



RSMS OPERATIONS REPORT

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MEASUREMENT OF FEDERAL RADIO CHANNEL
USAGE IN NORFOLK, VIRGINIA

30-50 MHz Band
April 1978



**NATIONAL TELECOMMUNICATIONS AND
INFORMATION ADMINISTRATION**

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MEASUREMENT OF FEDERAL RADIO CHANNEL
USAGE IN NORFOLK, VIRGINIA

30-50 MHz Band

April 1978

1. INTRODUCTION

These data provide the results of measurements made to determine the usage of Federal radio channels in the 30-50 MHz band at Norfolk, Virginia. These measurements were conducted during April 10-11, 1978 as part of the National Telecommunications and Information Administration/Spectrum Management Support Program (NTIA/SMSP). They were made with the NTIA Radio Spectrum Measurement System (RSMS) which is operated by NTIA personnel of the Institute for Telecommunication Sciences (ITS). Measurements for other bands, which constitute an additional part of this effort, are reported separately. A measurement site was selected at Sewells Point on the Norfolk Naval Air Station, Lat. N36.962^o, Long. W76.328^o, as shown in figure 1.1, which was about 10 feet above mean sea level.

All measurement activities were carried out in accordance with established Department of Commerce (DOC) policy and administrative procedures as defined in section 1 of the RSMS Operations Manual. A technical description of the system is also provided in the Operations Manual (sec. 2).

Objectives for this portion of the effort were as follows:

- (a) collect channel usage data for channels in the 30-50 MHz band; and
- (b) analyze the collected data to obtain spectrum usage statistics for each channel and various groups of channels.

Brief discussions of measurement and analysis procedures are provided in sections 3 and 4, respectively. Unprocessed measurements of channel usage and received power levels for each of the 320 channels measured in this band are given in section 5, and an overall usage summary is provided in section 2. Graphs showing usage as a function of time-of-day are given in section 6, and channel usage distributions are provided in section 7.

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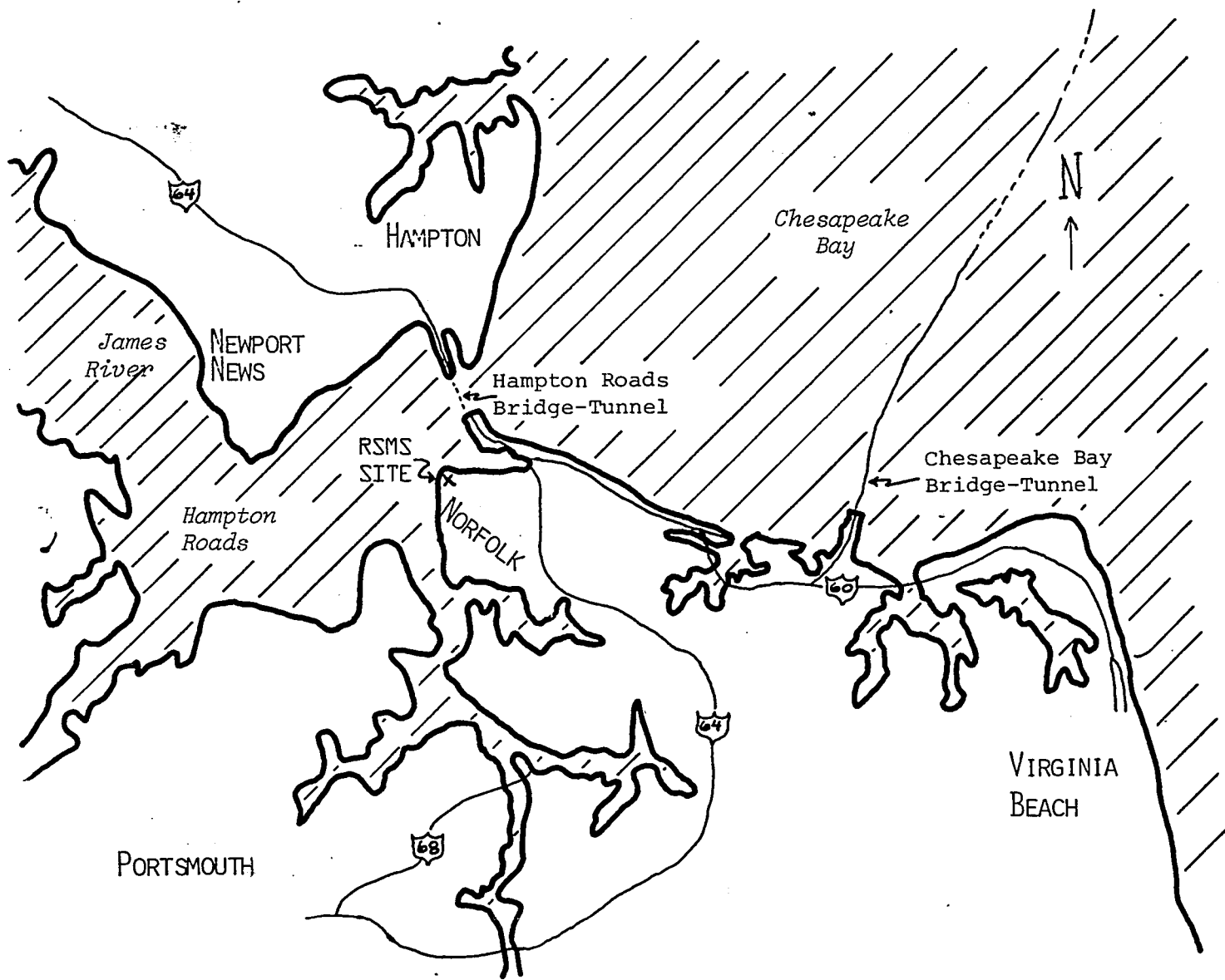


Figure 1.1. Map of Norfolk area, showing RSMS measurement site.

2. SUMMARY

A usage summary for the 30-50 MHz band at Norfolk is provided in table 2.1. It shows that three (25%) of the measured channels assigned within 50 mi were used for at least 0.5% of the time. And, 26 measured channels (8%) without assignments within 50 miles on the exact measured channel center frequency also had a usage of at least 0.5%. Measurements previously made at Norfolk in June 1974, did not include measurements for the 30-50 MHz band.

A time-of-day analysis of the measurements (fig. 6.2) shows that the heaviest usage (1%) of the 12 fixed government channels assigned within 50 mi occurred between 1 p.m. and 2 p.m.

Analysis of the channel usage distribution (fig. 7.2) indicates that 8% of the 12 assignments within 50 mi have a usage of at least 1%.

Table 2.1. Usage summary for 30-50 MHz band

Norfolk, Virginia		April 1978	Cass 174.301		
GMF 780101		Scans 23526	Threshold (dBm) -101		
BAND (MHz)	CHANNELS MEASURED	MEASURED CHANNELS WITH USAGE			
		>=0.5%	0.5-0.1%	<=0.1%	
30-50	12 : 323	3 : 26	2 : 39	7 : 258	

NOTES:

- 1) Assigned channels used are given first, and unassigned channels second; i.e., assigned: unassigned. With NO GMF all channels are taken as assigned; i.e., zero unassigned channels.
- 2) A channel is taken as assigned if it has a center frequency assignment within 50 mi of the measurement site that is made according to the channelization plan of the OTP Manual (P. 4-147).

3. MEASUREMENT PROCEDURES

Data were collected from Monday-Tuesday, April 10-11, 1978. For 41 hours of this period, statistical summary files were recorded on magnetic tape at the end of each hour. The measurement program is designed to operate continuously in this mode without operator intervention. On April 10 a 24-hour measurement was made, collecting hourly statistics files on magnetic tape. This 24-hour data was analyzed to give time-of-day information (sec. 6).

The statistics files contain data for each channel on:

- 1) the number of times the amplitude of the received signal was sampled during the previous measurement period and was found to be above the usage threshold. This threshold was chosen to be - 101 dBm and the reception of a signal above this amplitude was assumed to indicate that the channel was being used. This count, along with data on how many times each channel was sampled, is used to determine percent usage for each channel;

- 2) the peak signal received on each channel; and

- 3) the sum of signal amplitudes above threshold for each channel. This sum is used to calculate the average amplitude for the periods when a signal above the usage threshold was present.

In addition to the above data arrays for each channel, a 100-element parameter array contains various logistics and identification data on the whole set of measurements. Included in the parameter array are calibration information, time and location, system configuration, and number of samples taken at each frequency.

Each statistics file contains data compiled from about 1,318 measurements on each of the 335 channels measured in the band. Each channel is measured every three seconds, approximately, with the MSCAN routine, starting at the lowest frequency in the band and continuing until the highest frequency in the band is measured. MSCAN discriminates against impulsive noise by selecting the minimum of 40 measurements made for a specific channel as the current scan measurement value for that channel. It also discriminates against false usage indications associated with receiver overload and intermodulation by rejecting data collected when signals strong enough to cause these problems could be present.

Short summaries of the usage data can be printed out after each hour's measurement during the several minutes while the system is waiting to begin the next hour's measurements. These lists are used to select channels for later subsequent monitoring. Data from monitoring was kept in a card file, with all data pertaining to a given frequency being kept on a single card. Actual monitoring results were then summarized in the RSMS Operations Log.

Usage data were collected using a vertically polarized omnidirectional discone antenna. To eliminate RFI associated with our computer, this antenna was mounted on a 15 ft pole about 30 ft in front of the van. The special communication measurement receiver (CMR) front-end developed for narrow-band communication channels was used for these measurements along with the MSCAN routine that provides discrimination against impulsive noise. Before starting the measurements, the CMR is calibrated at 40 MHz (band center) with a signal generator. This process generates calibration factors that are used automatically in the measurement process, as well as allowing the operator to check the IF bandpass characteristic. Such a bandpass characteristic is shown in figure 3.1. A frequency error in the CMR local oscillator will show up as a shift in the center frequency of the bandpass characteristic.

A 10 dB attenuator was used at the receiver input to reduce potential overload problems. Even with the 10 dB attenuator, system sensitivity is still determined partly by external noise, so the attenuator did not appreciably affect the useful sensitivity of the RSMS. The 40 MHz calibration was performed through this pad so that it is compensated for in the calibration.

