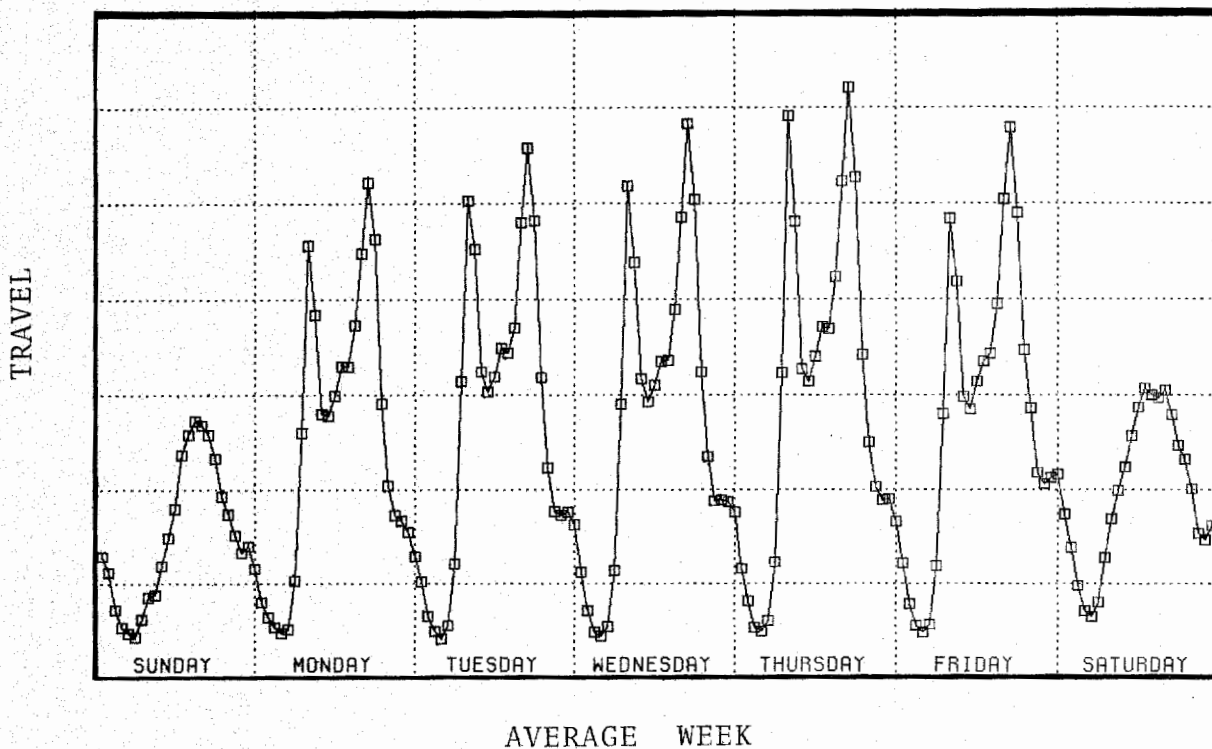




U.S. Department
of Transportation
**Federal Highway
Administration**

ANALYSIS OF NATIONAL AND REGIONAL TRAVEL TRENDS

OCTOBER 1986



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By

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DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WASHINGTON, D. C.

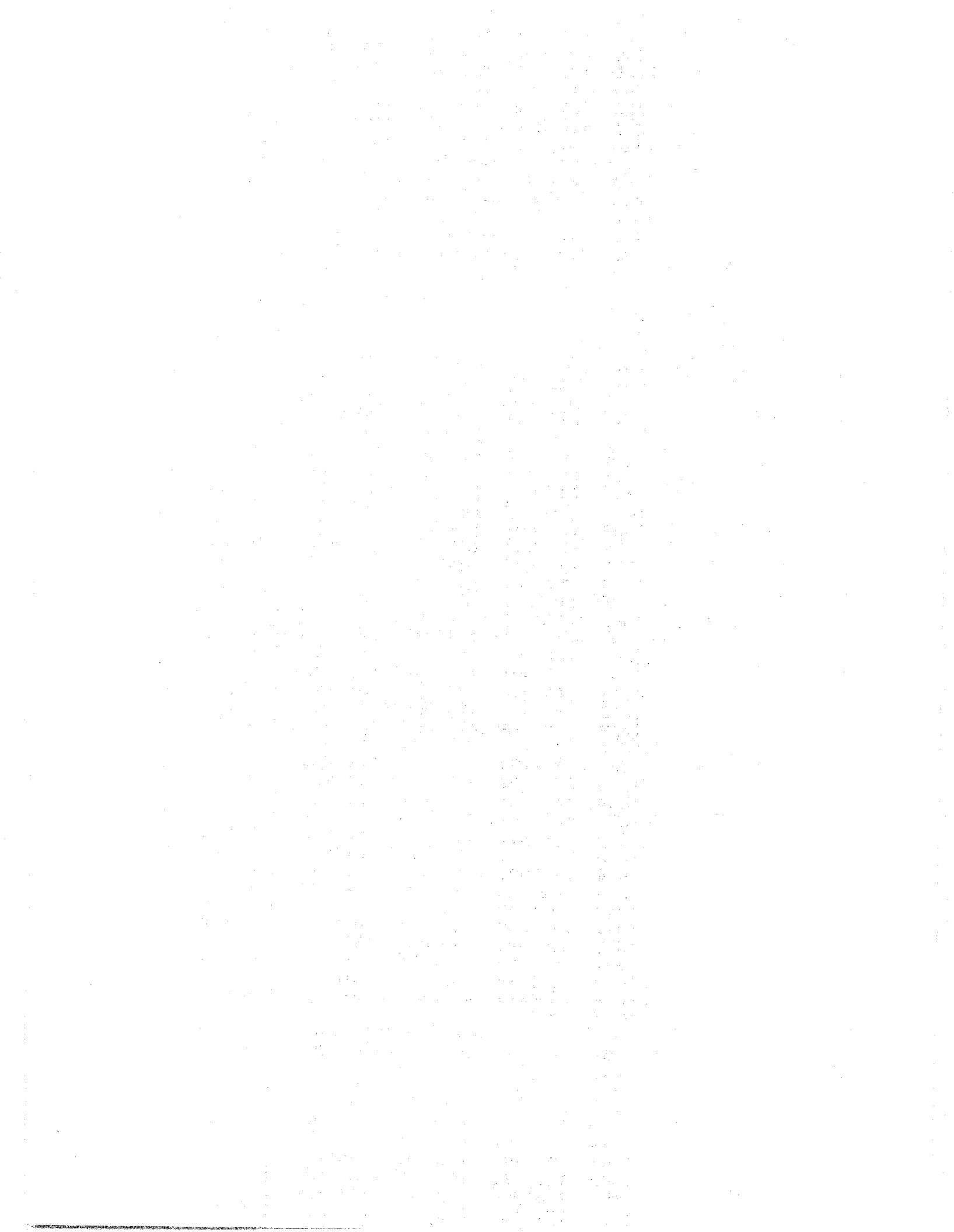


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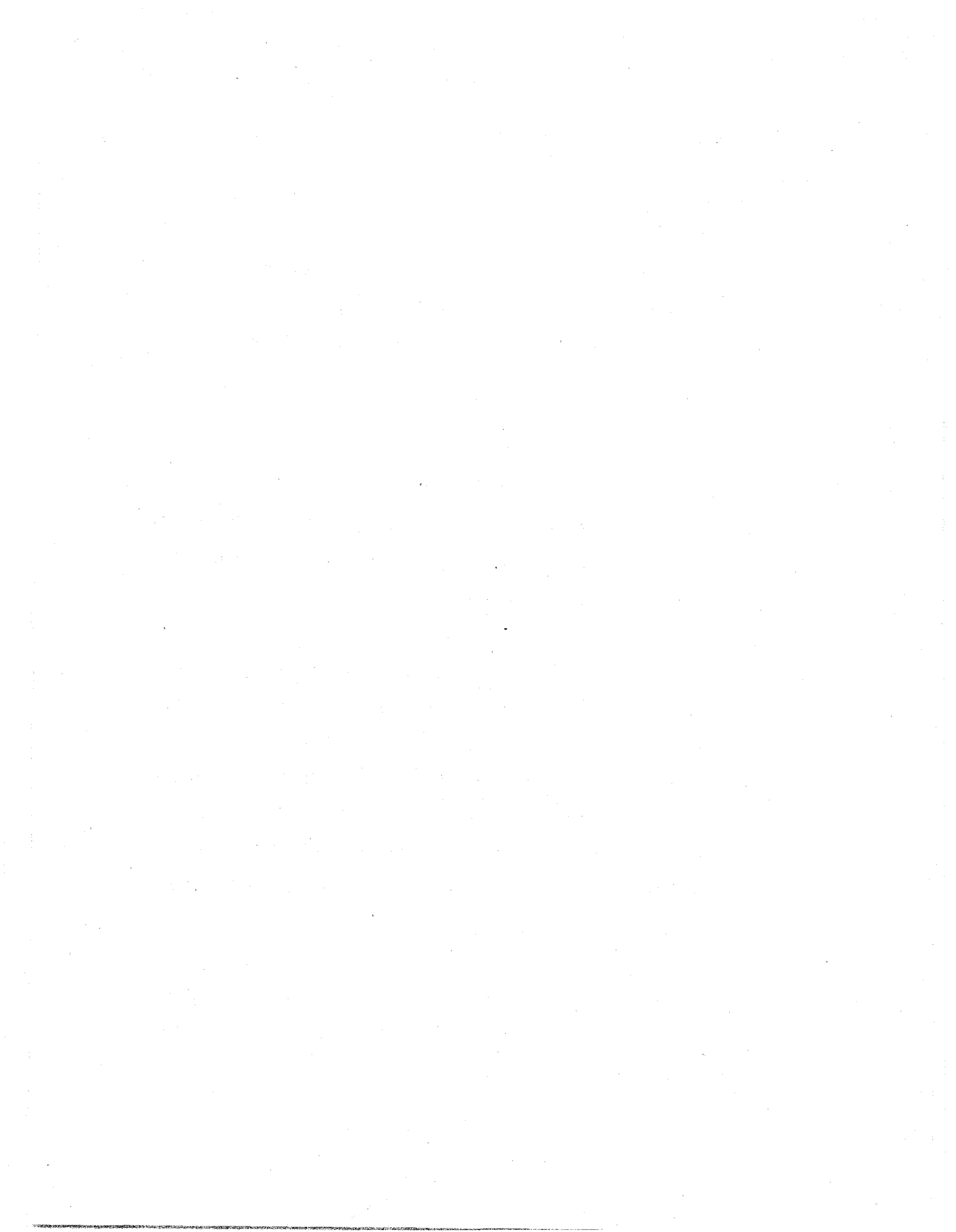
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I. INTRODUCTION

A. Purpose

This report investigates the relationship of vehicular travel with respect to time. Past analyses have primarily looked at travel on an annual basis. This report also looks at annual travel, but over selected periods of time, and examines various travel patterns or trends that exist.

B. Scope

This analysis focuses mainly on highway travel in the United States since 1970. Although this report does not directly address the two energy crises of 1974 and 1979, they played a major role in regard to influencing highway travel. Thus, throughout this report, the energy crises are often mentioned.

This report is divided into two sections. The first section concerns national travel with respect to different time frames. Annual, seasonal, monthly, weekly, and daily travel trends are analyzed on the basis of total national, rural, and urban distributions. The weekly travel is further divided into three parts. The first part deals with the distribution of weekly travel by hour of the day and day of the week. Next, a comparison is made between the distribution of daily traffic by weekend day and weekday and hour. Finally, the distribution of weekly travel by hour, day of the week, and season of the year is investigated.

The annual, seasonal, and monthly travel patterns are analyzed for the period 1970-1984 as compared to the weekly patterns which are investigated for two separate periods, 1978 and 1983.

The second action of the paper deals with regional travel trends, including the annual rural and urban distributions for the period 1970-1984, annual travel by functional system during the period 1976-1984, as well as daily weekly travel by hour of the day for 1978 and 1983. Detailed weekly and daily travel data for each region are located in Appendix A.

The data used for the highway travel comes from the Highway Statistics publications. The study period begins in 1970 and ends with 1984. Functional system classification began in 1976, thus, analyses concerning functional systems pertain only to the period between 1976 and 1984. The definition for seasons used in the weekly travel section is different from the one used in the seasonal highway travel section. In the weekly travel section, the winter quarter covers December through February, whereas in the seasonal highway travel section, winter covers January through March.

The functional system classification used is guided by Title 23 of the United States Code and Federal Highway Administration Federal-Aid Highway Program Manual 4-6-7. This report uses only six different classifications: Three each for the rural and urban system (Interstate, Arterial, and Collector). All principal arterial-Interstates are designated as Interstate, other principal and minor arterial as Arterial, and finally collectors and local systems as Collector. Note also that for the weekly traffic distribution, the Urban Interstate System includes the category, Other Freeway and Expressway.

The hourly traffic data was collected from automatic traffic recorders. Data from 895 stations were used to derive a national average. The stations chosen are from 12 States that represent a cross section of various population sizes and localities. The States included are Georgia, Illinois, Massachusetts, Minnesota, Montana,

Nebraska, New Hampshire, Oregon, Pennsylvania, Tennessee, Texas, and Utah. The hourly traffic counts for the season, functional system, and day of week are prorated as a percent of the weekly traffic for the appropriate categories.

The years 1978 and 1983 were analyzed with greater detail by functional class due to the fact that much of the information had been generated for a previous report. In addition, these years were not affected by any unusual disturbance. The years 1979/1984, or 1980/1985 could have been used to yield a more recent data base; however, 1979 was not an ideal year for comparison due to the energy crunch that year, and the 1985 data collection and processing was not completed.

In the daily distribution of traffic, the weekday traffic period began at 12 midnight and ended at the same time 24 hours later for Monday to Friday. Although some States' definition of weekend traffic may conflict, this report assumes the weekend traffic begins at 12:01 a.m. on Saturday and ends 48 hours later at 12 midnight Sunday.

The regional designation follows the Federal Highway Administration's regional definition. The weekly traffic for the regions was calculated using the traffic count of a selected State within that region. The chosen States were the major contributors to their region's VMT. In the case of Region 9, California's data were not available; therefore, Arizona was substituted for California. The States used included: Texas, Pennsylvania, New York, Florida, Washington, Missouri, Colorado, Ohio, and Arizona. Note that the above States used for the regional trend analysis are different from the ones used to derive the national average weekly traffic.

II. NATIONAL TRENDS

A. Annual Highway Travel - Total, Rural, and Urban (1970-1984)

From 1970 through 1984, the highway travel has been increasing at an annual average rate of 3.20 percent based on an analysis of the past vehicular data. The total vehicle miles have increased 55.0 percent over the past 15 years, from 1,109.7 to 1,716.8 billion vehicle miles. The largest annual growth during the study period occurred in 1972, with 6.87 percent. The largest annual decrease was in 1974 when travel dropped by 2.48 percent. Two energy crises occurred during the 15 year period, in 1974 and 1979, and caused a decrease in the highway travel. The VMT decreased 2.48 percent in 1974 and by 1.01 percent in 1979. The total number of miles traveled in 1980 remained constant compared to 1979 (Table 1).

Urban travel is increasing faster than rural travel, with travel in the rural sector growing 2.10 percent annually, while travel in urban area rose 4.12 percent. The urban travel, thus, is growing at nearly twice the rate of rural travel. Total urban area vehicle miles increased 75.1 percent during the study period compared to 31.1 percent in the rural areas. In 1971, rural travel experienced the largest annual growth of 6.17 percent. Similarly, the urban largest growth in the urban area occurred in 1972 (10.55 percent). During the two energy crises, travel within the rural areas was more adversely affected than that of urban areas. In 1974, for example, the rural travel dropped by 3.38 percent, while urban travel dropped only by 1.71 percent.

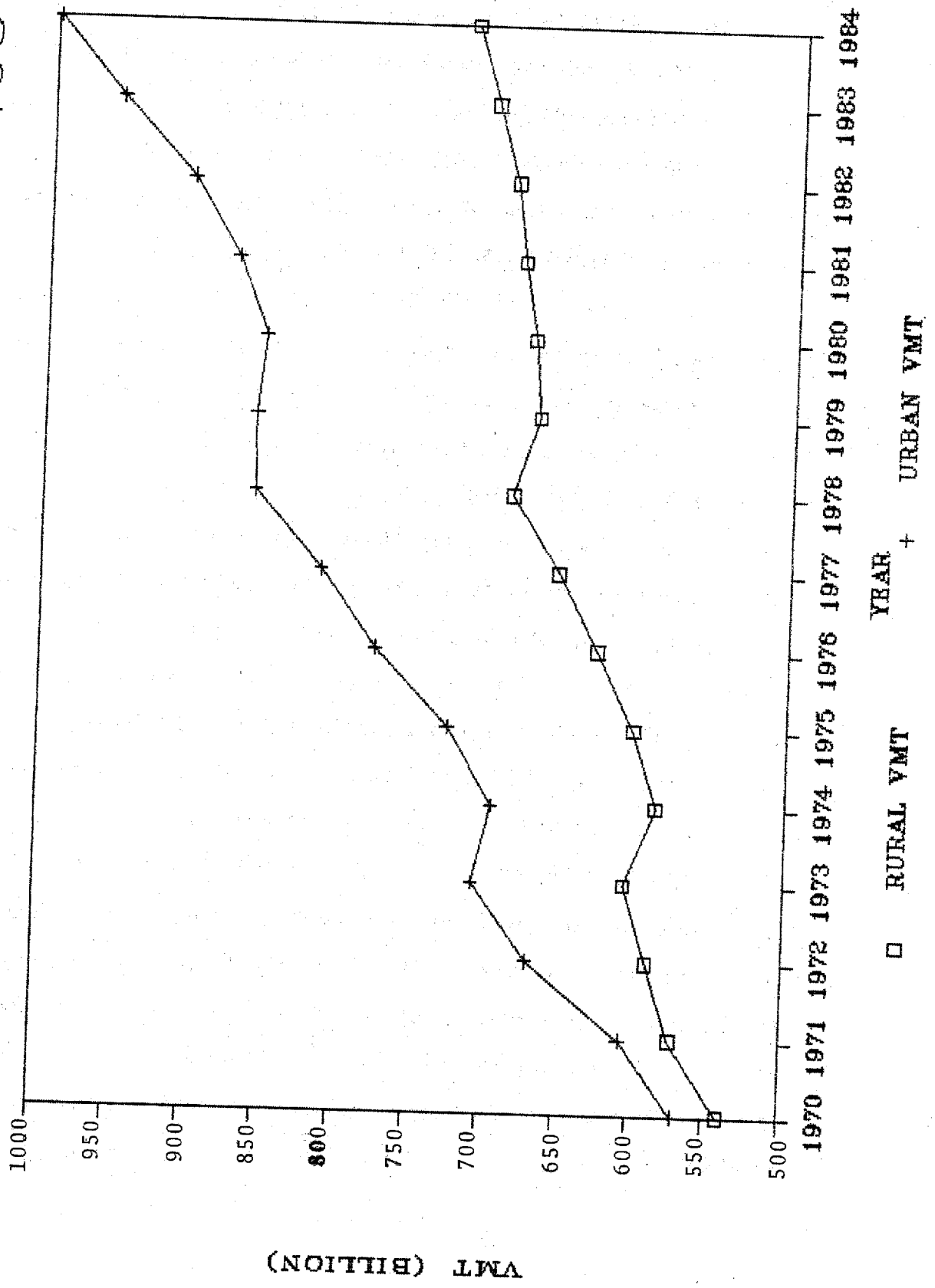
Since the rural travel is growing slower than the urban travel, the gap between the two systems of travel is increasing. For example, in 1970, the difference between the two systems equaled 30.78 billion vehicle miles, but by 1978 this difference expanded to 172.17 billion vehicle miles. From 1970 to 1984, the gap increased ninefold, from 30.78 to 279.07 billion vehicle miles (Figure 1).

TABLE 1. ANNUAL HIGHWAY TRAVEL 1970 - 1984

YEAR	RURAL VMT (BILLION)	ANNUAL PERCENT CHANGE	URBAN VMT (BILLION)	ANNUAL PERCENT CHANGE	TOTAL VMT (BILLION)	ANNUAL PERCENT CHANGE
1970	539.47		570.25		1,109.7	
1971	572.77	6.17	606.05	6.28	1,178.8	6.23
1972	589.78	2.97	670.00	10.55	1,259.8	6.87
1973	605.80	2.72	707.31	5.57	1,313.1	4.23
1974	585.35	-3.38	695.19	-1.71	1,280.5	-2.48
1975	601.66	2.79	726.01	4.43	1,327.7	3.68
1976	627.10	4.23	775.29	6.79	1,402.4	5.63
1977	654.09	4.31	812.93	4.86	1,467.0	4.61
1978	686.26	4.92	858.45	5.60	1,544.7	5.29
1979	670.08	-2.36	859.05	0.07	1,529.1	-1.01
1980	674.07	0.59	854.04	-0.58	1,528.1	-0.07
1981	682.53	1.26	873.95	2.33	1,556.5	1.86
1982	688.68	0.90	905.09	3.56	1,593.8	2.40
1983	703.63	2.17	953.92	5.39	1,657.5	4.00
1984	718.85	2.16	997.92	4.61	1,716.8	3.57
AVERAGE PERCENT	ANNUAL CHANGE	2.10		4.12		3.20

ALL DATA FOR THE VEHICLE MILE TRAVELED (VMT) COMES FROM THE REVISED VM-2 TABLE OF THE HIGHWAY STATISTICS PUBLICATION.

FIGURE 1
ANNUAL HIGHWAY TRAVEL 1970-1984



B. Seasonal Travel - Total, Rural, and Urban (1970-1984)

The seasonal data for this section are from Table 3-A as published in the FHWA "Monthly Traffic Volume Trends" report. The table summarizes the monthly vehicle miles of travel as combined into four quarters. The first quarter's VMT represents all travel which took place during the months of January through March, and likewise for all other quarters (Table 2 and 3).

The seasonal travel reflects a repetitive annual cycle. The peak period of travel occurs during the third quarter, which includes the months of July, August, and September. Conversely, the low travel period occurs during the first quarter (winter months). Prior to the first energy crisis, the travel pattern shows uniform growth (Figure 2). The fourth quarter of 1973 and first quarter of 1974 reflect the decrease in highway travel caused by the fuel shortage. For the next 4 years, the travel pattern remains consistent, with a spur of third quarter travel in 1978. The second fuel shortage in 1979 caused the summer travel to drop considerably, while travel during the remaining seasons stayed at the 1978 level. The divergence of mileage between the first and third quarters is increasing, especially since 1982 (as can be seen from Figure 2).

In the early 1970's, the fluctuations between the first quarter and third quarter rural travel were almost twice those of urban travel; however, by 1982, the urban travel fluctuation had surpassed that for rural travel (Figure 3). Note that the later urban travel resembles rural travel. More of the annual urban travel is done in the third quarter and less in the first quarter. The rural travel was highly influenced by both crises, especially the 1979. Rural vehicle travel since 1979 has not attained the level

it reached previously in 1978 during the third quarter. Table 3a shows otherwise. One reason may be the redefinition of the rural and urban area boundaries due to the 1980 census. The shift in urban and rural designation has caused some change in trends, but the portion that is attributed to this shift is uncertain.

TABLE 2. SEASONAL TRAVEL FOR ALL SYSTEMS (BILLION)

YEAR	QTR 1	QTR 2	QTR 3	QTR 4
1970	247.836	287.963	308.615	275.912
1971	258.428	307.194	326.396	293.595
1972	283.663	327.448	346.580	310.672
1973	296.722	338.797	356.443	316.326
1974	282.191	330.633	354.085	322.734
1975	295.715	342.178	361.996	330.185
1976	315.272	364.421	382.235	347.236
1977	324.821	379.717	396.738	362.130
1978	341.891	396.050	429.055	381.215
1979	355.410	393.127	402.372	378.224
1980	348.979	388.646	402.399	380.832
1981	353.612	398.314	415.900	382.441
1982	345.452	412.239	441.811	392.980
1983	364.077	423.099	454.411	407.520
1984	378.972	443.267	472.156	428.243

All data for this table was extracted from the Traffic Volume Trends Table 3A. Quarter 1 represents the months of January, February, and March. Quarter 2 represents the following 3 months, etc.

TABLE 3A. SEASONAL TRAVEL FOR RURAL SYSTEMS (BILLION)

YEAR	QTR 1	QTR 2	QTR 3	QTR 4
1970	111.947	139.879	159.007	132.259
1971	116.925	150.363	166.390	139.469
1972	124.067	153.608	170.331	142.220
1973	130.892	157.511	170.121	142.651
1974	121.334	151.218	166.437	144.483
1975	127.801	155.208	170.384	147.238
1976	136.308	167.798	182.137	155.183
1977	139.670	175.597	190.104	162.698
1978	145.504	177.475	198.811	168.162
1979	149.164	174.387	182.517	164.011
1980	149.276	173.213	183.057	168.179
1981	151.176	177.648	189.809	168.263
1982	149.509	178.953	191.756	170.467
1983	153.297	180.123	194.781	172.334
1984	159.781	189.279	202.112	181.453

TABLE 3B. SEASONAL TRAVEL FOR URBAN SYSTEMS (BILLION)

YEAR	QTR 1	QTR 2	QTR 3	QTR 4
1970	135.889	148.084	149.608	143.653
1971	141.503	156.831	160.006	154.126
1972	159.596	173.840	176.249	168.452
1973	165.830	181.286	186.322	173.675
1974	160.857	179.415	187.648	178.251
1975	167.914	186.970	191.612	182.947
1976	178.964	196.623	200.098	192.053
1977	185.151	204.120	206.634	199.432
1978	196.387	218.575	230.244	213.053
1979	206.246	218.740	219.855	214.213
1980	199.703	215.433	219.342	212.653
1981	202.436	220.666	226.091	214.178
1982	195.943	233.286	250.055	222.513
1983	210.780	242.976	259.630	235.186
1984	219.191	253.988	270.044	246.790

ALL DATA FOR THE FOLLOWING TABLE ARE EXTRACTED FROM THE TRAFFIC VOLUME TRENDS TABLE 3A.

FIGURE 2

SEASONAL TRAVEL- ALL SYSTEMS

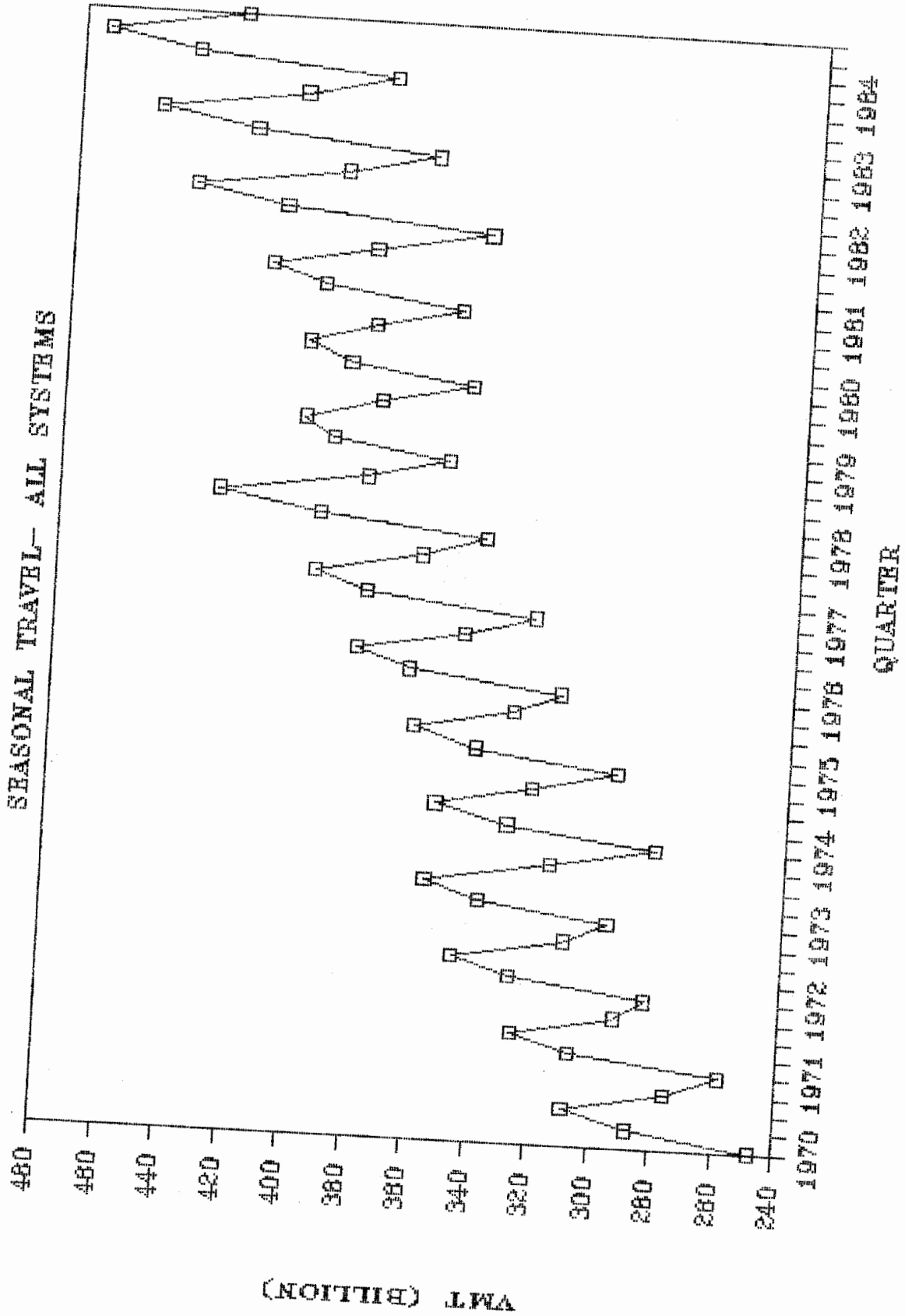
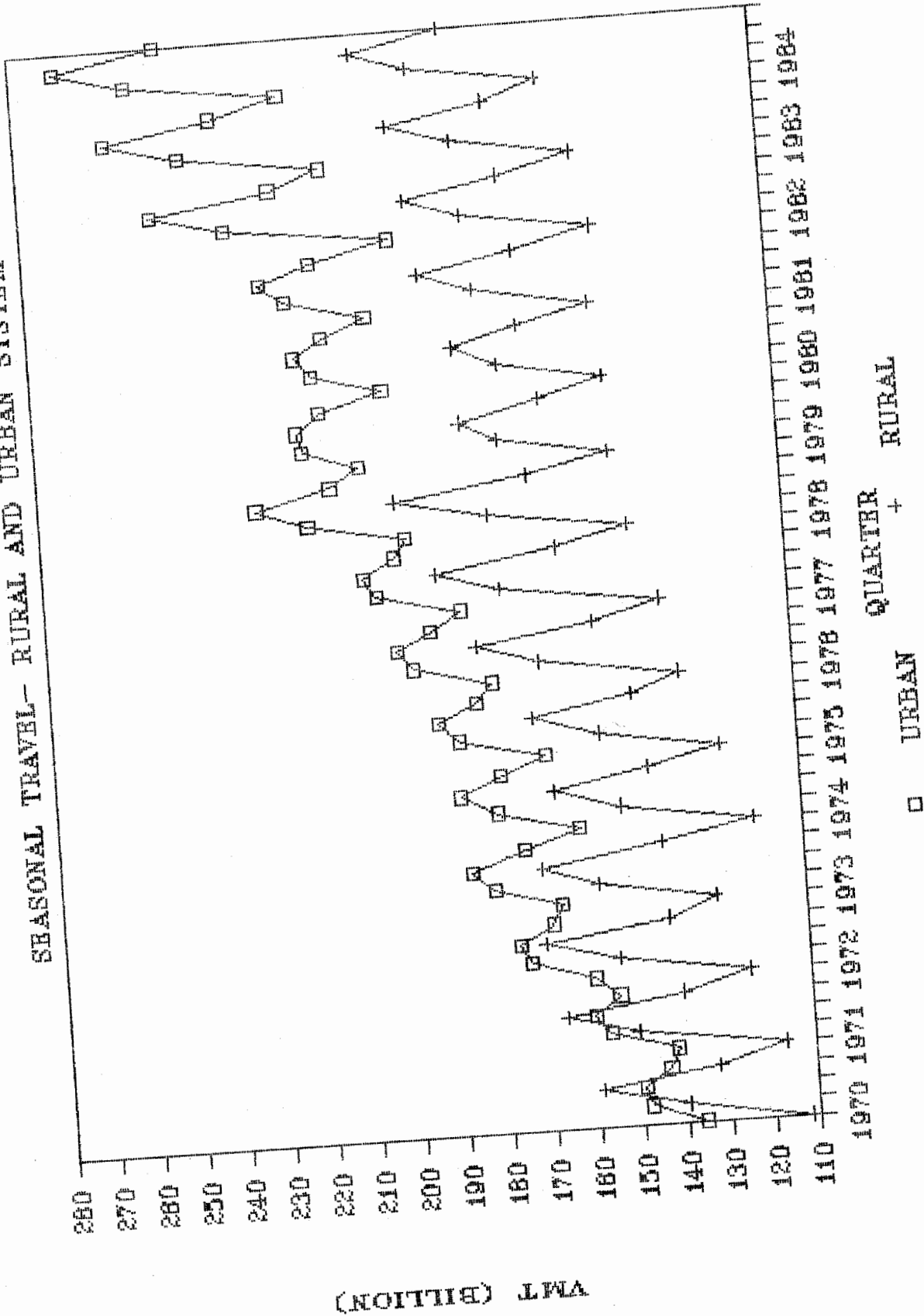


FIGURE 3

SEASONAL TRAVEL- RURAL AND URBAN SYSTEM



C. Monthly Travel - Total, Rural, and Urban (1970-1984)

Similar to the seasonal travel, the data for this section is also from the FHWA Traffic Volume Trends Table 3A. Vehicle miles traveled for each month is recorded for the rural and urban systems. In Table 4, month 1 denotes January, and similarly for all other months respectively.

The rural monthly travel pattern mirrors that of the seasonal travel. The summer months of July and August are the peak travel months, with January and February being the lowest. The last fuel shortage resulted in lasting effects on the rural sector. During 1979, the travel between the April to September period diminished considerably (Figure 4B), and the same pattern perpetuated into the following year (Figure 4C). It took 5 years to reach the VMT observed prior to the 1979 crisis.

The annual cycle for the urban travel is less variable. The fluctuation between the summer months and the winter months is not as extreme in the urban areas (Figure 4A). The urban travel is generally for the purpose of home to work trips, and, thus, the urban travel fluctuation range is less than the rural. However, since 1982, the gap between the peak and the lowest urban travel has increased as compared to rural travel (Figure 4C).

In the annual travel cycle, March marks the beginning of the upswing in vehicle travel, and the peak is reached during August. September reflects the end of the summer discretionary trips, and a decrease in highway travel. In 1979 and 1980, Spring and Summer VMT dropped, showing a reduction in discretionary travel.

TABLE 4. MONTHLY TRAVEL (VEHICLE MILES IN BILLION)

RURAL SYSTEM					
MONTH	1970	1971	1972	1973	1974
1	35.562	38.402	39.911	42.101	40.325
2	34.864	35.957	37.647	40.818	36.963
3	41.521	42.566	46.509	47.973	44.046
4	41.871	46.869	47.231	49.221	46.890
5	47.596	50.531	52.099	53.184	51.276
6	50.412	52.963	54.278	55.106	53.052
7	55.431	58.326	59.247	58.869	57.763
8	55.929	58.099	59.515	60.107	59.033
9	47.647	49.965	51.569	51.145	49.641
10	47.138	49.963	50.958	52.072	50.846
11	43.419	45.577	44.230	47.421	47.221
12	41.702	43.929	45.032	43.158	46.416

URBAN SYSTEM					
MONTH	1970	1971	1972	1973	1974
1	44.611	46.934	52.554	54.564	54.704
2	42.577	44.161	50.625	51.749	49.463
3	48.701	50.408	56.417	59.517	56.690
4	48.086	51.237	56.007	58.899	57.688
5	50.375	53.124	58.846	61.635	60.891
6	49.623	52.470	58.987	60.752	60.836
7	50.961	54.139	59.348	62.816	63.127
8	51.040	54.543	60.398	64.319	65.037
9	47.607	51.324	56.503	59.187	59.484
10	49.180	52.561	57.883	61.017	61.726
11	46.264	49.978	54.561	56.960	57.858
12	48.209	51.587	56.008	55.698	58.667

ALL DATA FOR THE FOLLOWING TABLE ARE EXTRACTED FROM THE TRAFFIC VOLUME TRENDS TABLE 3A. MONTH 1 DENOTES JANUARY.

TABLE 4. MONTHLY TRAVEL (VEHICLE MILES IN BILLION)

RURAL SYSTEM

MONTH	1975	1976	1977	1978	1979
1	41.684	43.667	43.224	46.288	46.964
2	39.107	42.625	44.062	45.365	45.852
3	47.010	50.016	52.384	53.851	56.348
4	46.962	52.993	55.331	53.711	56.603
5	53.095	56.605	59.610	59.853	58.840
6	55.151	58.200	60.656	63.911	58.944
7	59.640	63.410	66.330	69.587	61.749
8	60.062	63.447	65.973	69.772	64.127
9	50.682	55.280	57.801	59.452	56.641
10	52.132	54.879	58.102	59.149	57.833
11	47.727	50.579	53.187	54.707	53.680
12	47.379	49.725	51.409	54.306	52.498

URBAN SYSTEM

MONTH	1975	1976	1977	1978	1979
1	56.658	58.793	59.221	63.550	67.390
2	52.196	55.903	58.354	61.653	63.798
3	59.060	64.268	67.576	71.184	75.058
4	60.171	64.021	66.182	69.029	72.937
5	63.563	66.674	69.273	74.574	73.555
6	63.237	65.928	68.665	74.972	72.248
7	64.855	67.481	69.868	78.622	73.105
8	66.041	68.466	70.364	79.689	75.814
9	60.717	64.151	66.402	71.933	70.936
10	63.118	66.331	69.286	73.781	73.785
11	59.263	62.417	65.299	68.983	69.700
12	60.566	63.305	64.847	70.289	70.728

ALL DATA FOR THE FOLLOWING TABLE ARE EXTRACTED FROM THE TRAFFIC VOLUME TRENDS TABLE 3A. MONTH 1 DENOTES JANUARY.

TABLE 4. MONTHLY TRAVEL (VEHICLE MILES IN BILLION)

RURAL SYSTEM

MONTH	1980	1981	1982	1983	1984
1	49.294	49.127	47.521	50.007	51.892
2	45.760	46.662	46.286	46.690	49.365
3	54.222	55.387	55.702	56.600	58.524
4	55.389	56.568	56.663	56.645	60.325
5	58.534	59.947	60.323	60.644	63.589
6	59.290	61.133	61.967	62.834	65.365
7	62.666	65.391	66.425	67.568	69.674
8	63.417	65.709	66.613	67.351	70.740
9	54.974	58.709	58.718	59.862	61.698
10	59.106	59.119	59.619	60.873	62.996
11	54.506	55.109	55.389	56.700	59.421
12	54.567	54.035	55.459	54.761	59.036

URBAN SYSTEM

MONTH	1980	1981	1982	1983	1984
1	67.168	66.922	62.237	69.429	71.912
2	61.578	63.103	61.226	65.137	68.410
3	70.957	72.411	72.480	76.214	78.869
4	70.310	71.896	73.182	76.096	80.300
5	72.734	74.358	79.960	82.975	86.599
6	72.389	74.412	80.144	83.905	87.089
7	73.585	75.861	85.775	89.255	92.323
8	75.249	77.755	86.687	90.298	94.529
9	70.508	72.475	77.593	80.077	83.192
10	73.508	74.097	79.162	83.171	86.498
11	68.915	69.695	71.672	77.000	80.824
12	70.230	70.386	71.679	75.015	79.468

ALL DATA FOR THE FOLLOWING TABLE ARE EXTRACTED FROM THE TRAFFIC VOLUME TRENDS TABLE 3A. MONTH 1 DENOTES JANUARY.

FIGURE 4A

MONTHLY VMT FOR 1970-1974

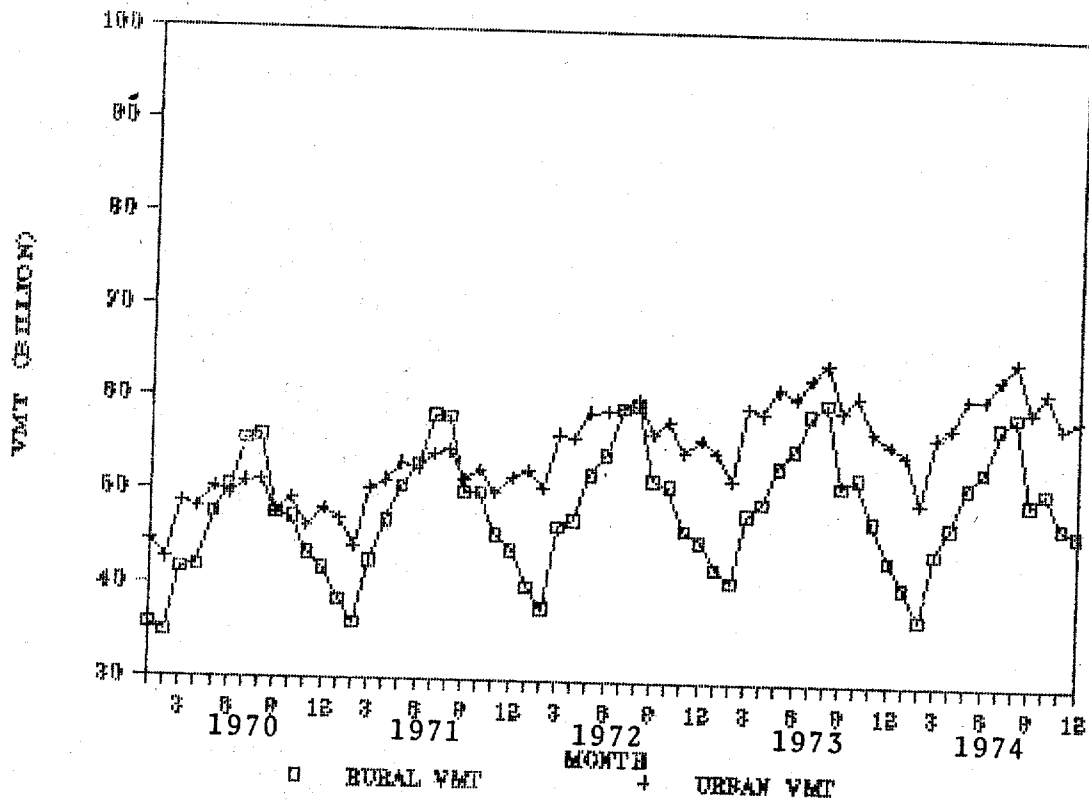


FIGURE 4B

MONTHLY VMT FOR 1975-1979

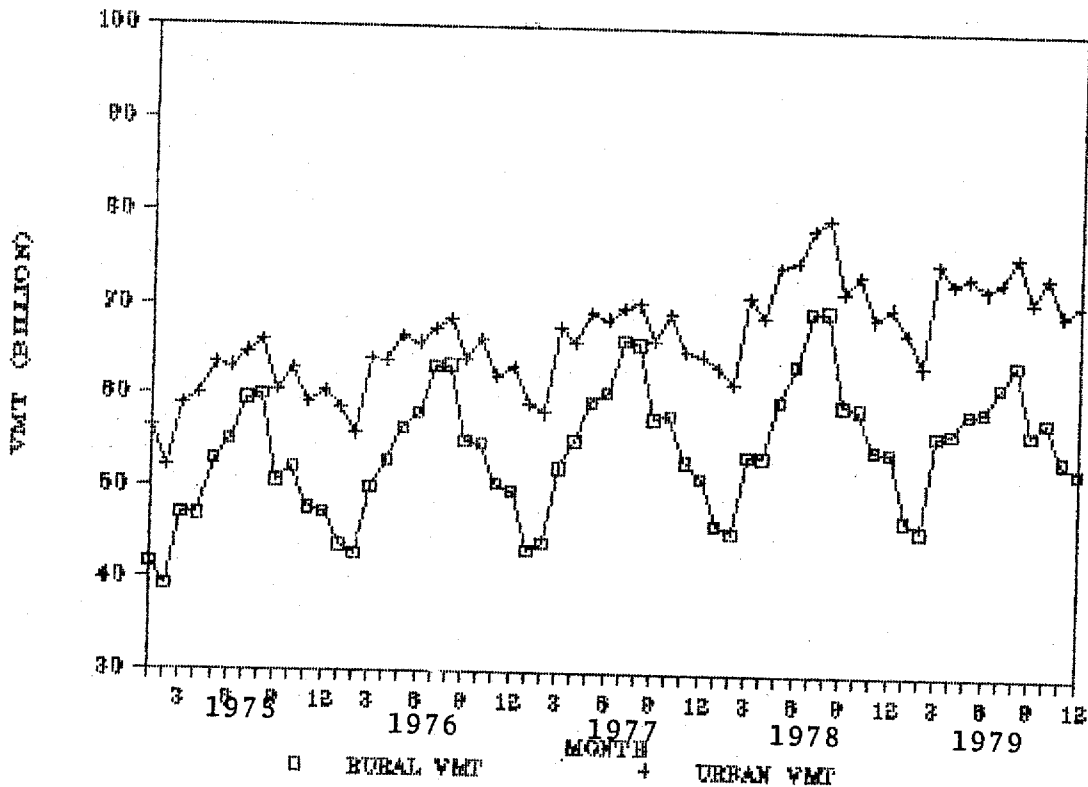
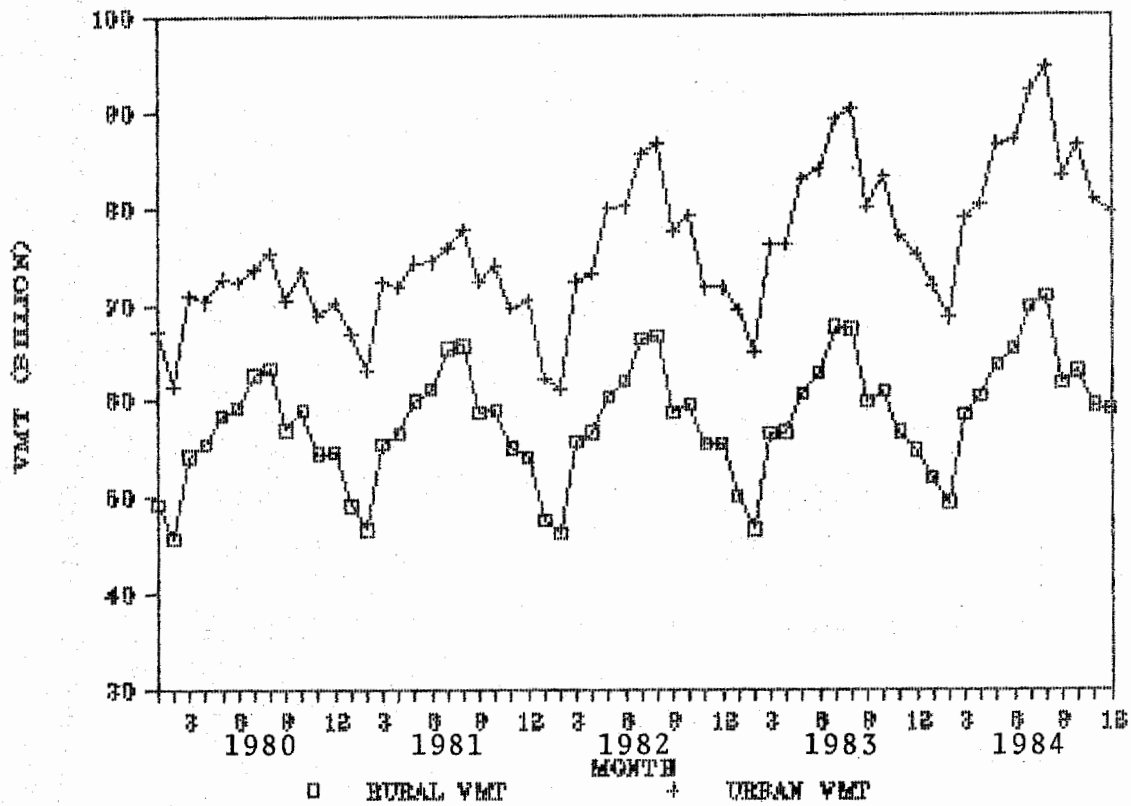


FIGURE 4C

MONTHLY VMT FOR 1980-1984



D. Weekly Travel - Total All Systems (1978, 1983)

The average weekly travel contains two different patterns of travel, one for the weekday and one for the weekend. The weekday lowest travel takes place between the hours of 2 a.m. to 4 a.m., and increases as it approaches the early morning. The morning peak lasts 3 hours, from 6 a.m. to 9 a.m.. A slight midday peak can be observed due to the lunch time travel in urban areas. Around 3 p.m., the afternoon peak begins, and lasts through the evening until 6 p.m. Afterwards, the traffic slowly recedes. This pattern of travel is attributed to the home-to-work trips. The morning peak occurs when the commuters make their journey to work, and the afternoon peak when they return home (Figures 5A and 5B, for 1978, and Figures 7A and 7B for 1983).

The weekend travel usually reflects recreational trips. The weekend traffic curve approaches a normal distribution (bell-shaped curve). The low traffic period occurs during 4 a.m. to 6 a.m., and immediately increases until noon. The period between noon to 6 p.m. are the peak weekend period. Similar to the weekday pattern, traffic declines after this period until 4 a.m. of the next day. The general weekly characteristics remain unchanged with only minor variations where winter weekday morning and afternoon peaks are higher and weekend peaks are lower. Summer shows the opposite, with lower weekday peaks, and higher weekend travel (Figures 6A to 6D, and Figures 8A to 8D).

In the course of 5 years, from 1978 to 1983, the volume of weekday travel increased during peak periods, but decreased during the low period. This is true for all four seasons. In 1978, at 5 a.m. on Sunday, 0.2 percent of the weekly traffic is in motion, but by 1983, only 0.13 percent is evident. Likewise, the morning peak hour (7 a.m.)

on Monday records a 0.87 percent in 1978, and in 1983 records 0.92 percent (Figures 5B and 7B). The weekend recreational travel decreased, while the weekday work-related travel increased. When separated by seasons, 1983 shows an increase in weekend travel during winter and spring, but relatively constant travel for summer and fall.

