



PACIFIC REGION TECHNICAL NOTES

No. 78 -050
December 18, 1978

PRELIMINARY AIREPS FEASIBILITY STUDY

Fred Eddy, Meteorologist
Pacific Weather Centre

Introduction

The recent announcement of the phasing out of ship PAPA has put new emphasis on the Pacific Weather Centre to re-examine our meteorological data needs over the Pacific, and if possible to use nonconventional data sources to minimize the effect of the loss of ship PAPA. The introduction of the half-hourly GOES images has helped to supplant this office's needs for vertical meteorological data over the Pacific however as of yet temperature and wind structures of the atmosphere are still difficult to assess without other confirming data. The use of AIREPS over the Pacific gives this office a source of temperature and wind observations at flight level but data coverage is limited to aircraft flight tracks. During the months of October and November 1978 a feasibility study was conducted to assess the usefulness of the AIREPS to the experimental Pacific Weather Centre Satellite Program. The study showed that the AIREPS were a very valuable source of confirmation data to interpret satellite images. The AIREPS have now been incorporated into the operational program and are available to the forecaster via CRT. This note will present the results of the analysis of the availability of AIREPS over the Pacific.

Method

During the months of October and November 1978, the AIREPS received at the Pacific Weather Centre were sorted by computer into 10° latitude by 10° longitude sectors over the Northeastern Pacific (from 25°N to 65°N and from 120°W to 180° - the date line). The AIREPS were also sorted into 6 hour time periods centred on the synoptic hours. A count was made of the number of AIREPS in each sector for each time period.

Results

Between Oct. 21 and Nov. 30, a period of 39 days (two days of data were missing), there were 15,938 AIREPS within the sector boundaries. These AIREPS were received under the following headings:-

UAAK1 PANC; UAAK2 PANC; UAPA1 KSFO; UAPA1 KWBC;

The flight levels of the AIREPS were between 27 thsd and 41 thsd feet with the majority between 33 thsd and 39 thsd feet. The average number and the standard deviation of AIREPS in each sector for each time period were calculated (see Figures 1,2,3 & 4). As one might surmise, the most frequent reports occurred in those sectors covering the route from the United States west coast to Hawaii with another minor maximum along the great circle route to Japan.

The number of AIREPS per time period shows a maximum at 00Z and a minimum at 12Z (see Figure 6). A study of the frequency of the AIREPS with respect to the days of the week indicated no great variation although there was a maximum on Sunday and another lesser maximum on Friday (see Figure 5).