The 40 MHz calibration did not account for transmission line loss or frequency response factors. Although these additional factors could not easily be automatically used by the measurement program to correct the measurements, it is important to know what the numbers are--partly to diagnose faulty system operation, and partly to know whether they are small enough to ignore. A second calibration procedure was performed using a noise diode at the antenna terminals, which can be used to calibrate the complete system for frequencies within the 30-50 MHz band. Such data are shown in figure 3.2, where the correction factor C_{RA} is

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shown versus frequency. Power available at the antenna input of the transmission line P_A can be determined from the indicated received power at the receiver input P_{RR} by using

$$P_A = P_{RR} + C_{RA} + 1.5, \quad (1)$$

where (1) is dimensionally consistent and decibel-type units are used for all terms.

DATE: 780411

TIME: 172500

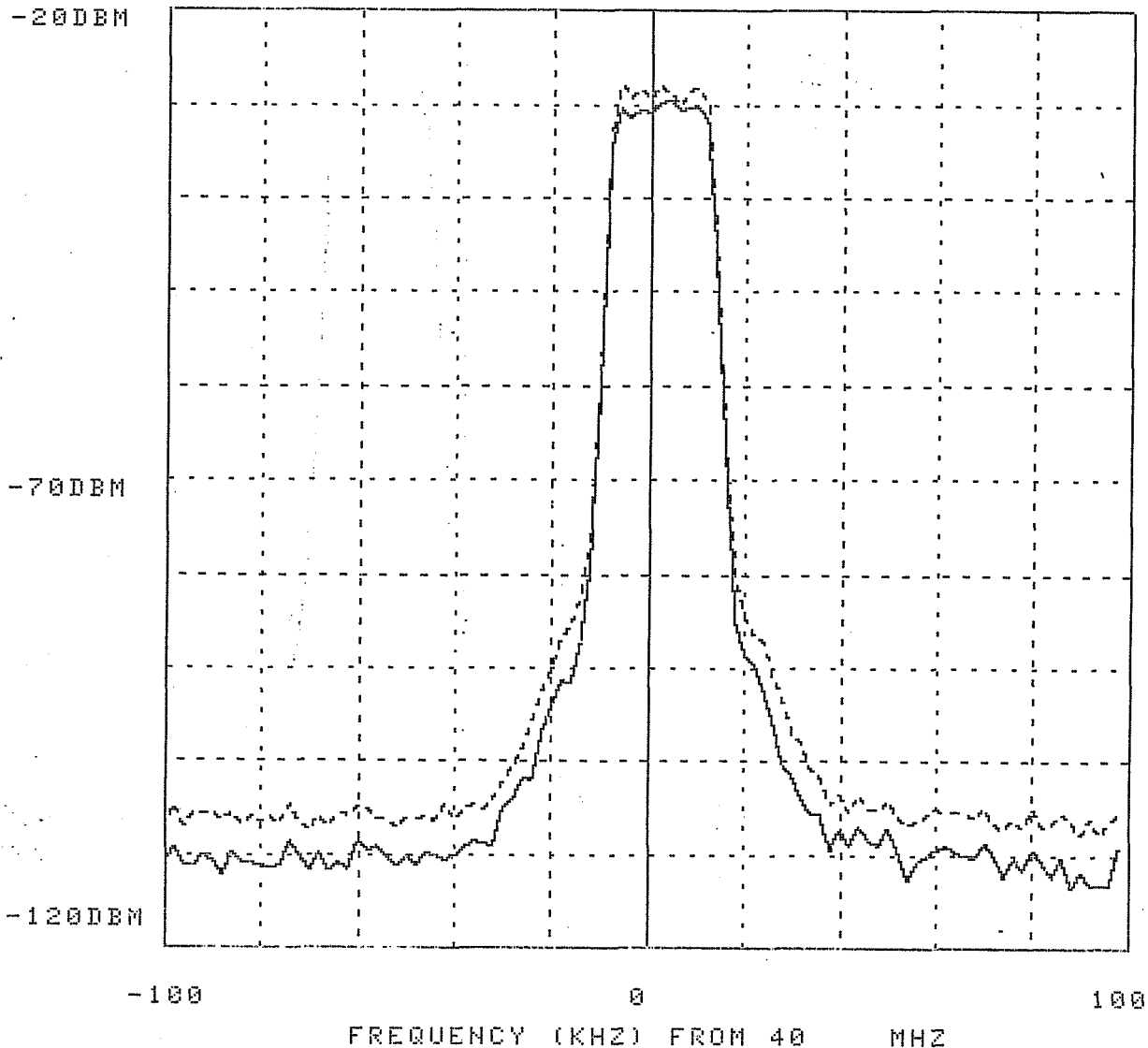


Figure 3.1. Effective IF bandpass shape. The dashed line is based on a single measurement per channel. The solid line is based on the minimum of 40 measurements per channel as per the MSCAN measurement routine, and is appropriate for the 30-50 MHz band measurements made at Norfolk.

4. ANALYSIS PROCEDURES

Tapes supplied by the Frequency Management Support Division (FMSD) of NTIA with the January 1978 GMF and May 1975 non-government assignment data for the Norfolk area were processed at ITS to obtain a Mini-GMF file (MGF). The Mini-GMF code is a six digit word that is generated from assignment files and paired with channel center frequencies measured by the RSMS to provide a concise summary of the assignment situation. Each digit of the code word indicates that number (up to 9) of assignments within a specific category. A value of 9 indicates nine or more such assignments. The first four digits are concerned with Government Master File (GMF) assignments and the last two are concerned with non-government (NG) and International Telecommunications Union File (ITUF) assignments. Details on the Mini-GMF code can be found in Table 4.1.

Table 4.1. Mini-GMF code word description.

Digit	Category
sign	Negative (-) if aural monitoring is <i>not</i> permitted (i.e., if digit 5 is non-zero). Positive (blank) if aural monitoring is permitted (i.e., digit 5 is zero). Positive (+) if digit 5 is non-zero, but a manual check of the assignment records show that the NG assignment(s) involved could not be demodulated into intelligible messages by the RSMS.
1	Fixed GMF assignments within range of expected signal reception (50 mi) and on exact frequency.
2	Fixed GMF assignments within possible signal reception range (150 mi) and on exact frequency.
3	Fixed GMF assignments within extended range that are not on the exact frequency, but have bandwidth overlap.
4	Area GMF assignments with bandwidth overlap.
5	Fixed and area NG assignments in extended range with bandwidth overlap.
6	Fixed and area non-USA ITUF assignments in extended range with bandwidth overlap.

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Individual one-hour statistics files collected on weekdays between 8 a.m. and 5 p.m. are combined into a single master statistics file (MSF) for the entire 30-50 band measurement period using program EDIT 30. Then the MSF and MGF are processed with program PLOT 30 to produce a band usage summary (table 2.1) along with channel-by-channel usage summary tables (tables 5.1 to 5.8), and plots (figs. 5.1 to 5.8).

Program EDIT 30 is used to obtain a set of 24 consecutive hourly statistics files that are ordered by time-of-day starting with the hour after midnight. These data and the MGF are processed with program TOD-30 (time-of-day) to produce graphs showing band usage as a function of time-of-day for all channels in the band (fig. 6.1) and channels with GMF assignments within 50 mi of the RSMS (fig. 6.2).

Processing of the MSF and the MGF by program DIST-30 produces channel usage distributions. This program uses the MGF to select appropriate channels. Distributions for all channels in the band (fig. 7.1) and channels with GMF assignments within 50 mi of the RSMS (fig. 7.2) are developed.

5. CHANNEL OCCUPANCY AND AMPLITUDE STATISTICS

This section contains the results of measurements on the 30-50 MHz band in the Norfolk area. Measurements included in this analysis were collected during three weekdays between 8 a.m. and 5 p.m. This included 18 hours of data which contained 23,526 measurements on each channel. At the end of this section the data are listed and plotted according to frequency in 1 MHz blocks. The same data are used in section 7.

The measurement index number used in tables 5.1 to 5.8 is not to be construed as any sort of official designation, but is used in data analysis as a convenient means of identifying each of the 335 channels measured in this band. The percent usage is rounded off to the nearest 0.1% (corresponding to 24 measurements out 23,526). The maximum and average received power is rounded to the nearest decibel. All amplitude measurements were made with the MSCAN routine, which may not accurately measure average power values, depending on modulation characteristics. When signals larger than - 30 dBm are present, general statistics are not collected, but the peak signal amplitude is recorded.

The plots of usage in figures 5.1 to 5.8 are plotted between 0.5% and 100% on a logarithmic scale with grid lines drawn on a 1-2-5-10 basis. The amplitude statistics are plotted over the range between - 120 dBm and - 20 dBm, with the bottom of the vertical line representing the average signal level during the time the signal was above - 101 dBm threshold. The top of the line is the maximum signal amplitude measured at that frequency. In both graphs, the graphed data have been offset very slightly to the right of their proper positions so that data are not hidden when they fall directly on the scale lines or edges of the graphs.

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Table 5.1. Usage Summary List For 30-31 MHz.