FIGURE 5A

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEM - 1978

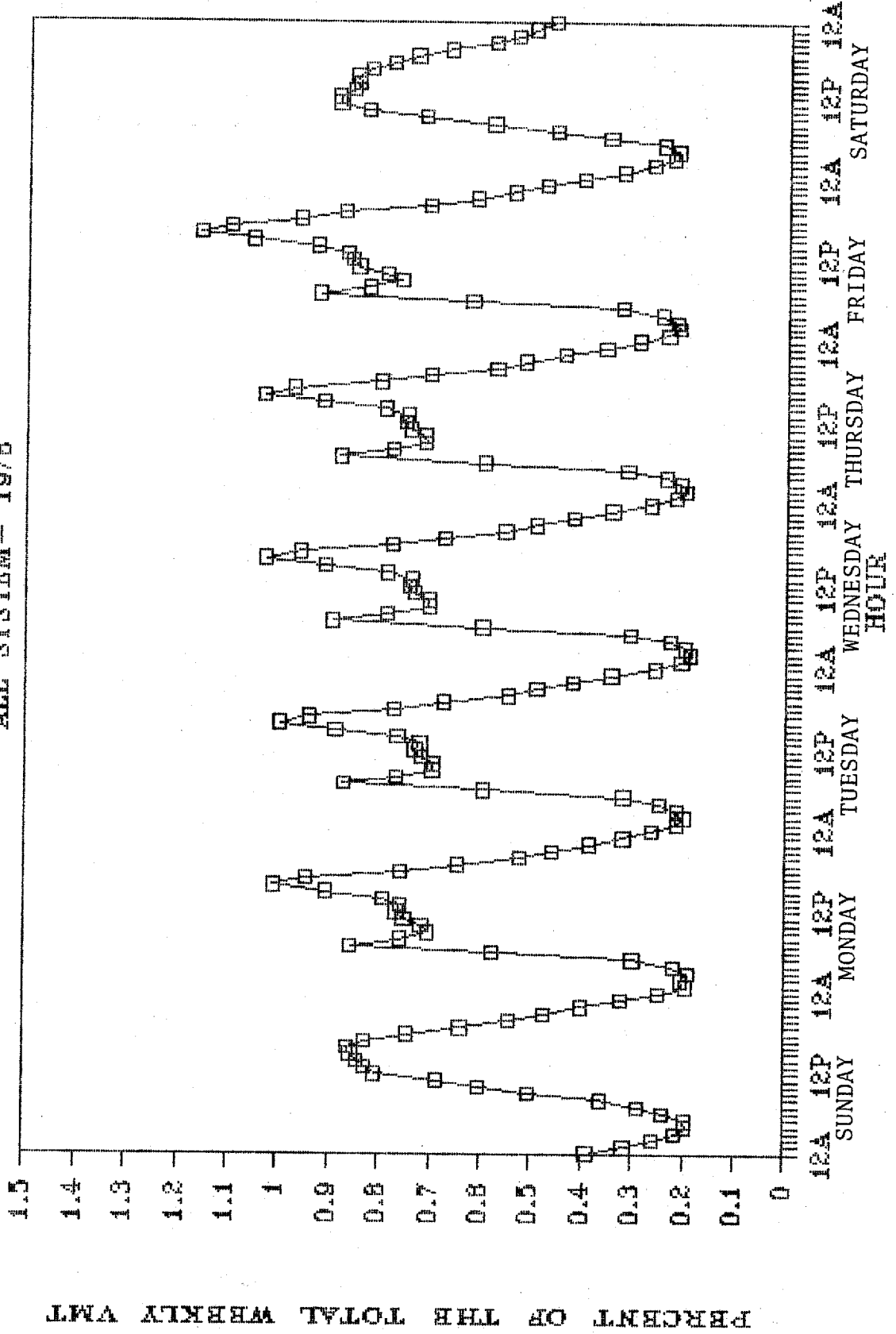


FIGURE 5B

DAILY TRAFFIC DISTRIBUTION

ALL SYSTEM 1978

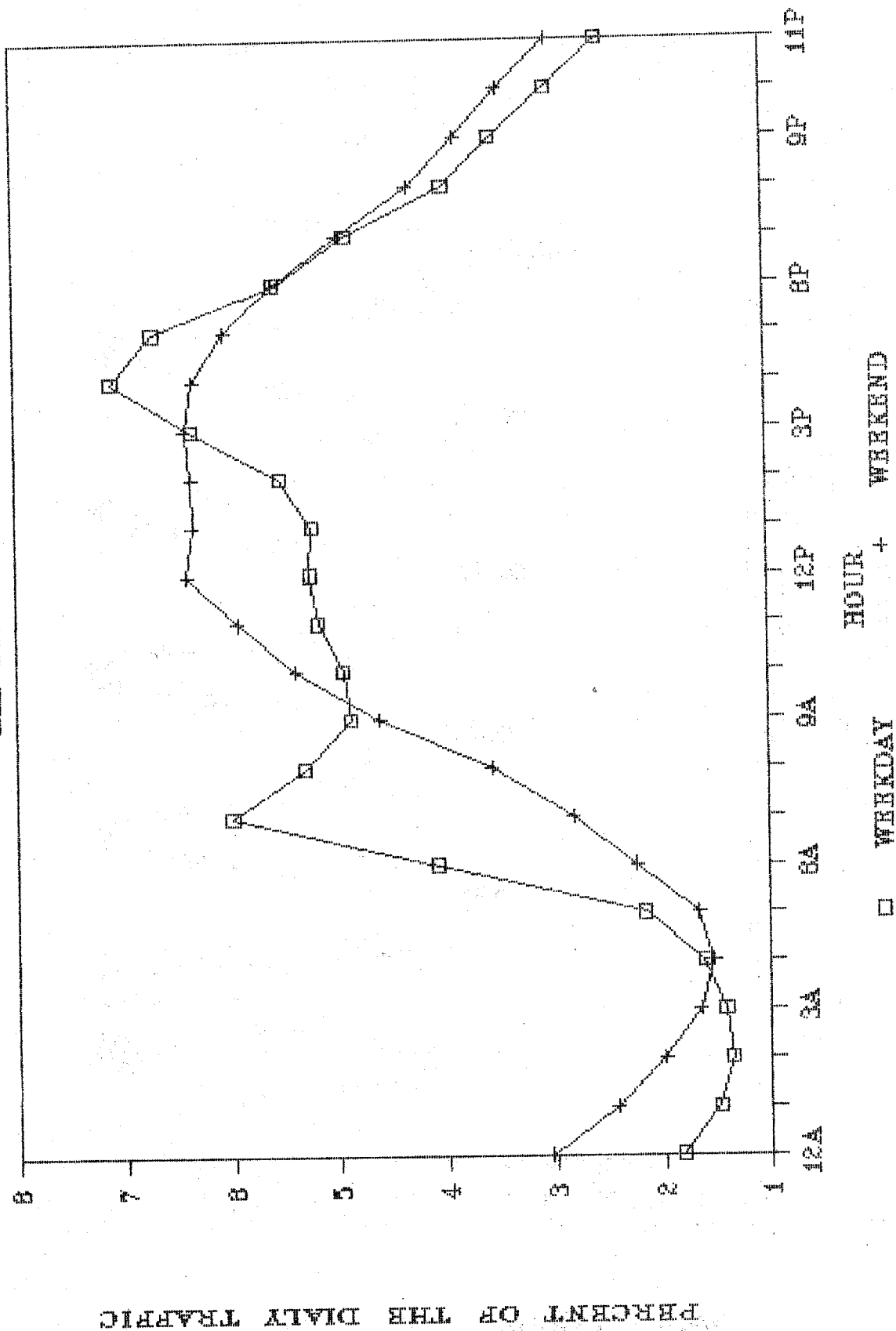


FIGURE 6A

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEMS - SPRING 1978

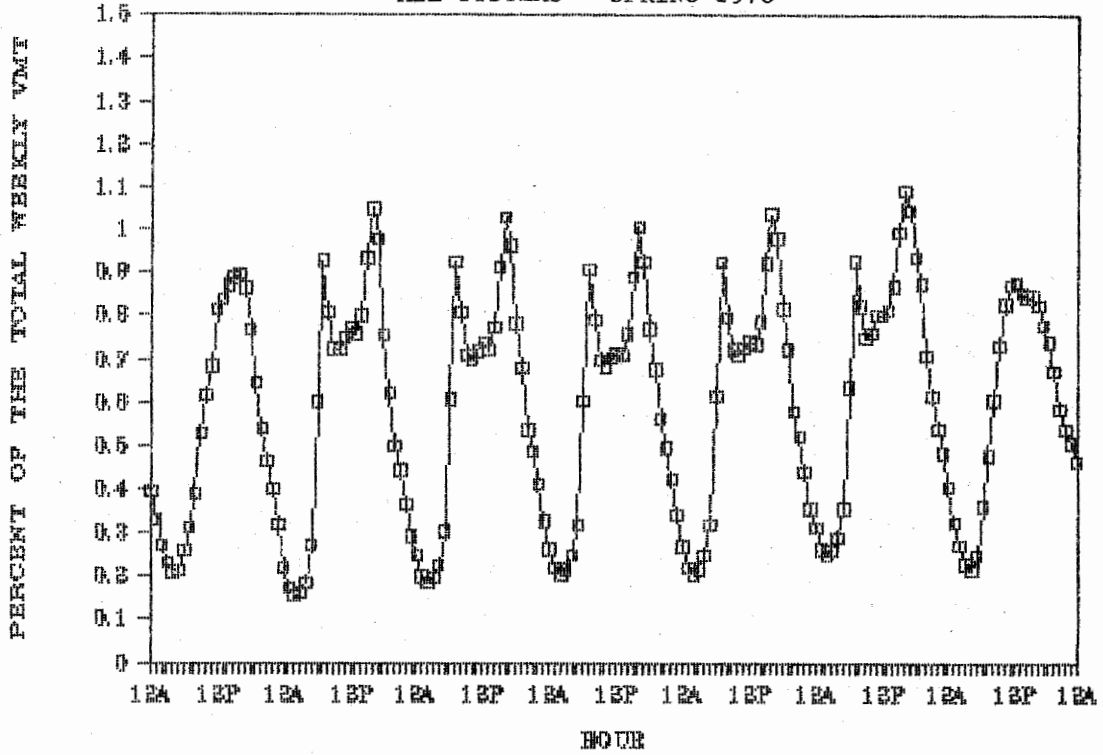


FIGURE 6C

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEMS - FALL 1978

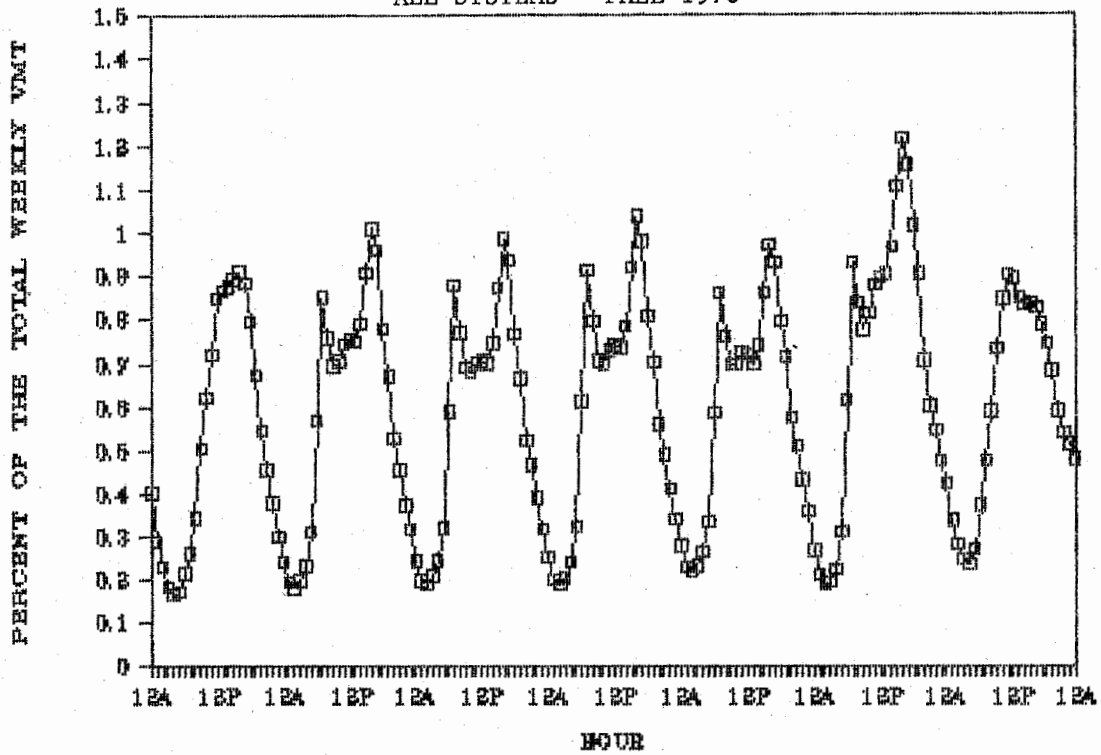


FIGURE 6D

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEMS - WINTER 1978

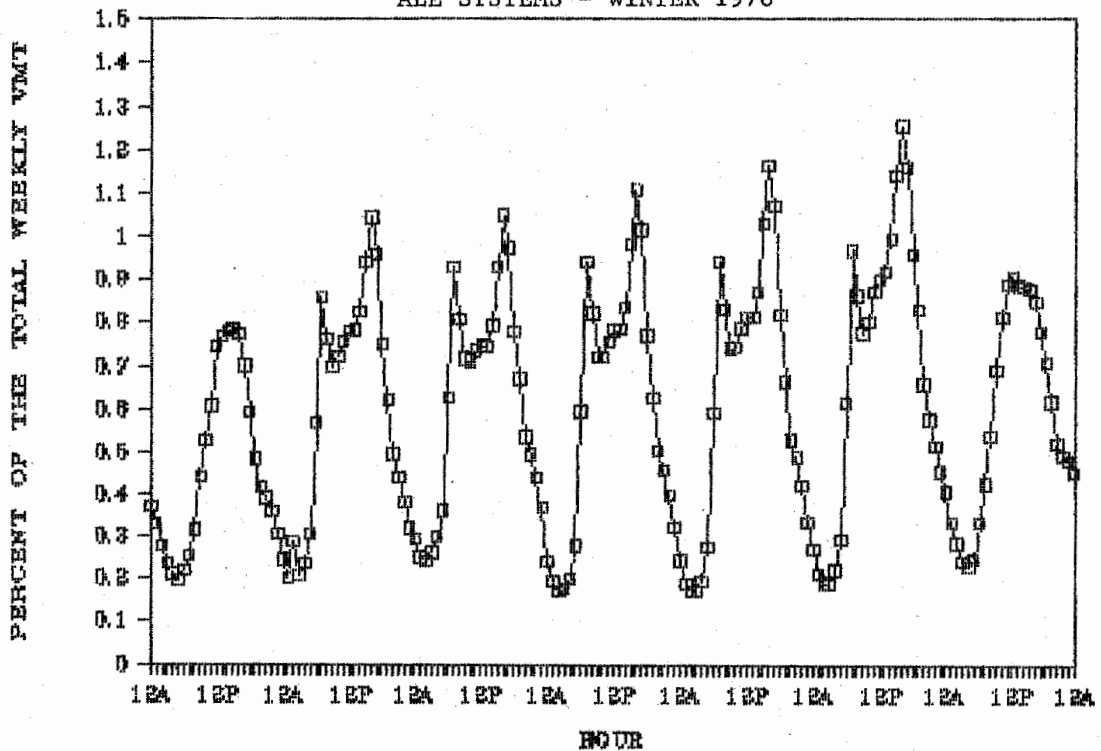


FIGURE 7A

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEM - 1983

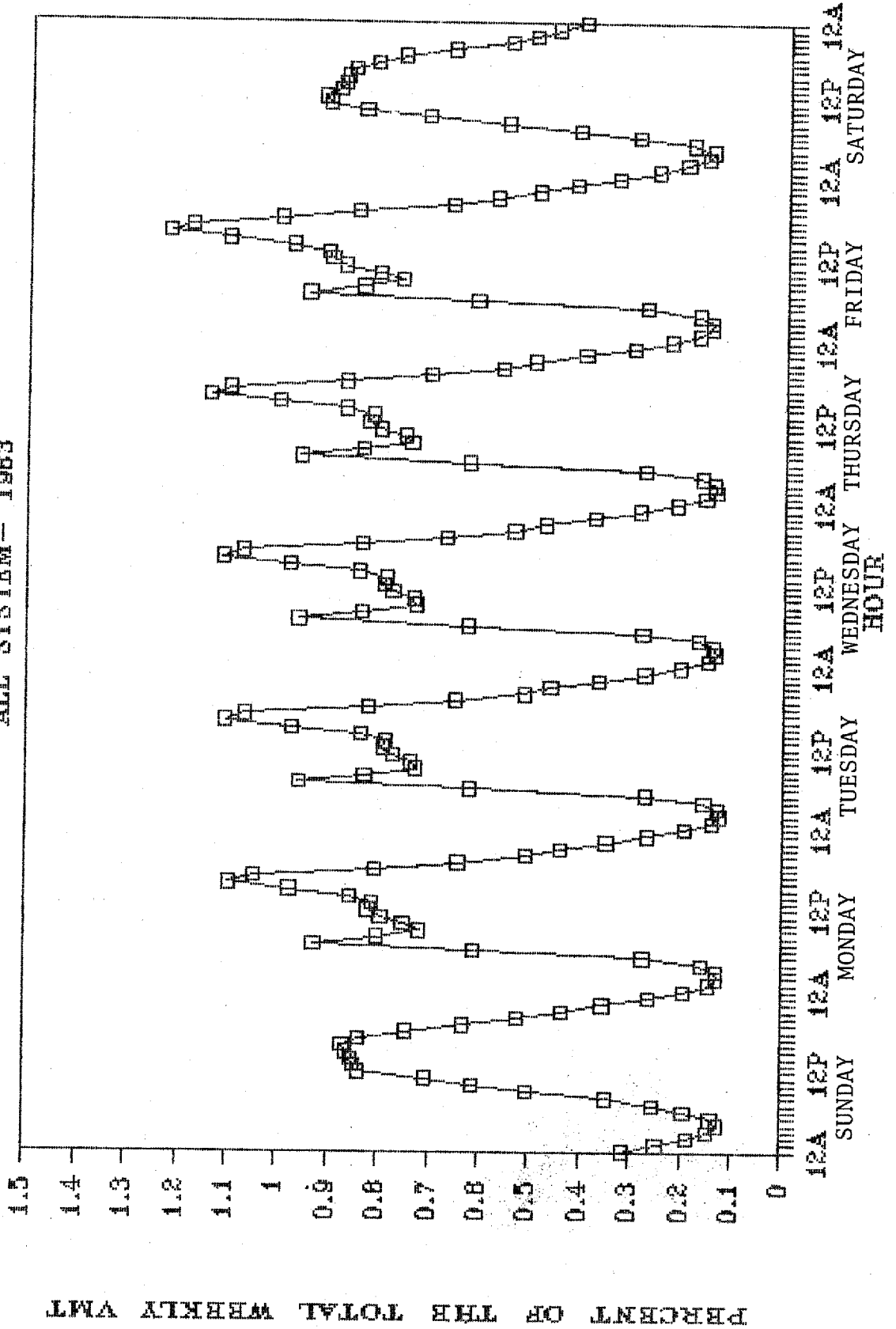
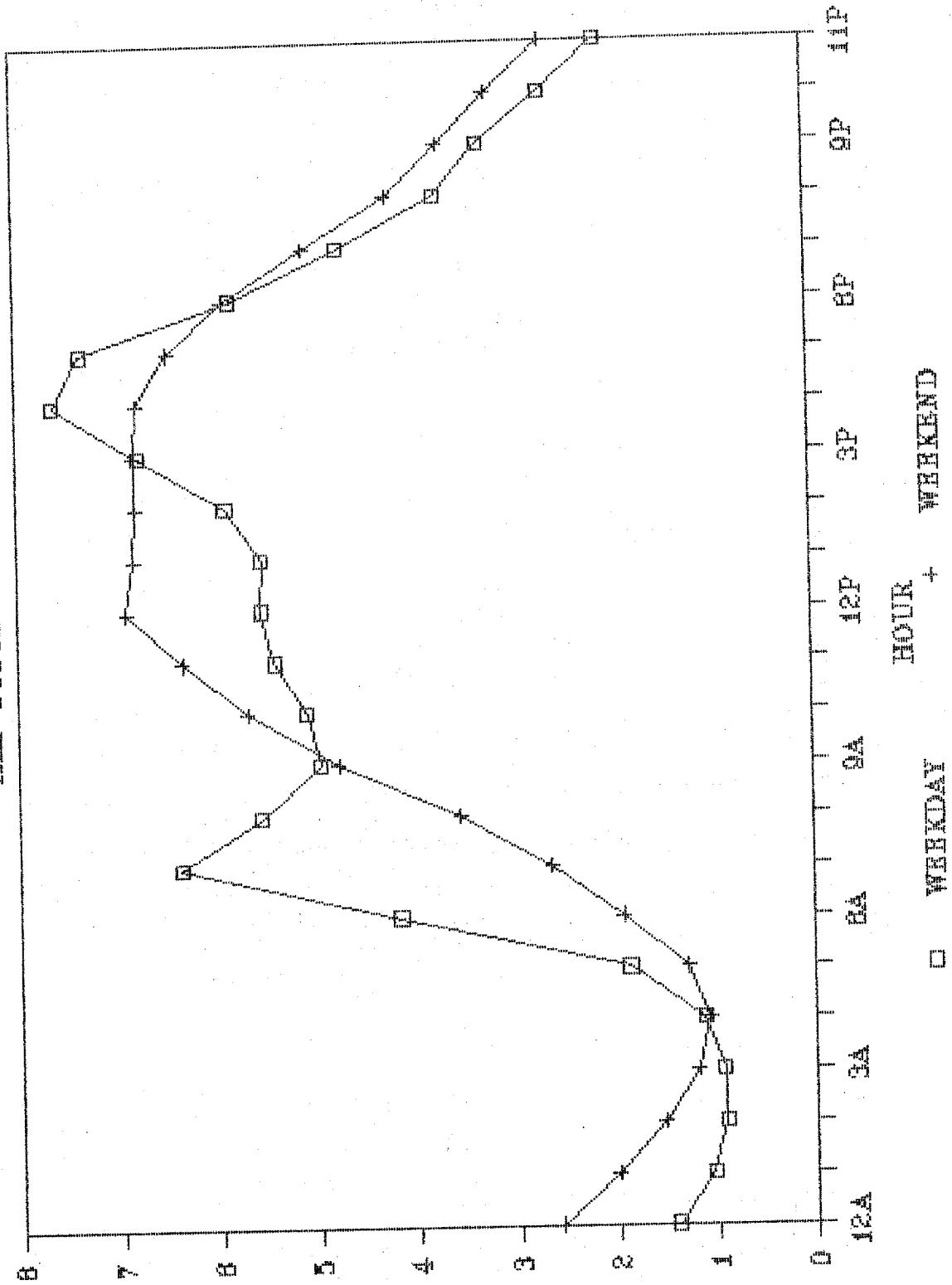


FIGURE 7B

DAILY TRAFFIC DISTRIBUTION

ALL SYSTEM 1983



PERCENT OF THE DAILY TRAFFIC

FIGURE 8A

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEMS - SPRING 1983

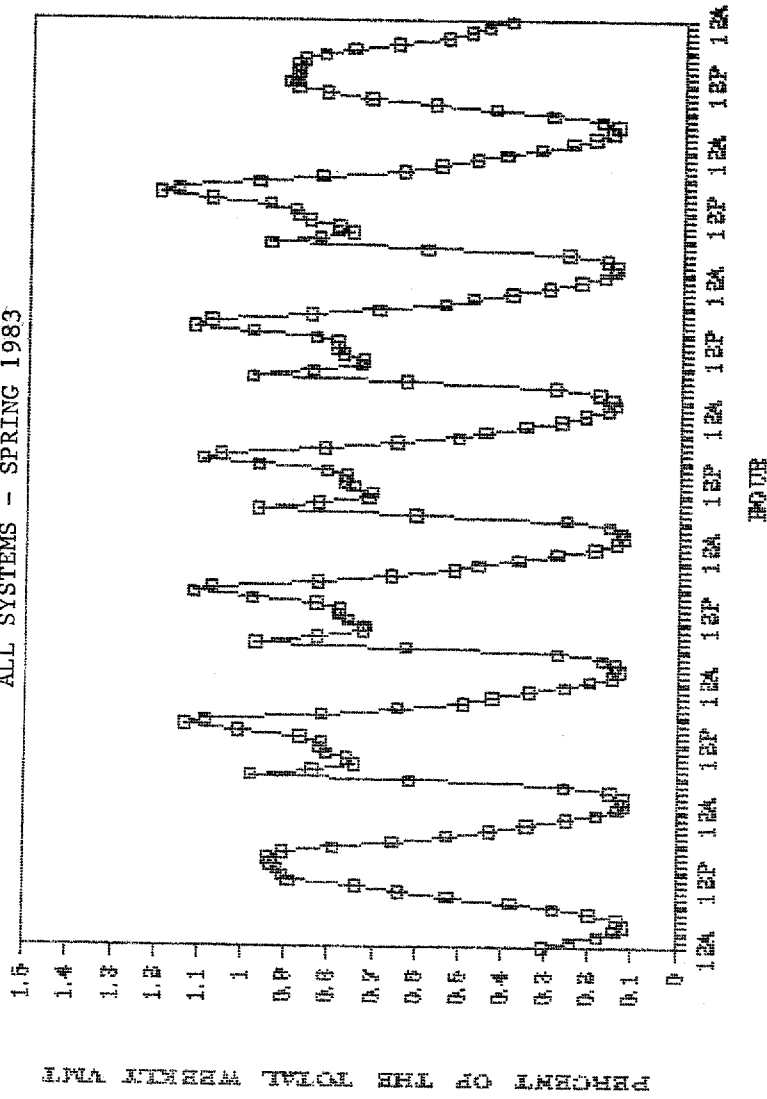


FIGURE 8B

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEMS - SUMMER 1983

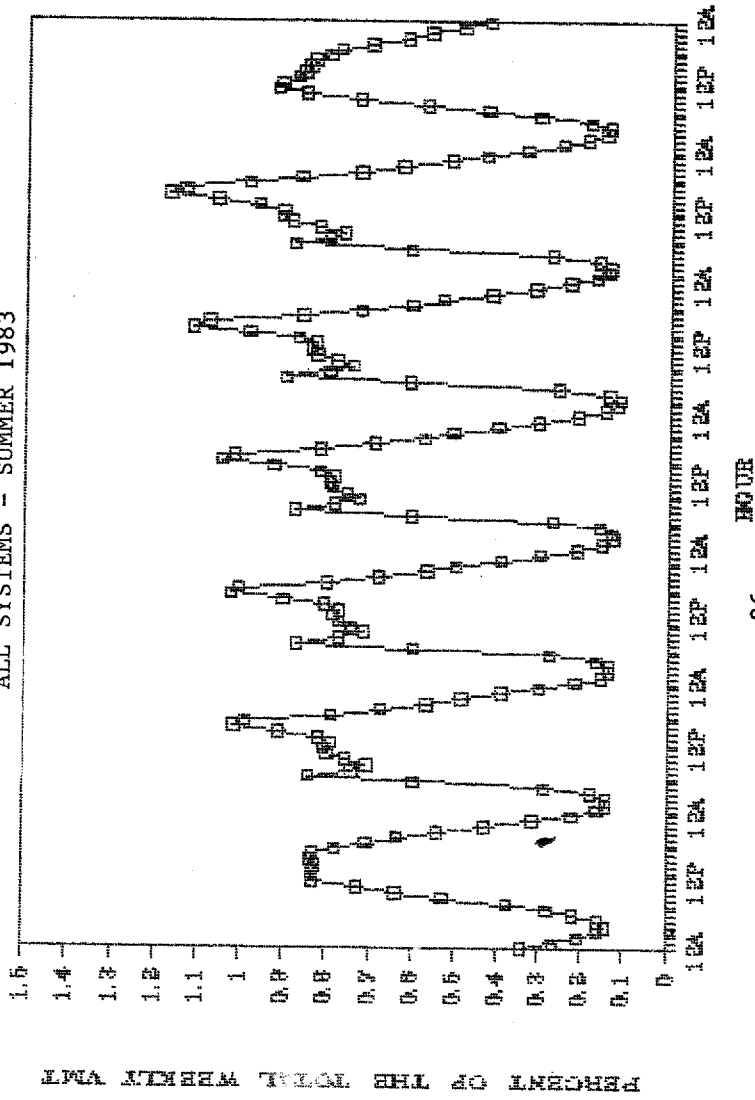


FIGURE 8C

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEMS - FALL 1983

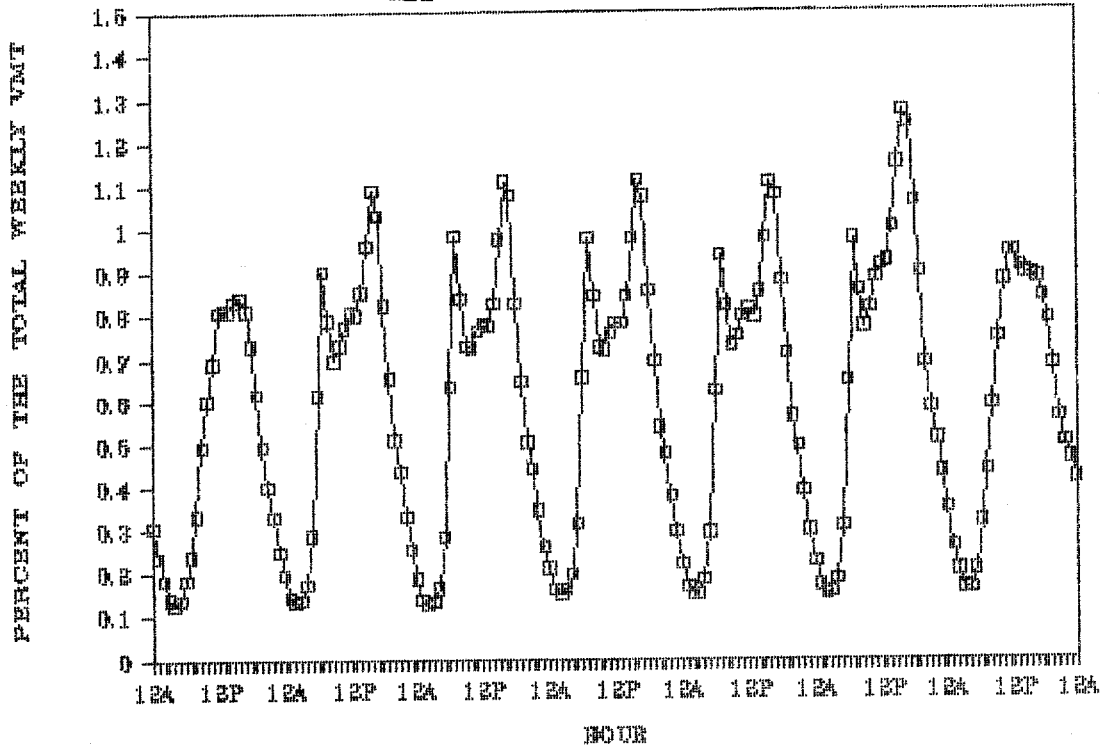
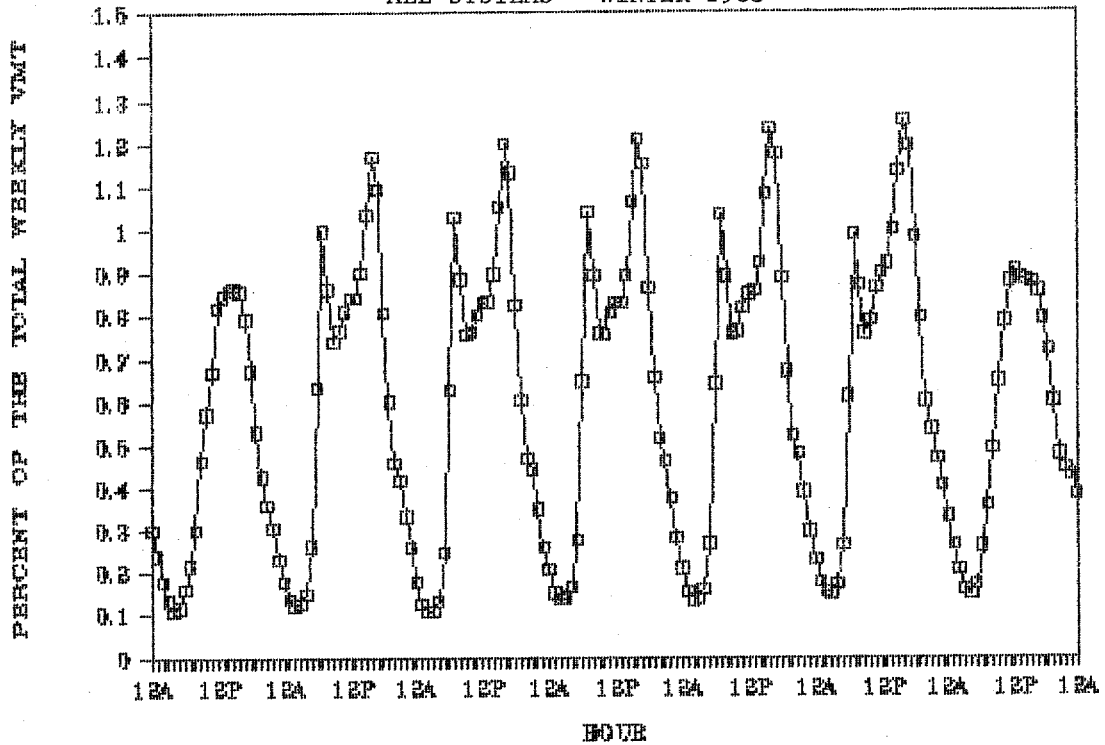


FIGURE 8D

DISTRIBUTION OF WEEKLY VMT

ALL SYSTEMS - WINTER 1983



E. Weekly Travel - Total Rural Systems (1978, 1983)

The average weekly hourly pattern shows that weekend discretionary travel is high in the rural area, especially on Sunday (Figure 9A). In fact, the Sunday peak traffic is higher than the weekday morning or afternoon peaks. Although the Saturday travel peak is not as high as Sunday, the length of time of this peak is much longer than Sunday's. Also, the Saturday peak (11 a.m.) starts earlier than the Sunday (4 p.m. by 5 hours). The weekday travel has a slight morning peak (Figure 9B). The highest afternoon peak occurs on Friday, but this is mainly the influence of the weekend traffic. The high Friday afternoon peak is sometimes considered part of the weekend traffic.

For the weekday traffic, the morning peak starts at 6 a.m. and ends at 8 a.m. Traffic remains fairly constant from 8 a.m. until 2 p.m. By 3 p.m., the afternoon peak traffic starts to pick up. The peak hour of the travel occurs about 4 p.m., and by 5 p.m., the traffic tapers off until the next day (Figure 9B). For the weekend traffic, the lowest hour of travel is at 4 a.m., as compared to 2 a.m. for the average weekday. This is attributed to higher late night recreational travel. The weekend traffic starts to peak around noon and tapers off at 5 p.m.--similar to the weekday traffic.

Over the 5 years (1978-1983), the pattern of travel remains unchanged. The peak weekday traffic, however, has increased, whereas the late night traffic (between 1 a.m. to 4 a.m. has sharply decreased. This is true for all rural systems (Figure 11 and 12).

The peak season of travel for the rural system is summer. Note that in the summer season, the morning peak is low when compared with the other season. The traffic during the peak period relative to the weekly traffic is highest during the winter season for the rural arterial and collector systems (see Appendix A).

Weekly traffic for all three rural systems: Interstate, arterial, and collector, along with daily traffic distributions are presented in Appendix A.

FIGURE 9A

DISTRIBUTION OF WEEKLY TRAFFIC RURAL SYSTEM- 1978

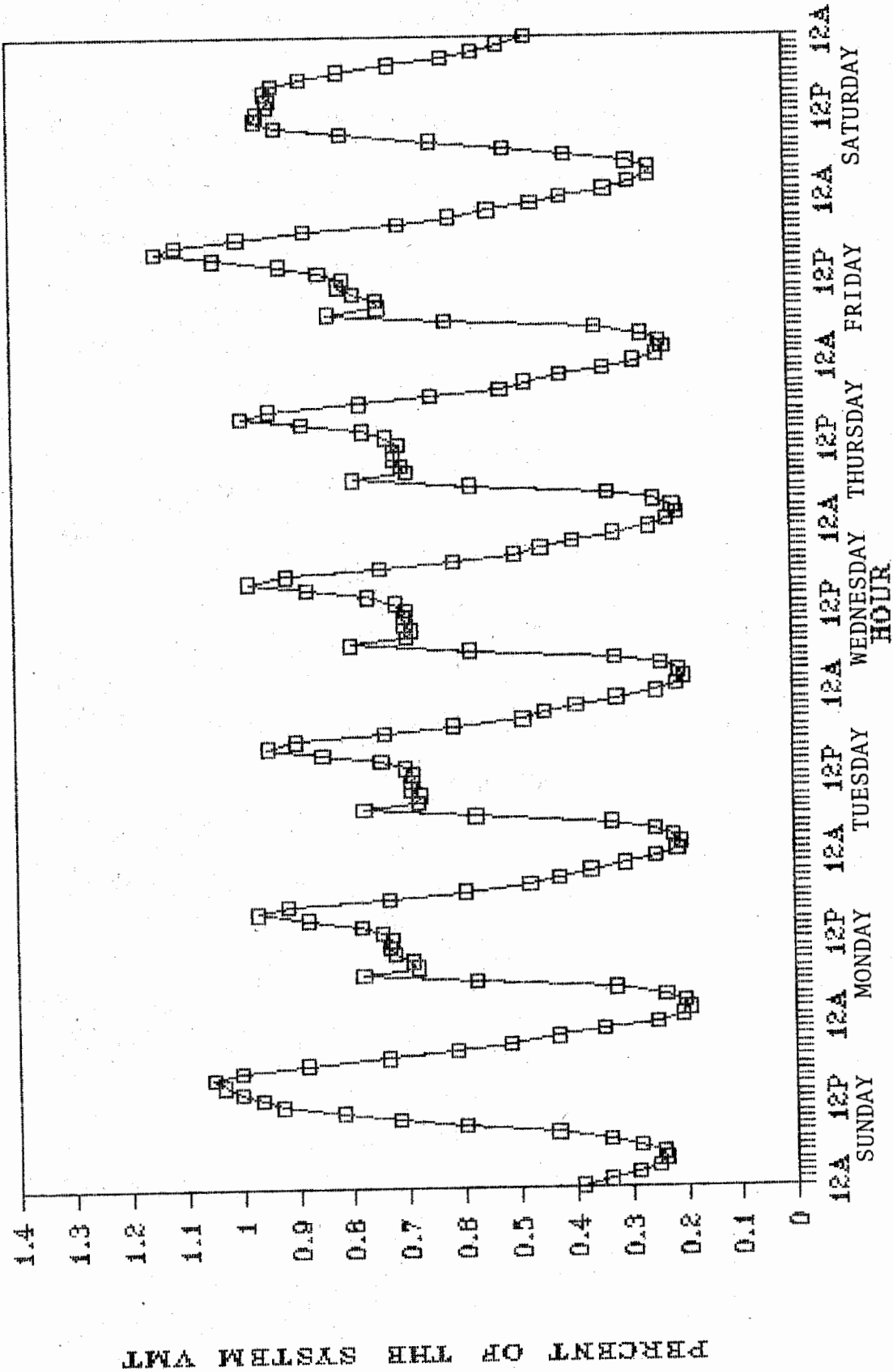


FIGURE 9B

DAILY TRAFFIC DISTRIBUTION

RURAL SYSTEM 1976

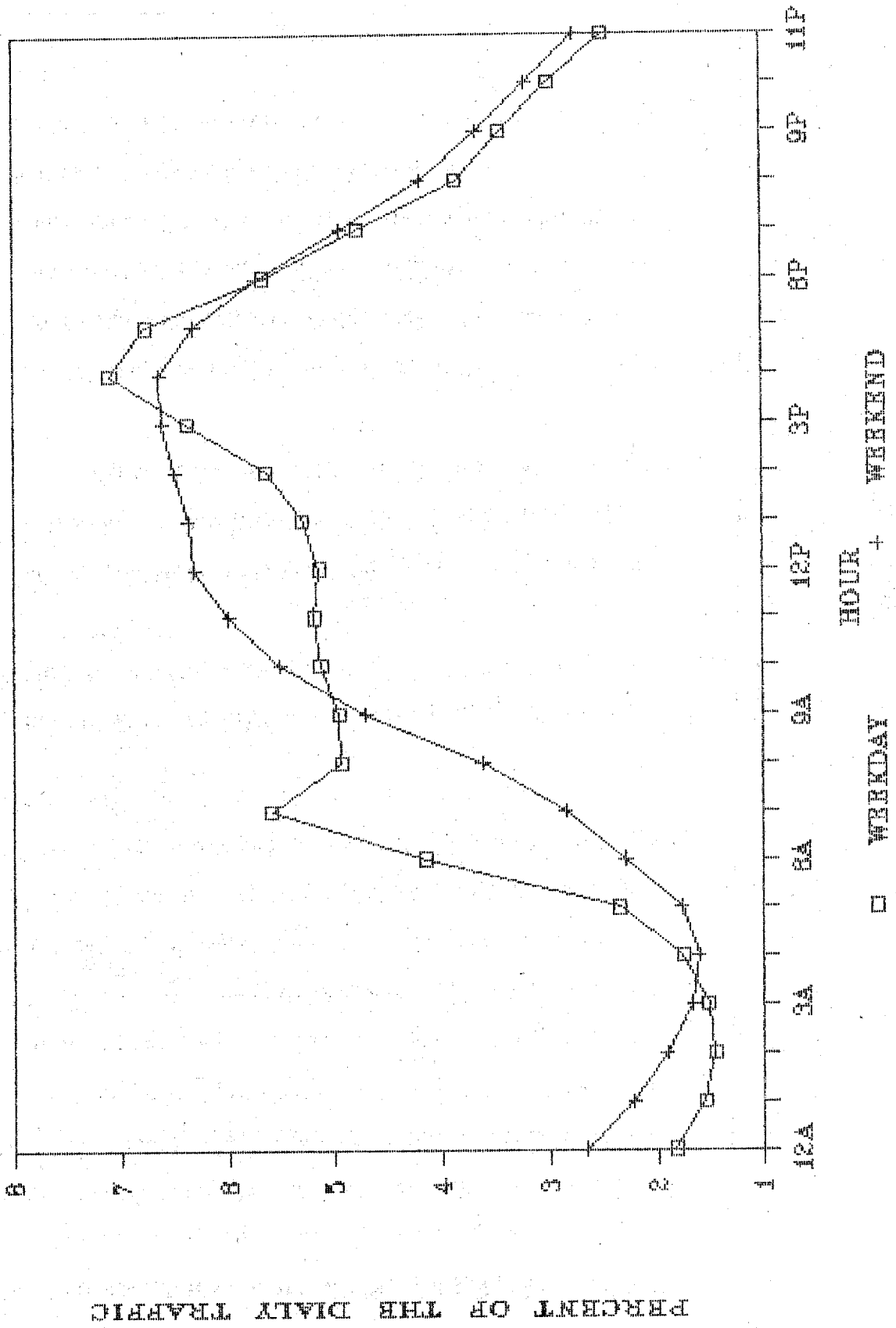


FIGURE 10A

DISTRIBUTION OF WEEKLY TRAFFIC

RURAL SYSTEMS - SPRING 1978

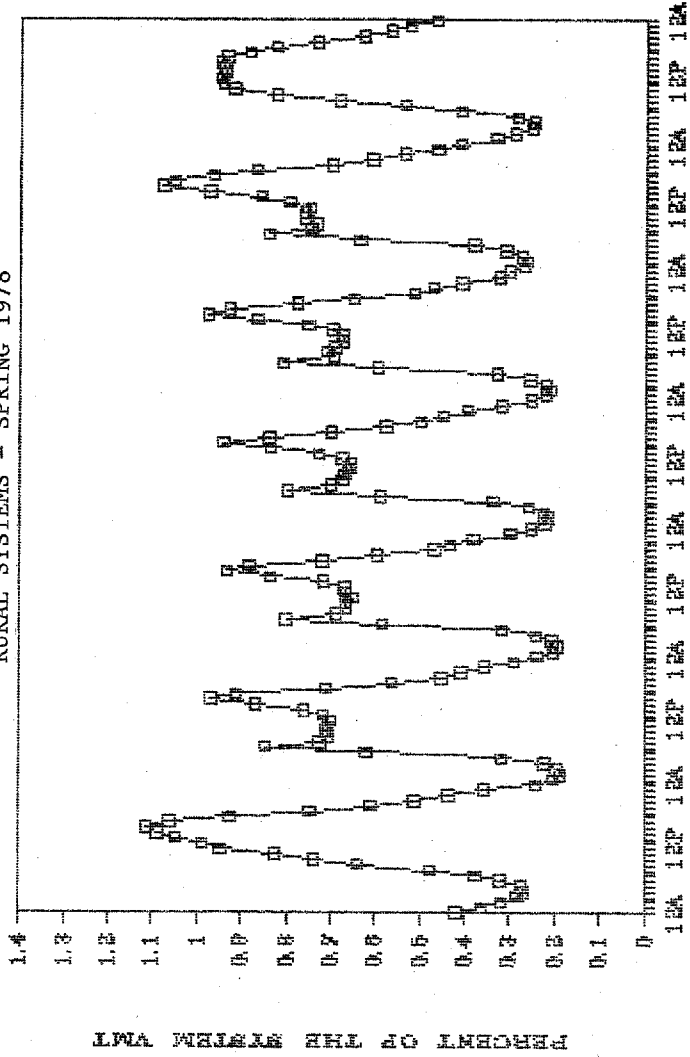


FIGURE 10B

DISTRIBUTION OF WEEKLY TRAFFIC

RURAL SYSTEMS - SUMMER 1978

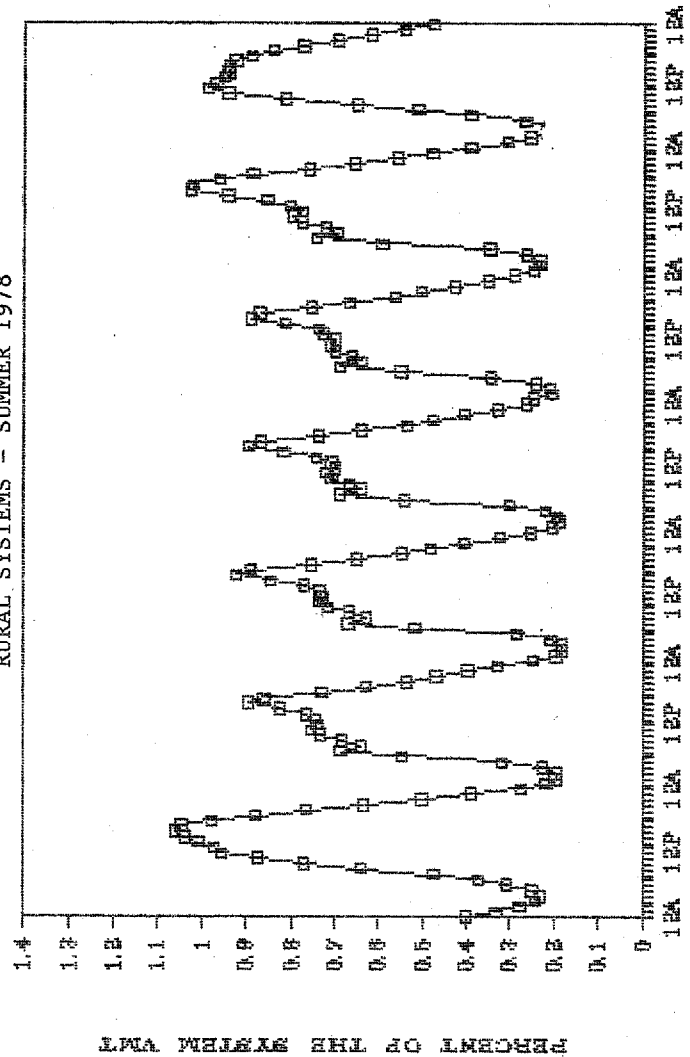


FIGURE 10C

DISTRIBUTION OF WEEKLY TRAFFIC

RURAL SYSTEMS - FALL 1978

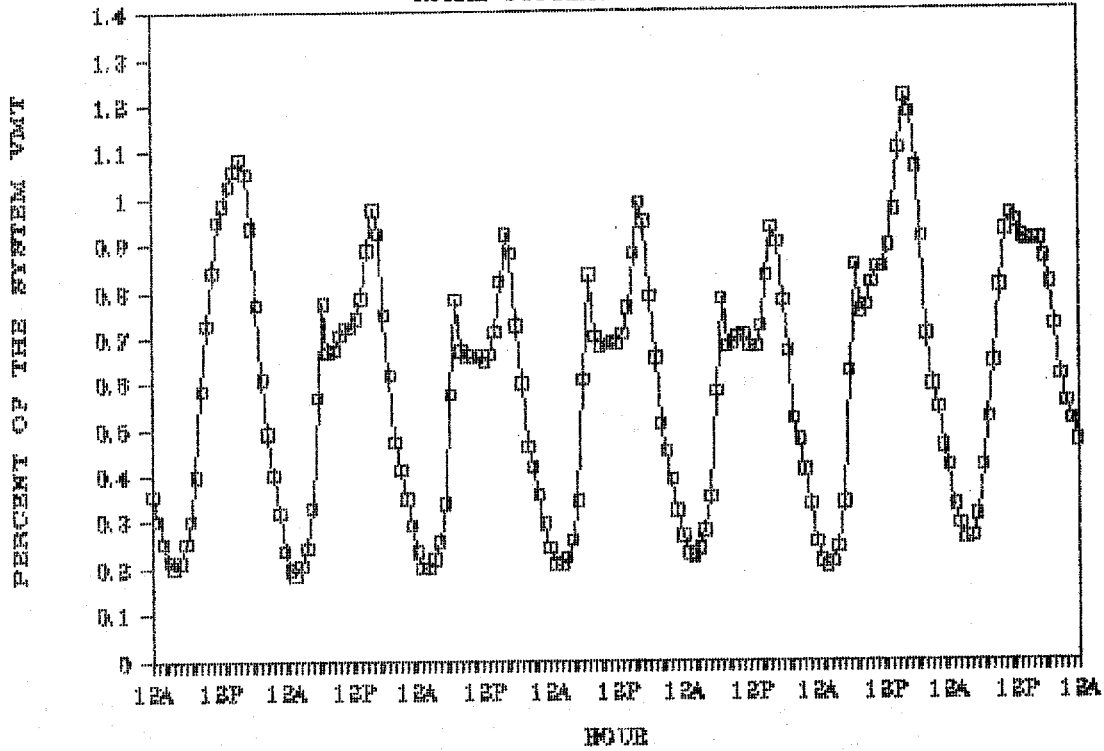


FIGURE 10D

DISTRIBUTION OF WEEKLY TRAFFIC

RURAL SYSTEMS - WINTER 1978

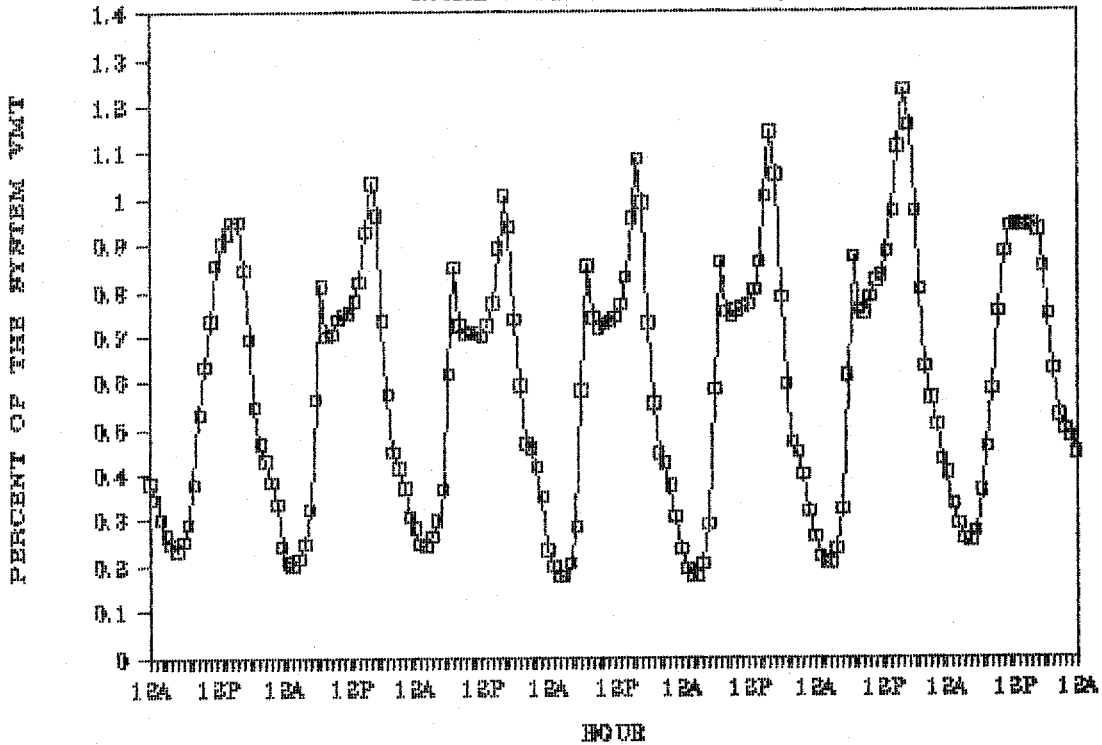


FIGURE 11A

DISTRIBUTION OF WEEKLY TRAFFIC

RURAL SYSTEM - 1983

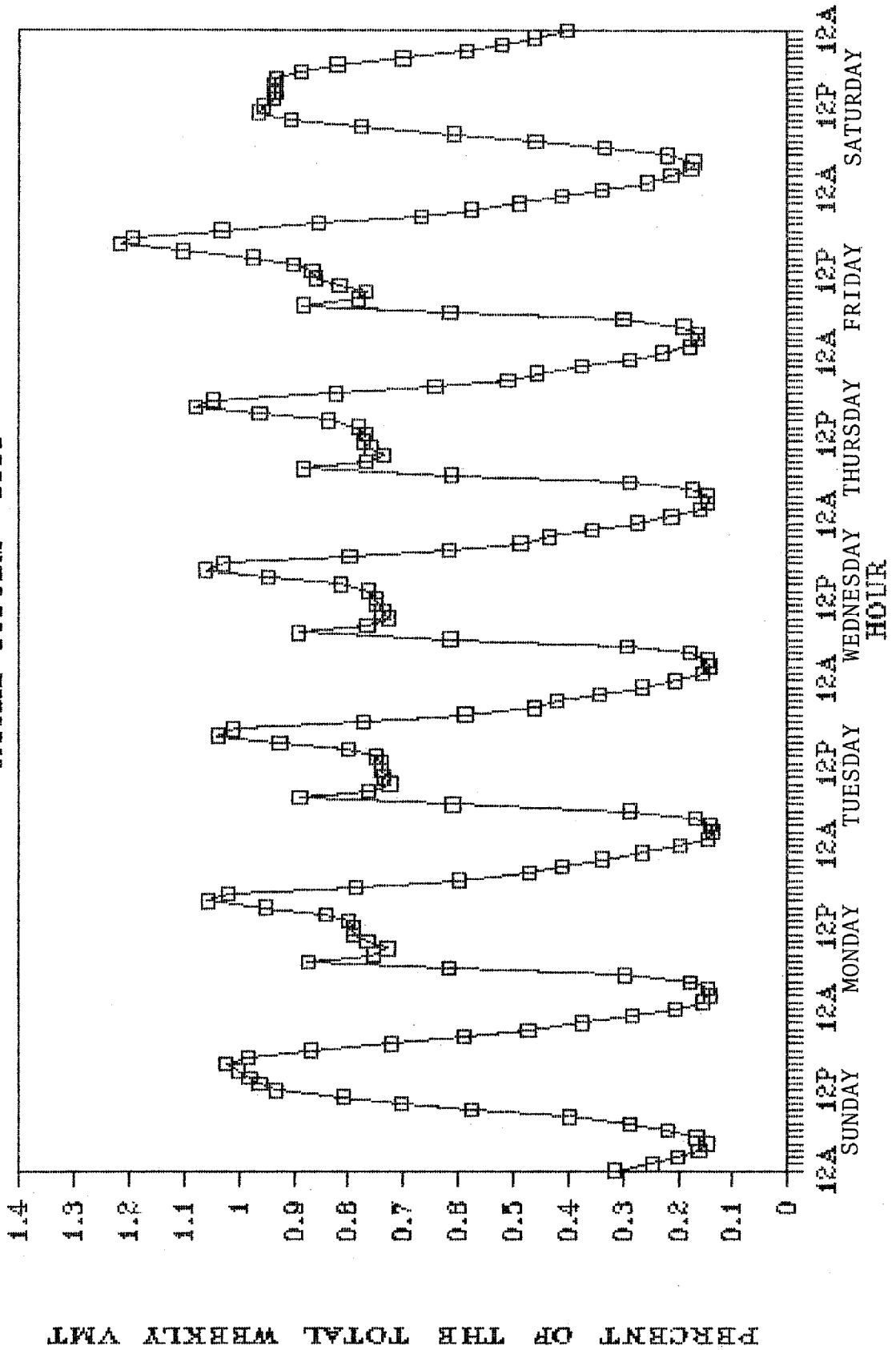


FIGURE 11B

DAILY TRAFFIC DISTRIBUTION

RURAL SYSTEM 1983

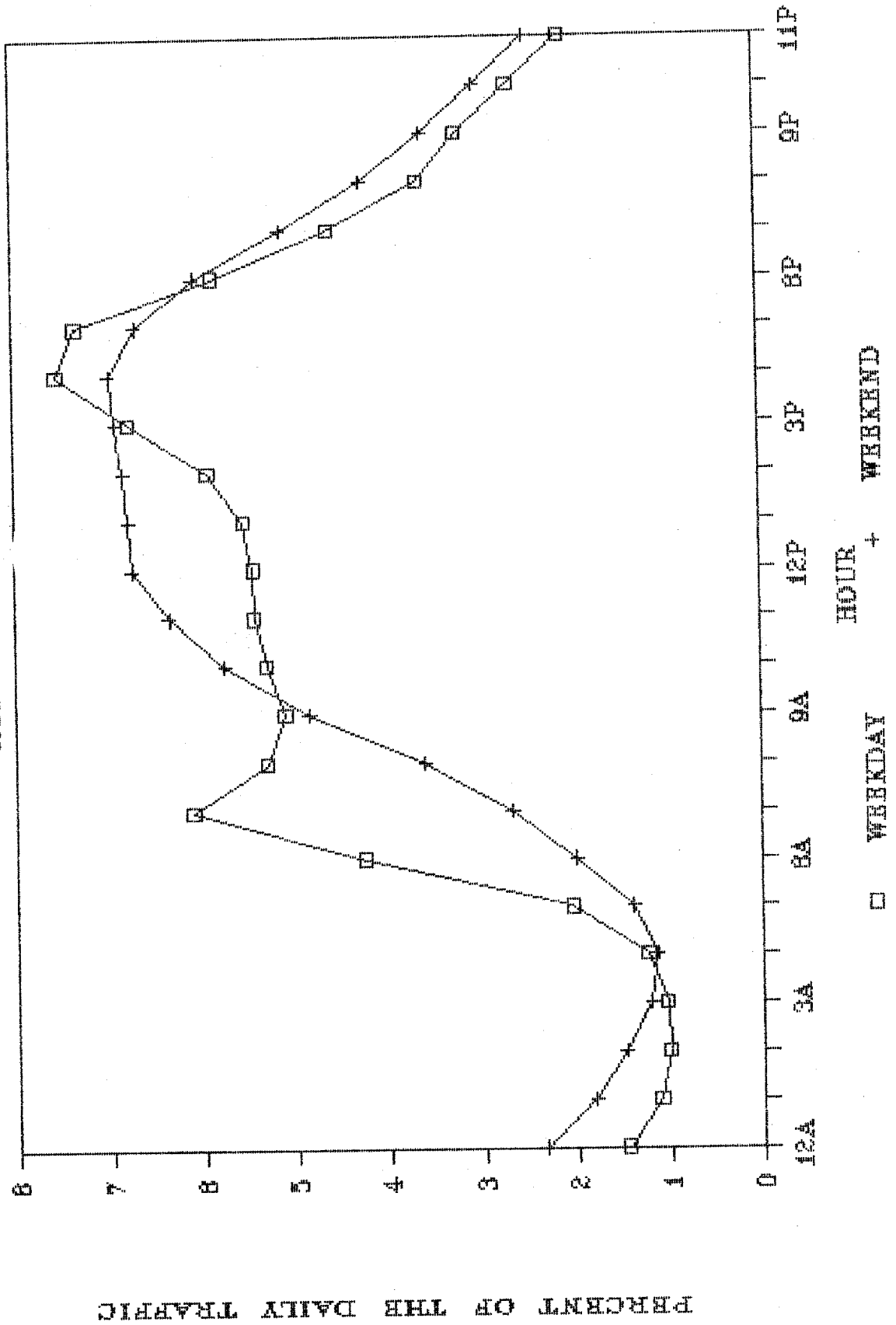


FIGURE 12A

DISTRIBUTION OF WEEKLY TRAFFIC
RURAL SYSTEMS - SPRING 1983

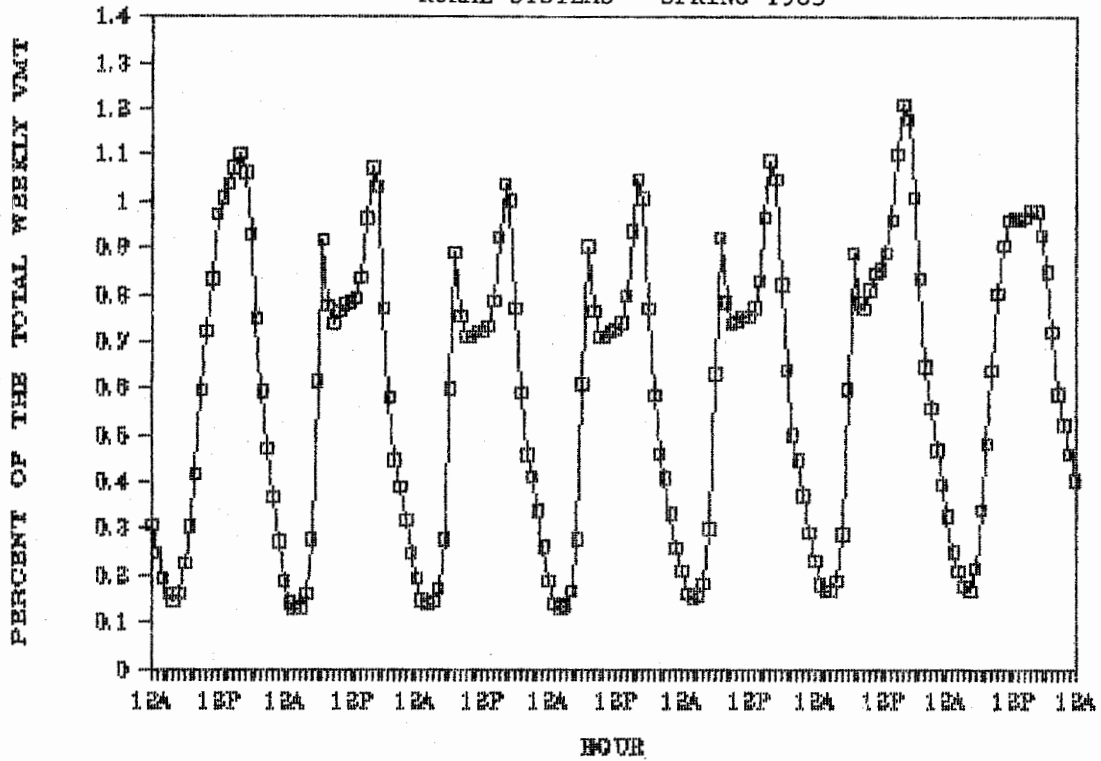


FIGURE 12B

DISTRIBUTION OF WEEKLY TRAFFIC
RURAL SYSTEMS - SUMMER 1983

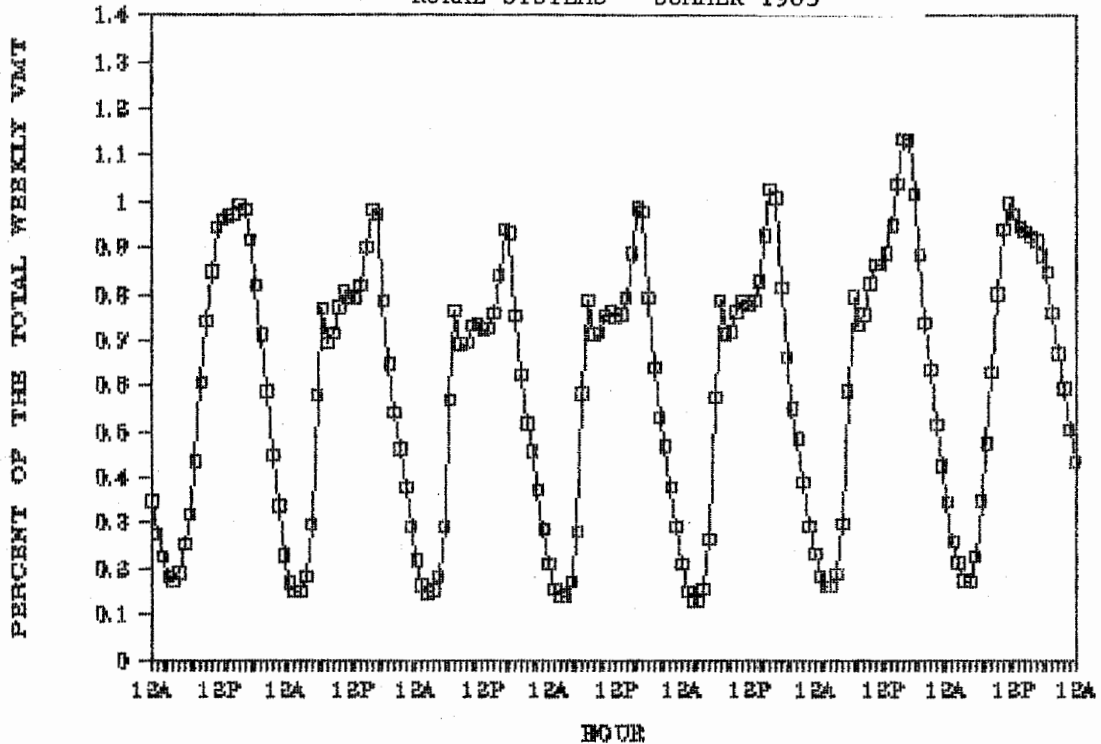


FIGURE 12C

DISTRIBUTION OF WEEKLY TRAFFIC

RURAL SYSTEMS - FALL 1983

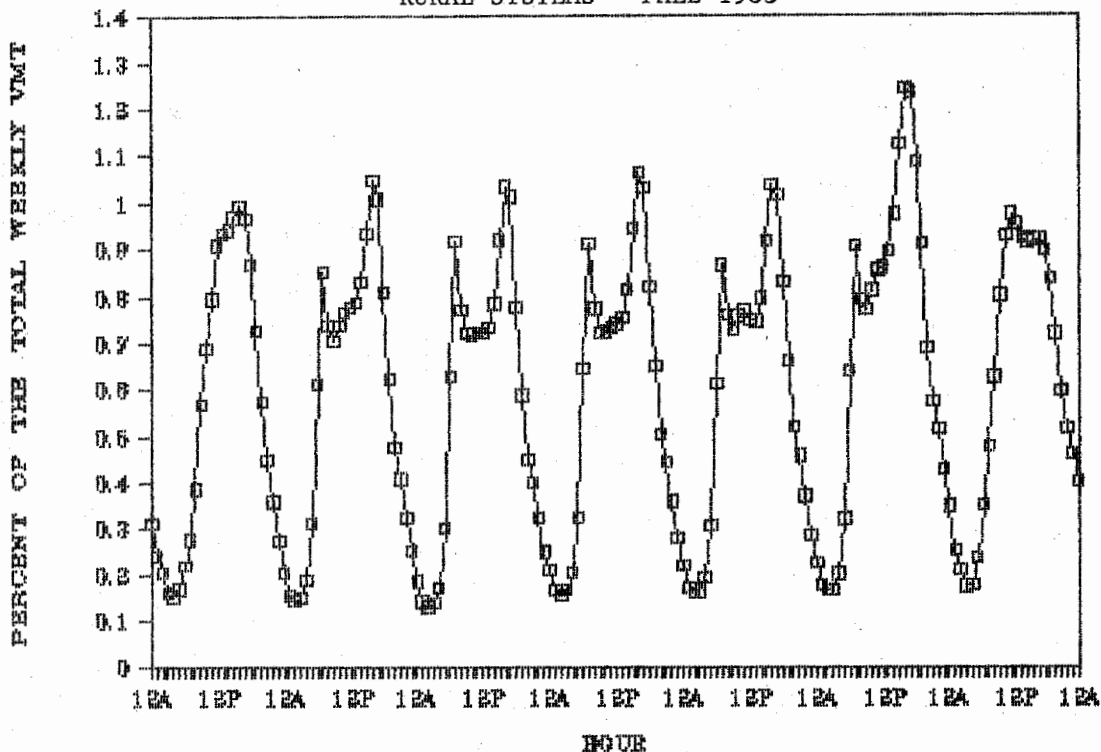
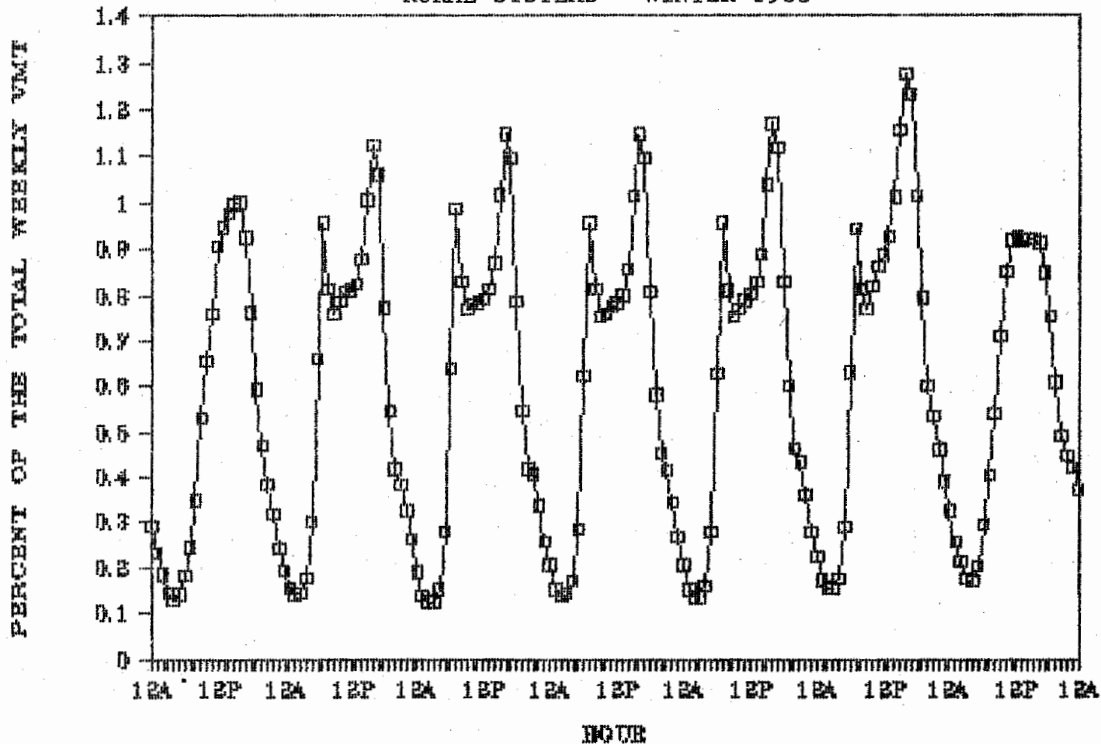


FIGURE 12D

DISTRIBUTION OF WEEKLY TRAFFIC

RURAL SYSTEMS - WINTER 1983



F. Weekly Travel - Total Urban System (1978, 1983)

Although the urban weekday and weekend travel patterns are similar to the rural patterns, the proportion of urban travel from weekday to weekend varies widely from the rural system. Most of the travel on the urban system tends to be during the week days (Figure 13A). The weekday traffic consists of three peak periods, morning, midday, and afternoon. The morning and afternoon peaks result from the mass of commuter traffic traveling on the home to work trips (rush hour). The midday peak is the accumulation of traffic during the lunch hour. Saturday and Sunday traffic have similar patterns; however, the Sunday travel peak is of longer duration from noon to 5 p.m., while the Saturday peaks at noon and traffic tapers off thereafter.

