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A FLIGHT TEST DESIGN FOR STUDYING AIRBORNE APPLICATIONS OF AIR TO GROUND DUPLEX DATA LINK COMMUNICATIONS

by

Charles H. Scanlon
Associate Professor
Department of Computer Science,
Mathematics, and Physics
Arkansas State University
State University, Arkansas 72467

The Federal Aviation Administration (FAA) maintains a National Airspace System (NAS) plan that charts a strategy for modernizing and improving air traffic control and airway facilities. The overall goals and objectives of this plan include timely implementation of features of the NAS, accommodating increased utilization, allowing airspace utilization with minimum errors, reduction of risk of accidents and collisions, increased air traffic controller and flight specialist productivity, improvements in reliability, decreased costs of maintaining NAS facilities, and implementation and utilization of a Mode-S data link communication system for digital duplex air to ground communications. Initially, the FAA plan calls for inflight airplane data link access to the Weather Communications Processor (WCP) for transfer of such information as aviation route forecasts, notices to airmen, pilot reports, winds and temperature aloft forecasts, flight assistance, and weather alerts. The Automatic En Route Air Traffic Control (AERA) and the Advanced Automated System (AAS) of the NAS plan, call for utilization of data link for such items as computer generated flight clearances, enroute minimum safe altitude warnings, sector probes, out of conformance check, automated flight services, and flow management of advisories. A major technical challenge remaining is the integration, flight testing, and validation of data link equipment and procedures in the aircraft cockpit.

The flight test organizational chart, figure 1, was designed to have the airplane side of data link experiments implemented in the NASA Langley Research Center (LaRC) experimental Boeing 737 airplane. This design would enable investigations into implementation of data link equipment and pilot interface, operations, and procedures. The illustrated ground system, which could be utilized to emulate ATC and WCP, consists of a work station with links to a national weather database and a data link transceiver system. The data link transceiver system could be a Mode-S transponder, ACARS, AVSAT, or another type of radio system such as the military type HF data link. The airborne system was designed so that a data link transceiver, workstation, and touch panel could be interfaced with an input output processor to the aircraft system bus and thus have communications access to other

digital airplane systems. The clear touch panel will be overlaid on a multicolored CRT display unit for pilot input and output. Pilot input can then be implemented in user friendly software by displaying menu selected touch sensitive areas for pilot touch. The airborne workstation can function as a transcriber for conversion of voice communications to digital format for ATC data link emulation. Each work station also serves as a communications processor and time stamped packet data logger.

AN ARCHITECTURE FOR DATA LINK RESEARCH

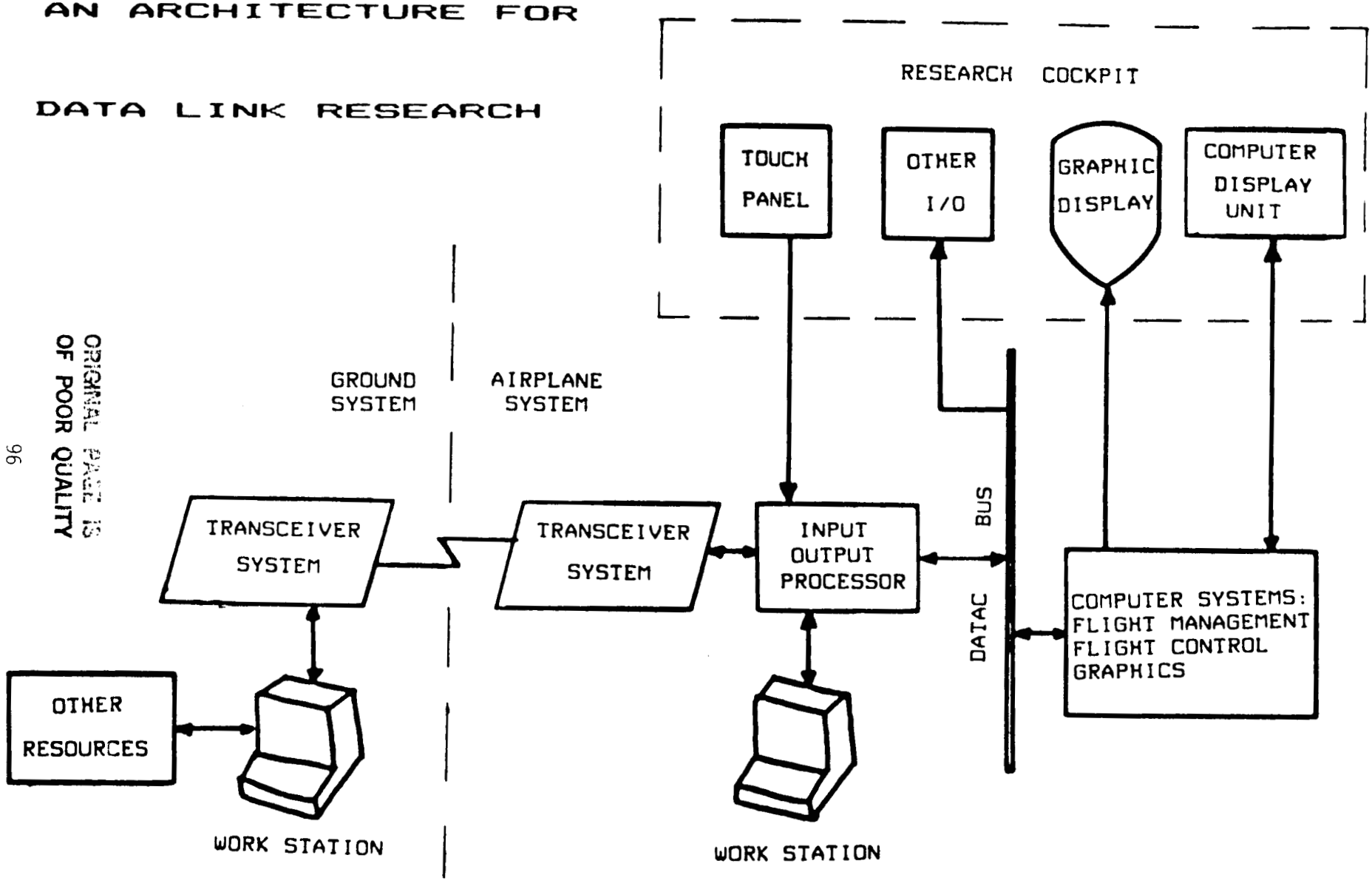

Figure 1