NORFOLK, VIRGINIA		APRIL 1978	CASS 174.301		
GMF 780101		SCANS 23526	THRESHOLD (dBm) -101		
INDEX	FREQUENCY (MHz)	USAGE (%)	MAXIMUM (dBm)	AVERAGE (dBm)	MINI-GMF CODE
2	30.03	2.6	-78	-96	001100
7	30.13	.1	-78	-85	003300
8	30.15	.1	-76	-85	141500
10	30.19	.1	-77	-84	001100
12	30.23	.3	-91	-97	001100
13	30.25	.5	-77	-96	001100
16	30.31	20.3	-76	-96	001100
21	30.41	.1	-97	-99	001100
22	30.43	.8	-90	-98	002200
23	30.45	.1	-96	-99	012300
25	30.49	.2	-86	-97	011200
26	30.51	.1	-94	-98	001100
28	30.55	1	-88	-98	221300

Δ NORFOLK, VIRGINIA APRIL 1978 CASS 174.301
GMF 780101 SCANS 23526 THRESHOLD (dBm) -101

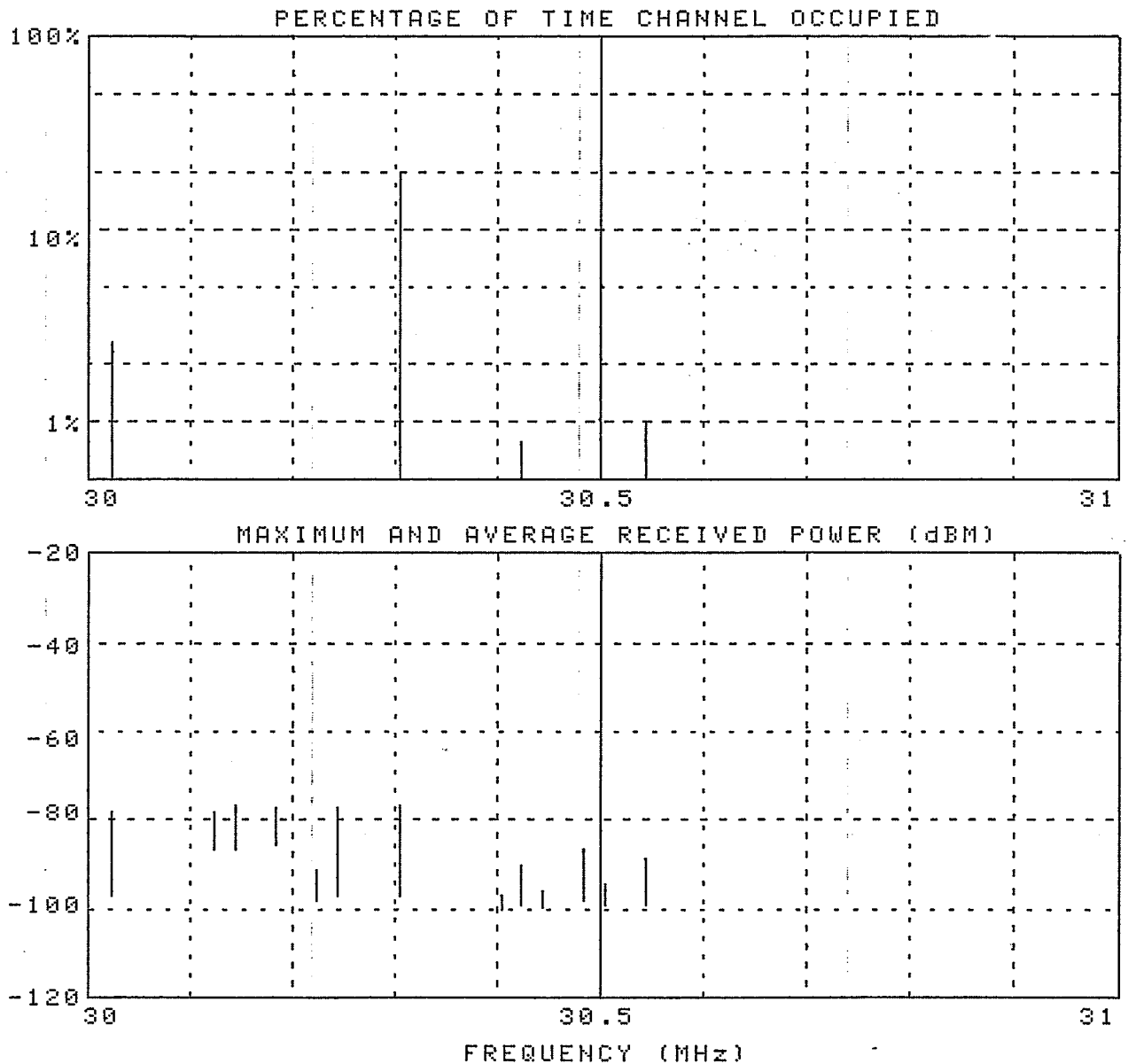


Figure 5.1. Usage summary plot for 30-31 MHz.

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Table 5.2. Usage Summary List For 32-33 MHz.

NORFOLK, VIRGINIA		APRIL 1978		CASS 174.301	
GMF 780101		SCANS 23526		THRESHOLD (dBm) -101	
INDEX	FREQUENCY (MHz)	USAGE (%)	MAXIMUM (dBm)	AVERAGE (dBm)	MINI-GMF CODE
29	32.01	.5	-92	-98	001100
30	32.03	.1	-95	-98	004400
31	32.05	.1	-92	-98	231400
32	32.07	.1	-91	-98	004400
33	32.09	.1	-93	-98	001100
34	32.11	.1	-96	-99	011200
35	32.13	.1	-86	-98	011200
36	32.15	.5	-88	-96	001100
37	32.17	.1	-81	-97	001100
38	32.19	.1	-82	-97	001100
39	32.21	.6	-81	-97	011200
40	32.23	.1	-93	-98	041500
41	32.25	.1	-96	-99	001100
42	32.27	.1	-92	-99	001100
43	32.29	.1	-94	-98	001100
44	32.31	.1	-91	-98	011200
45	32.33	.1	-78	-98	001100
46	32.35	.1	-81	-97	001100
47	32.37	.2	-81	-95	001100
48	32.39	.1	-93	-98	001100
49	32.41	.1	-90	-98	001100
50	32.43	.8	-79	-95	002200
51	32.45	.1	-83	-96	012300
52	32.47	.1	-89	-98	003300
53	32.49	.1	-94	-98	001100
54	32.51	1.6	-65	-93	0
55	32.53	.1	-87	-98	020200
56	32.55	.1	-88	-98	0
57	32.57	.1	-95	-99	0
58	32.59	.1	-95	-99	0
59	32.61	.1	-97	-99	0
60	32.63	.1	-86	-98	0
61	32.65	.1	-92	-98	0
62	32.67	.1	-94	-98	0
63	32.69	.1	-91	-98	0
64	32.71	.5	-72	-98	0
65	32.73	.1	-93	-98	010100
66	32.75	.3	-91	-97	0
67	32.77	.1	-97	-99	0
68	32.79	.1	-96	-99	0
69	32.81	.1	-92	-98	0
70	32.83	.3	-93	-98	0
71	32.85	.1	-90	-98	002200
72	32.87	.1	-94	-98	002200
73	32.89	.1	-88	-97	0
74	32.91	.4	-88	-95	000010
75	32.93	.1	-88	-97	000010
76	32.95	.1	-87	-98	0
77	32.97	.3	-92	-98	0
78	32.99	.1	-89	-98	0

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Δ NORFOLK, VIRGINIA
GMF 780101

APRIL 1978
SCANS 23526

CASS 174.301
THRESHOLD (dBm) -101

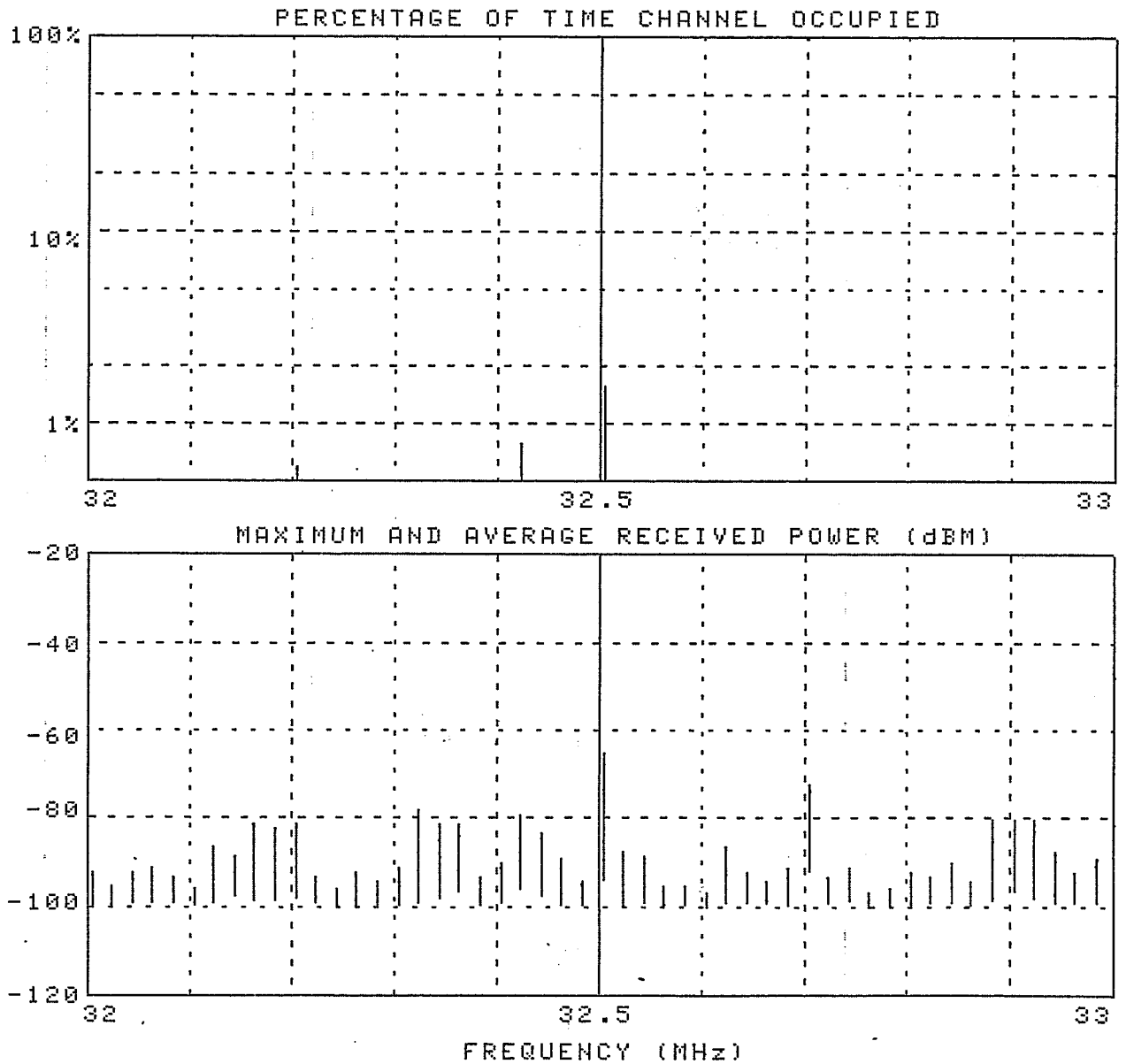


Figure 5.2. Usage summary plot for 32-33 MHz.