The average weekday morning traffic peak is slightly lower than that of the afternoon. The morning peak hour accounts for 6.4 percent of the daily traffic as compared to 7.1 percent for the peak afternoon hour (Figure 13B). However, for the urban Interstate system, the morning peak exceeds the afternoon peak, with 7.06 percent for the morning and 6.73 percent for the afternoon (Appendix B).

Although the passage of time has not altered the basic characteristics of travel, a shift of travel during the day has taken place during the last few years (Figures 13B and 15B). The increase of traffic has generally occurred during the peak hours, and the decline during the late night hours between 1 a.m. and 4 a.m. The variation of the urban pattern for the seasons differs minimally. However, note that the weekend traffic during summer extends for a much longer period of time, and is slightly higher (Appendix B).

FIGURE 13A

DISTRIBUTION OF WEEKLY TRAFFIC
URBAN SYSTEM - 1978

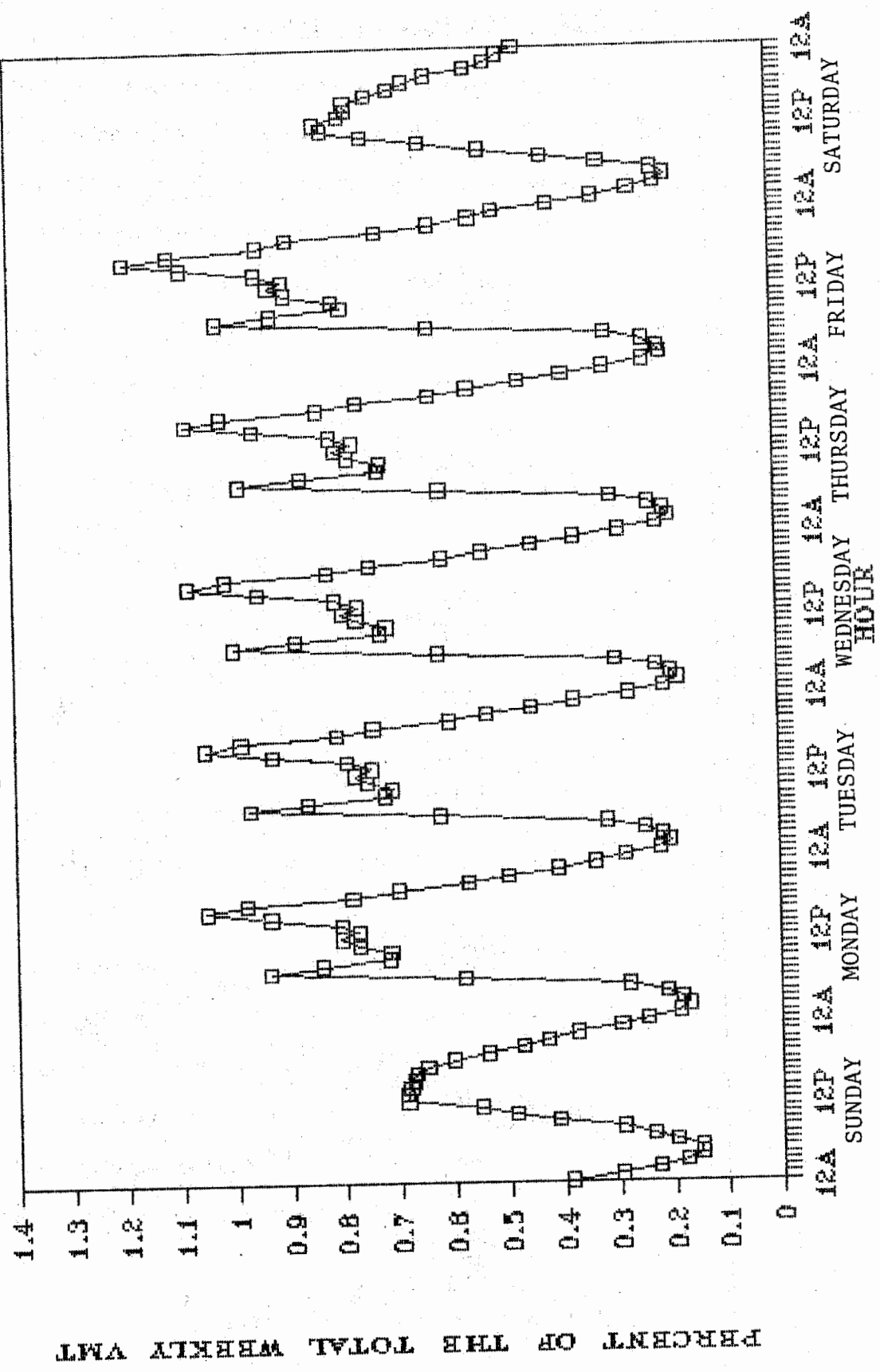


FIGURE 13B

DAILY TRAFFIC DISTRIBUTION

URBAN SYSTEM 1978

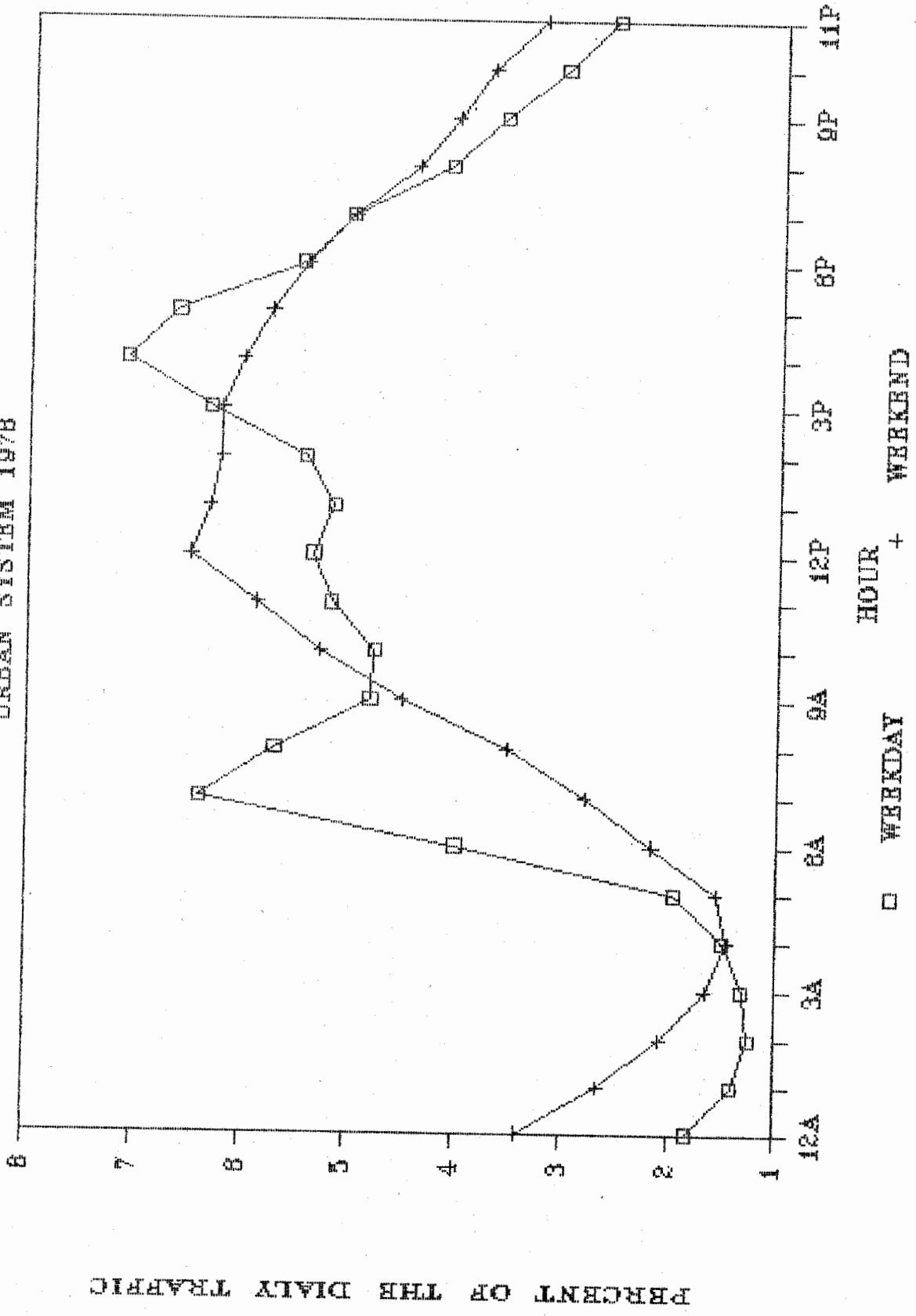
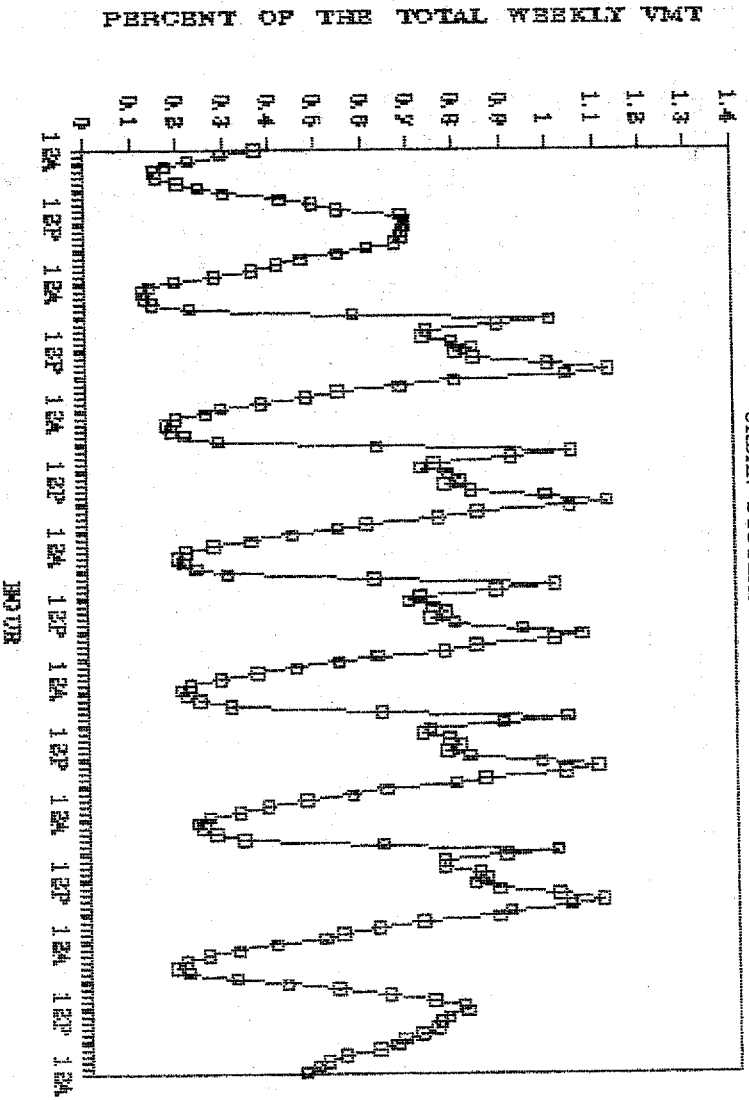


FIGURE 14A

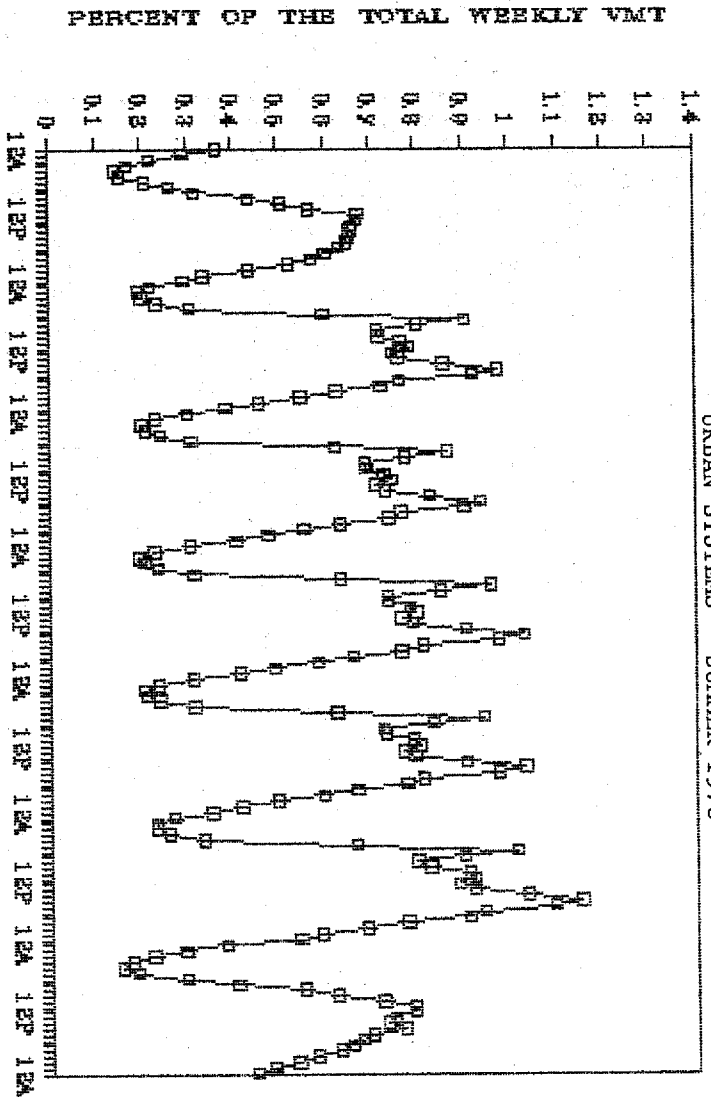
DISTRIBUTION OF WEEKLY TRAFFIC
URBAN SYSTEMS - SPRING 1978



INDOR

FIGURE 14B

DISTRIBUTION OF WEEKLY TRAFFIC
URBAN SYSTEMS - SUMMER 1978



INDOR

FIGURE 14C

DISTRIBUTION OF WEEKLY TRAFFIC

URBAN SYSTEMS - FALL 1978

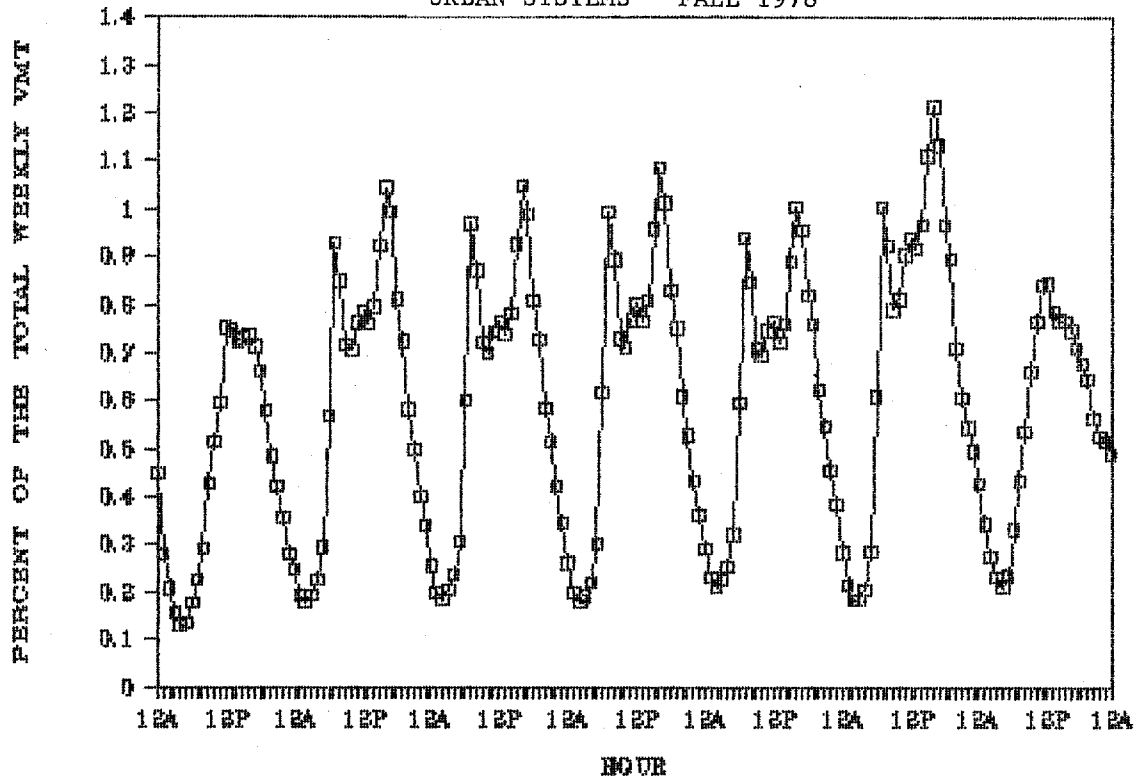


FIGURE 14D

DISTRIBUTION OF WEEKLY TRAFFIC

URBAN SYSTEMS - WINTER 1978

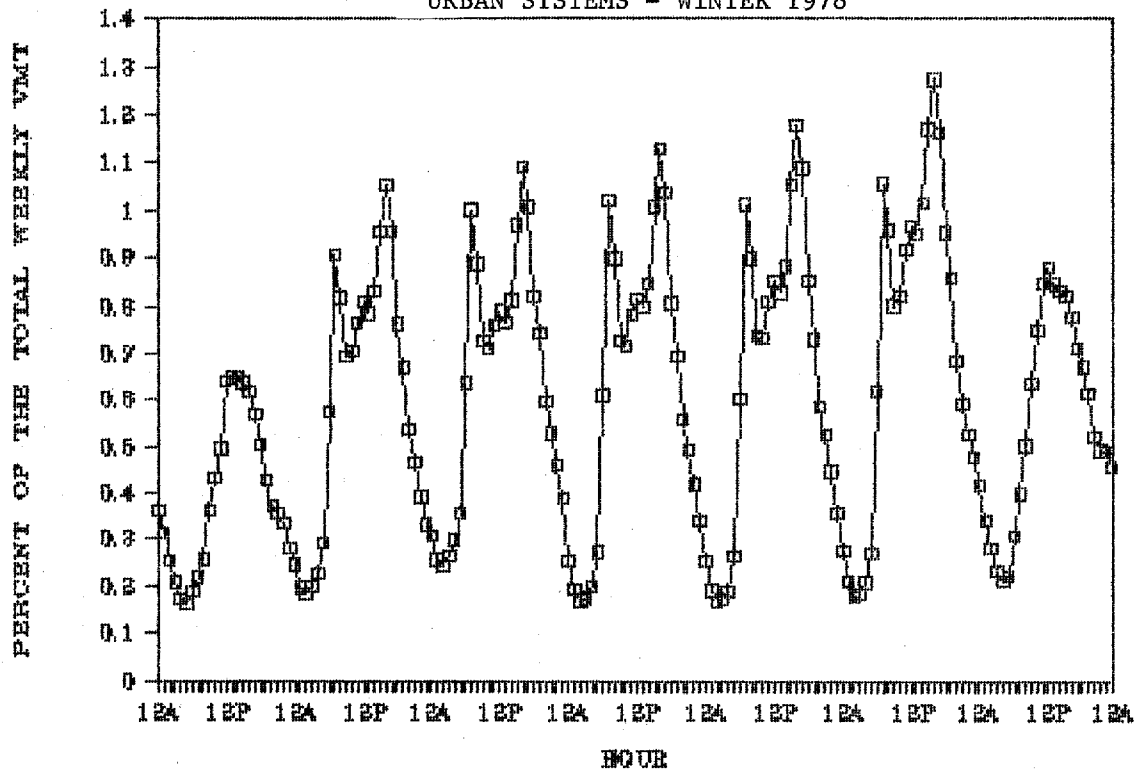


FIGURE 15A

DISTRIBUTION OF WEEKLY TRAFFIC

URBAN SYSTEM - 1963

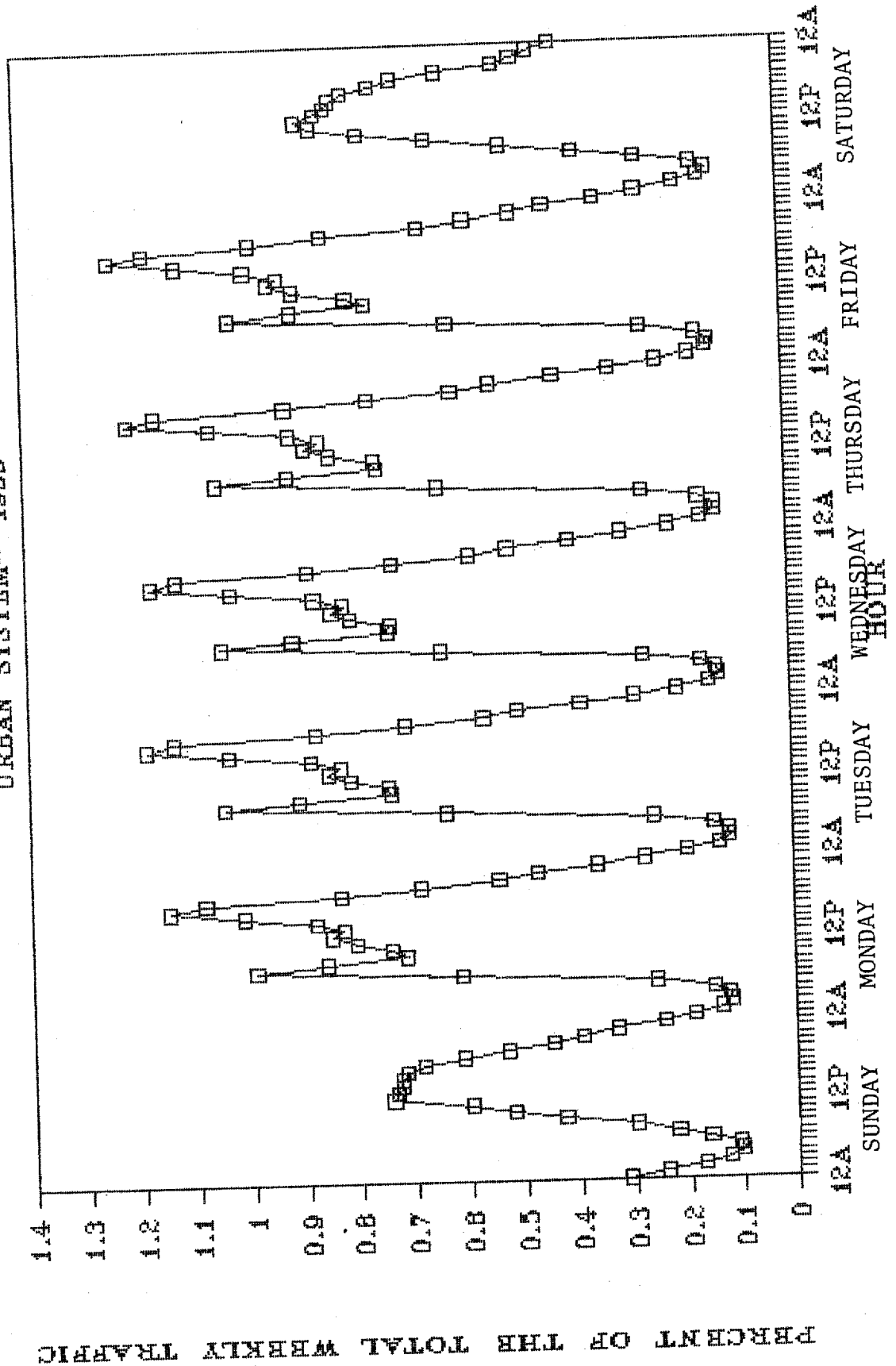


FIGURE 15B

DAILY TRAFFIC DISTRIBUTION

URBAN SYSTEM 1983

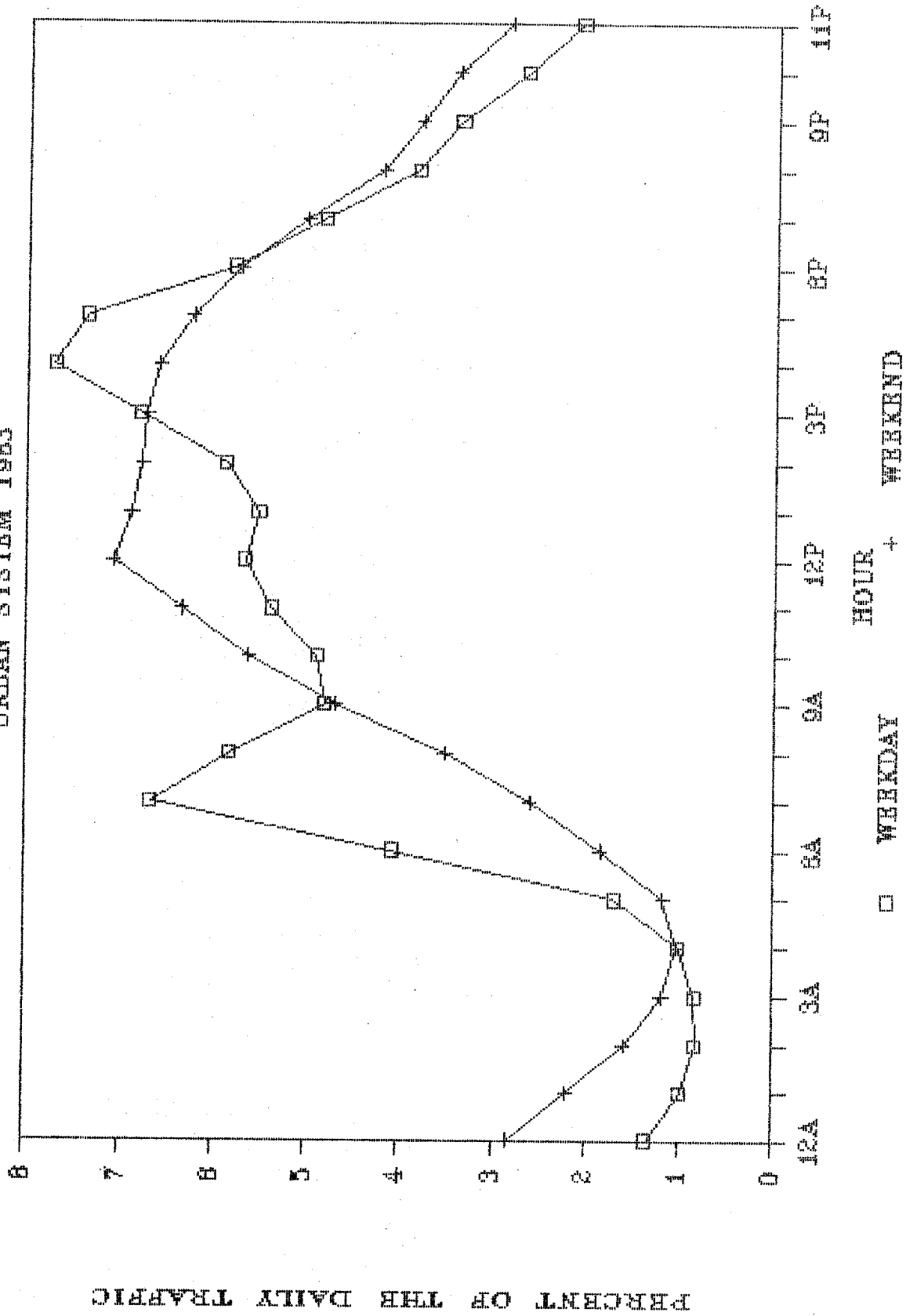


FIGURE 16A

DISTRIBUTION OF WEEKLY TRAFFIC

URBAN SYSTEMS - SPRING 1983

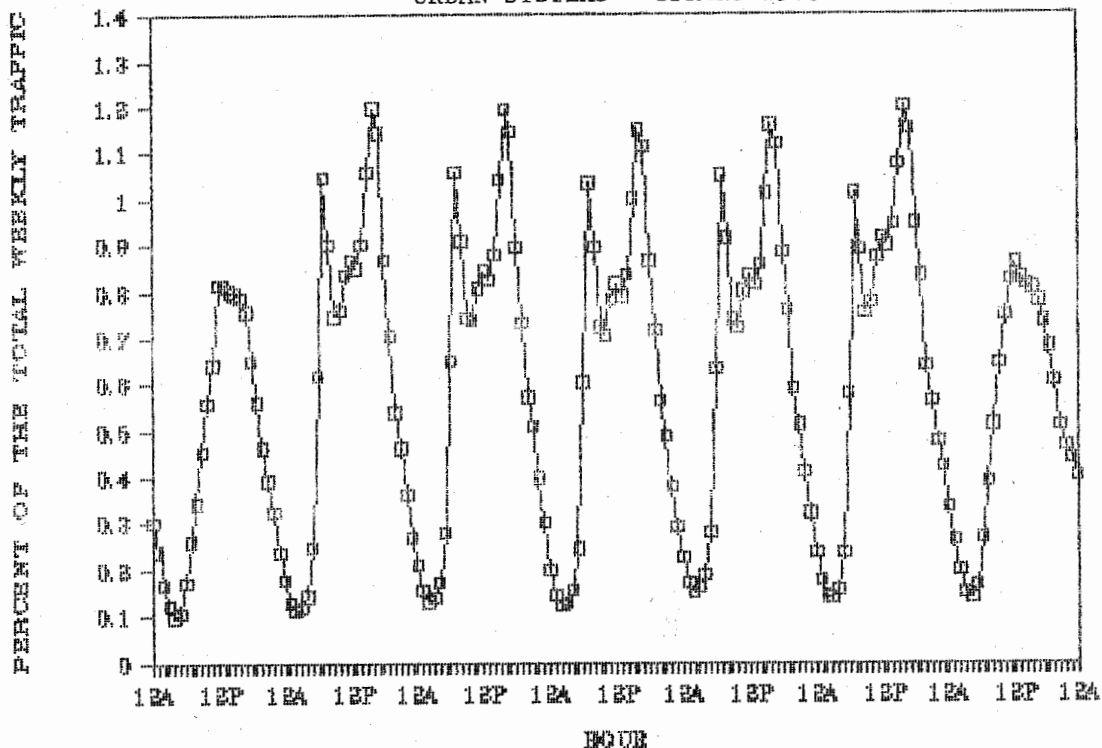


FIGURE 16B

DISTRIBUTION OF WEEKLY TRAFFIC

URBAN SYSTEMS - SUMMER 1983

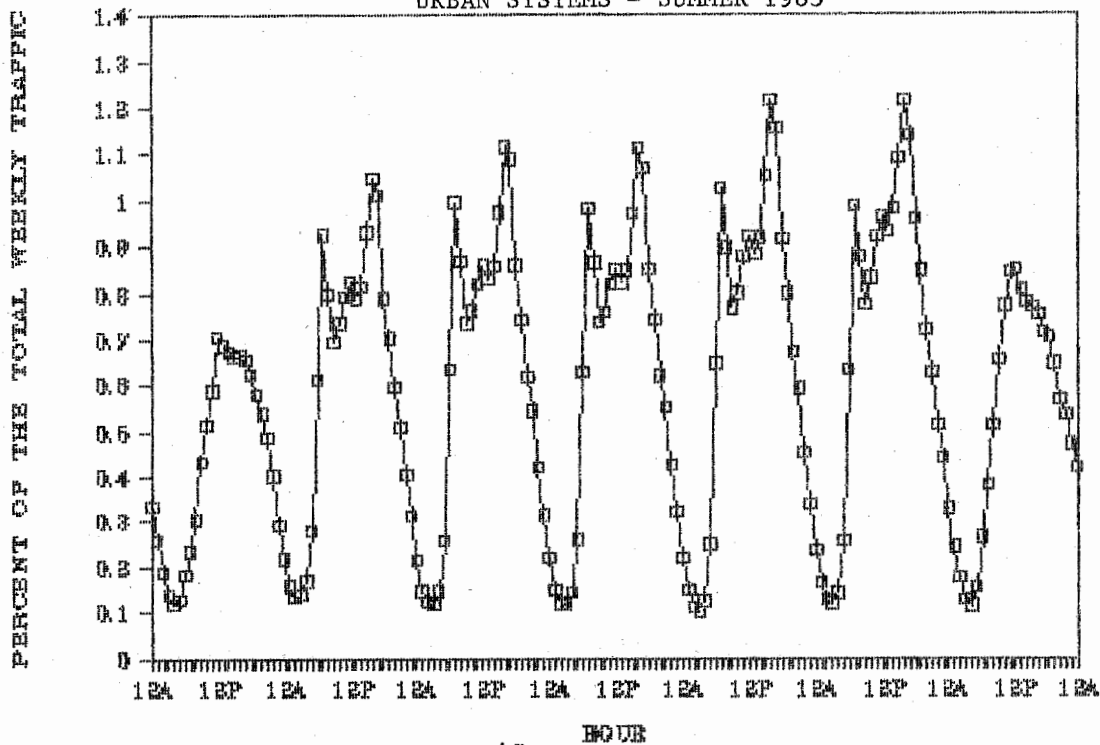


FIGURE 16C

DISTRIBUTION OF WEEKLY TRAFFIC

URBAN SYSTEMS - FALL 1983

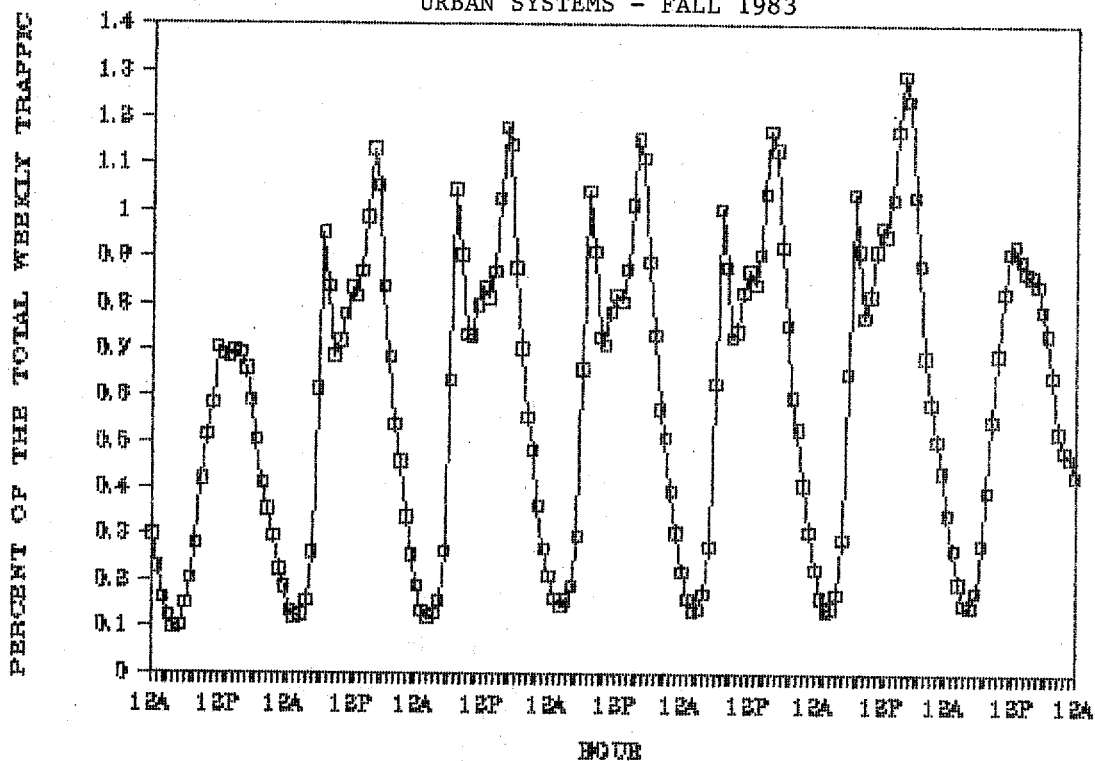
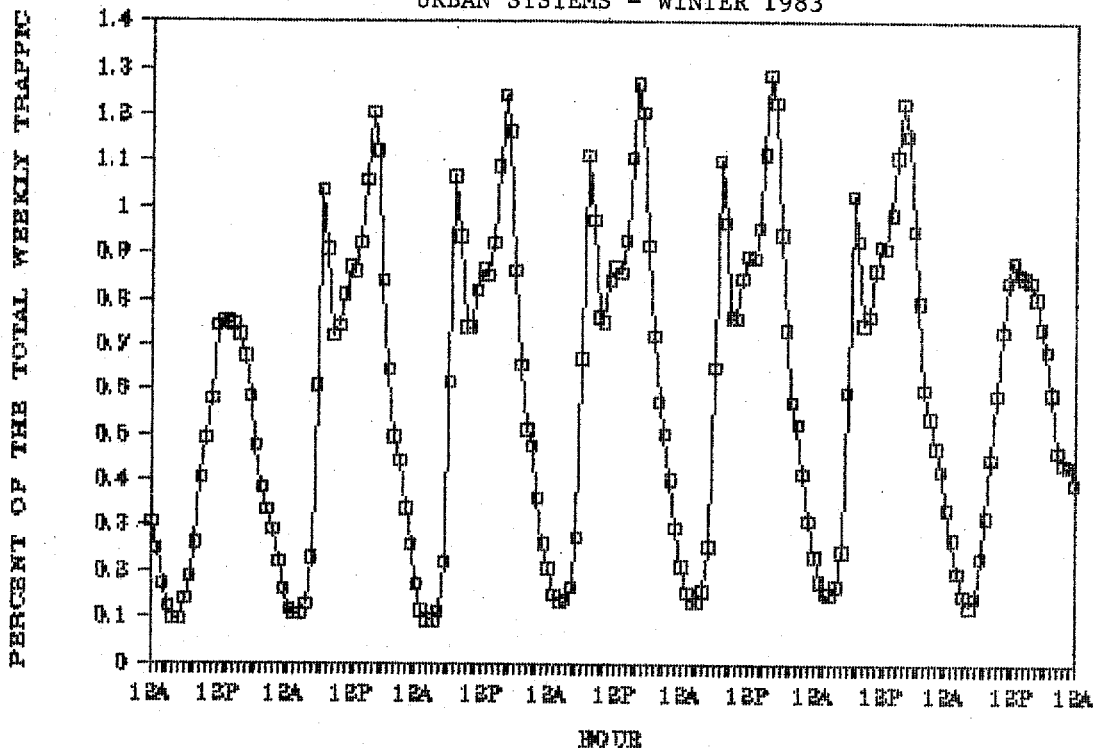


FIGURE 16D

DISTRIBUTION OF WEEKLY TRAFFIC

URBAN SYSTEMS - WINTER 1983



G. Total Travel by Rural and Urban Functional Systems (1976-1984)

Table 4 is the accumulation of data from the VM-2 table of the FHWA Highway Statistics publication. Prior to implementation of the functional classification systems in 1976, the Federal-aid administrative system classifications were used. Due to the difficulty of converting the vehicle miles traveled on the administrative system to vehicle miles traveled on the functional system, only the period beginning with 1976 was analyzed.

The urban travel represented 55.28 percent of the total travel in 1976. However, by 1984, the urban travel had increased to 58.13 percent of the total. With further dividing of the 1984 urban and rural categories, it was found that the urban arterial system carried almost one-third of all vehicle miles (Table 5, Figures 17A and 17C).

The urban Interstate increased from 9.46 percent to 11.86 percent from 1976 to 1984. The rural Interstate remained fairly constant, growing 0.25 percent over the 9-year period. The drop in rural vehicle miles is due to the decrease in both the rural arterial and collector systems. The rural arterial system went from 18.81 percent to 16.35 percent, and the rural collector system from 17.50 percent to 16.87 percent between 1976 and 1984 (Figures 17B and 17C).

The decrease in travel in the rural and urban collector systems may be due to the reclassification of the highway system. Over time, some of the urban collectors were upgraded to urban arterial. In the same manner, some of the rural system was incorporated into urban areas. Consequently, the urban system will grow bigger, and make up a larger percent of the total annual vehicle miles. The rural system growth will be smaller and contribute less to the total annual vehicle miles of travel.

TABLE 5A. RURAL FUNCTIONAL SYSTEM
(VMT IN BILLION)

	YEAR	INTERSTATE	ARTERIAL	COLLECTOR	TOTAL
NATIONAL	1976	117.885	263.786	245.424	627.095
	1977	126.149	272.787	255.158	654.094
	1978	136.125	277.684	272.446	686.255
	1979	133.597	274.110	262.372	670.079
	1980	135.153	263.359	275.553	674.065
	1981	138.772	266.960	276.794	682.526
	1982	142.081	269.978	276.617	688.676
	1983	144.498	273.376	285.754	703.628
	1984	148.542	280.671	289.636	718.849
PERCENT OF TOTAL SYSTEM	1976	8.406	18.810	17.501	44.716
	1977	8.599	18.595	17.393	44.586
	1978	8.812	17.977	17.637	44.426
	1979	8.737	17.926	17.158	43.821
	1980	8.844	17.234	18.032	44.111
	1981	8.916	17.152	17.783	43.851
	1982	8.915	16.940	17.356	43.211
	1983	8.718	16.493	17.240	42.450
	1984	8.652	16.349	16.871	41.872

TABLE 5B. URBAN FUNCTIONAL SYSTEM
(VMT IN BILLION)

	YEAR	INTERSTATE	ARTERIAL	COLLECTOR	TOTAL
NATIONAL	1976	132.698	417.577	225.010	775.285
	1977	141.639	436.698	234.596	812.933
	1978	156.793	460.728	240.928	858.449
	1979	159.452	474.274	225.328	859.054
	1980	161.100	482.970	209.974	854.044
	1981	166.275	498.377	209.293	873.945
	1982	175.606	514.099	215.389	905.094
	1983	192.520	534.401	226.998	953.919
	1984	203.572	559.890	234.457	997.919
PERCENT OF TOTAL SYSTEM	1976	9.462	29.776	16.045	55.284
	1977	9.655	29.768	15.991	55.414
	1978	10.150	29.826	15.597	55.574
	1979	10.428	31.016	14.736	56.179
	1980	10.542	31.606	13.741	55.889
	1981	10.683	32.020	13.447	56.149
	1982	11.018	32.257	13.514	56.789
	1983	11.615	32.240	13.695	57.550
	1984	11.858	32.613	13.657	58.128

ALL THE ABOVE INFORMATION ARE EXTRACTED AND COMPILED FROM THE VM-2 TABLE OF THE HIGHWAY STATISTICS PUBLICATIONS.

FIGURE 17A

TOTAL FUNCTIONAL SYSTEM TRAVEL

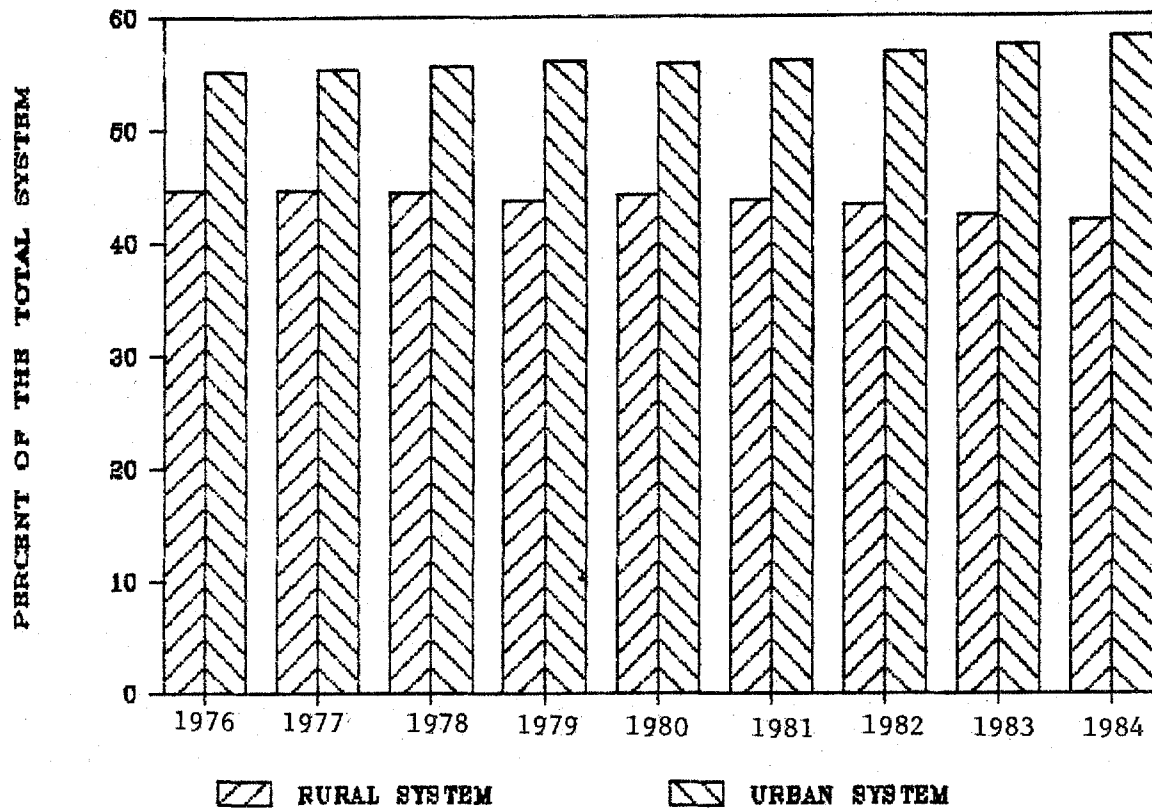


FIGURE 17B

RURAL FUNCTIONAL SYSTEM TRAVEL

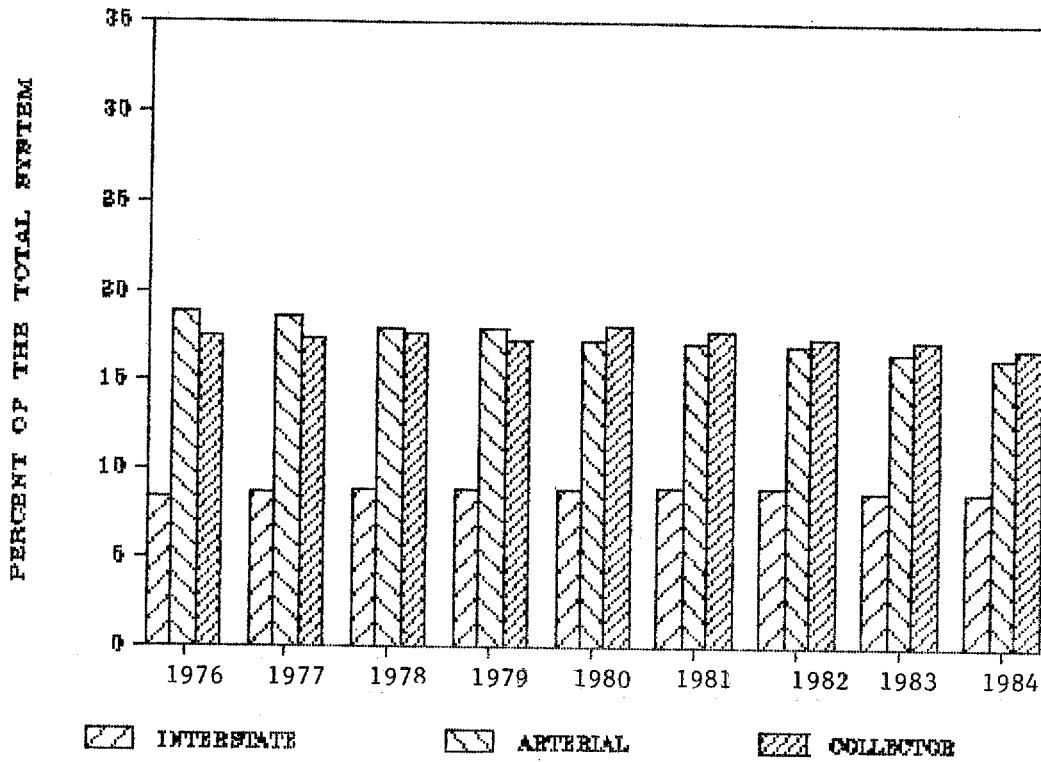
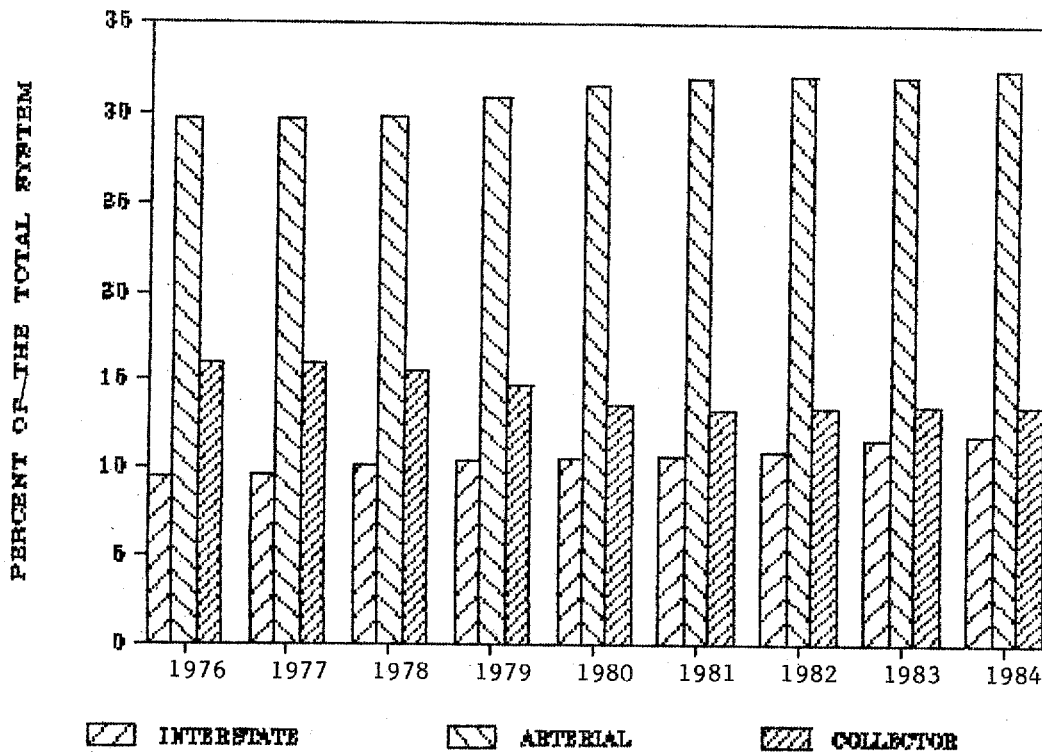


FIGURE 17C

URBAN FUNCTIONAL SYSTEM TRAVEL



III. REGIONAL TRENDS

A. Highway Travel - Rural and Urban (1970-1984)

Because all regions have different ranges of VMT, comparisons between regions and functional classes, such as between rural and urban groups, are difficult (Table 6). In order to compare the regional data, the leading year of the study period was designated as the base year, and all VMT were normalized to 1970 data. Each region has its own pattern of growth, but generally, the urban travel is increasing at a rate much greater than that of the rural travel. When the fuel shortage occurred in 1974 and again in 1979, all regions showed declines (as can be seen in Figures 19A to 19I).

