COCKPIT WEATHER INFORMATION NEEDS

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Inflight real time weather assimilation is currently time consuming and labor intensive, especially in fast changing conditions associated with frontal activity and unstable weather regions. Voice communications with a dispatcher, company meteorologist, ATC, Weather Watch, or the nearest Flight Service Station is the most common means of weather access. ACARS also provides ASCII typed weather for many aircraft. In these systems the pilot crew has to mentally assimilate multiple textual and verbal reports and forecasts into some kind of mental situation awareness of the weather conditions in the vicinity of the intended flight path for that particular time period.

In this research effort, the primary objective is to develop an advanced pilot weather interface for the flight deck and to measure its ulitization and effectiveness in pilot reroute decision processes, weather situation awareness, and weather monitoring. Identical graphical weather displays for the dispatcher, ATC, and pilot crew should also enhance the dialogue capabilities for reroute decisions.

By utilizing a broudcast data link for surface observations, forecasts, radar summaries, lightning strikes, and weather alerts, onboard weather computing facilities construct graphical displays, historical weather displays, color textual displays, and other tools to assist the pilot crew. Since the weather data is continually being received and stored by the airborne system, the pilot crew has instantaneous access to the latest information. This information is color coded to distinguish degrees of category for surface observations, ceiling and visibilities, and ground radar summaries.

Automatic weather monitoring and pilot crew alerting is accomplished by the airborne computing facilities. When a new weather information is received, the displays are instantaneously changed to reflect the new information. Also when a new surface or special observation for the intended destination is received, the pilot crew is informed so that information can be studied at the pilot's discretion. The pilot crew is also immediately alerted when a severe weather notice, AIRMET or SIGMET is received.

The cockpit weather display shares a multi-color eight inch CRT and overlaid touch panel with a pilot crew data link interface. Touch sensitive buttons and areas are used for pilot selection of graphical and data link displays. Time critical ATC messages are presented in a small window that overlays other displays so that immediate pilot alerting and action can be taken. Predeparture and reroute clearances are displayed on the graphical weather system so pilot review of weather along the route can be accomplished prior to pilot acceptance of the clearance.

An on-going multi-phase test series is planned for testing and modifying the graphical weather system. The first phase, completed in August 1991, was designed to measure the effectiveness of a graphical weather system on pilot reroute decisions and to measure the acceptance of such a system by airline transport pilots. In order to simplify data measurements, single pilot crews flying a short enroute segment were tested using passive ground support. Data from this first phase is currently being analyzed and a report should be published next year. Preliminary data shows that the nine test subjects considered the graphical presentation to be much better than their current weather information source for situation awareness, flight safety, and reroute decision making.

Later phases will include testing with two pilot crews and dispatcher support. A flight test is planned using the NASA Langley Research Center B-737 and a broadcast type data link.