Table 5.3. Usage Summary List For 34-35 MHz.

NORFOLK, VIRGINIA		APRIL 1978		CASS 174.301	
GMF 780101		SCANS 23526		THRESHOLD (dBm) -101	
INDEX	FREQUENCY (MHz)	USAGE (%)	MAXIMUM (dBm)	AVERAGE (dBm)	MINI-GMF CODE
79	34.01	.3	-80	-93	0
80	34.03	.1	-91	-98	0
81	34.05	.1	-91	-98	010100
82	34.07	.5	-81	-96	020200
83	34.09	.1	-95	-99	0
84	34.11	.1	-93	-98	0
85	34.13	.1	-92	-98	004400
86	34.15	.7	-82	-93	132500
87	34.17	.1	-88	-97	002200
88	34.19	.1	-95	-99	0
89	34.21	.2	-96	-99	0
90	34.23	.1	-88	-98	0
91	34.25	.1	-89	-98	0
92	34.27	.1	-89	-98	0
93	34.29	.3	-85	-95	0
94	34.31	2.5	-63	-93	0
95	34.33	.1	-94	-98	001100
96	34.35	.1	-92	-98	021300
97	34.37	.1	-96	-99	0
98	34.39	.1	-95	-99	0
99	34.41	.1	-96	-99	0
100	34.43	.1	-92	-98	0
101	34.45	.1	-92	-98	0
102	34.47	.1	-96	-99	0
103	34.49	.1	-91	-98	0
104	34.51	.1	-92	-98	0
105	34.53	.1	-91	-98	002200
106	34.55	1.1	-74	-89	002200
107	34.57	.4	-79	-95	0
108	34.59	.1	-93	-98	0
109	34.61	.1	-92	-98	0
110	34.63	.1	-96	-99	0
111	34.65	.1	-95	-99	0
112	34.67	.1	-94	-98	0
113	34.69	.1	-96	-99	0
114	34.71	.1	-92	-98	0
115	34.73	.1	-93	-99	001100
116	34.75	.2	-84	-97	001100
117	34.77	.1	-94	-98	0
118	34.79	.1	-92	-99	0
119	34.81	.7	-79	-97	0
120	34.83	.5	-77	-98	290900
121	34.85	4	-49	-72	0
122	34.87	2.4	-79	-98	0
123	34.89	.1	-95	-99	0
124	34.91	.1	-94	-99	0
125	34.93	.1	-92	-98	0
126	34.95	.1	-94	-99	010100
127	34.97	.1	-93	-98	0
128	34.99	.1	-92	-98	0

Δ NORFOLK, VIRGINIA
GMF 780101

APRIL 1978
SCANS 23526

CASS 174.301
THRESHOLD (dBm) -101

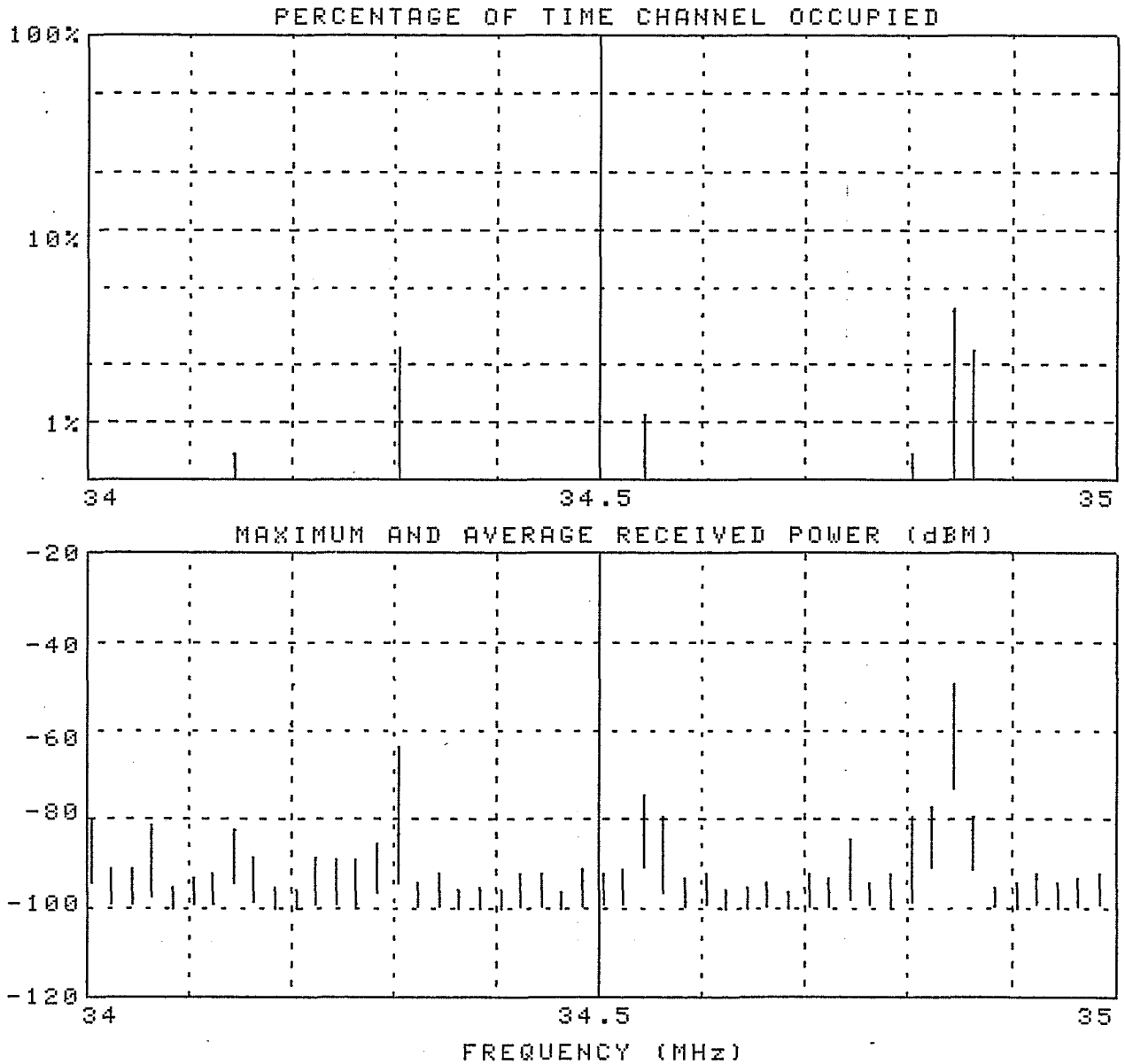


Figure 5.3. Usage summary plot for 34-35 MHz.

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Table 5.4. Usage Summary List For 36-37 MHz.

NORFOLK, VIRGINIA
GMF 780101

APRIL 1978
SCANS 23526

CASS 174.301
THRESHOLD (dBm) -101

INDEX	FREQUENCY (MHz)	USAGE (%)	MAXIMUM (dBm)	AVERAGE (dBm)	MINI-GMF CODE
129	36.01	.2	-88	-97	0
130	36.03	.1	-84	-96	0
131	36.05	.7	-60	-81	0
132	36.07	.2	-74	-97	0
133	36.09	.1	-77	-97	0
134	36.11	.1	-81	-97	0
135	36.13	.1	-93	-98	003300
136	36.15	.3	-93	-98	240400
137	36.17	.2	-88	-98	003300
138	36.19	.2	-83	-97	0
139	36.21	.2	-82	-96	001100
140	36.23	.1	-91	-99	001100
141	36.25	.6	-86	-98	010100
142	36.27	.2	-83	-96	0
143	36.29	.4	-80	-91	0
144	36.31	.4	-77	-88	010100
145	36.33	.1	-84	-95	0
146	36.35	1.9	-82	-97	010100
147	36.37	.3	-88	-97	0
148	36.39	.1	-94	-98	0
149	36.41	.1	-91	-98	0
150	36.43	.1	-89	-97	0
151	36.45	1	-90	-98	0
152	36.47	.2	-95	-98	0
153	36.49	.1	-86	-98	0
154	36.51	.1	-95	-99	010100
155	36.53	.1	-89	-98	002200
156	36.55	.1	-94	-99	150500
157	36.57	.1	-95	-99	002200
158	36.59	.1	-93	-98	001100
159	36.61	.1	-93	-98	001100
160	36.63	.1	-77	-94	010100
161	36.65	.1	-82	-97	0
162	36.67	.1	-94	-98	0
163	36.69	.1	-95	-99	040400
164	36.71	.3	-75	-93	010100
165	36.73	.1	-96	-98	0
166	36.75	.1	-90	-98	0
167	36.77	.1	-94	-98	0
168	36.79	.1	-96	-99	010100
169	36.81	.1	-92	-99	0
170	36.83	.1	-94	-98	002200
171	36.85	.1	-95	-98	131400
172	36.87	.1	-93	-98	003300
173	36.89	.1	-85	-97	0
174	36.91	.4	-86	-97	010100
175	36.93	.1	-96	-99	0
176	36.95	.1	-93	-99	0
177	36.97	.1	-96	-99	0
178	36.99	.1	-95	-99	020210