In Region 1 (see Figure 19A), urban travel dropped in 1974 and again in 1979, but the recovery in 1980 was not as rapid as in 1975. The urban growth rate is fairly consistent for the years when travel was increasing. The rural showed the biggest increase in 1979 and 1980. For the last 2 years of the study period, the rural VMT has been increasing.

Region 3 urban travel (see Figure 19B) showed a steep increase in 1976 following the decrease in 1974. The next crunch came in 1979, and was similar to Region 1. Little growth was experienced until 1982. Rural travel showed a similar decrease rate in 1974, but the 1979 crisis had minimum effects.

Urban travel has been steadily increasing in Region 4 (see Figure 19C). Urban vehicle miles for 1974 and 1979 did not reflect the decrease experienced in other regions. Over the 15-year study period, the urban travel doubled. The rural VMT peaked during 1977, but never quite recovered from the 1979 crisis. The 1974 crisis had less influence on the vehicle miles.

Although vehicle miles traveled in Region 5 are high (see Figure 19D), it has the smallest growth during the 15-year study period. During the energy crisis, Region 5 recorded an observable decline. In 1977, urban traffic peaked and then decreased for the following 2 years. It was not until 1984 that the urban traffic reached the same level recorded for 1977.

Both energy crises had the least effects on the travel within Region 6 (see Figure 19E). During the fuel shortages, both rural and urban travel maintained approximately the same level as the previous year. Region 6 experienced the largest growth of any other region. Over the 15 years, the urban VMT grew more than 100 percent and the rural VMT increased over 62 percent. Whereas in other regions such as Region 4 and Region 9 that have had urban travel which doubled that of 1970 by 1984, rural travel increases were much lower than for Region 6. Note that travel in the Regions 4 and 6 is growing at an accelerated rate as compared to the travel in Regions 1, 3, and 5.

Region 7 urban VMT followed the basic pattern (see Figure 19F), with declines in 1974 and again in 1979 and 1980. During the period 1970 to 1972, the rate of increase for the rural traffic was larger than that for urban traffic, but by 1973, the urban rate of increase had overtaken the rural. For the rural VMT, the fuel shortage had a greater impact than on the urban. From 1979 on, the VMT has reexamined stable.

The first fuel crisis did not affect Region 8's urban or rural travel. Since then, the rural and urban travel have had a sporadic growth cycle (Figure 19G). In 1983, the urban VMT showed the largest increase, 13.5 percent from the previous year, and then dropped by 12.4 percent in 1984 (Table 6).

Region 9 urban travel has increased by more than 100 percent from that of 1970 (Figure 19H). The rural VMT increased at a much slower pace during the early 1970's. The first fuel shortage in 1974 caused the rural VMT to drop below 1973 levels and did not surpass 1973 level until 1977. Two years later, the next crisis hit, and the rural VMT dropped a second time. It was not until 1984 that the rural travel finally increased above that recorded for 1978.

Although the pattern of growth is similar to the other regions, Region 10 is the only region where the rural travel has been increasing faster than the urban travel (Figure 19I). Both the rural and urban VMT reflected the influence the energy crises had on travel, but to a lesser degree than in other regions.

FIGURE 18

Field Regions of the Federal Highway Administration



⊛ Washington, D.C. Headquarters

● Field Region Headquarters

* Region 15 (Arlington, Va.), Eastern Federal Highway Projects Office

NOTE: FHWA Region 1 Conforms to Standard Regions 1 and 2

FIGURE 19A

NORMALIZED VMT FOR REGION 1

1970-1984

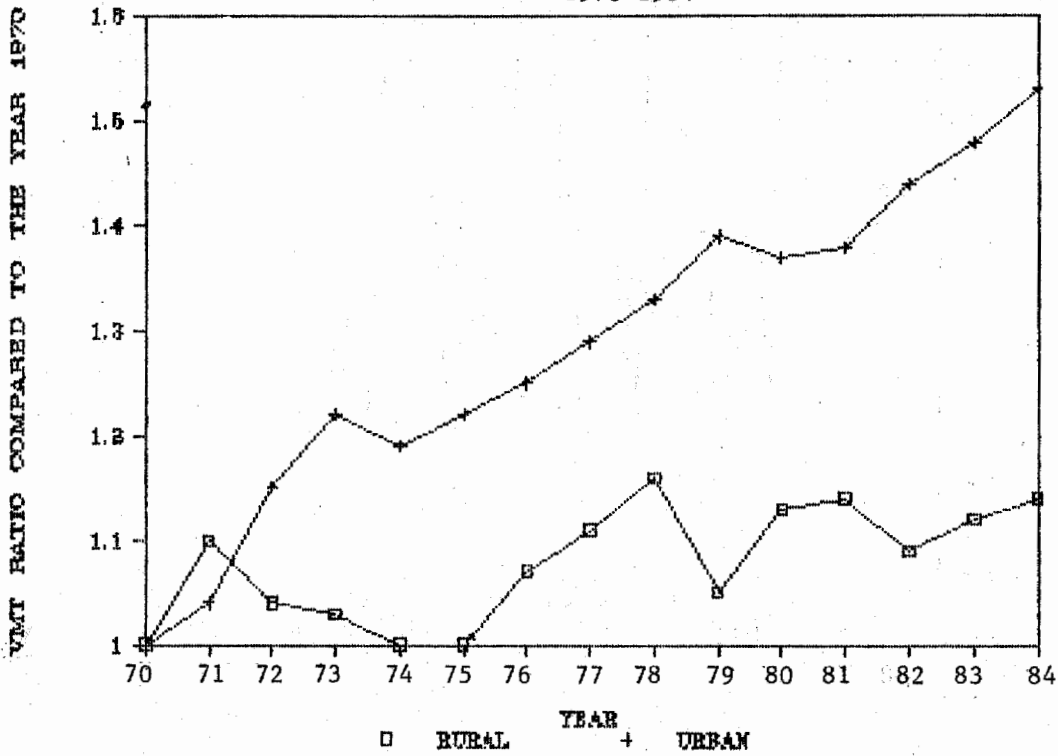


FIGURE 19B

NORMALIZED VMT FOR REGION 3

1970-1984

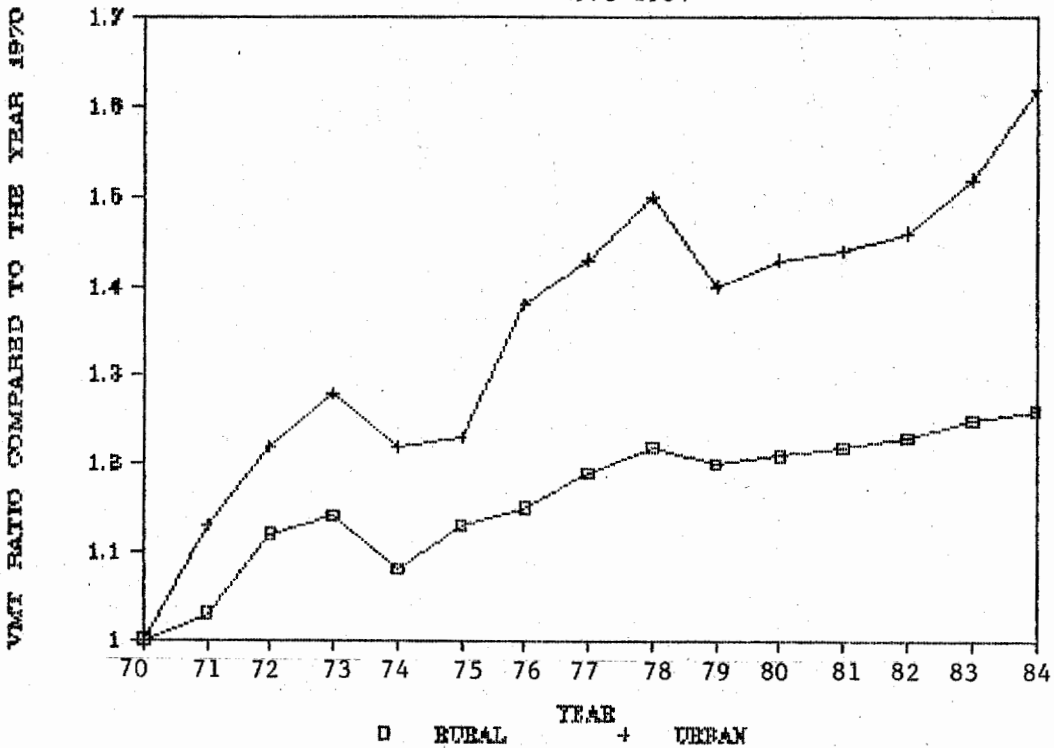


FIGURE 19E

NORMALIZED VMT FOR REGION 4
1970-1984

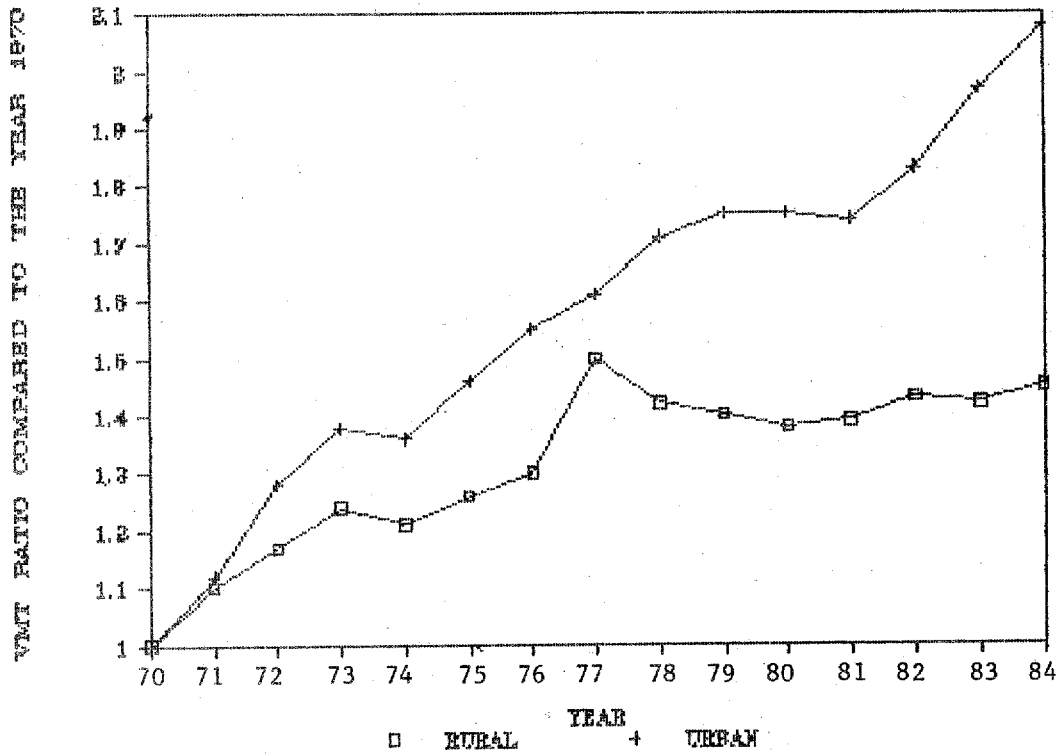


FIGURE 19D

NORMALIZED VMT FOR REGION 5
1970-1984

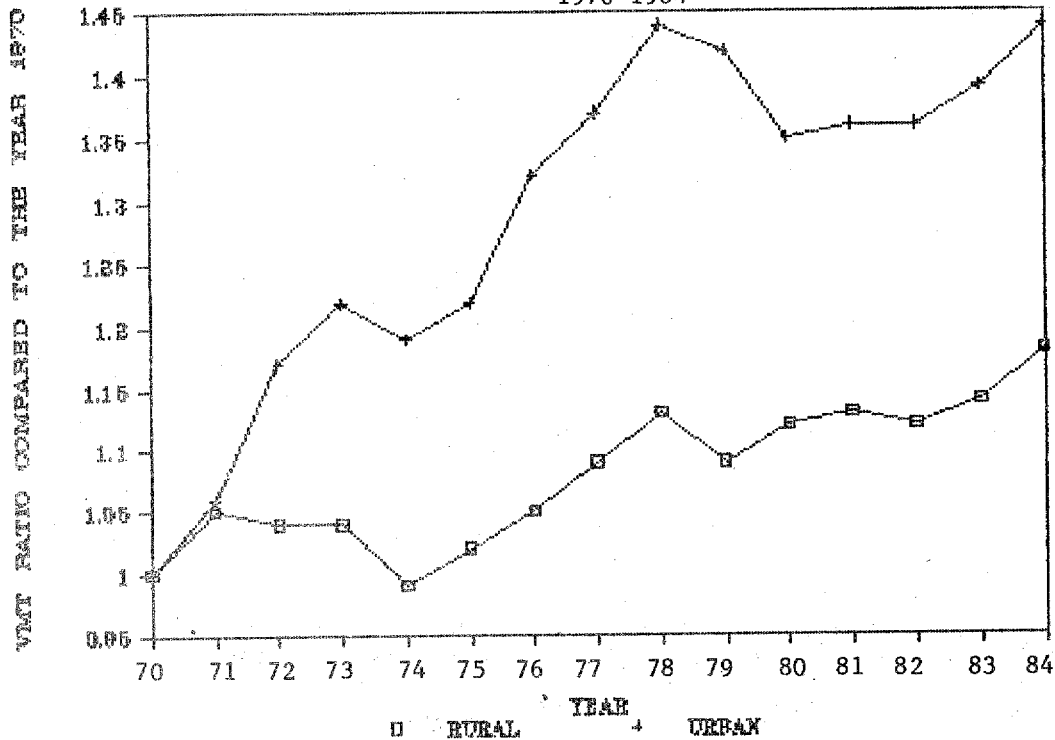


FIGURE 19E

NORMALIZED VMT FOR REGION 6
1970-1984

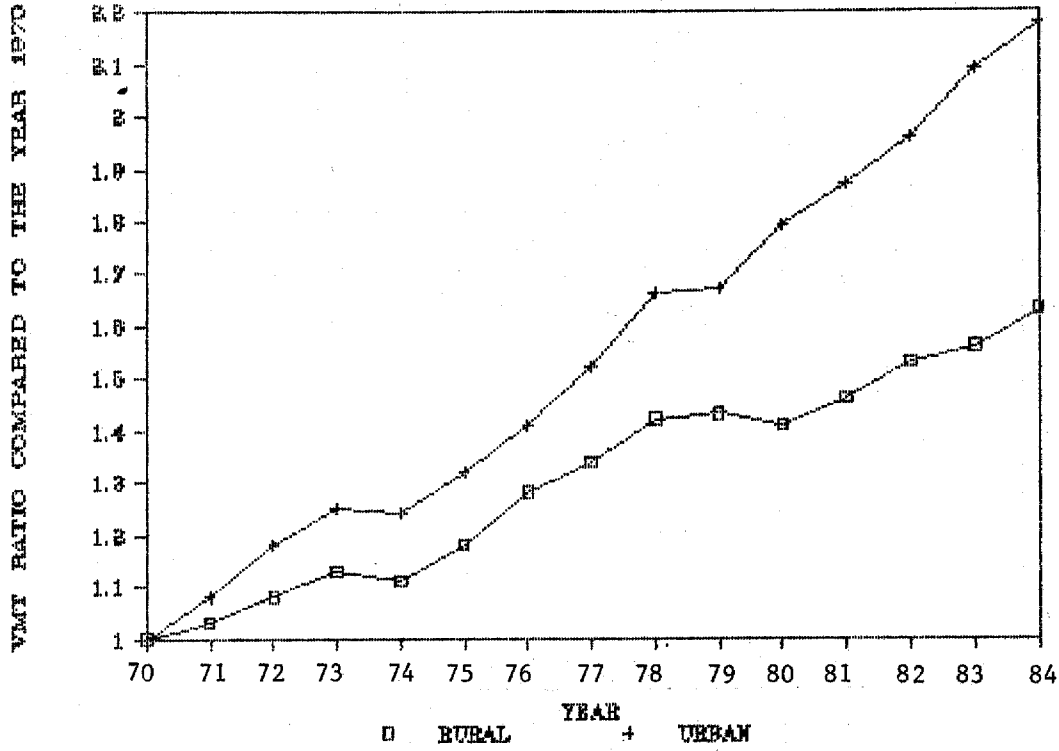


FIGURE 19F

NORMALIZED VMT FOR REGION 7
1970-1984

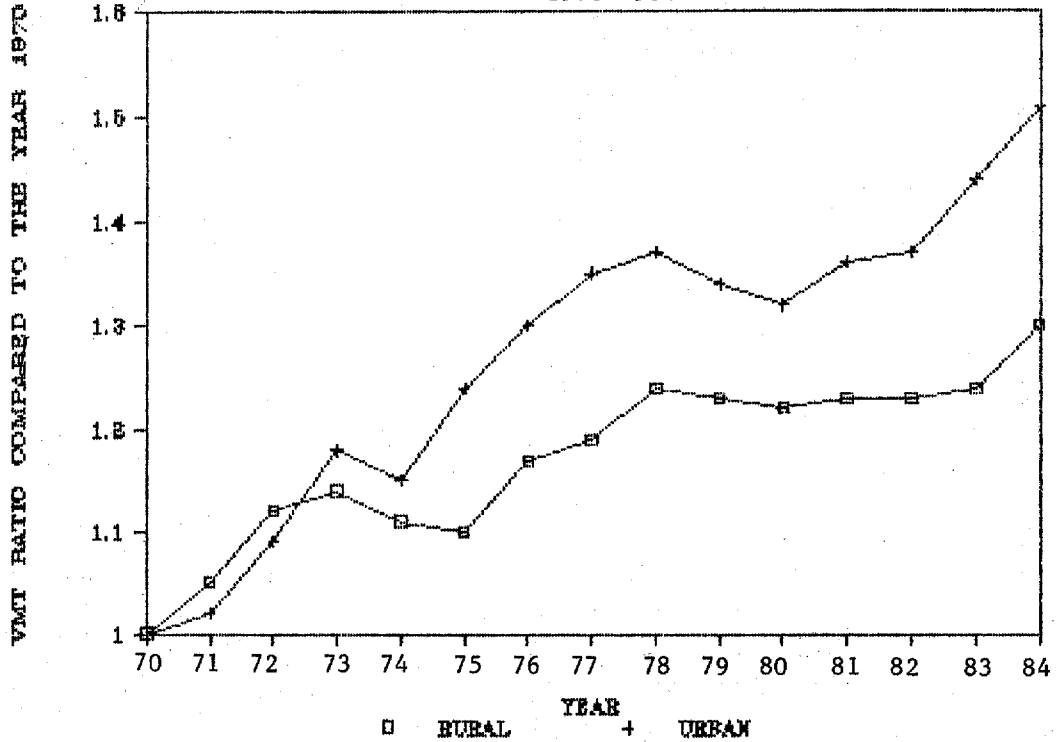


FIGURE 19G

NORMALIZED VMT FOR REGION 8

1970-1984

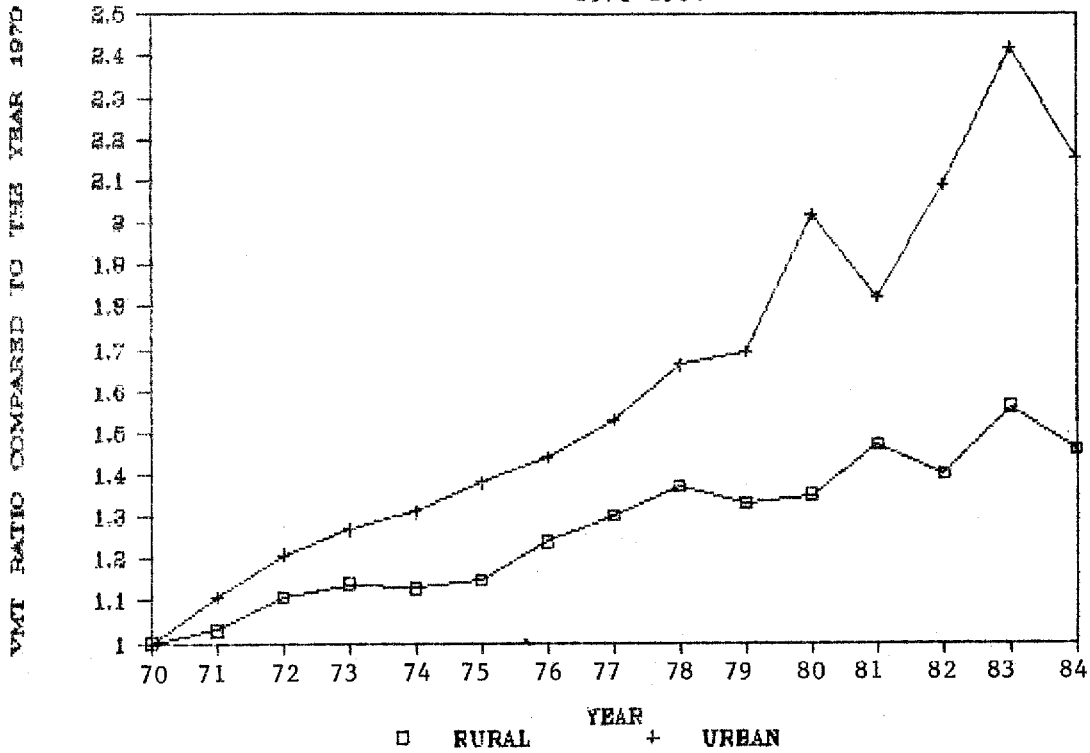


FIGURE 19H

NORMALIZED VMT FOR REGION 9

1970-1984

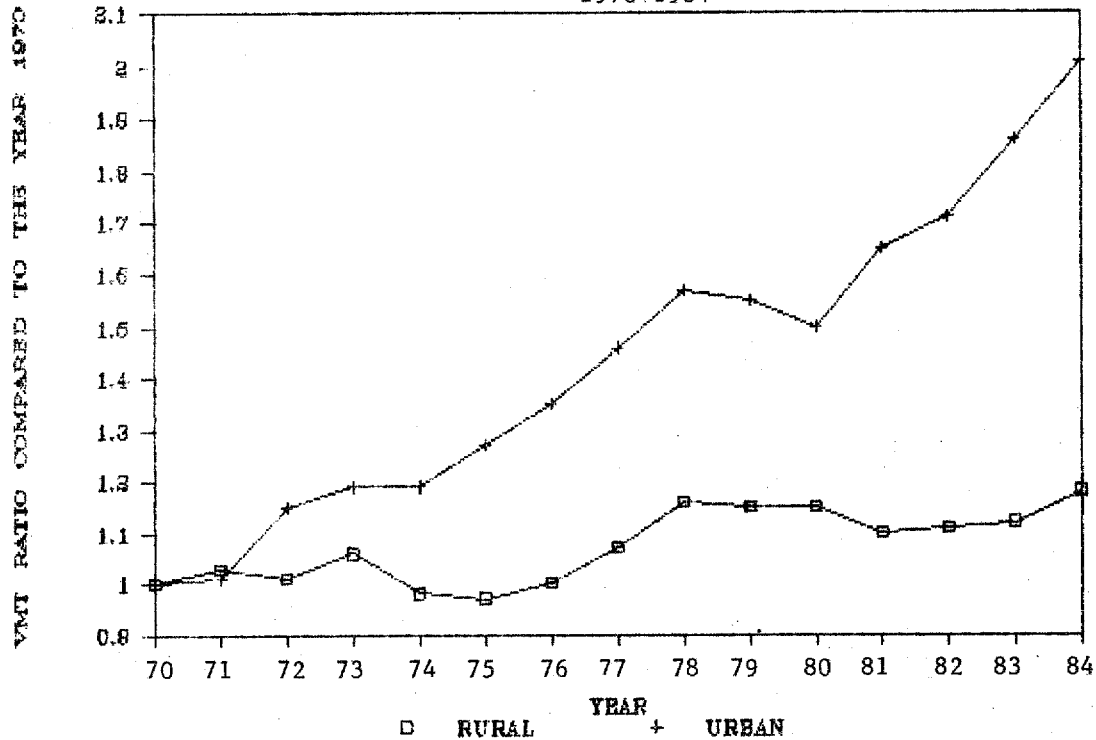


FIGURE 191

NORMALIZED VMT FOR REGION 10
1970-1984

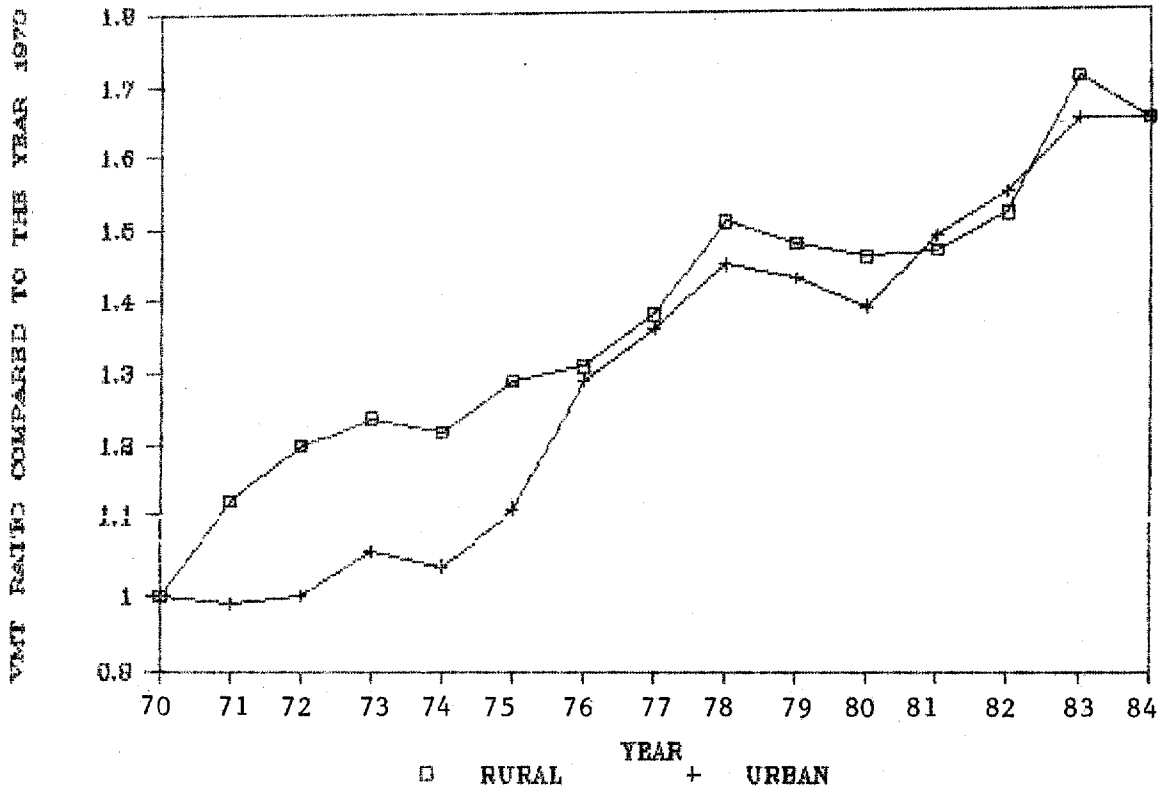


TABLE 6. REGIONAL HIGHWAY TRAVEL
(VMT IN BILLION)

RURAL VMT

	REG 1	REG 3	REG 4	REG 5	REG 6	REG 7	REG 8	REG 9	REG 10
1970	54.34	62.49	109.77	114.89	64.16	38.58	23.61	51.24	20.39
1971	59.65	64.41	121.11	120.90	66.24	40.59	24.39	52.70	22.79
1972	56.78	69.97	128.26	119.82	69.20	43.36	26.30	51.65	24.45
1973	55.95	71.10	135.85	119.74	72.74	44.01	26.96	54.10	25.35
1974	54.38	67.78	133.10	114.20	71.17	42.87	26.68	50.30	24.87
1975	54.40	70.35	138.66	117.13	75.50	42.59	27.15	49.53	26.36
1976	57.94	71.91	142.34	120.83	81.83	45.25	29.34	51.02	26.64
1977	60.46	74.33	148.04	125.50	86.14	46.07	30.72	54.68	28.16
1978	63.06	76.11	155.58	129.85	91.22	47.76	32.41	59.51	30.75
1979	56.81	75.14	153.20	125.75	91.45	47.39	31.46	58.71	30.18
1980	61.24	75.40	150.99	128.14	90.54	46.88	31.94	59.10	29.84
1981	61.78	76.21	152.25	129.89	93.94	47.55	34.63	56.37	29.92
1982	59.38	77.14	157.03	128.75	97.97	47.54	32.95	56.89	31.03
1983	60.75	78.39	155.56	131.52	100.33	47.99	36.87	57.36	34.86
1984	62.18	78.81	159.70	135.18	104.32	50.23	34.50	60.39	33.55

URBAN VMT

	REG 1	REG 3	REG 4	REG 5	REG 6	REG 7	REG 8	REG 9	REG 10
1970	106.88	57.27	79.78	125.79	57.47	26.24	12.11	84.75	19.98
1971	111.07	64.63	89.13	133.21	62.02	26.84	13.47	85.84	19.85
1972	123.26	70.08	101.84	146.55	67.79	28.51	14.67	97.36	19.95
1973	130.47	73.55	109.74	153.61	72.04	30.98	15.33	100.43	21.15
1974	127.51	70.16	108.12	149.82	71.51	30.24	15.89	101.24	20.70
1975	130.20	70.46	116.14	154.01	76.00	32.63	16.72	107.80	22.04
1976	134.04	78.86	123.70	165.67	80.94	34.03	17.41	114.78	25.85
1977	137.99	82.02	128.81	171.94	87.55	35.30	18.55	123.58	27.21
1978	142.42	85.90	136.30	180.53	95.67	35.93	20.15	132.64	28.91
1979	149.08	80.46	139.61	178.42	96.10	35.11	20.42	131.27	28.58
1980	146.05	81.79	139.54	169.45	103.01	34.70	24.43	127.30	27.78
1981	147.41	82.42	138.54	170.93	107.31	35.72	22.07	139.79	29.76
1982	154.36	83.42	146.00	171.21	112.64	35.90	25.33	145.30	30.94
1983	157.94	87.00	156.89	174.49	119.90	37.90	29.26	157.65	32.90
1984	163.35	92.74	166.29	181.37	125.04	39.49	26.04	170.60	33.00

ALL THE ABOVE INFORMATION ARE EXTRACTED AND COMPILED FROM THE VM-2 TABLE OF THE HIGHWAY STATISTICS PUBLICATIONS.

B. Travel by Functional System (1976-1984)

Similar to system usage at the national level, the percent of travel on the urban arterial system dominates over all others (Figures 21A, 21B, 21D, and 21H). The usage of the urban arterial is also increasing, whereas, the rural arterial and urban collector are decreasing. Although both Interstate systems are increasing, the rate of increase is very slight when compared to the urban arterial (Figures 21A to 21I).

During the 1979 fuel crisis, the proportion of travel on each functional class remained much the same, with the exception of Regions 1, 3, and 6. In Region 1, the decline in travel occurred mostly in the rural collector (Figure 20A). The vehicle miles traveled decreased from 30.65 billion to 23.82 billion (Table 7). In Region 3, the decline in usage for the urban collector is evident; however, the decrease began prior to the 1979 fuel crisis (Figure 20B). For Region 6, the urban arterial usage increased at the same time the urban collector usage decreased during the fuel crisis. But since then, the usage patterns reflect the change that took place in 1979 (Figure 21E).

In Region 10, the vehicle miles traveled on the urban collector increased while vehicle miles traveled on the urban arterial declined for 1978. A similar pattern was observed in 1979. Since 1979, the travel pattern has reverted to the pre-1978 pattern.

