S211A - FLIGHT TEST DEVELOPMENT BY MEANS OF REAL-TIME DATA ANALYSIS

Franco Brembati
Technical Director
and
Giovanni Bonaita
Flight Test Manager
AGUSTA S.p.A.
Engineering Aeroplani

Giancarlo Bianchini
MILANO SYSTEM

SUMMARY

The S211A aircraft will incorporate substantial low-risk improvements (uprated engine, drooped wing tips, etc.) with minimum modifications to the basic S211 version.
The vehicle will be the AGUSTA-GRUMMAN team candidate for the USAF/USN JPATS (Joint Primary Aircraft Training System) competition where demonstration of aerodynamic characteristics, structural integrity and systems performance will be required in an efficient and cost effective manner.
This same high level of productivity was also required for the flight test development of the S211A configuration utilizing a modified S211 as a flying test bed. To achieve this goal, a new data ground station (G.S.) was defined and developed to perform in real time the various aspects of data acquisition, computing, storing, analysis, display and management.
Real-time displays of raw and calculated parameters were provided in various selectable formats (tabulations, time histories, crossplots) as required for individual technical requirements (structural loads, engine and/or aircraft performance, systems performance, etc.). Direct comparison of flight test results with analytical predictions became available in real time also.
The working methods and organization of the Agusta flight test department were correspondingly modified to provide the optimum utilization of this enhanced data handling and processing capability.
This effort was performed at the Agusta (SIAI Marchetti) facilities in Vergiate (VA).

1. INTRODUCTION

This paper describes how the Agusta ground station, with the use of appropriate User Application software and corresponding output displays, provides a real-time data analysis capability with a substantial reduction in time.

The ground station is comprised of signal receivers, a computing and data handling section, and various output displays (primarily three CRT-equipped work stations and three 8-channel strip chart recorders; see Section 4.1 for detailed components).
The telemetered data is also recorded on a tape unit for post-flight processing, as necessary. Through the use of appropriate algorithms, calculated parameters can be displayed in various formats on the CRT's or on the strip charts. The result is that the technical analysts monitoring the flight can view, in real time, test answers and not just raw Engineering Units (E.U.) parameters (i.e. loads values instead of just strain gage outputs).
In this form, comparisons with estimated and/or previous test data can be readily made, thereby reducing the time between maneuvers (such as during envelope expansion tests) or from flight to flight. The obvious advantages are less operating costs (manpower and processing) and a substantial improvement in flight safety.