Δ NORFOLK, VIRGINIA
GMF 780101

APRIL 1978
SCANS 23526

CASS 174.301
THRESHOLD (dBm) -101

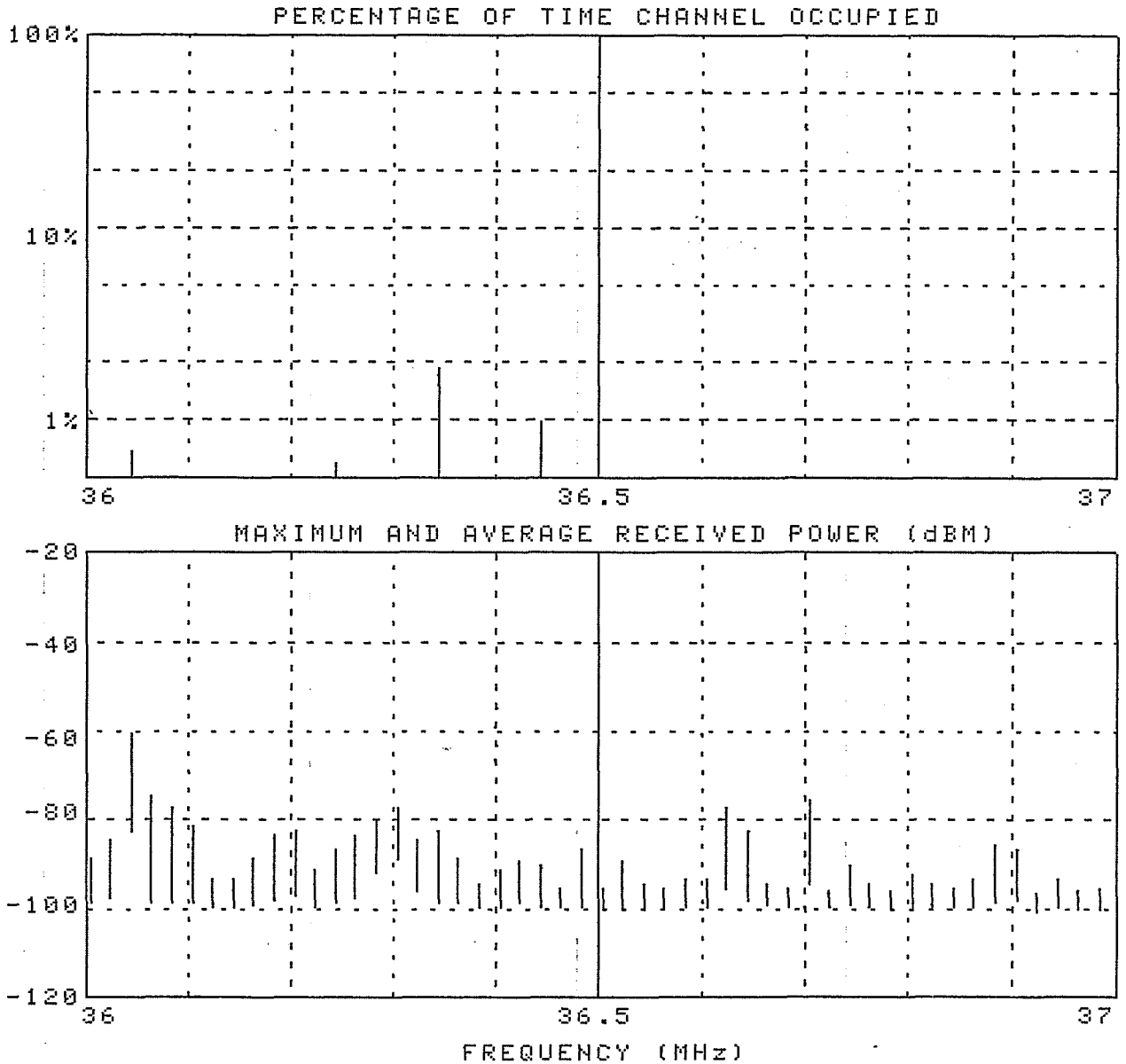


Figure 5.4. Usage summary plot for 36-37 MHz.

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Table 5.5. Usage Summary List For 38-39 MHz.

NORFOLK, VIRGINIA		APRIL 1978		CASS 174.301	
GMF 780101		SCANS 23526		THRESHOLD (dBm) -101	
INDEX	FREQUENCY (MHz)	USAGE (%)	MAXIMUM (dBm)	AVERAGE (dBm)	MINI-GMF CODE
179	38.27	.3	-88	-97	0
185	38.39	.1	-88	-98	0
186	38.41	.1	-96	-99	0
187	38.43	.1	-88	-98	0
191	38.51	3.5	-76	-82	0
192	38.53	.1	-76	-95	010100
193	38.55	1	-54	-82	0
194	38.57	.4	-57	-87	0
196	38.61	.1	-88	-98	0
197	38.63	.1	-88	-98	001100
198	38.65	.1	-88	-93	011200
200	38.69	.1	-94	-99	001100
201	38.71	.1	-86	-98	001100
202	38.73	.1	-91	-95	001100
203	38.75	.1	-89	-95	001100
204	38.77	.4	-88	-97	0
206	38.81	.1	-88	-97	0
207	38.83	.1	-96	-99	0
208	38.85	8.2	-77	-93	0
209	38.87	.4	-82	-96	0
211	38.91	.1	-82	-96	001100
213	38.95	.2	-82	-92	010100
215	38.99	.1	-96	-98	000010

Δ NORFOLK, VIRGINIA APRIL 1978 CASS 174.301
GMF 780101 SCANS 23526 THRESHOLD (dBm) -101

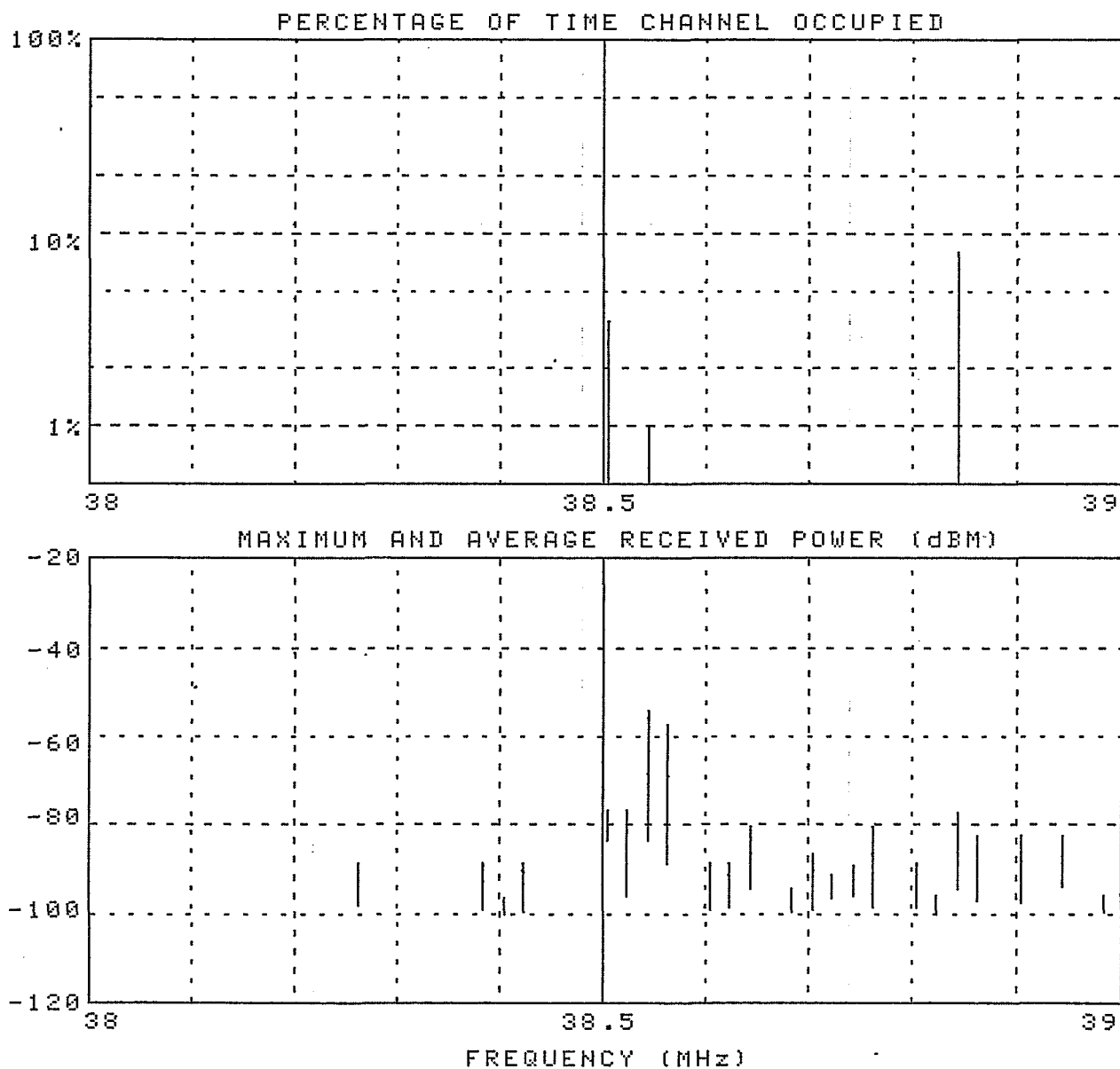


Figure 5.5. Usage summary plot for 38-39 MHz.

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Table 5.6. Usage Summary List For 40-41 MHz.

