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CTS ATTENUATION AND CROSS POLARIZATION MEASUREMENTS
AT 11.7 GHz

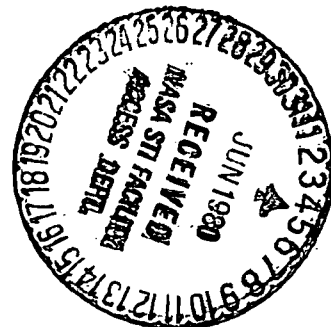
W. J. Vogel
Electrical Engineering Research Laboratory
The University of Texas at Austin
10100 Burnet Road
Austin, TX 78758

Final Report Covering the Period 1 February 1978 to 31 January 1979
Under Contract NAS5-22576
May 1979

Prepared for

GODDARD SPACE FLIGHT CENTER

Greenbelt, MD 20771



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16. Abstract Attenuation and cross-polarization isolation at 11.7 GHz, measured at Austin, Texas by receiving the circularly polarized emissions from the CTS satellite are presented. The data are a 12 month summary for Feb 78 to Jan 79. For .016% of the time the attenuation was greater than 10 dB, the isolation was less than 21 dB and the rainrate exceeded 55 mm/hr. Ice depolarization has been observed frequently.		
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I. INTRODUCTION

The nominally right hand circularly polarized 11.7 GHz beacon transmitter on the CTS satellite has been monitored at The University of Texas at Austin for the periods of its operation. The data presented in this report cover the attenuation and isolation measurements made with a dually polarized receiver and rain rate measurements made with a single tipping bucket rain gauge during the period of February 1978 to January 1979. Reports to be issued later will cover the other two experiments going on in connection with the one presented here. They are (1) the adjustable receiver polarization experiment and (2) COMSTAR attenuation and diversity measurements at 19, 28 and 13 GHz. In addition, at the conclusion of the CTS experiment a summary report covering all the data collected will be issued. The data collected before February 1978 have been summarized in two previous reports. The first of these also contains a detailed description of the receiver.

II. RECEIVER DESCRIPTION

The pertinent characteristics of the receiver and data collection system are given in Table I.

Vogel, W. J. and Straiton, A. W., 1977, "CTS Attenuation and Cross-Polarization Measurements at 11.7 GHz," Final Report under Contract NAS5-22576 for 12 June 1976 - 30 August 1976.

Vogel, W. J., 1978, "CTS Attenuation and Cross-polarization Measurements at 11.7 GHz," Final Report under Contract NAS5-22576 for 18 October 1976 - 31 January 1978.

TABLE I

DUAL POLARIZATION RECEIVER CHARACTERISTICS

Antenna:	3m parabola, prime focus feed, $f/D = .375$ program pointing to $.02^\circ$, elevation $\approx 50^\circ$
Feed:	turnstile polarizer
Polarization:	RHC, LHC (nominally), matched by adjusting for minimum power in cross-polar channel during clear-air propagation
Isolation:	better than 45 dB with optimum pointing
Fade margin:	30 dB for co-polarized channel 45 dB for cross-polarized channel
Calibration:	Precision attenuated 11.7 GHz signal injected into front end
Output:	logarithmic amplitudes, recorded on stripchart, digitized at 5 samples per minute

III. METEOROLOGICAL DATA

The total precipitation for each month and the number of thunderstorms, as reported by the Weather Service are given in Table II.

TABLE II
PRECIPITATION AND THUNDERSTORMS FOR AUSTIN

<u>Month</u>	<u>Rain (mm)</u>	<u>No. of Thunderstorms</u>
Feb 78	50	2
Mar	21	2
Apr	44	3
May	147	10
June	76	5
July	30	1
Aug	38	1
Sept	113	4
Oct	35	0
Nov	139	6
Dec 78	72	1
Jan 79	<u>54</u>	<u>1</u>
TOTAL	819	36

Integrating over the rain rate distribution measured at the receiver site from 5 mm/hr to 150 mm/hr gives a total of 480 mm. This means that about 40% of the rain fell at rates below 5 mm/hr. Comparing the total rain and number of thunderstorms to their long term average of 846 mm and 41 thunderstorms, it can be concluded that this reporting period had close to average weather.

IV. 12 MONTH SUMMARY OF THE ATTENUATION AND CROSS-POLARIZATION ISOLATION MEASUREMENTS

The percentage of time the attenuation exceeded specific values is

shown in Figure 1. For example 10 dB were exceeded for 1.6×10^{-2} percent of the time. From Figure 2 it can be seen that for the same percentage the isolation was less than 21 dB. The isolation is defined as the power ratio between the co-polarized and cross-polarized channel, or when expressed in dB:

$$\text{CPI(dB)} = \text{Co-polarized signal level (dB)} - \\ \text{cross-polarized signal level (dB)}$$

where the signal levels are measured with respect to some arbitrary reference. In this case this reference was the clear air level of the co-polarized signal. As shown in Figure 3 for 1.6×10^{-2} percent of time the rain rate exceeded 55 mm/hr.

The distribution curves define statical relationships between the measured parameters which can be used for modelling. For example, from the equal probability pairs of attenuation A and cross-polarization isolation CPI one can derive that the two are statistically related as

$$\text{CPI} = 33.4 - 13.1 \log A.$$

This equation represents the least squared error fit to the points indicated in Figure 5.

The density function of the quantities A in the range 0 to 30 dB and CPI in the range 10 to 40 dB was calculated from the data. From this the curves given in Figure 4 were derived. They show the 10% expectation, median and 90% expectation of exceeded isolation for each attenuation. For instance the three points at 5 dB mean that for

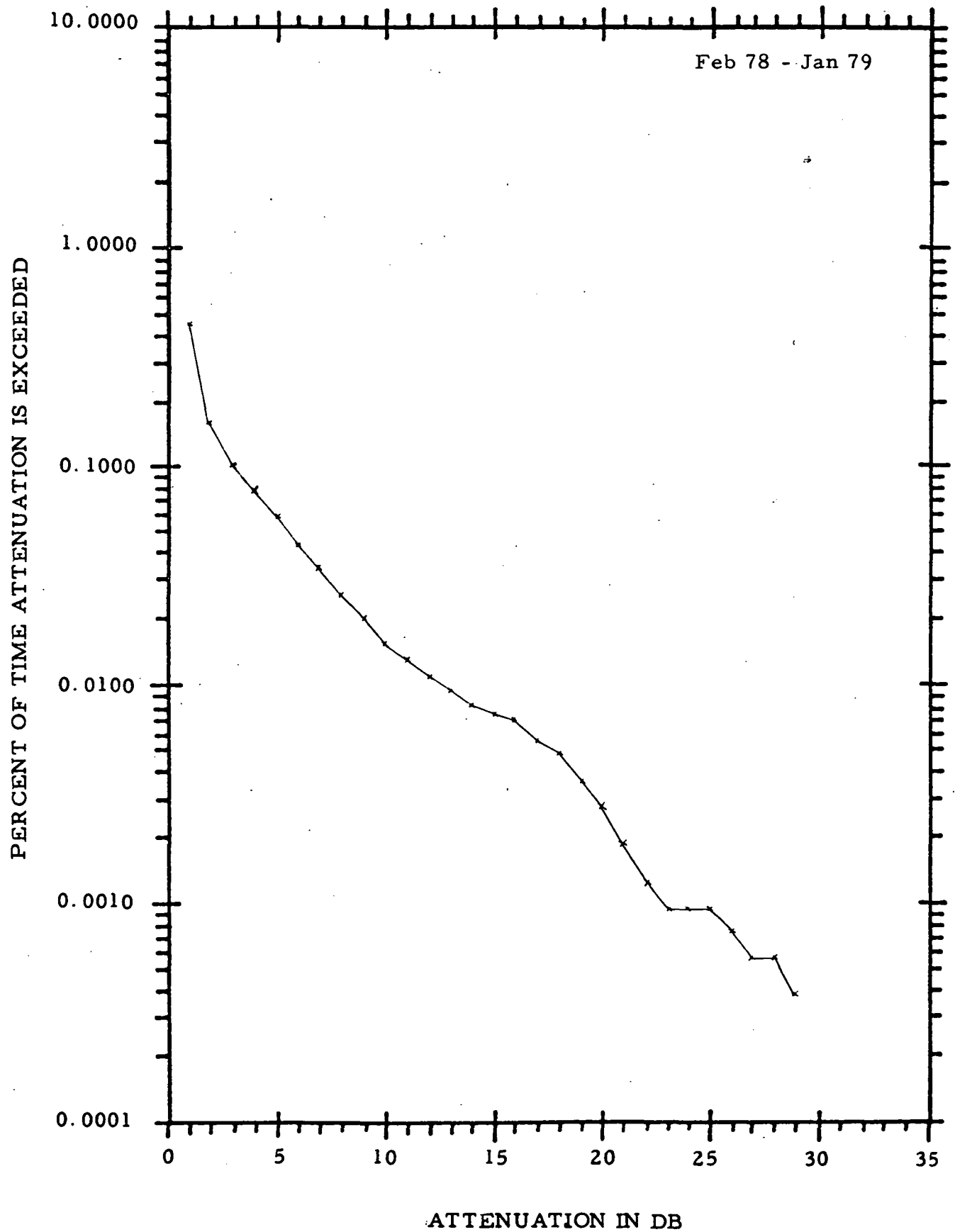
11.7 GHZ ATTENUATION DISTRIBUTION
AUSTIN, TEXAS

Fig. 1 12 Month Attenuation Exceedence Plot

11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS

Feb 78 - Jan 79

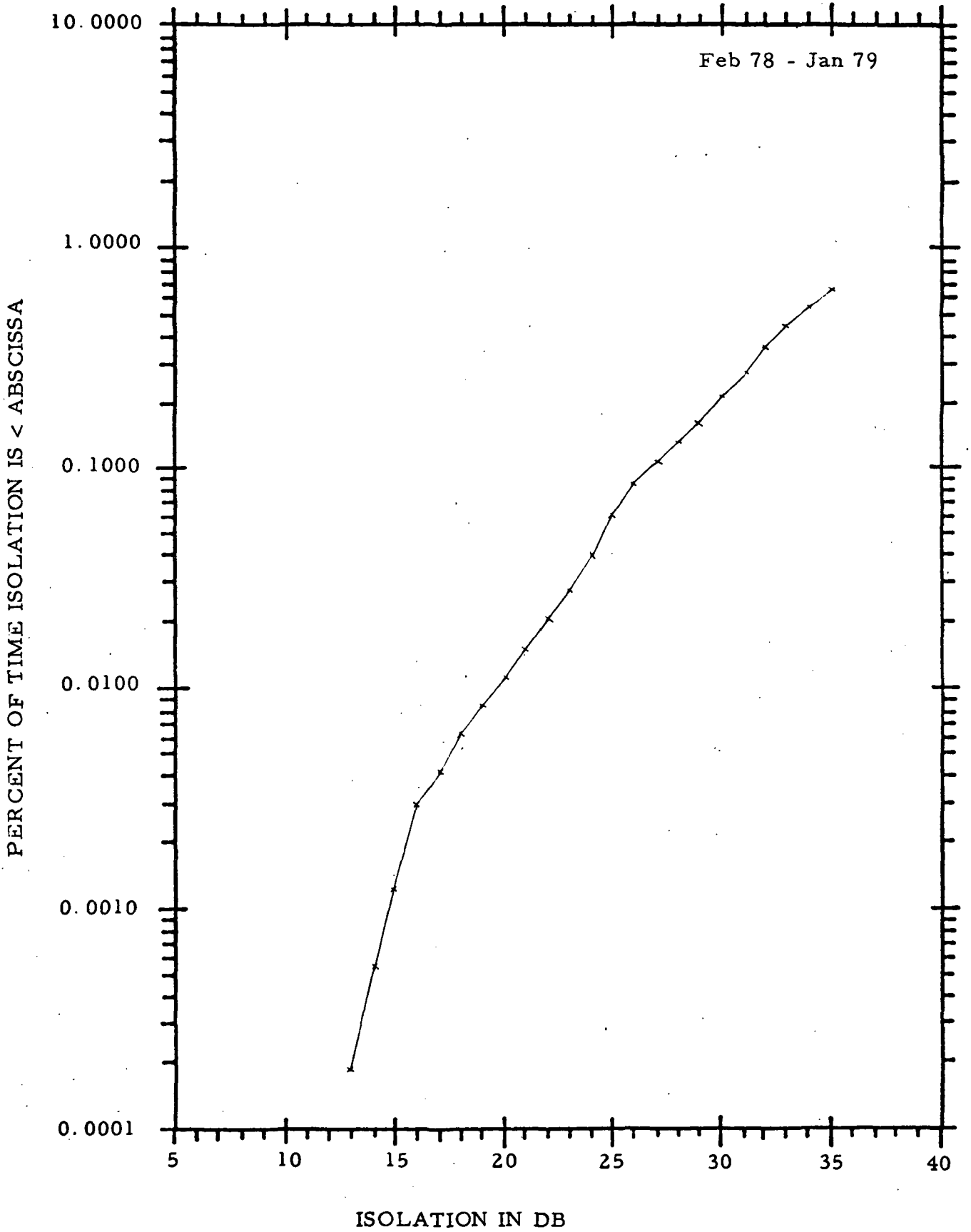


Fig. 2 12 Month Isolation Distribution Plot

RAIN RATE DISTRIBUTION
AUSTIN, TEXAS

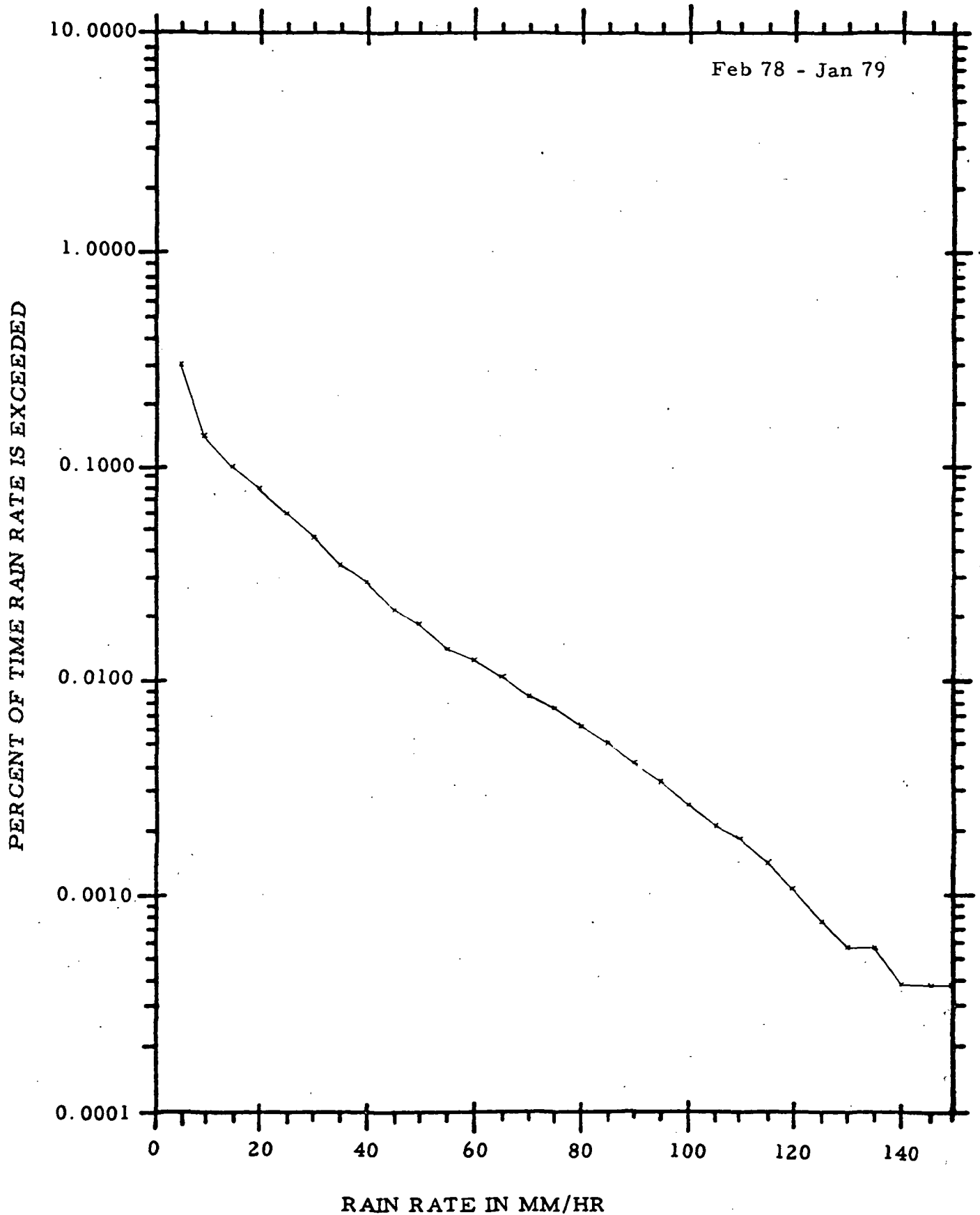


Fig. 3 12 Month Rain Rate Exceedence Plot

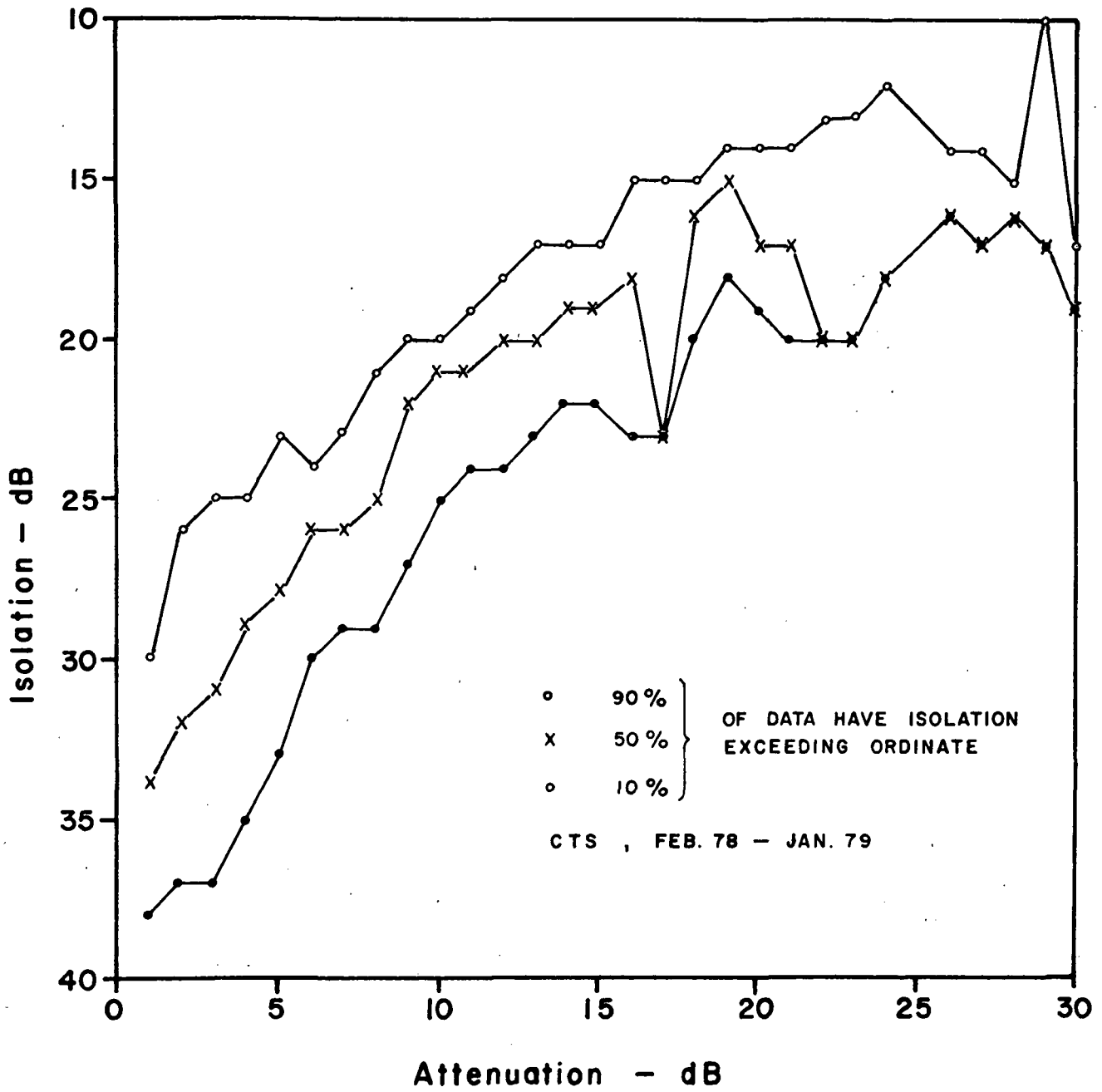


Fig. 4 12 Month Isolation vs. Attenuation

$$4 < A \leq 5 \text{ dB}$$

90% of the data collected had CPI better than 23 dB, 50% of the data (the median value) had isolation better than 28 dB and for 10% of the data the isolation was better than 33 dB. These curves given some indication of the consistency of the relationship between the two parameters. It should be noted that the curves are better defined in the lower attenuation range where they are based on more samples.

The logarithmic fit to these three curves was determined to be:

$$10\%: \quad \text{CPI} = 42.9 - 17.5 \log A \quad (r^2 = .94)$$

$$50\%: \quad \text{CPI} = 35.8 - 13.4 \log A \quad (r^2 = .89)$$

$$90\%: \quad \text{CPI} = 31.5 - 12.6 \log A \quad (r^2 = .90)$$

The value of r^2 is a measure of the quantity of the fit. If $r^2 = 1$ all points lie exactly on the line and if $r^2 = 0$ the points were randomly distributed. (For the equal probability fit r^2 was .99). The curves defined by the above equations have been added to Figure 5. It is apparent that the equal probability curve predicts less isolation than the median data curve, a fact related to the particular shape of the density curve.

To estimate the contribution of ice depolarization to the isolation statistics, Figure 6 shows the percentage of ice depolarization in the total depolarization events. The points were calculated by

$$\text{Percent} = \left(\frac{\text{Time the isolation was less than the abscissa} \right. \\ \left. \text{and the attenuation less or equal 1 dB)}{\text{Time} \right. \\ \left. \text{the isolation was less than the abscissa} \right) \times 100.$$

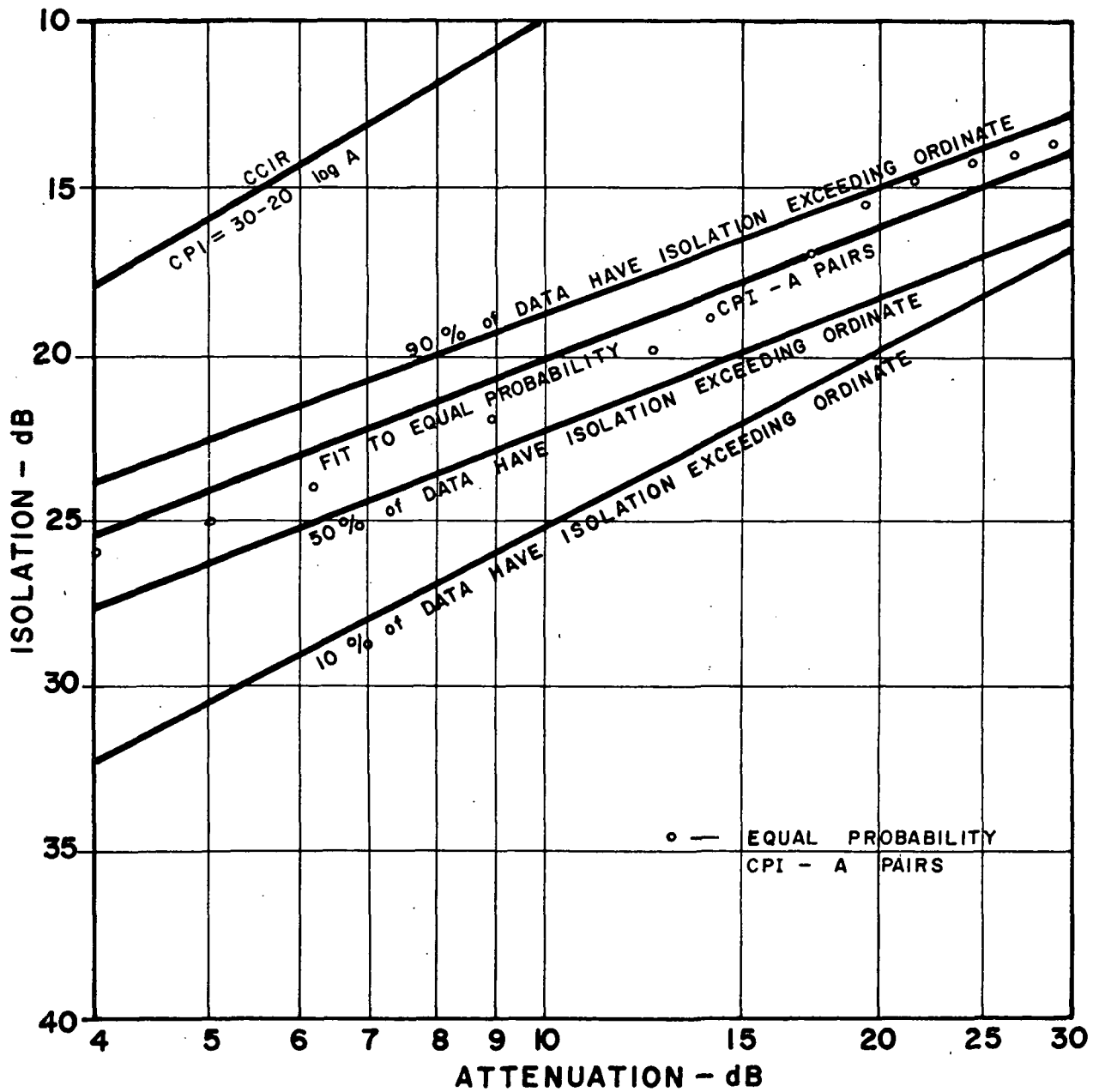


Fig. 5 Logarithmic Fits to Isolation vs. Attenuation

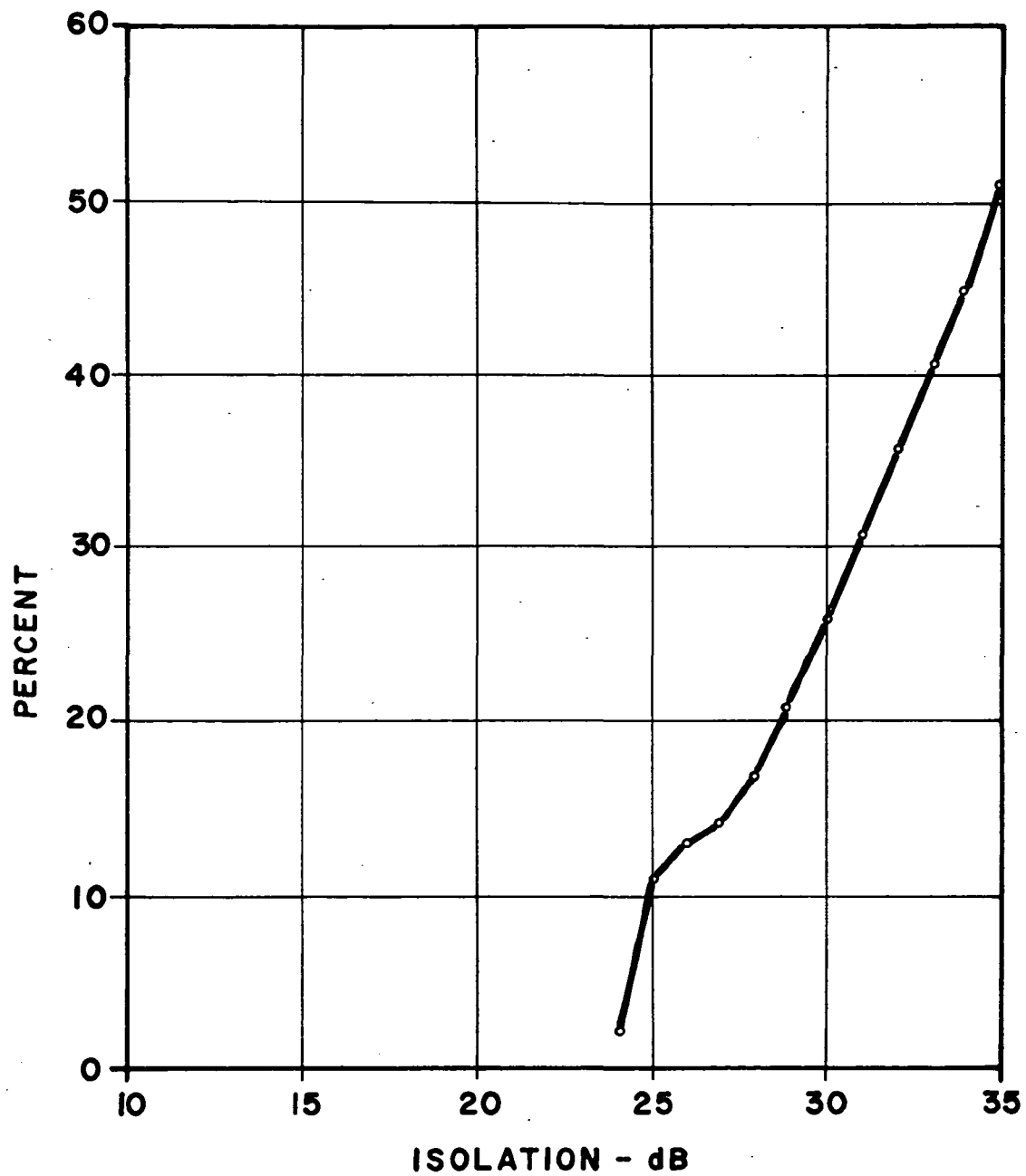


Fig. 6 The Contribution of Ice Depolarization to all
Depolarization Events

The interpretation of this curve is that caution has to be exercised when using the logarithmic fits to the CPI - A relationship in conjunction with attenuation statistics to predict depolarization at low attenuations. The derived isolation statistics will need correction as per Figure 6 to account for the contribution of ice depolarization. The excess depolarization will decrease with increasing attenuation. Also part of the data summary are Tables 3 - 8.