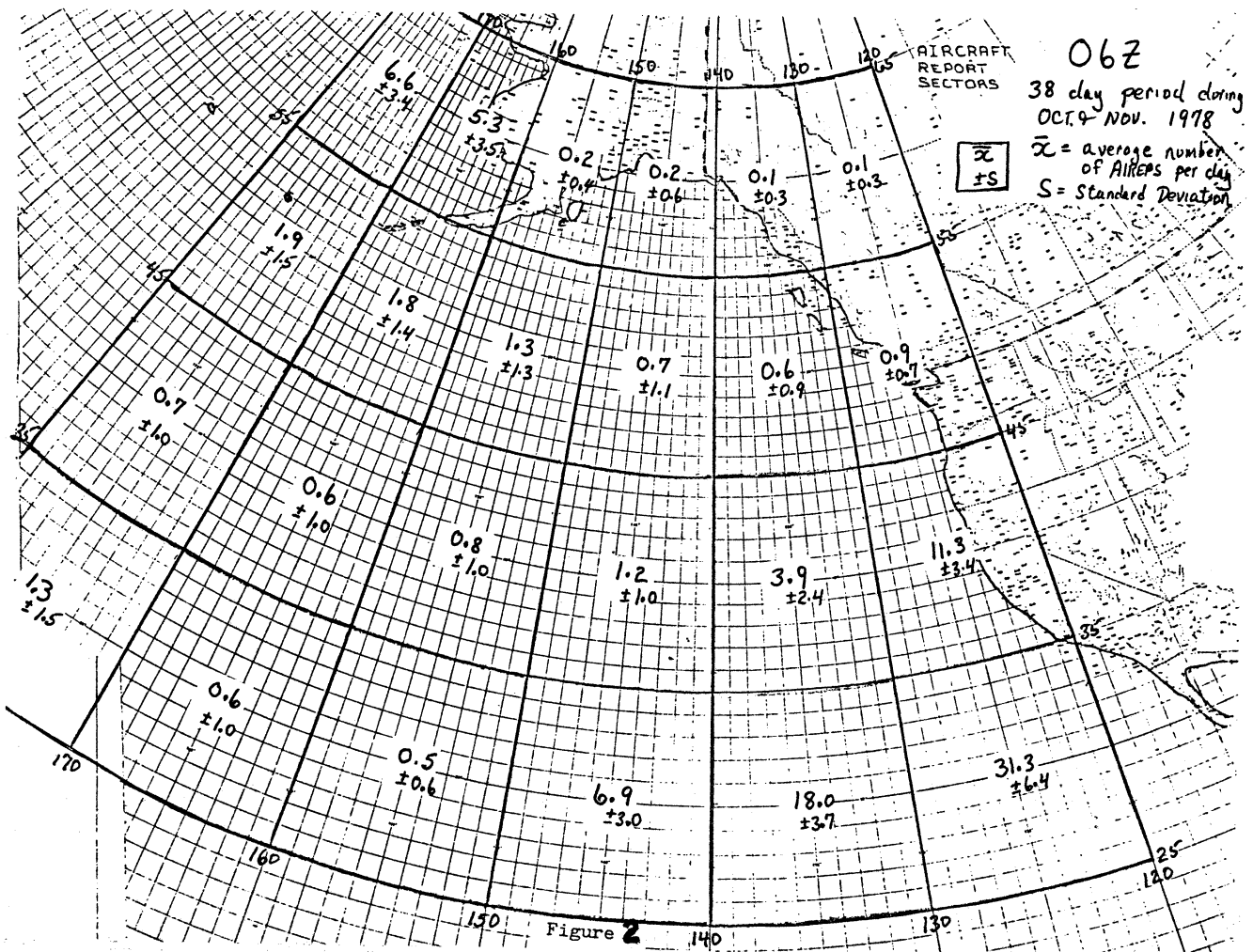