NORFOLK, VIRGINIA		APRIL 1978		CASS 174.301	
GMF 780101		SCANS 23526		THRESHOLD (dBm) -101	
INDEX	FREQUENCY (MHz)	USAGE (%)	MAXIMUM (dBm)	AVERAGE (dBm)	MINI-GMF CODE
217	40.03	.1	-96	-99	0
221	40.11	.2	-91	-98	003300
223	40.15	.2	-79	-85	001100
224	40.17	0	-91	-98	120200
225	40.19	0	-98	-99	120200
226	40.21	.1	-71	-93	0
236	40.41	.1	-82	-94	001100
238	40.45	.3	-73	-89	0
239	40.47	.1	-77	-95	0
242	40.53	1.1	-73	-84	002200
243	40.55	.2	-77	-90	250500
245	40.59	.2	-67	-91	0
246	40.61	.2	-78	-89	0
247	40.63	.2	-82	-91	010100
250	40.69	.1	-79	-92	0
251	40.71	.2	-73	-86	0
252	40.73	.1	-88	-95	0
254	40.77	.1	-76	-91	0
255	40.79	.2	-58	-87	005500
256	40.81	.1	-74	-92	006600
257	40.83	.2	-61	-80	001100
258	40.85	.1	-76	-91	0
259	40.87	.1	-90	-98	130300
264	40.97	.1	-75	-87	0

Δ NORFOLK, VIRGINIA
GMF 780101

APRIL 1978
SCANS 23526

CASS 174.301
THRESHOLD (dBm) -101

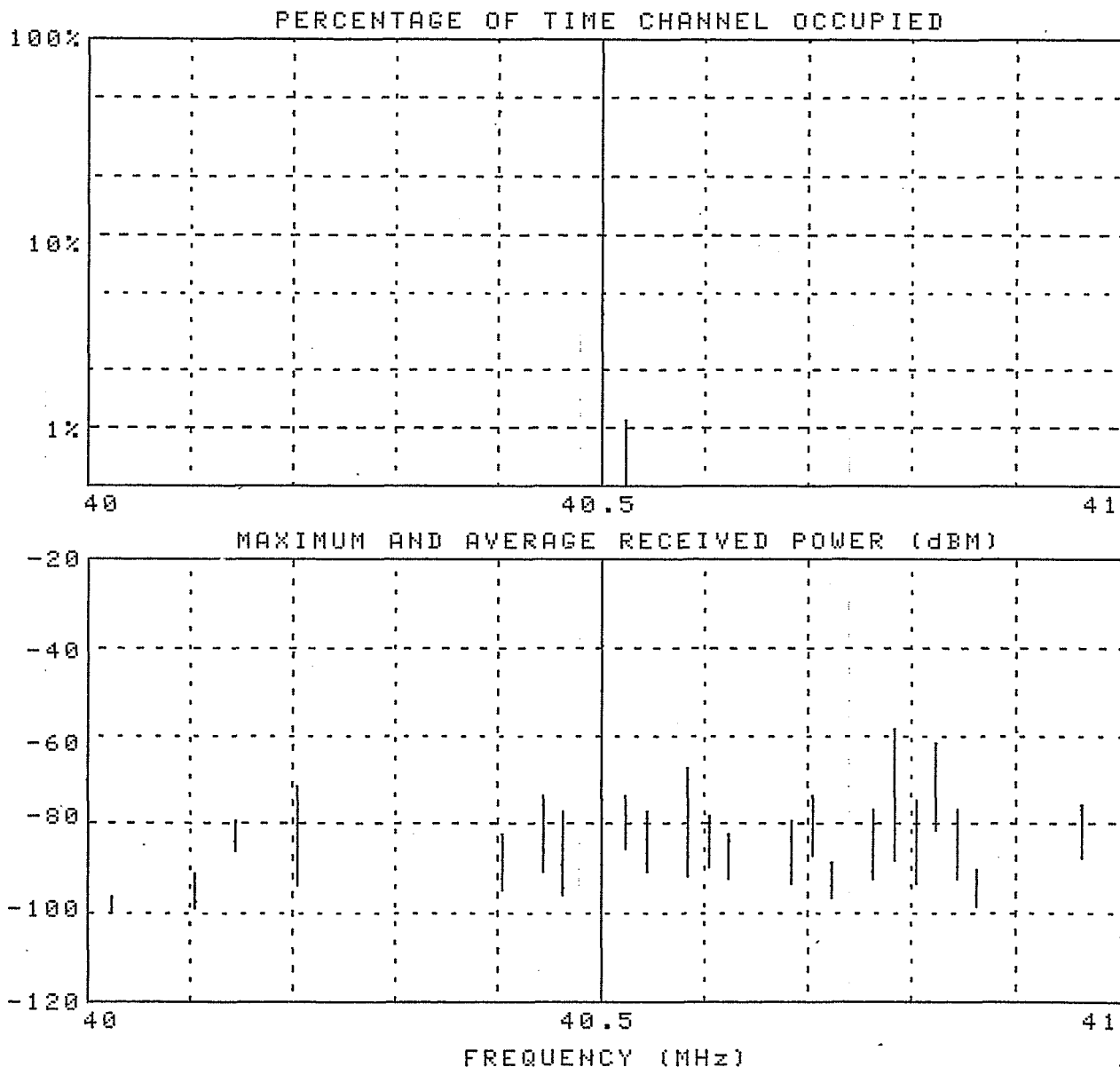


Figure 5.6. Usage summary plot for 40-41 MHz.

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Table 5.7. Usage Summary List For 41-42 MHz.

NORFOLK, VIRGINIA		APRIL 1978	CASS 174.301		
GMF 700101		SCANS 23526	THRESHOLD (dBm) -101		
INDEX	FREQUENCY (MHz)	USAGE (%)	MAXIMUM (dBm)	AVERAGE (dBm)	MINI-GMF CODE
277	41.23	.1	-81	-94	0
288	41.45	13.9	-76	-95	010100
290	41.49	.1	-79	-94	001100
291	41.51	.6	-39	-62	001100
303	41.75	.4	-78	-85	0
304	41.77	.1	-92	-97	0

Δ NORFOLK, VIRGINIA
GMF 780101

APRIL 1978
SCANS 23526

CASS 174.301
THRESHOLD (dBm) -101

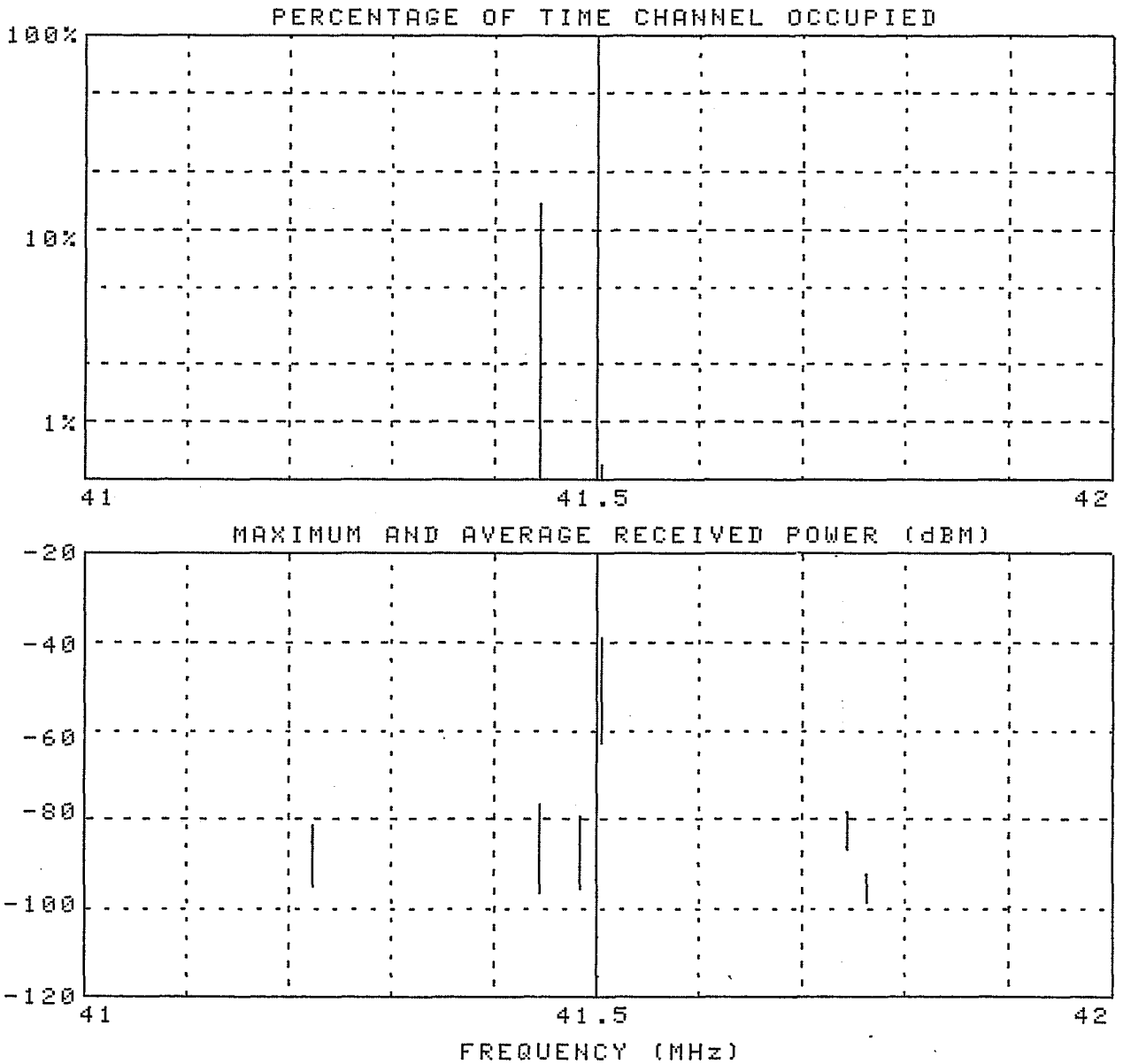


Figure 5.7. Usage summary plot for 41-42 MHz.

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Table 5.8. Usage Summary List For 46-47 MHz.

