DIGITAL DIGEST

Baudot and Beyond

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Addressing ACARS

In this month's column we'll take a break from our examination of HF modes and focus on one of the newer VHF modes instead: ACARS - Aircraft Communications Addressing and Reporting System.

During peak air traffic periods, over 1,000 commercial flights may be found just in the skies over North America alone. Air traffic control centers operated by the Federal Aviation Administration (FAA) in the United States and NAVCanada in Canada are entrusted with the gargantuan task of air traffic command and control management. No less onerous an undertaking is the myriad of voice contacts between flight deck crews and ground controllers/flight operations managers that keep the airborne fleet flying safely and efficiently.

Much of the voice contact traffic in the past was devoted to describing routine aircraft maneuvers such as push back from the gate, take off, landing and gate arrival at the destination. Added to this were messages on aircraft performance, fuel consumption, position reports, etc. Voice contacts generally require that the message receiver repeat the message content in its entirety so that the sender can confirm successful transmission.

As flight engineers were eliminated from the flight decks of many aircraft, the reporting part of their job now fell to the pilots and copilots, making the need to find a method to handle these routine air/ground communications even more critical.

The ACARS solution was developed and implemented for the aviation industry by ARINC (Aeronautical Radio Inc.) in the mid 1970's. The system was designed to cut down on flight crew work load by utilizing computers on board aircraft and at ground facilities to exchange routine reports and messages. However, it took nearly two decades for computer technology and equipment cost effectiveness to catch up with the reality.

While not every airline carrier is ACARS-equipped and not all aircraft in the fleet may be outfitted, the number of aircraft utilizing the system is growing significantly. ACARS is now a standard package on all new Airbus and Boeing deliveries.

■ What is ACARS?

ACARS is the acronym for Aircraft Communications Addressing and Reporting System. This system is an air/ground network which enables aircraft to function as mobile computer terminals linked to a ground-based command and control management system. Information collected from sensors onboard ACARS-equipped aircraft is automatically transferred by VHF radio link to ACARS ground facilities. It is then relayed via the ground stations to a central computer processor where the data is converted into inter-airline operational messages through the ARINC Electronic Switching System (ESS).

Over 9 million ACARS messages are currently processed in any given month.

■ ACARS Components

Three major elements comprise the ACARS Network.
1. The Airborne Subsystem (onboard the aircraft), which consists of the Management and Control units.
2. The ARINC Ground System, consisting of the ACARS VHF Remote Networks, the ACARS Front-end Processor System (AFEPS) and the ARINC Electronic Switching System (ESS).
3. The Air Carrier C^2 (Command and Control) and Management Subsystems which include ground-based flight operations, maintenance centers, dispatch offices, etc., of the various airline carriers who are ACARS-equipped.

■ What Can You Monitor?

For most ACARS monitors (except those living within close proximity to a major airport), transmissions from the aircraft's airborne subsystem are audible only when the aircraft is actually airborne. On good VHF propagation days, with aircraft flying at Flight Levels FL350 and above, you can expect to receive transmissions from up to 300/400 miles away.

Generally these transmissions fall into one of three broad categories:

1. ACARS traffic occurring immediately after departure.
2. ACARS traffic from high altitude flights crossing the Center's Flight Information Region.
3. ACARS traffic from aircraft on approach to land.

The general rule of thumb regarding distant ACARS transmissions is that if VHF voice transmissions can be heard from your location, you will also be able to receive ACARS traffic from the same location.

ACARS transmissions from aircraft on the ground will not generally be audible unless you live within sight of a major airport.
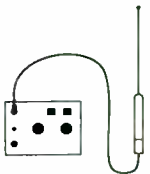
■ What Equipment Do You Need?

To monitor ACARS transmissions you require a VHF scanner/receiver capable of tuning the AM Aircraft band (118.00 MHz to 136.00 MHz). A suitable VHF antenna is also required. While table-top scanner/receivers are preferred, they certainly are not necessary.

There are several standalone and computer related decoders available to the ACARS monitor today. Most units are relatively inexpensive (under $200) and do an adequate job of decoding airborne traffic.

For further information on ACARS and other digital modes, please see my web site at: **www.interlog.com/~reevans/radio/**