Table 3 gives the distribution data in minutes. These were used to draw the exceedence plots Figures 1 - 3.

Tables 4, 5 and 6 gives distribution data resolved into time of day of the occurrence of fades, depolarization and rain rate. While the density of the data events is not uniform over the 24 one-hour intervals, it is hard to make a general statement as to whether events are more serious at certain times than at others. The times are Universal Time (GMT), which is 6 hours advanced from Central Standard Time. Maybe it will be possible, when all the data collected will be analyzed in this fashion, to discern if the probability of data events is evenly distributed over all 24 hours of a day. Table 7 orders the data events by their duration. It gives the number of events for each threshold level and their duration. The data show that the events with higher attenuation, lower isolation or higher rain rate tend to be fewer and shorter. The lower number of events when the rain rate exceeded 5 mm/hr for short durations is due to the fact that the rain

TABLE 3

UNIV OF TEXAS CTS EXCEEDENCE DATA FOR FEB 78 TO JAN 79

ATTENUATION EXCEEDED DB FOR MINUTES		ISOLATION LESS THAN DB FOR MINUTES		RAINFALL EXCEEDED MM/HR FOR MINUTES	
1	2413	35	3485	5	1573
2	906	34	2909	10	801
3	544	33	2355	15	565
4	416	32	1890	20	421
5	310	31	1487	25	315
6	228	30	1160	30	246
7	178	29	919	35	185
8	138	28	730	40	150
9	104	27	588	45	116
10	83	26	454	50	98
11	71	25	320	55	78
12	59	24	210	60	67
13	50	23	145	65	57
14	44	22	112	70	45
15	40	21	82	75	40
16	37	20	62	80	33
17	30	19	45	85	27
18	25	18	33	90	22
19	19	17	22	95	18
20	15	16	16	100	14
21	10	15	7	105	11
22	7	14	3	110	10
23	5	13	1	115	8
24	5	12	0	120	6
25	5	11	0	125	4
26	4	10	0	130	3
27	3	9	0	135	3
28	3	8	0	140	2
29	2	7	0	145	2
30	0	6	0	150	2

TABLE 4

UNIV OF TEXAS CTS TIME OF DAY DATA FOR FEB 78 TO JAN 79

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	70	26	10	1	0	0	
1	2	8	1	1	1	1	0	
2	3	14	8	7	5	4	0	
3	4	49	21	5	1	0	0	
4	5	14	6	0	0	0	0	
5	6	41	24	9	1	0	0	
6	7	5	0	0	0	0	0	
7	8	8	0	0	0	0	0	
8	9	47	25	16	1	0	0	
9	10	58	11	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	7	0	0	0	0	0	
12	13	13	1	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	10	5	1	0	0	0	
15	16	1	0	0	0	0	0	
16	17	28	16	12	3	0	0	
17	18	27	16	4	1	0	0	
18	19	4	1	0	0	0	0	
19	20	41	24	10	1	0	0	
20	21	20	4	0	0	0	0	
21	22	13	7	2	0	0	0	
22	23	8	3	1	0	0	0	
23	24	59	28	6	0	0	0	

TABLE 5

UNIV OF TEXAS CTS TIME OF DAY DATA FOR FEB 78 TO JAN 79

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	140	81	19	5	0	0	
1	2	103	43	6	1	0	0	
2	3	129	19	8	5	0	0	
3	4	211	54	21	1	0	0	
4	5	303	77	4	0	0	0	
5	6	293	146	65	8	1	0	
6	7	182	78	6	0	0	0	
7	8	251	46	0	0	0	0	
8	9	95	50	36	24	4	0	
9	10	209	88	20	0	0	0	
10	11	130	50	5	0	0	0	
11	12	173	40	5	0	0	0	
12	13	224	79	28	0	0	0	
13	14	116	19	0	0	0	0	
14	15	186	36	1	0	0	0	
15	16	132	19	2	0	0	0	
16	17	109	38	16	10	0	0	
17	18	50	24	14	3	1	0	
18	19	38	7	0	0	0	0	
19	20	88	42	24	3	1	0	
20	21	97	16	1	0	0	0	
21	22	72	38	12	0	0	0	
22	23	43	10	2	0	0	0	
23	24	109	58	24	1	0	0	

TABLE 6

UNIV OF TEXAS CTS TIME OF DAY DATA FOR FEB 78 TO JAN 79

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED						MM/HR
		5	25	50	75	100	125	
0	1	113	17	3	2	1	0	
1	2	75	24	12	7	3	1	
2	3	59	9	5	2	0	0	
3	4	110	35	6	3	1	0	
4	5	119	3	0	0	0	0	
5	6	119	30	18	9	4	1	
6	7	53	13	1	0	0	0	
7	8	35	2	1	0	0	0	
8	9	60	33	18	6	1	0	
9	10	114	38	6	1	0	0	
10	11	38	0	0	0	0	0	
11	12	89	12	3	0	0	0	
12	13	98	14	2	1	0	0	
13	14	23	0	0	0	0	0	
14	15	25	1	0	0	0	0	
15	16	16	0	0	0	0	0	
16	17	41	15	8	4	2	1	
17	18	40	8	6	3	1	0	
18	19	18	1	0	0	0	0	
19	20	84	21	7	2	1	0	
20	21	90	16	1	0	0	0	
21	22	52	3	1	0	0	0	
22	23	23	5	0	0	0	0	
23	24	78	15	1	0	0	0	

TABLE 7

UNIV OF TEXAS CTS DURATION DATA FOR FEB 78 TO JAN 79

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	32	31	11	16	2	0	
1	2	9	7	4	1	0	0	
2	4	11	12	6	0	1	0	
4	8	13	9	5	1	0	0	
8	16	11	7	2	0	0	0	
16	32	9	1	0	0	0	0	
32	64	2	0	0	0	0	0	
64	**	0	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	434	328	128	21	14	0	
1	2	112	70	24	7	1	0	
2	4	78	50	15	3	0	0	
4	8	72	34	11	2	0	0	
8	16	52	16	6	2	0	0	
16	32	28	7	1	0	0	0	
32	64	13	3	1	0	0	0	
64	**	4	1	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	2	56	96	82	58	21	
1	2	18	24	12	3	0	0	
2	4	58	24	4	1	0	0	
4	8	37	8	3	1	0	0	
8	16	30	10	2	0	0	0	
16	32	18	1	0	0	0	0	
32	64	4	0	0	0	0	0	
64	**	3	0	0	0	0	0	

TABLE 8

UNIV OF TEXAS CTS ISOLATION VS ATTENUATION FEB 78 TO JAN 79

ATTENUATION INTERVAL		10%	50%	90%
DB		OF DATA DB	HAVE ISOLATION DB	GREATER THAN DB
0	1	38	34	30
1	2	37	32	26
2	3	37	31	25
3	4	35	29	25
4	5	33	28	23
5	6	30	26	24
6	7	29	26	23
7	8	29	25	21
8	9	27	22	20
9	10	25	21	20
10	11	24	21	19
11	12	24	20	18
12	13	23	20	17
13	14	22	19	17
14	15	22	19	17
15	16	23	18	15
16	17	23	23	15
17	18	20	16	15
18	19	18	15	14
19	20	19	17	14
20	21	20	17	14
21	22	20	20	13
22	23	20	20	13
23	24	18	18	12
24	25	**	**	**
25	26	16	16	14
26	27	17	17	14
27	28	16	16	15
28	29	17	17	10
29	30	19	19	17

rate is calculated from the interval between accumulating .254 mm of precipitation. Therefore short durations of low rainfall rate are not resolved.

The data in Table 8 were used to plot Figure 4. They give the spread of isolation values for the measured attenuations.

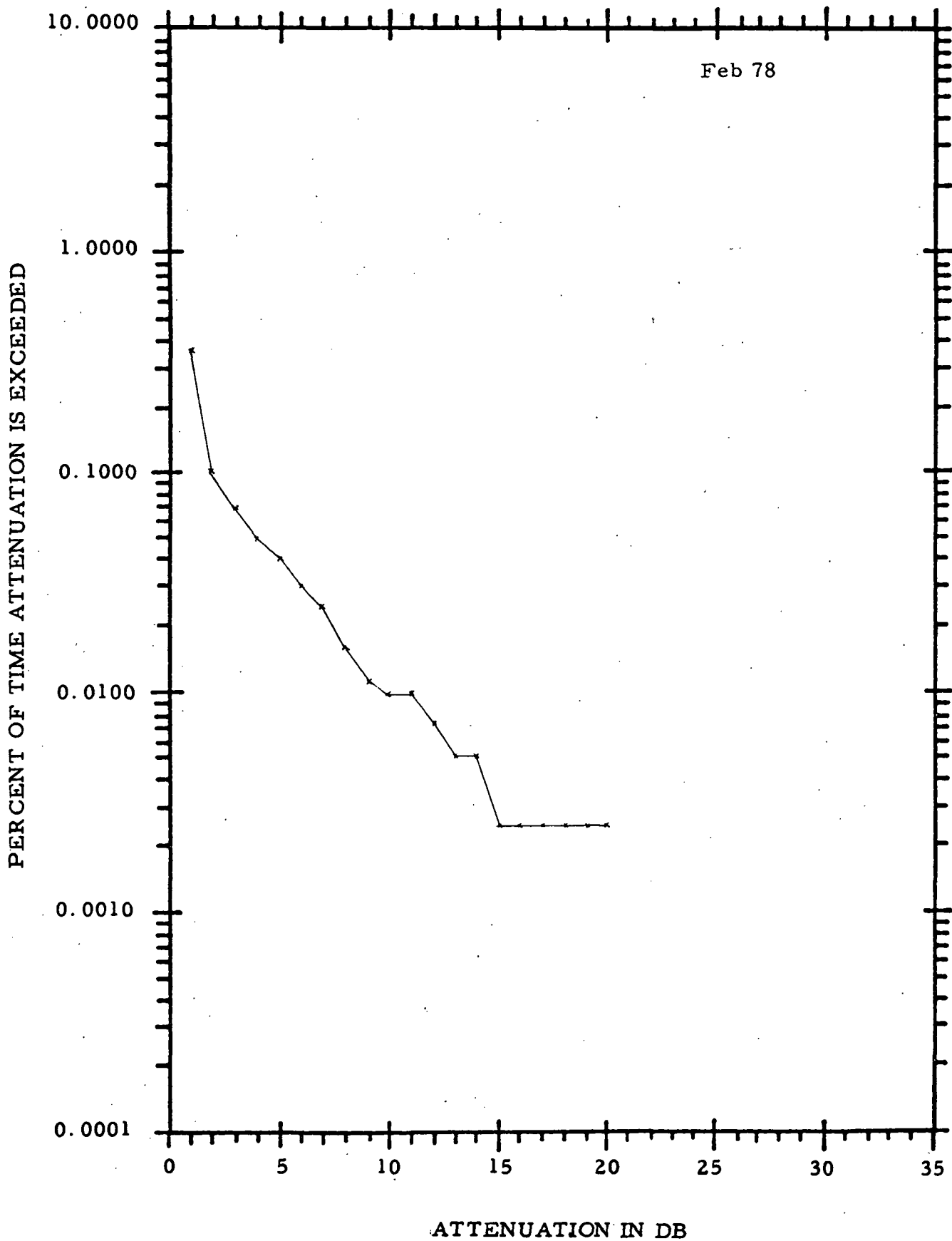
The data for each month of this reporting period are presented in the Appendix. Given are the distribution plots for attenuation, isolation and rain rate and the same set of numerical tables as has been included for the yearly summary, i. e. distribution tables, time of day tables, the duration data and the isolation vs. attenuation table.

V. CONCLUSION

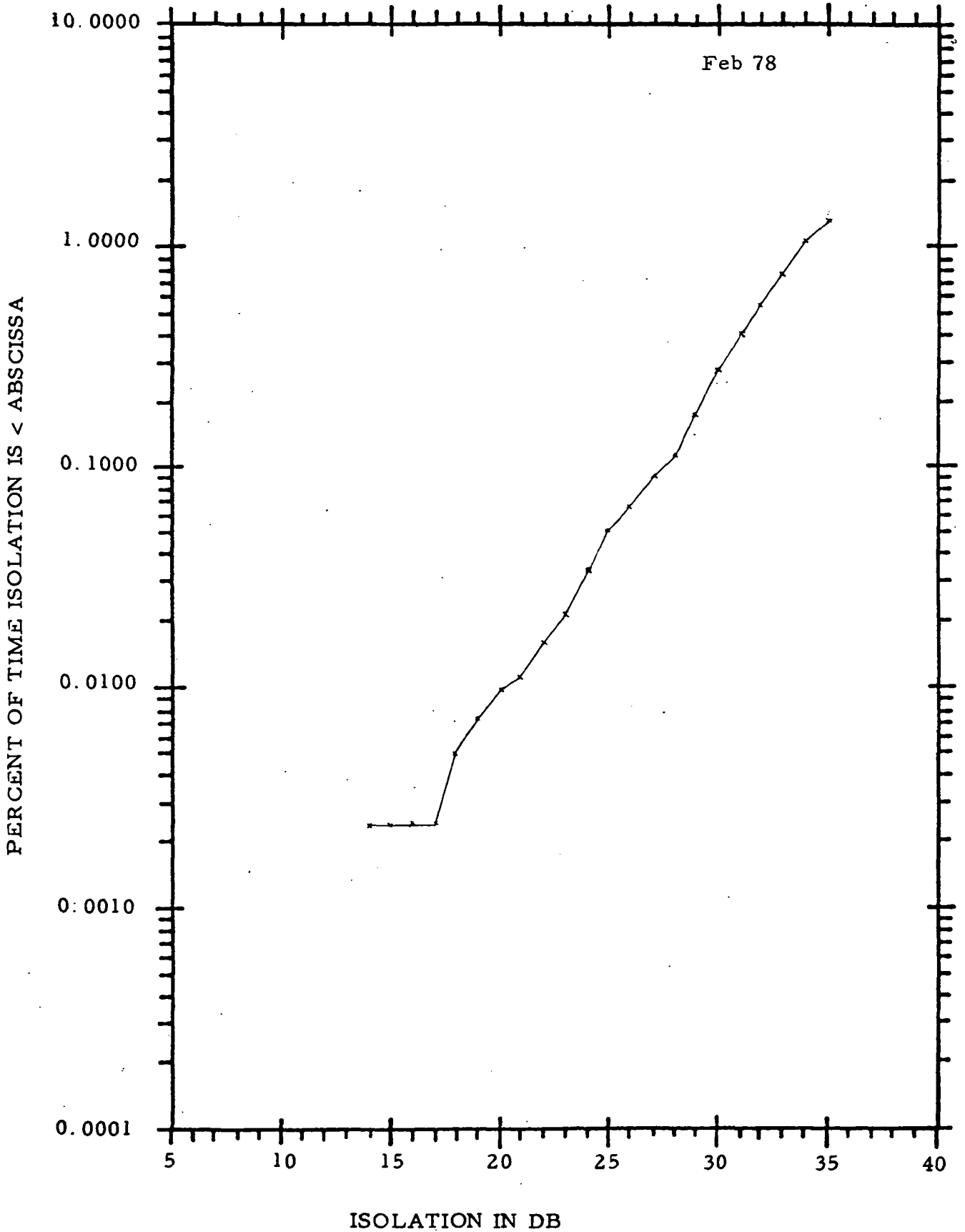
Attenuation and cross-polarization isolation data have been presented for a 12 month period. During this time the weather was close to the long term mean. Fades exceeded 10 dB for about .02 percent of time. With the same probability isolation was reduced below 21 dB. The data events were not evenly distributed over the time of day, however it is hard to identify a distinct pattern from the 12 months data.

APPENDIX

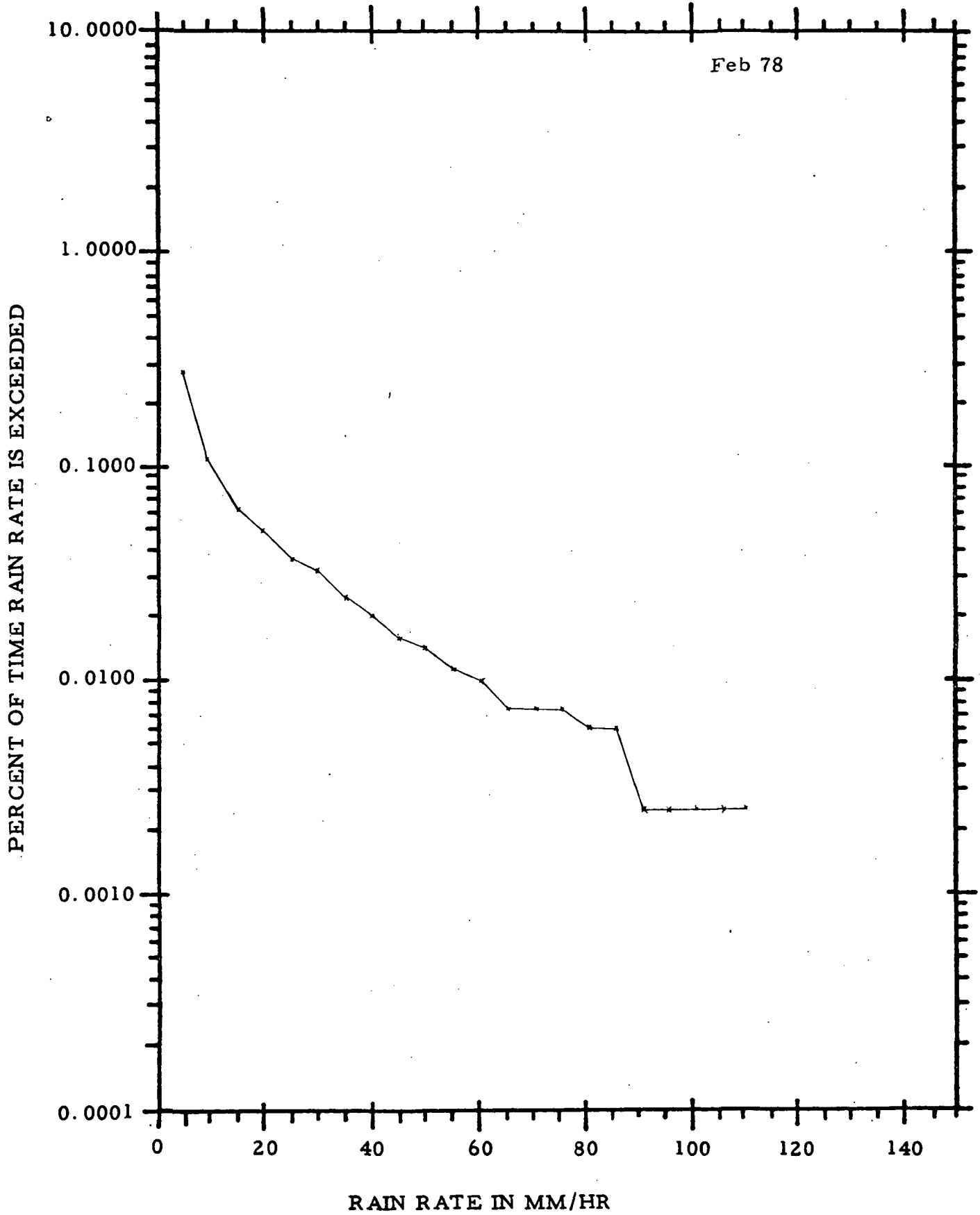
11.7 GHZ ATTENUATION DISTRIBUTION AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS



RAIN RATE DISTRIBUTION
AUSTIN, TEXAS



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 2 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	149	35	574	5	116
2	42	34	431	10	49
3	28	33	318	15	26
4	20	32	225	20	20
5	16	31	166	25	15
6	12	30	113	30	13
7	10	29	72	35	10
8	7	28	49	40	8
9	5	27	37	45	7
10	4	26	27	50	6
11	4	25	21	55	5
12	3	24	14	60	4
13	2	23	9	65	3
14	2	22	7	70	3
15	1	21	5	75	3
16	1	20	4	80	2
17	1	19	3	85	2
18	1	18	2	90	1
19	1	17	1	95	1
20	1	16	1	100	1
21	1	15	1	105	1
22	0	14	1	110	1
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 2 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	3	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	8	0	0	0	0	0	
17	18	17	12	4	1	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 2 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	0	0	0	0	0	0	
1	2	7	2	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	18	1	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	6	3	1	0	0	0	
10	11	24	6	1	0	0	0	
11	12	44	9	1	0	0	0	
12	13	77	15	0	0	0	0	
13	14	77	16	0	0	0	0	
14	15	89	7	0	0	0	0	
15	16	98	12	2	0	0	0	
16	17	64	18	3	1	0	0	
17	18	33	17	13	3	1	0	
18	19	32	6	0	0	0	0	
19	20	3	0	0	0	0	0	
20	21	1	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	2	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 2 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED						MM/HR
		5	25	50	75	100	125	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	3	0	0	0	0	0	
11	12	4	0	0	0	0	0	
12	13	28	2	0	0	0	0	
13	14	15	0	0	0	0	0	
14	15	10	0	0	0	0	0	
15	16	4	0	0	0	0	0	
16	17	19	3	1	0	0	0	
17	18	26	8	6	3	1	0	
18	19	7	1	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS, DURATION DATA FOR 2 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	4	1	0	2	0	0	
1	2	2	0	0	0	0	0	
2	4	2	2	2	0	0	0	
4	8	0	1	0	0	0	0	
8	16	0	0	0	0	0	0	
16	32	1	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

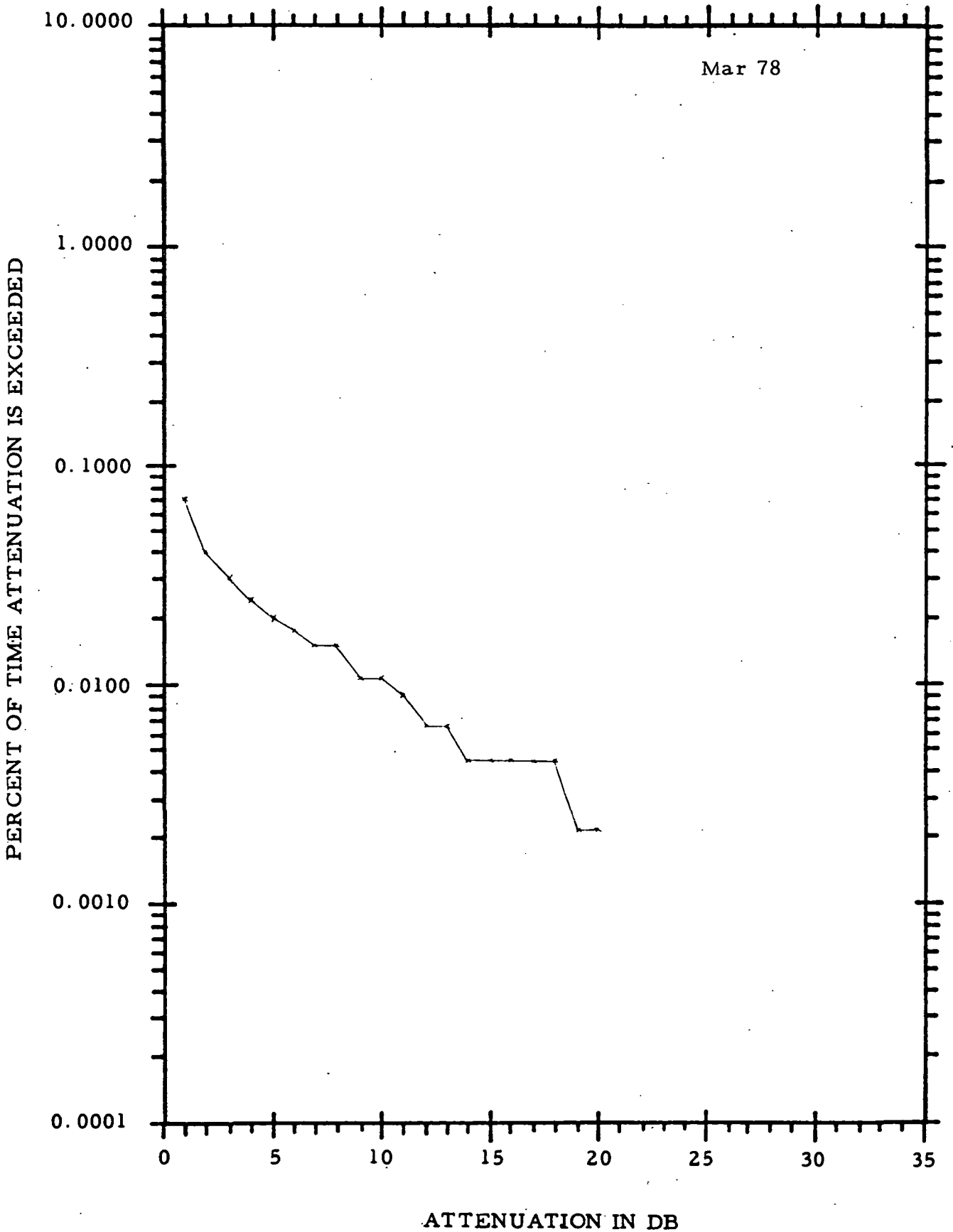
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	157	138	25	1	1	0	
1	2	48	12	1	1	0	0	
2	4	27	8	2	1	0	0	
4	8	13	2	1	0	0	0	
8	16	13	0	0	0	0	0	
16	32	6	1	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	0	5	5	8	4	1	
1	2	2	4	3	0	0	0	
2	4	7	2	0	0	0	0	
4	8	5	0	0	0	0	0	
8	16	3	0	0	0	0	0	
16	32	1	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