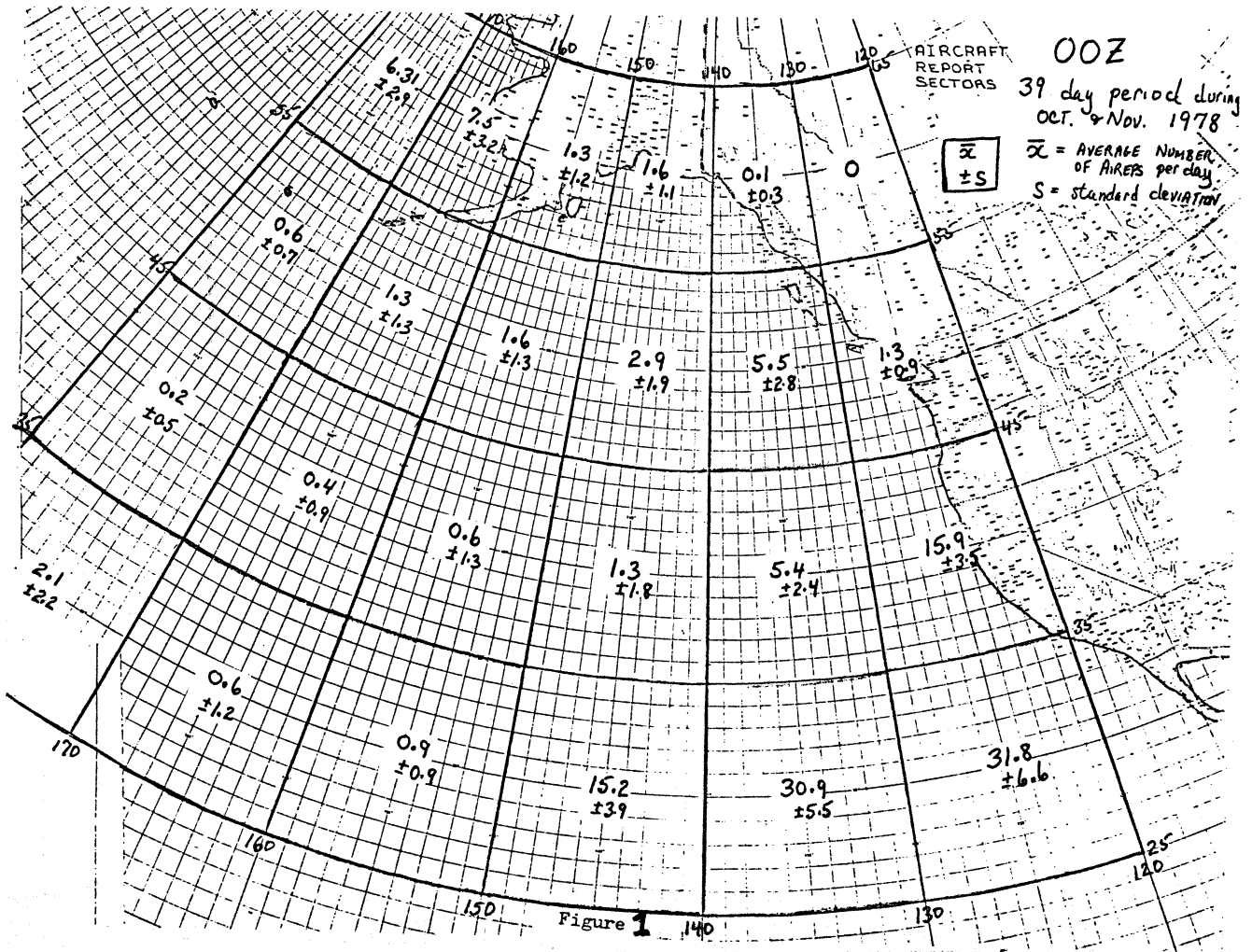
Comments