FIGURE 20A

RURAL FUNCTIONAL CLASS USAGE

REGION 1

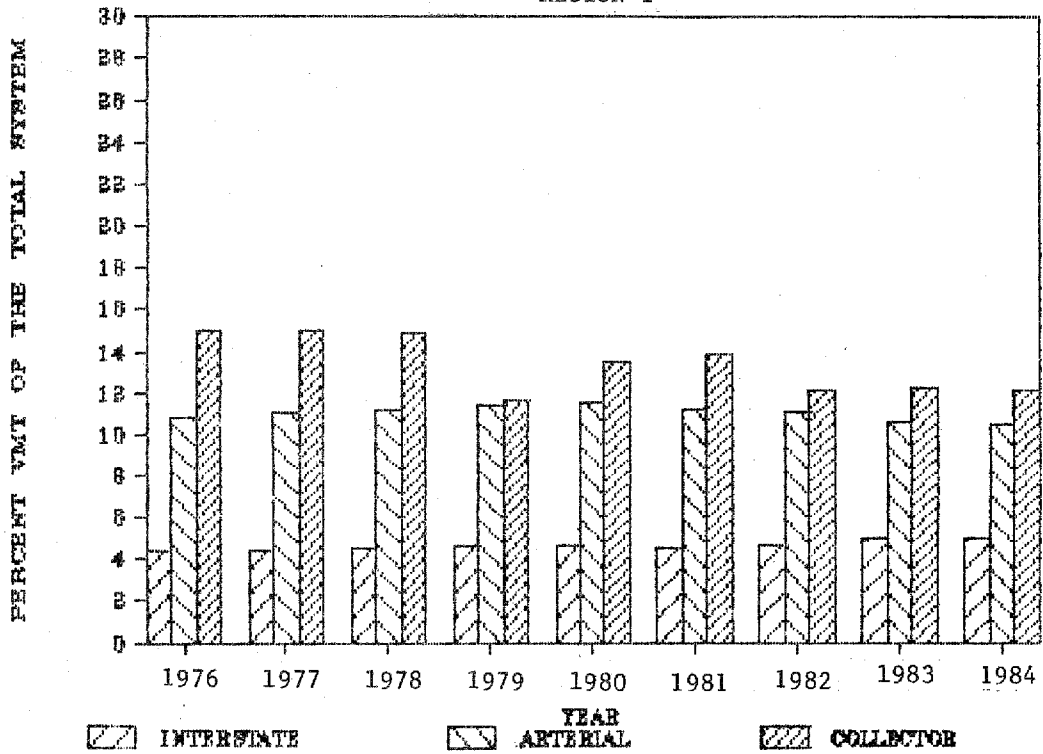


FIGURE 21A

URBAN FUNCTIONAL CLASS USAGE

REGION 1

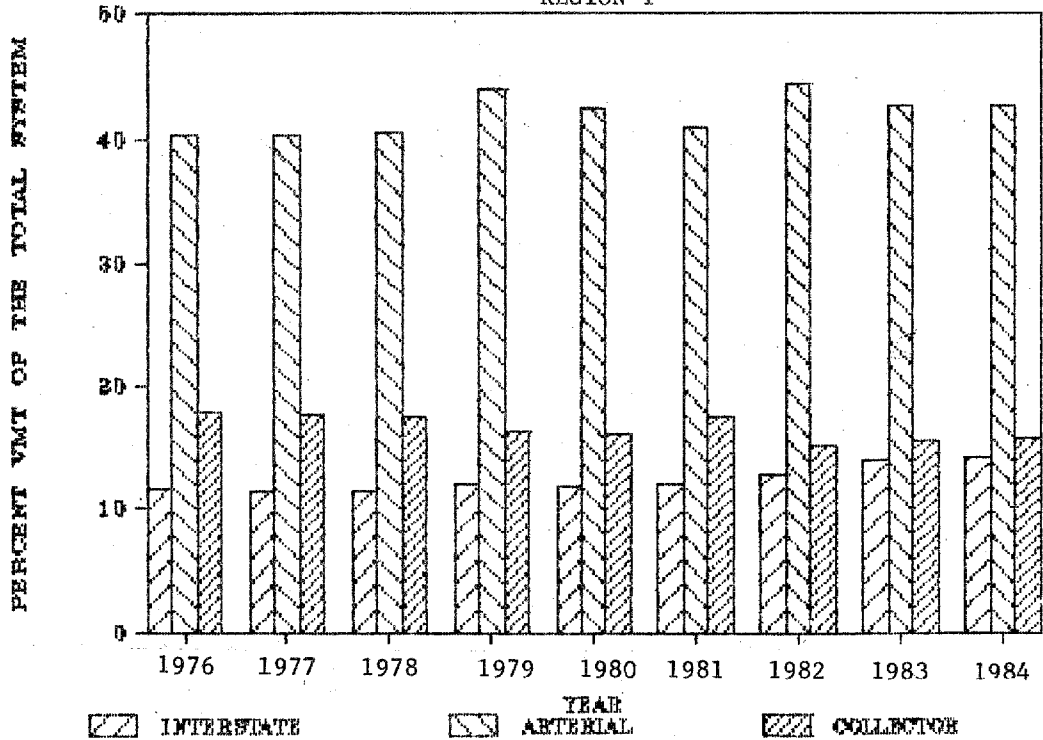


FIGURE 20B

RURAL FUNCTIONAL CLASS USAGE
REGION 3

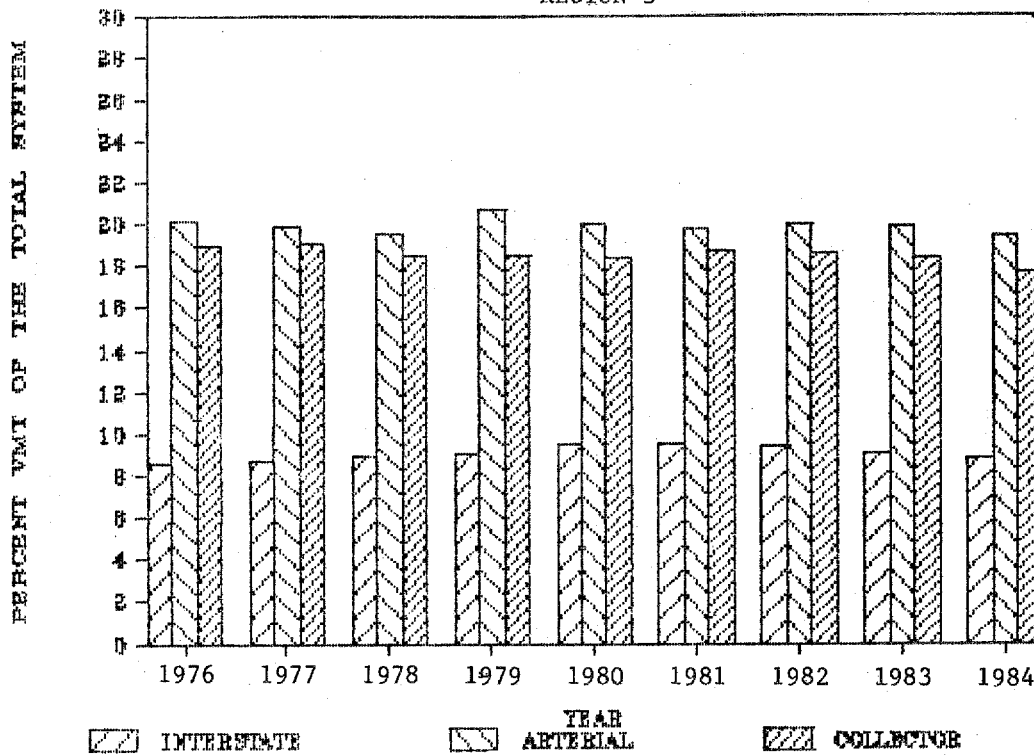


FIGURE 21B

URBAN FUNCTIONAL CLASS USAGE
REGION 3

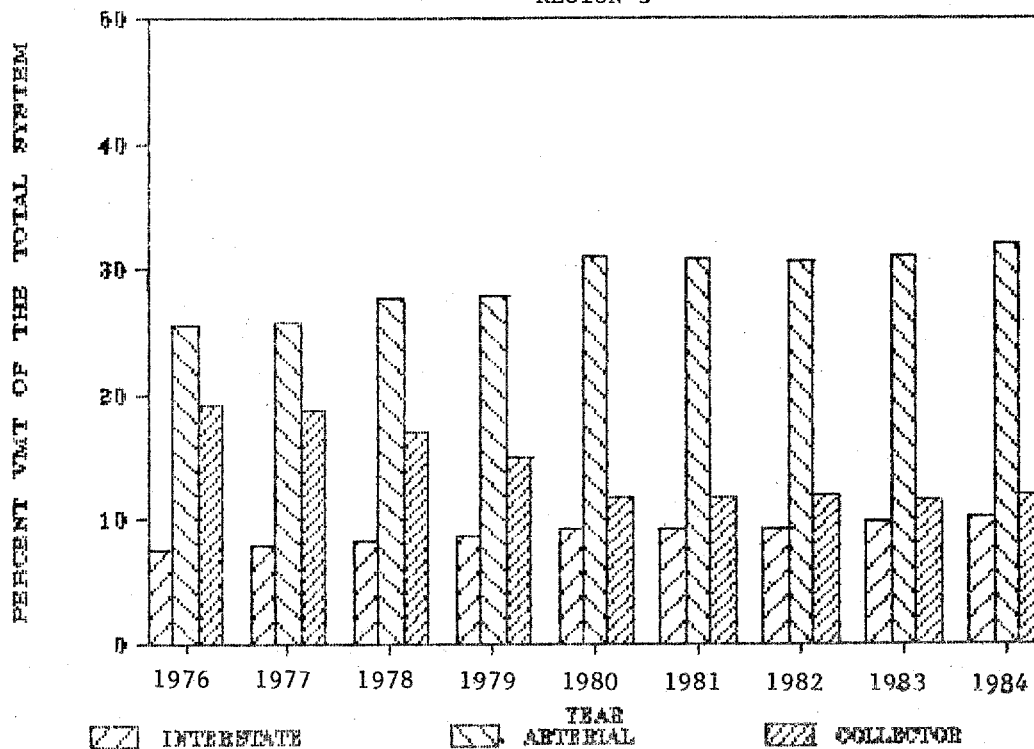


FIGURE 20C

RURAL FUNCTIONAL CLASS USAGE

REGION 4

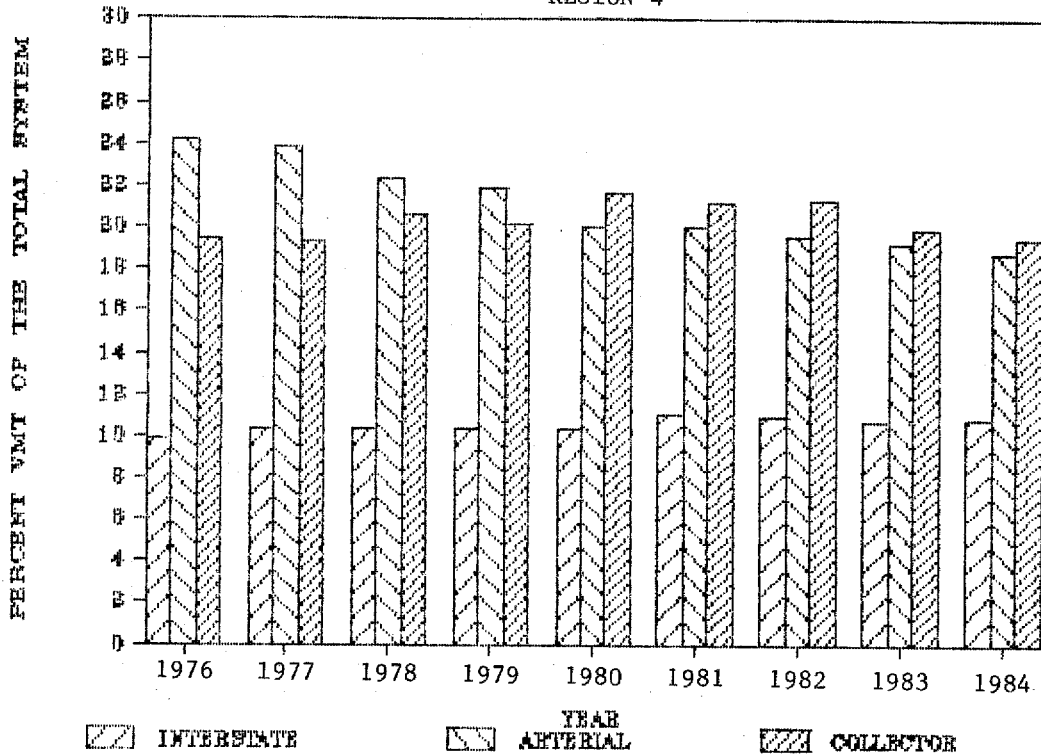


FIGURE 21C

URBAN FUNCTIONAL CLASS USAGE

REGION 4

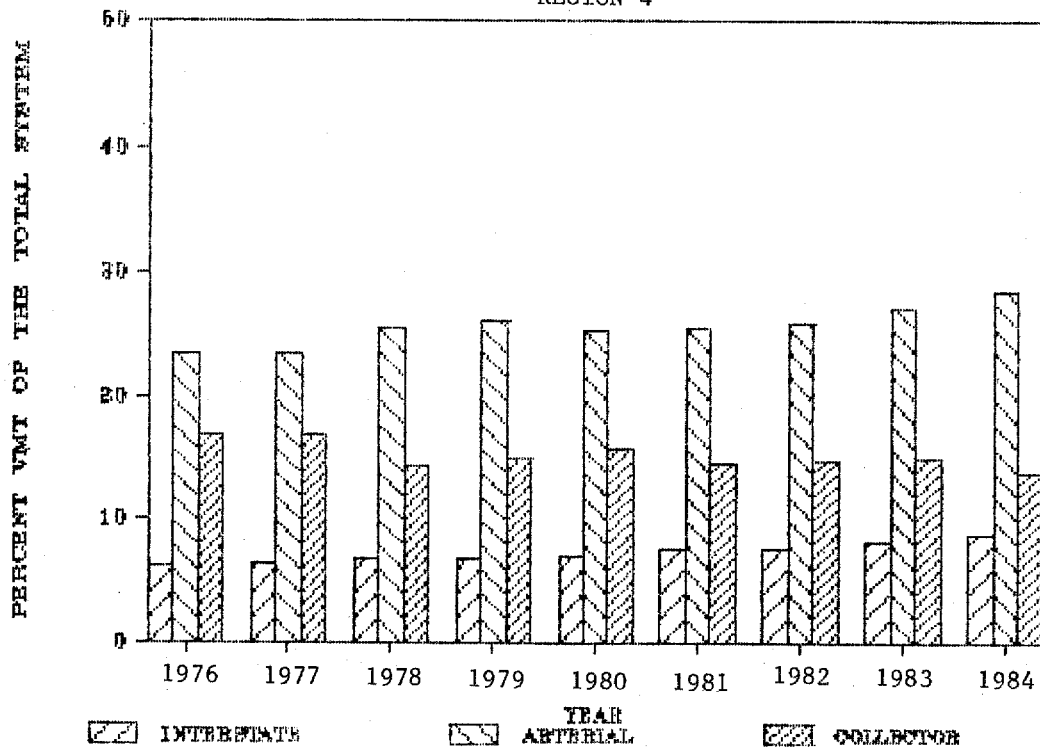


FIGURE 20D

RURAL FUNCTIONAL CLASS USAGE
REGION 5

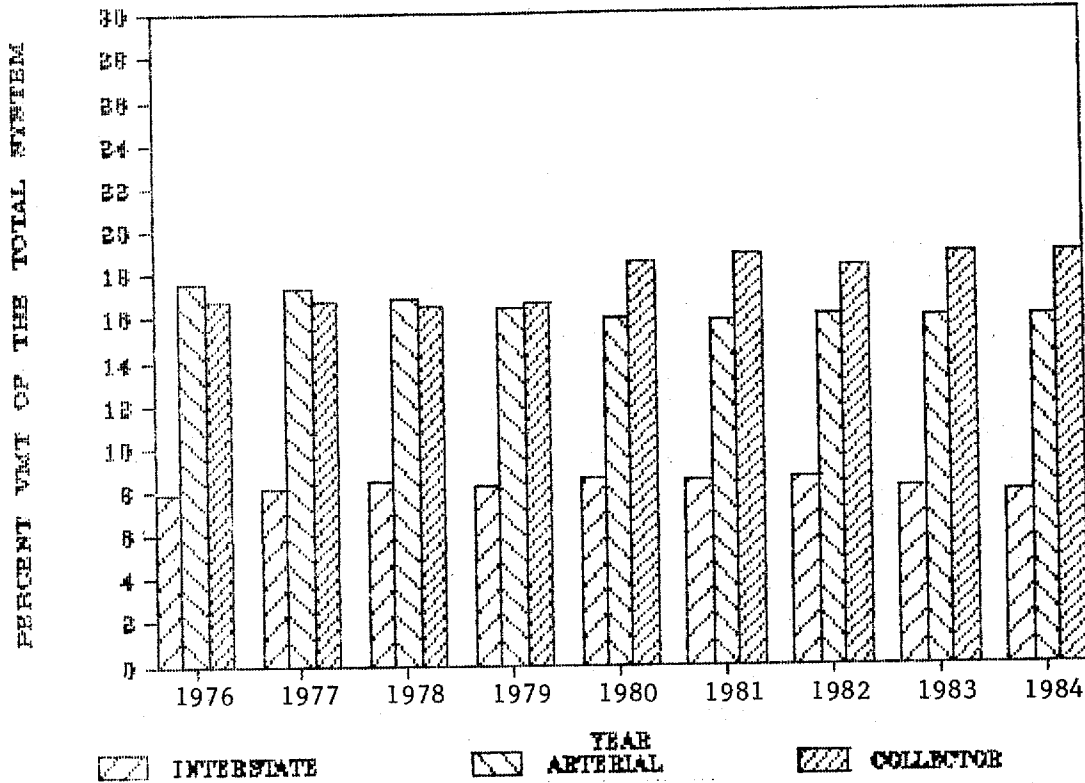


FIGURE 21D

URBAN FUNCTIONAL CLASS USAGE
REGION 5

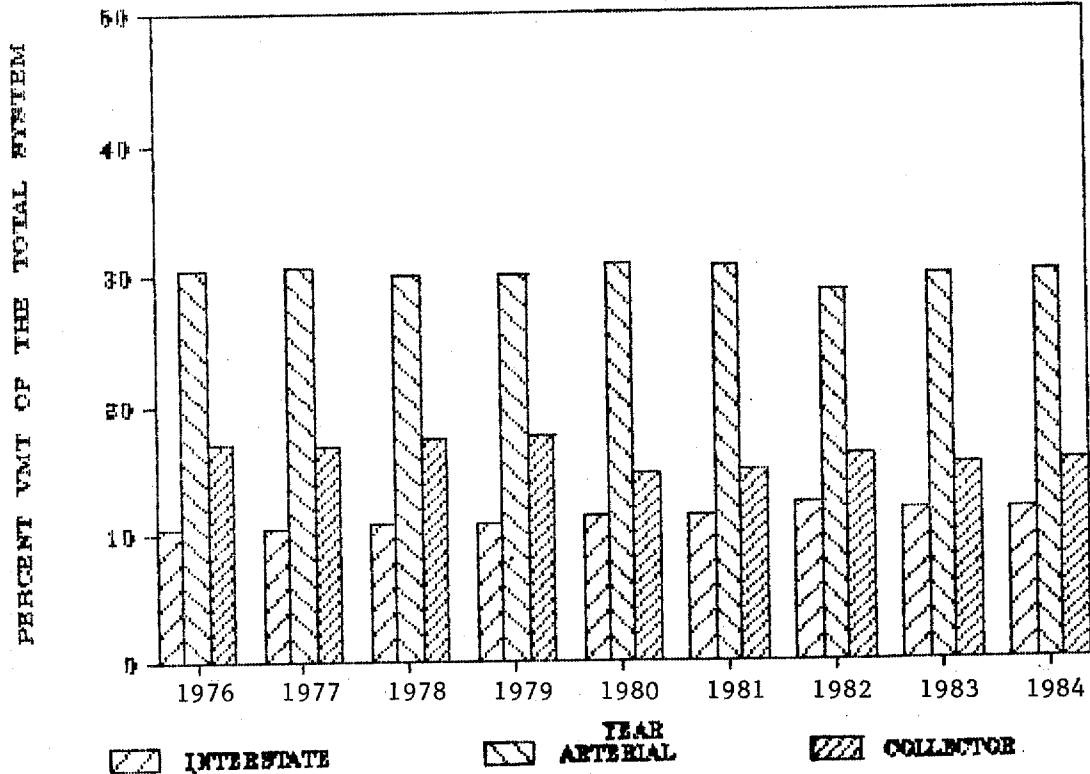


FIGURE 20E

RURAL FUNCTIONAL CLASS USAGE

REGION 6

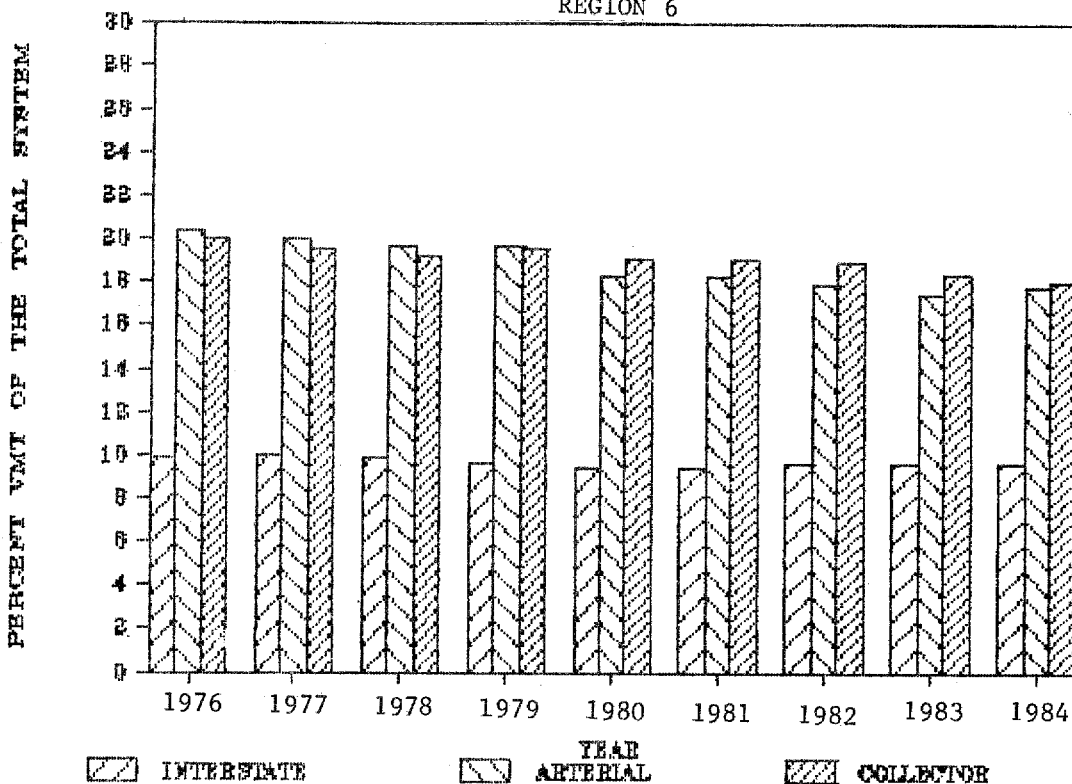


FIGURE 21E

URBAN FUNCTIONAL CLASS USAGE

REGION 6

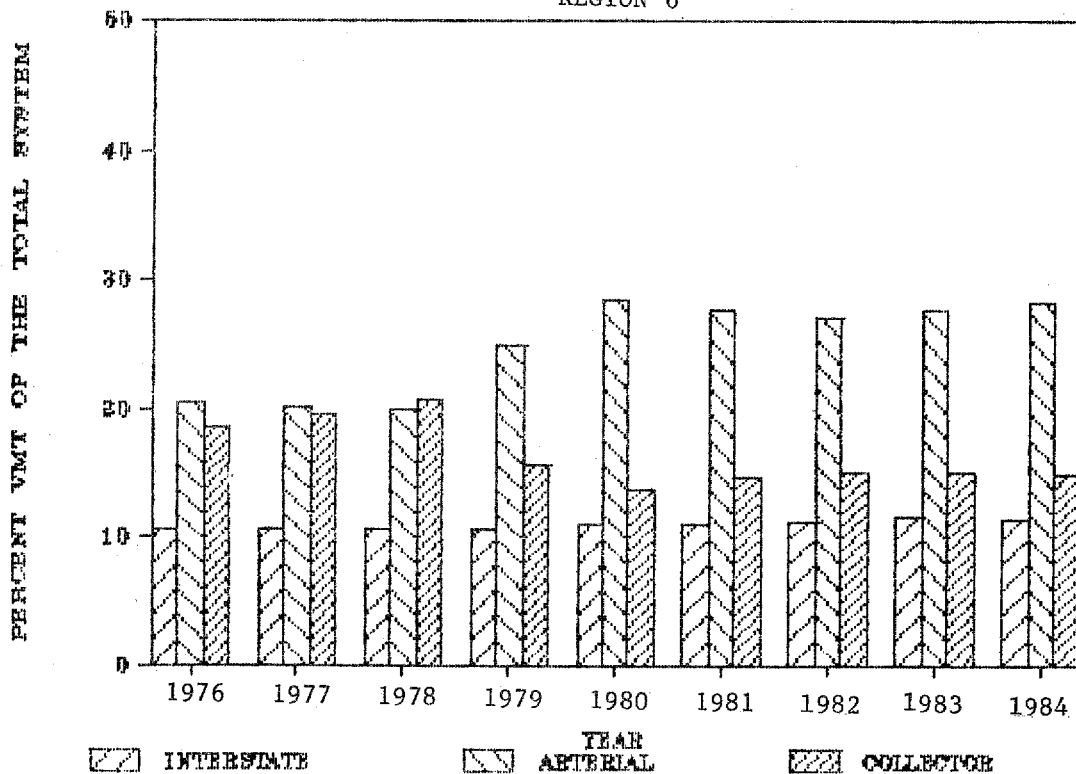


FIGURE 20F

RURAL FUNCTIONAL CLASS USAGE

REGION 7

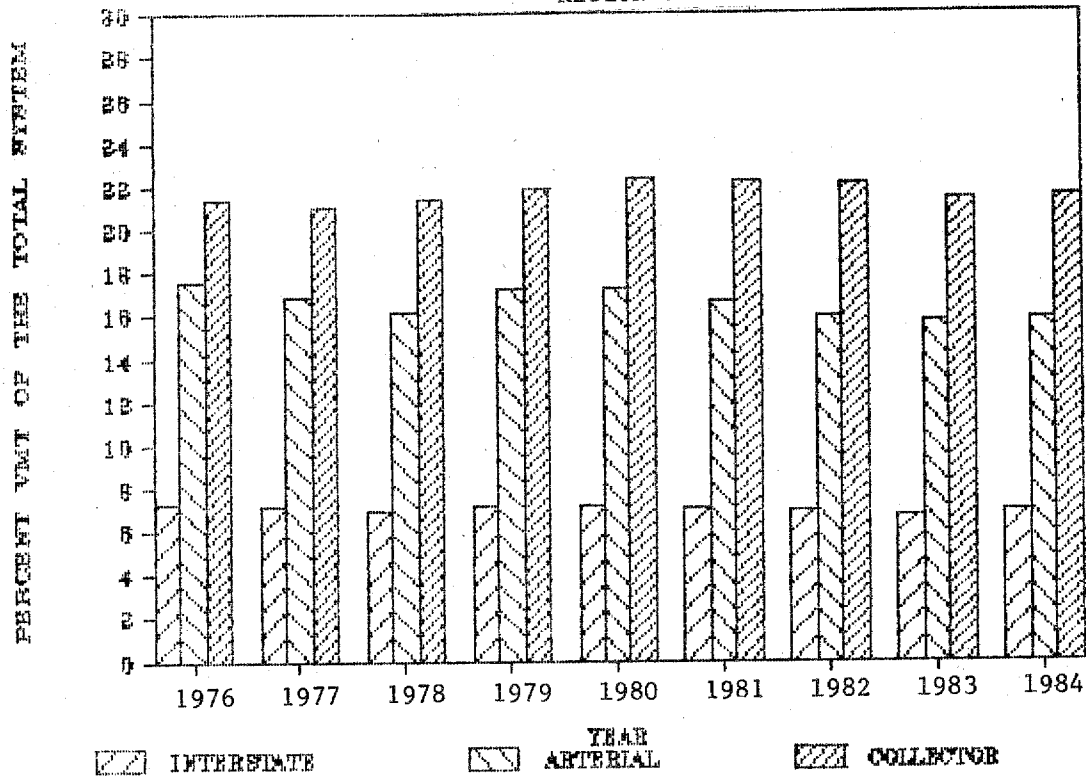


FIGURE 21F

URBAN FUNCTIONAL CLASS USAGE

REGION 7

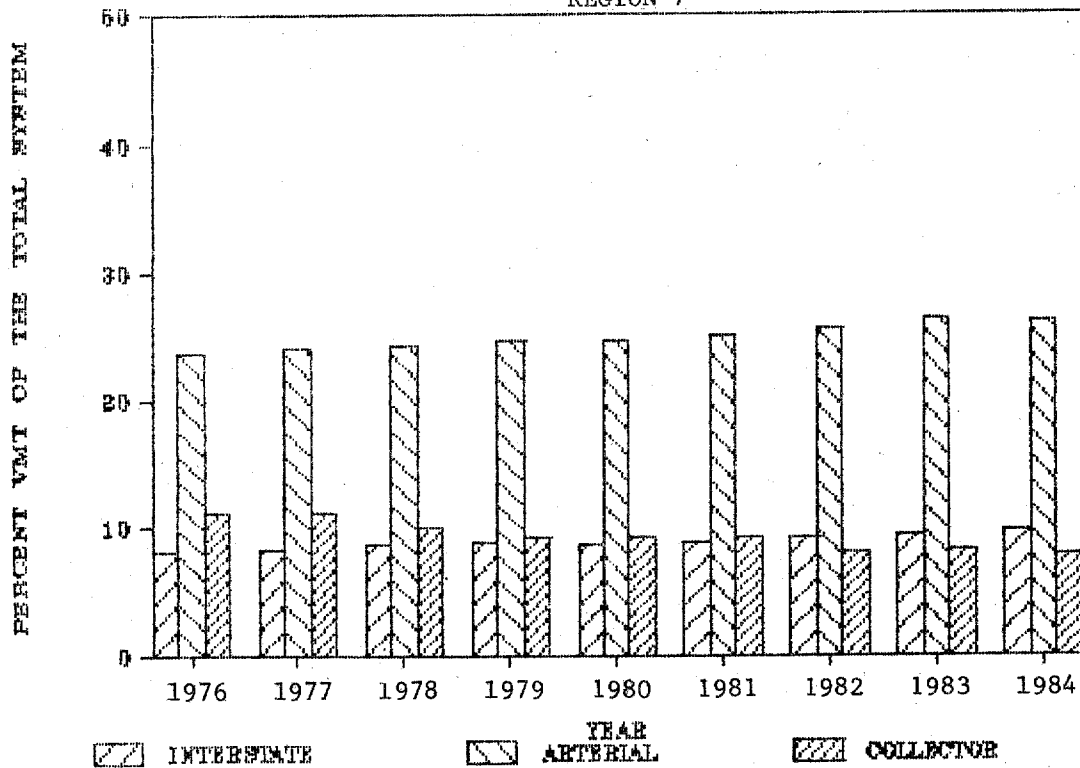


FIGURE 20G

RURAL FUNCTIONAL CLASS USAGE

REGION 8

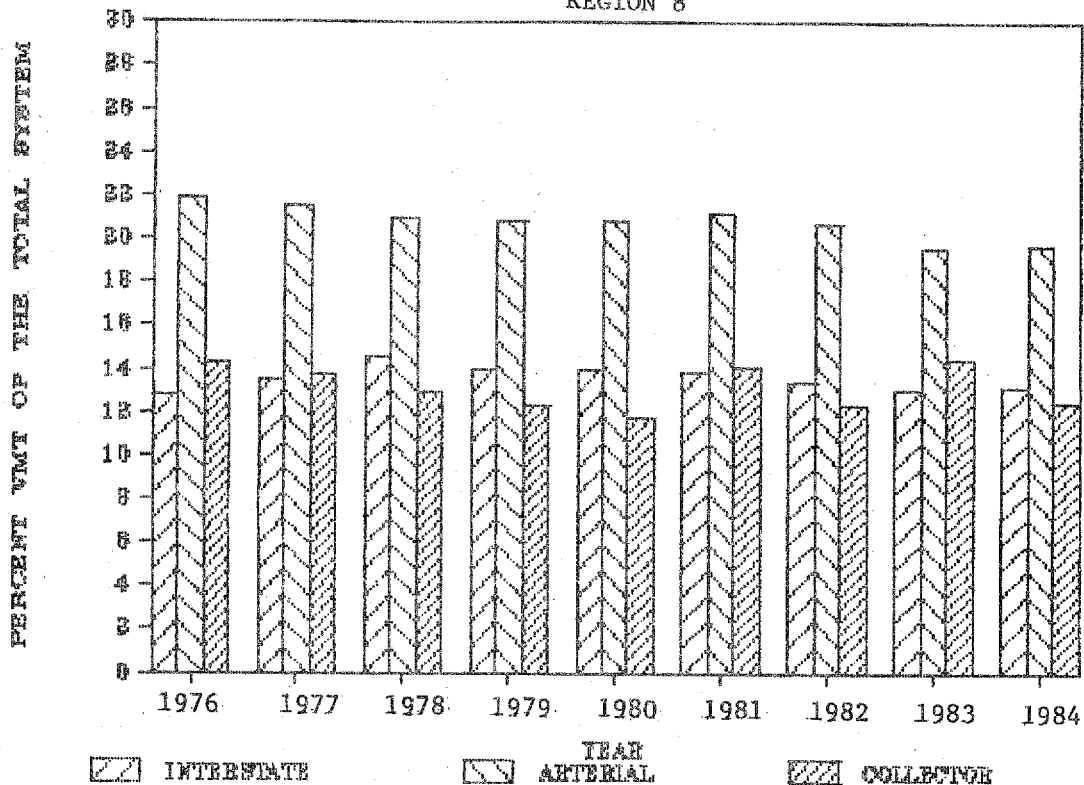


FIGURE 21G

URBAN FUNCTIONAL CLASS USAGE

REGION 8

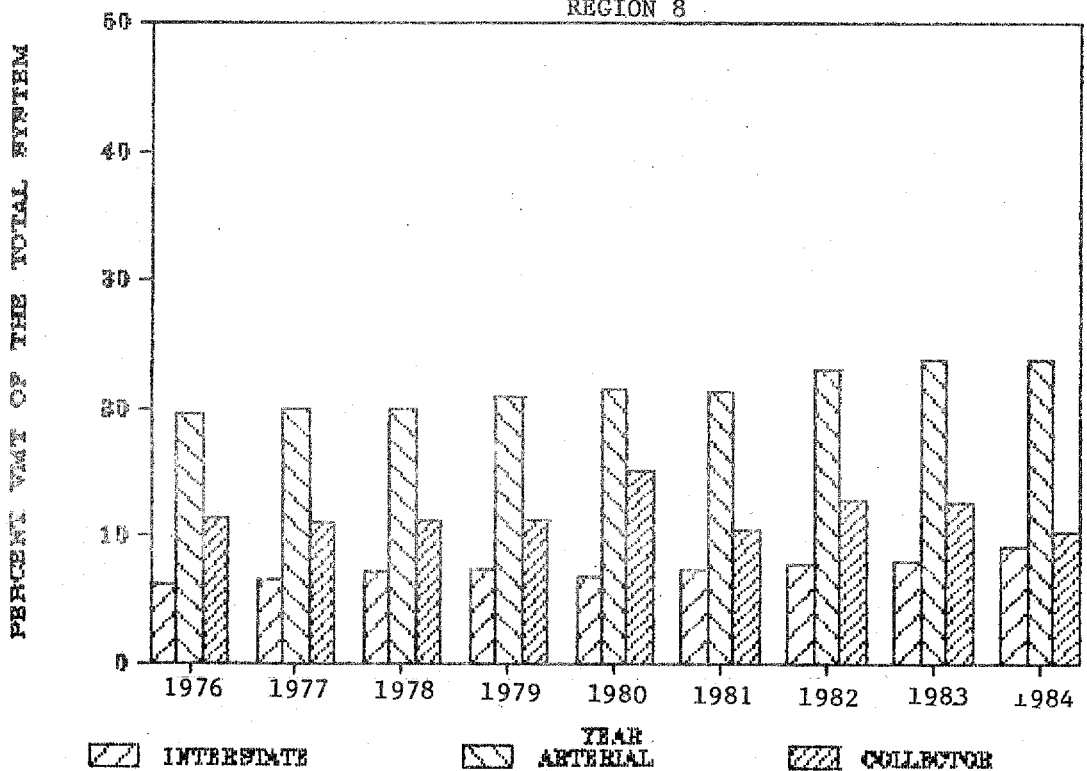


FIGURE 20H

RURAL FUNCTIONAL CLASS USAGE

REGION 9

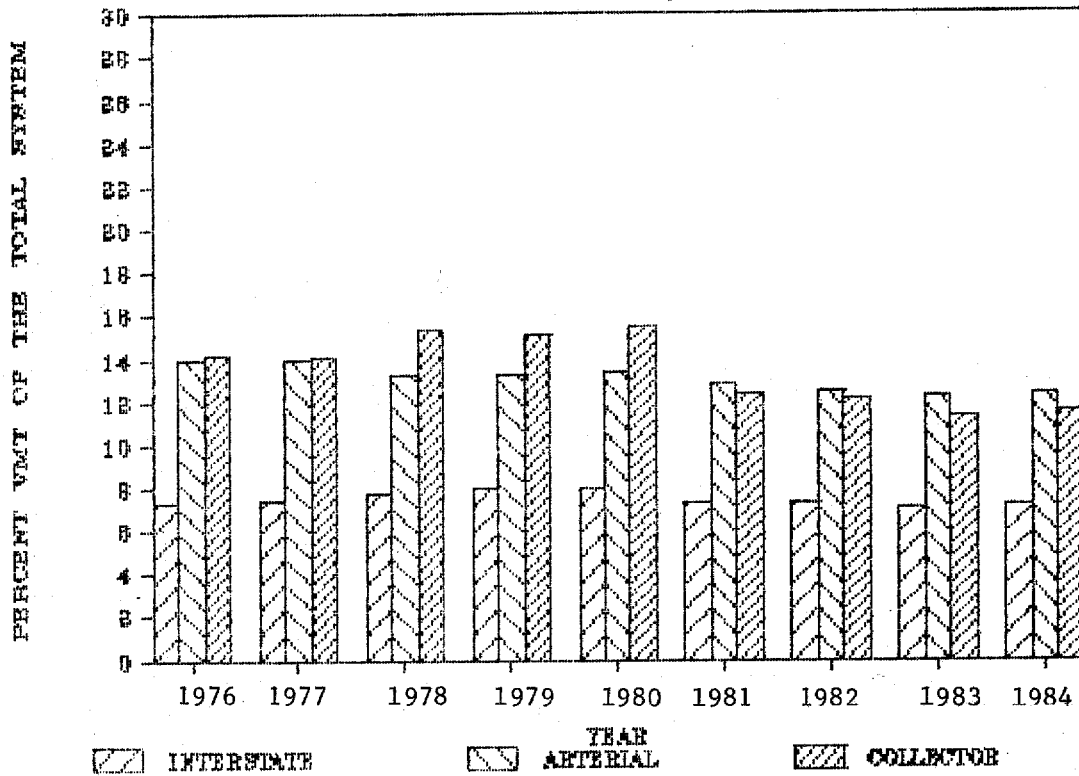


FIGURE 21H

URBAN FUNCTIONAL CLASS USAGE

REGION 9

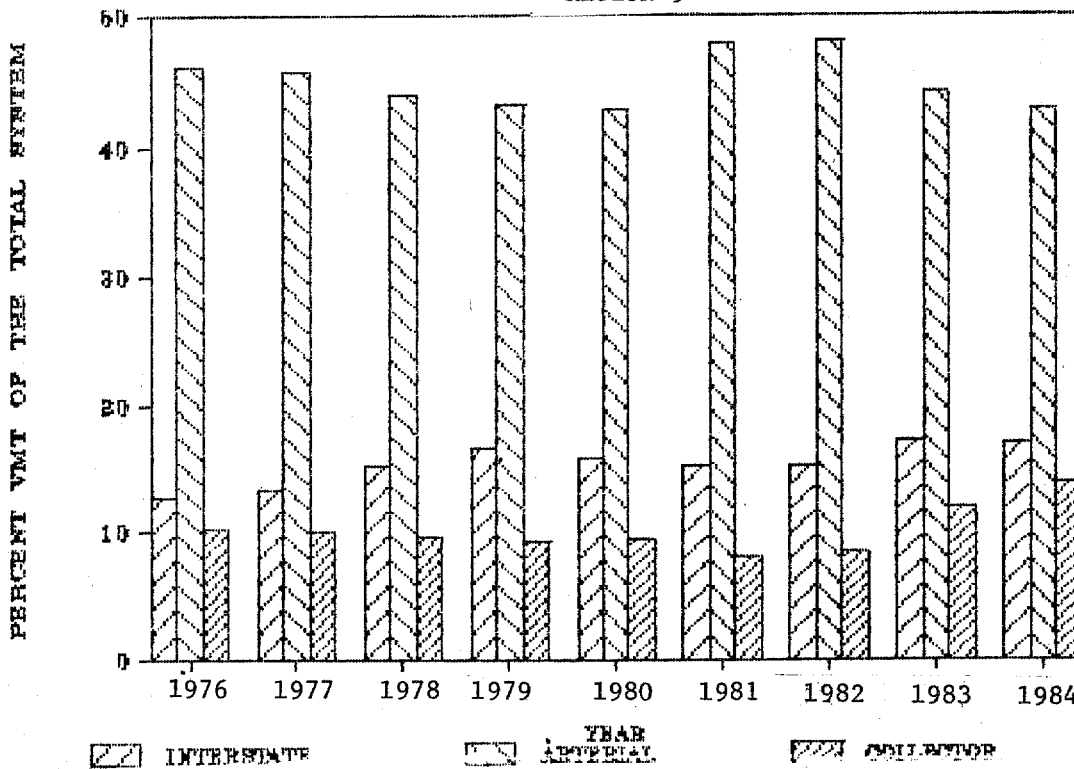


FIGURE 20I

RURAL FUNCTIONAL CLASS USAGE

REGION 10

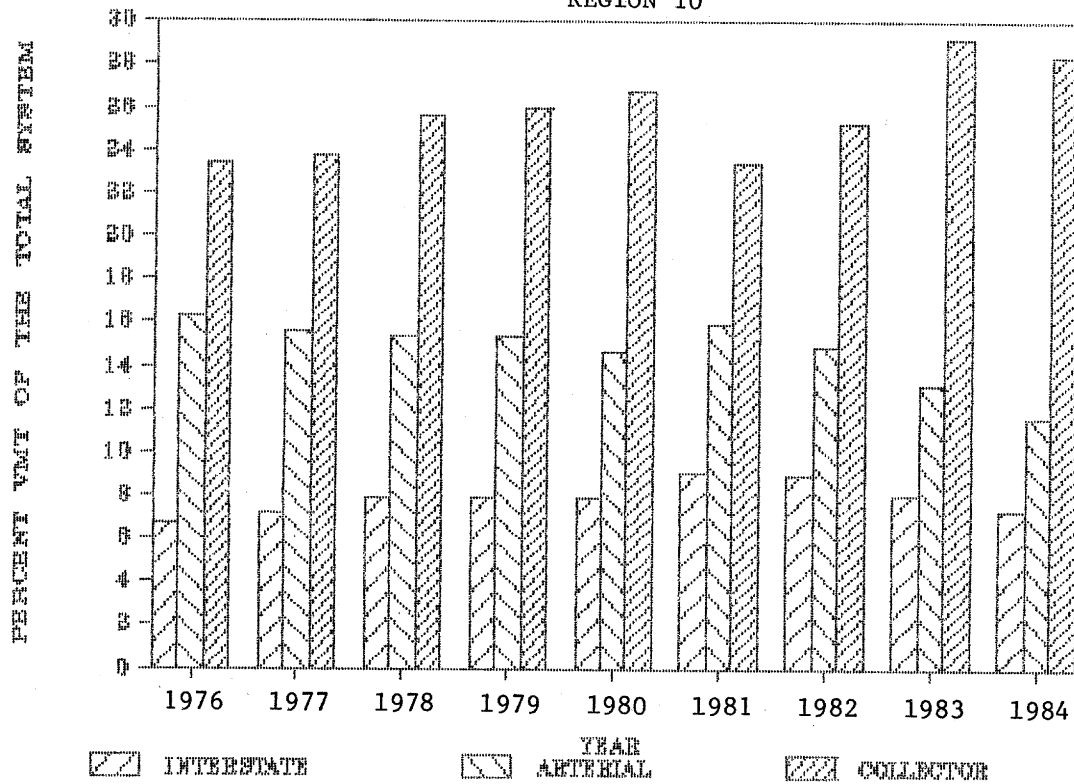
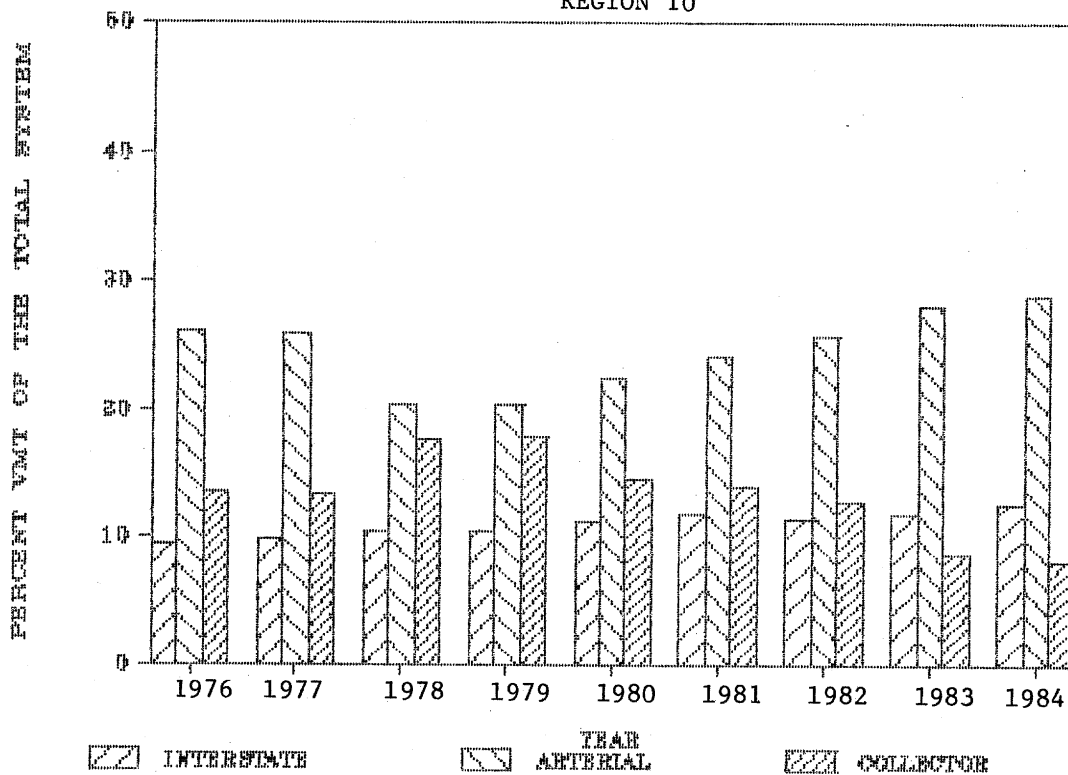


FIGURE 21I

URBAN FUNCTIONAL CLASS USAGE

REGION 10



The 1979 crisis had minimal effects on the usage pattern for Regions 4, 7, 8, and 9.

TABLE 7. REGIONAL VMT BY FUNCTIONAL SYSTEM

YEAR	RURAL VMT (BILLION)			URBAN VMT (BILLION)		
	REG 1			REG 1		
	INTERST	ARTERIAL	COLLECTR	INTERST	ARTERIAL	COLLECTR
1976	8.578	20.792	28.751	22.242	77.660	34.133
1977	8.751	21.899	29.807	22.706	80.292	34.987
1978	9.287	22.981	30.651	23.481	83.250	35.689
1979	9.433	23.556	23.818	24.670	90.748	33.664
1980	9.508	23.844	27.889	24.492	88.121	33.439
1981	9.494	23.418	28.964	25.049	85.789	36.572
1982	9.915	23.569	25.898	27.241	94.812	32.308
1983	10.959	23.146	26.645	30.555	93.442	33.938
1984	11.182	23.665	27.336	31.898	96.200	35.254
	REG 3			REG 3		
	INTERST	ARTERIAL	COLLECTR	INTERST	ARTERIAL	COLLECTR
1976	12.931	30.308	28.670	11.398	38.576	28.890
1977	13.505	31.059	29.765	12.194	40.395	29.426
1978	14.517	31.741	29.997	13.418	44.997	27.484
1979	14.146	32.142	28.855	13.397	43.499	23.566
1980	15.043	31.481	28.878	14.506	48.664	18.623
1981	15.066	31.418	29.725	14.766	48.804	18.852
1982	15.137	32.181	29.824	14.897	49.314	19.213
1983	14.990	32.927	30.475	16.405	51.372	19.226
1984	15.097	33.329	30.386	17.520	54.781	20.436
	REG 4			REG 4		
	INTERST	ARTERIAL	COLLECTR	INTERST	ARTERIAL	COLLECTR
1976	26.300	64.444	51.595	16.384	62.433	44.883
1977	28.456	66.198	53.388	17.737	64.666	46.411
1978	30.140	65.345	60.094	19.804	74.635	41.861
1979	30.102	64.172	58.921	19.777	76.374	43.454
1980	30.143	58.055	62.792	20.175	74.057	45.312
1981	32.174	58.301	61.773	22.038	74.373	42.132
1982	33.002	59.335	64.689	22.593	78.663	44.743
1983	33.345	59.915	62.296	25.519	84.809	46.558
1984	35.218	61.146	63.339	28.520	92.769	44.999

ALL INFORMATION IN THIS TABLE IS EXTRACTED AND COMPILED FROM THE VM-2 TABLE OF THE HIGHWAY STATISTICS PUBLICATIONS.

TABLE 7. REGIONAL VMT BY FUNCTIONAL SYSTEM

YEAR	RURAL VMT (BILLION)			URBAN VMT (BILLION)		
	REG 5			REG 5		
	INTERST	ARTERIAL	COLLECTR	INTERST	ARTERIAL	COLLECTR
1976	22.679	50.189	47.957	29.887	87.204	48.582
1977	24.047	51.588	49.869	31.160	90.939	49.843
1978	26.287	52.281	51.278	33.488	93.074	53.967
1979	25.239	49.860	50.652	33.056	91.698	53.666
1980	25.561	47.388	55.189	33.893	91.899	43.653
1981	25.498	47.680	56.714	34.137	92.305	44.491
1982	25.773	48.212	54.764	36.827	86.275	48.108
1983	24.954	48.821	57.735	36.320	91.356	46.811
1984	25.047	50.491	59.637	37.329	95.058	48.980

YEAR	REG 6			REG 6		
	INTERST	ARTERIAL	COLLECTR	INTERST	ARTERIAL	COLLECTR
1976	16.135	33.113	32.584	17.258	33.364	30.317
1977	17.376	34.851	33.911	18.527	35.015	34.006
1978	18.396	34.750	35.765	19.875	37.136	38.659
1979	18.012	36.782	36.654	19.848	46.935	29.321
1980	18.152	35.425	36.962	21.213	55.069	26.724
1981	18.915	36.711	38.315	22.023	55.624	29.660
1982	20.216	37.624	39.933	23.743	57.115	31.780
1983	21.221	38.524	40.583	25.469	61.043	33.391
1984	22.022	40.809	41.488	26.377	64.724	33.939

YEAR	REG 7			REG 7		
	INTERST	ARTERIAL	COLLECTR	INTERST	ARTERIAL	COLLECTR
1976	8.630	20.689	15.934	6.451	18.768	8.814
1977	8.954	20.919	16.195	6.750	19.489	9.056
1978	9.278	21.394	17.088	7.305	20.296	8.325
1979	8.893	21.252	17.243	7.263	20.270	7.580
1980	8.628	20.720	17.530	7.105	20.053	7.541
1981	8.861	20.861	17.828	7.328	20.739	7.648
1982	9.054	20.833	17.648	7.665	21.413	6.824
1983	9.132	21.216	17.646	8.176	22.575	7.146
1984	9.676	22.114	18.439	8.849	23.471	7.168

TABLE 7. REGIONAL VMT BY FUNCTIONAL SYSTEM

YEAR	RURAL VMT (BILLION)			URBAN VMT (BILLION)		
	REG 8			REG 8		
	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR
1976	7.209	12.367	9.766	2.920	9.167	5.319
1977	7.990	12.709	10.029	3.256	9.819	5.471
1978	8.922	12.903	10.599	3.735	10.499	5.920
1979	8.476	12.574	10.406	3.818	10.915	5.791
1980	8.764	13.079	10.094	3.800	12.081	8.548
1981	8.859	13.572	12.197	4.116	12.079	5.878
1982	8.590	13.341	11.015	4.508	13.414	7.406
1983	8.834	13.226	14.812	5.167	15.911	8.283
1984	8.831	13.257	12.409	5.474	14.399	6.181

YEAR	REG 9			REG 9		
	INTERST ARTERIAL COLLECTR			INTERST ARTERIAL COLLECTR		
	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR
1976	10.557	20.071	20.389	21.172	76.694	16.926
1977	11.499	21.488	21.693	23.861	81.699	18.023
1978	12.917	21.972	24.925	29.497	84.871	18.473
1979	13.141	21.805	23.765	31.462	82.042	17.765
1980	13.112	21.791	24.204	29.450	90.093	17.759
1981	12.951	22.751	20.665	29.811	94.178	15.796
1982	13.315	22.813	20.765	31.075	97.165	17.056
1983	13.672	23.450	20.241	36.978	94.939	25.728
1984	14.107	24.132	22.146	39.247	99.296	32.059

YEAR	REG 10			REG 10		
	INTERST ARTERIAL COLLECTR			INTERST ARTERIAL COLLECTR		
	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR	INTERST ARTERIAL COLLECTR
1976	4.866	11.813	9.956	4.986	13.721	7.146
1977	5.581	12.076	10.504	5.448	14.384	7.373
1978	6.381	12.317	12.060	6.189	12.171	10.550
1979	6.155	11.967	12.058	6.161	11.893	10.521
1980	6.242	11.586	12.015	6.466	12.933	8.376
1981	6.954	12.248	10.713	7.007	14.486	8.244
1982	7.079	11.870	12.091	7.057	15.928	7.951
1983	7.391	12.150	15.321	7.931	19.054	5.917
1984	7.362	11.728	14.456	8.358	19.293	5.441

C. Daily and Weekly Travel by Hour of the Day (1978, 1983)

The regional weekly travel patterns follow the same basic characteristics as the national weekly travel. Weekday travel contains two peak periods--morning and afternoon while weekend travel has a long midday peak period.

The rural morning peak is small when compared to the afternoon peak. In some regions, the rural morning peak does not exist (Region 4, 5, 8, 9, and 10). The highest morning peak occurs in Region 5. In 1978, the morning peak represented 6.3 percent of the daily traffic and, in 1983, increased to 7.0 percent of the daily traffic (Appendix A). Overall, the rural regional travel reflects the same characteristics as the national rural travel.

The urban travel has a higher morning and afternoon peak than rural travel. Generally, the morning peak travel is less than the afternoon peak travel with the exception of Region 6 (Appendix A). The morning peak for Region 6 measured 8.0 percent, while the afternoon peak measured 7.8 percent of the daily traffic. Although most travel increased with time, the urban travel in Region 8 decreased for the period between 1978 to 1983.

Due to the lack of hourly traffic information for California, Arizona ATR data was used instead. The data for the rural sector does not reflect Region 9 rural travel; instead, it reflects rural travel in Arizona. The data for Region 10 showed an unusually high midday peak.

This section only contains the travel data for Region 1. Further details concerning all other regions are located in Appendix A.

FIGURE 22A

DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 1 - 1978

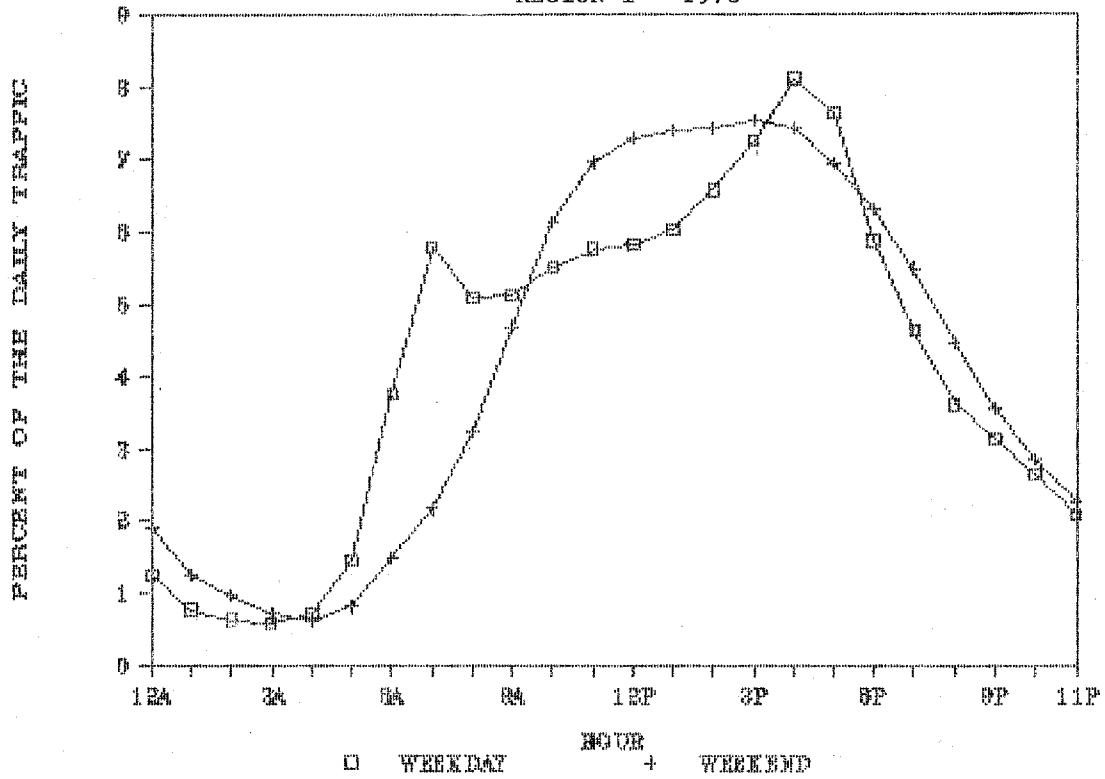


FIGURE 22B

PERCENT VMT FOR THE RURAL SYSTEM

REGION 1 - 1978

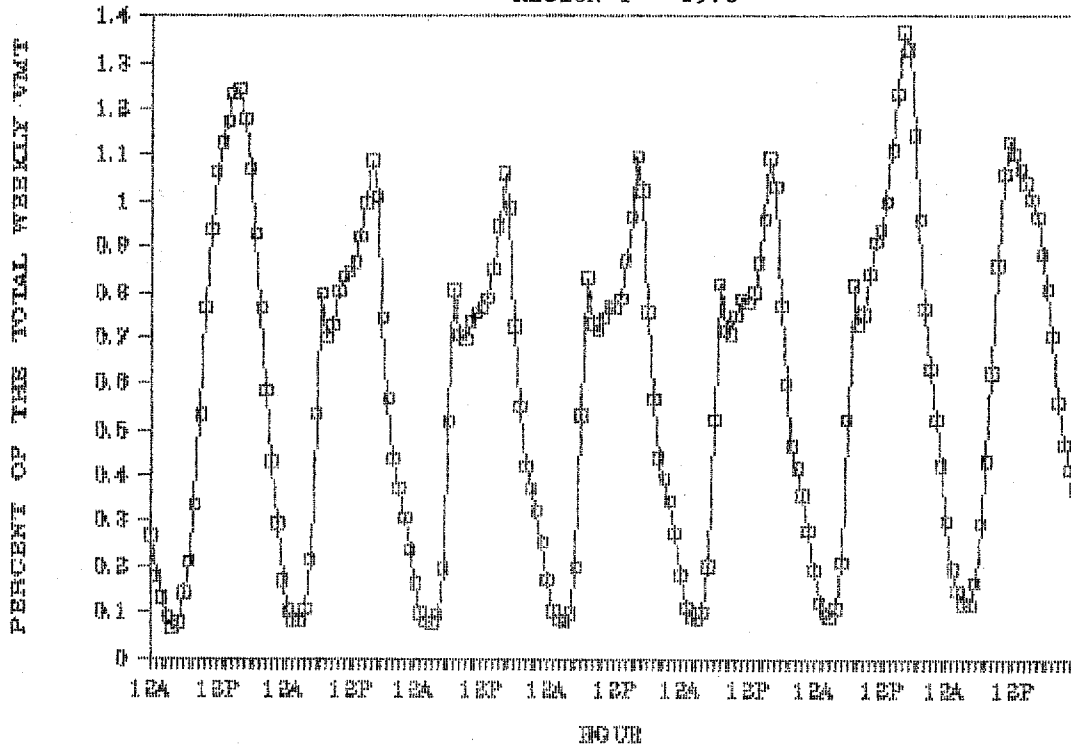


FIGURE 23A

DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 1- 1978

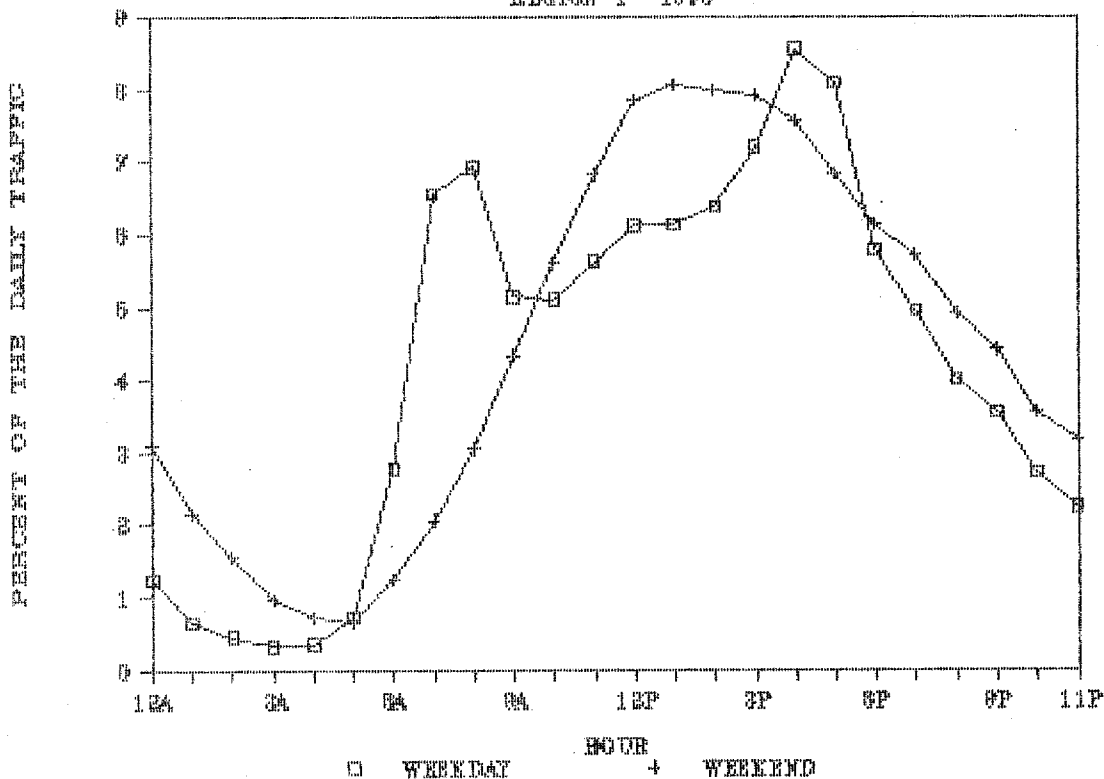


FIGURE 23B

PERCENT VMT FOR THE URBAN SYSTEM

REGION 1- 1978

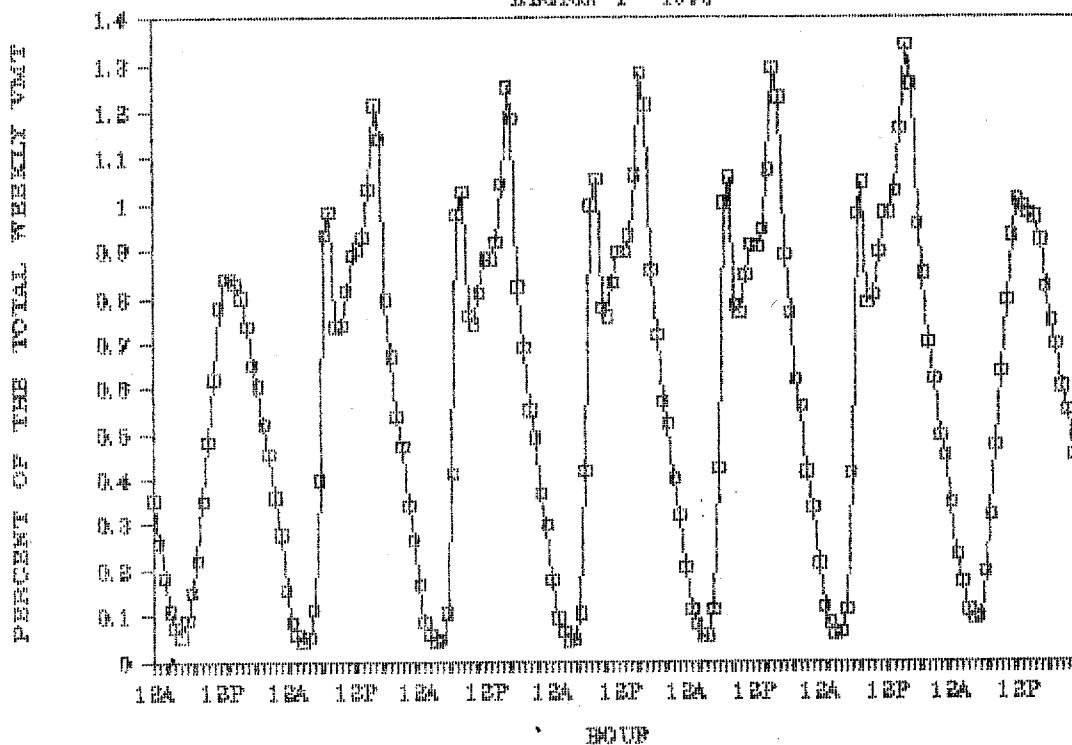


FIGURE 24A

DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 1- 1983

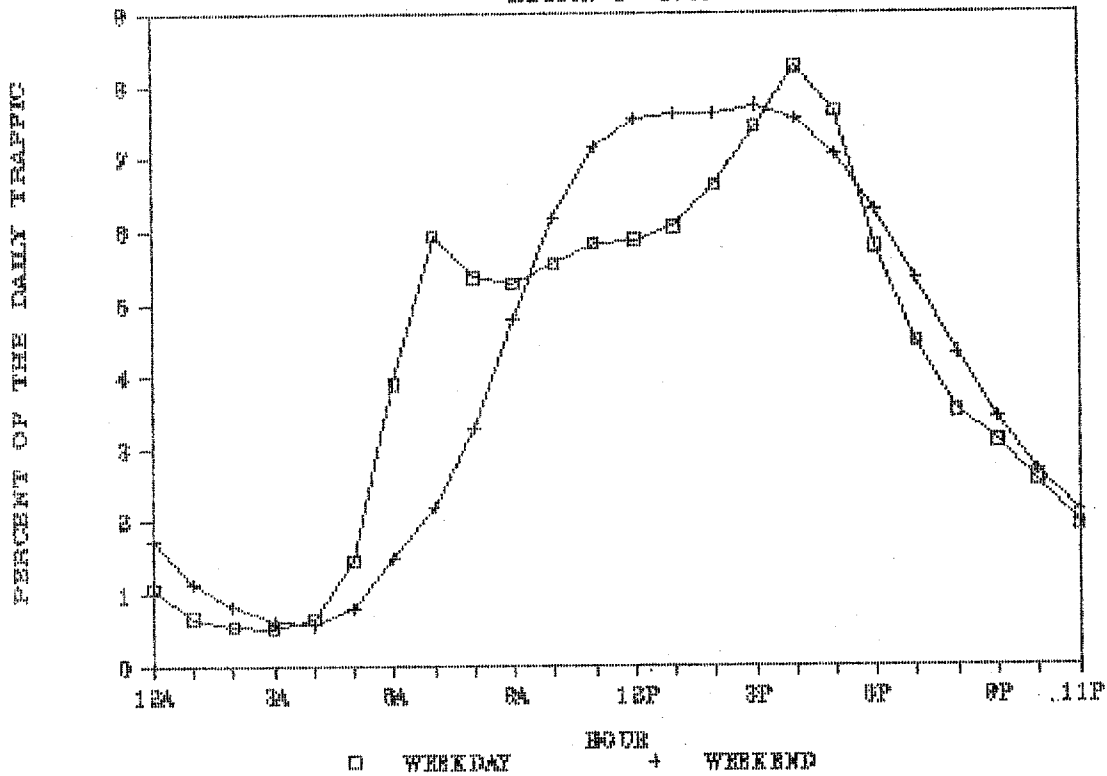


FIGURE 24B

PERCENT VMT FOR THE RURAL SYSTEM

REGION 1- 1983

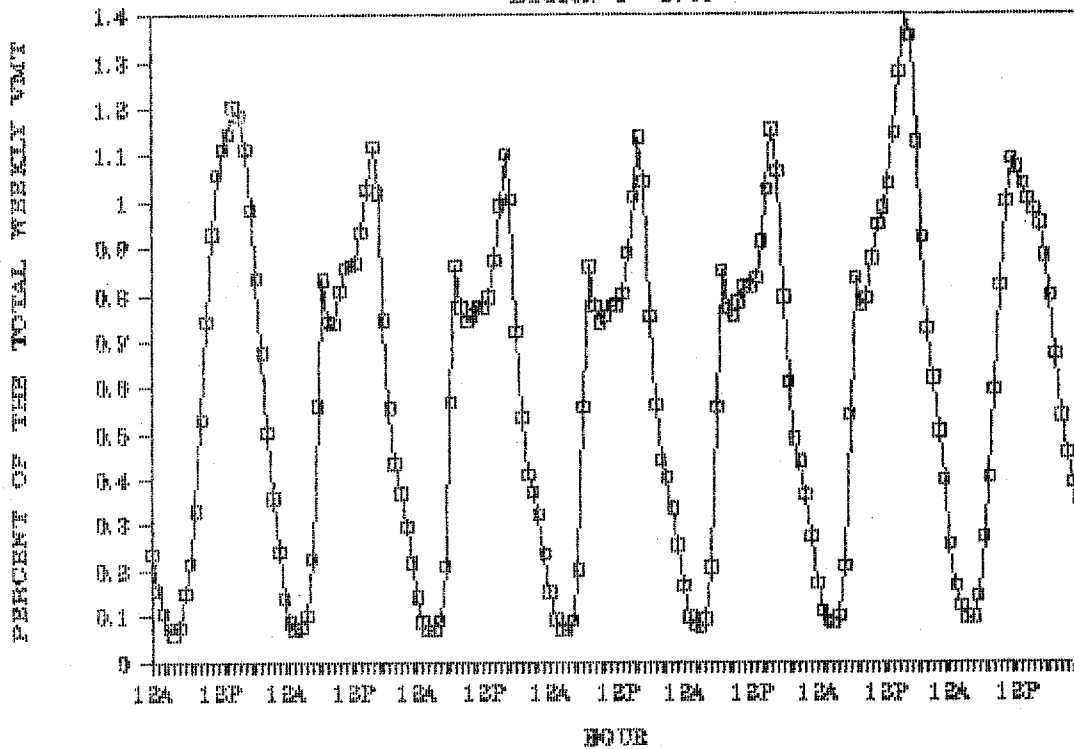


FIGURE 25A

DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 1- 1983

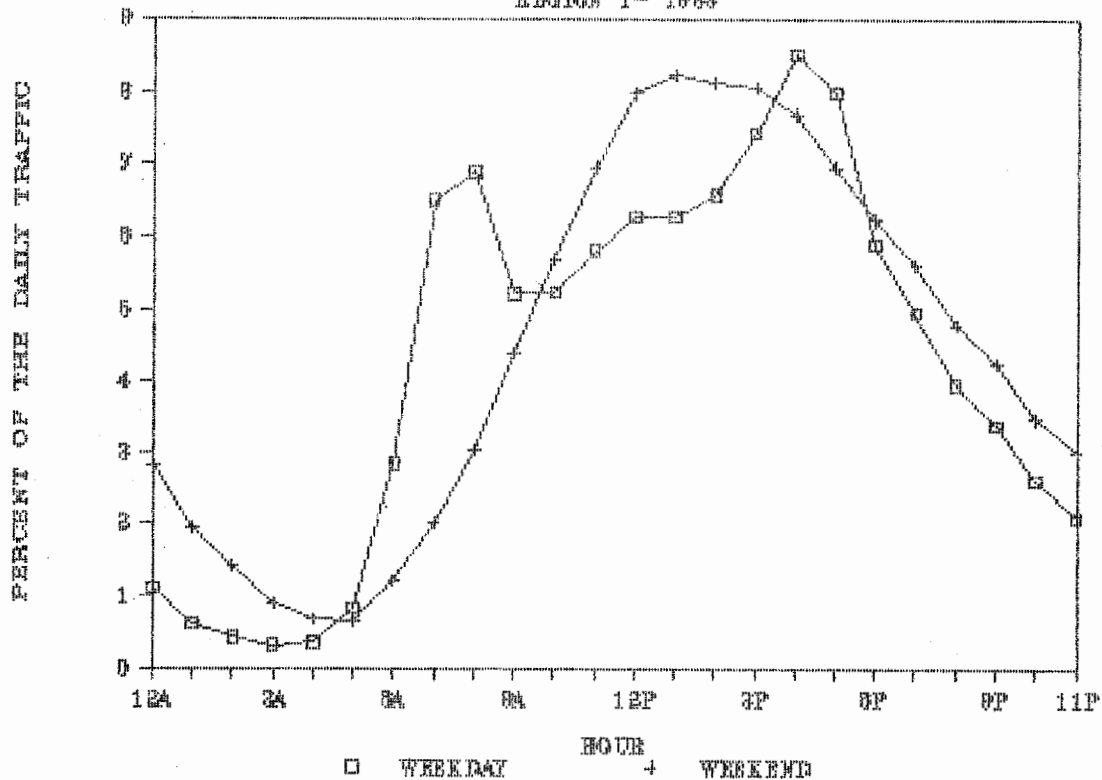
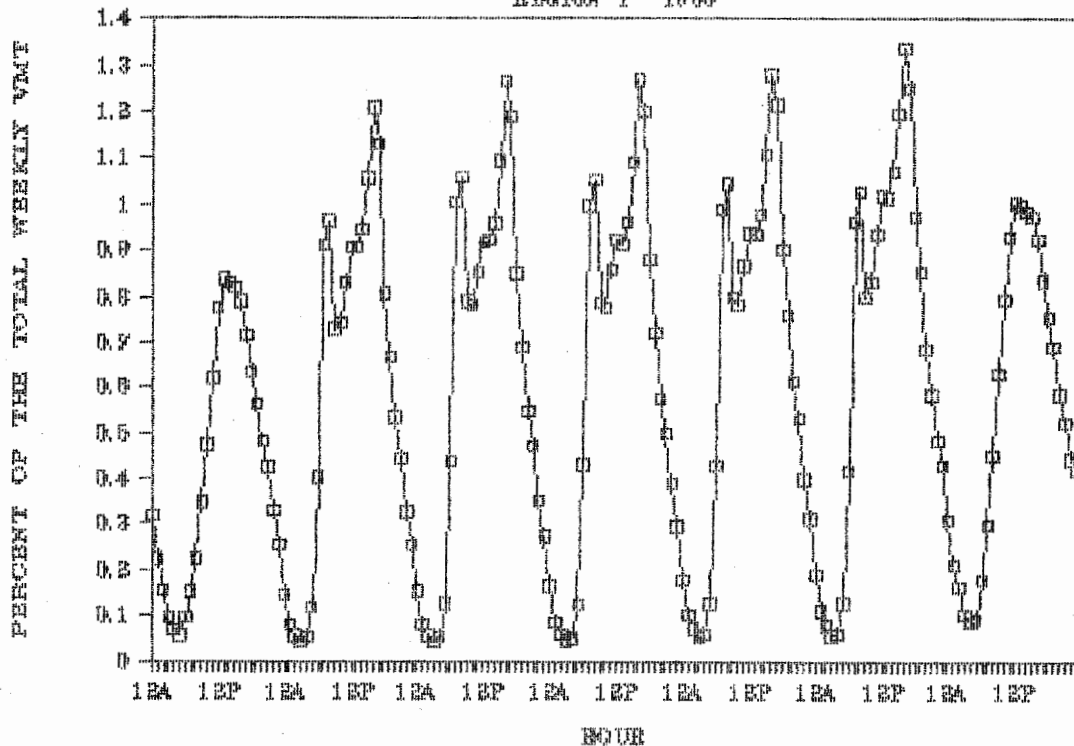


FIGURE 25B

PERCENT VMT FOR THE URBAN SYSTEM

REGION 1- 1983

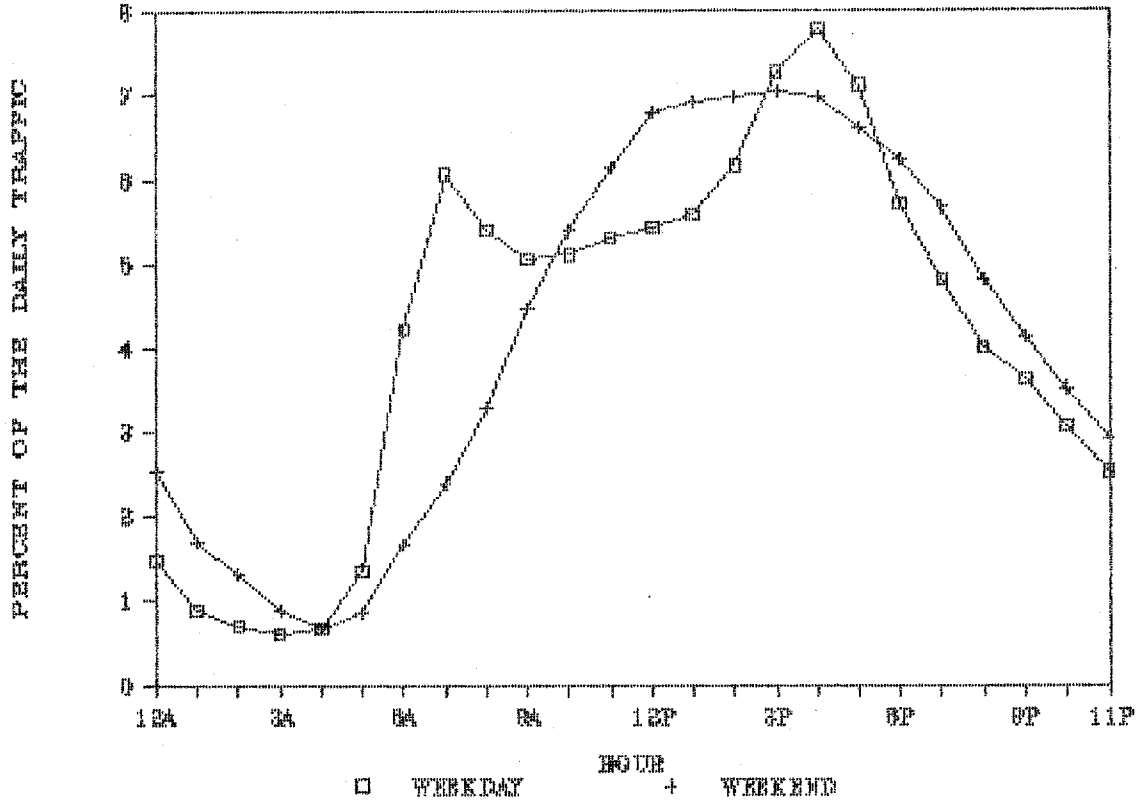


APPENDIX A



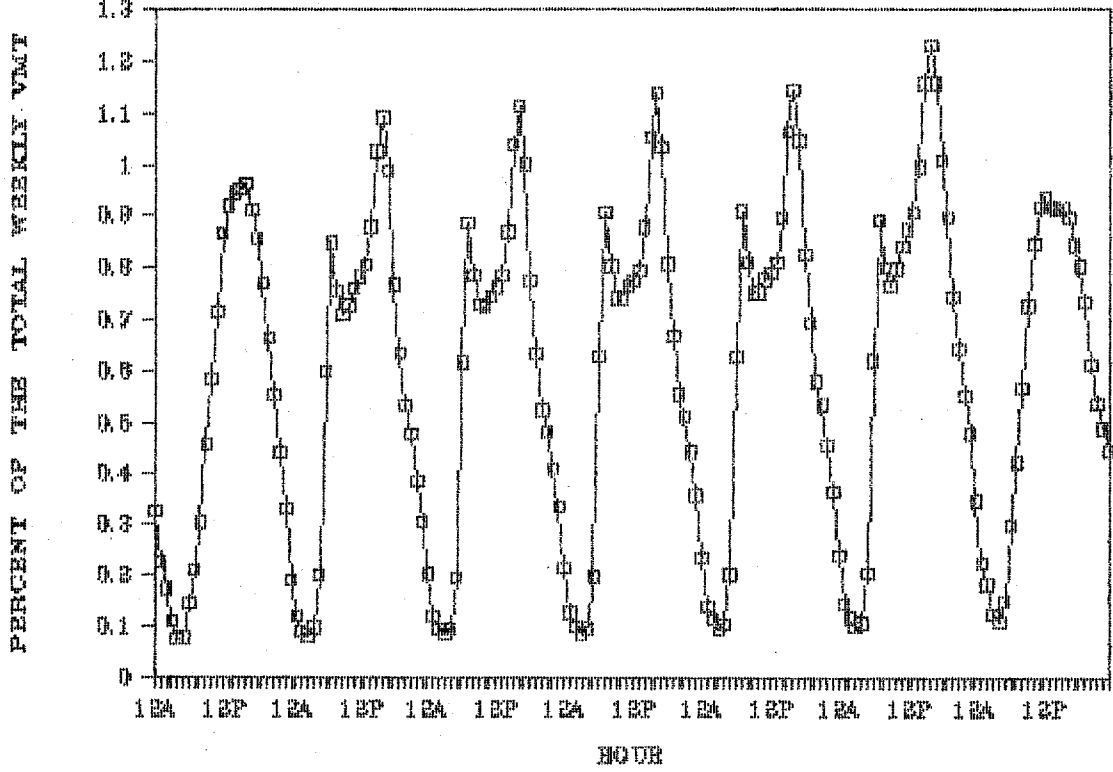
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 3 - 1978