NORFOLK, VIRGINIA		APRIL 1978	CASS 174.301		
GMF 780101		SCANS 23526	THRESHOLD (dBm) -101		
INDEX	FREQUENCY (MHz)	USAGE (%)	MAXIMUM (dBm)	AVERAGE (dBm)	MINI-GMF CODE
318	46.65	.1	-94	-98	010100

Δ NORFOLK, VIRGINIA
GMF 780101

APRIL 1978
SCANS 23526

CASS 174.301
THRESHOLD (dBm) -101

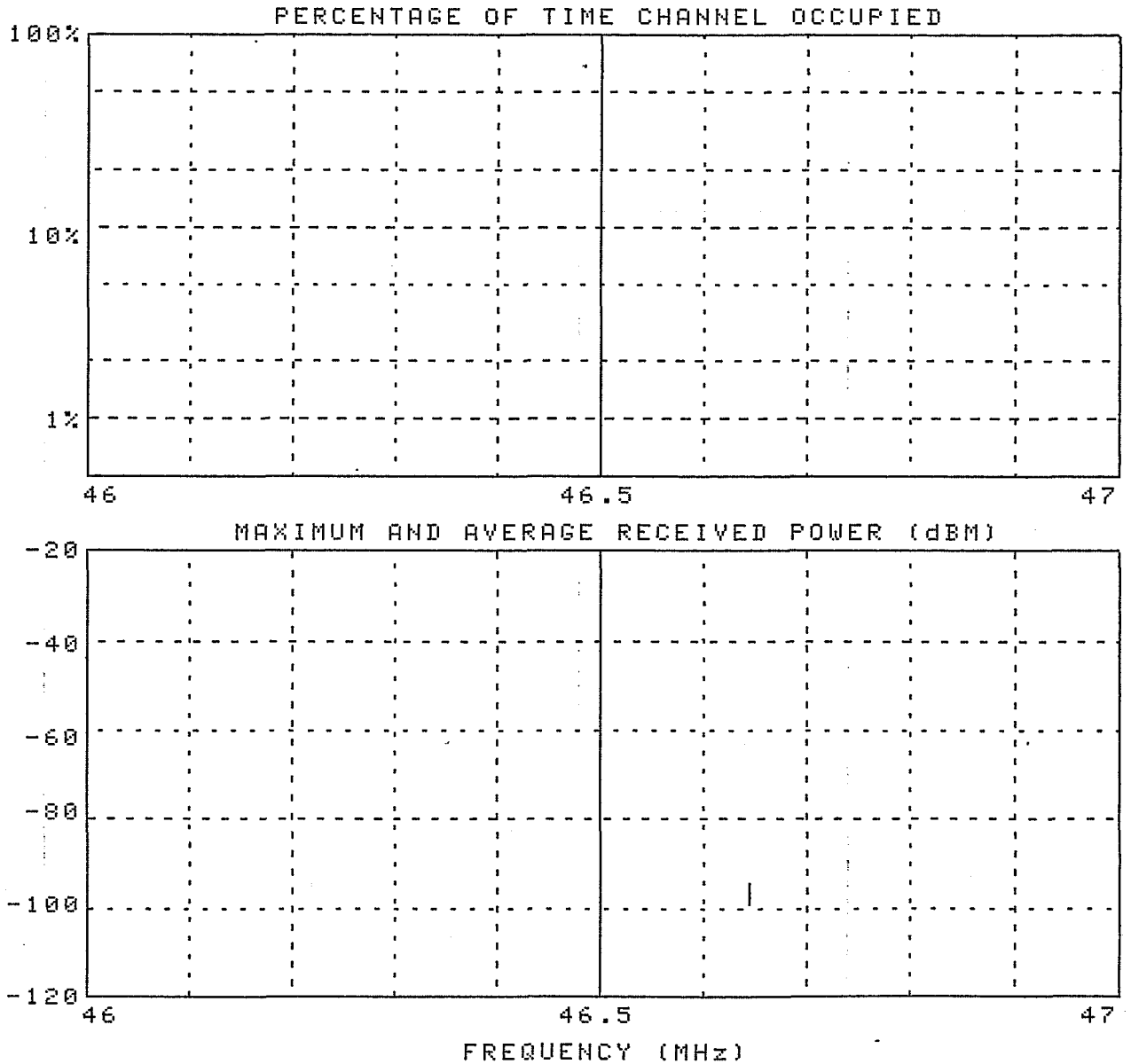


Figure 5.8. Usage summary plot for 46-47 MHz.

6. OCCUPANCY BY TIME-OF-DAY

Consecutive hourly statistics files of usage data collected 24 hours of the day during April 10, 1978 were used to generate the hourly band occupancy vs. time-of-day plot shown in figures 6.1 and 6.2.

Figure 6.1 is for all of the 335 channels measured in the 30-50 MHz band, and figure 6.2 is for the 12 channels measured that have exact channel center GMF assignments within 50 mi of the Norfolk RSMS measurement site. Note that the ordinate scale of figures 6.1 and 6.2 go to 10%.

The heaviest usage (1%) of the 12 fixed government channels assigned within 50 mi occurred between 1 p.m. and 2 p.m.

APRIL 1978
NORFOLK, VA.

MTAPE 174
CHANNELS = 335

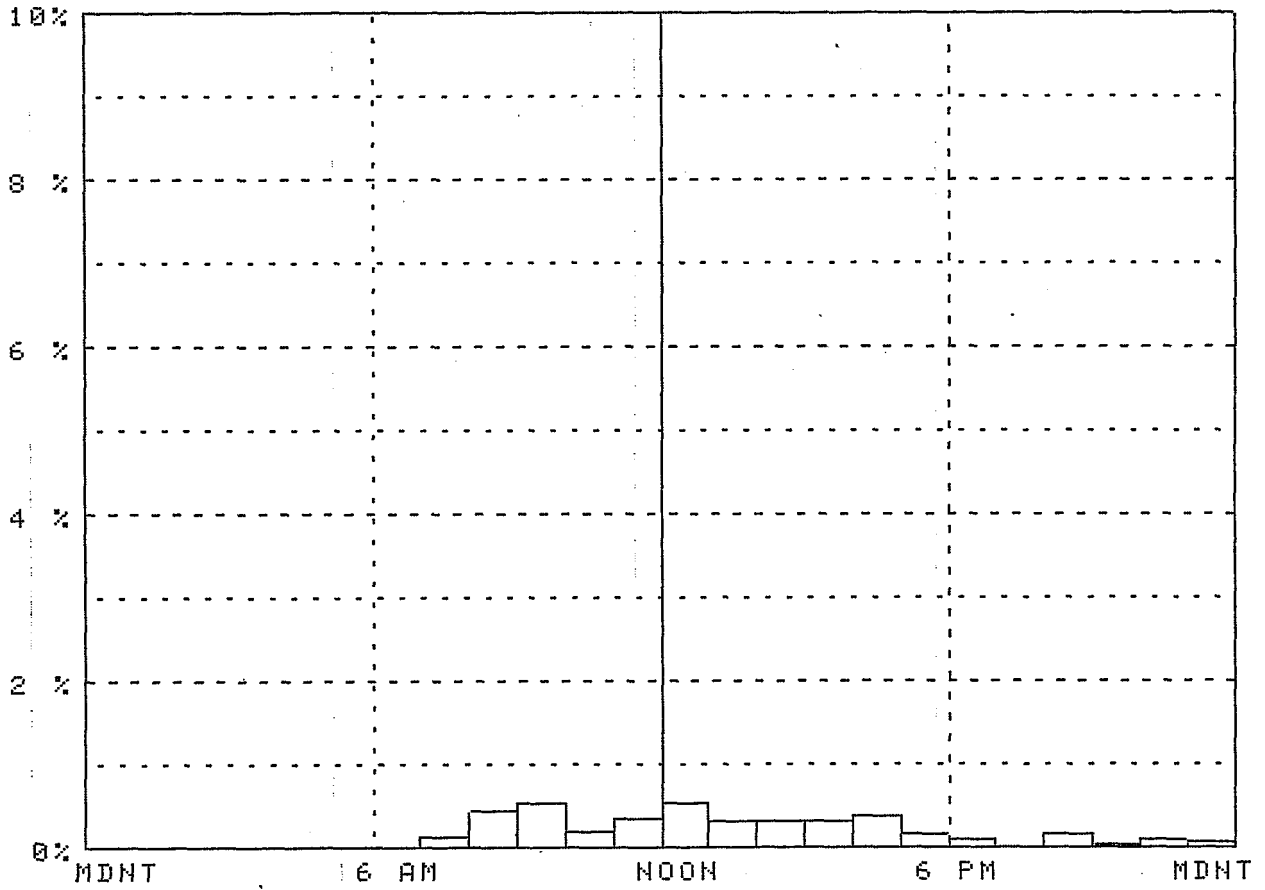


Figure 6.1. Occupancy versus time-of-day for 30-50 MHz band.

APRIL 1978
NORFOLK, VA.

MTAPE 174
CHANNELS = 12

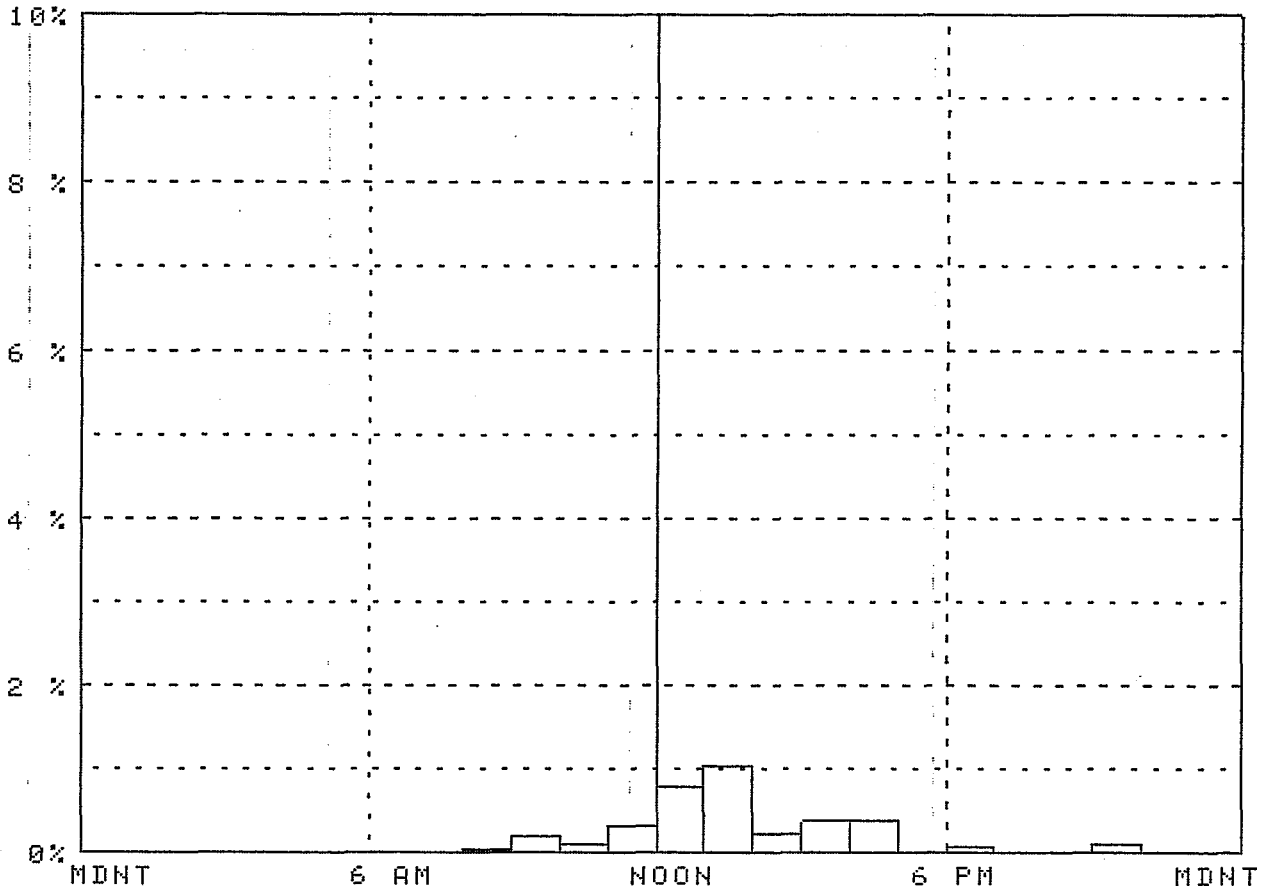


Figure 6.2. Occupancy versus time-of-day for 30-50 MHz band.