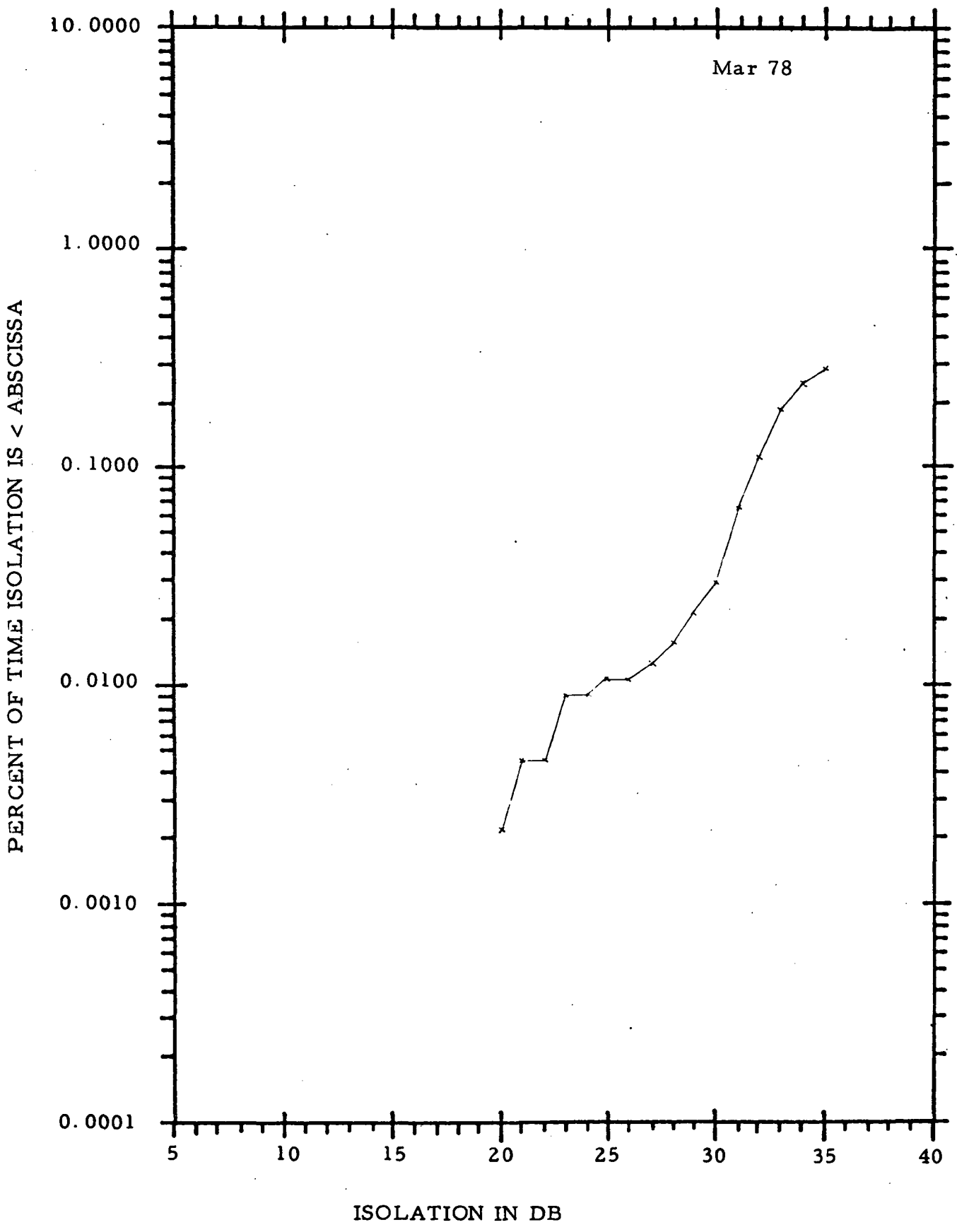
UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 2 78

ATTENUATION INTERVAL		10%	50%	90%
DB		DB	DB	DB
0	1	38	34	30
1	2	37	33	28
2	3	33	31	29
3	4	37	30	28
4	5	30	30	25
5	6	28	28	22
6	7	27	27	22
7	8	26	23	23
8	9	26	26	22
9	10	22	22	20
10	11	21	21	18
11	12	20	20	19
12	13	20	20	18
13	14	19	19	18
14	15	17	17	17
15	16	**	**	**
16	17	**	**	**
17	18	**	**	**
18	19	15	15	15
19	20	16	16	13
20	21	15	15	15
21	22	13	13	13
22	23	**	**	**
23	24	13	13	13
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

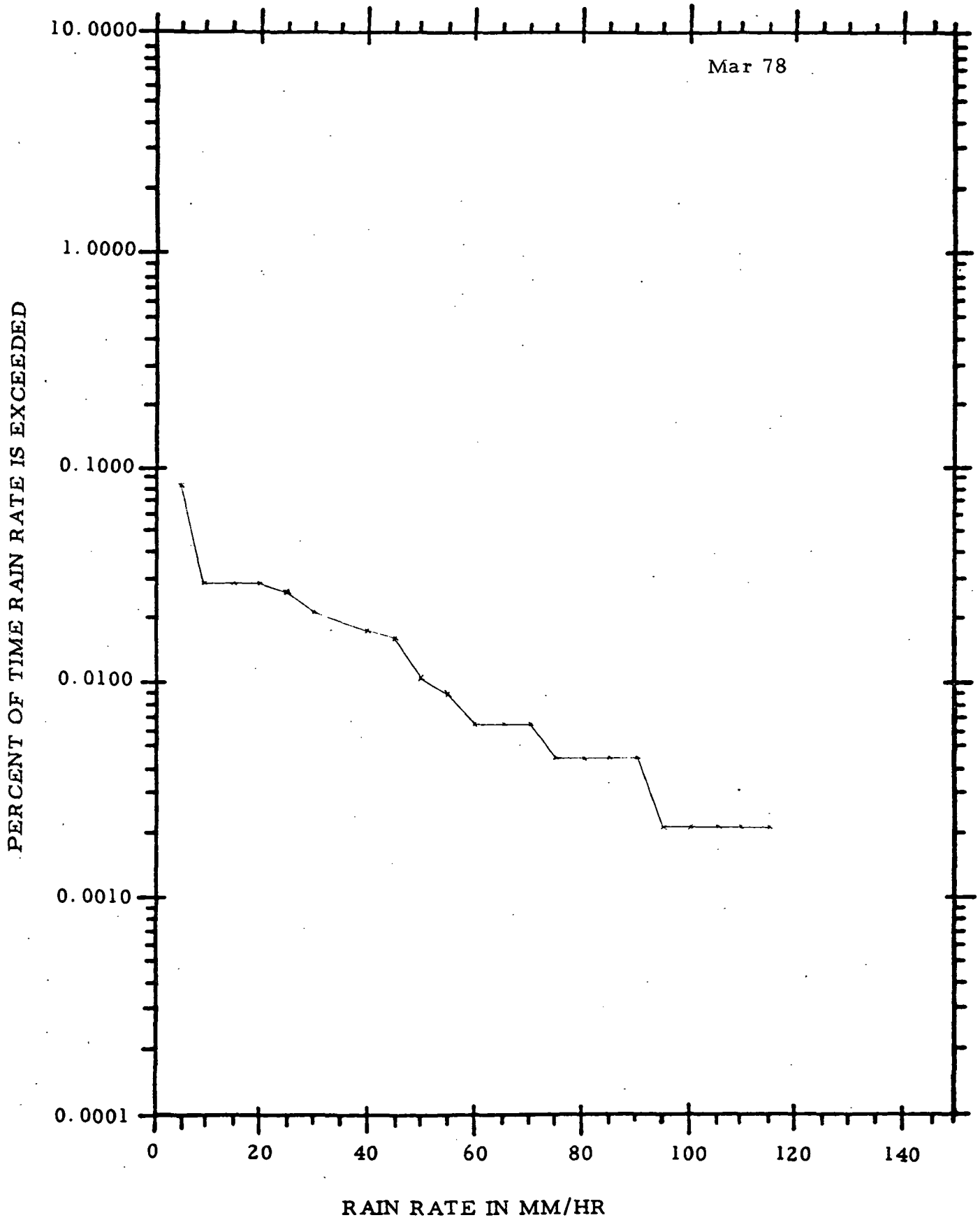
11.7 GHZ ATTENUATION DISTRIBUTION
AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS



RAIN RATE DISTRIBUTION
AUSTIN, TEXAS



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 3 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	32	35	127	5	37
2	18	34	112	10	13
3	14	33	83	15	13
4	11	32	52	20	13
5	9	31	29	25	12
6	8	30	13	30	10
7	7	29	13	35	8
8	7	28	7	40	7
9	5	27	6	45	5
10	5	26	5	50	4
11	4	25	5	55	3
12	3	24	4	60	3
13	3	23	4	65	3
14	2	22	2	70	2
15	2	21	2	75	2
16	2	20	1	80	2
17	2	19	0	85	2
18	2	18	0	90	1
19	1	17	0	95	1
20	1	16	0	100	1
21	0	15	0	105	1
22	0	14	0	110	1
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 3 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED					DB
		3	6	10	20	25	
0	1	0	0	0	0	0	0
1	2	0	0	0	0	0	0
2	3	0	0	0	0	0	0
3	4	14	8	5	1	0	0
4	5	0	0	0	0	0	0
5	6	0	0	0	0	5	0
6	7	0	0	0	0	5	0
7	8	0	0	0	0	0	0
8	9	0	0	0	0	0	0
9	10	0	0	0	0	0	0
10	11	0	0	0	0	0	0
11	12	0	0	0	0	0	0
12	13	0	0	0	0	0	0
13	14	0	0	0	0	0	0
14	15	0	0	0	0	0	0
15	16	0	0	0	0	0	0
16	17	0	0	0	0	0	0
17	18	0	0	0	0	0	0
18	19	0	0	0	0	0	0
19	20	0	0	0	0	0	0
20	21	0	0	0	0	0	0
21	22	0	0	0	0	0	0
22	23	0	0	0	0	0	0
23	24	0	0	0	0	0	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 3 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	38	10	5	1	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	40	1	0	0	0	0	
10	11	20	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	2	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	23	1	0	0	0	0	
17	18	2	1	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	2	0	0	0	0	0	
21	22	1	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 3 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED					MM/HR
		5	25	50	75	100	125
0	1	0	0	0	0	0	0
1	2	0	0	0	0	0	0
2	3	0	0	0	0	0	0
3	4	26	12	4	2	1	0
4	5	0	0	0	0	0	0
5	6	0	0	0	0	0	0
6	7	0	0	0	0	0	0
7	8	0	0	0	0	0	0
8	9	0	0	0	0	0	0
9	10	0	0	0	0	0	0
10	11	0	0	0	0	0	0
11	12	0	0	0	0	0	0
12	13	0	0	0	0	0	0
13	14	0	0	0	0	0	0
14	15	0	0	0	0	0	0
15	16	0	0	0	0	0	0
16	17	0	0	0	0	0	0
17	18	0	0	0	0	0	0
18	19	0	0	0	0	0	0
19	20	0	0	0	0	0	0
20	21	8	0	0	0	0	0
21	22	3	0	0	0	0	0
22	23	0	0	0	0	0	0
23	24	0	0	0	0	0	0

UNIV OF TEXAS CTS DURATION DATA FOR 3 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	1	0	1	2	0	0	
1	2	0	0	0	0	0	0	
2	4	0	0	0	0	0	0	
4	8	0	1	1	0	0	0	
8	16	1	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

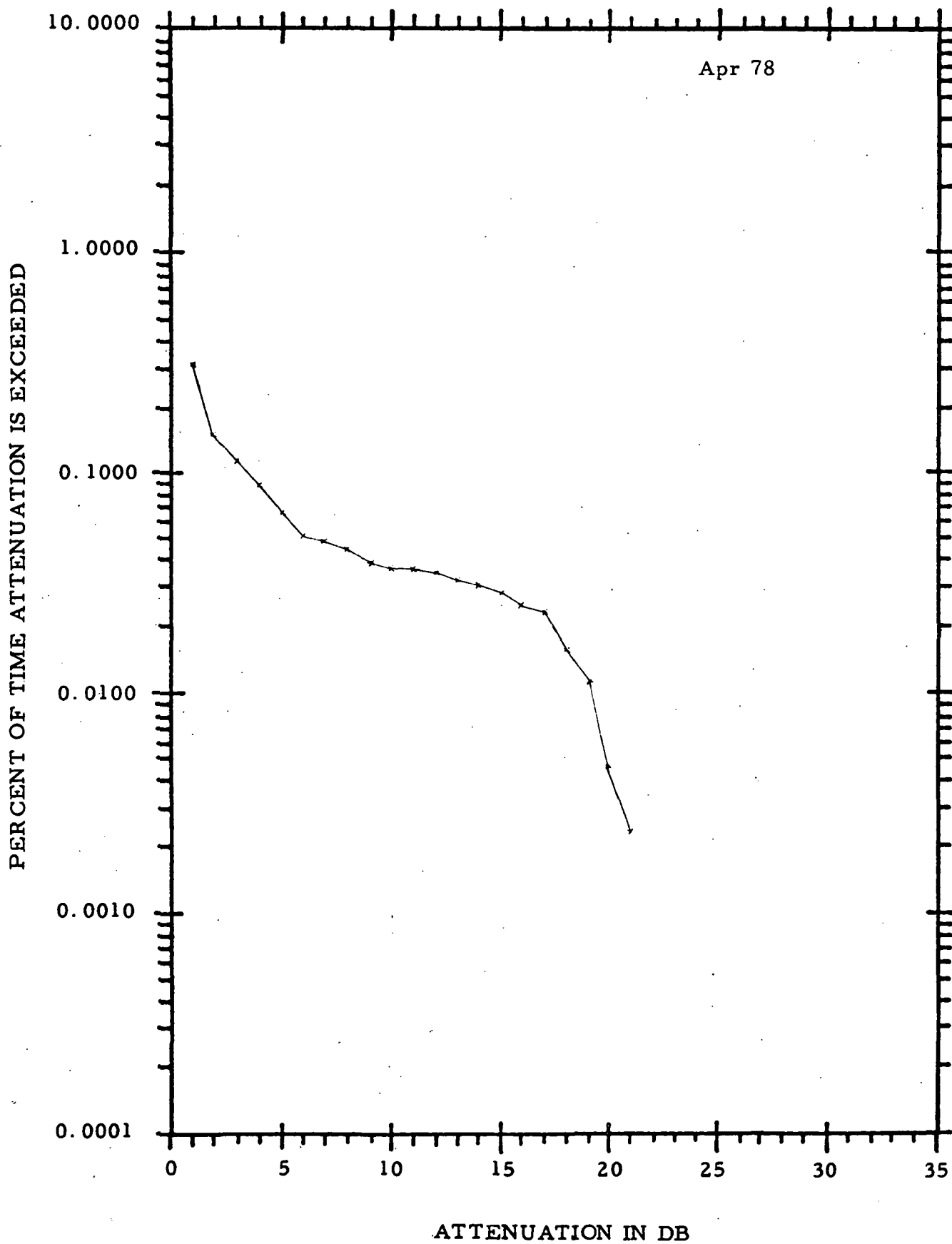
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	29	5	0	1	0	0	
1	2	3	2	1	0	0	0	
2	4	2	0	1	0	0	0	
4	8	1	1	0	0	0	0	
8	16	3	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	1	0	0	0	0	0	
64	**	0	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	0	0	3	5	4	2	
1	2	0	0	2	0	0	0	
2	4	4	0	0	0	0	0	
4	8	2	0	0	0	0	0	
8	16	1	1	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

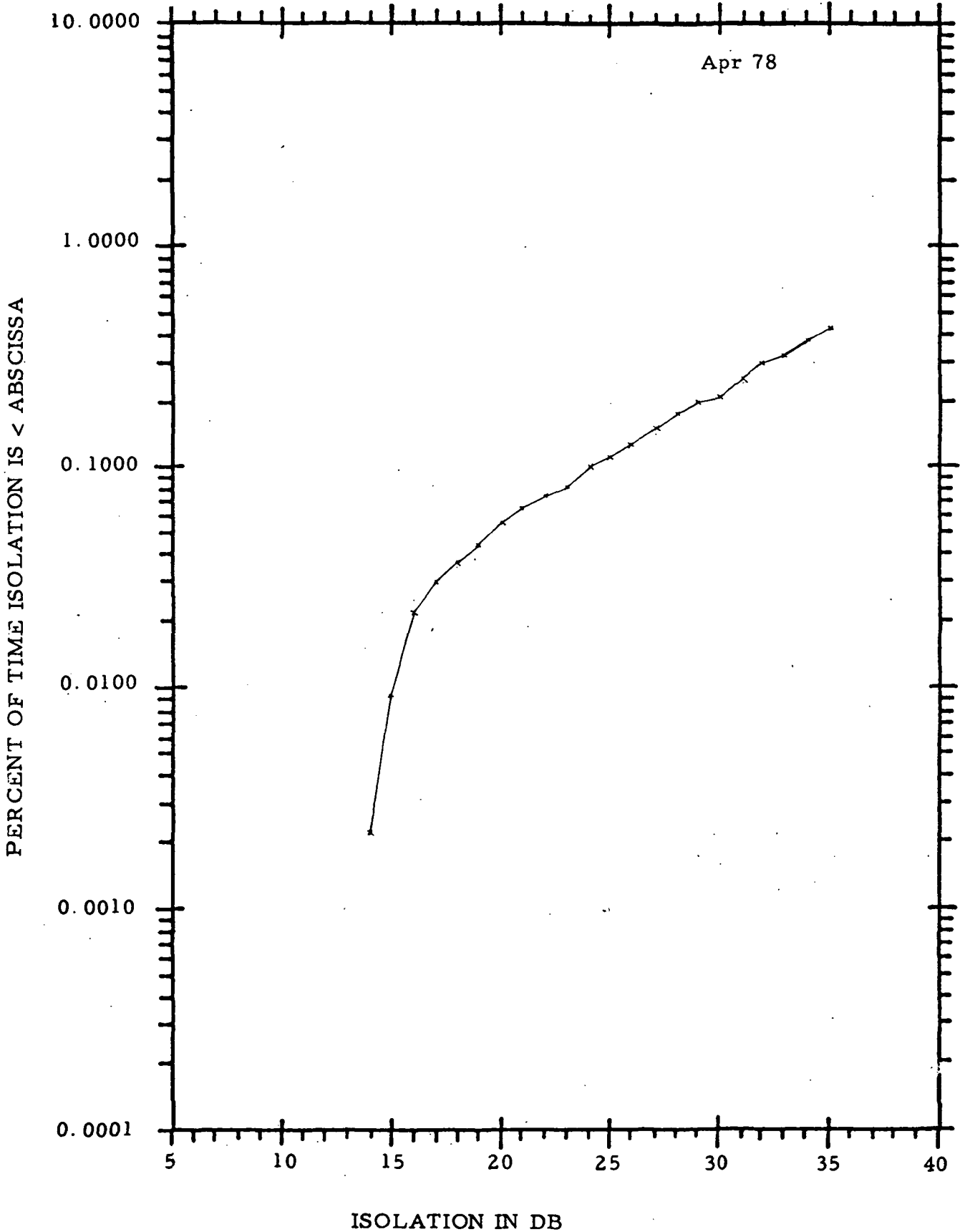
UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 3 78

ATTENUATION INTERVAL		10%	50%	90%
DB		DB	DB	DB
0	1	39	39	31
1	2	34	33	31
2	3	38	31	29
3	4	35	35	30
4	5	38	38	28
5	6	38	38	27
6	7	27	27	26
7	8	31	31	26
8	9	29	29	24
9	10	24	24	22
10	11	28	28	23
11	12	24	24	22
12	13	26	26	22
13	14	22	22	20
14	15	**	**	**
15	16	24	24	22
16	17	19	19	19
17	18	**	**	**
18	19	22	22	22
19	20	19	19	18
20	21	20	20	19
21	22	20	20	20
22	23	20	20	20
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

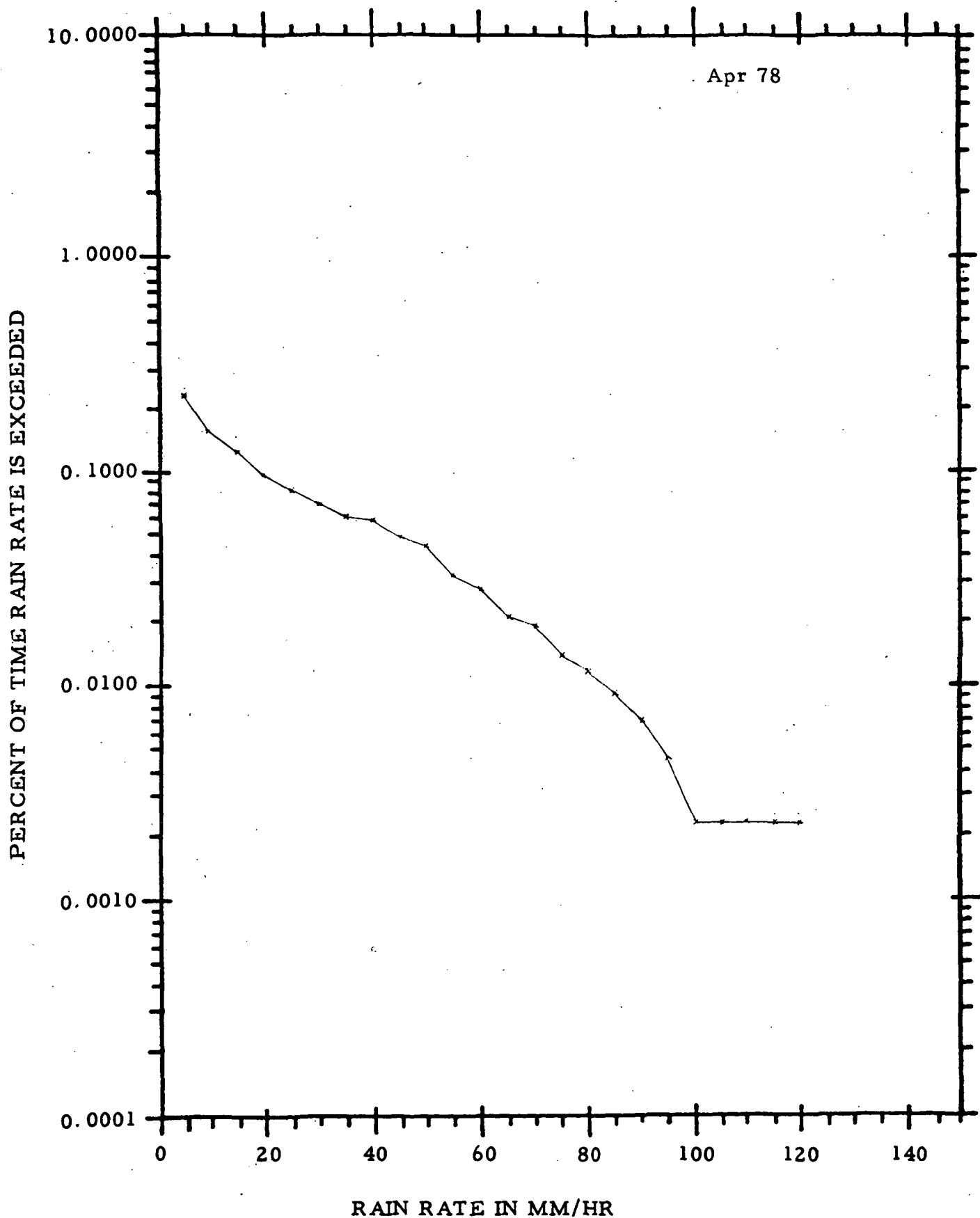
11.7 GHZ ATTENUATION DISTRIBUTION
AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS



RAIN RATE DISTRIBUTION AUSTIN, TEXAS



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 4 78

ATTENUATION EXCEEDED DB FOR MINUTES		ISOLATION LESS THAN DB FOR MINUTES		RAINRATE EXCEEDED MM/HR FOR MINUTES	
1	137	35	186	5	188
2	68	34	163	18	71
3	51	33	144	15	56
4	38	32	129	28	42
5	28	31	111	25	35
6	22	30	94	38	38
7	21	29	87	35	26
8	19	28	78	48	25
9	17	27	69	45	21
10	16	26	62	58	19
11	15	25	52	55	14
12	14	24	44	68	12
13	13	23	36	65	9
14	12	22	32	78	8
15	11	21	28	75	6
16	10	20	24	88	5
17	7	19	19	85	4
18	5	18	16	98	3
19	2	17	13	95	2
20	1	16	10	108	1
21	0	15	4	105	1
22	0	14	1	118	1
23	0	13	0	115	1
24	0	12	0	128	1
25	0	11	0	125	0
26	0	10	0	138	0
27	0	9	0	135	0
28	0	8	0	148	0
29	0	7	0	145	0
30	0	6	0	158	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 4 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	31	22	16	1	0	0	
9	10	14	1	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	5	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 4 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN					DB
		35	30	25	20	15	
0	1	0	0	0	0	0	0
1	2	0	0	0	0	0	0
2	3	17	4	1	0	0	0
3	4	2	0	0	0	0	0
4	5	11	0	0	0	0	0
5	6	14	0	0	0	0	0
6	7	1	0	0	0	0	0
7	8	0	0	0	0	0	0
8	9	35	35	33	24	4	0
9	10	57	42	14	0	0	0
10	11	0	0	0	0	0	0
11	12	49	12	4	0	0	0
12	13	0	0	0	0	0	0
13	14	0	0	0	0	0	0
14	15	0	0	0	0	0	0
15	16	0	0	0	0	0	0
16	17	0	0	0	0	0	0
17	18	0	0	0	0	0	0
18	19	0	0	0	0	0	0
19	20	0	0	0	0	0	0
20	21	0	0	0	0	0	0
21	22	0	0	0	0	0	0
22	23	0	0	0	0	0	0
23	24	0	0	0	0	0	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 4 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED						MM/HR
		5	25	50	75	100	125	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	1	0	0	0	0	0	
6	7	2	0	0	0	0	0	
7	8	8	0	0	0	0	0	
8	9	30	25	17	6	1	0	
9	10	38	6	1	0	0	0	
10	11	0	0	0	0	0	0	
11	12	21	4	2	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 4 75

