver should work as well with DSB emissions as with SSB emissions having a carrier reduced to 6 or 12 dB below peak envelope power.

### 3.3 *Overall selectivity*

The reference receiver has an overall bandwidth (at  $-3$  dB) of 4 kHz, with a slope of attenuation of 35 dB/kHz.

*Note:* Other combinations of bandwidth and slope of attenuation are possible, as given below, and will provide the same performance at 5 kHz carrier difference.

Slope of attenuation	Overall bandwidth ( $-3$ dB)
25 dB/kHz	3 300 Hz
15 dB/kHz	2 700 Hz



*Relative RF protection ratio values with reference to the co-channel RF protection ratio for DSB wanted and unwanted signals (dB)<sup>1</sup> for use in the HF bands allocated exclusively to the broadcasting service*

	Wanted signal	Unwanted signal	Carrier frequency separation $f_{\text{unwanted}} - f_{\text{wanted}}, \Delta f$ (kHz)								
			-20	-15	-10	-5	0	+5	+10	+15	+20
1	DSB	SSB (6 dB carrier reduction relative to p.e.p.)	-51	-46	-32	+1	3	-2	-32	-46	-51
2	SSB (6 dB carrier reduction relative to p.e.p.)	DSB	-54	-49	-35	-3	0	-3	-35	-49	-54
3	SSB (6 dB carrier reduction relative to p.e.p.)	SSB (6 dB carrier reduction relative to p.e.p.)	-51	-46	-32	+1	0	-2	-32	-46	-51
4	SSB (12 dB carrier reduction relative to p.e.p.)	SSB (12 dB carrier reduction relative to p.e.p.)	-57	-57	-57	-45	0	-20	-47	-52	-57

<sup>1</sup> Frequency separations  $\Delta f$  less than -20 kHz, as well as  $\Delta f$  greater than 20 kHz, need not be considered.



APPENDIX F: RELATIVE RFPR REFERENCE FROM REPORT TO THE SECOND SESSION OF THE CONFERENCE WARC HFBC-84

3.3.2 Relative values of protection ratio as a function of carrier frequency separation

Once a value for the co-channel radio-frequency protection ratio has been determined, the radio-frequency protection ratio, expressed as a function of the carrier frequency spacing, shall be determined by adding the value given in the curve in Figure 3-7 to the value of the co-channel RF protection ratio.

