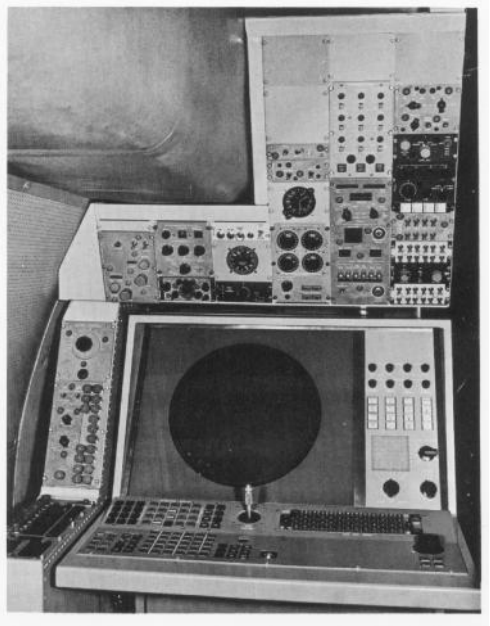
A-NEW MOD I Airborne Display System
Circa 1963
Compiled by Ron Handy, Field Service Engineer (1963 – 1972)
Stromberg DatagraphiX, Inc. (AKA General Dynamics/Electronics Div.)

Background and Summary

The A-NEW MOD I Display system was designed and built by Stromberg DatagraphiX, Inc. located in San Diego, CA under contract from the Naval Air Development Center (NADC), Johnsville, PA. The one-of-a-kind system was delivered to NADC in 1963.



The display system was first integrated with a Packard Bell Electronics PB250 host computer and peripherals in a simulation development lab at NADC. It was then installed by NADC in a US Navy YN-P3A "Orion" aircraft S/N 148276, a converted Lockheed "Electra" commercial airliner.

RH Note #1: (Excerpt from August 1963 press release)

> **"Small Computer Goes A loft**
> A PB250 desk-top digital computer has gone aloft at the Naval Air Development Center, Johnsville, Pa. The PB250, made by Packard Bell Electronics, is being used in Project A-New, whose purpose is to develop a new generation of aircraft for antisubmarine warfare. The PB250 is installed in a YP-3A, a test-bed version of the Navy's new ASW aircraft, the P3A Orion. The latter, in turn, is a special version of Lockheed's four-engine commercial turboprop, the Electra. In the YP-3A, the computer works with analog-to-digital converters and other data handling equipment. It accepts information such as air speed, altitude, heading, and doppler radar data and processes it for use by the aircraft's electronic ASW system. The PB250 actually is being used as an interim measure. It's standing in for a special airborne computer now under development by Univac."

After initial shake-down flights out of NADC, the aircraft and crew were transferred to the Naval Air Test Center (NATC) at Patuxent River, MD for continued system flight testing.

RH Note #2 – (Observation)

> Initial test flights out of NATC had some interesting aspects. The 350 pound PB250 computer was installed in the far aft cabin section that added to the aircraft's already adverse aft center of gravity. During taxi maneuvers, it was common SOP to have all flight crew normally seated in the aft cabin (including myself) to move to the forward cabin just behind the flight deck to reduce the risk of the aircraft tipping back on its tail. When ready for takeoff, the pilot would lock the brakes and apply power and instruct the unseated crew to take to their seats. A somewhat normal takeoff was then made. A similar procedure was followed during landing…..after coming to a halt after touchdown, the pilot would lock the brakes, hold taxi power and those seated aft would move forward before taxiing commenced. After arrival at the hanger and before the engines were shut down, the flight engineer would exit the aircraft and place a metal brace between the aft fuselage and the deck to prevent the aircraft tipping backwards.

Technical Tidbits:

- Display system built to Best Commercial Practice standards
- Heart of the display was a 16" diameter Charactron Shaped Beam Tube
- 512 Kbyte core refresh memory
- Vacuum tube power supplies and deflection amplifiers
- Digital control logic used discrete components, diodes & transistors (NOT integrated circuits)

The original Charactron Shaped Beam Tube (CSBT), when invented, was six feet long with a display face area of approximately 7 inches in diameter. The CSBT concept was based on generating an electron beam within a vacuum tube then deflecting the beam towards a physical metal stencil mask mounted about half way down the beam path. The electron beam was then extruded by the stencil to form alphanumeric characters etched in the mask. The 'shaped beam' was then deflected to a desired X and Y coordinate on the tube faceplate. When the electron beam impacted the phosphor on the screen, the resulting image was an exact replica