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						DB
MIN		3	6	10	20	25	30	
0	1	3	1	1	2	0	0	
1	2	0	1	0	0	0	0	
2	4	1	0	0	0	0	0	
4	8	3	0	0	0	0	0	
8	16	0	0	1	0	0	0	
16	32	1	1	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

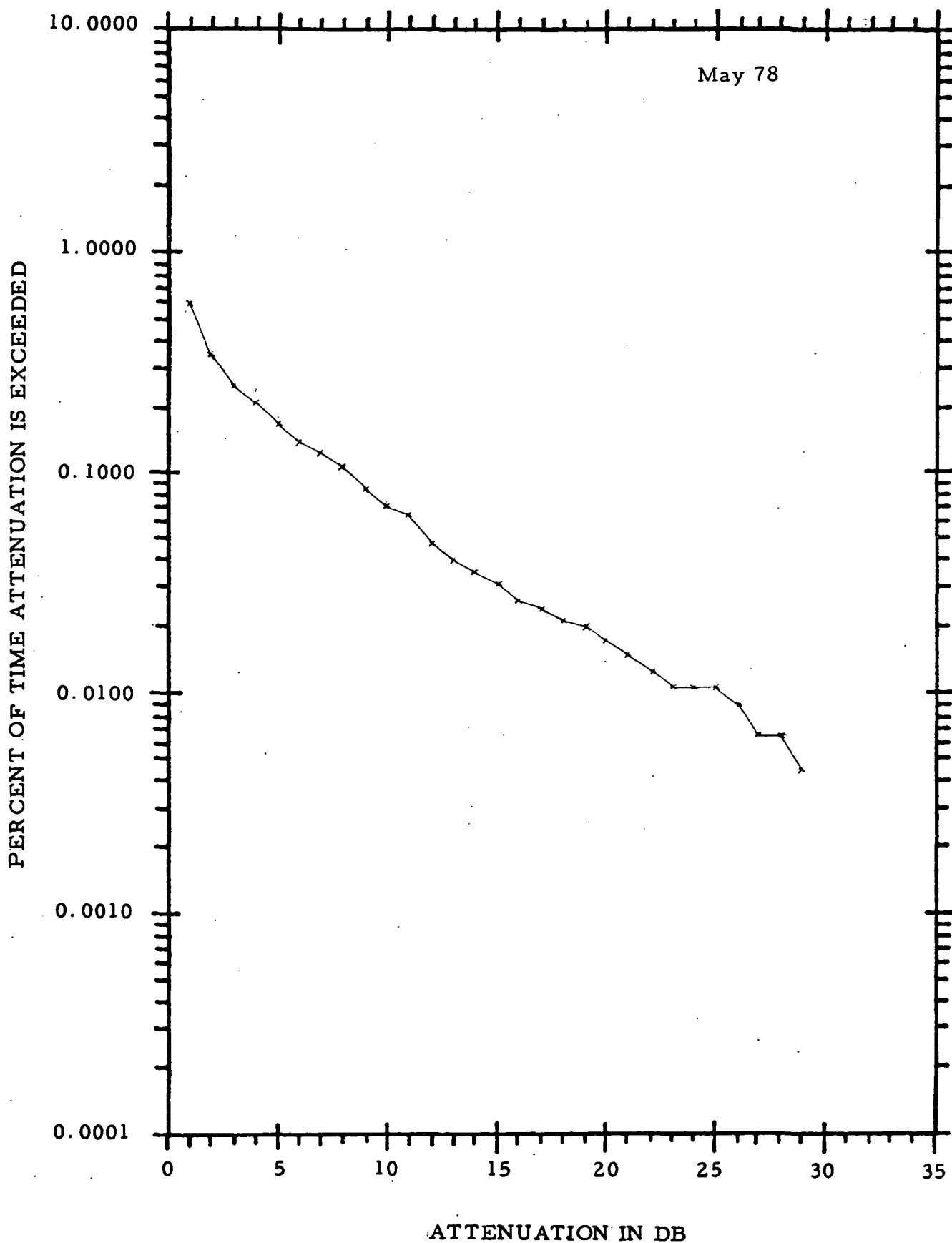
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						DB
MIN		35	30	25	20	15	10	
0	1	18	18	15	3	9	0	
1	2	3	5	3	2	1	0	
2	4	3	3	3	0	0	0	
4	8	2	3	0	1	0	0	
8	16	4	1	0	1	0	0	
16	32	1	0	0	0	0	0	
32	64	2	1	1	0	0	0	
64	**	0	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						MM/HR
MIN		5	25	50	75	100	125	
0	1	0	7	12	15	4	2	
1	2	1	1	0	0	0	0	
2	4	1	2	1	0	0	0	
4	8	1	0	2	0	0	0	
8	16	2	2	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	1	0	0	0	0	0	

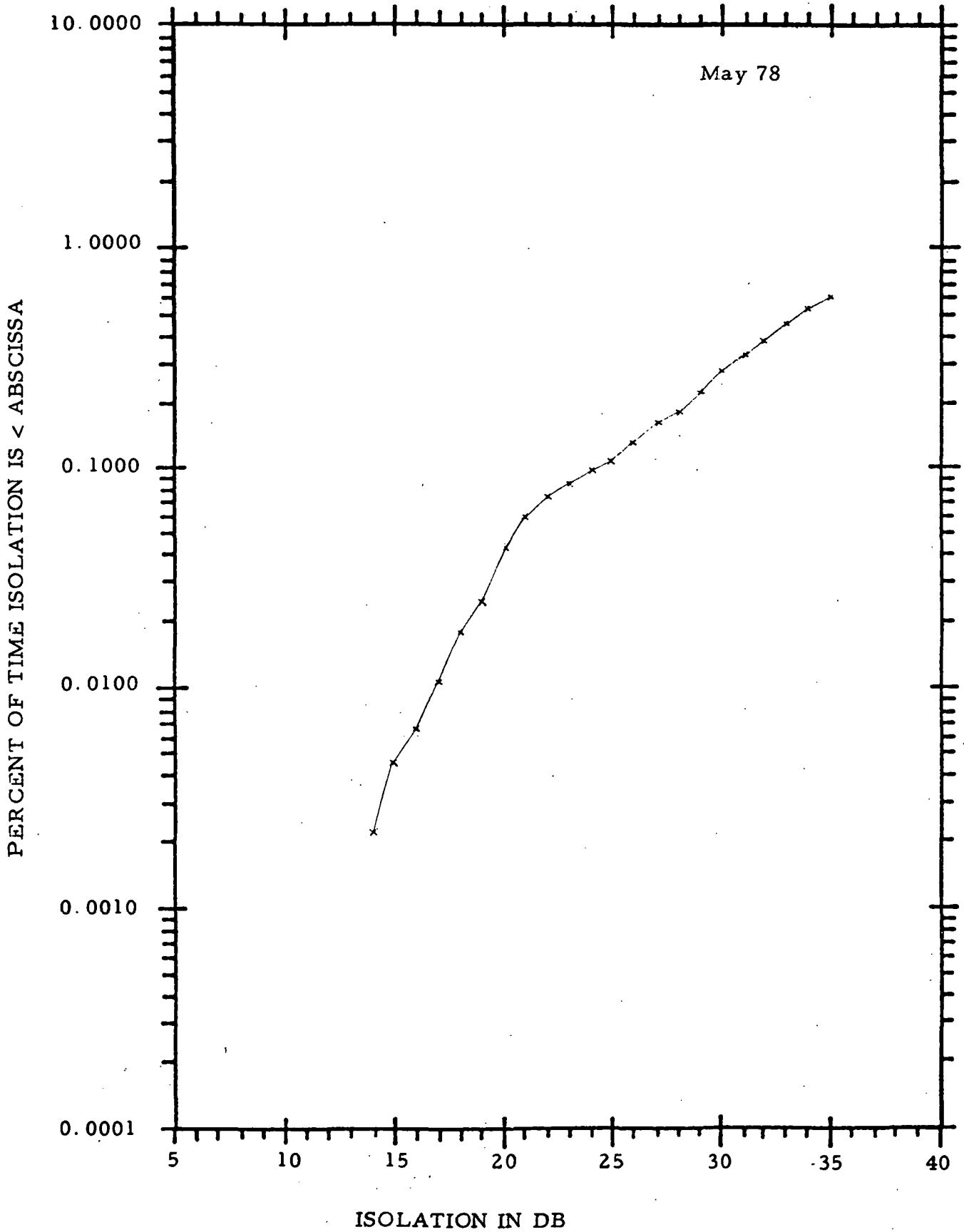
UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 4 78

ATTENUATION INTERVAL		10%	50%	90%
DB		DB	DB	DB
0	1	35	35	29
1	2	36	33	27
2	3	38	25	22
3	4	27	24	26
4	5	24	23	19
5	6	24	23	19
6	7	23	23	19
7	8	28	28	19
8	9	22	22	18
9	10	28	28	18
10	11	19	19	14
11	12	17	17	16
12	13	19	19	17
13	14	17	17	15
14	15	16	16	14
15	16	16	16	15
16	17	16	15	14
17	18	16	16	14
18	19	15	15	13
19	20	15	15	12
20	21	15	15	13
21	22	14	14	13
22	23	**	**	**
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

11.7 GHZ ATTENUATION DISTRIBUTION AUSTIN, TEXAS

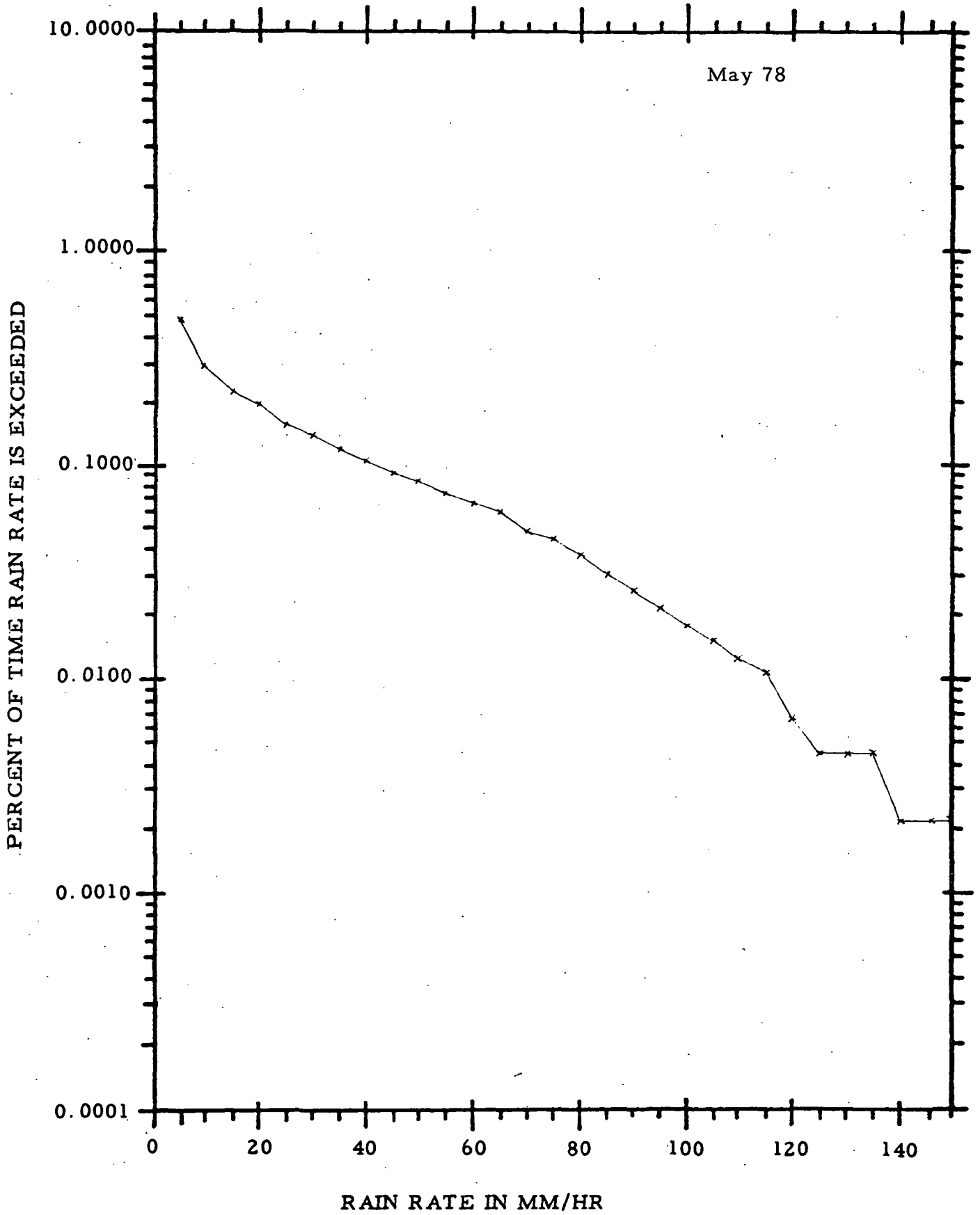


11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS



RAIN RATE DISTRIBUTION
AUSTIN, TEXAS

A31



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 5 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	270	35	276	5	220
2	160	34	241	10	135
3	117	33	208	15	101
4	97	32	175	20	89
5	82	31	153	25	77
6	69	30	127	30	66
7	57	29	103	35	56
8	47	28	85	40	48
9	39	27	74	45	41
10	32	26	61	50	38
11	29	25	50	55	33
12	22	24	44	60	30
13	18	23	39	65	27
14	16	22	34	70	22
15	14	21	27	75	20
16	12	20	19	80	17
17	11	19	11	85	14
18	10	18	8	90	12
19	9	17	5	95	10
20	8	16	3	100	8
21	7	15	2	105	7
22	6	14	1	110	6
23	5	13	0	115	5
24	5	12	0	120	3
25	5	11	0	125	2
26	4	10	0	130	2
27	3	9	0	135	2
28	3	8	0	140	1
29	2	7	0	145	1
30	0	6	0	150	1

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 5 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	32	16	10	1	0	0	
1	2	8	1	1	1	1	0	
2	3	11	8	7	5	4	0	
3	4	0	0	0	0	0	0	
4	5	1	0	0	0	0	0	
5	6	13	11	6	1	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	10	8	4	1	0	0	
20	21	1	1	0	0	0	0	
21	22	10	7	2	0	0	0	
22	23	8	3	1	0	0	0	
23	24	22	13	1	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 5 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	35	28	11	5	0	0	
1	2	29	6	1	1	0	0	
2	3	19	9	6	5	0	0	
3	4	4	2	0	0	0	0	
4	5	39	3	0	0	0	0	
5	6	44	24	10	5	1	0	
6	7	9	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	13	10	1	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	16	11	7	3	1	0	
20	21	14	3	0	0	0	0	
21	22	18	10	5	0	0	0	
22	23	10	4	1	0	0	0	
23	24	27	17	7	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 5 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED						MM/HR
		5	25	50	75	100	125	
0	1	20	8	3	2	1	0	
1	2	55	24	12	7	3	1	
2	3	20	9	5	2	0	0	
3	4	0	0	0	0	0	0	
4	5	5	0	0	0	0	0	
5	6	55	25	18	9	4	1	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	5	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	8	3	0	0	0	0	
20	21	2	0	0	0	0	0	
21	22	13	2	1	0	0	0	
22	23	18	5	0	0	0	0	
23	24	21	2	0	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 5 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						DB
MIN		3	6	10	20	25	30	
0	1	5	7	5	4	2	0	
1	2	1	2	2	1	0	0	
2	4	2	3	1	0	1	0	
4	8	3	5	4	1	0	0	
8	16	5	2	0	0	0	0	
16	32	2	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						DB
MIN		35	30	25	20	15	10	
0	1	39	28	7	13	4	0	
1	2	8	8	1	4	0	0	
2	4	3	7	4	1	0	0	
4	8	8	5	5	1	0	0	
8	16	8	5	0	0	0	0	
16	32	3	0	0	0	0	0	
32	64	1	0	0	0	0	0	
64	**	0	0	0	0	0	0	

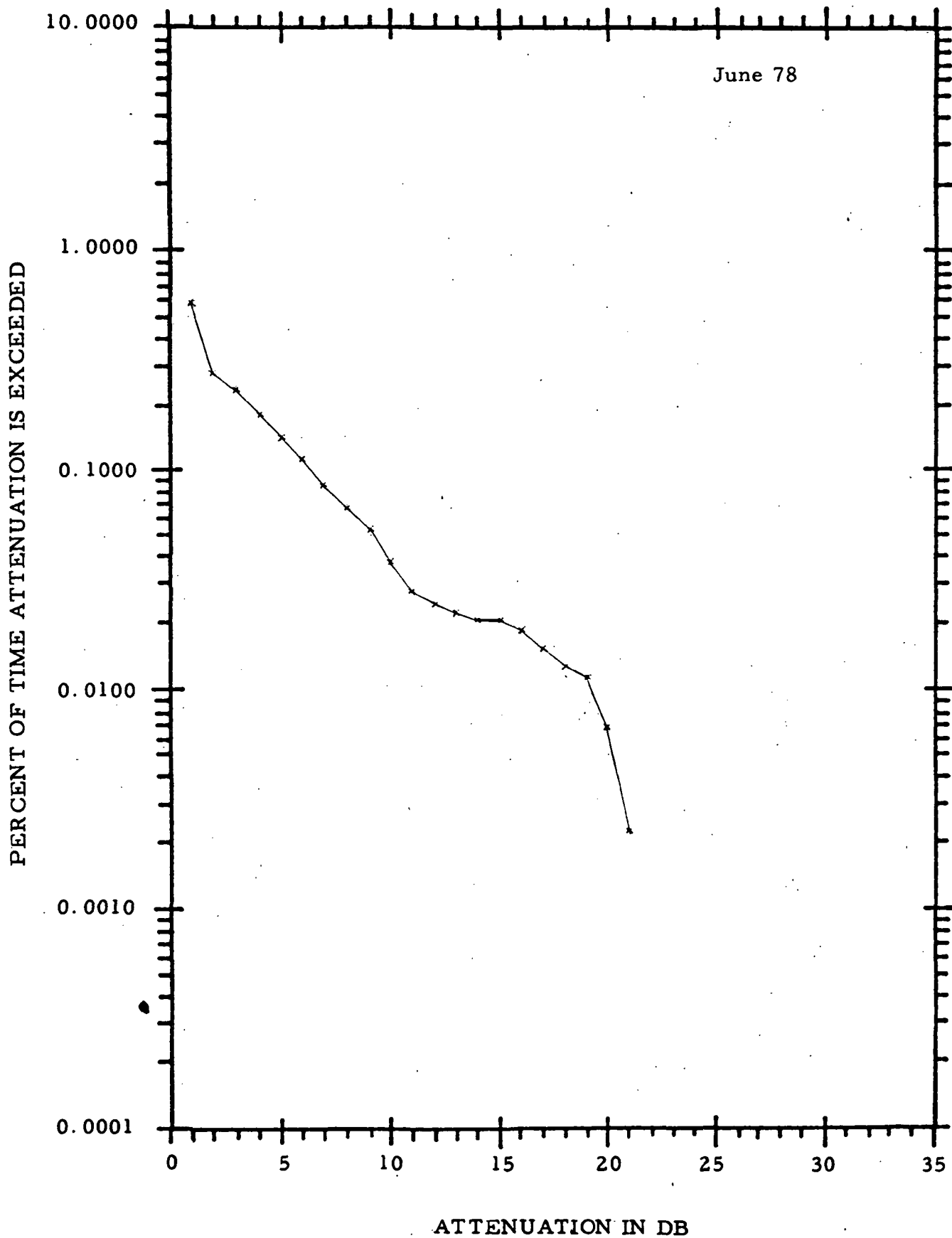
DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						MM/HR
MIN		5	25	50	75	100	125	
0	1	0	3	14	16	31	10	
1	2	1	6	1	3	0	0	
2	4	1	3	2	1	0	0	
4	8	4	0	1	1	0	0	
8	16	3	3	2	0	0	0	
16	32	3	1	0	0	0	0	
32	64	2	0	0	0	0	0	
64	**	0	0	0	0	0	0	

UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 5 78

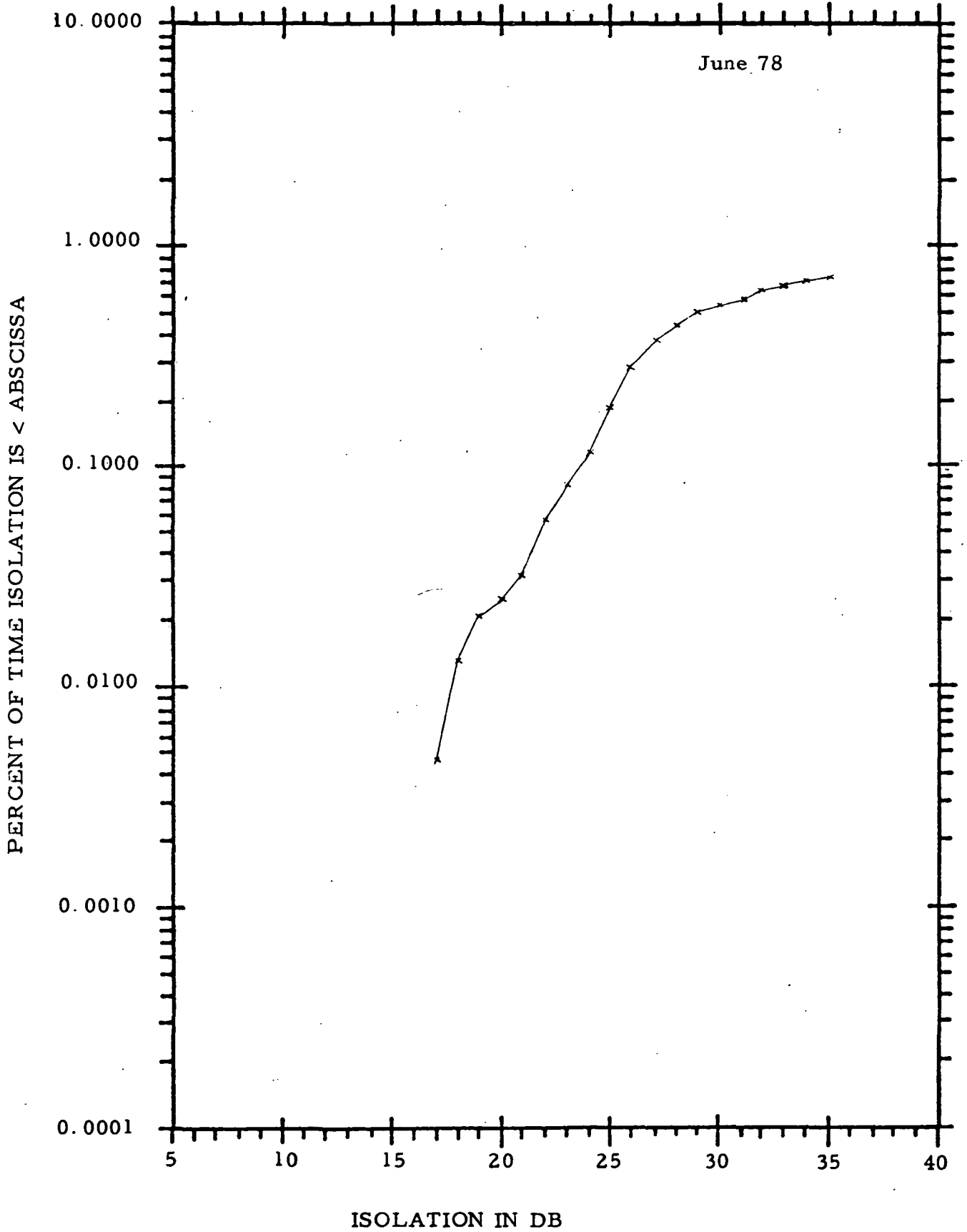
ATTENUATION INTERVAL 10% 50% 90%
 OF DATA HAVE ISOLATION GREATER THAN

DB	DB	DB	DB
0 1	39	39	31
1 2	38	33	29
2 3	35	32	28
3 4	33	30	27
4 5	35	29	26
5 6	32	27	25
6 7	30	26	23
7 8	33	25	23
8 9	31	24	20
9 10	27	22	20
10 11	25	20	19
11 12	21	20	19
12 13	25	25	18
13 14	21	21	18
14 15	24	24	18
15 16	21	21	17
16 17	23	23	19
17 18	26	26	17
18 19	17	17	15
19 20	26	26	14
20 21	26	26	13
21 22	17	17	13
22 23	19	19	13
23 24	18	18	12
24 25	**	**	**
25 26	16	16	14
26 27	17	17	14
27 28	16	16	15
28 29	17	17	10
29 30	19	19	17