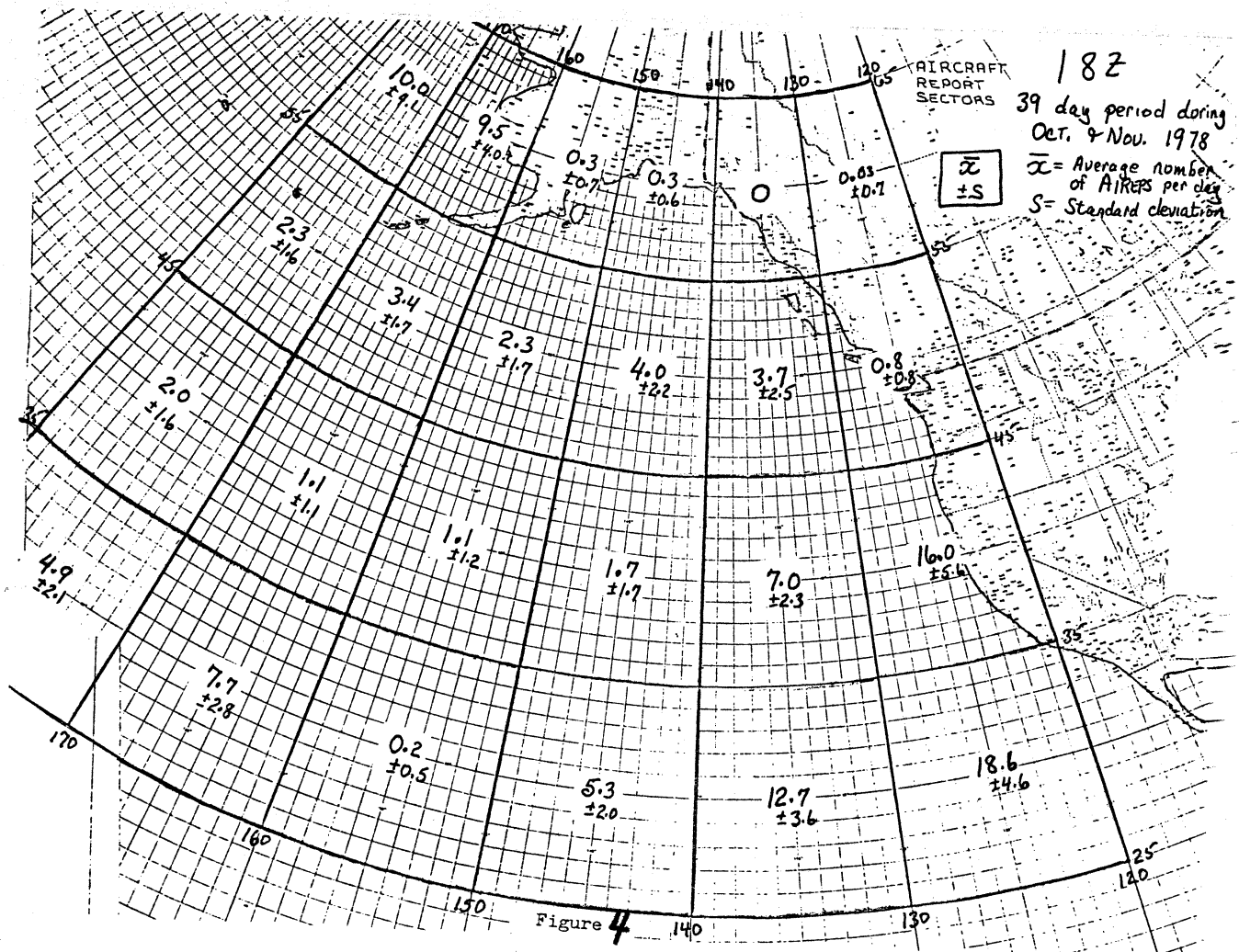
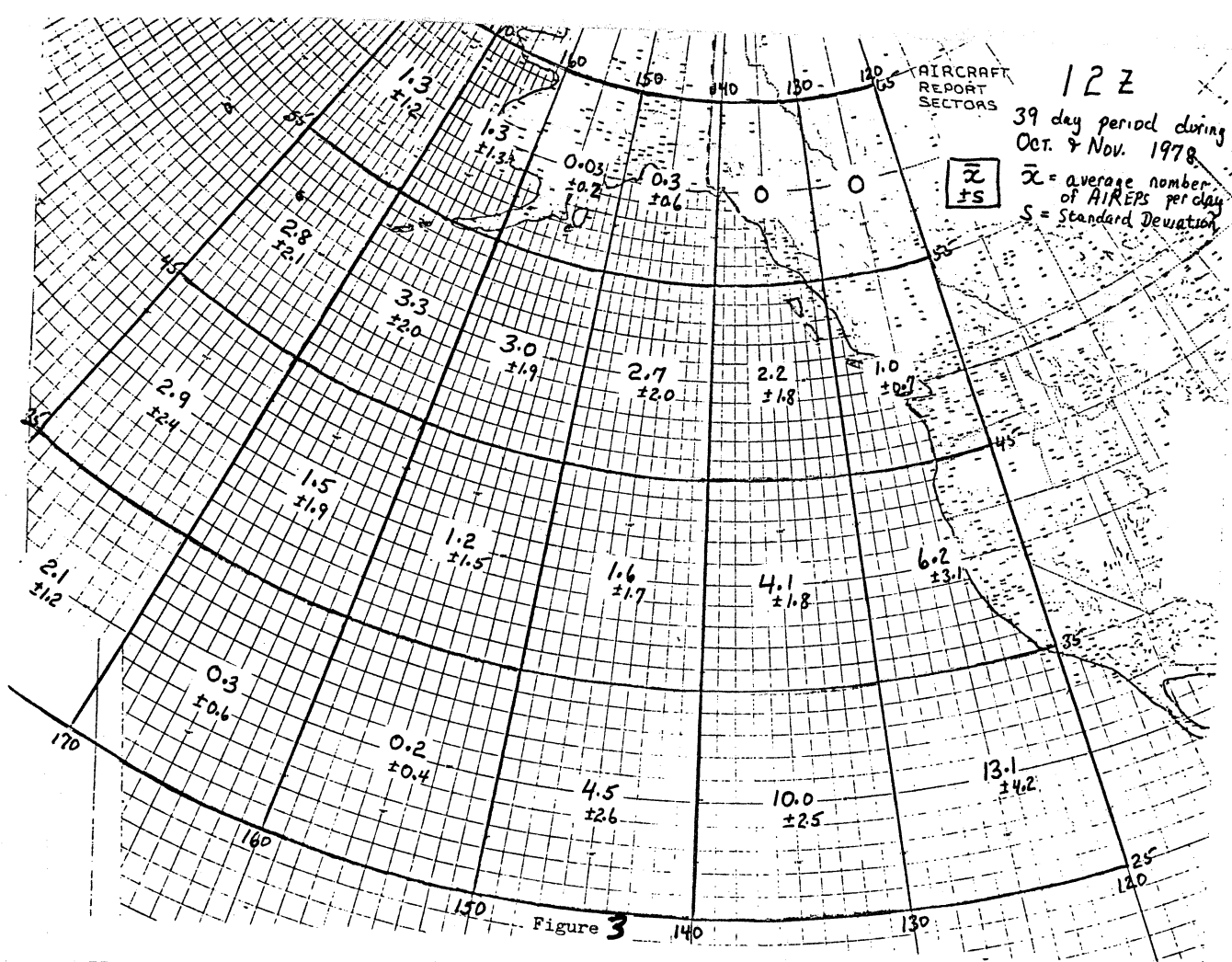
A check was made with the AIREPS received at the PWC and those plotted on the CMC facsimile 250mb analysis. It was found that CMC plotted only AIREPS at levels from 33 thsd to 35 thsd feet. If two or more AIREPS occurred within a close distance of one another, then of course only one of them was plotted. Some days CMC plotted most of the AIREPS while on other days they plotted only a few of those between 33 and 35 thsd feet which were received at the PWC. This variation could be due to the time of receipt (too late to be included on the CMC analysis) or the CMC time limitation is more stringent than the ± 3 hours used at the PWC.