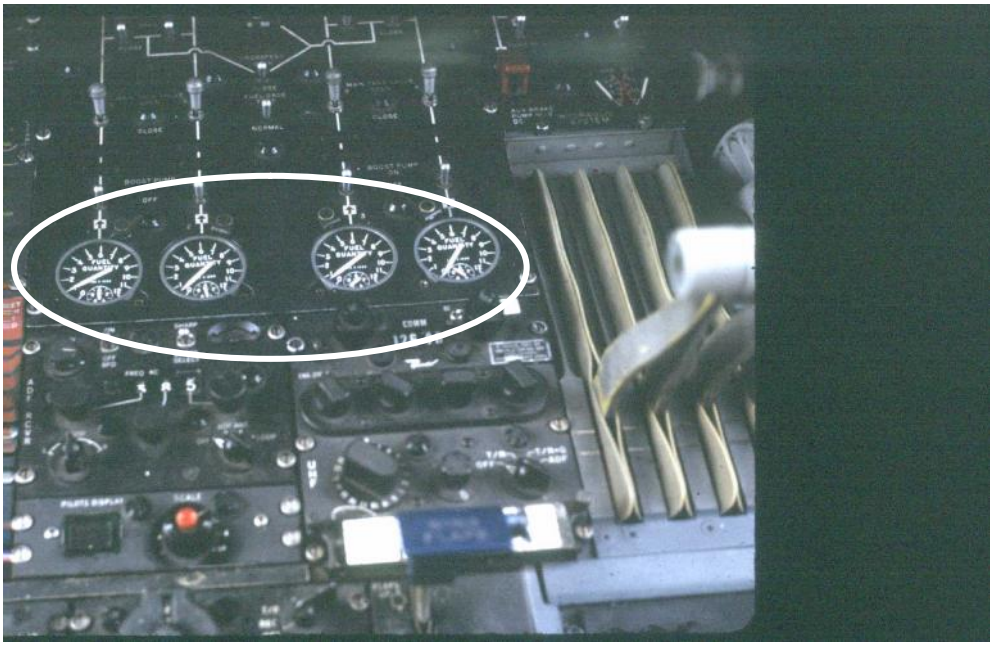
of the stencil image. Manipulation and steering of the electron beam was accomplished with electromagnetic deflection coils mounted around the tube envelope. The original CSBT was reduced in size for the USAF SAGE project. Subsequent "miniaturization" made it small enough to be used in the MOD 1 airborne display.

One of the early "lessons-learned" during flight tests was the alphanumeric characters displayed on the tube face viewing surface would be clipped and distorted depending on the aircraft's heading. This was caused by the earth's magnetic field acting like a deflection coil on the tube's electron beam. This problem was fixed by adding a Mu metal (antimagnetic) shield around the neck of the tube. 'Sounds simple now but was the reason for many exasperating experiments such as flying around in circles for hours to diagnose the problem and to find a fix.

The ASW mission objective was to detect, localize, track and attack (simulated) surface and subsurface targets. The single MOD I display console was mounted amid ships and was manned by the mission Tactical Coordinator (TACCO). It displayed a tactical plot of the area being patrolled and displayed sonobouy locations and synthetic sensor information such as radar returns post processed acoustic sensor data, i.e., target fixes. Using this info, the TACCO could develop strategies for localizing sub surface targets and providing the pilot with "Fly To" points on a situation display mounted in the cockpit.

The integrated crew concept evolved with the A-NEW MOD I TACCO display being the focal point of data gathered and processed by a central digital computer system.

Sea Story:
The YN-P3A aircraft used for the MOD 1 project was a converted Lockheed Electra commercial airliner and was not equipped with long range fuel tanks. The typical mission duration for our test flights was approximately six to seven hours. On one flight from RAF Bally Kelly, Northern Ireland to Argentia, Newfoundland, we ran into some extremely adverse headwinds. We were over the North Atlantic in the winter and the sea below was running sea state five. We were briefed on the finer art of donning our "Poopy/Survival Suits". We did manage to finally reach Argentia running on fumes….all four fuel gauges were indicating empty. This is how I learned first-hand the meaning of "pucker factor".



Postscript:
A-NEW MOD 1 Crew:

Pilot – Lcdr. Ed Waller
Copilot – Lt. Jack Rennie
TACCO – Lt. Don Johnsen
Navigation/Communication – Lt. Ray Bryant
Flight Engineer – Don Irig, ADC
Radar/MAD Operator – Bill Chapman, AX1
Sensor operator 1 – Floyd McClerren, AXC
Sensor operator 2 – Don Kulacz, AX1
Sensor Operator 3 – Steve Blevens, AX2
Ordnance - Monty Montgomery, AOC
Tech Rep – Univac hardware – Gerry Buttenhoff
Tech Rep – Univac software – Stan Sederstrom
Tech rep – Lockheed – Al Chrisopherson
Tech rep – General Dynamics – Ron Handy

---END---