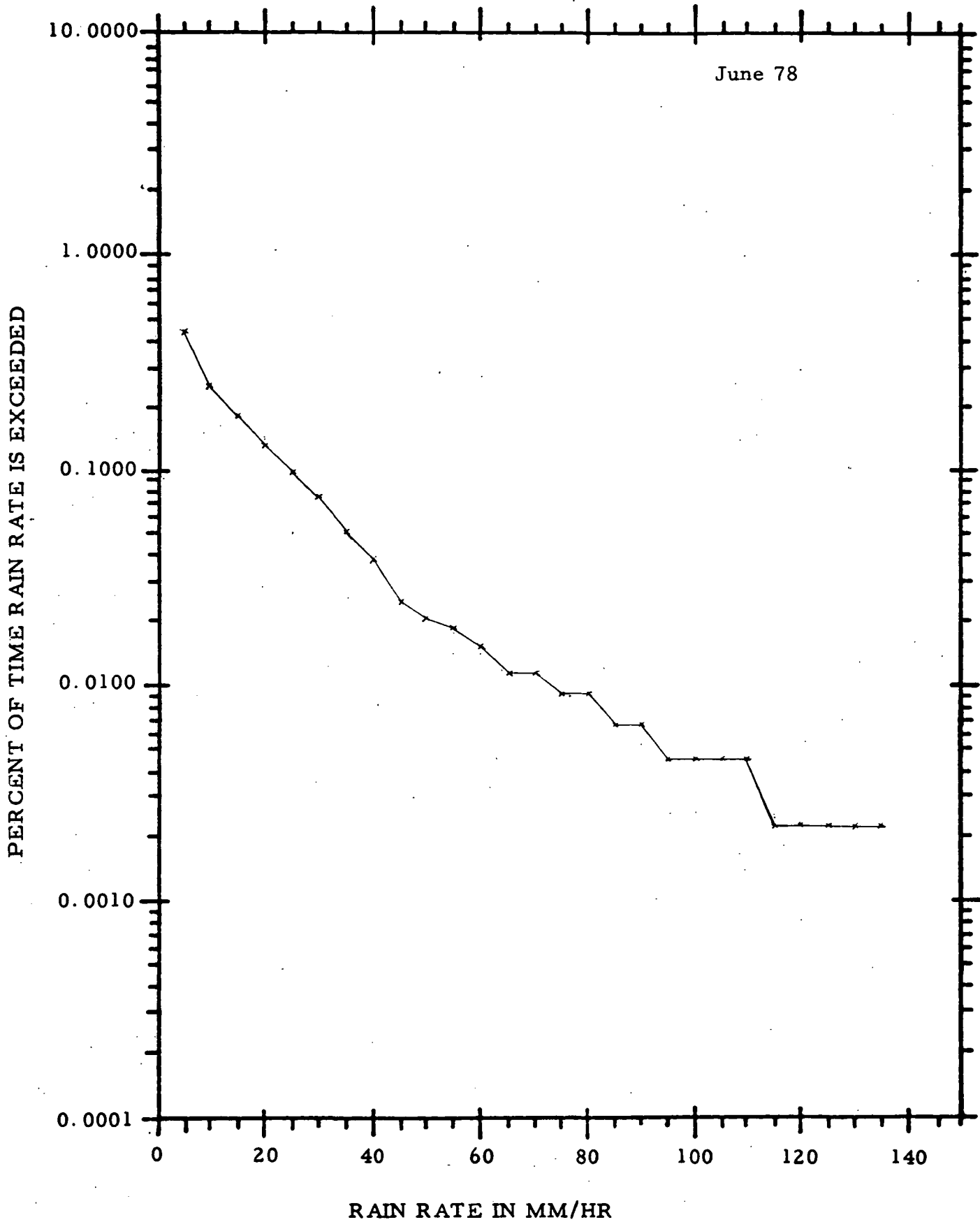
11.7 GHZ ATTENUATION DISTRIBUTION
AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS



RAIN RATE DISTRIBUTION AUSTIN, TEXAS



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 6 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	257	35	320	5	195
2	127	34	312	10	113
3	103	33	296	15	80
4	82	32	275	20	62
5	66	31	253	25	43
6	52	30	237	30	33
7	38	29	222	35	22
8	30	28	188	40	17
9	23	27	163	45	11
10	17	26	127	50	9
11	12	25	80	55	8
12	11	24	50	60	7
13	10	23	36	65	5
14	9	22	25	70	5
15	9	21	14	75	4
16	8	20	11	80	4
17	7	19	9	85	3
18	6	18	6	90	3
19	5	17	2	95	2
20	3	16	0	100	2
21	1	15	0	105	2
22	0	14	0	110	2
23	0	13	0	115	1
24	0	12	0	120	1
25	0	11	0	125	1
26	0	10	0	130	1
27	0	9	0	135	1
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 6 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	31	10	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	31	13	0	0	0	0	
4	5	4	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	20	16	12	3	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	16	13	5	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 6 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	30	19	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	11	0	0	0	0	0	
3	4	60	35	16	0	0	0	
4	5	60	55	2	0	0	0	
5	6	60	60	36	0	0	0	
6	7	30	30	1	0	0	0	
7	8	30	5	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	22	19	13	10	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	17	14	12	1	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 6 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED						MM/HR
		5	25	50	75	100	125	
0	1	37	9	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	2	0	0	0	0	0	
3	4	44	21	2	1	0	0	
4	5	58	0	0	0	0	0	
5	6	17	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	7	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	19	11	7	4	2	1	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	11	1	0	0	0	0	

UNIV OF TEXAS GTS DURATION DATA FOR 6 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						DB
MIN		3	6	10	20	25	30	
0	1	0	8	2	5	0	0	
1	2	1	0	1	0	0	0	
2	4	0	0	1	0	0	0	
4	8	1	1	0	0	0	0	
8	16	0	3	1	0	0	0	
16	32	2	0	0	0	0	0	
32	64	1	0	0	0	0	0	
64	**	0	0	0	0	0	0	

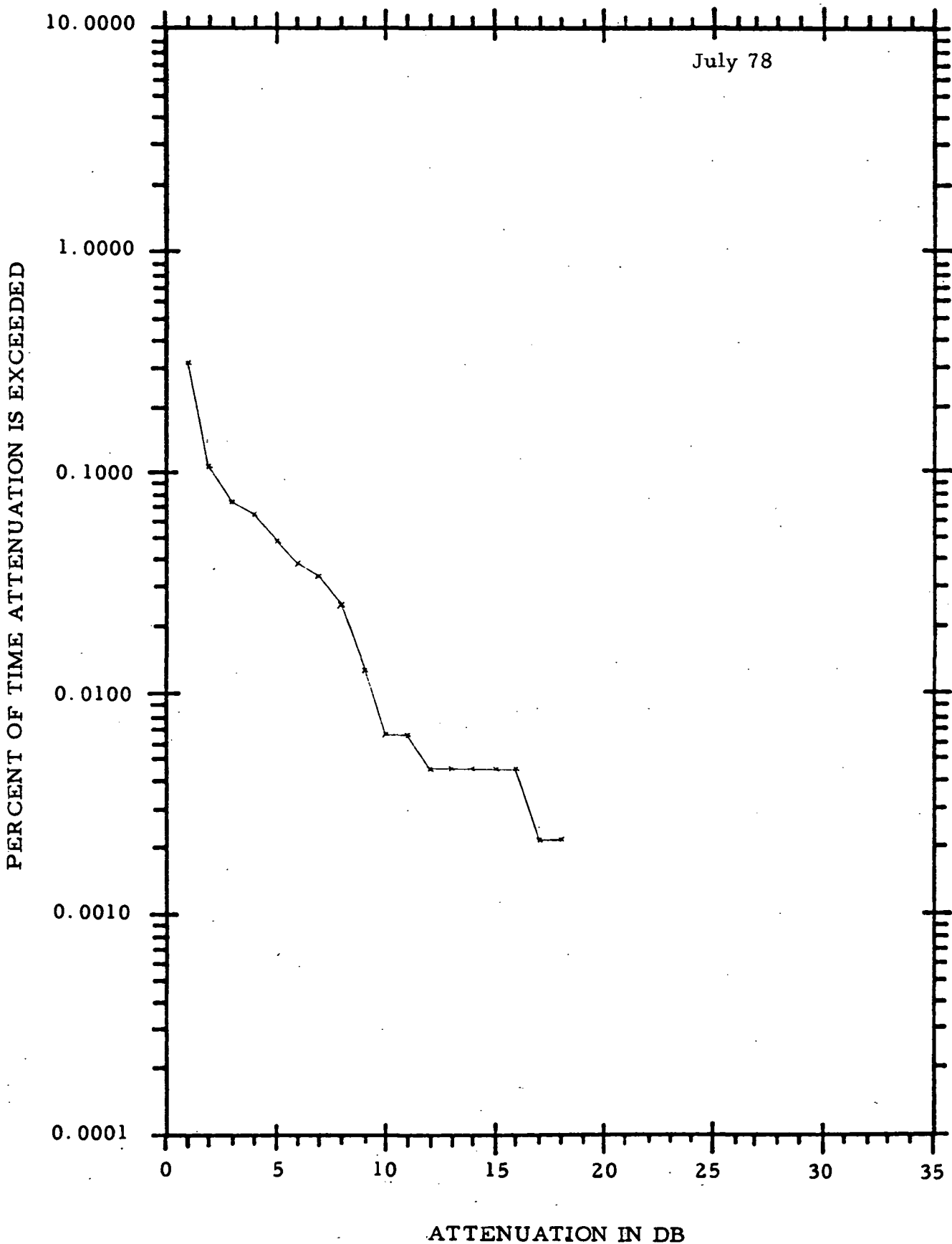
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						DB
MIN		35	30	25	20	15	10	
0	1	12	9	18	2	0	0	
1	2	1	4	2	0	0	0	
2	4	1	5	0	0	0	0	
4	8	0	1	3	0	0	0	
8	16	0	1	3	1	0	0	
16	32	1	3	1	0	0	0	
32	64	1	0	0	0	0	0	
64	**	1	1	0	0	0	0	

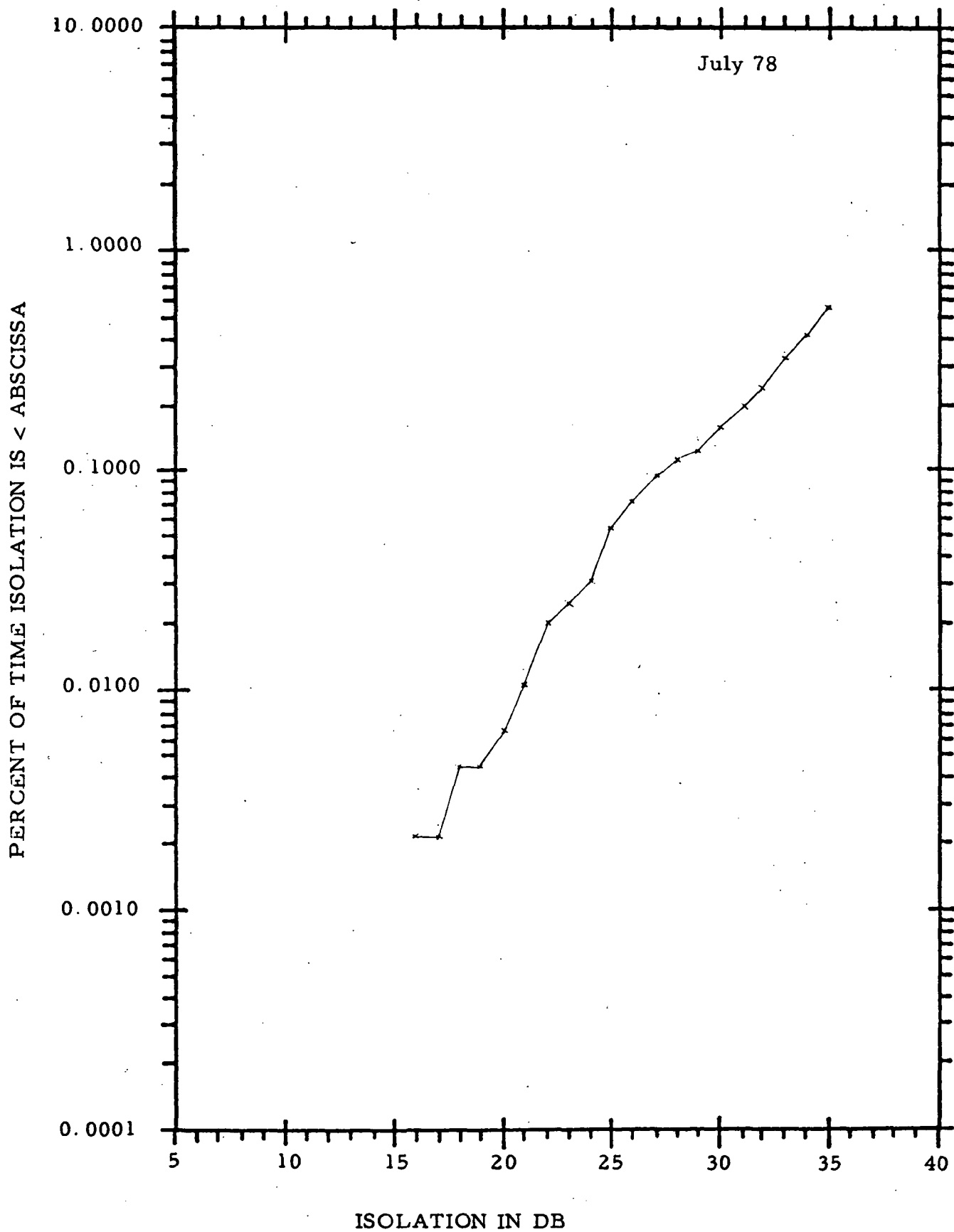
DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						MM/HR
MIN		5	25	50	75	100	125	
0	1	0	10	13	15	10	4	
1	2	1	3	2	0	0	0	
2	4	1	3	1	0	0	0	
4	8	2	1	0	0	0	0	
8	16	1	2	0	0	0	0	
16	32	3	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	1	0	0	0	0	0	

UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 6 78

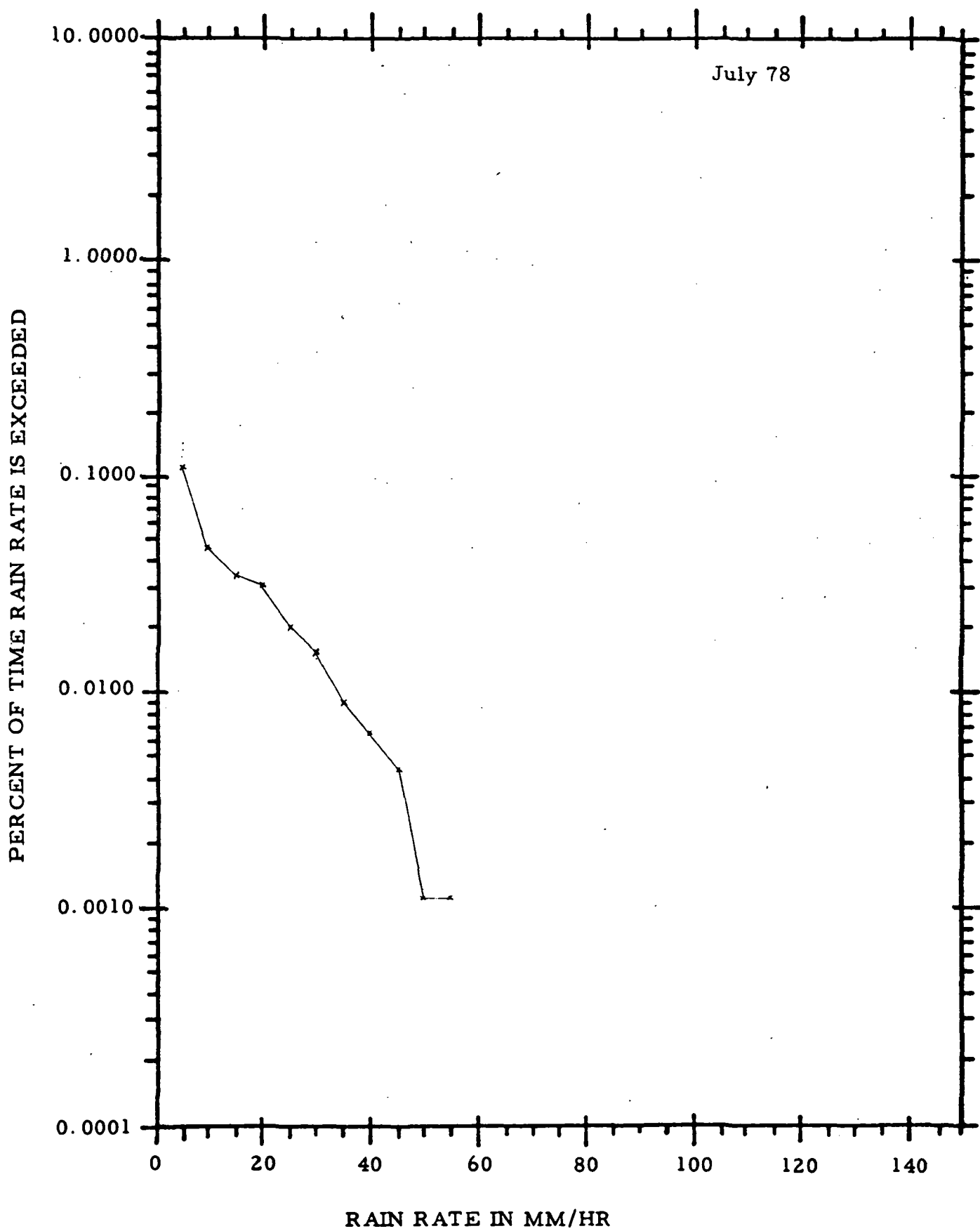
ATTENUATION INTERVAL DB		10% OF DATA HAVE DB	50% ISOLATION DB	90% GREATER THAN DB
0	1	35	30	24
1	2	35	27	23
2	3	34	26	25
3	4	34	30	25
4	5	33	29	23
5	6	29	27	24
6	7	28	26	24
7	8	26	24	21
8	9	24	22	21
9	10	24	21	20
10	11	21	21	19
11	12	22	22	20
12	13	21	21	20
13	14	20	20	19
14	15	19	19	18
15	16	18	18	18
16	17	18	18	18
17	18	18	18	17
18	19	18	18	17
19	20	17	17	16
20	21	18	18	16
21	22	17	17	15
22	23	17	17	16
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

11.7 GHZ ATTENUATION DISTRIBUTION AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS

RAIN RATE DISTRIBUTION AUSTIN, TEXAS



UNIV OF TEXAS GTS EXCEEDENCE DATA FOR 7 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	141	35	251	5	53
2	47	34	188	10	21
3	33	33	146	15	15
4	29	32	112	20	14
5	22	31	88	25	9
6	17	30	76	30	7
7	15	29	57	35	4
8	11	28	52	40	3
9	6	27	42	45	2
10	3	26	32	50	1
11	3	25	24	55	1
12	2	24	14	60	0
13	2	23	11	65	0
14	2	22	9	70	0
15	2	21	5	75	0
16	2	20	3	80	0
17	1	19	2	85	0
18	1	18	2	90	0
19	0	17	1	95	0
20	0	16	1	100	0
21	0	15	0	105	0
22	0	14	0	110	0
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 7 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	27	14	3	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	6	3	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 7 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	2	1	0	0	0	0	
3	4	36	0	0	0	0	0	
4	5	39	1	0	0	0	0	
5	6	56	35	18	3	0	0	
6	7	58	34	5	0	0	0	
7	8	53	2	0	0	0	0	
8	9	2	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	6	4	1	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 7 78

TIME OF DAY		MINUTES THE RAINRATE EXCEEDED						MM/HR
(GMT)		5	25	50	75	100	125	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	13	0	0	0	0	0	
5	6	21	4	1	0	0	0	
6	7	8	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	3	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	8	5	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 7 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	0	0	0	0	0	0	
1	2	1	0	0	0	0	0	
2	4	0	1	1	0	0	0	
4	8	1	0	0	0	0	0	
8	16	0	1	0	0	0	0	
16	32	1	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

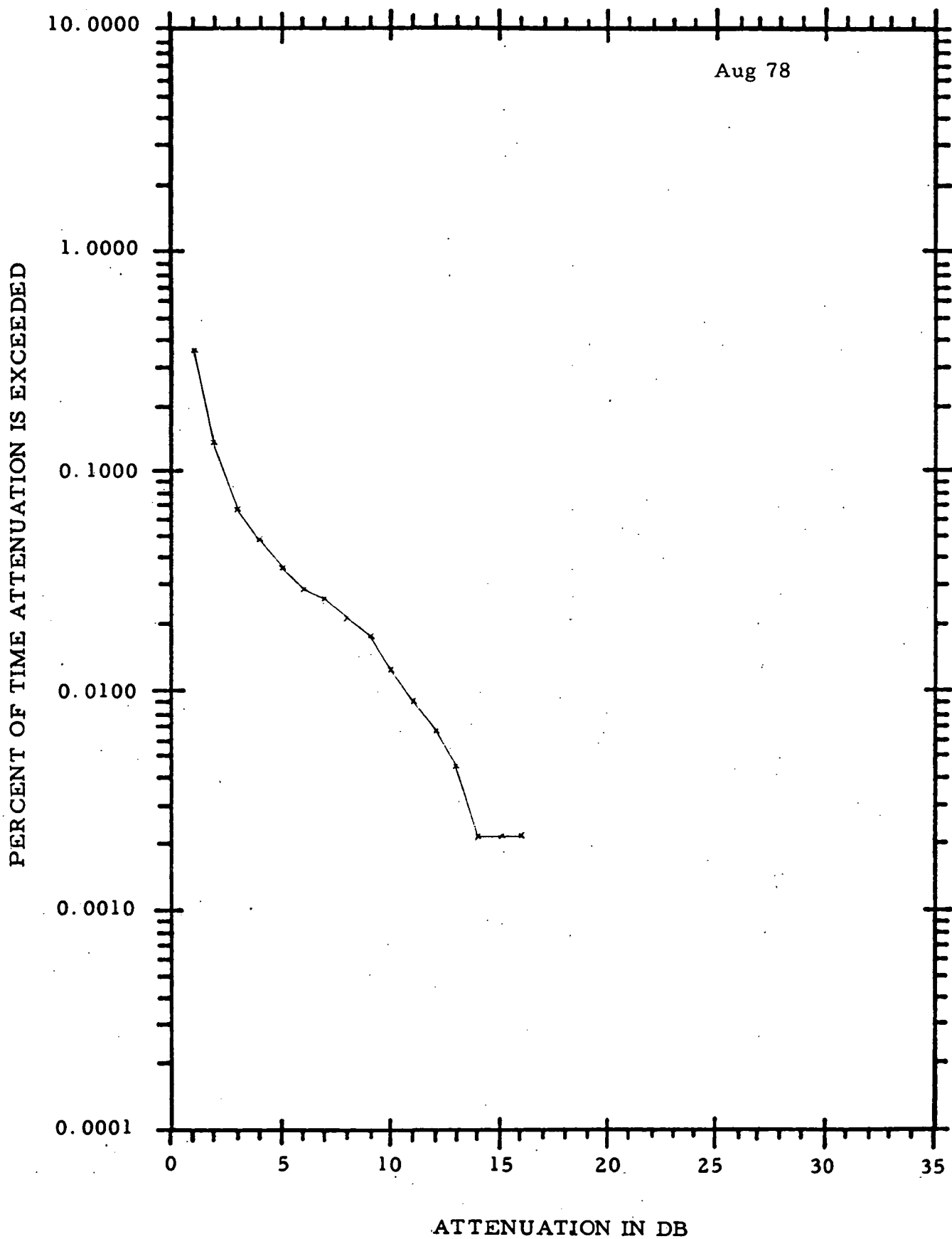
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	10	7	3	0	0	0	
1	2	3	3	4	0	0	0	
2	4	3	1	1	1	0	0	
4	8	3	0	0	0	0	0	
8	16	3	1	1	0	0	0	
16	32	3	0	0	0	0	0	
32	64	0	1	0	0	0	0	
64	**	1	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	1	0	2	0	0	0	
1	2	0	1	0	0	0	0	
2	4	3	1	0	0	0	0	
4	8	2	1	0	0	0	0	
8	16	3	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

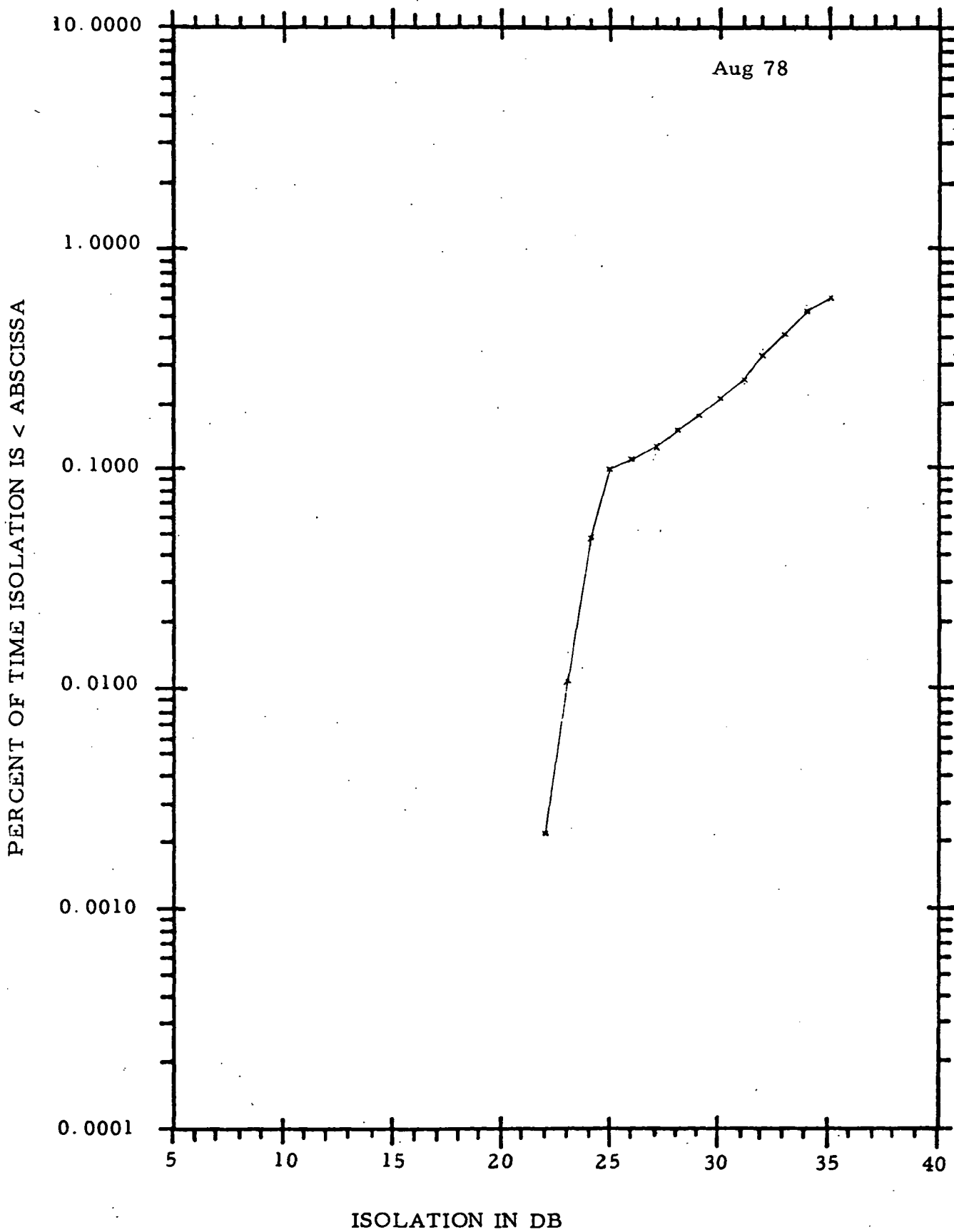
UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 7 78

ATTENUATION INTERVAL		10%	50%	90%
DB		OF DATA	HAVE ISOLATION	GREATER THAN
		DB	DB	DB
0	1	37	34	29
1	2	35	33	31
2	3	31	29	26
3	4	34	28	26
4	5	26	26	24
5	6	25	24	24
6	7	27	27	23
7	8	26	26	22
8	9	23	23	21
9	10	21	21	20
10	11	19	19	19
11	12	19	19	19
12	13	18	18	18
13	14	17	17	17
14	15	**	**	**
15	16	**	**	**
16	17	18	18	16
17	18	15	15	15
18	19	17	17	15
19	20	16	16	16
20	21	**	**	**
21	22	**	**	**
22	23	**	**	**
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