Conclusions

In respect to the sector containing ship PAPA, the average number of flights per day reaches a maximum at 18Z (4 flights) and a minimum at 06Z (less than 1 flight). At both 00Z and 12Z the average number is just under 3 flights per day.

This study used only data collected during October and November and likely other seasons would have different flight frequencies (e.g. less flights to Hawaii during the summer?). A study also could be made on whether there is a significant change in flight tracks and levels with different jet stream patterns.





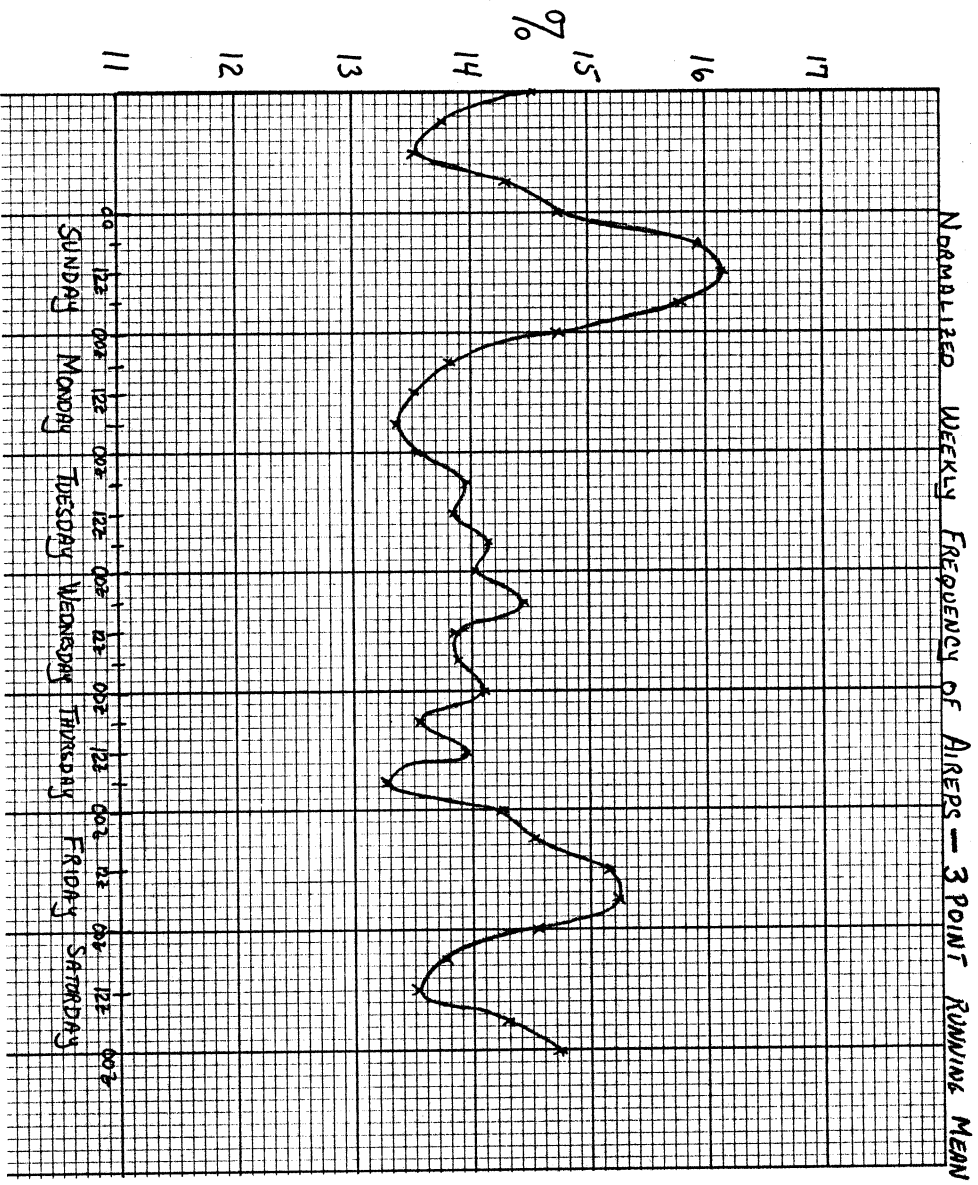


FIGURE 5

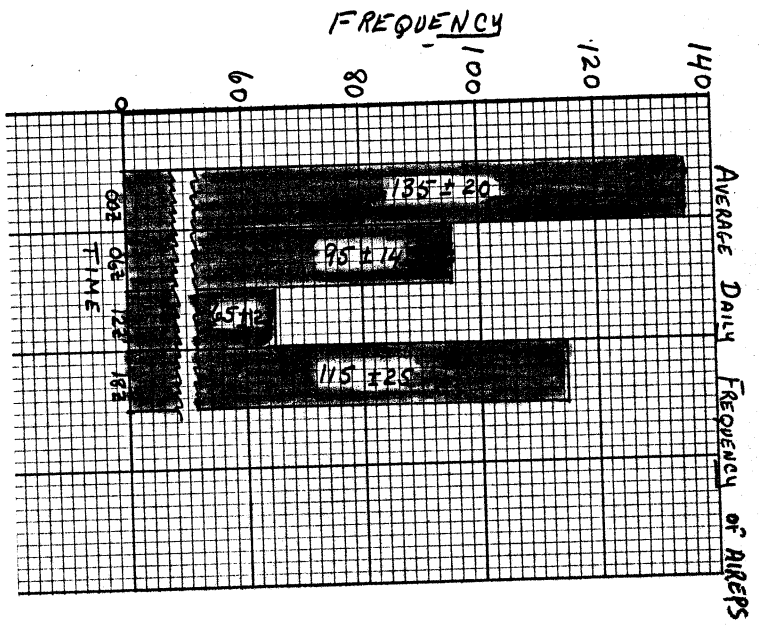


FIGURE 6