7. CHANNEL USAGE DISTRIBUTIONS

Figures 7.1 and 7.2 are channel usage distribution made from the same data used to develop the usage information provided in section 5 on the channel-by-channel basis. Figure 7.1 is for all of the 335 channels measured in the 30-50 MHz band, and figure 7.2 is for the 12 channels measured that have exact channel center GMF assignments within 50 mi of the Norfolk RSMS measurement site. About 8% of the fixed government channels assigned within 50 mi have a usage of at least 1% or more.

NORFOLK, VIRGINIA
GMF 780101

APRIL 1978
SCANS 23526

CASS 174.303
THRESHOLD (dBm) -101

APPLICABLE ONLY TO ALL CHANNELS.

INCLUDED ARE 335 OF THE 335 CHANNELS MEASURED.

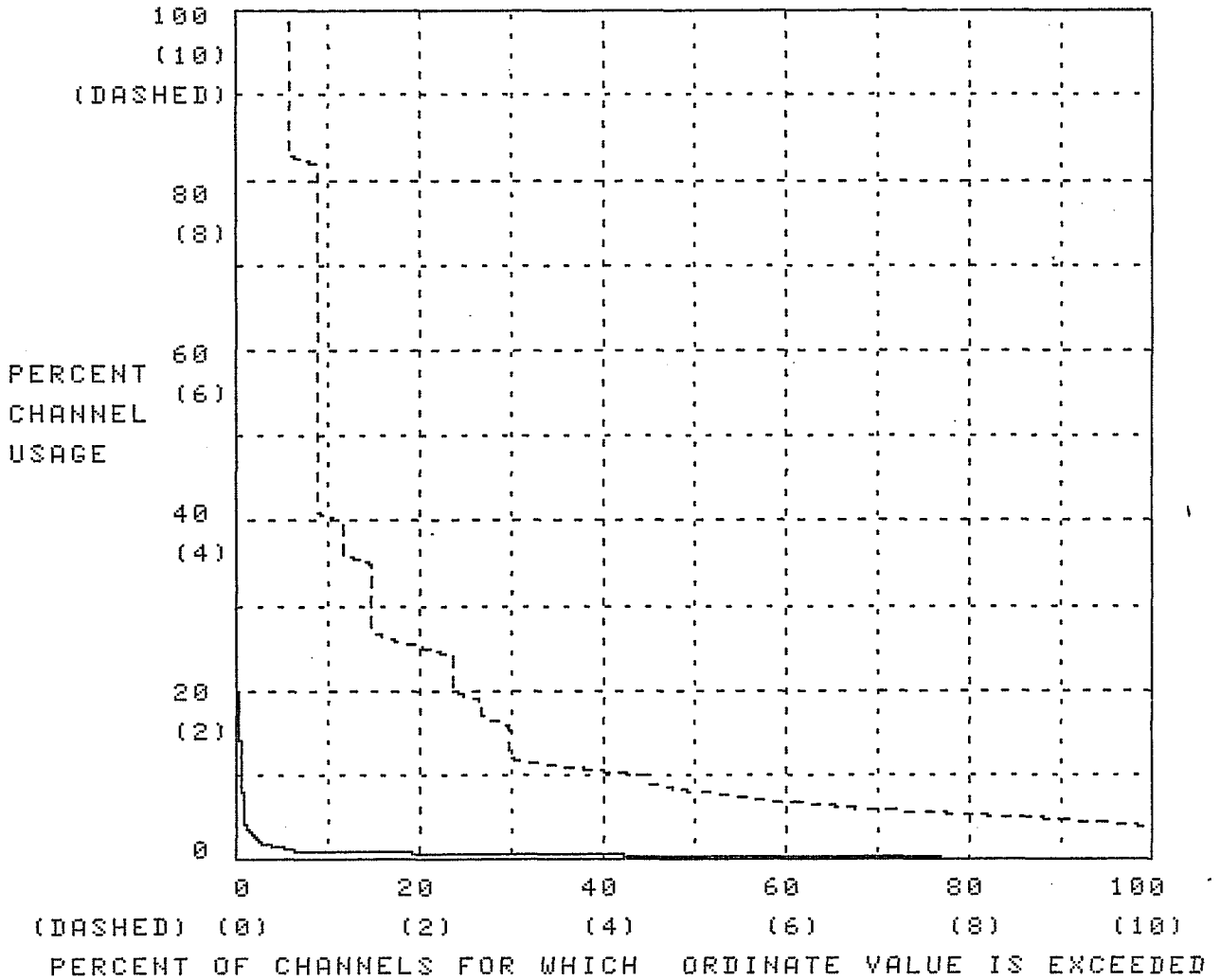


Figure 7.1. Channel usage distribution for 30-50 MHz band.

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NORFOLK, VIRGINIA

APRIL 1978

CASS 174.303

GMF 780101

SCANS 23526

THRESHOLD (dBm) -101

APPLICABLE ONLY TO FIXED GOV'T CHANNELS WITHIN 50 MI.

INCLUDED ARE 12 OF THE 335 CHANNELS MEASURED.

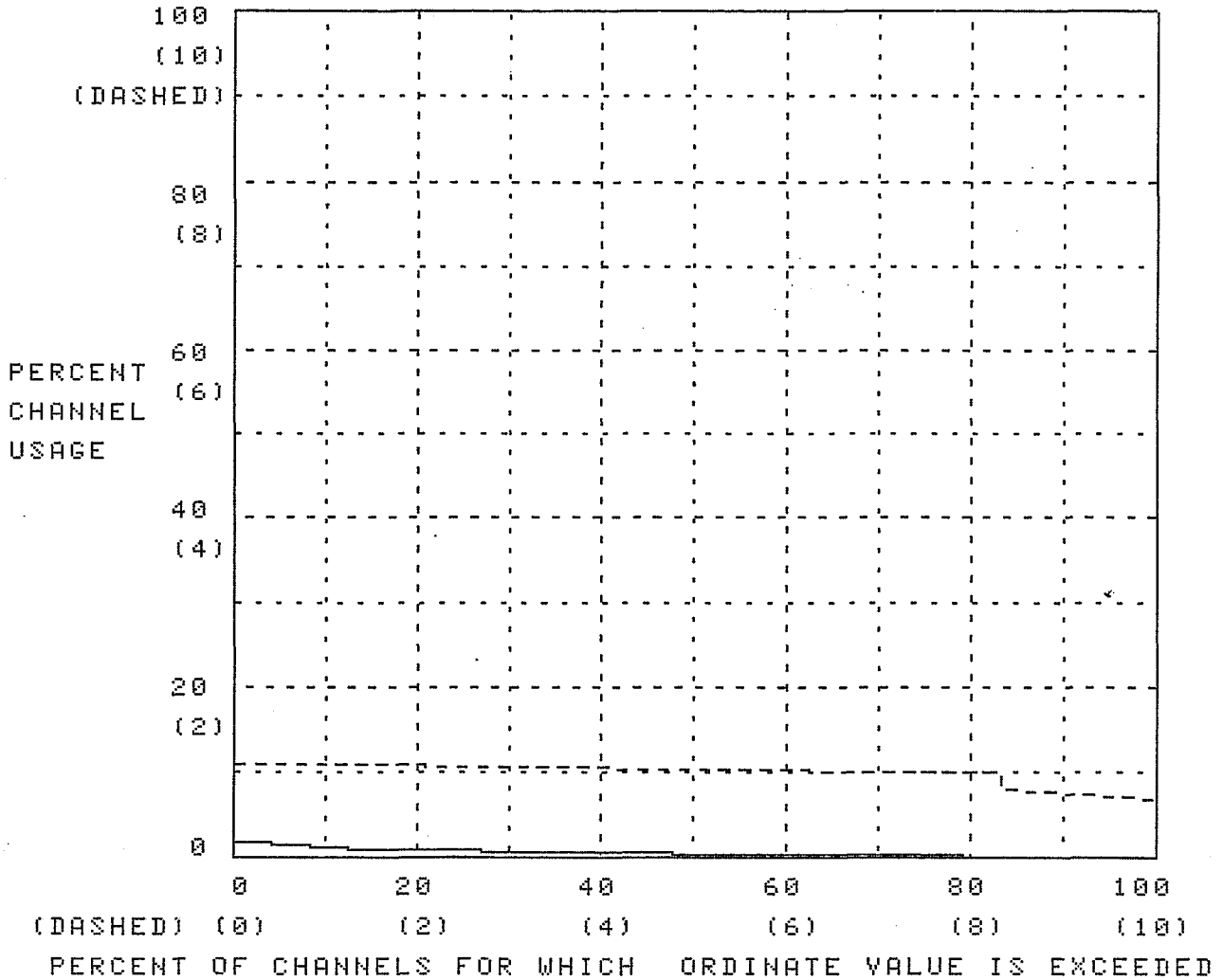


Figure 7.2. Channel usage distribution for 30-50 MHz band.

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