

CRH SSD
APRIL 1992

CENTRAL REGION TECHNICAL ATTACHMENT 92-07

THE METEOROLOGIST WEATHER PROCESSOR

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1. Introduction

The Meteorologist Weather Processor (MWP) is a computer-based interactive meteorological data processing system (Harris Corporation, 1991). It is a new tool for the meteorologists of the Center Weather Service Unit (CWSU) to collect and analyze weather data and relay pertinent weather information to the Federal Aviation Administration (FAA) air traffic controllers.

The MWP is one element of the Central Weather Processor program (CWP) identified by the FAA in the National Airspace System (NAS) plan (Mandel, 1988). The NAS plan first appeared in 1981 and called for the replacement or upgrade of all FAA operational facilities with state-of-the-art technology. The CWP program is expected to be complete in the mid 1990s and will provide air traffic controllers with near real time data.

Harris Corporation in Melbourne, Florida, designed and built the MWP. Harris also processes the weather data that is received into the system. All of the MWP's data base, except weather radar, originates with the National Weather Service's Family of Services.

The MWP is an impressive system with a tremendous ability to display and analyze weather data. As the meteorologists at each of the centers develop their systems, Air Route Traffic Control Center (ARTCC) personnel will benefit with increased information and a clearer understanding of meteorology.

The following is a general description of the MWP and its capabilities.

2. Discussion

The MWP system includes the meteorologist's work station and a number of briefing terminals throughout the ARTCC control room.

The meteorologist's work station includes two high resolution color monitors, a keyboard for entering textual information,

a mouse for graphic generation and option selection, a color graphics printer, and a dot matrix printer for alphanumeric data.

The ARTCC controllers can interact with the briefing terminals to call up various graphic and alphanumeric weather information. The briefing terminal includes a high resolution color monitor and a keyboard. The meteorologist programs the information and assures that the information and forecasts going into the terminals are up to date.

Many of the centers will add a briefing terminal to their work station due to the limitations of having just two display monitors.

Each center has its own radar mosaic display which combines National Weather Service (NWS) radar images in and around each of the ARTCC regions. These mosaics are updated every 10 minutes and are fed by dedicated phone lines from the radar sites. Additionally, a continuous scan of any individual NWS radar site in the mosaic can be displayed and more distant sites can be dialed up for an instantaneous image.

Visible, infrared and water-vapor satellite images are updated every half hour from the Harris data facility in Melbourne. These images can be easily zoomed, panned, and color enhanced.

Automation of Field Operations and Services (AFOS) graphics can be overlaid on top of each other or over radar and satellite images. There is no limit to the number of graphics that can be overlaid. The graphics appear as solid fields and can be designated in any one of 15 colors. If desired, these fields can be manually toggled on and off.

Upper air and surface observations can be plotted over graphics, satellite, and radar images or on blank maps of any size. Any variety of station models can be created by the meteorologist to display the data. The set of stations to be plotted can also be selected. Thresholds can be set within the system so that certain weather conditions, such as visibility below a quarter-mile, can be plotted in a different color.

Data collected by the MWP can be analyzed using the Barnes Analysis (a data averaging analysis technique) (Barnes, 1964). This enables the meteorologist to have analyzed a number of parameters such as temperature, pressure, moisture and divergence at various levels of the atmosphere.

Each MWP has an automatic product generator (APG) which can be programmed to the needs of each CWSU. The APG is used to produce graphics that are displayed routinely by the meteorologists. These can include AFOS graphics, National Meteorological Center (NMC) model data, radar and satellite data and Barnes Analyses.

The MWP has an easy-to-use graphics editor which allows the meteorologist to create full color products that can be used by air traffic control personnel. These products may include graphic depictions of a forecast for thunderstorms, turbulence and icing. This feature gives new meaning to the saying "a picture is worth a thousand words."

SKEW-T and stability analyses may be performed for any upper air observation. Cross sectional analysis for upper air parameters between any set of stations can also be displayed. The meteorologist can interact with SKEW-T data by modifying temperature and dew point on the analysis when changes in the conditions are expected between upper air runs.

As for alphanumeric data, the MWP is not a very strong tool. The memory is tremendous, but displaying the information is an awkward task. There are no means to have alphanumeric data print automatically.

The MWP is equipped to alert the meteorologist with an alarm when a designated observation site(s) has a certain ceiling, visibility, weather condition, or wind speed. The alert function is fully programmable and has the advantage of making the meteorologist aware of weather conditions that are critical to the operations of the ARTCC.

Full deployment of the MWP had been delayed several months due to contractual problems between the FAA and Harris. Problems have been solved and the installation of the MWPs has resumed. In Central Region, the Kansas City and Indianapolis CWSUs were among the first to get their MWP. Minneapolis and Chicago CWSUs received theirs recently and Denver CWSU will obtain the MWP shortly.

3. Summary

The FAA has given a boost to the Center Weather Service Unit's capability by providing the MWP. The system is of benefit to both the meteorologists and the air traffic controllers. Despite certain limitations in display and alphanumeric use, the MWP provides a significant improvement over previous CWSU systems

and greatly enhances the ability of the meteorologist to perform his/her duties.

Much of the improvement is in the form of being able to:

- A. enhance and animate radar and satellite images,
- B. have quick analysis made of numerous parameters,
- C. display high quality presentations to the supervisors of the air traffic controllers, and
- D. program a system to the needs of the CWSU and the individual meteorologists.

A stop at an ARTCC will give NWS employees a look at the new CWSU and a peek into the near future as NWS offices look forward to big changes in the next few years.

4. References

Harris Corporation, 1991: Operation and Program Manual for the Meteorologist Weather Processor (MWP) System. Available from the Harris Corp., Melbourne, FL.

Mandel, E., K. Young, D. Panzer, and H. Ludwig, 1988: The Status of the FAA Central Weather Processor (CWP) Program. National Airspace System Plan, available from the Federal Aviation Administration, Washington, D.C.

Barnes, S., 1964: A Technique For Maximizing Details In Numerical Weather Map Analysis. *J. Appl. Meteor.*, 3, 396.