NAVIGATIONAL AND ENVIRONMENTAL MEASUREMENT SYSTEM (NEMS)

by

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The NEMS concept and design were initiated from the need to measure and record positional and environmental information during aircraft flights of developmental science research instrumentation. The unit was designed as a stand-alone system which could serve the needs of instruments whose developmental nature did not justify the cost and complexity of including these measurements within the instrument data system. Initially, the system was comprised of a Loran-C receiver and a portable IBM compatible computer recording position and time. Later, the system was interfaced with the Wallops aircraft inertial navigation system (INS), and various other sensors were supplied and shared by the Goddard science users. Initial development was supported by various Code 600 users. During 1986 and 1987, the Wallops Aeronautical Programs Branch (Code 831) supported development and equipment purchases. Real-time position mapping on video monitors was added for investigator's use and information. In 1987, the use of a Global Positioning System (GPS) receiver was included in some missions.

General System Description

Figure 1 shows a total configuration of the system and the various sensors which can be incorporated. These sensors are added or deleted as required for a particular mission. The

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system and sensors are a single stand-alone unit moved from aircraft to aircraft as required. The following information is among that which can be sensed and recorded by the system:

1) Time - GMT or Local

2) Aircraft Latitude and Longitude Loran-C

3) Aircraft Latitude and Longitude from the aircraft INS

4) Aircraft Latitude, Longitude, and Altitude from GPS

5) Aircraft ground speed

6) Aircraft Flight track

7) Aircraft (or instrument) roll and pitch angle

8) Outside total air temperature

9) Outside air pressure (with standard altitude calculated)

10) Outside air dew point
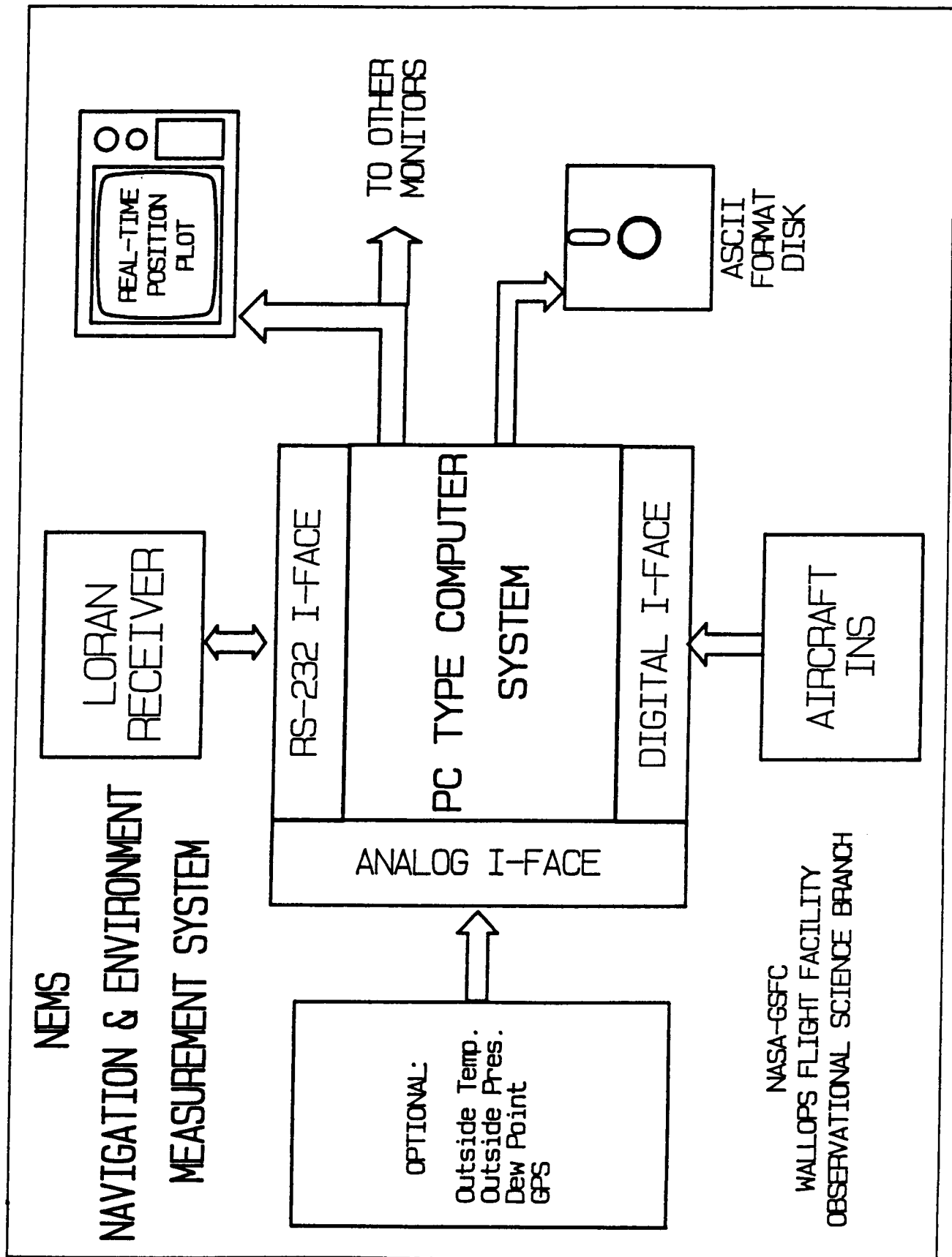
11) Nadir thermal irradiance

12) Vertical acceleration

NEMS
NAVIGATION & ENVIRONMENT
MEASUREMENT SYSTEM

REAL-TIME POSITION PLOT

TO OTHER MONITORS

ASCII FORMAT DISK

LORAN RECEIVER

RS-232 I-FACE

PC TYPE COMPUTER SYSTEM

DIGITAL I-FACE

ANALOG I-FACE

AIRCRAFT INS

OPTIONAL:
Outside Temp.
Outside Pres.
Dew Point
GPS

NASA-GSFC
WALLOPS FLIGHT FACILITY
OBSERVATIONAL SCIENCE BRANCH

Figure 1.