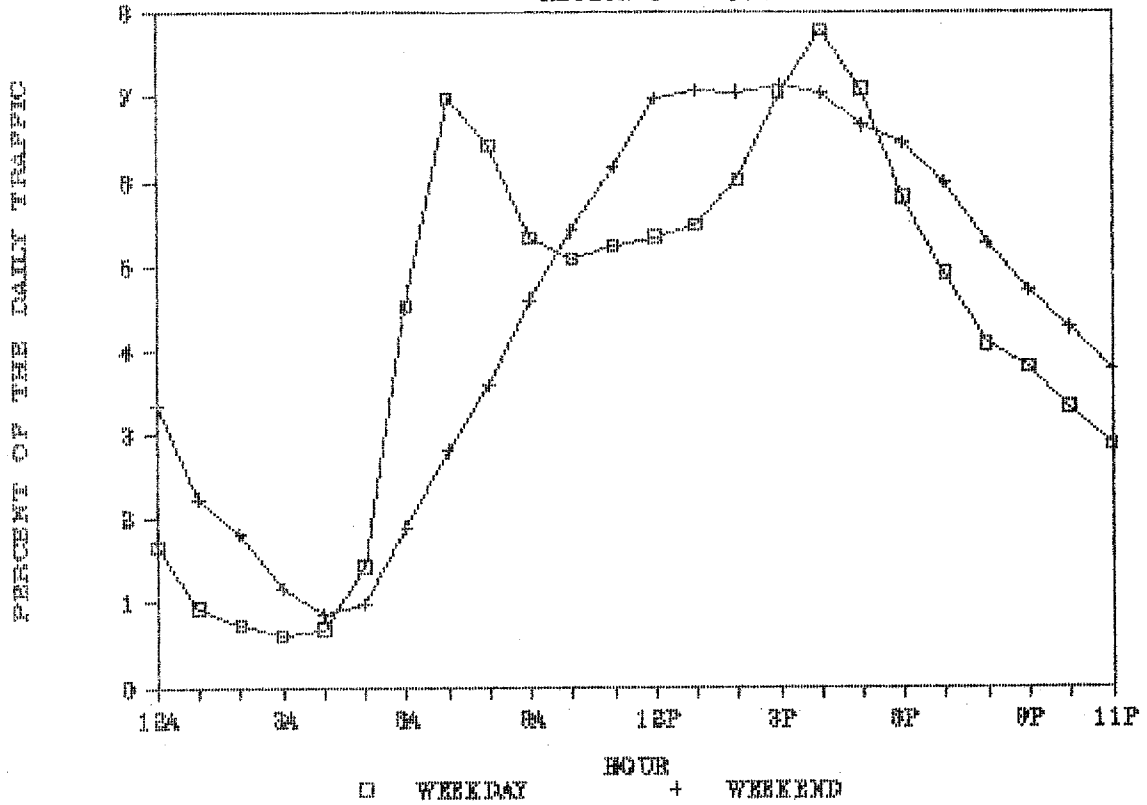
PERCENT VMT FOR THE RURAL SYSTEM

REGION 3 - 1978



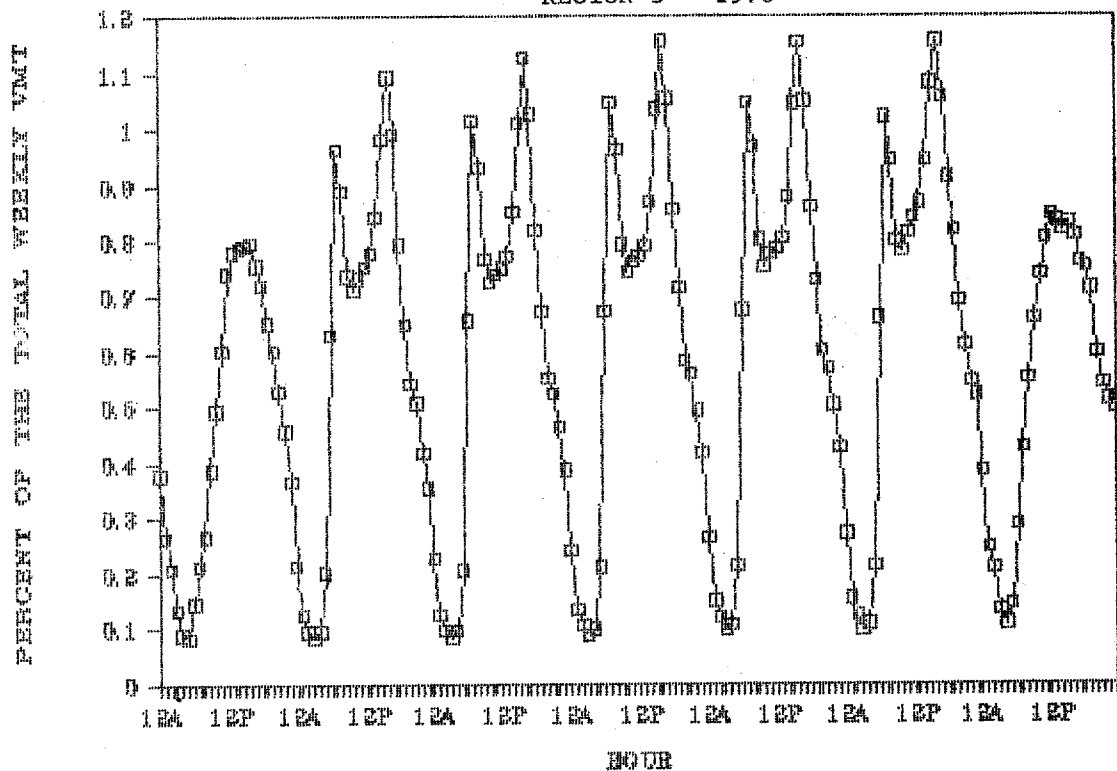
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 3 - 1978



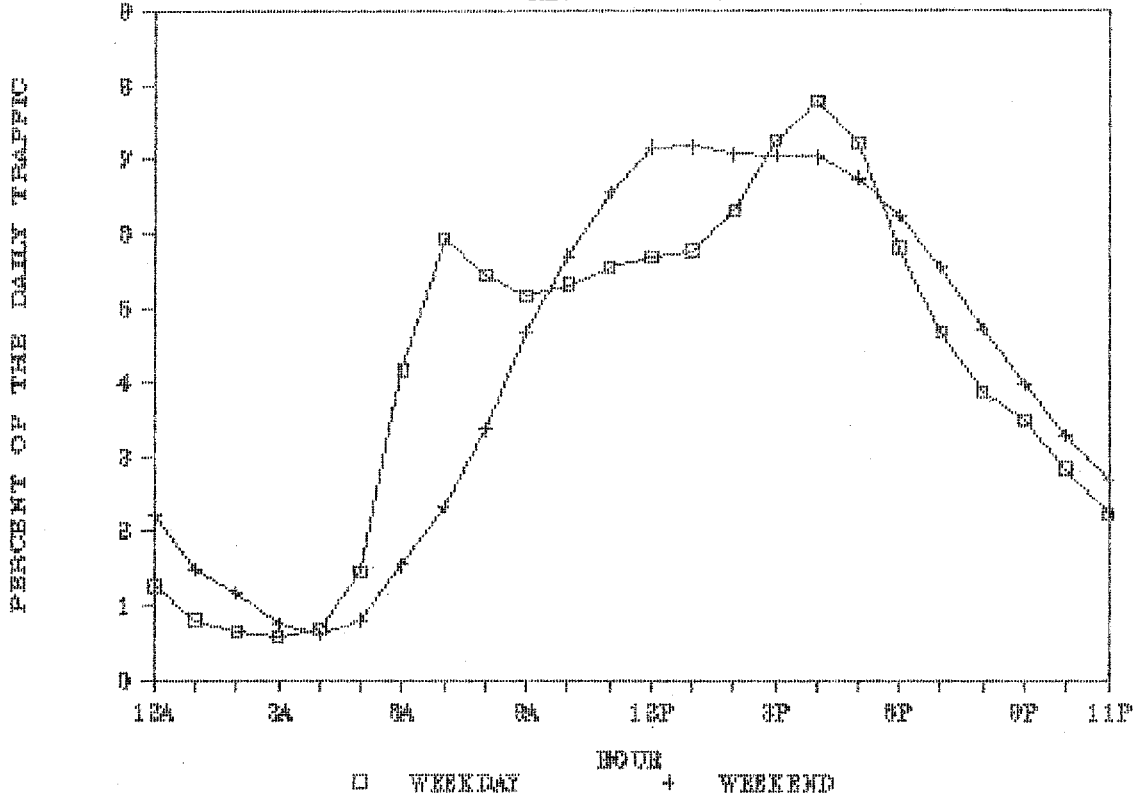
PERCENT VMT FOR THE URBAN SYSTEM

REGION 3 - 1978



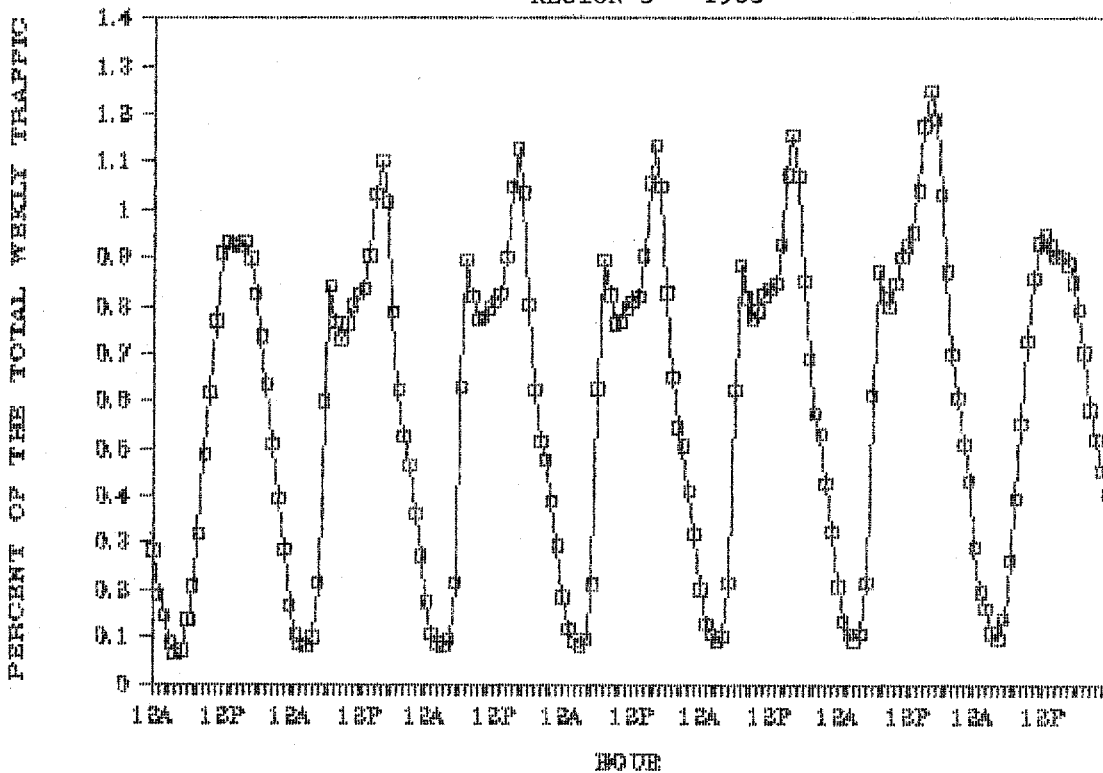
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 3 - 1983



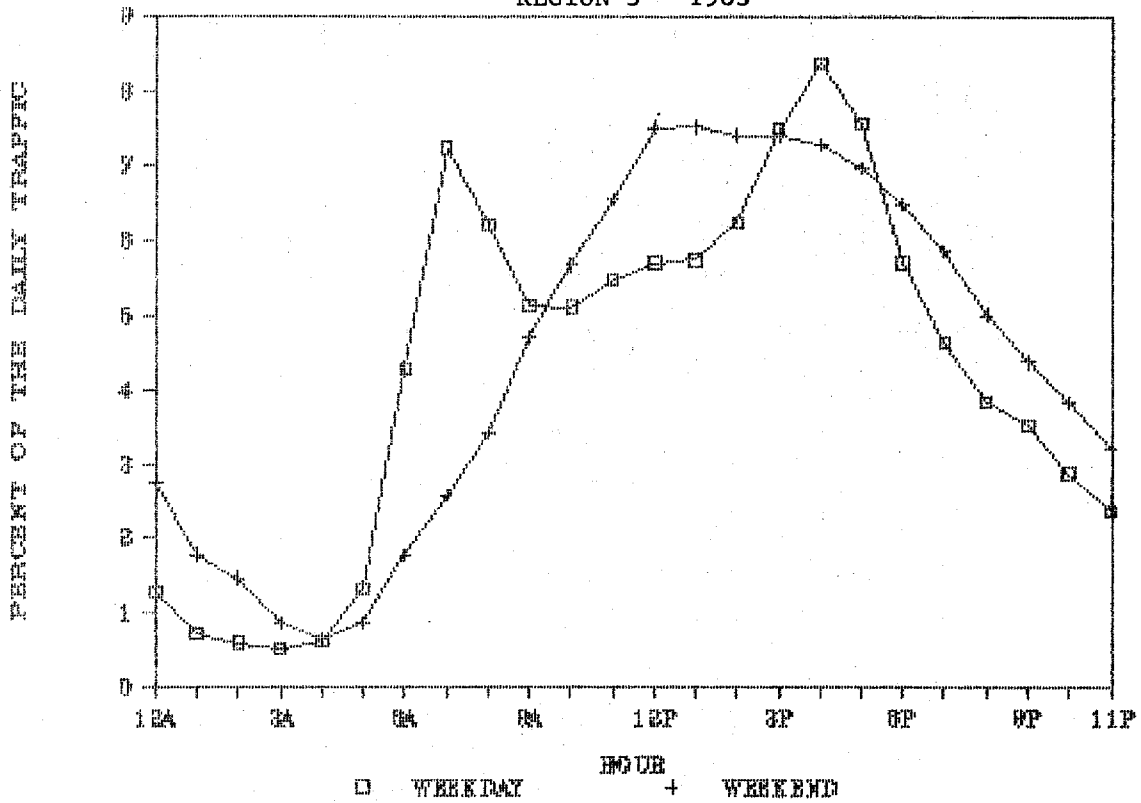
PERCENT VMT FOR THE RURAL SYSTEM

REGION 3 - 1983



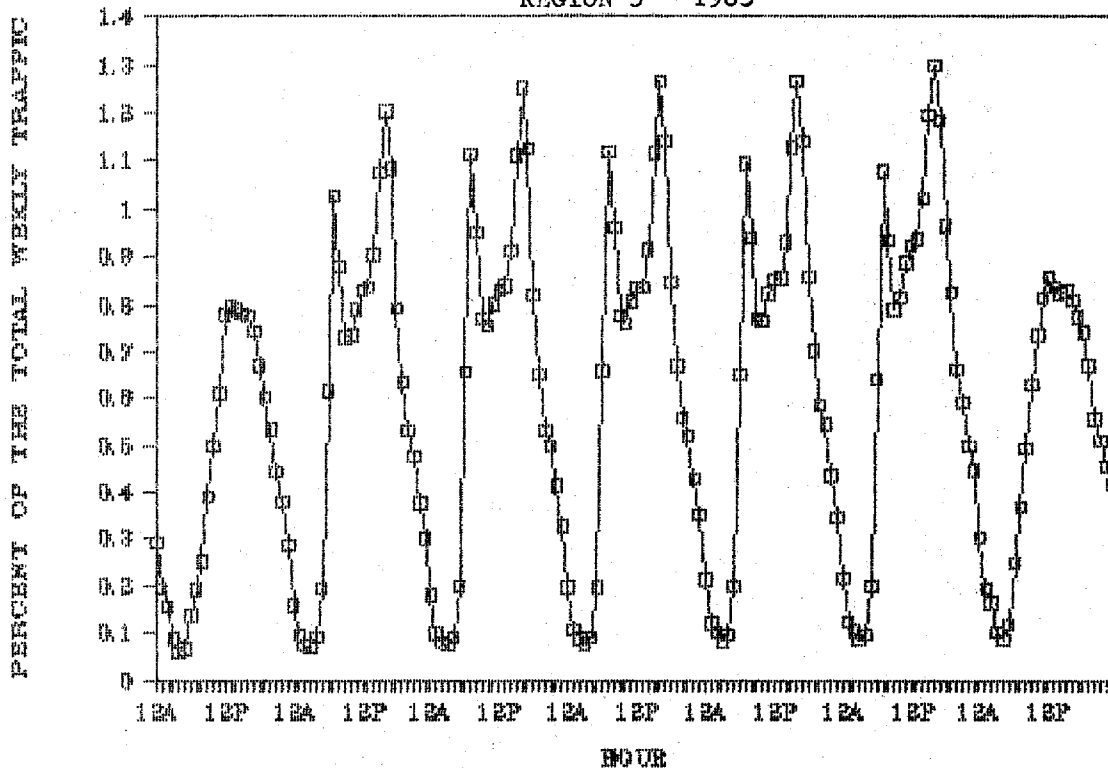
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 3 - 1983



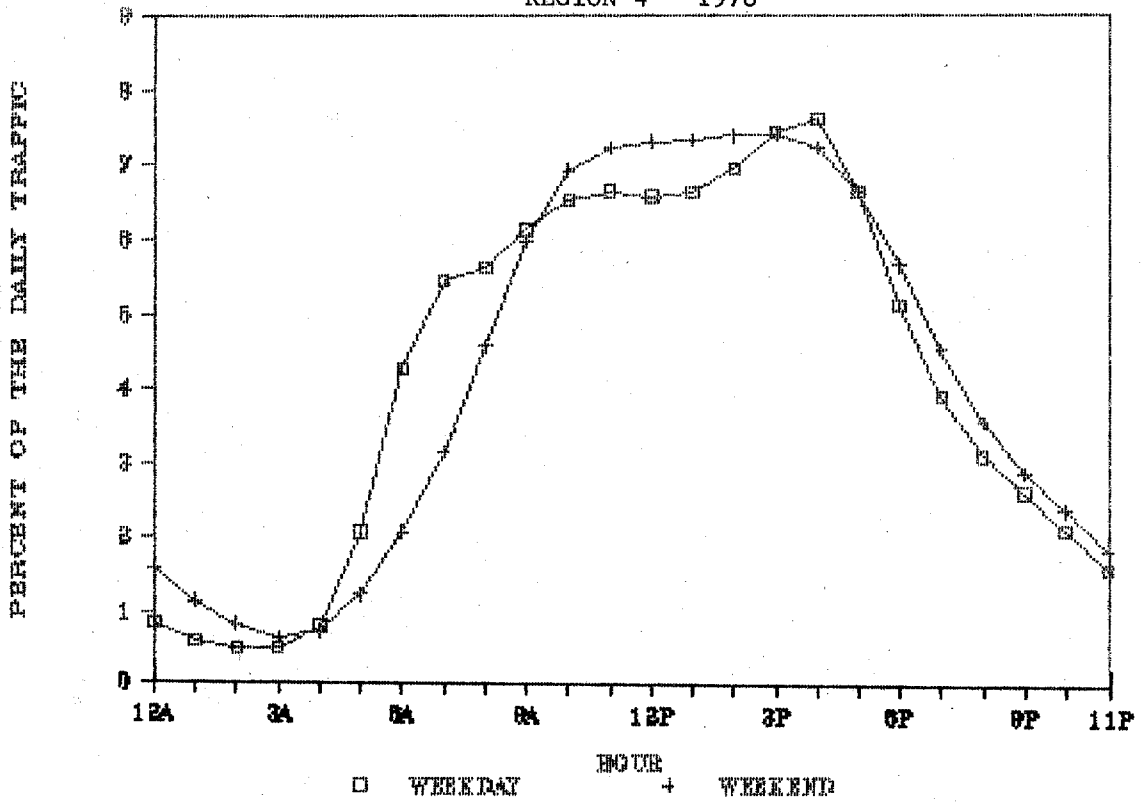
PERCENT VMT FOR THE URBAN SYSTEM

REGION 3 - 1983



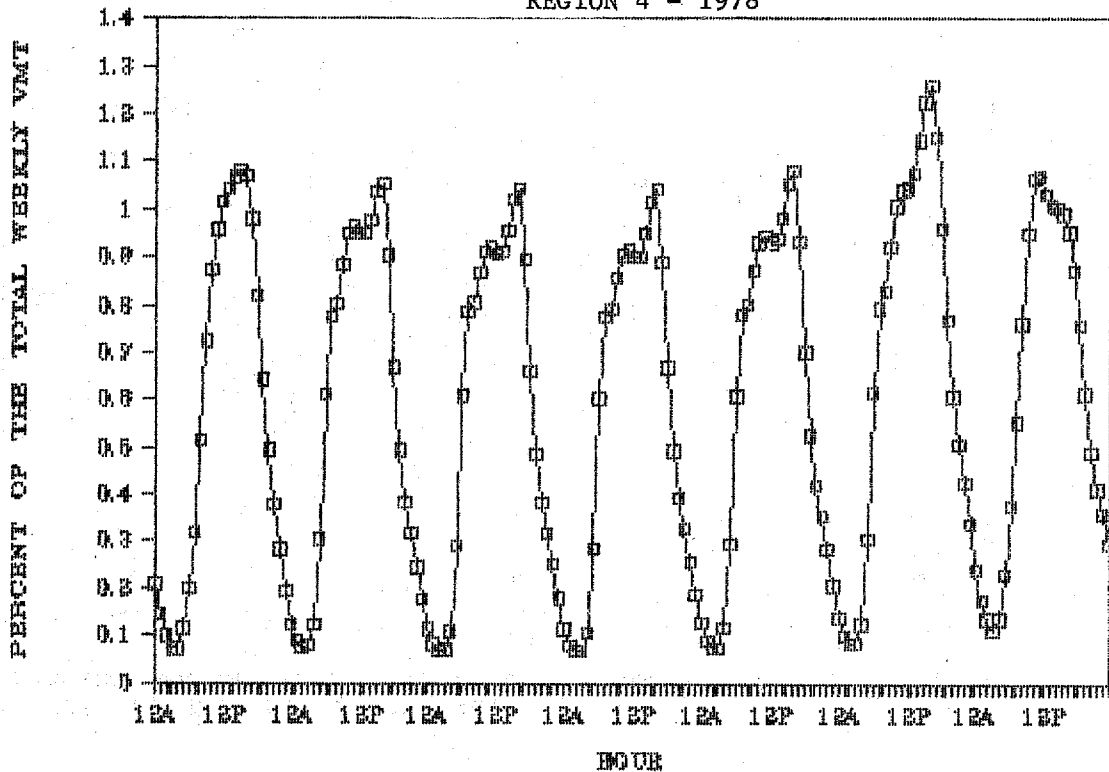
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 4 - 1978



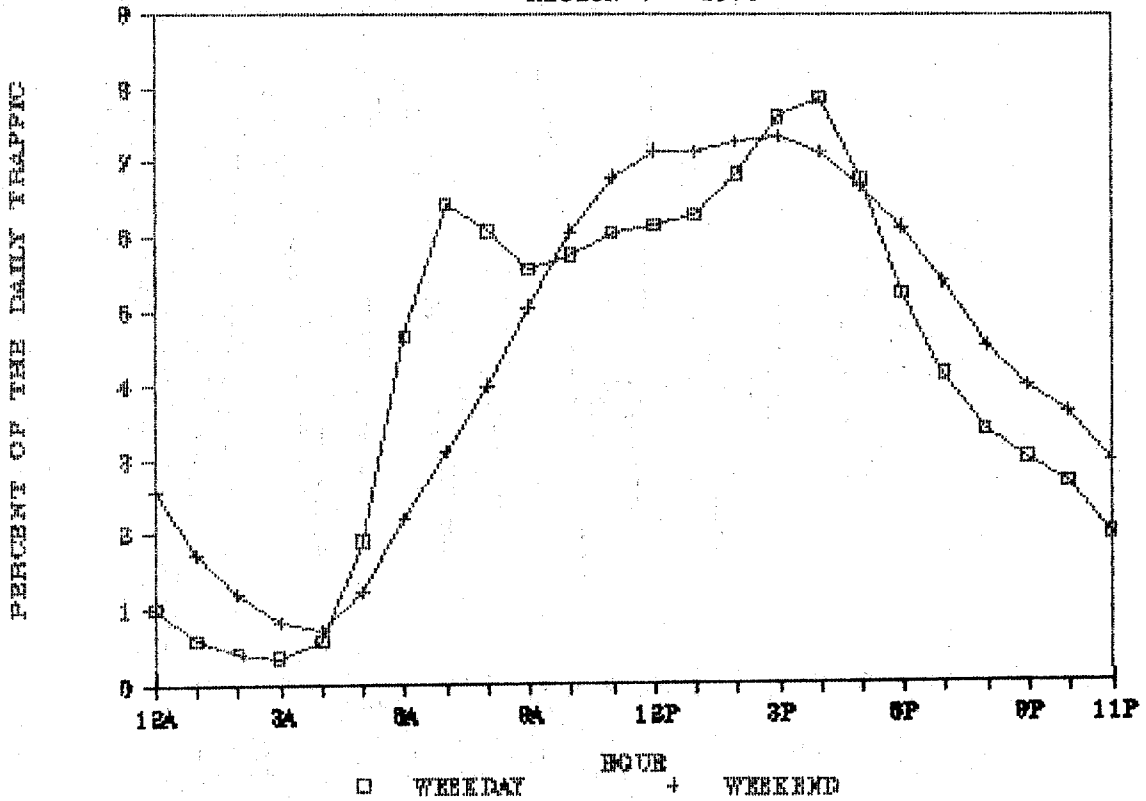
PERCENT VMT FOR THE RURAL SYSTEM

REGION 4 - 1978



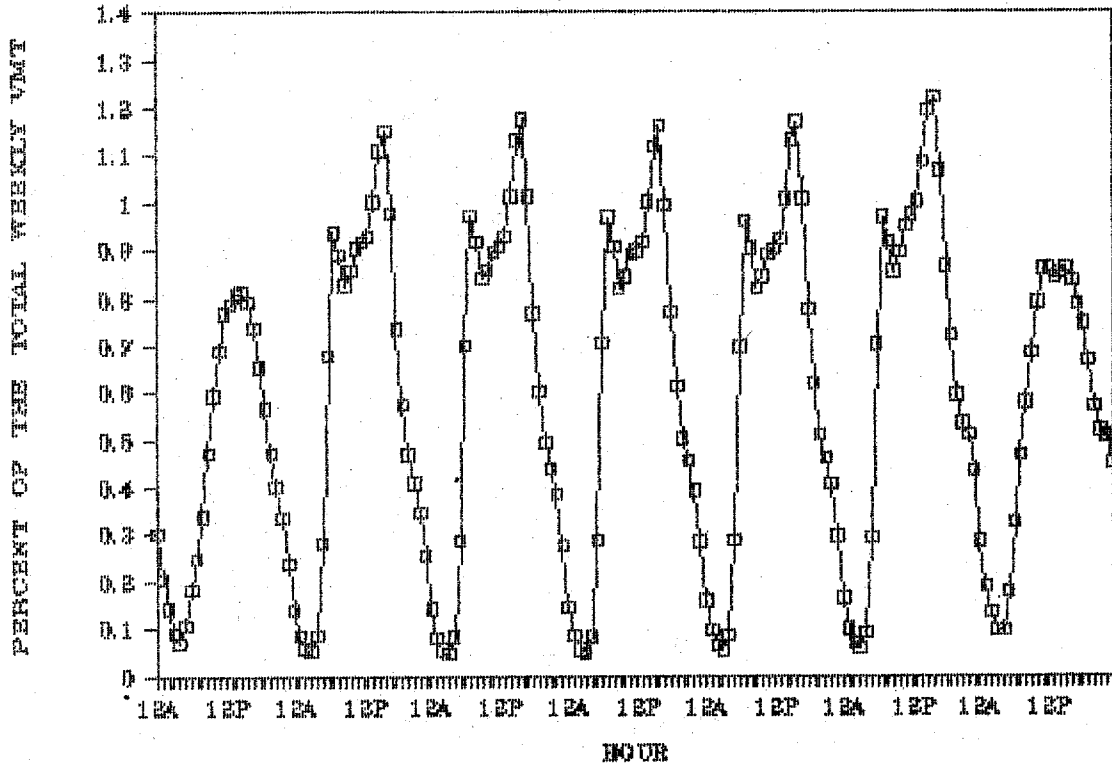
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 4 - 1978



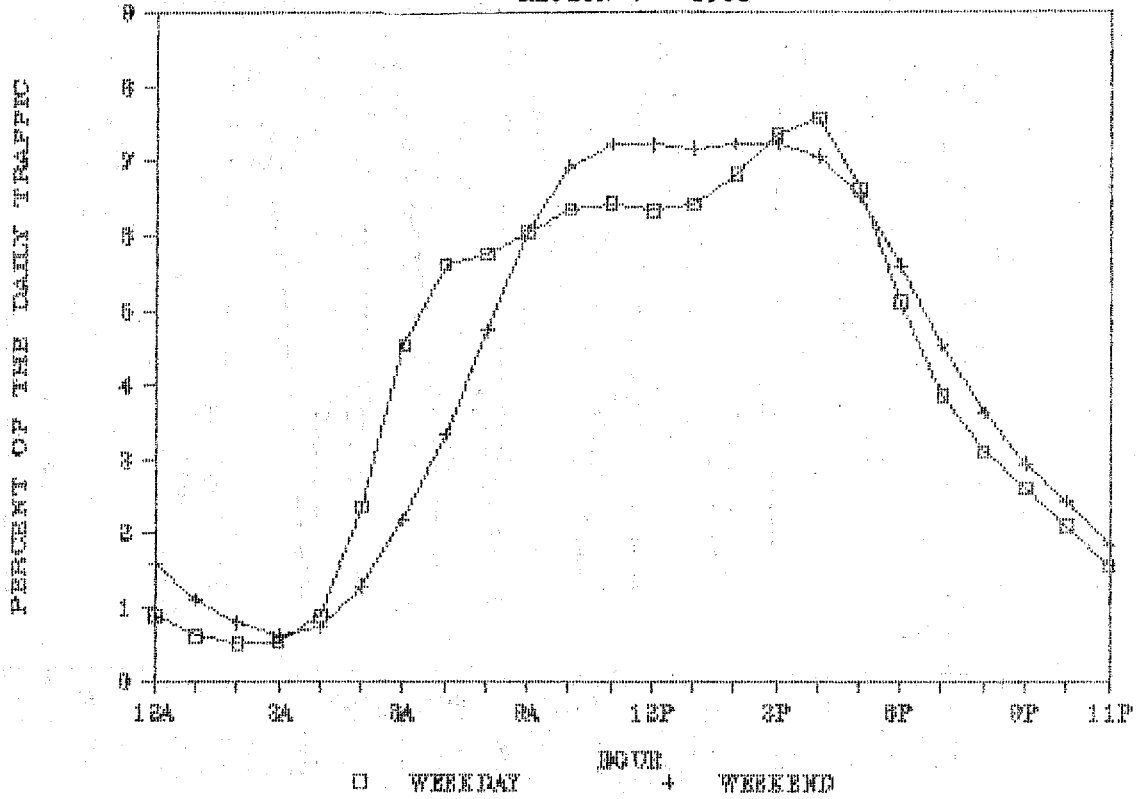
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REGION 4 - 1978



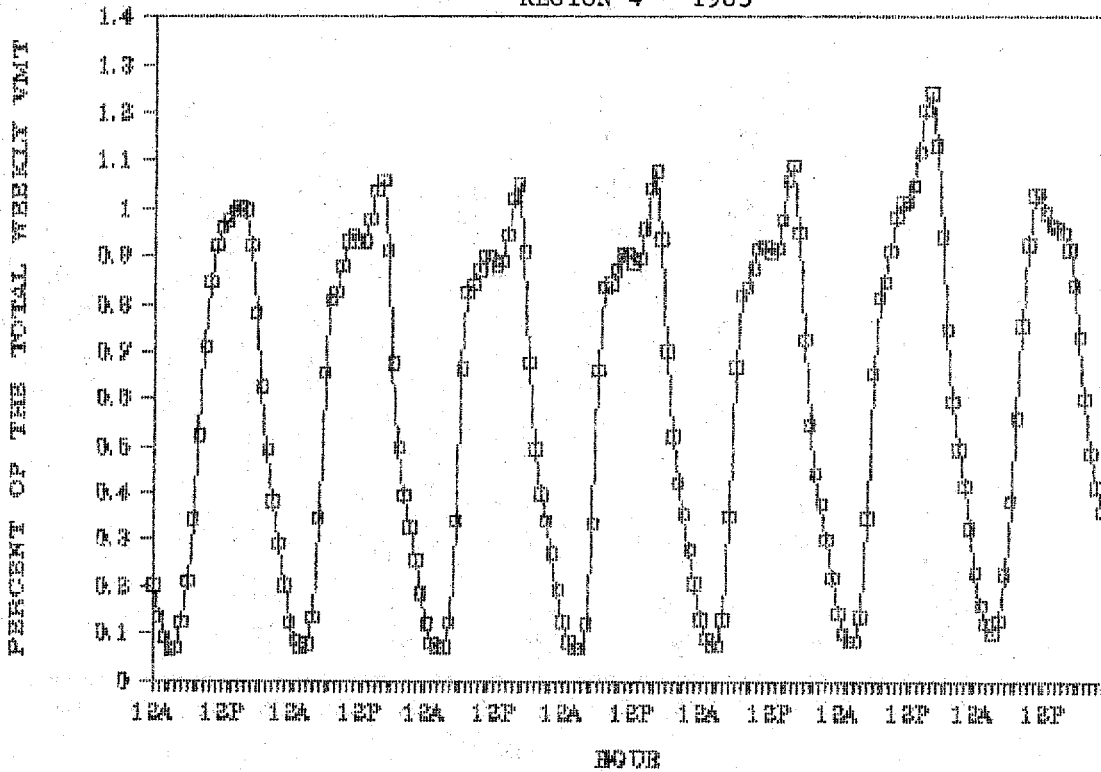
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 4 - 1983



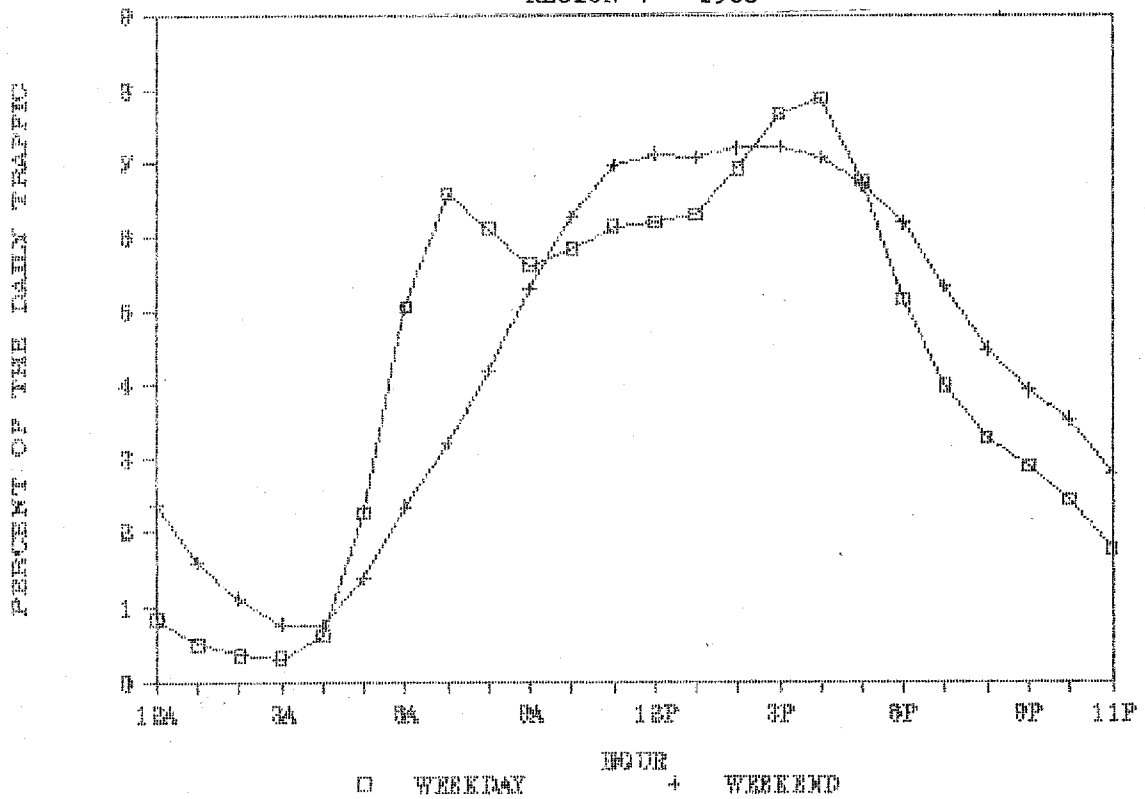
PERCENT VMT FOR THE RURAL SYSTEM

REGION 4 - 1983



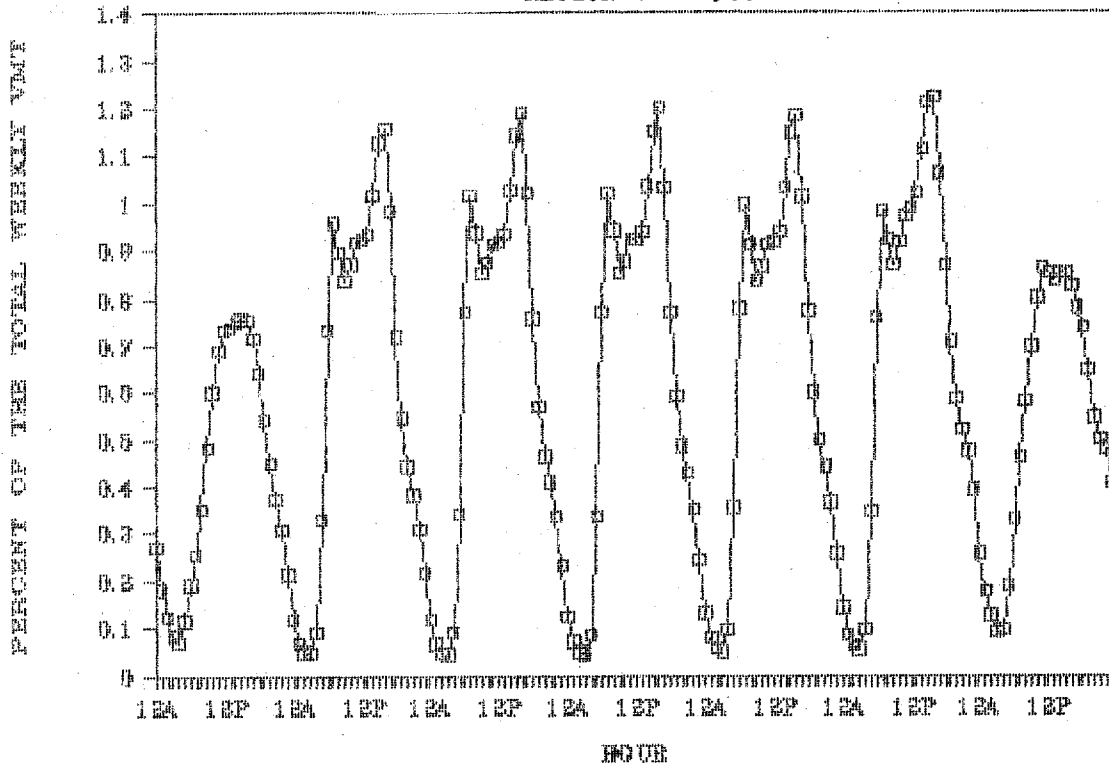
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REGION 4 - 1983



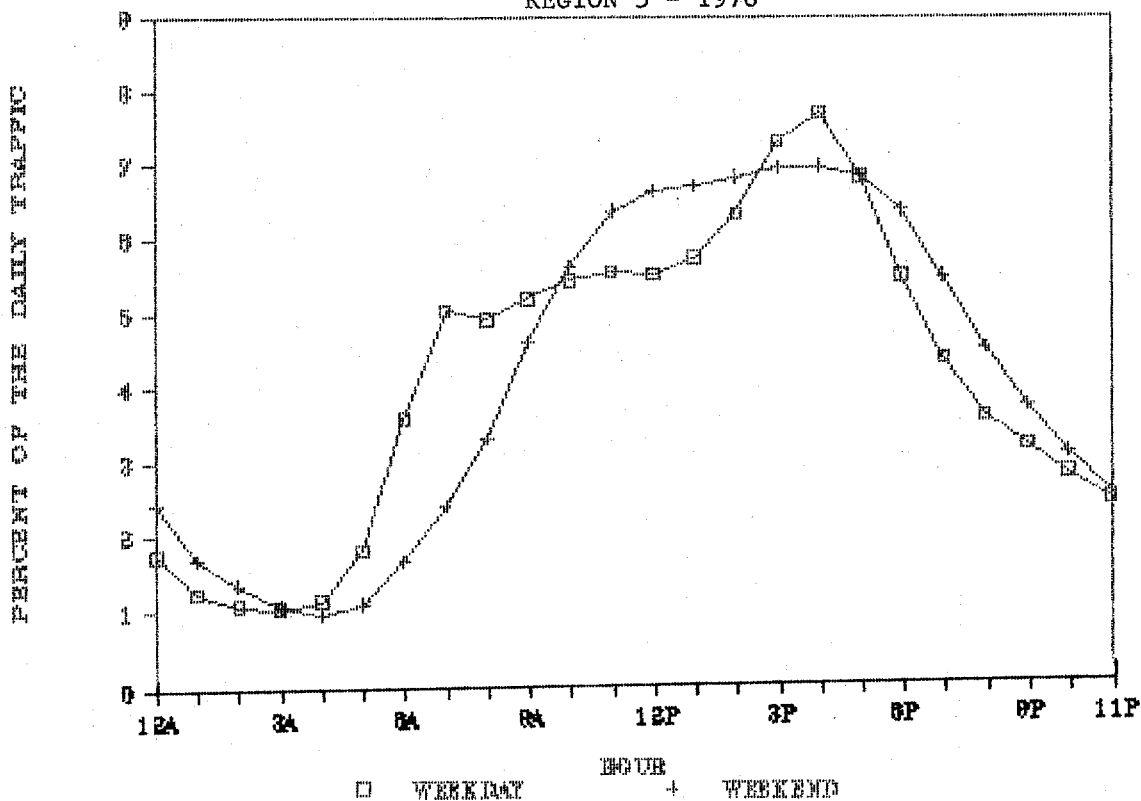
PERCENT VMT FOR THE URBAN SYSTEM

REGION 4 - 1983



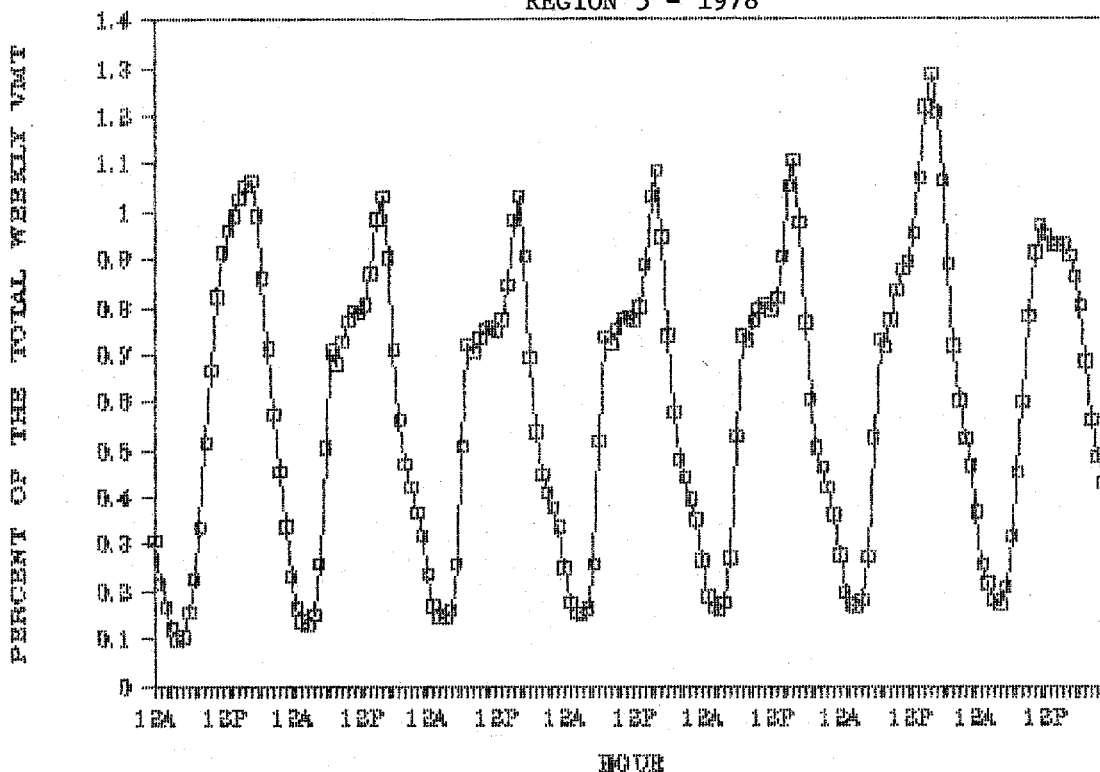
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 5 - 1978



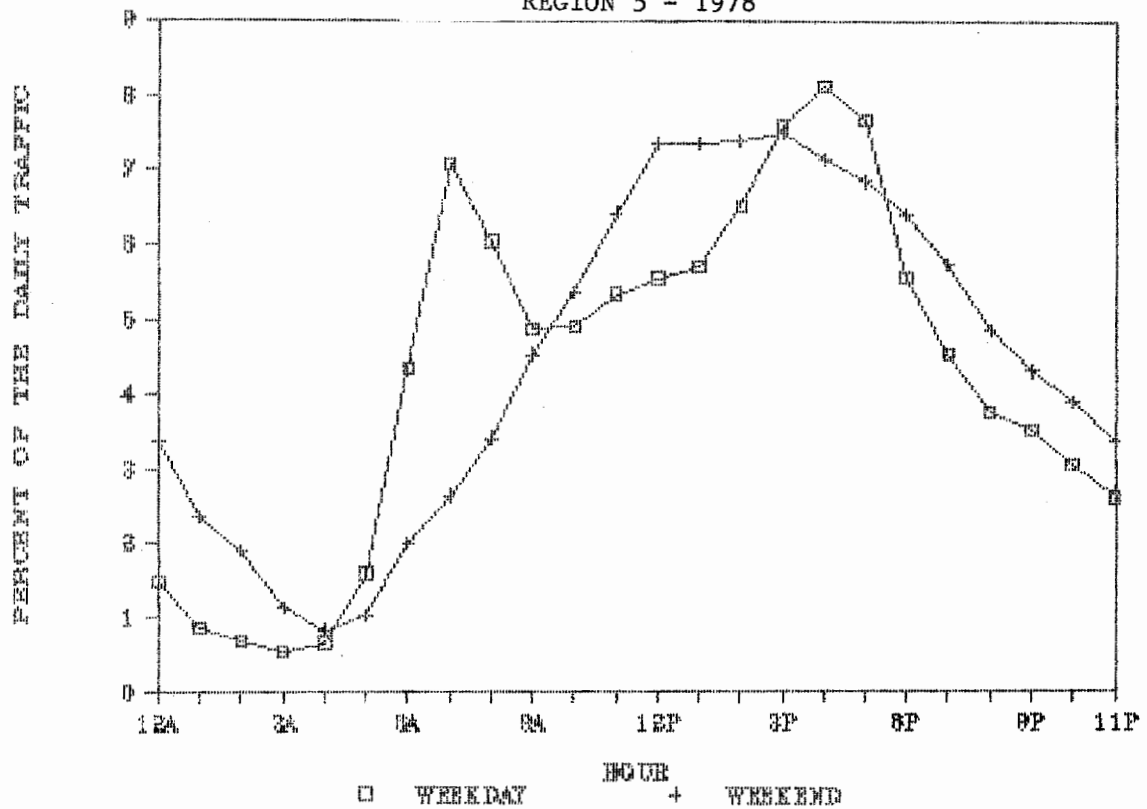
PERCENT VMT FOR THE RURAL SYSTEM

REGION 5 - 1978



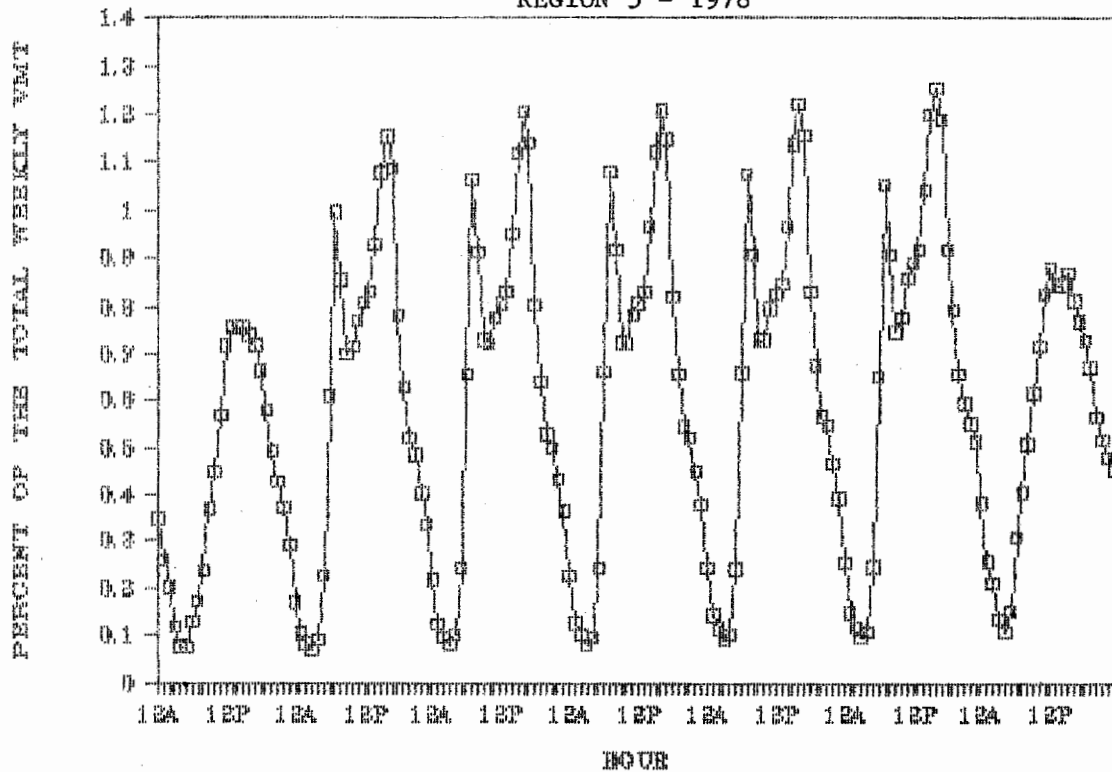
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 5 - 1978



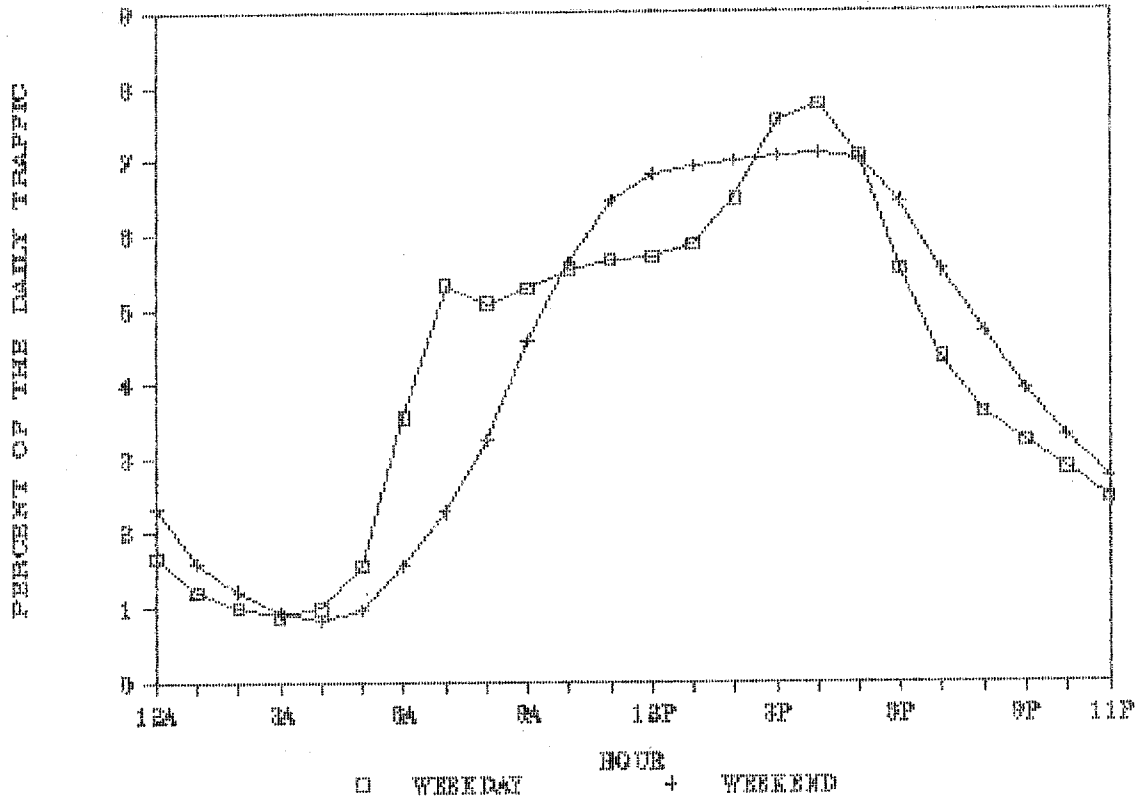
PERCENT VMT FOR THE URBAN SYSTEM

REGION 5 - 1978



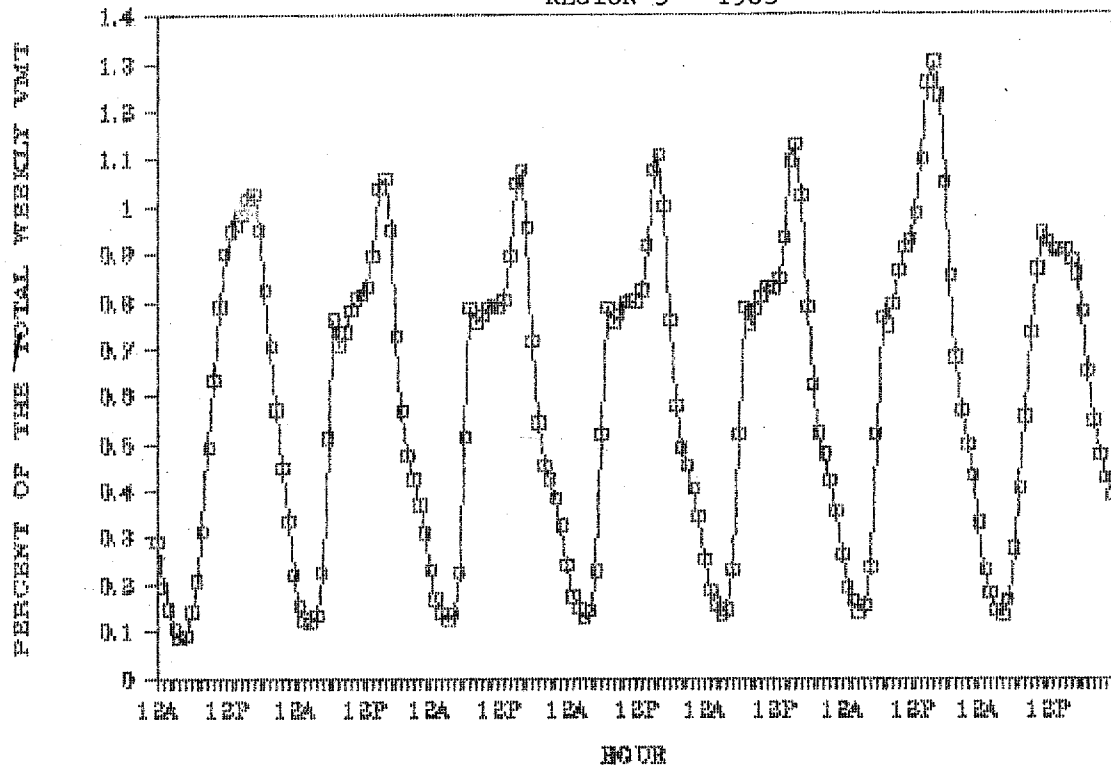
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 5 - 1983