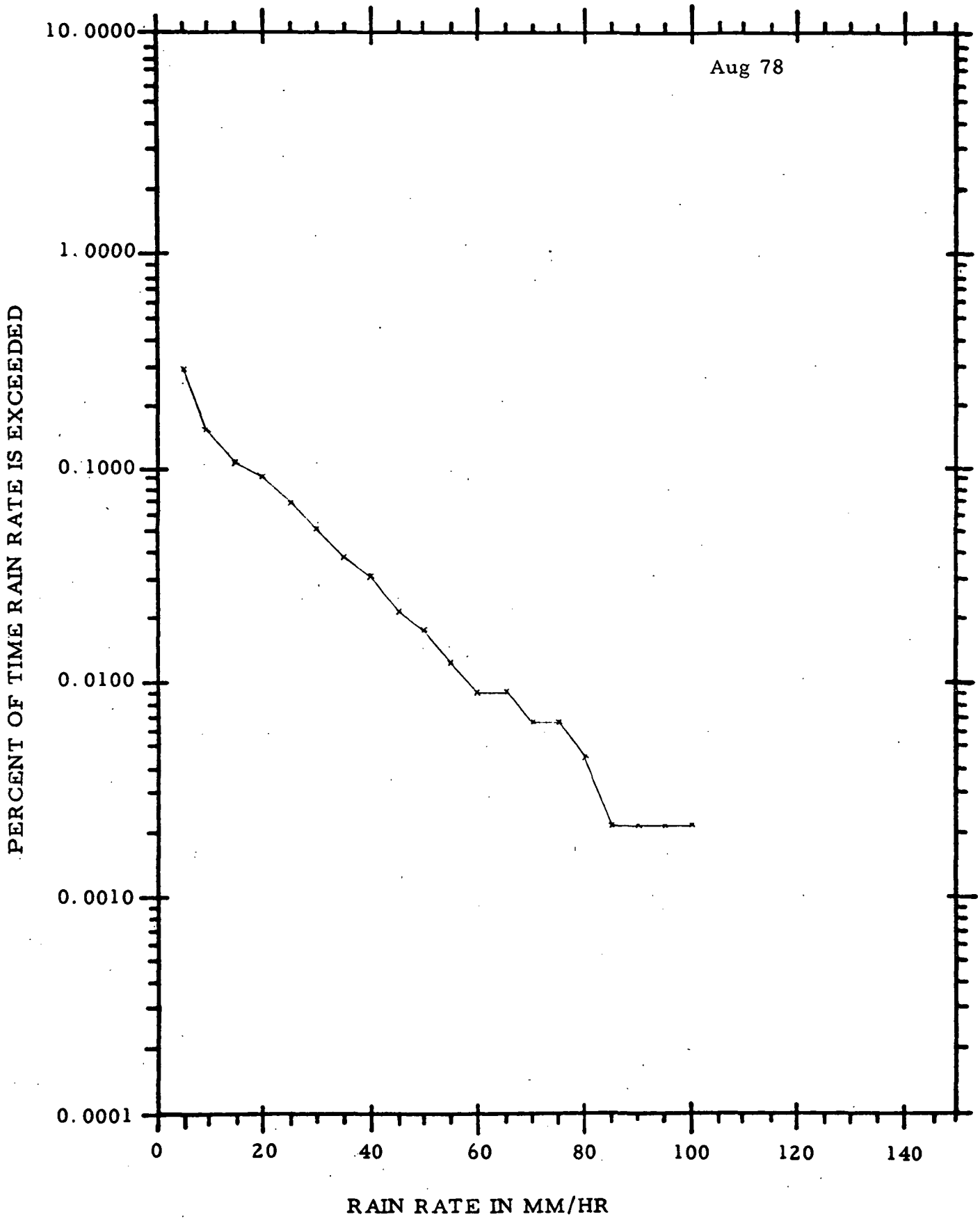
11.7 GHZ ATTENUATION DISTRIBUTION AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION AUSTIN, TEXAS



RAIN RATE DISTRIBUTION
AUSTIN, TEXAS



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 8 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	164	35	266	5	131
2	61	34	231	10	71
3	30	33	184	15	50
4	22	32	147	20	40
5	16	31	116	25	31
6	13	30	95	30	23
7	12	29	80	35	17
8	10	28	71	40	14
9	8	27	62	45	10
10	6	26	54	50	8
11	4	25	44	55	6
12	3	24	22	60	4
13	2	23	5	65	4
14	1	22	1	70	3
15	1	21	0	75	3
16	1	20	0	80	2
17	0	19	0	85	1
18	0	18	0	90	1
19	0	17	0	95	1
20	0	16	0	100	1
21	0	15	0	105	0
22	0	14	0	110	0
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 8 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	3	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	5	0	0	0	0	0	
7	8	6	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	17	13	6	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 8 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	5	1	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	11	0	0	0	0	0	
7	8	50	10	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	20	1	0	0	0	0	
10	11	10	0	0	0	0	0	
11	12	20	0	0	0	0	0	
12	13	57	54	27	0	0	0	
13	14	17	2	0	0	0	0	
14	15	30	6	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	35	20	17	0	0	0	
20	21	11	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS GTS TIME OF DAY DATA FOR 8 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED					125	MM/HR
		5	25	50	75	100		
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	10	2	0	0	0	0	
4	5	3	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	35	13	1	0	0	0	
7	8	13	2	1	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	39	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	3	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	7	0	0	0	0	0	
19	20	20	14	7	2	1	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 8 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	3	2	1	1	0	0	
1	2	2	0	1	0	0	0	
2	4	2	0	1	0	0	0	
4	8	1	0	0	0	0	0	
8	16	1	1	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

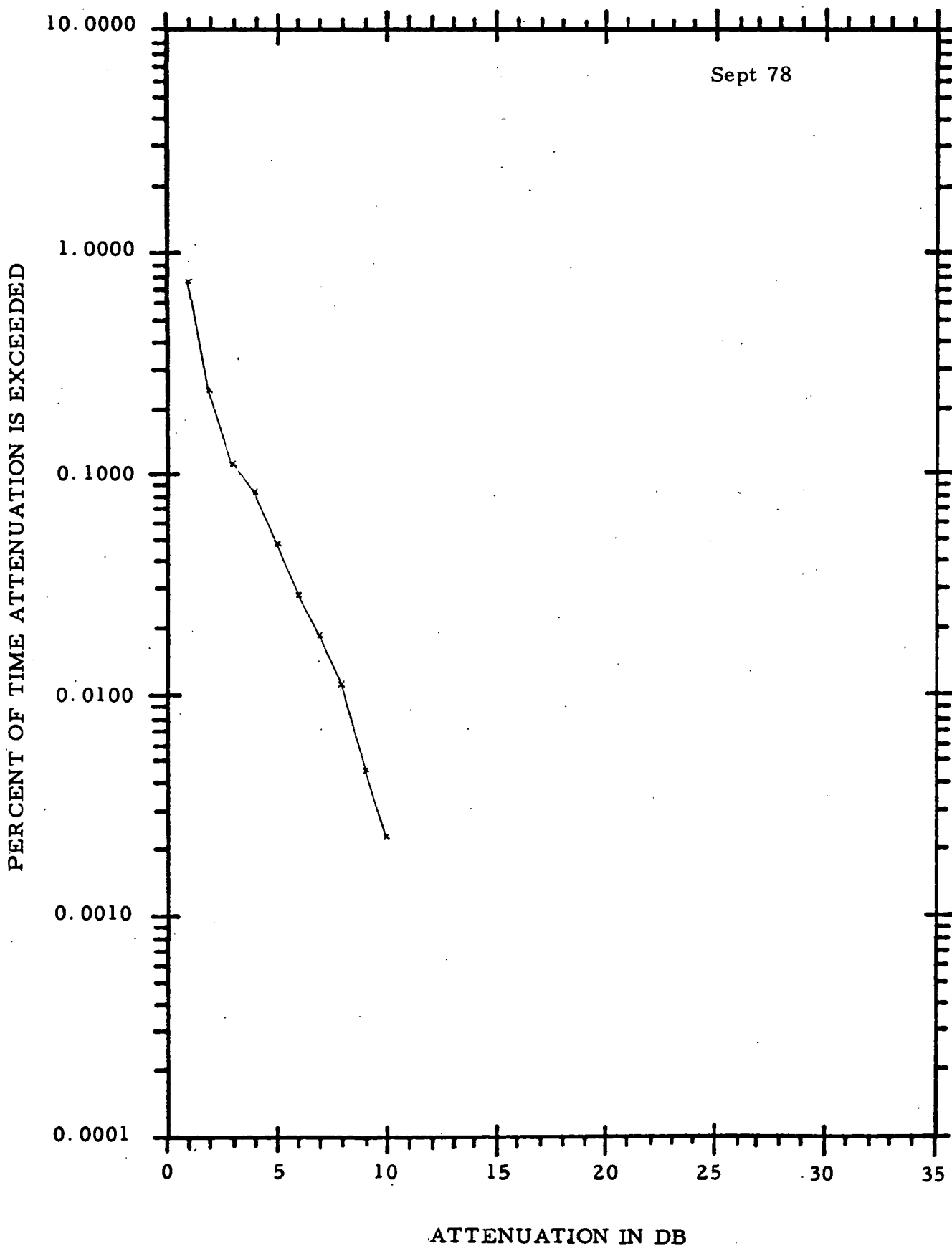
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	10	9	5	1	0	0	
1	2	3	4	1	0	0	0	
2	4	3	1	2	0	0	0	
4	8	7	3	2	0	0	0	
8	16	2	1	2	0	0	0	
16	32	2	0	0	0	0	0	
32	64	1	1	0	0	0	0	
64	**	1	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	1	10	18	9	3	1	
1	2	0	1	1	0	0	0	
2	4	6	3	0	0	0	0	
4	8	4	0	0	0	0	0	
8	16	2	1	0	0	0	0	
16	32	2	0	0	0	0	0	
32	64	1	0	0	0	0	0	
64	**	0	0	0	0	0	0	

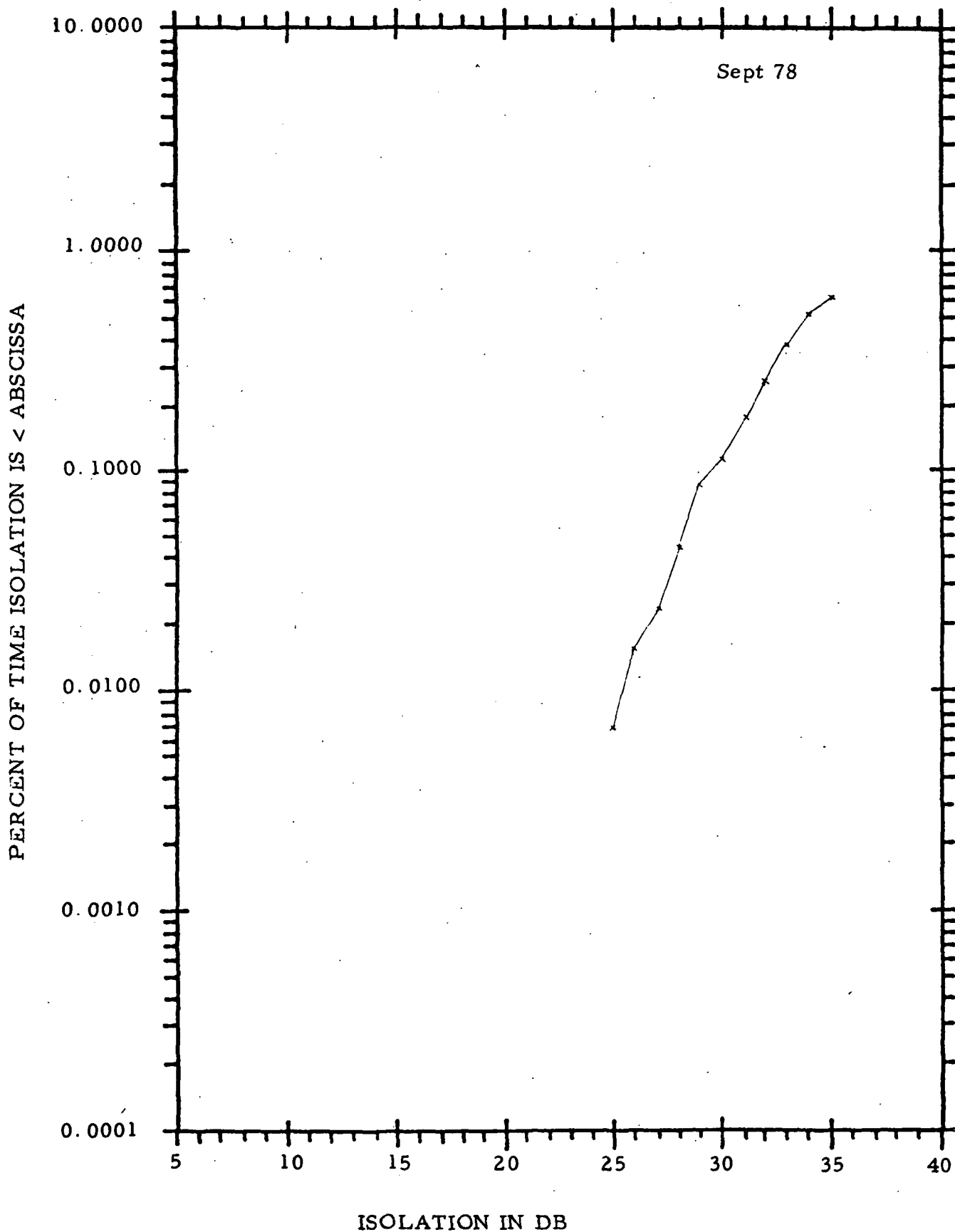
UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 8 78

ATTENUATION INTERVAL		10%	50%	90%
DB		OF DATA DB	HAVE ISOLATION DB	GREATER THAN DB
0	1	37	33	30
1	2	36	28	23
2	3	36	28	23
3	4	38	35	27
4	5	36	36	25
5	6	39	39	24
6	7	24	24	21
7	8	35	35	21
8	9	30	30	20
9	10	26	26	22
10	11	24	24	23
11	12	25	25	23
12	13	23	23	22
13	14	24	24	22
14	15	22	22	22
15	16	23	23	23
16	17	23	23	23
17	18	**	**	**
18	19	24	24	24
19	20	**	**	**
20	21	24	24	24
21	22	**	**	**
22	23	**	**	**
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

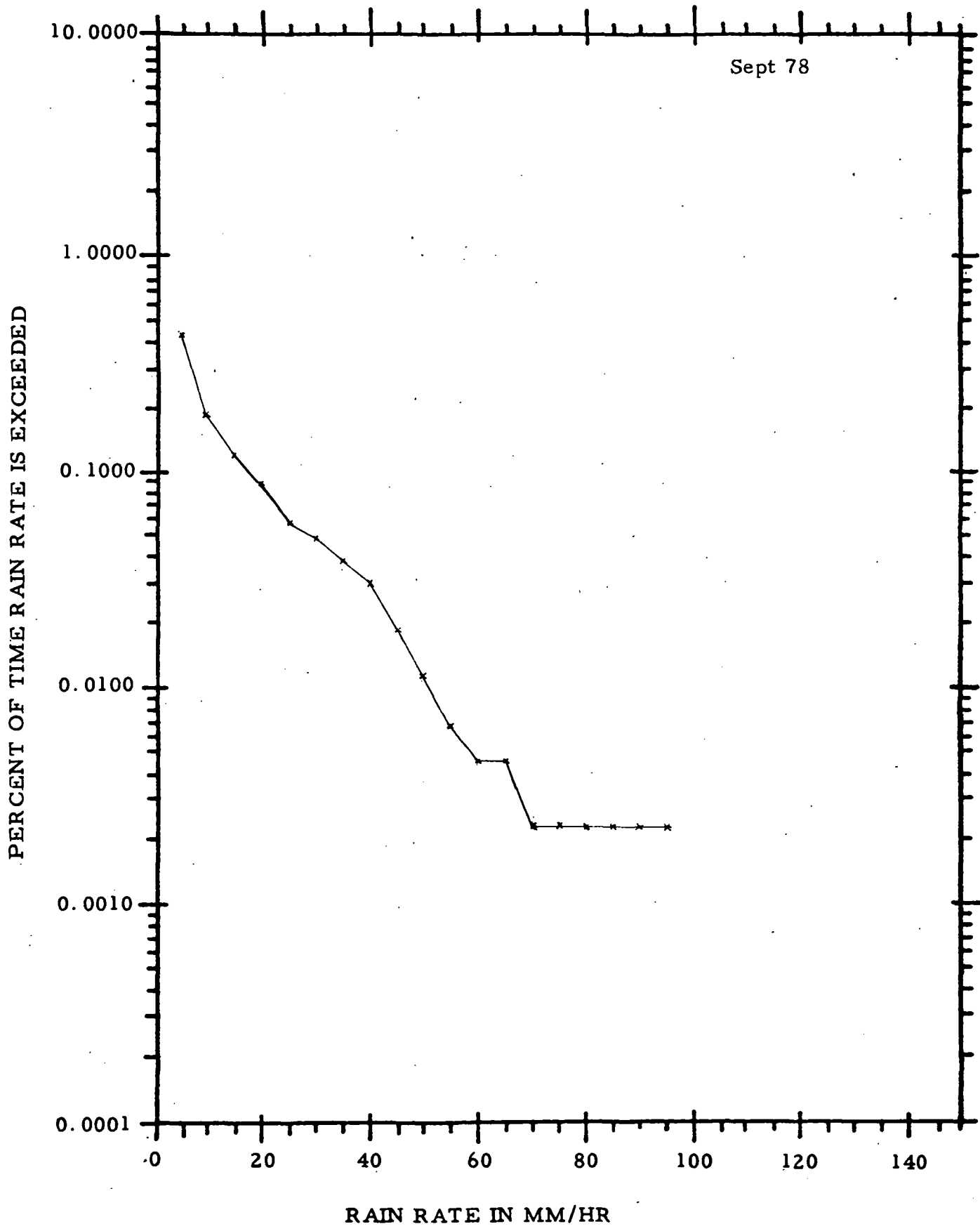
11.7 GHZ ATTENUATION DISTRIBUTION AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS



RAIN RATE DISTRIBUTION AUSTIN, TEXAS



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 9 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	333	35	271	5	190
2	106	34	226	10	80
3	51	33	164	15	55
4	36	32	114	20	38
5	21	31	77	25	25
6	12	30	53	30	21
7	8	29	37	35	17
8	5	28	19	40	13
9	2	27	10	45	8
10	1	26	7	50	5
11	0	25	3	55	3
12	0	24	0	60	2
13	0	23	0	65	2
14	0	22	0	70	1
15	0	21	0	75	1
16	0	20	0	80	1
17	0	19	0	85	1
18	0	18	0	90	1
19	0	17	0	95	1
20	0	16	0	100	0
21	0	15	0	105	0
22	0	14	0	110	0
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 9 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	3	0	0	0	0	0	
3	4	1	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	1	0	0	0	0	0	
12	13	9	1	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	6	3	1	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	11	4	0	0	0	0	
18	19	4	1	0	0	0	0	
19	20	14	4	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	2	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 9 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	20	0	0	0	0	0	
3	4	10	0	0	0	0	0	
4	5	22	1	0	0	0	0	
5	6	8	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	1	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	10	0	0	0	0	0	
12	13	6	1	0	0	0	0	
13	14	8	0	0	0	0	0	
14	15	57	20	1	0	0	0	
15	16	14	6	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	12	6	1	0	0	0	
18	19	2	1	0	0	0	0	
19	20	35	10	0	0	0	0	
20	21	25	0	0	0	0	0	
21	22	1	0	0	0	0	0	
22	23	16	5	1	0	0	0	
23	24	23	2	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 9 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED					125	MM/HR
		5	25	50	75	100		
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	16	0	0	0	0	0	
5	6	1	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	3	0	0	0	0	0	
9	10	1	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	30	7	1	0	0	0	
12	13	29	12	2	1	0	0	
13	14	3	0	0	0	0	0	
14	15	4	0	0	0	0	0	
15	16	8	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	12	0	0	0	0	0	
18	19	3	0	0	0	0	0	
19	20	56	4	1	0	0	0	
20	21	14	0	0	0	0	0	
21	22	8	1	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 9 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	7	2	1	0	0	0	
1	2	1	0	0	0	0	0	
2	4	2	4	0	0	0	0	
4	8	2	0	0	0	0	0	
8	16	1	0	0	0	0	0	
16	32	1	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

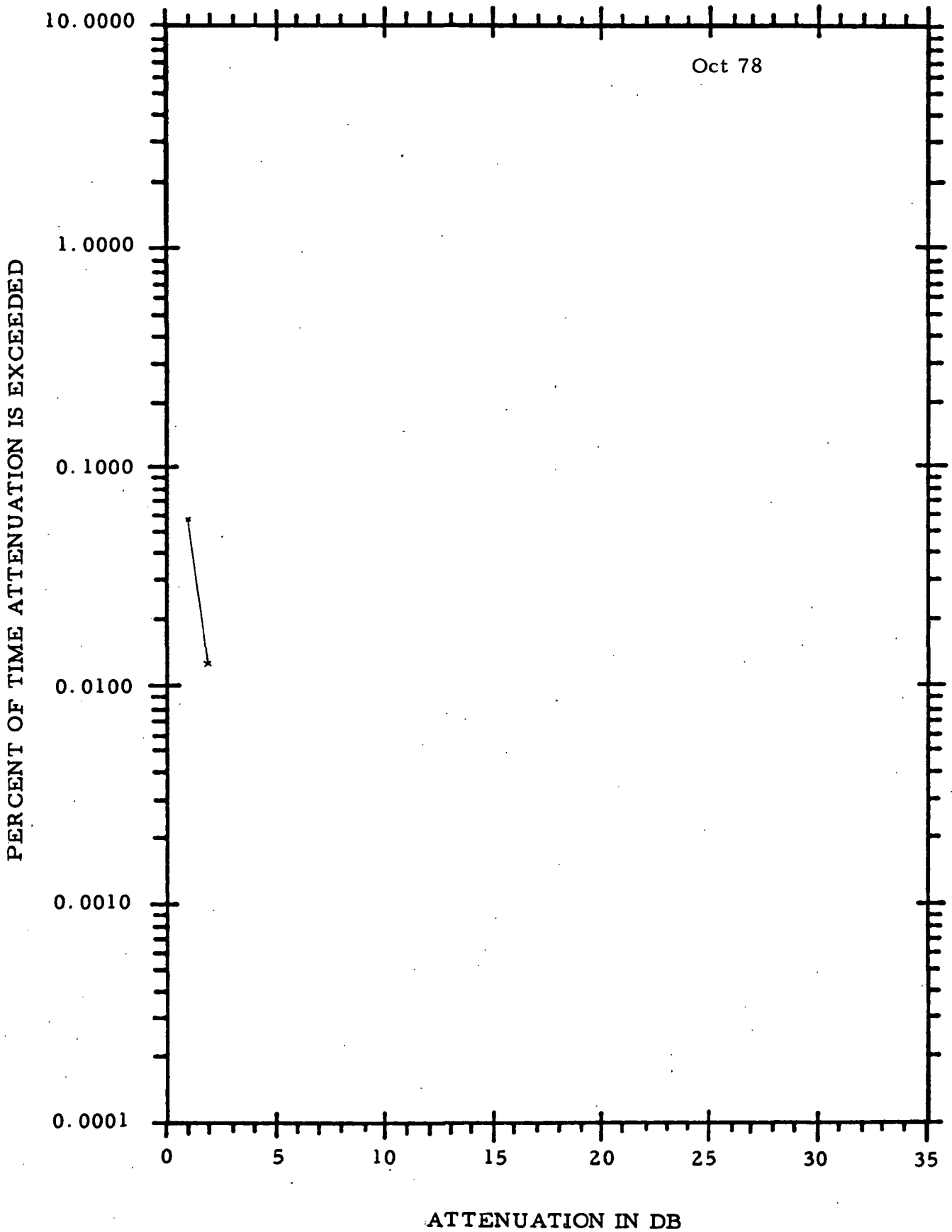
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	54	20	5	0	0	0	
1	2	7	4	1	0	0	0	
2	4	6	5	0	0	0	0	
4	8	14	3	0	0	0	0	
8	16	5	1	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	1	0	0	0	0	0	
64	**	0	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	0	2	9	2	2	1	
1	2	2	3	1	0	0	0	
2	4	8	4	0	0	0	0	
4	8	4	1	0	0	0	0	
8	16	4	0	0	0	0	0	
16	32	4	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

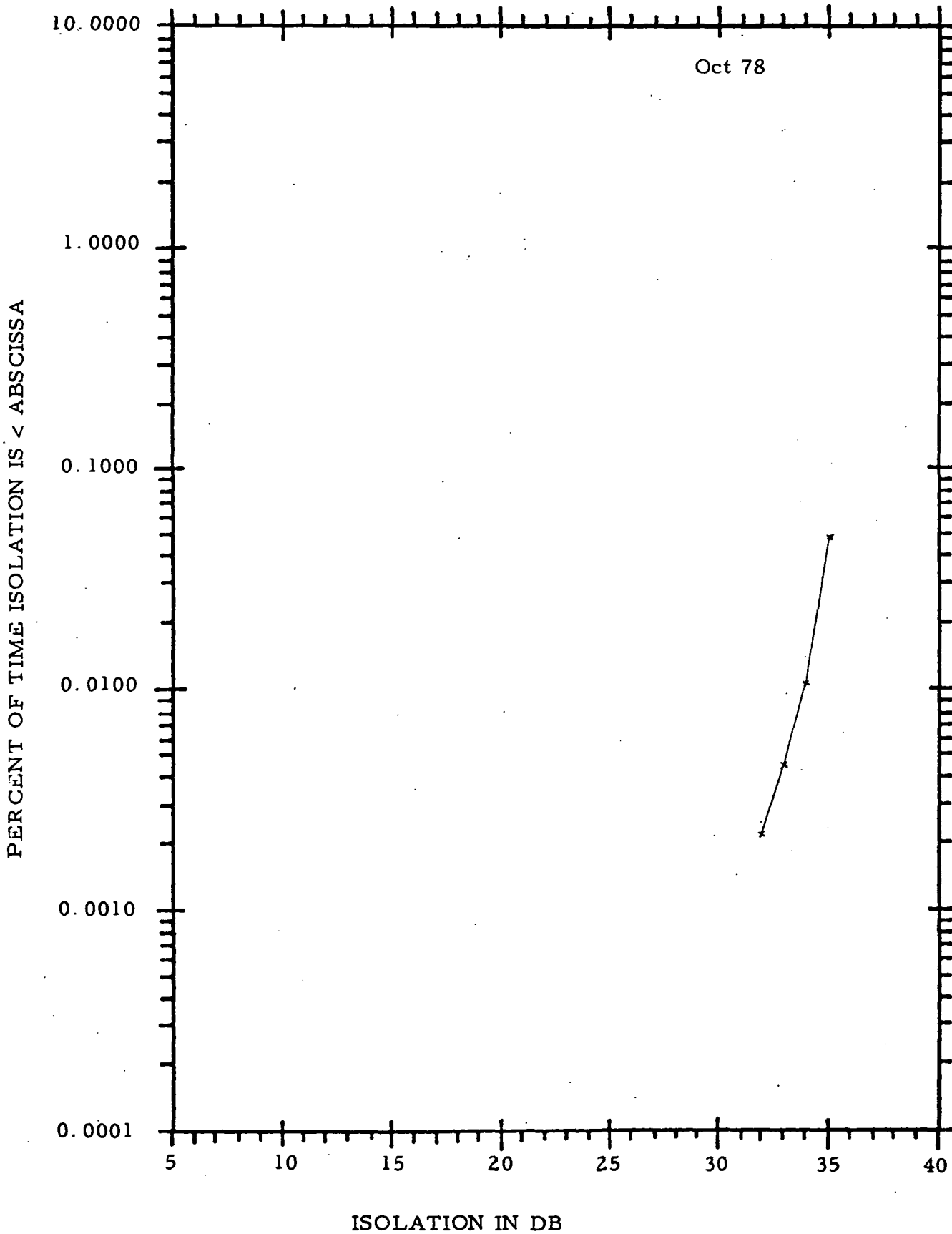
UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 9 78