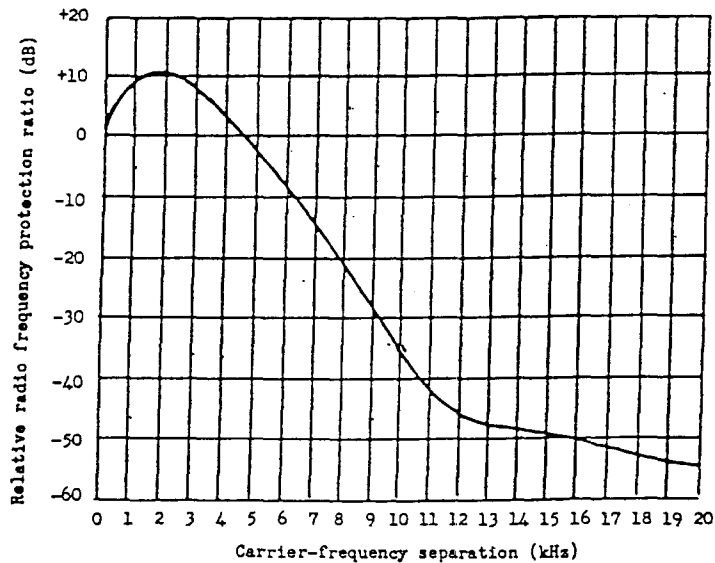
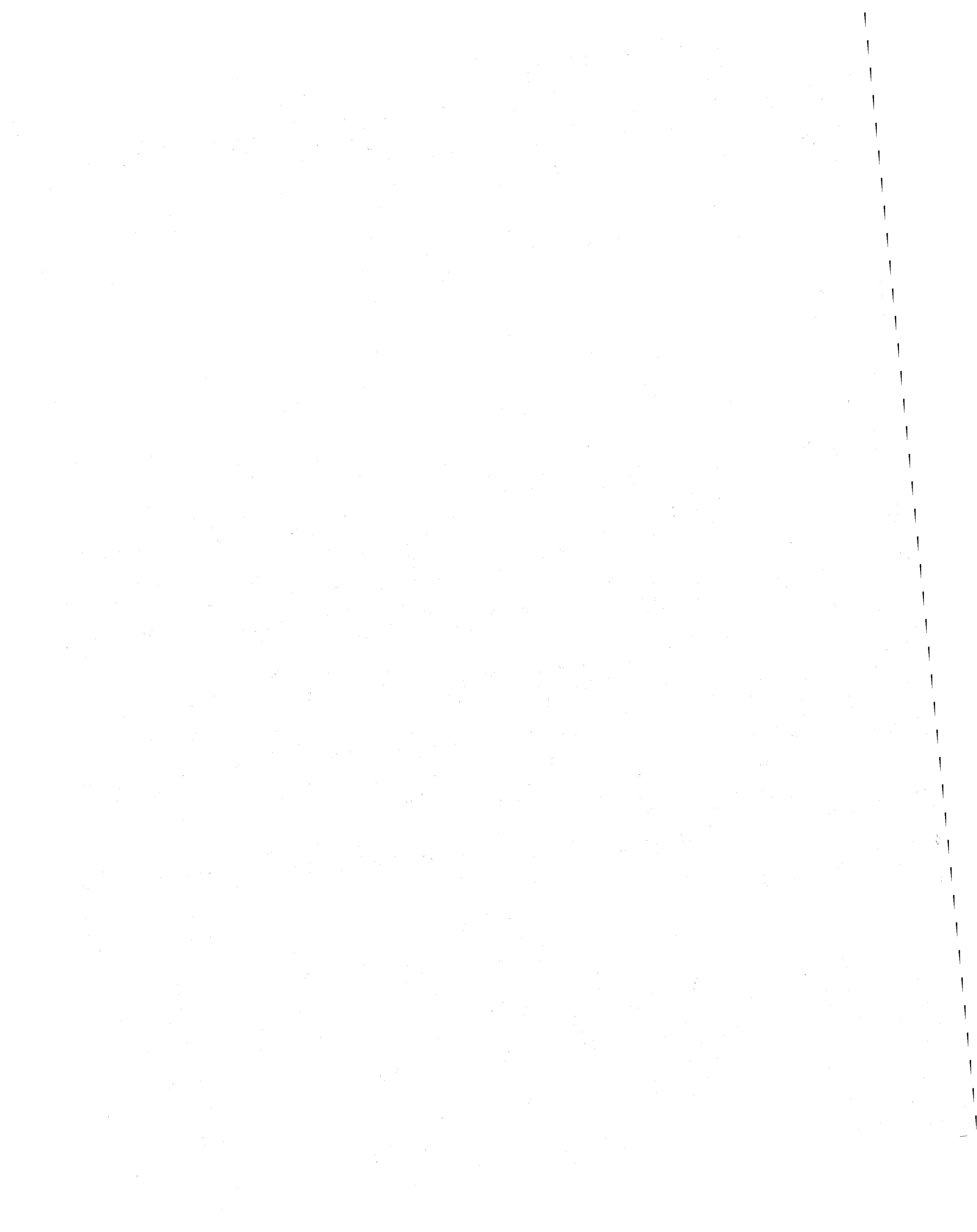


FIGURE 3-7

Relative value of the radio-frequency protection ratio as a function of the carrier-frequency separation



**BIBLIOGRAPHIC DATA SHEET**

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<p>Estimates of the minimum amount of spectrum needed in the high-frequency (HF) bands are made for satisfying worldwide broadcasting requirements. This analysis provides technical bases for the U.S. Allocation proposals being developed in preparations for the World Administrative Radio Conferences (WARC) to be held in 1992 and 1993. The analysis applies to the ITS developed HF spectrum use model (HFSUM) software to compute the minimum number of channels needed to assure specified levels of broadcast quality for both the existing double-sideband (DSB) and the proposed compatible single-sideband (SSB) systems. The HFSUM software produces definitive results for the existing DSB systems and for the spectrum needs of the proposed compatible SSB systems. The results obtained in this analysis when considering all HF bands indicate</p> <p style="text-align: center;">(Continued)</p>				
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HF spectrum use model (HFSUM); IFRB; likelihood estimates for time-sharing; limited reallocation WARC; minimum amount of HF spectrum required; WARC for HF broadcasting.				
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		19. Security Class. (This page)		21. Price:

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Bibliographic Data Sheet

that 1) the existing DSB system needs approximately three to four times as much HF spectrum as that currently allocated to broadcasting; 2) the proposed compatible SSB system needs approximately two to three times the currently allocated spectrum; and 3) there exists a significant likelihood that time-sharing of the HF bands between broadcast and nonbroadcast services is feasible.