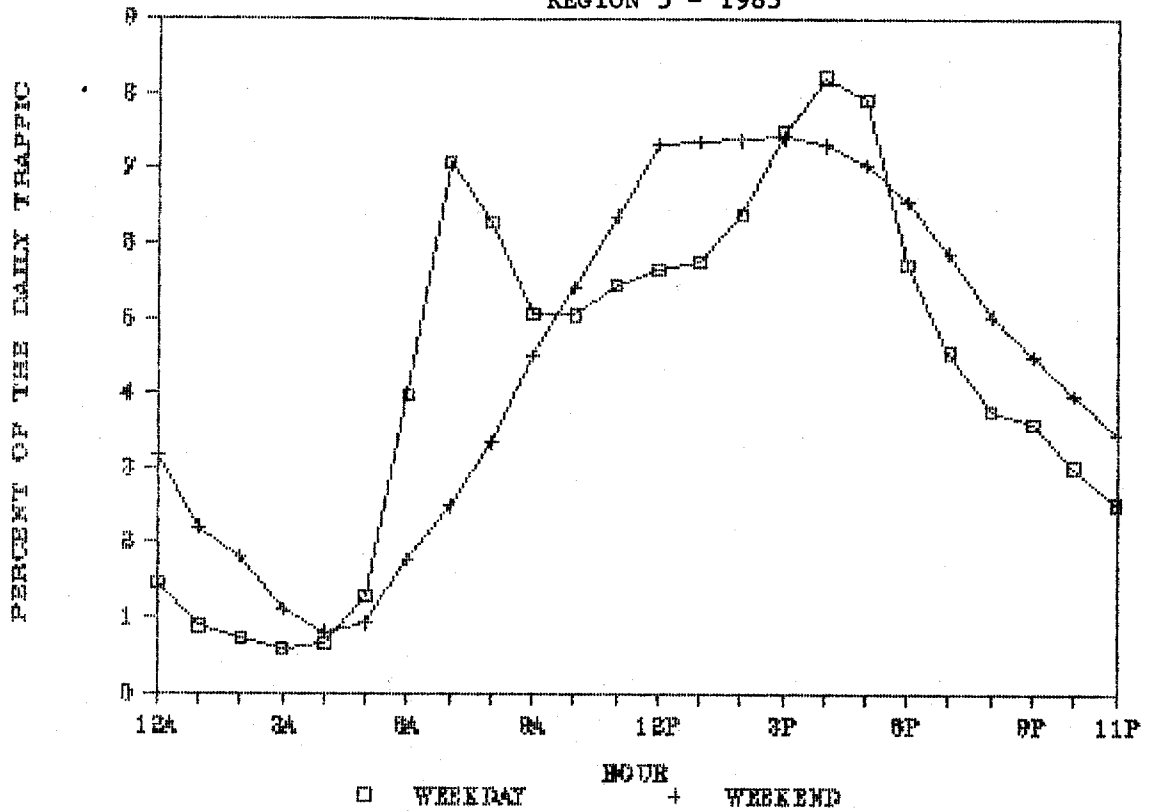
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REGION 5 - 1983



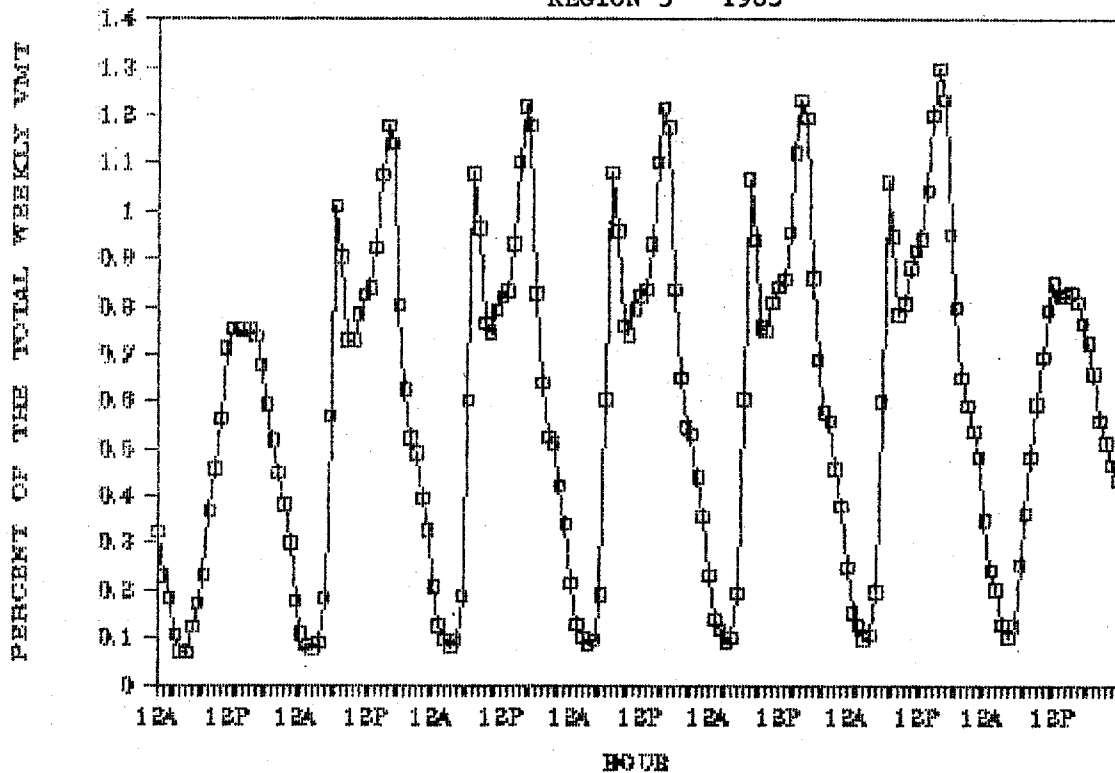
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REGION 5 - 1983



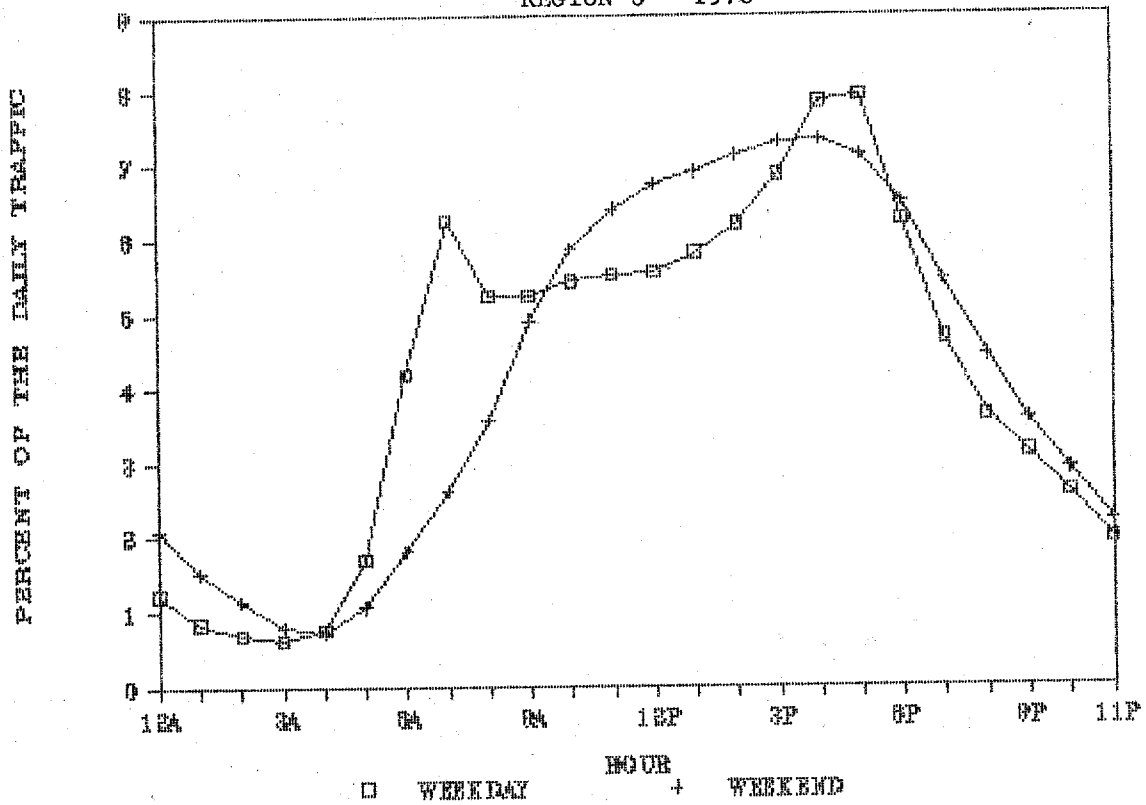
PERCENT VMT FOR THE URBAN SYSTEM

REGION 5 - 1983



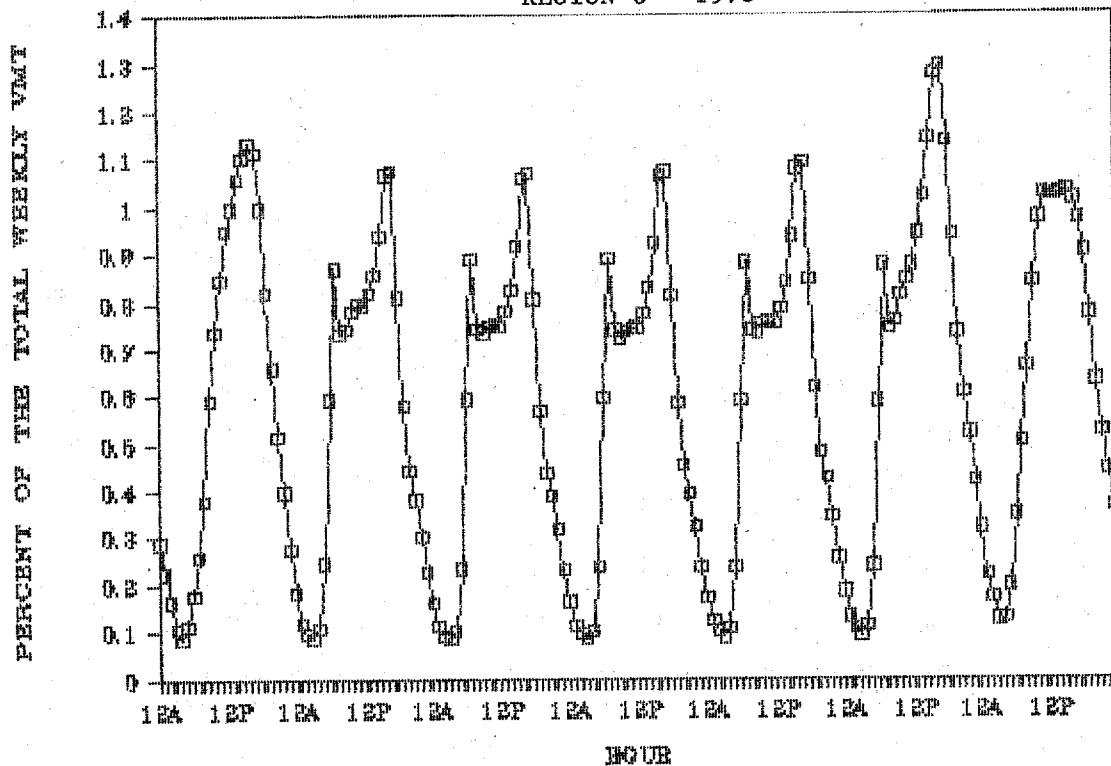
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 6 - 1978



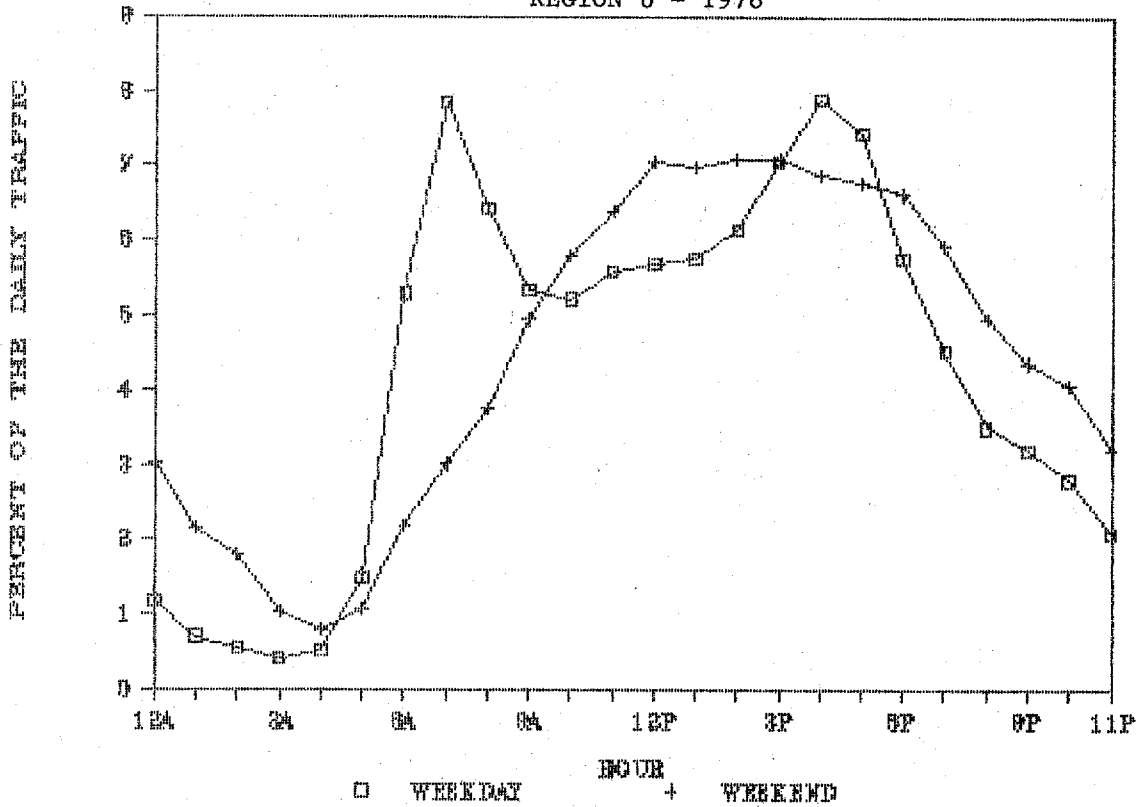
PERCENT VMT FOR THE RURAL SYSTEM

REGION 6 - 1978



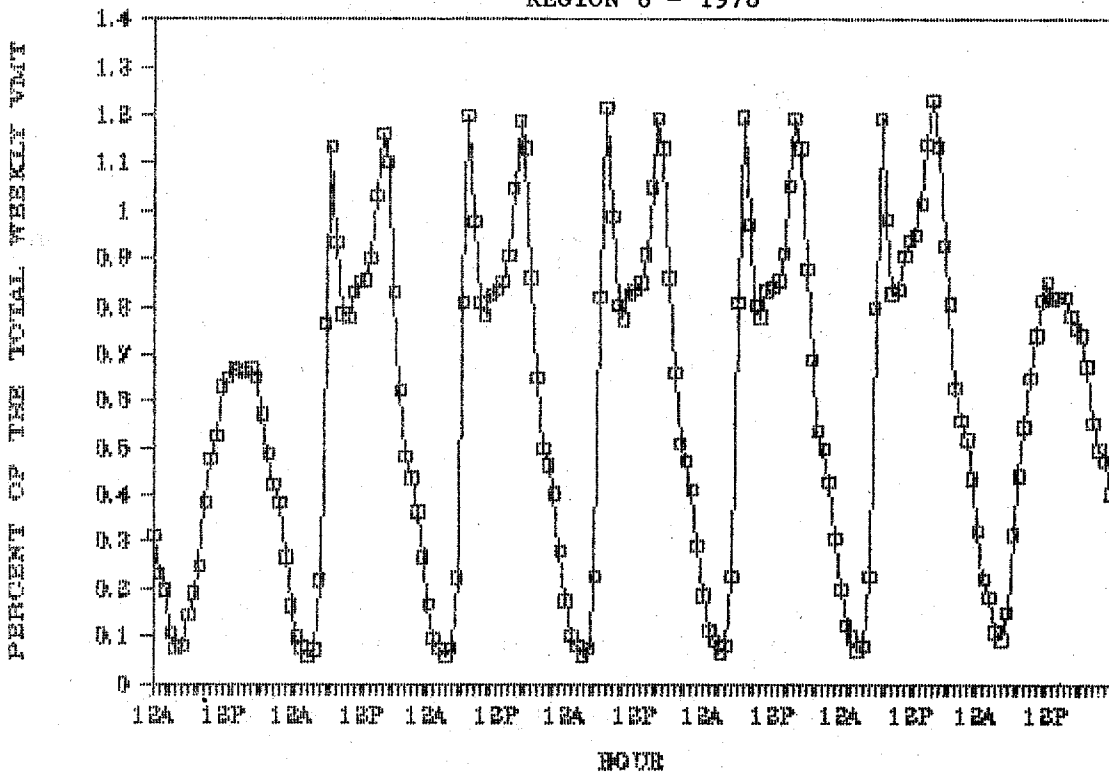
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 6 - 1978

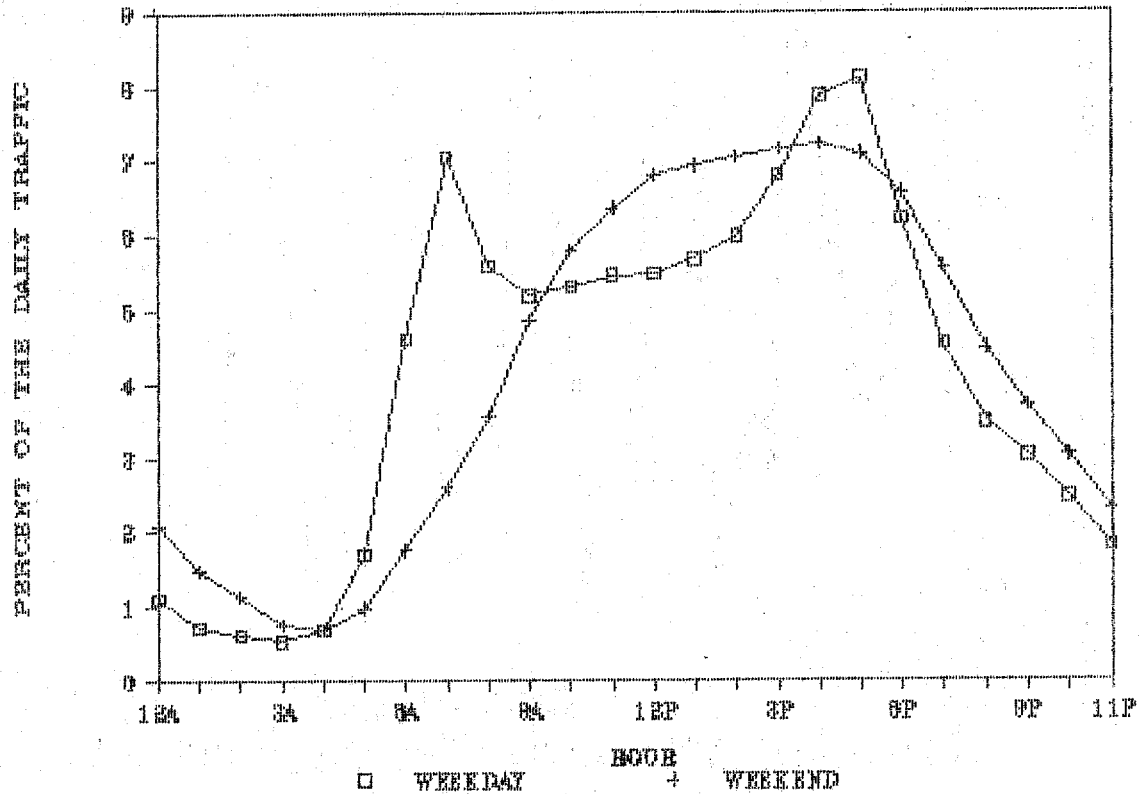


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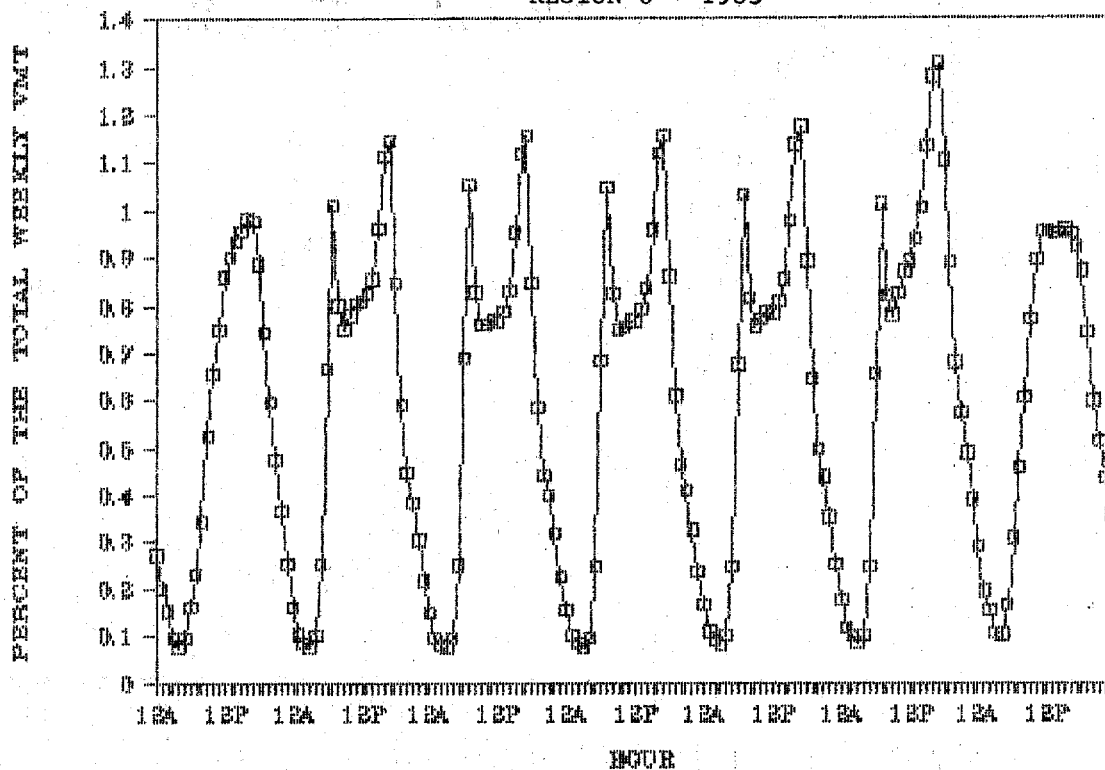
REGION 6 - 1978



DAILY DISTRIBUTION FOR RURAL SYSTEM REGION 6 - 1983

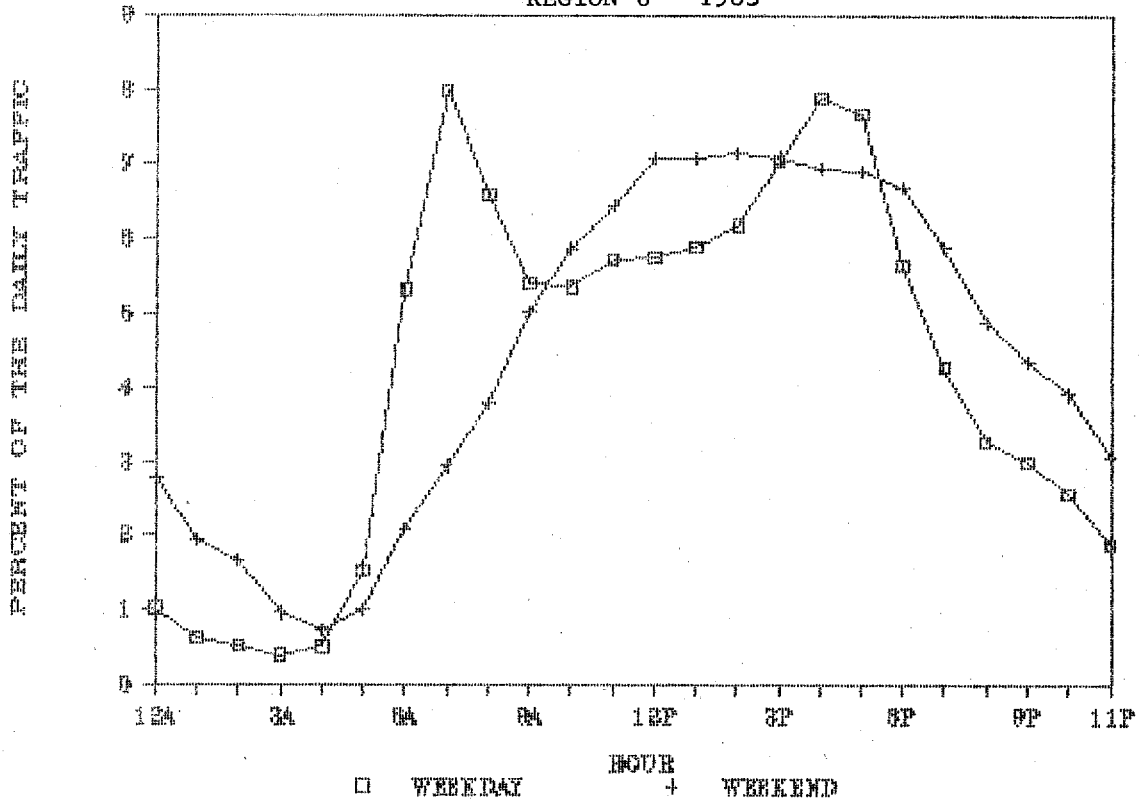


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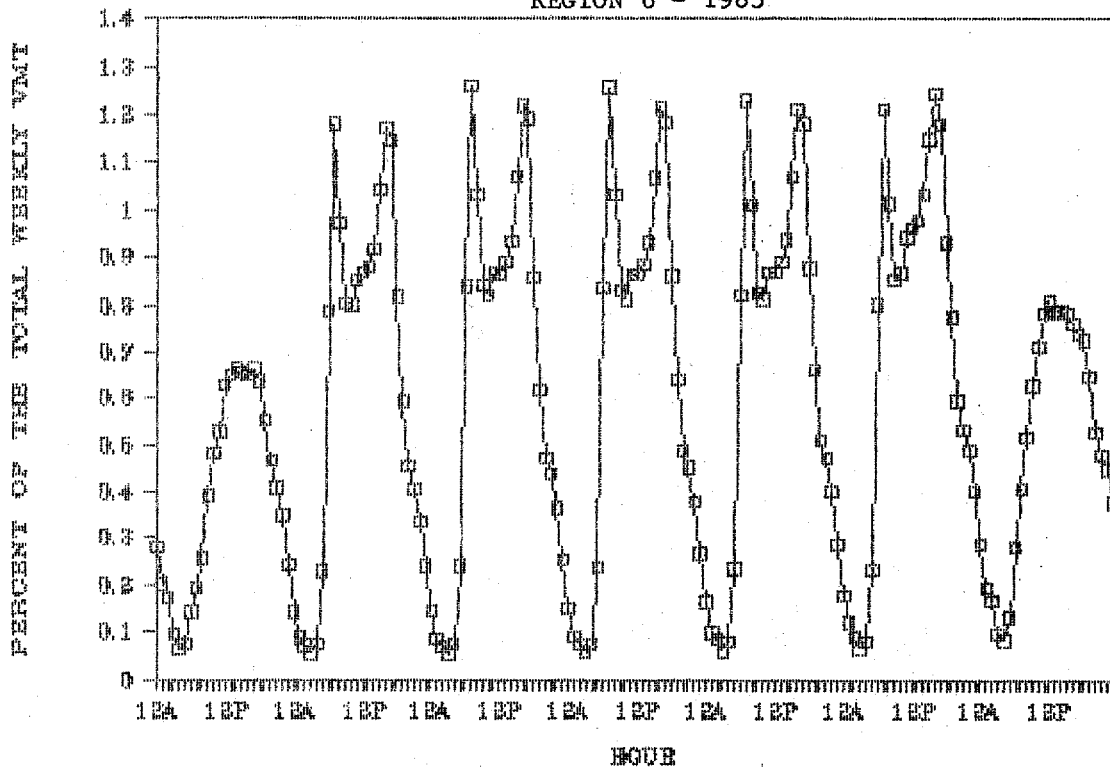
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 6 - 1983



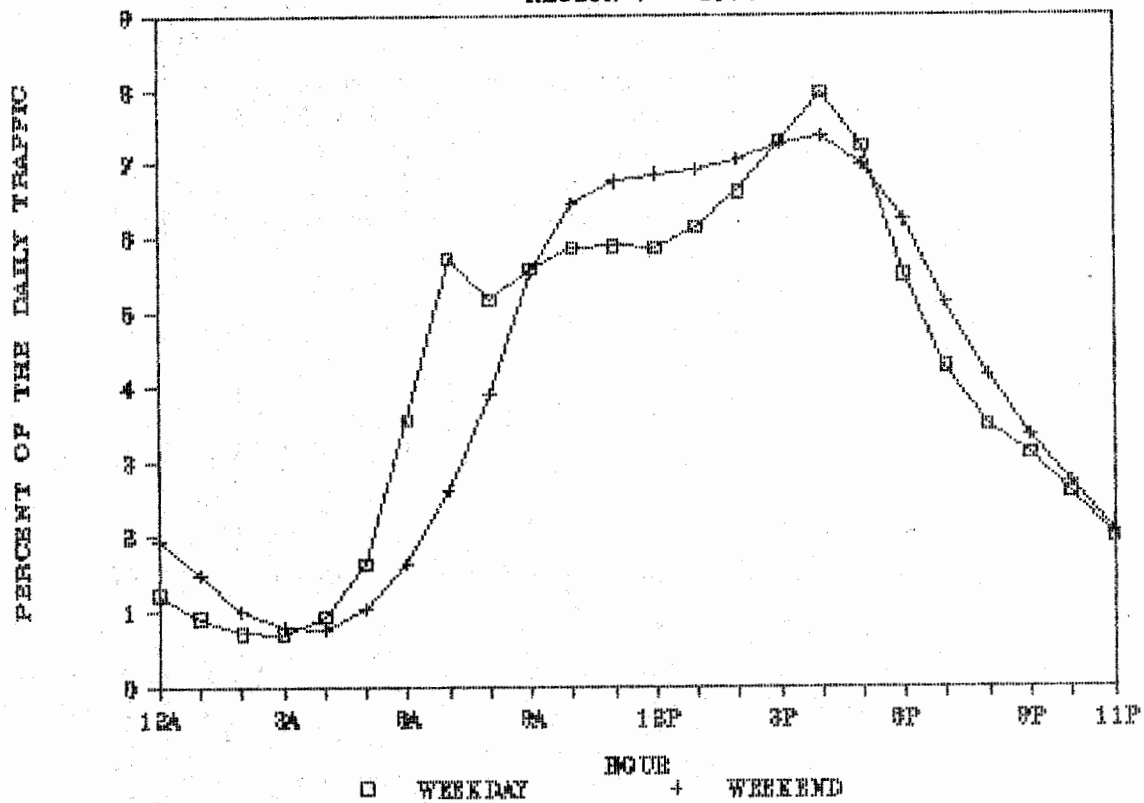
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REGION 6 - 1983



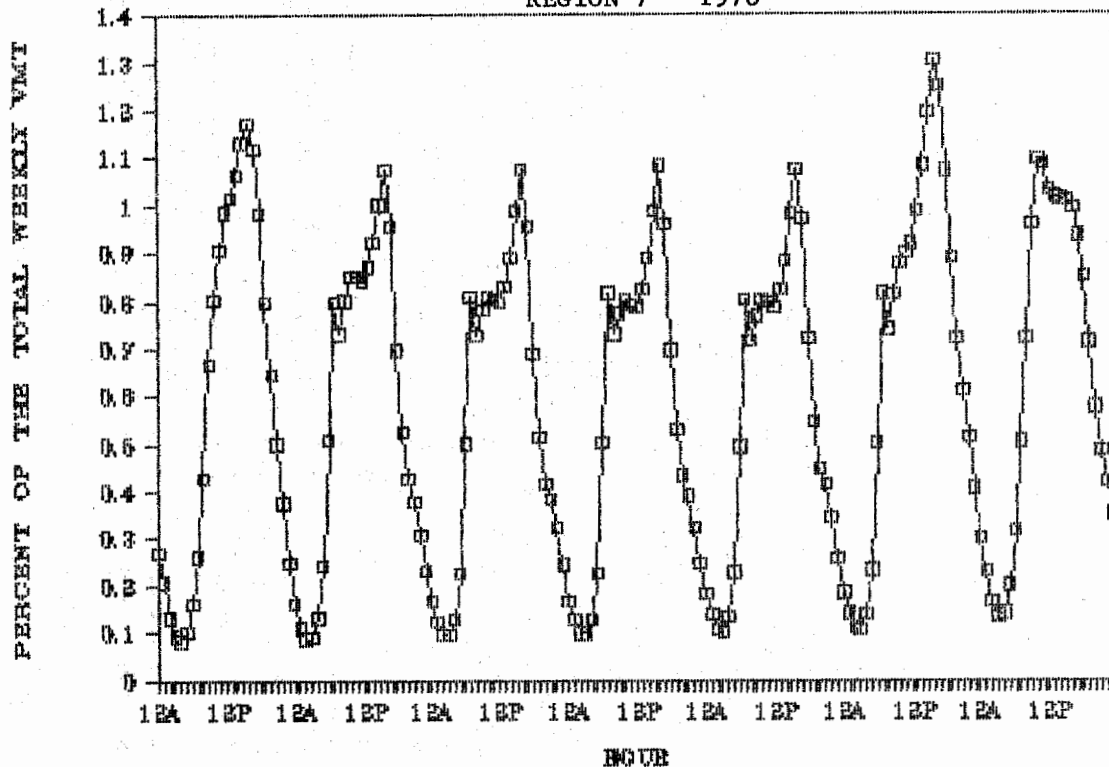
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 7 - 1978



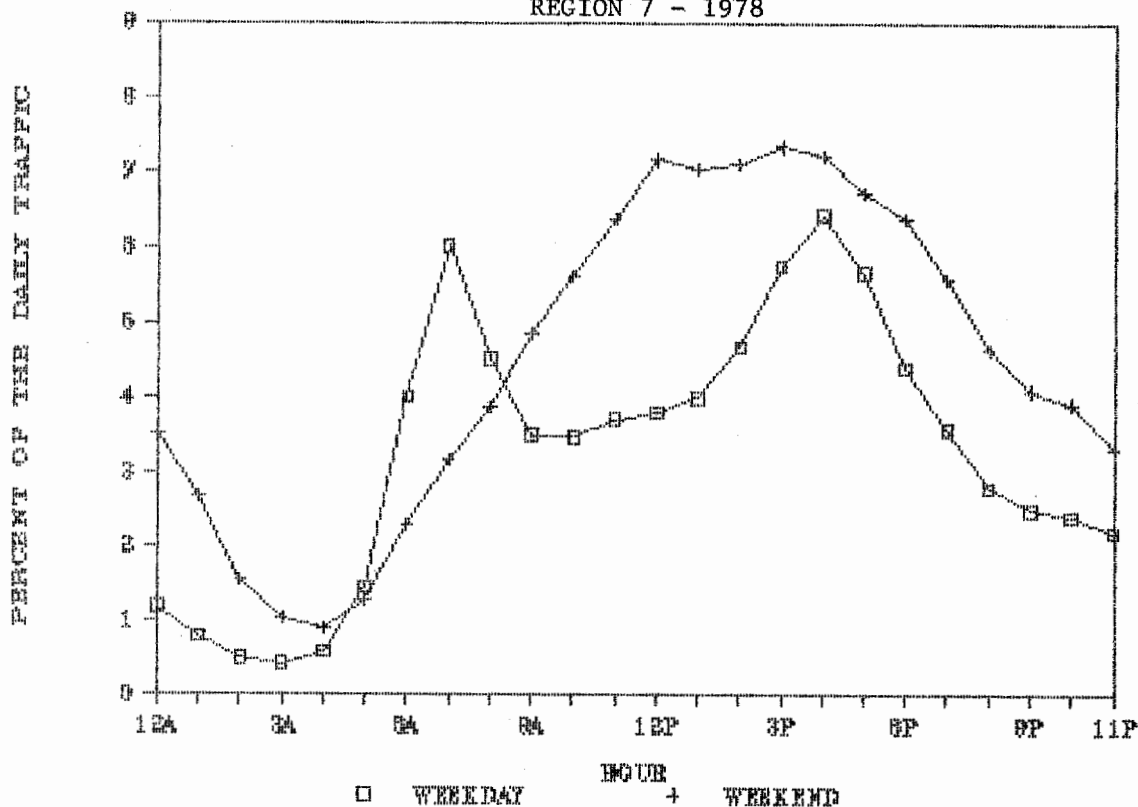
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REGION 7 - 1978



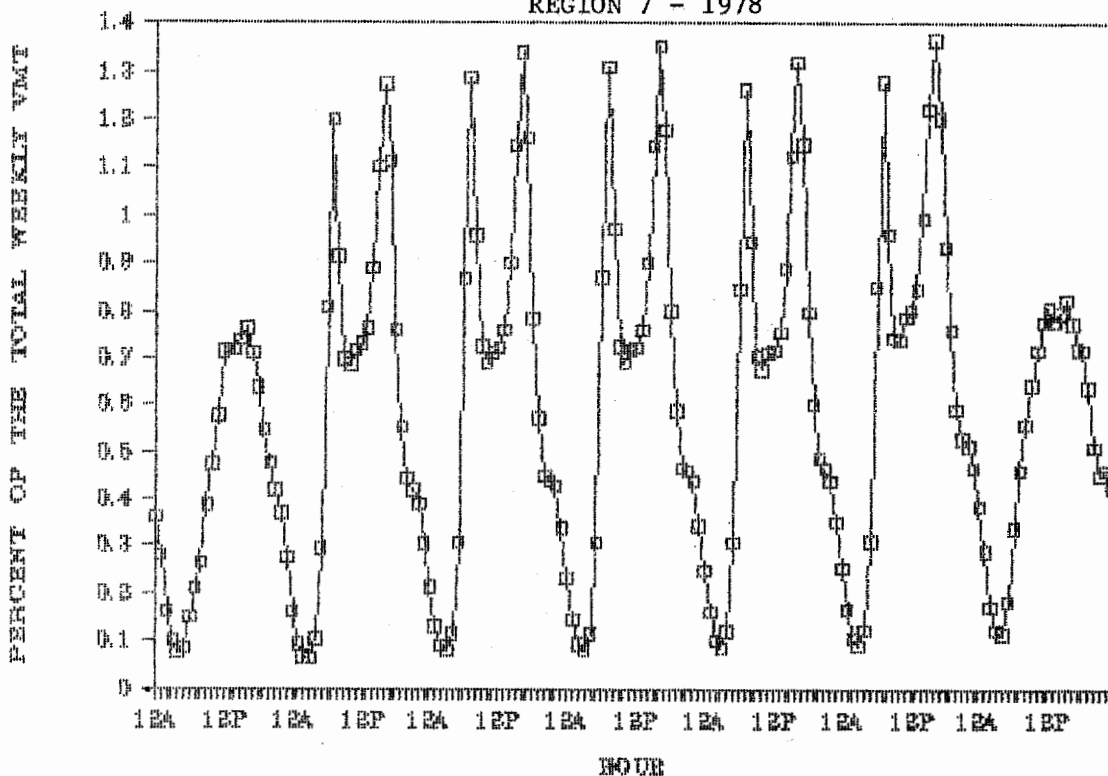
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 7 - 1978

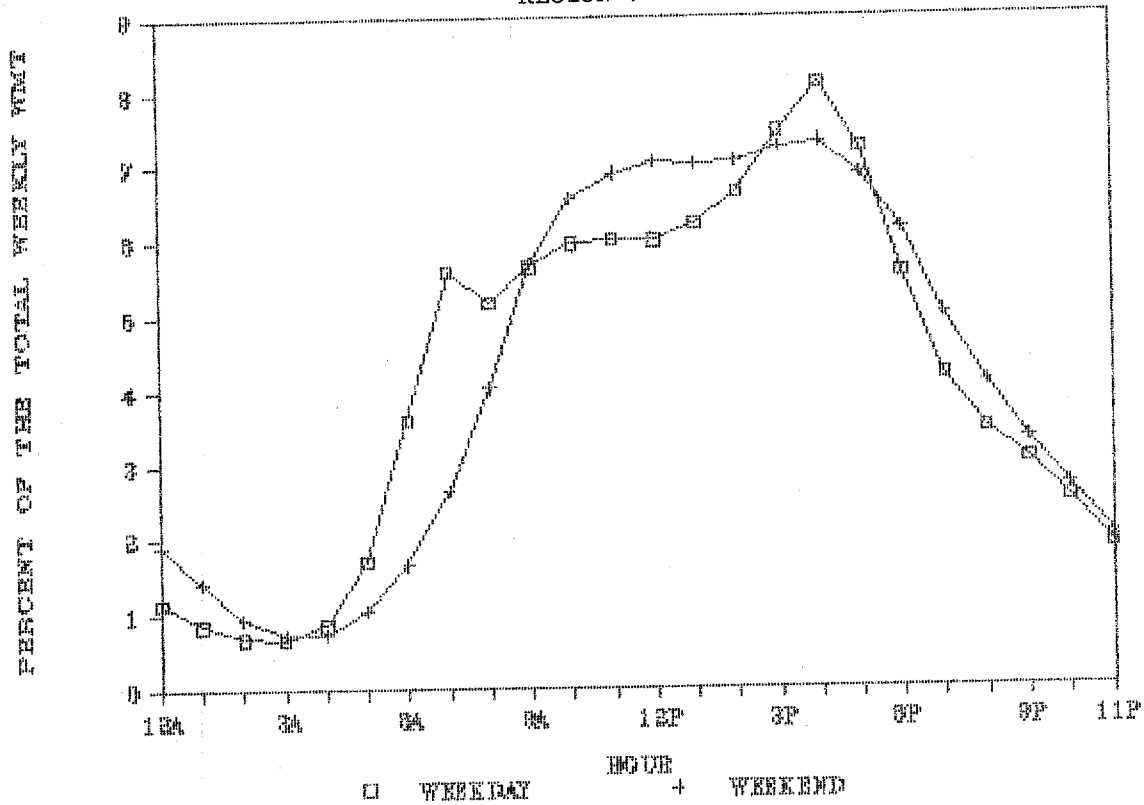


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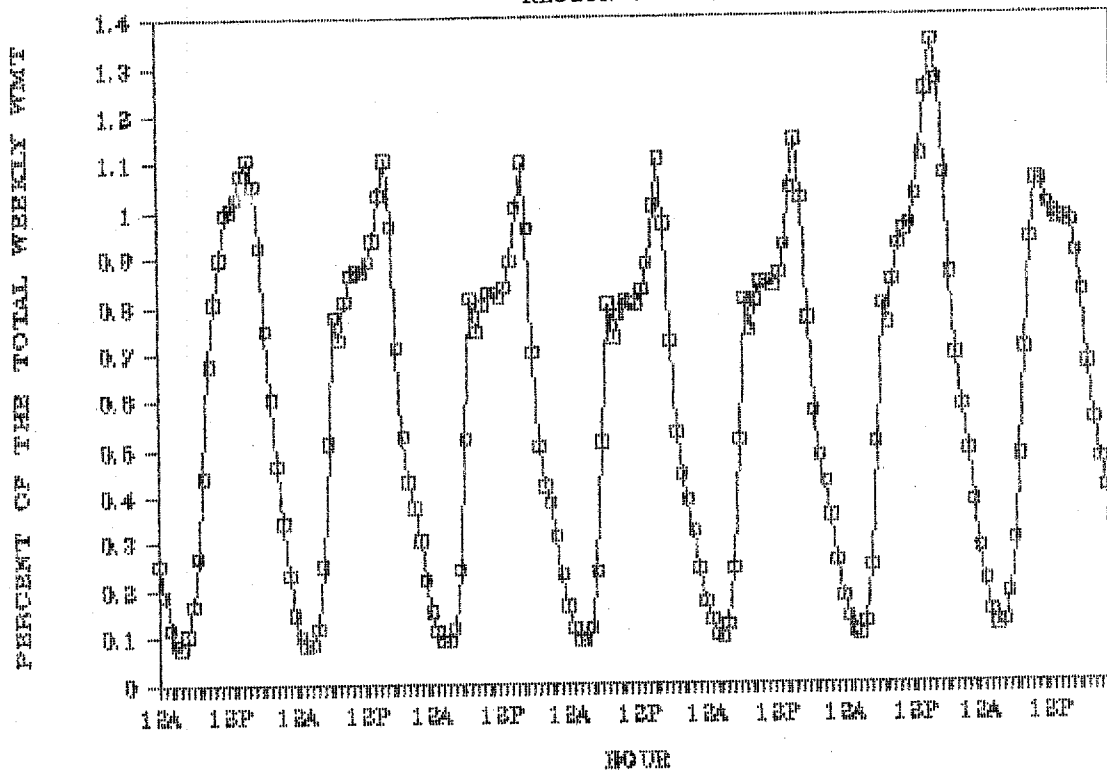
REGION 7 - 1978



DAILY DISTRIBUTION FOR RURAL SYSTEM REGION 7 - 1983

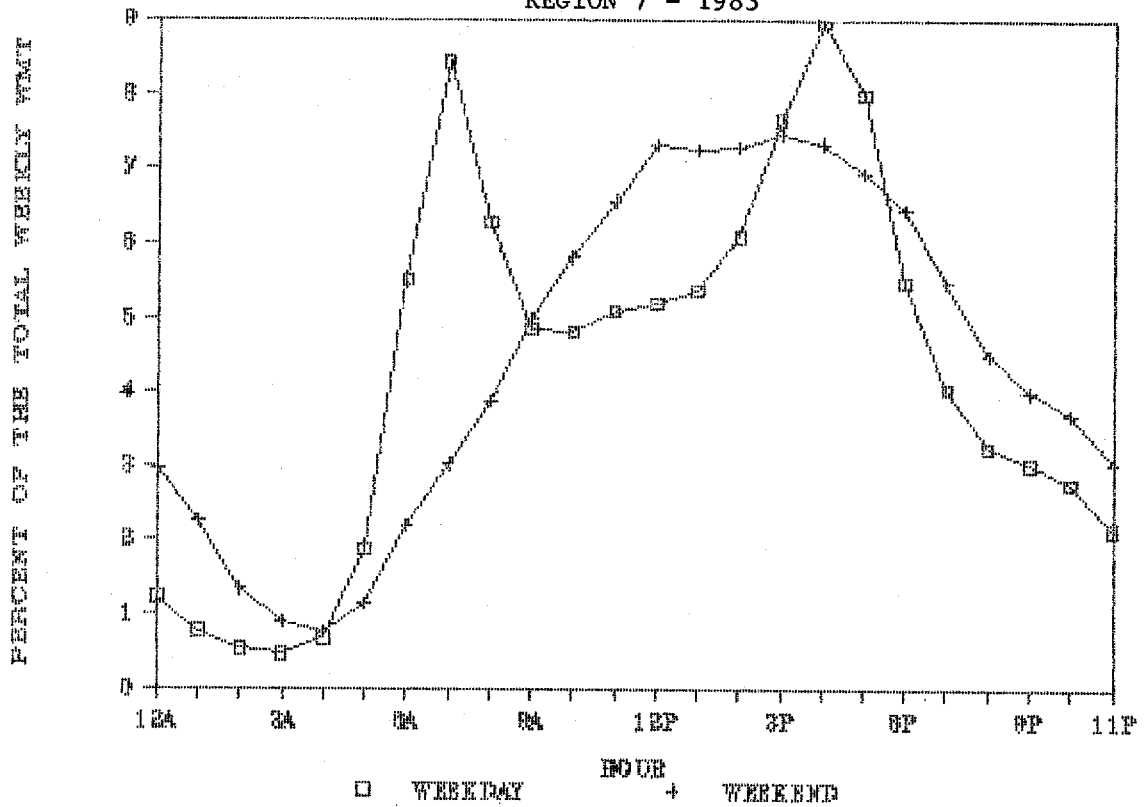


PERCENT VMT FOR THE RURAL SYSTEM REGION 7 - 1983



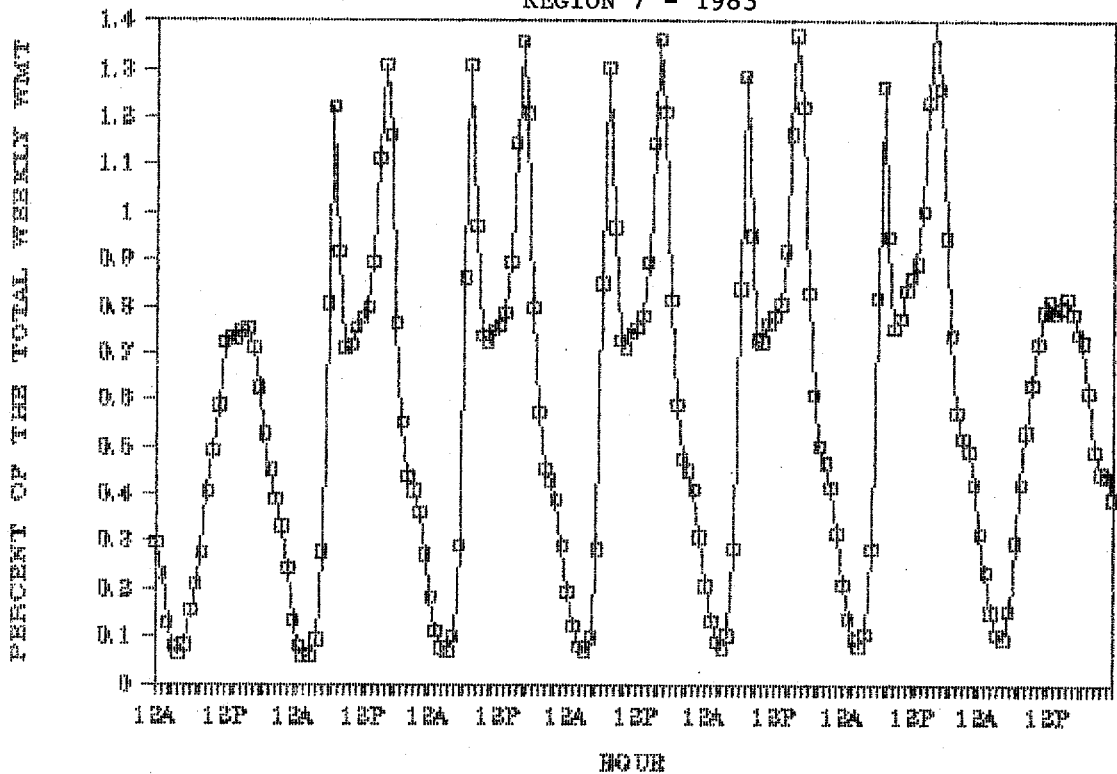
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REGION 7 - 1983



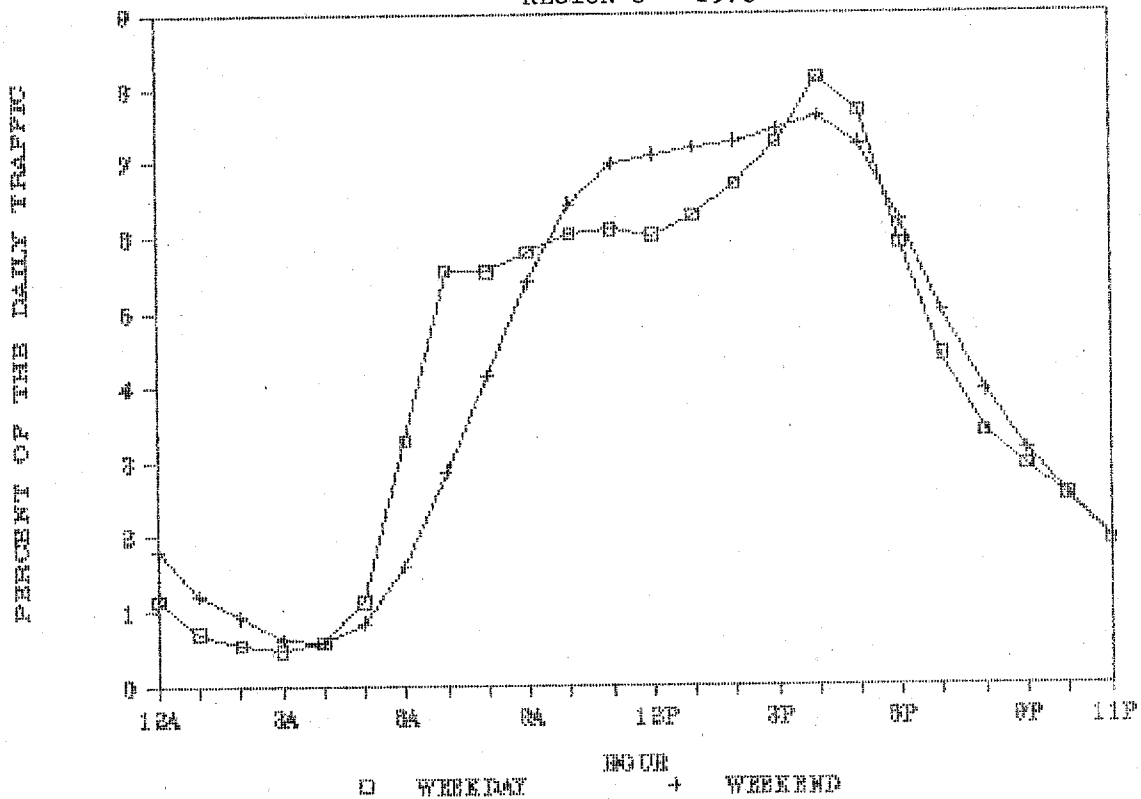
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REGION 7 - 1983



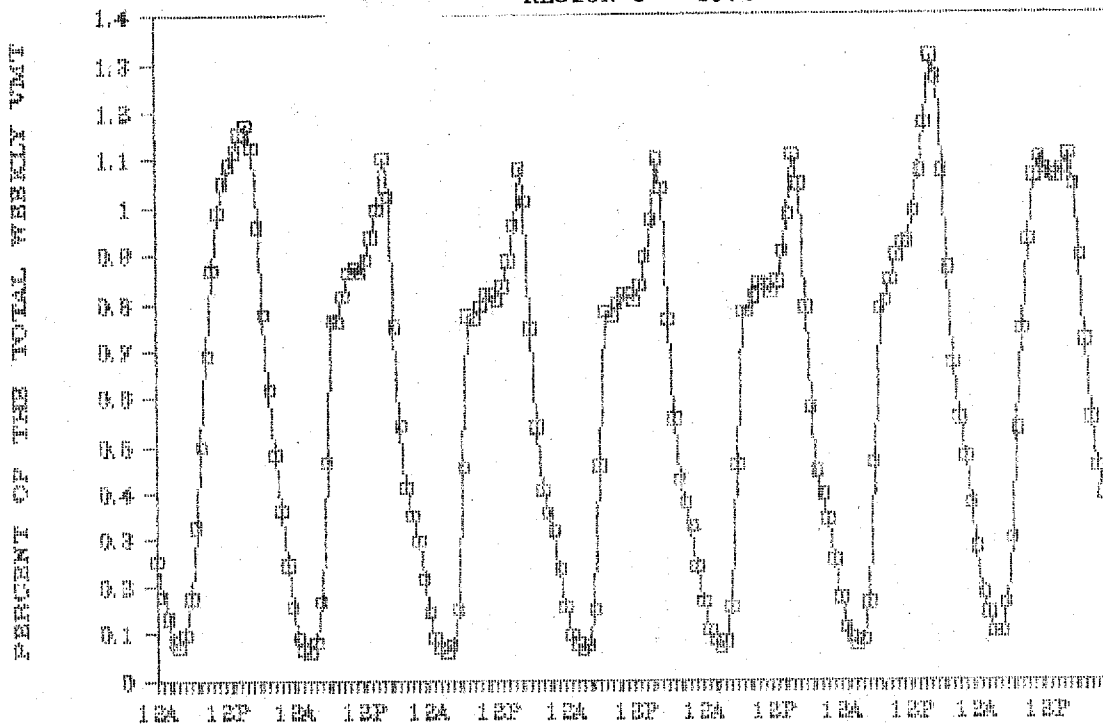
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REGION 8 - 1978