ATTENUATION INTERVAL		10%	50%	90%
DB		OF DATA HAVE DB	ISOLATION DB	GREATER THAN DB
0	1	38	34	29
1	2	38	36	31
2	3	39	39	32
3	4	37	35	31
4	5	36	32	30
5	6	33	31	28
6	7	31	29	27
7	8	29	29	25
8	9	28	28	24
9	10	26	26	24
10	11	24	24	24
11	12	**	**	**
12	13	**	**	**
13	14	**	**	**
14	15	**	**	**
15	16	**	**	**
16	17	**	**	**
17	18	**	**	**
18	19	**	**	**
19	20	**	**	**
20	21	**	**	**
21	22	**	**	**
22	23	**	**	**
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

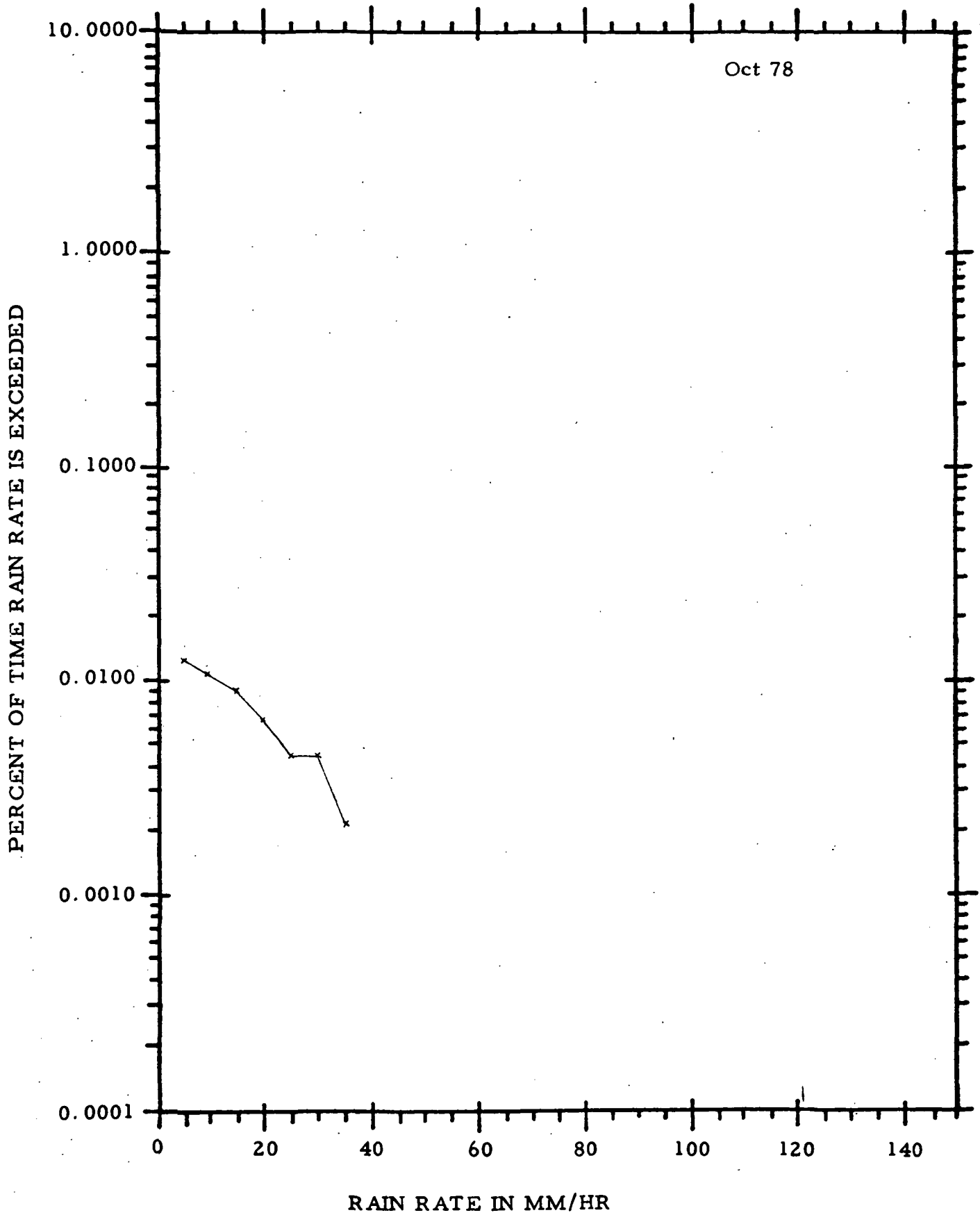
11.7 GHZ ATTENUATION DISTRIBUTION
AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS



RAIN RATE DISTRIBUTION AUSTIN, TEXAS



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 10 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	26	35	22	5	6
2	6	34	5	10	5
3	0	33	2	15	4
4	0	32	1	20	3
5	0	31	0	25	2
6	0	30	0	30	2
7	0	29	0	35	1
8	0	28	0	40	0
9	0	27	0	45	0
10	0	26	0	50	0
11	0	25	0	55	0
12	0	24	0	60	0
13	0	23	0	65	0
14	0	22	0	70	0
15	0	21	0	75	0
16	0	20	0	80	0
17	0	19	0	85	0
18	0	18	0	90	0
19	0	17	0	95	0
20	0	16	0	100	0
21	0	15	0	105	0
22	0	14	0	110	0
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 10 78

TIME OF DAY		MINUTES THE ATTENUATION EXCEEDED						DB
(GMT)		3	6	10	20	25	30	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 10 78

TIME OF DAY		MINUTES THE RAINRATE EXCEEDED						MM/HR
(GMT)		5	25	50	75	100	125	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	2	0	0	0	0	0	
4	5	3	2	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 10 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	2	0	0	0	0	0	
4	5	16	0	0	0	0	0	
5	6	5	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 10 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	1	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	4	0	0	0	0	0	0	
4	8	0	0	0	0	0	0	
8	16	0	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

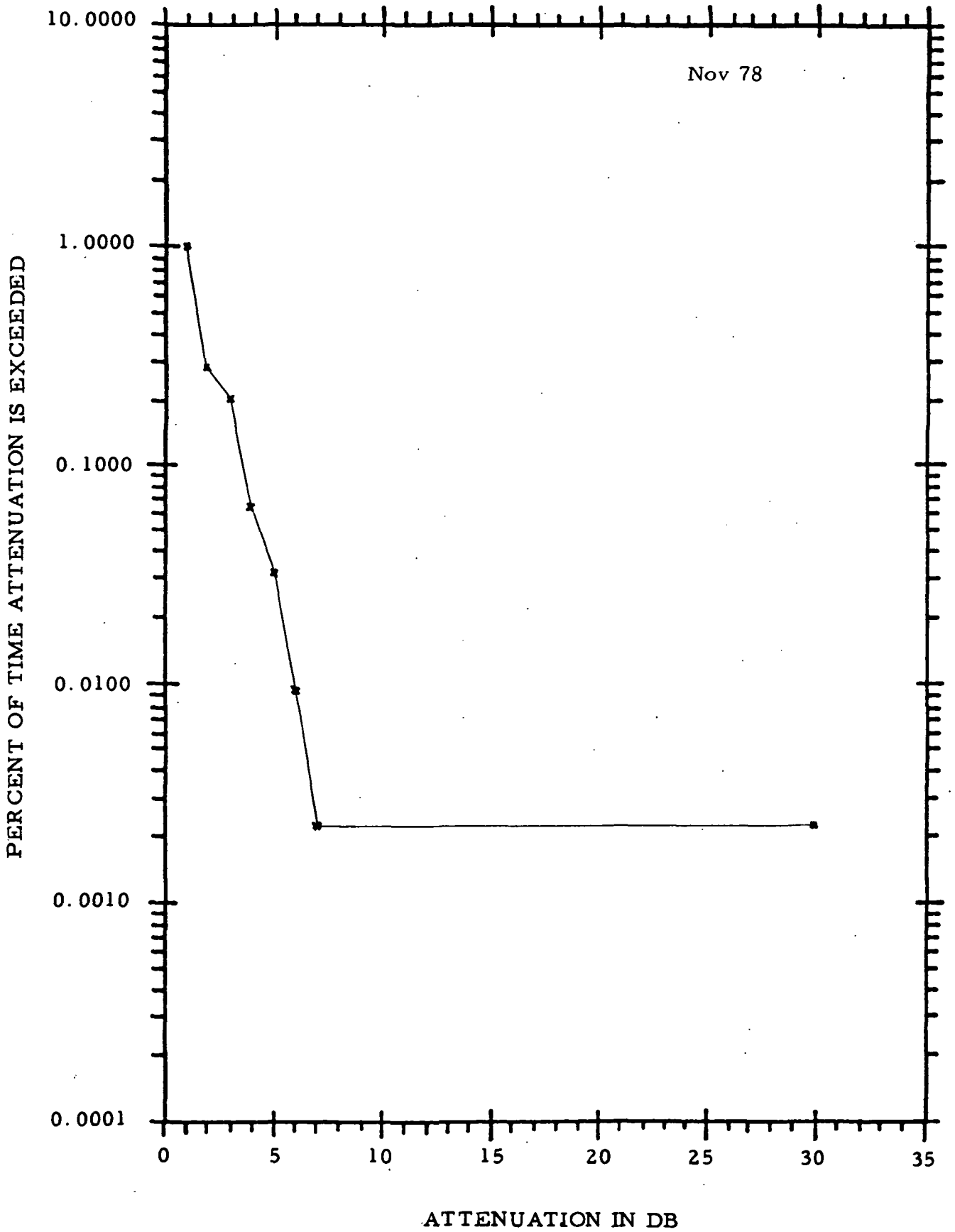
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	0	0	0	0	0	0	
1	2	3	0	0	0	0	0	
2	4	0	0	0	0	0	0	
4	8	2	0	0	0	0	0	
8	16	1	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	4	0	1	0	0	0	0	
4	8	1	0	0	0	0	0	
8	16	0	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

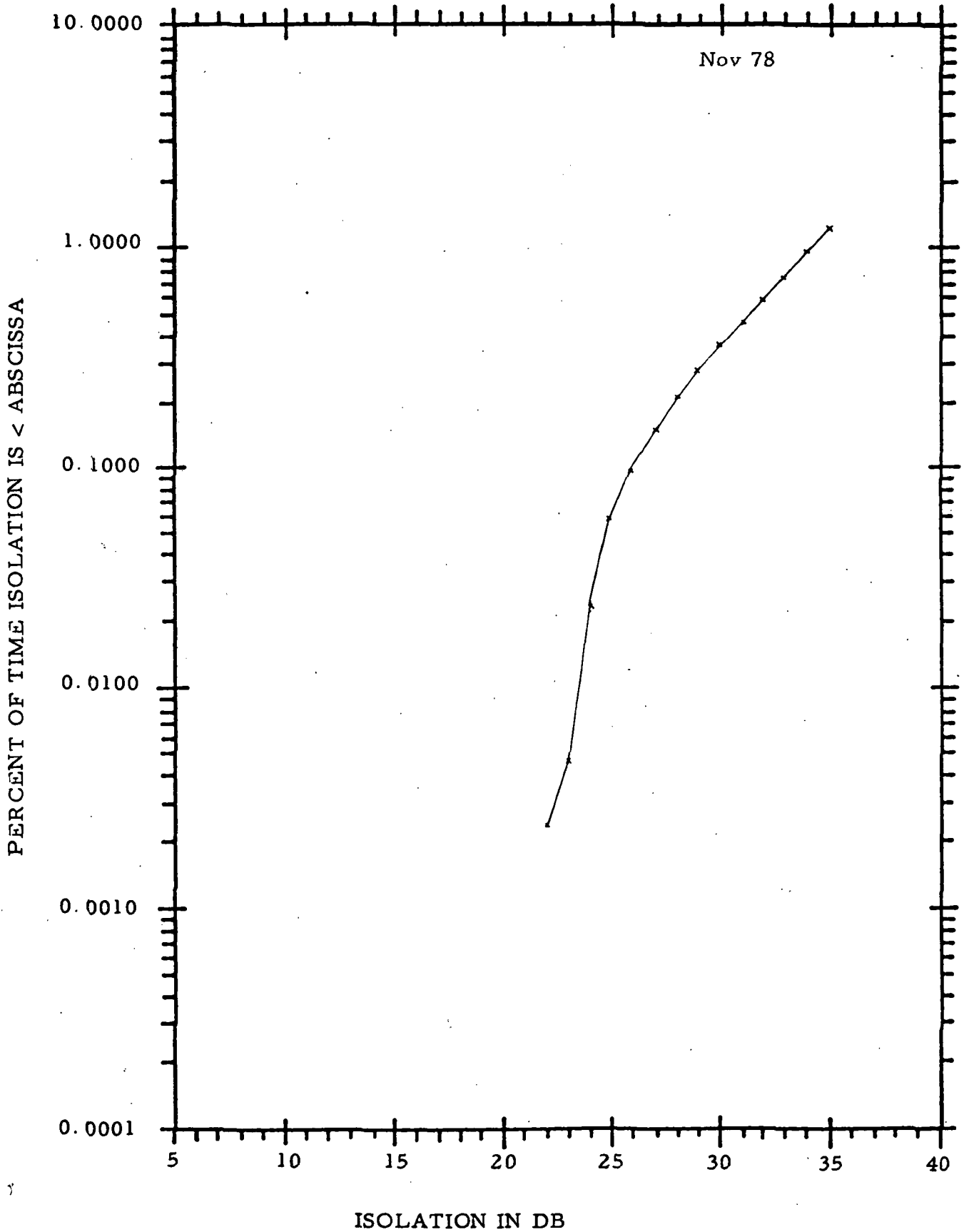
UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 10 78

ATTENUATION		10%	50%	90%
INTERVAL		OF DATA	HAVE ISOLATION	GREATER THAN
DB		DB	DB	DB
0	1	38	35	34
1	2	38	34	33
2	3	37	35	32
3	4	34	34	34
4	5	**	**	**
5	6	**	**	**
6	7	**	**	**
7	8	**	**	**
8	9	**	**	**
9	10	**	**	**
10	11	**	**	**
11	12	**	**	**
12	13	**	**	**
13	14	**	**	**
14	15	**	**	**
15	16	**	**	**
16	17	**	**	**
17	18	**	**	**
18	19	**	**	**
19	20	**	**	**
20	21	**	**	**
21	22	**	**	**
22	23	**	**	**
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

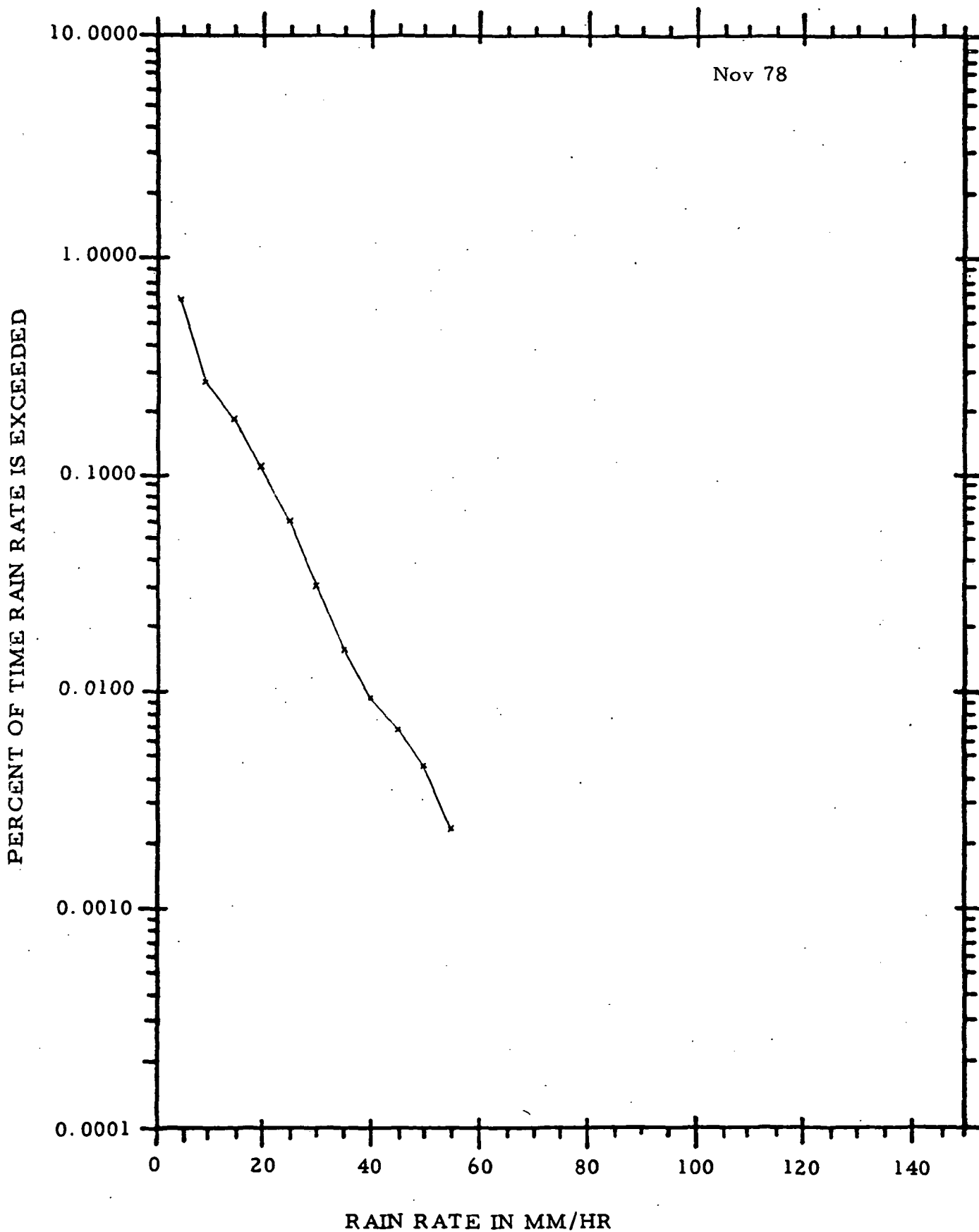
11.7 GHZ ATTENUATION DISTRIBUTION
AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS



RAIN RATE DISTRIBUTION AUSTIN, TEXAS



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 11 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	441	35	534	5	271
2	127	34	419	10	118
3	48	33	319	15	83
4	28	32	256	20	46
5	14	31	205	25	26
6	4	30	160	30	13
7	1	29	119	35	7
8	1	28	91	40	4
9	0	27	66	45	3
10	0	26	41	50	2
11	0	25	25	55	1
12	0	24	10	60	0
13	0	23	2	65	0
14	0	22	1	70	0
15	0	21	0	75	0
16	0	20	0	80	0
17	0	19	0	85	0
18	0	18	0	90	0
19	0	17	0	95	0
20	0	16	0	100	0
21	0	15	0	105	0
22	0	14	0	110	0
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 11 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	7	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	1	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	5	2	0	0	0	0	
15	16	1	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	12	0	0	0	0	0	
21	22	1	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	21	2	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 11 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	51	32	8	0	0	0	
1	2	56	33	5	0	0	0	
2	3	46	2	0	0	0	0	
3	4	56	5	0	0	0	0	
4	5	51	0	0	0	0	0	
5	6	39	1	0	0	0	0	
6	7	8	0	0	0	0	0	
7	8	42	21	0	0	0	0	
8	9	5	0	0	0	0	0	
9	10	29	0	0	0	0	0	
10	11	8	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	2	0	0	0	0	0	
13	14	3	0	0	0	0	0	
14	15	10	4	0	0	0	0	
15	16	8	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	24	8	0	0	0	0	
21	22	44	28	7	0	0	0	
22	23	11	0	0	0	0	0	
23	24	39	25	5	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 11 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED						MM/HR
		5	25	50	75	100	125	
0	1	51	0	0	0	0	0	
1	2	16	0	0	0	0	0	
2	3	28	0	0	0	0	0	
3	4	29	0	0	0	0	0	
4	5	3	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	14	2	0	0	0	0	
10	11	4	0	0	0	0	0	
11	12	4	0	0	0	0	0	
12	13	2	0	0	0	0	0	
13	14	5	0	0	0	0	0	
14	15	8	1	0	0	0	0	
15	16	2	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	39	11	1	0	0	0	
21	22	22	0	0	0	0	0	
22	23	3	0	0	0	0	0	
23	24	42	11	1	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 11 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						DB
MIN		3	6	10	20	25	30	
0	1	4	5	0	0	0	0	
1	2	1	1	0	0	0	0	
2	4	1	0	0	0	0	0	
4	8	2	0	0	0	0	0	
8	16	1	0	0	0	0	0	
16	32	1	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

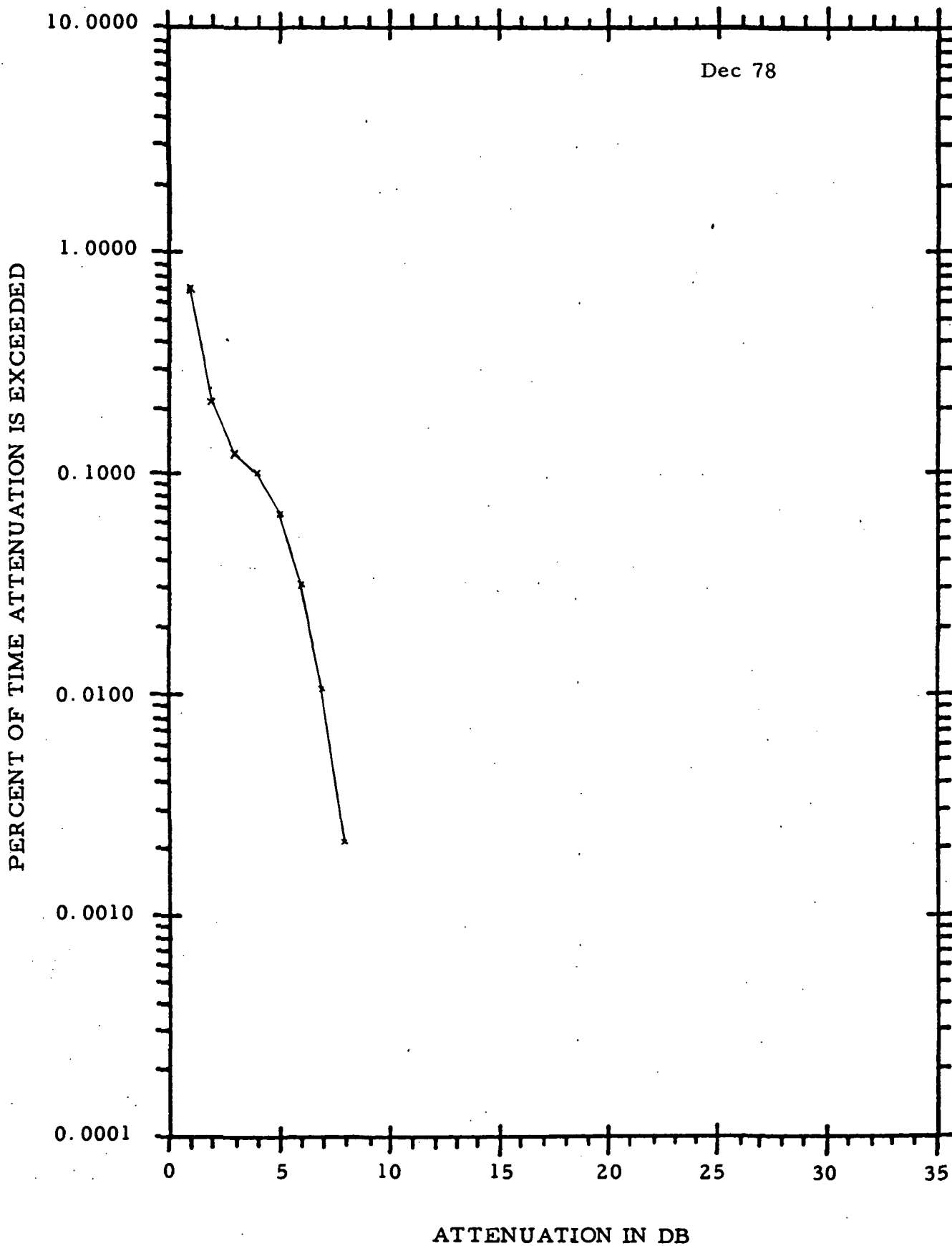
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						DB
MIN		35	30	25	20	15	10	
0	1	33	28	27	0	0	0	
1	2	19	12	6	0	0	0	
2	4	19	8	2	0	0	0	
4	8	11	7	0	0	0	0	
8	16	10	4	0	0	0	0	
16	32	6	1	0	0	0	0	
32	64	2	0	0	0	0	0	
64	**	0	0	0	0	0	0	