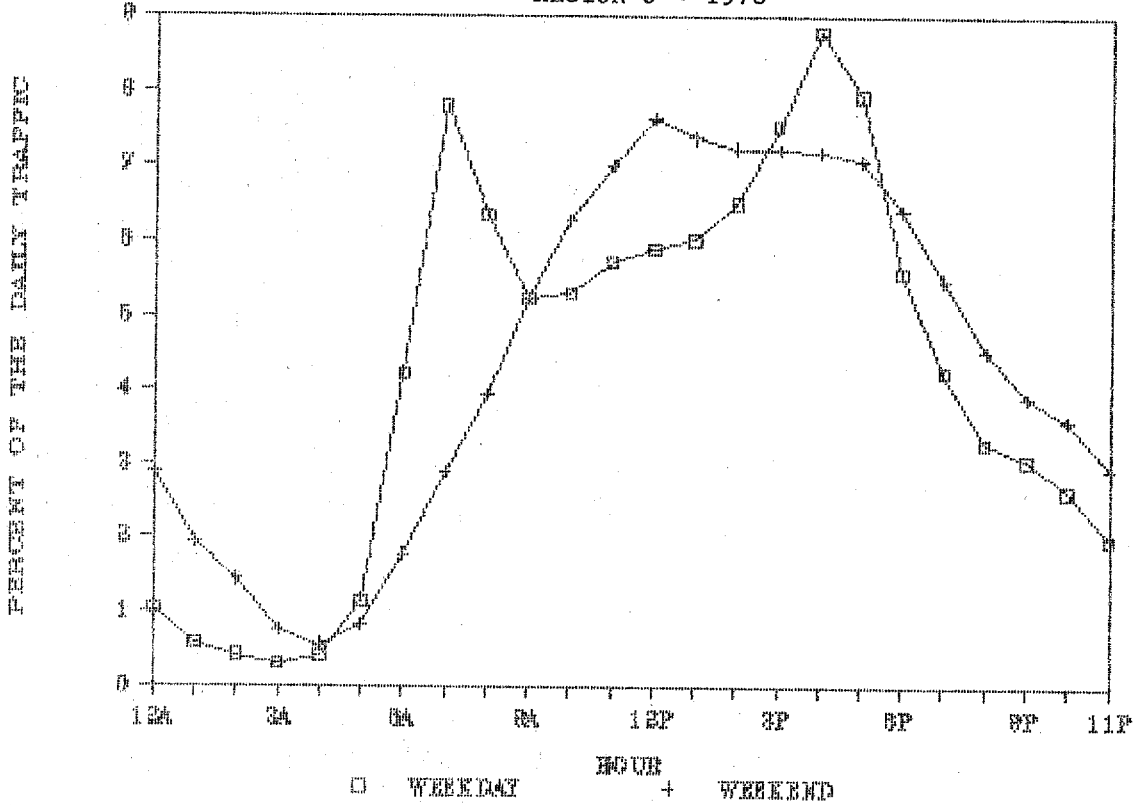
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REGION 8 - 1978



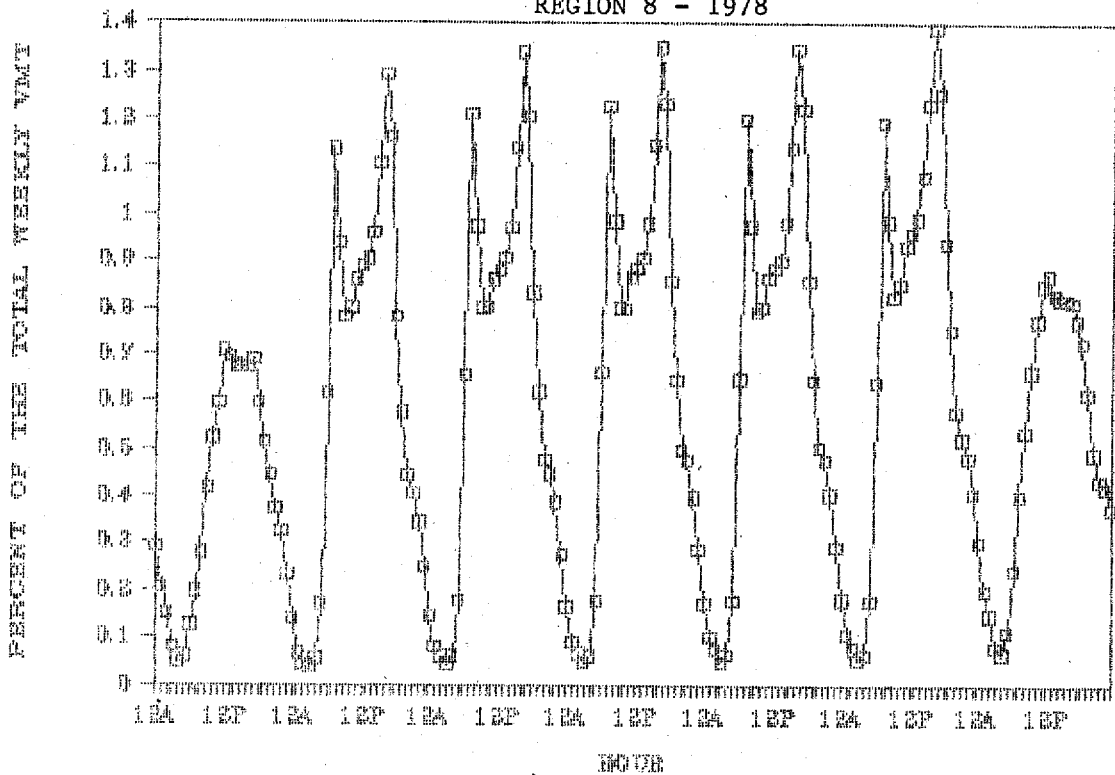
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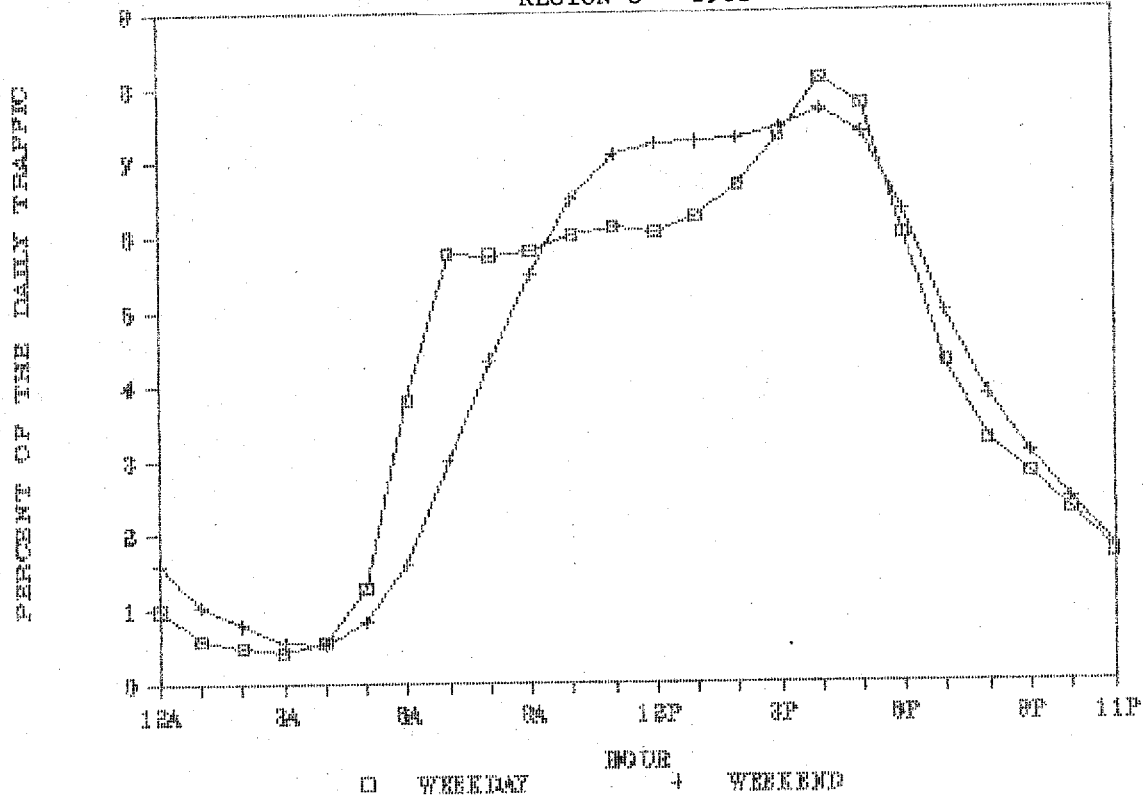
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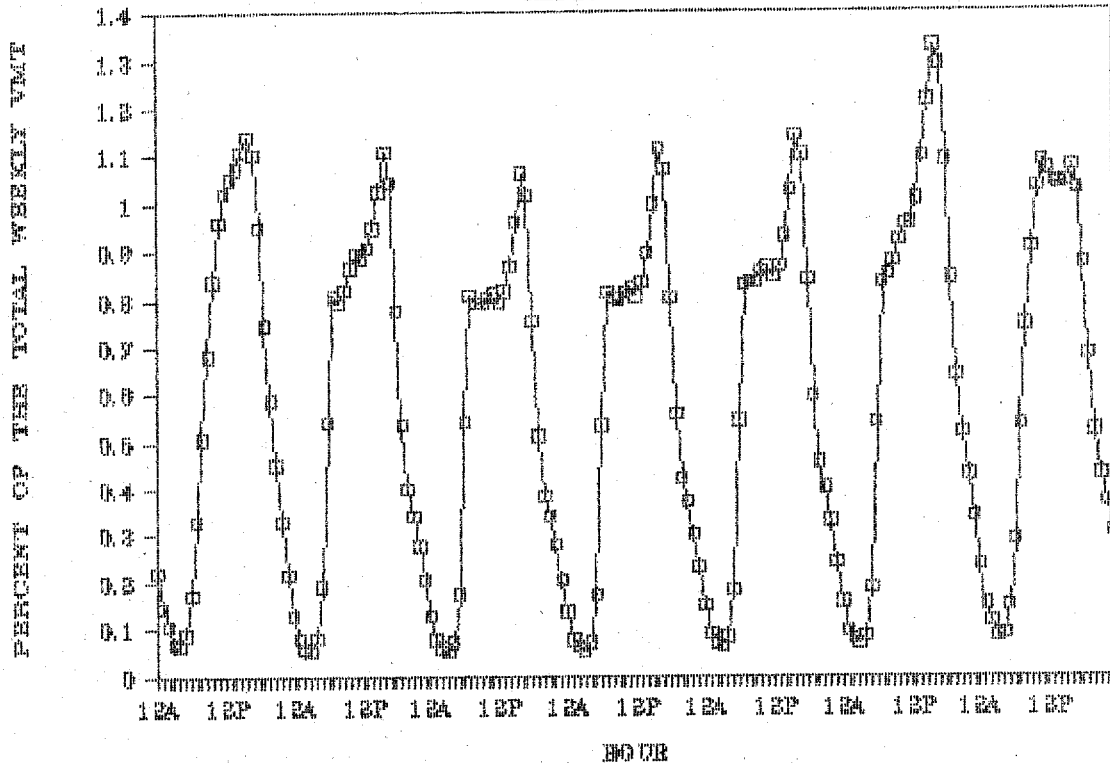
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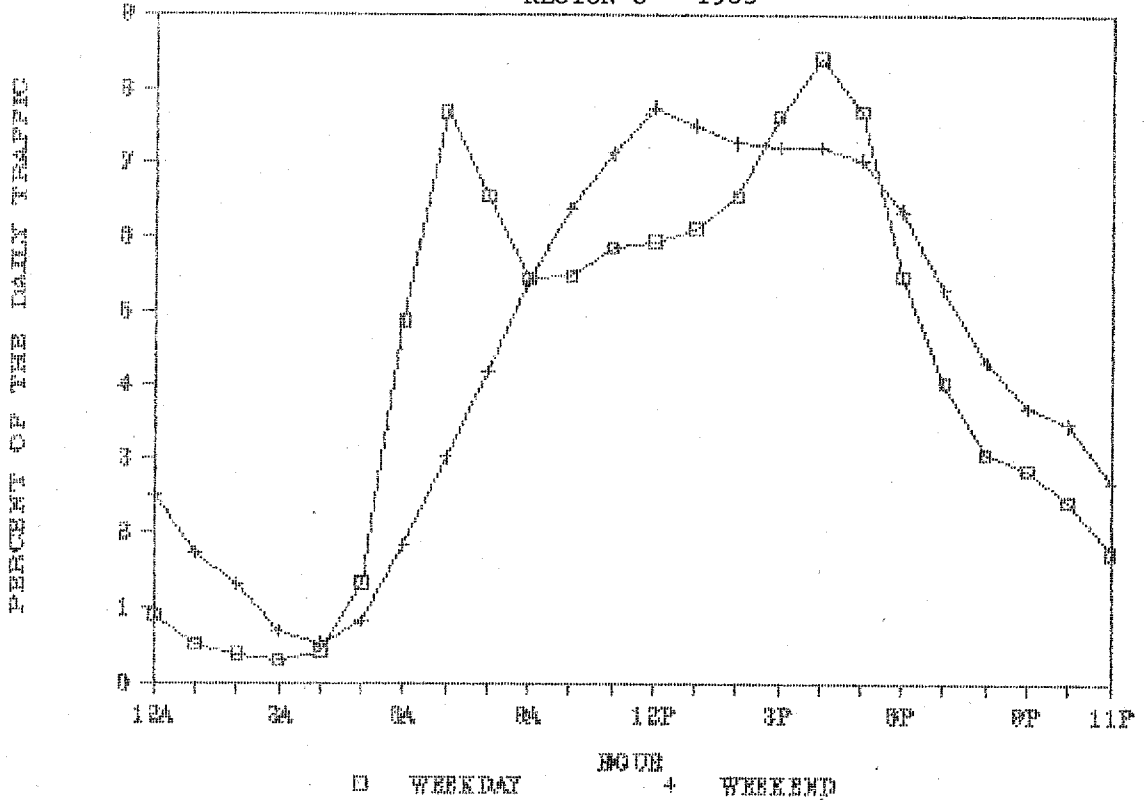
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REGION 8 - 1983



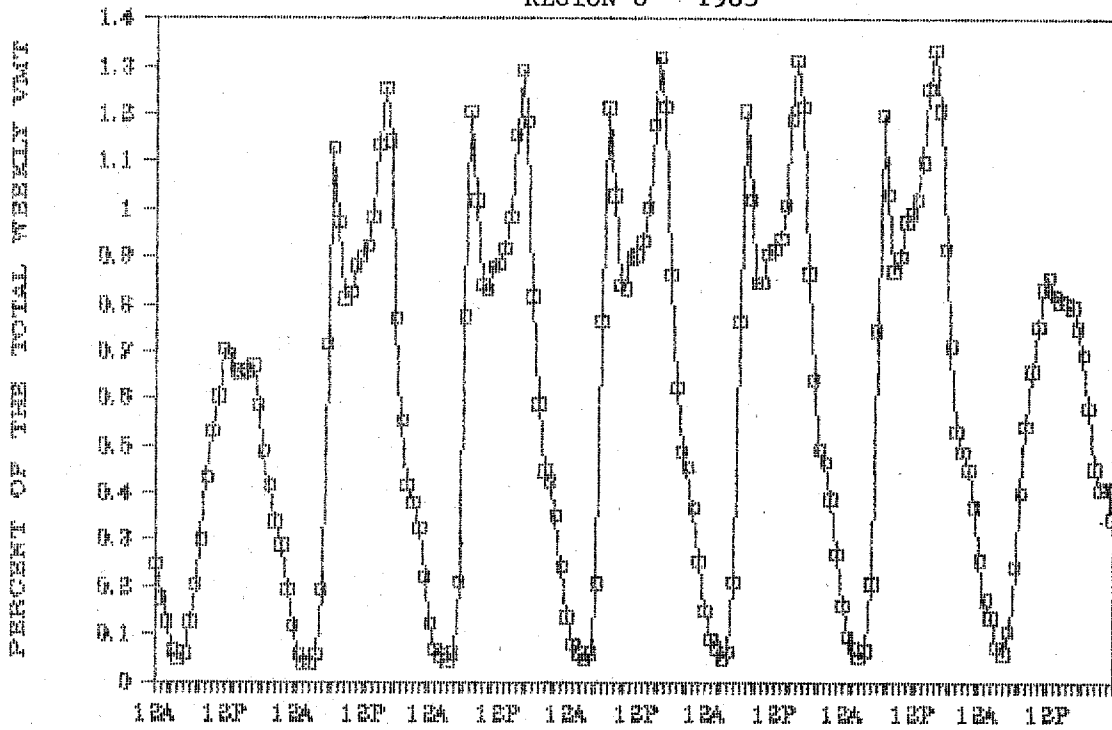
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 8 - 1983



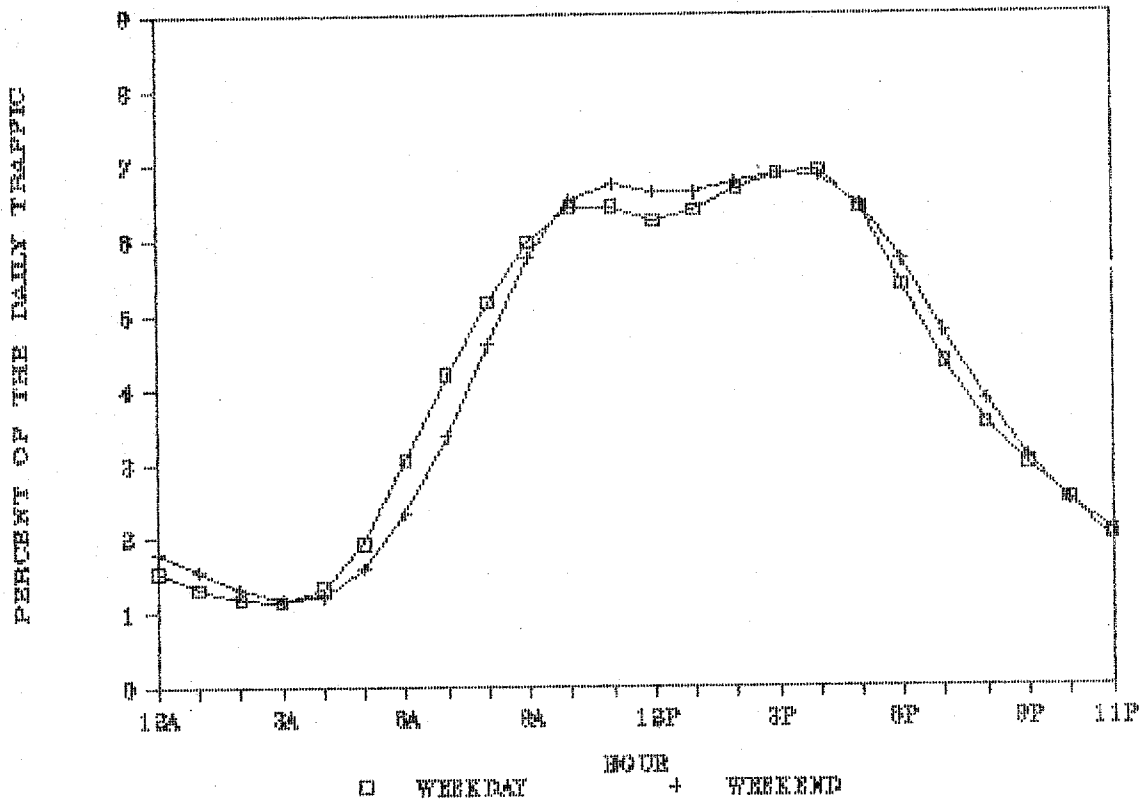
PERCENT VMT FOR THE URBAN SYSTEM

REGION 8 - 1983



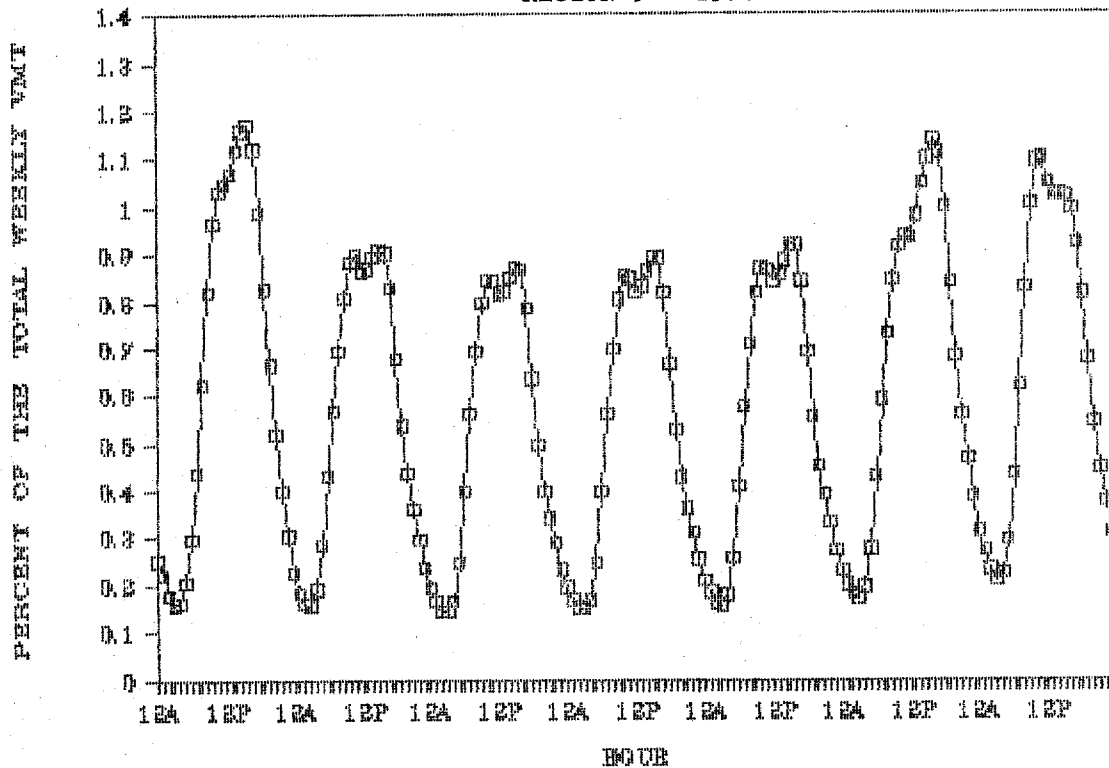
DAILY DISTRIBUTION FOR RURAL SYSTEM

REGION 9 - 1978



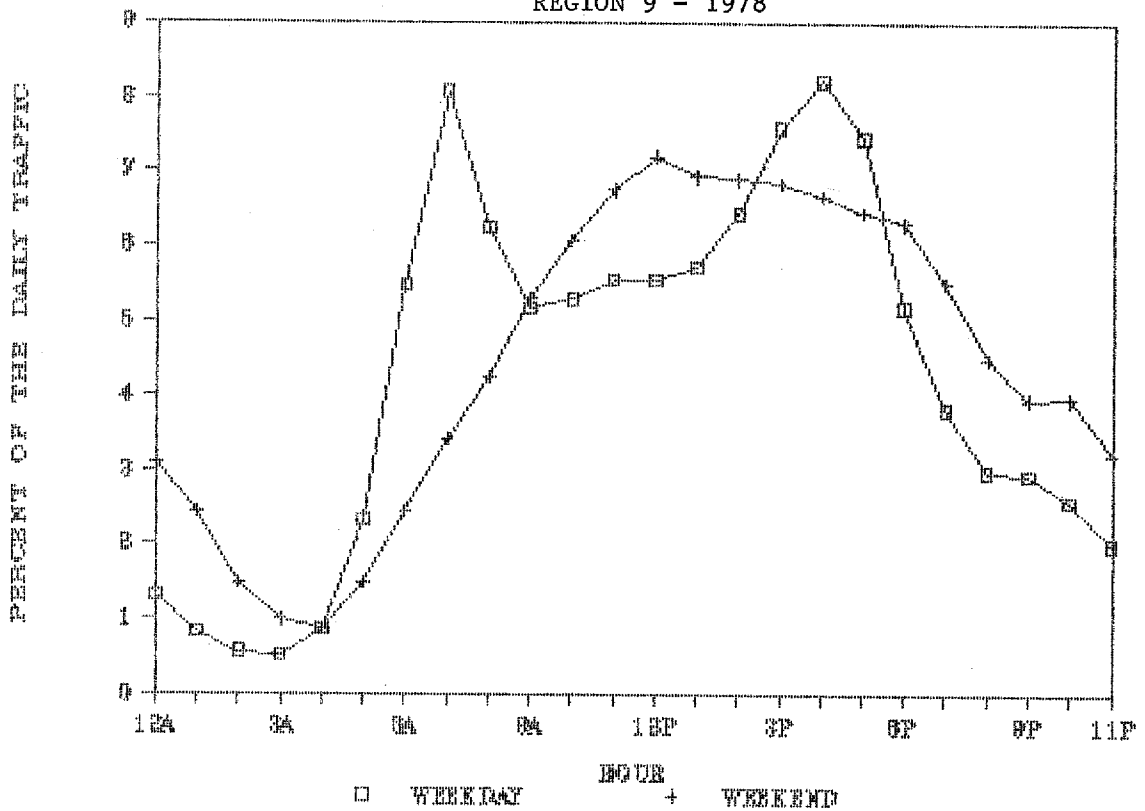
PERCENT VMT FOR THE RURAL SYSTEM

REGION 9 - 1978



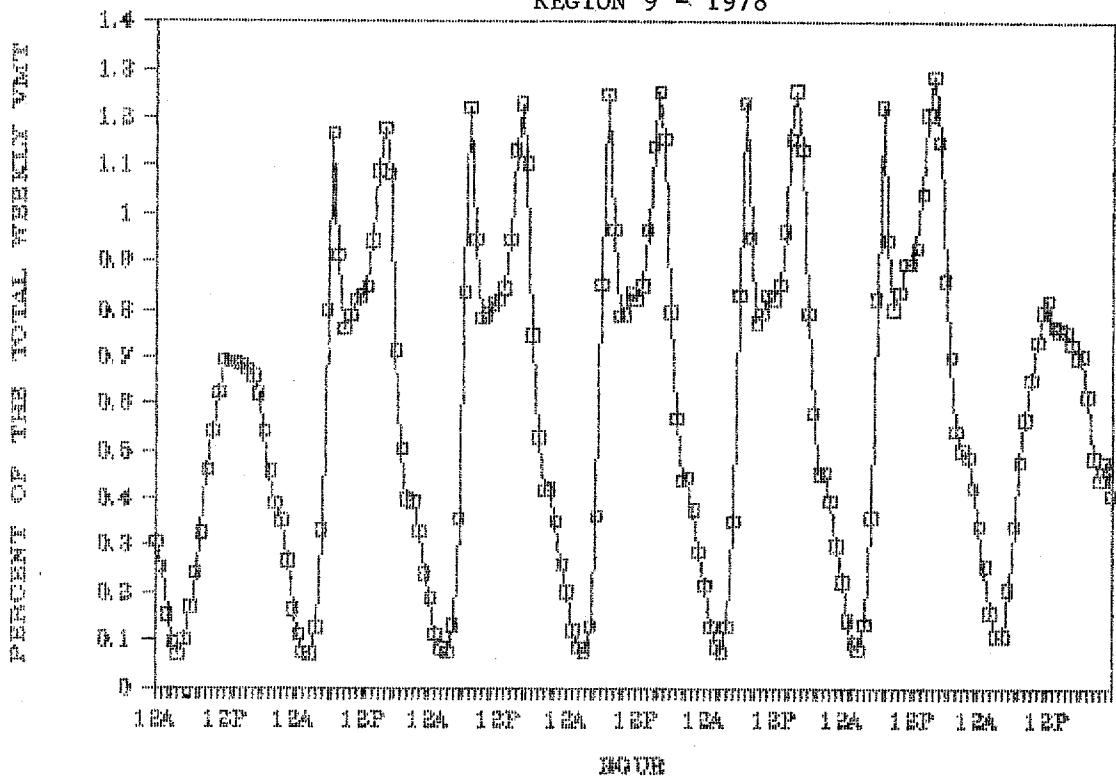
DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 9 - 1978



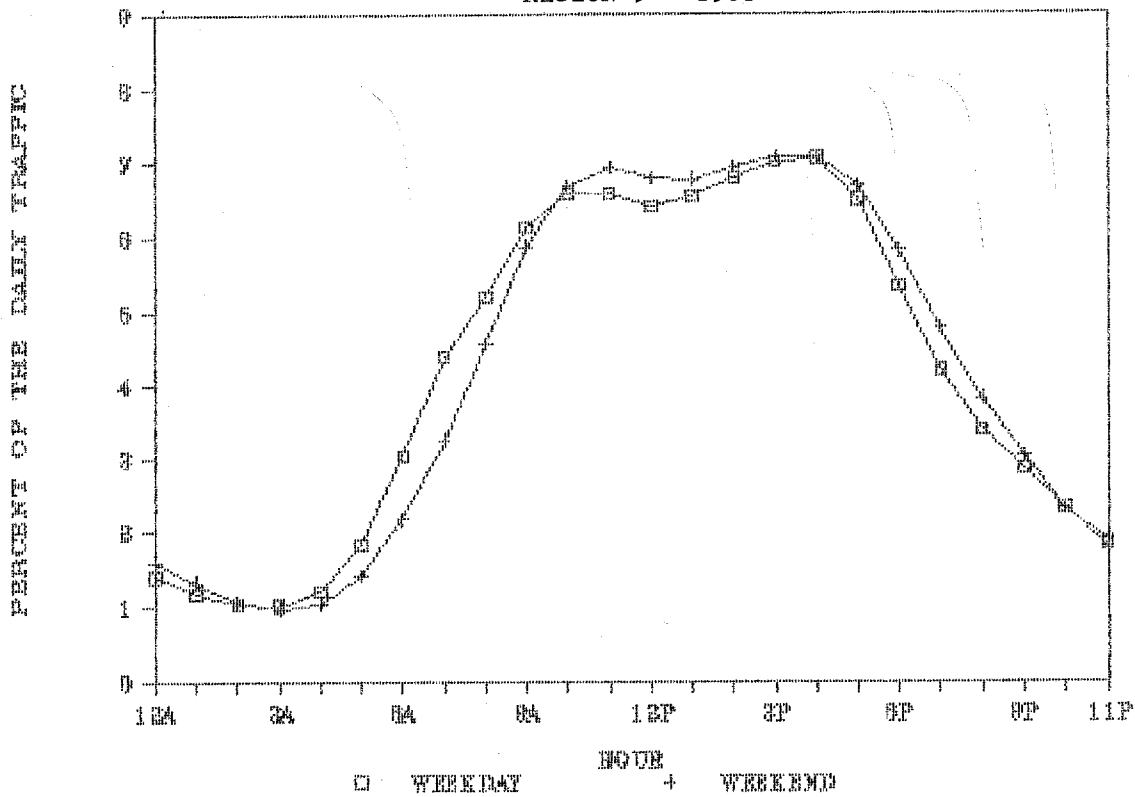
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REGION 9 - 1978



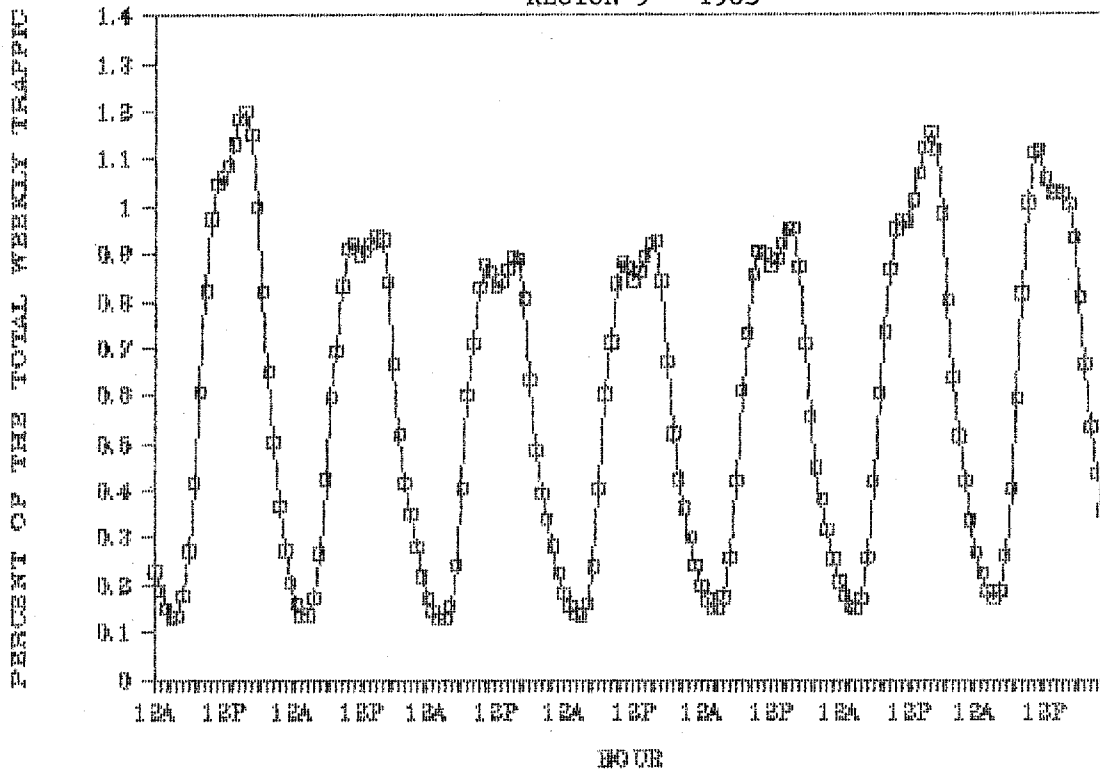
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REGION 9 - 1983



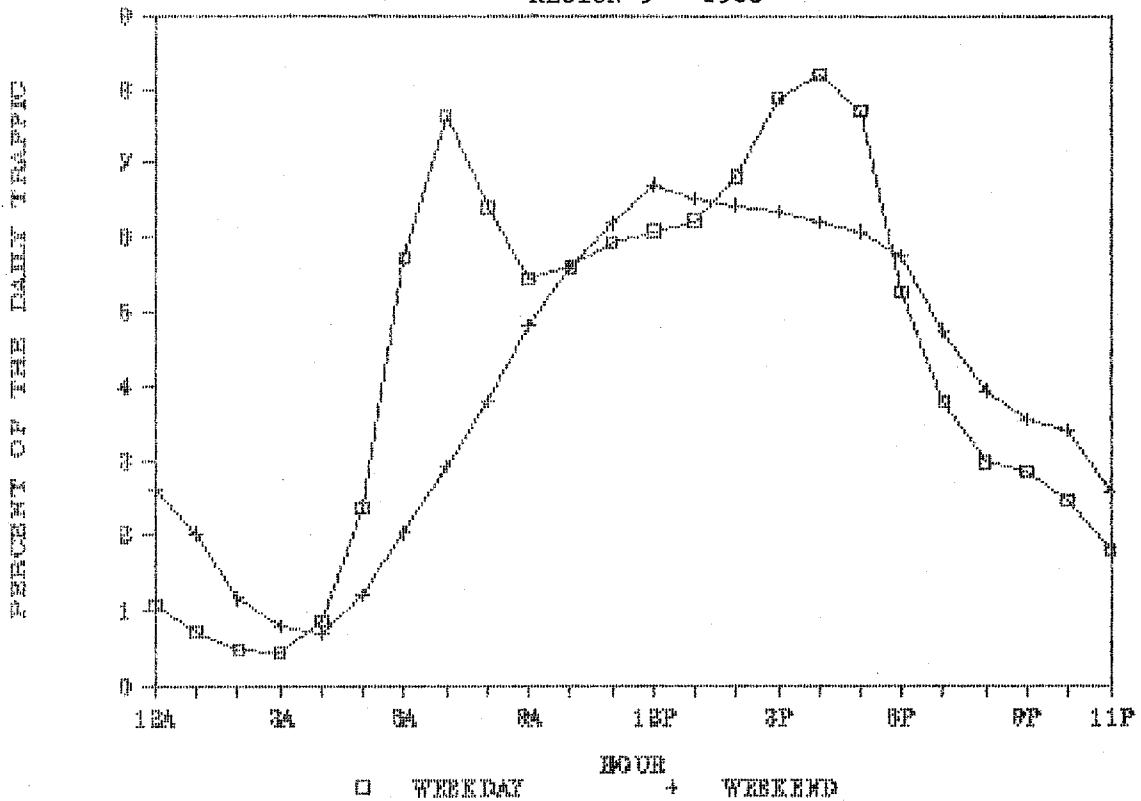
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REGION 9 - 1983



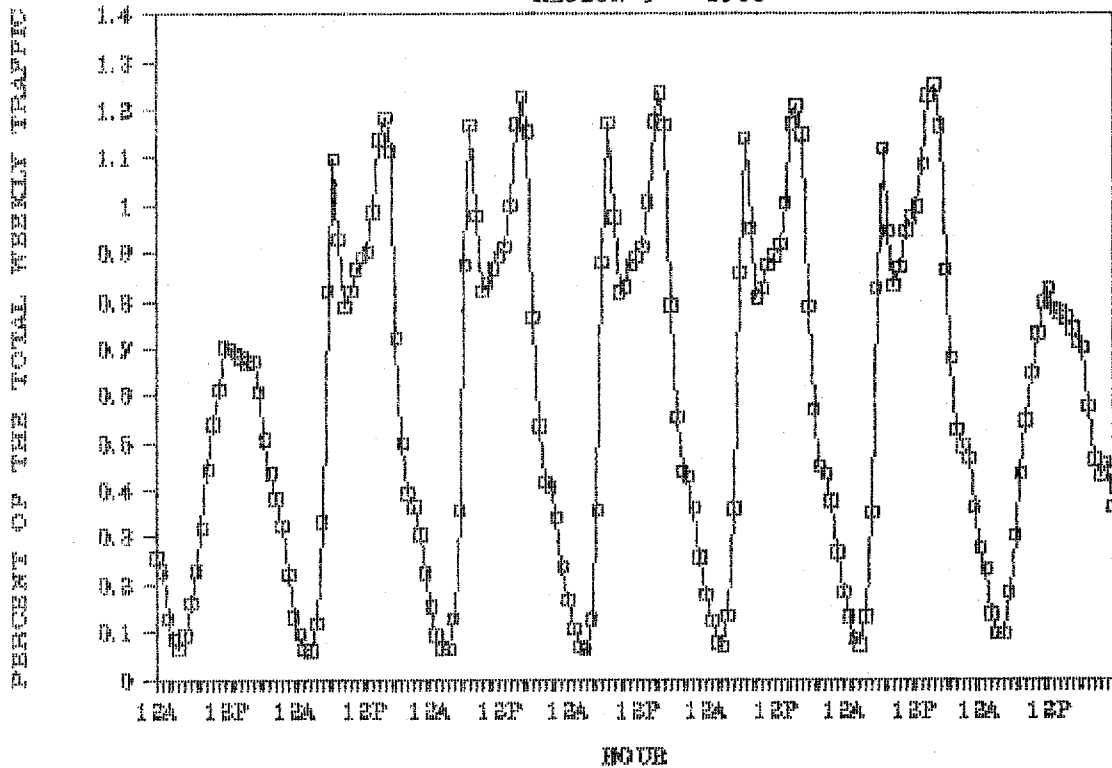
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REGION 9 - 1983



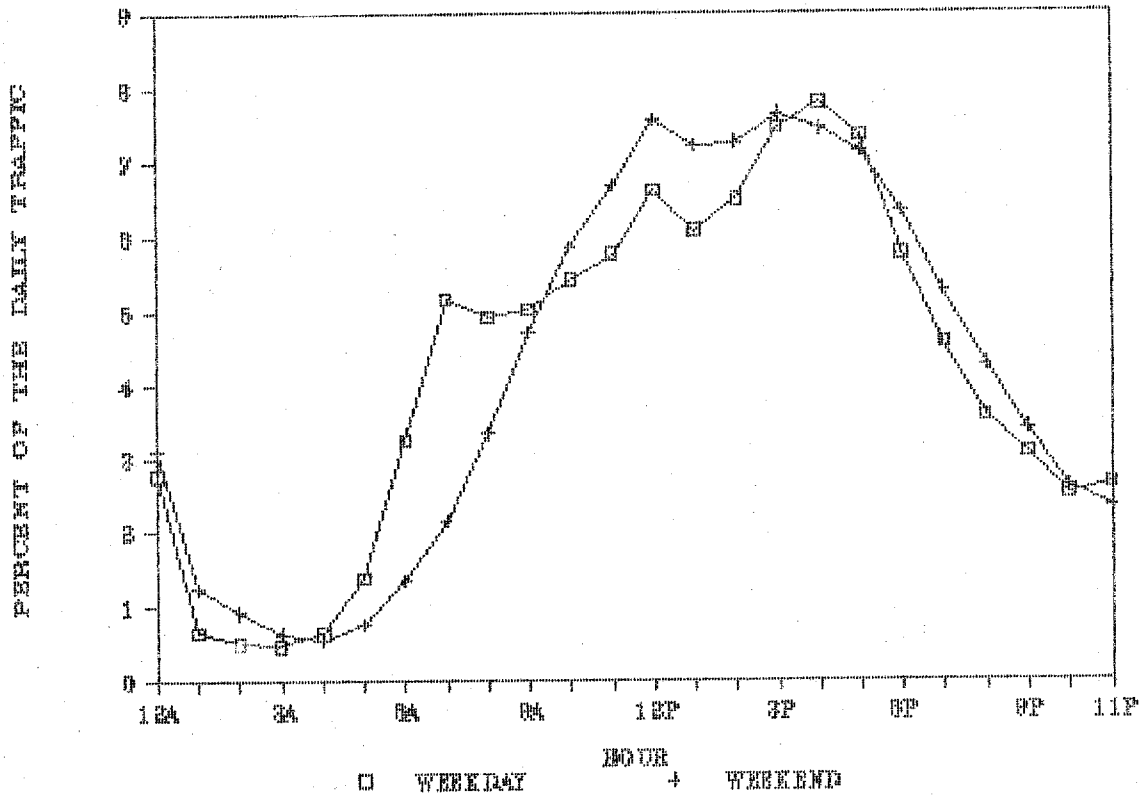
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REGION 9 - 1983



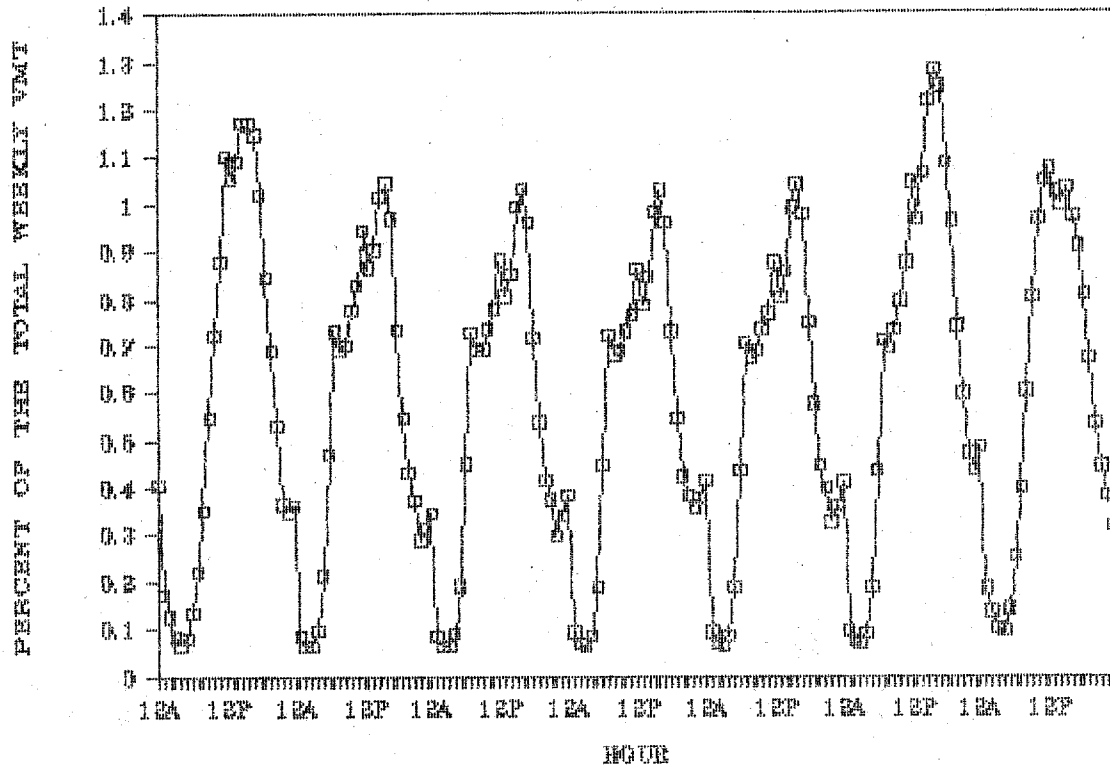
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REGION 10 - 1978



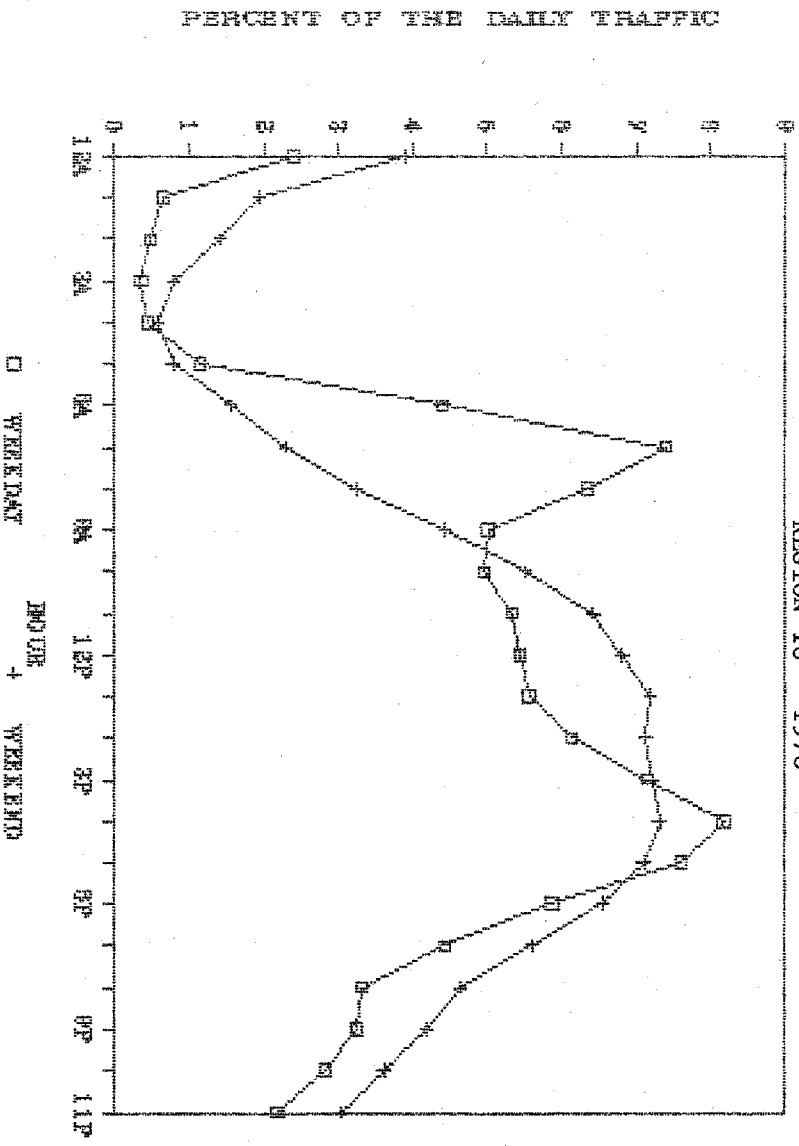
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REGION 10 - 1978



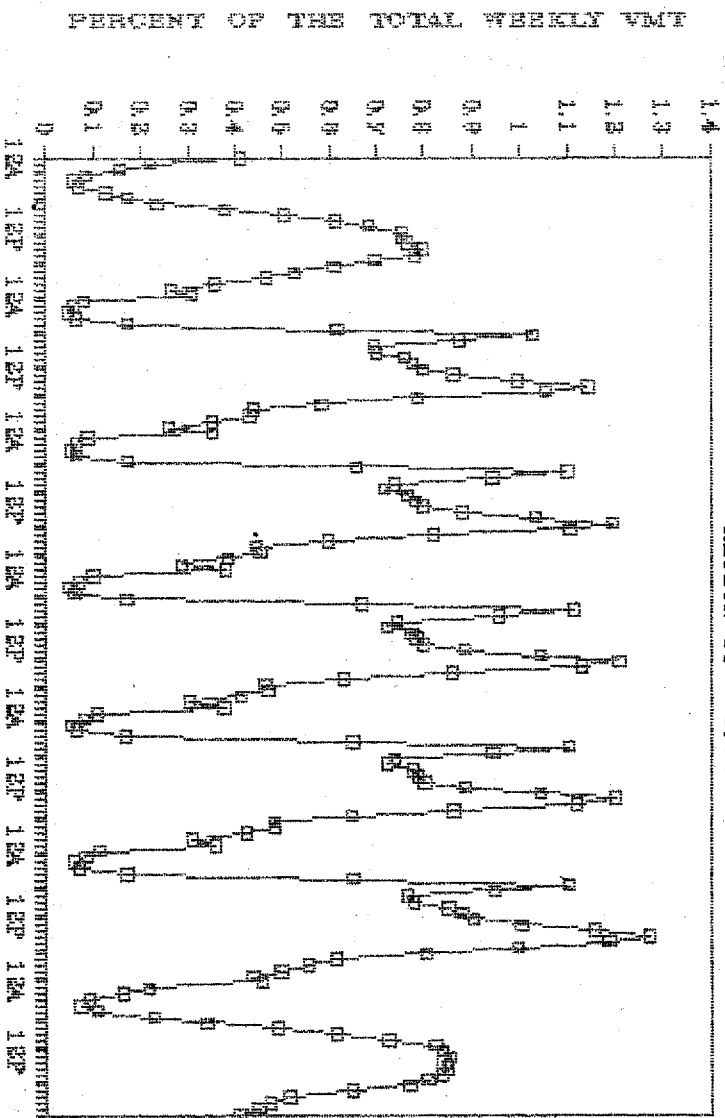
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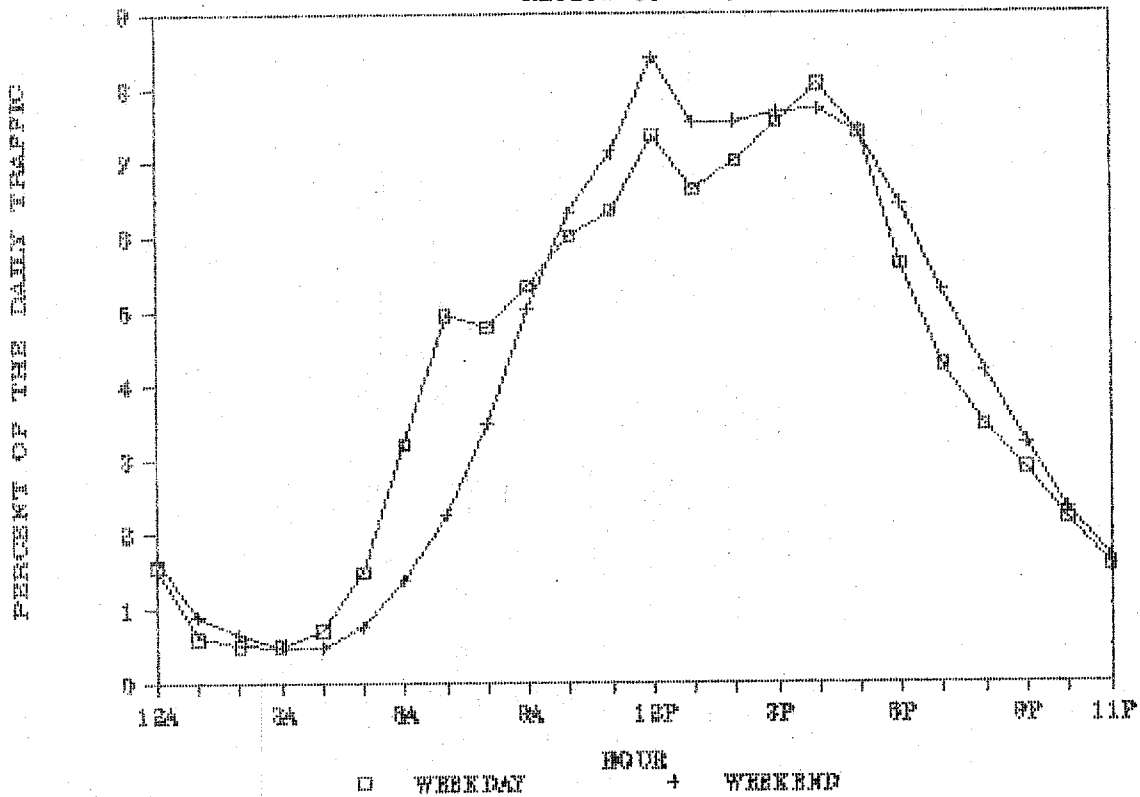
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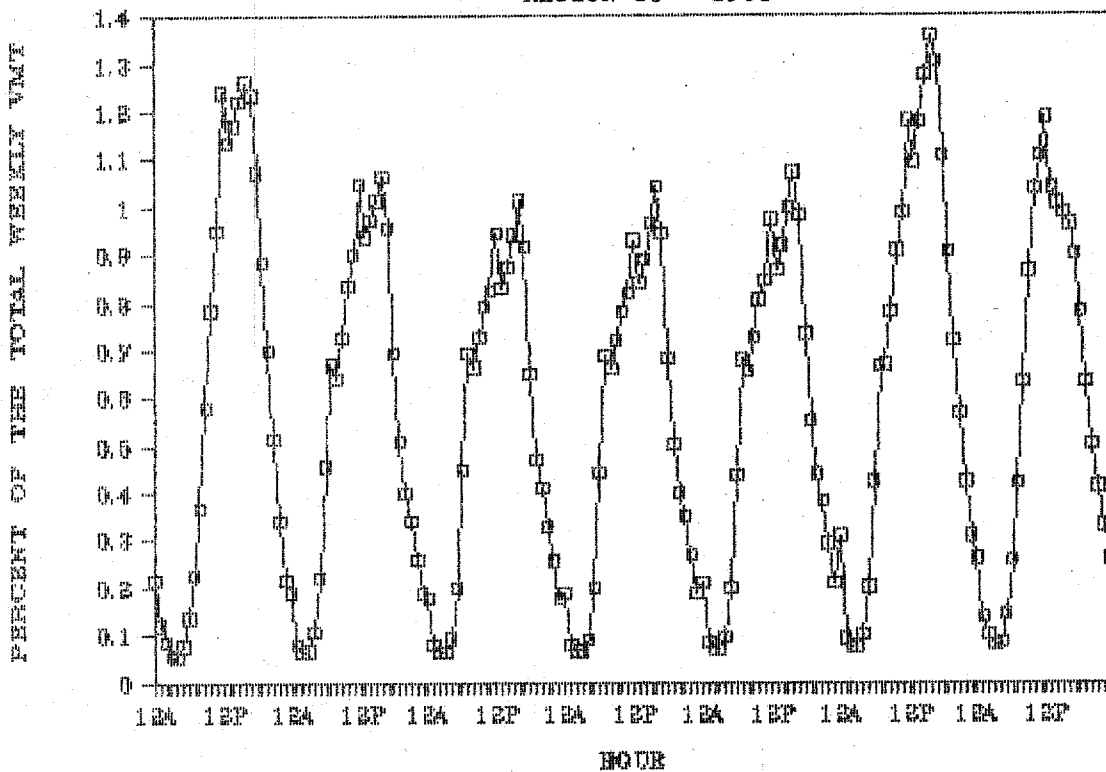
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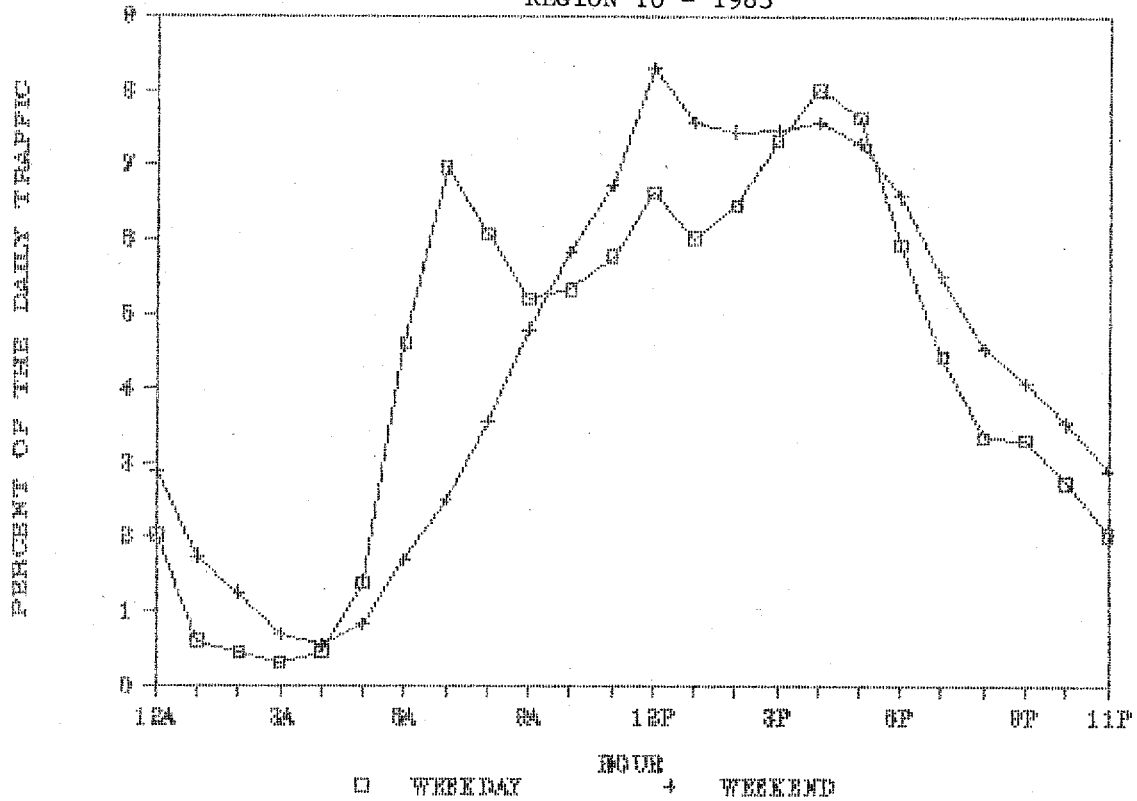
PERCENT VMT FOR THE RURAL SYSTEM

REGION 10 - 1983



DAILY DISTRIBUTION FOR URBAN SYSTEM

REGION 10 - 1983



PERCENT VMT FOR THE URBAN SYSTEM

REGION 10 - 1983