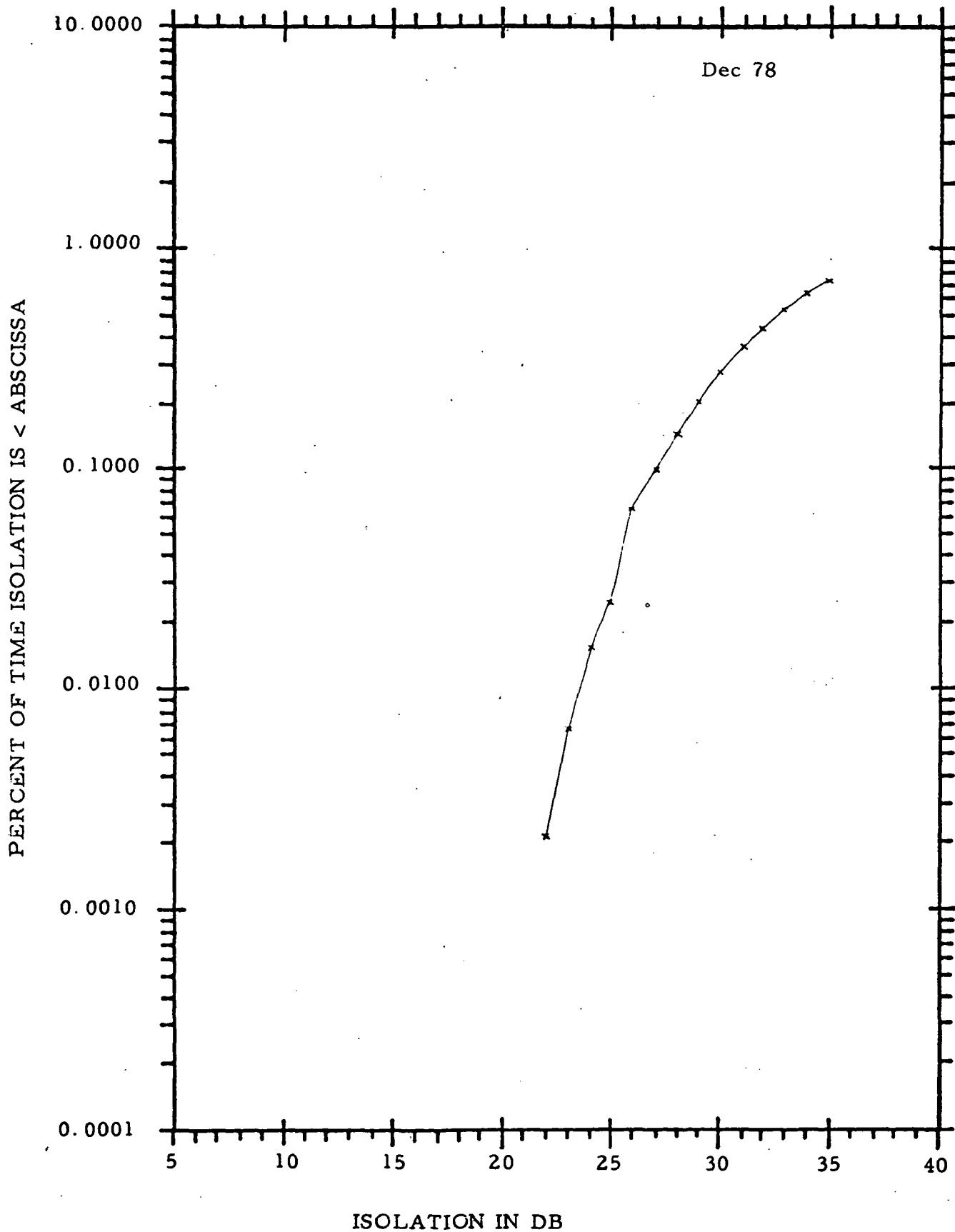
DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						MM/HR
MIN		5	25	50	75	100	125	
0	1	0	7	6	2	0	0	
1	2	4	1	0	0	0	0	
2	4	13	5	0	0	0	0	
4	8	5	1	0	0	0	0	
8	16	6	0	0	0	0	0	
16	32	3	0	0	0	0	0	
32	64	1	0	0	0	0	0	
64	**	0	0	0	0	0	0	

UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 11 78

ATTENUATION INTERVAL DB		10% OF DATA HAVE ISOLATION DB	50% ISOLATION DB	90% GREATER THAN DB
0	1	39	39	32
1	2	36	33	27
2	3	34	31	25
3	4	31	28	24
4	5	31	27	24
5	6	28	26	25
6	7	27	27	23
7	8	25	25	24
8	9	24	24	22
9	10	**	**	**
10	11	**	**	**
11	12	**	**	**
12	13	**	**	**
13	14	**	**	**
14	15	**	**	**
15	16	**	**	**
16	17	**	**	**
17	18	**	**	**
18	19	**	**	**
19	20	**	**	**
20	21	**	**	**
21	22	**	**	**
22	23	**	**	**
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

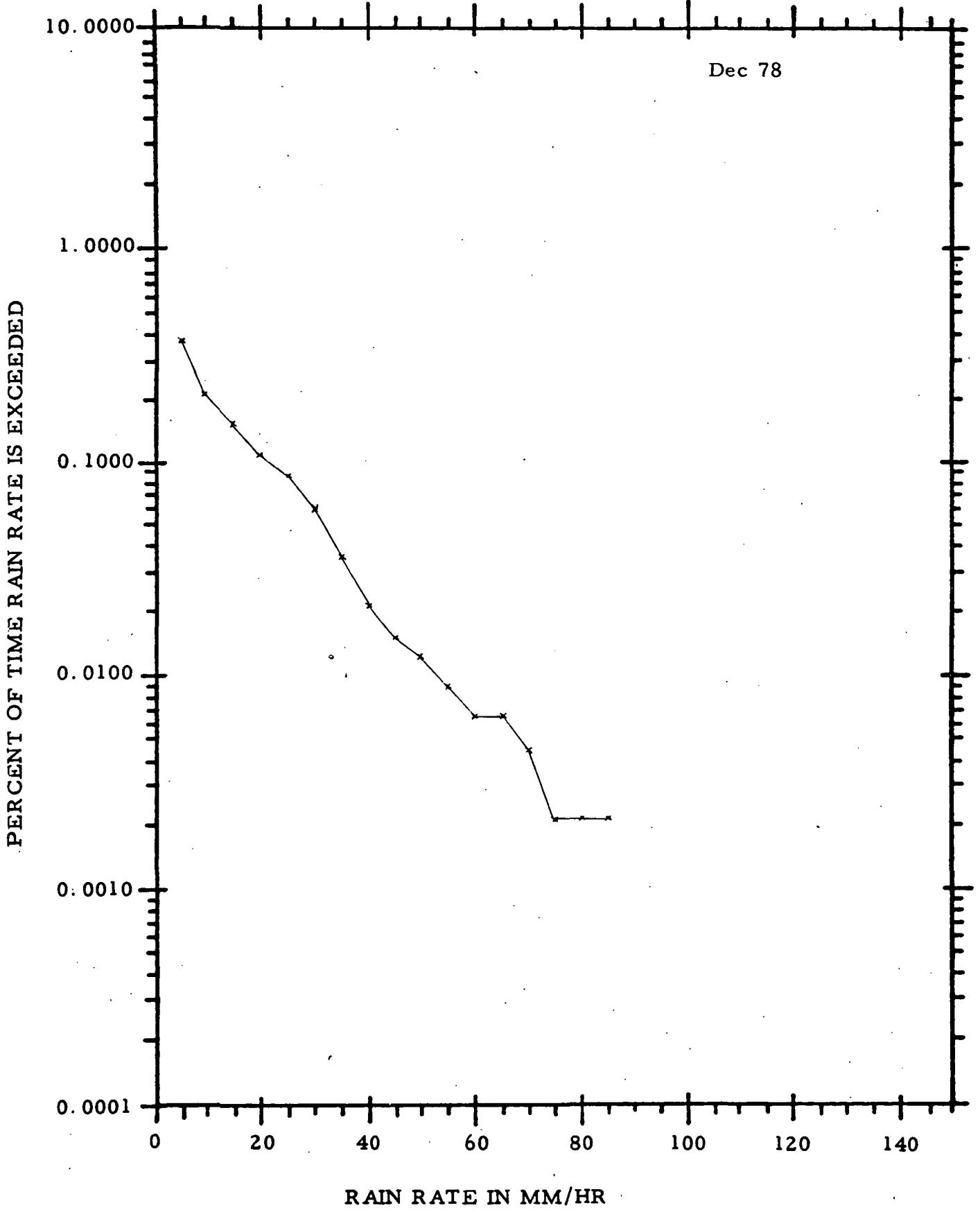
11.7 GHZ ATTENUATION DISTRIBUTION AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS

RAIN RATE DISTRIBUTION
AUSTIN, TEXAS

A94



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 12 78

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	311	35	325	5	168
2	100	34	284	10	99
3	60	33	236	15	74
4	45	32	197	20	54
5	29	31	163	25	39
6	14	30	125	30	27
7	5	29	93	35	16
8	1	28	66	40	10
9	0	27	44	45	7
10	0	26	29	50	6
11	0	25	11	55	4
12	0	24	7	60	3
13	0	23	3	65	3
14	0	22	1	70	2
15	0	21	0	75	1
16	0	20	0	80	1
17	0	19	0	85	1
18	0	18	0	90	0
19	0	17	0	95	0
20	0	16	0	100	0
21	0	15	0	105	0
22	0	14	0	110	0
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 12 78

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	1	0	0	0	0	0	
8	9	16	3	0	0	0	0	
9	10	44	11	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 12 78

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	8	0	0	0	0	0	
6	7	5	1	0	0	0	0	
7	8	16	6	0	0	0	0	
8	9	53	14	3	0	0	0	
9	10	57	41	5	0	0	0	
10	11	56	33	3	0	0	0	
11	12	50	19	0	0	0	0	
12	13	55	9	0	0	0	0	
13	14	8	1	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	12	1	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	3	0	0	0	0	0	
18	19	1	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	2	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 12 78

TIME OF DAY (GMT)		MINUTES THE RAINRATE EXCEEDED						MM/HR
		5	25	50	75	100	125	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	0	0	0	0	0	0	
5	6	4	1	0	0	0	0	
6	7	7	0	0	0	0	0	
7	8	7	0	0	0	0	0	
8	9	26	8	1	0	0	0	
9	10	60	29	6	1	0	0	
10	11	27	0	0	0	0	0	
11	12	38	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	1	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	5	1	0	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 12 78

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	4	4	0	0	0	0	
1	2	0	3	0	0	0	0	
2	4	1	2	0	0	0	0	
4	8	0	0	0	0	0	0	
8	16	1	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	1	0	0	0	0	0	
64	**	0	0	0	0	0	0	

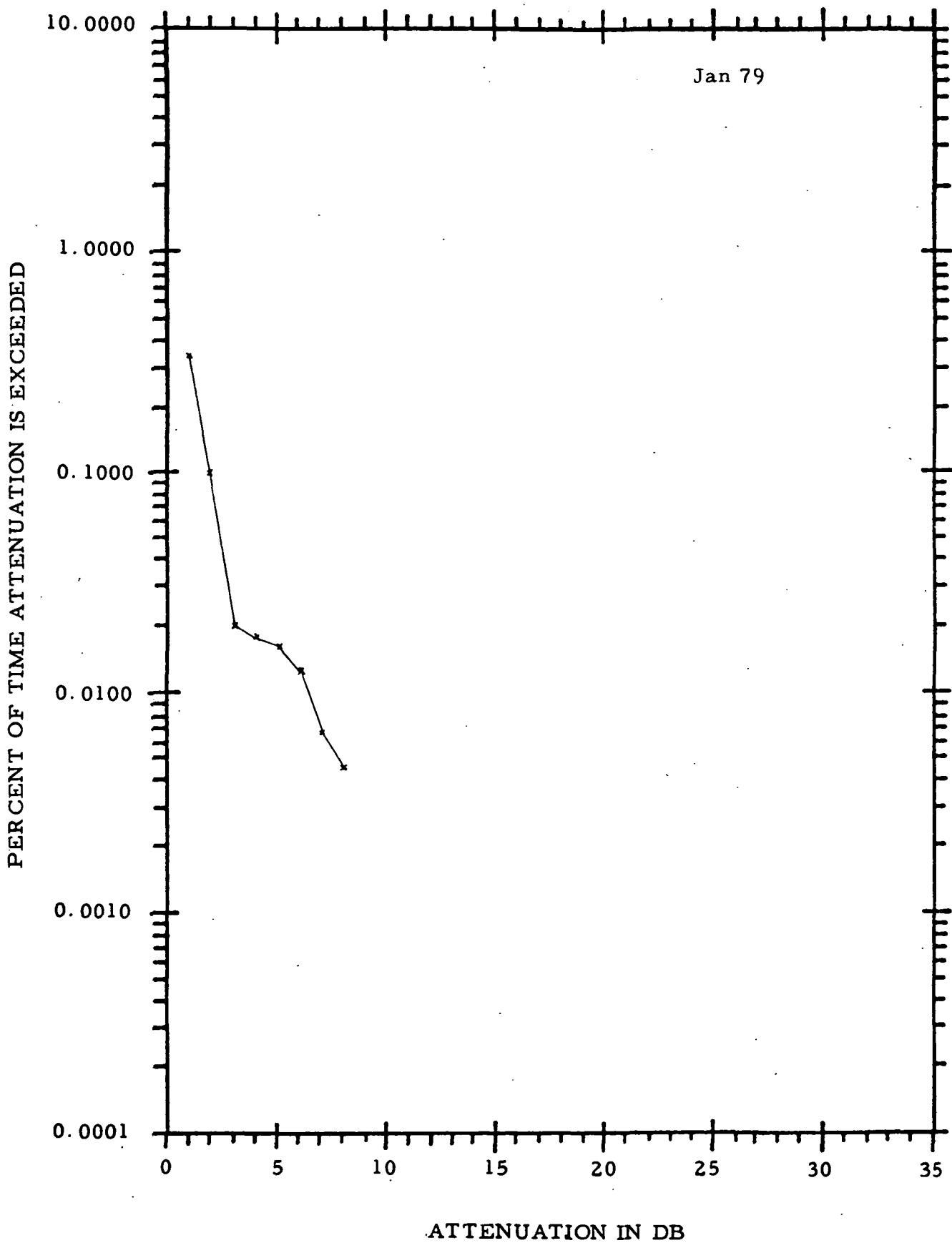
DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	45	55	15	0	0	0	
1	2	9	10	4	0	0	0	
2	4	6	8	0	0	0	0	
4	8	6	4	0	0	0	0	
8	16	2	1	0	0	0	0	
16	32	4	2	0	0	0	0	
32	64	3	0	0	0	0	0	
64	**	0	0	0	0	0	0	

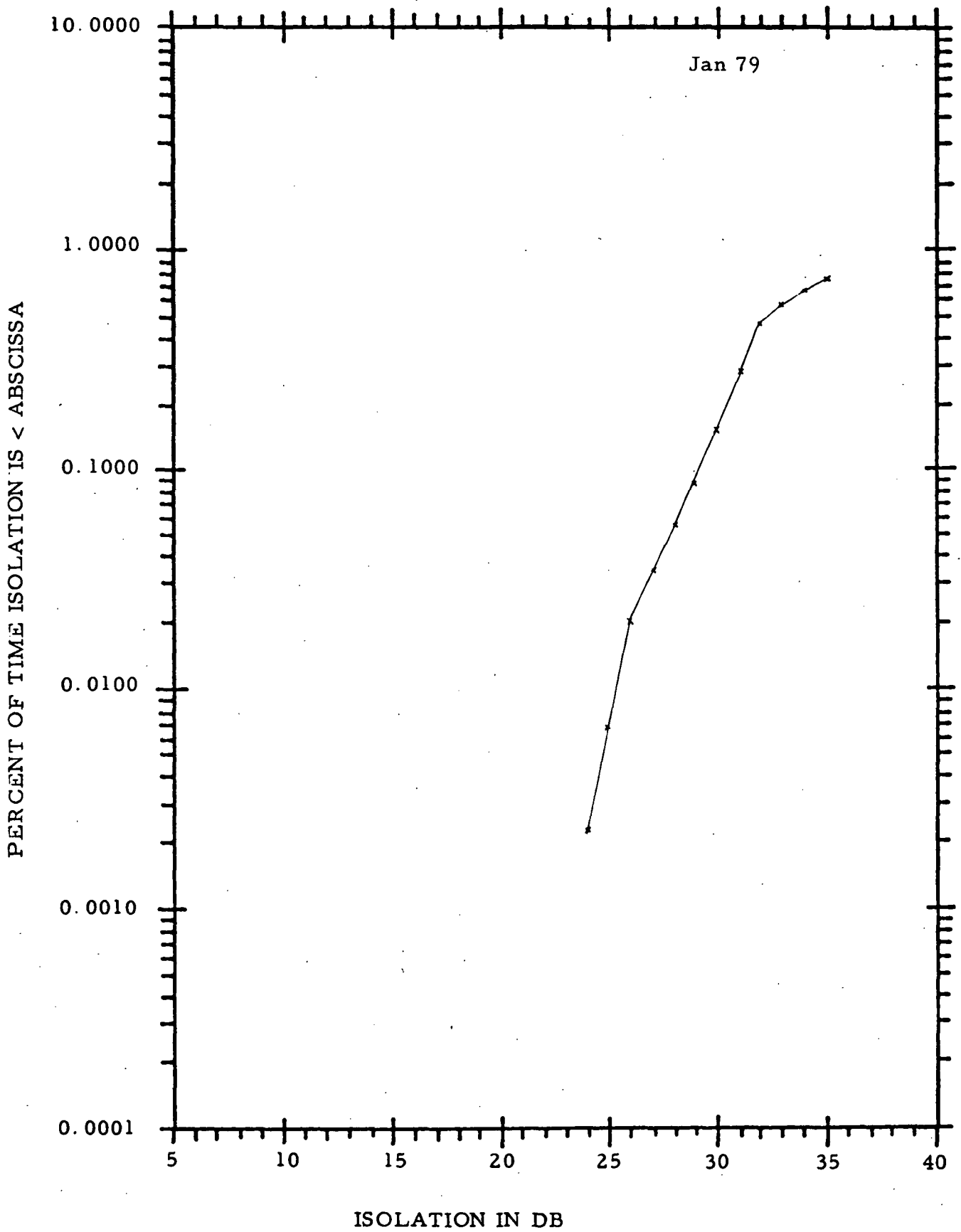
DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	0	9	13	7	0	0	
1	2	3	4	2	0	0	0	
2	4	6	0	0	0	0	0	
4	8	4	4	0	0	0	0	
8	16	1	1	0	0	0	0	
16	32	2	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	1	0	0	0	0	0	

UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 12 78

ATTENUATION INTERVAL		10%	50%	90%
DB		DB	DB	DB
0	1	39	39	31
1	2	36	32	28
2	3	34	31	28
3	4	31	28	25
4	5	29	26	25
5	6	28	26	24
6	7	28	26	23
7	8	27	25	22
8	9	24	24	22
9	10	22	22	22
10	11	**	**	**
11	12	**	**	**
12	13	**	**	**
13	14	**	**	**
14	15	**	**	**
15	16	**	**	**
16	17	**	**	**
17	18	**	**	**
18	19	**	**	**
19	20	**	**	**
20	21	**	**	**
21	22	**	**	**
22	23	**	**	**
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**

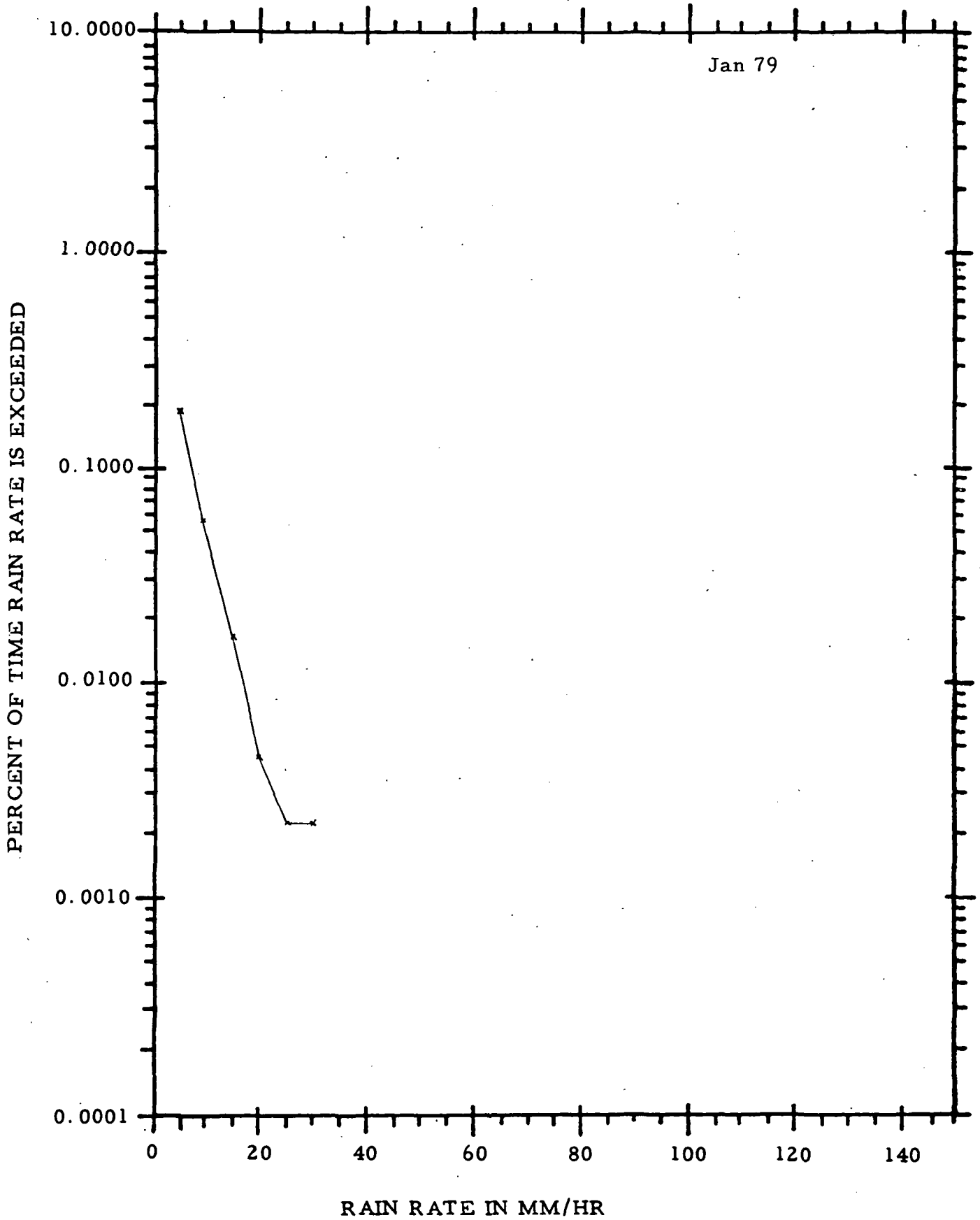
11.7 GHZ ATTENUATION DISTRIBUTION
AUSTIN, TEXAS



11.7 GHZ ISOLATION DISTRIBUTION
AUSTIN, TEXAS

RAIN RATE DISTRIBUTION
AUSTIN, TEXAS

A103



UNIV OF TEXAS CTS EXCEEDENCE DATA FOR 1 79

ATTENUATION EXCEEDED		ISOLATION LESS THAN		RAINRATE EXCEEDED	
DB	FOR MINUTES	DB	FOR MINUTES	MM/HR	FOR MINUTES
1	152	35	333	5	86
2	44	34	294	10	25
3	9	33	253	15	7
4	8	32	207	20	2
5	7	31	127	25	1
6	6	30	66	30	1
7	3	29	38	35	0
8	2	28	24	40	0
9	0	27	15	45	0
10	0	26	9	50	0
11	0	25	3	55	0
12	0	24	1	60	0
13	0	23	0	65	0
14	0	22	0	70	0
15	0	21	0	75	0
16	0	20	0	80	0
17	0	19	0	85	0
18	0	18	0	90	0
19	0	17	0	95	0
20	0	16	0	100	0
21	0	15	0	105	0
22	0	14	0	110	0
23	0	13	0	115	0
24	0	12	0	120	0
25	0	11	0	125	0
26	0	10	0	130	0
27	0	9	0	135	0
28	0	8	0	140	0
29	0	7	0	145	0
30	0	6	0	150	0

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 1 79

TIME OF DAY (GMT)		MINUTES THE ATTENUATION EXCEEDED						DB
		3	6	10	20	25	30	
0	1	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	
2	3	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	9	6	0	0	0	0	
5	6	0	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	0	0	0	0	0	0	
21	22	0	0	0	0	0	0	
22	23	0	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 1 79

TIME OF DAY (GMT)		MINUTES THE ISOLATION WAS LESS THAN						DB
		35	30	25	20	15	10	
0	1	25	2	0	0	0	0	
1	2	11	3	0	0	0	0	
2	3	12	2	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	47	17	2	0	0	0	
5	6	60	27	0	0	0	0	
6	7	60	13	0	0	0	0	
7	8	60	2	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	25	0	0	0	0	0	
13	14	2	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	0	0	0	0	0	0	
18	19	3	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	14	1	0	0	0	0	
21	22	8	0	0	0	0	0	
22	23	6	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS TIME OF DAY DATA FOR 1 79

TIME OF DAY		MINUTES THE RAINRATE EXCEEDED						MM/HR
(GMT)		5	25	50	75	100	125	
0	1	5	0	0	0	0	0	
1	2	5	0	0	0	0	0	
2	3	9	0	0	0	0	0	
3	4	0	0	0	0	0	0	
4	5	19	1	0	0	0	0	
5	6	20	0	0	0	0	0	
6	7	0	0	0	0	0	0	
7	8	0	0	0	0	0	0	
8	9	0	0	0	0	0	0	
9	10	0	0	0	0	0	0	
10	11	0	0	0	0	0	0	
11	12	0	0	0	0	0	0	
12	13	0	0	0	0	0	0	
13	14	0	0	0	0	0	0	
14	15	0	0	0	0	0	0	
15	16	0	0	0	0	0	0	
16	17	0	0	0	0	0	0	
17	18	1	0	0	0	0	0	
18	19	0	0	0	0	0	0	
19	20	0	0	0	0	0	0	
20	21	19	0	0	0	0	0	
21	22	6	0	0	0	0	0	
22	23	3	0	0	0	0	0	
23	24	0	0	0	0	0	0	

UNIV OF TEXAS CTS DURATION DATA FOR 1 79

DURATION INTERVAL		EVENTS WHEN ATTENUATION EXCEEDED						
MIN		3	6	10	20	25	30	DB
0	1	0	1	0	0	0	0	
1	2	0	0	0	0	0	0	
2	4	0	0	0	0	0	0	
4	8	0	1	0	0	0	0	
8	16	1	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN ISOLATION WAS LESS THAN						
MIN		35	30	25	20	15	10	DB
0	1	27	11	8	0	0	0	
1	2	5	6	0	0	0	0	
2	4	5	4	0	0	0	0	
4	8	5	5	0	0	0	0	
8	16	1	1	0	0	0	0	
16	32	2	0	0	0	0	0	
32	64	1	0	0	0	0	0	
64	**	1	0	0	0	0	0	

DURATION INTERVAL		EVENTS WHEN RAINRATE EXCEEDED						
MIN		5	25	50	75	100	125	MM/HR
0	1	0	3	1	0	0	0	
1	2	4	0	0	0	0	0	
2	4	8	0	0	0	0	0	
4	8	3	0	0	0	0	0	
8	16	4	0	0	0	0	0	
16	32	0	0	0	0	0	0	
32	64	0	0	0	0	0	0	
64	**	0	0	0	0	0	0	

UNIV OF TEXAS CTS ISOLATION VS ATTENUATION 1 79

ATTENUATION INTERVAL		10%	50%	90%
DB		DB	DB	DB
0	1	39	39	30
1	2	33	31	28
2	3	32	30	25
3	4	34	34	29
4	5	32	32	27
5	6	29	29	27
6	7	27	27	22
7	8	30	30	24
8	9	28	28	23
9	10	27	27	27
10	11	**	**	**
11	12	**	**	**
12	13	**	**	**
13	14	**	**	**
14	15	**	**	**
15	16	**	**	**
16	17	**	**	**
17	18	**	**	**
18	19	**	**	**
19	20	**	**	**
20	21	**	**	**
21	22	**	**	**
22	23	**	**	**
23	24	**	**	**
24	25	**	**	**
25	26	**	**	**
26	27	**	**	**
27	28	**	**	**
28	29	**	**	**
29	30	**	**	**