Application Note 9

Flight Test

Pressure, Electrical and Temperature Measurement

Scanivalve

GENERAL DESCRIPTION

All Aerospace products must be tested extensively to prove that the designs are valid before production can begin. Testing begins with computer generated drawings, followed by wind tunnel and ground tests. Finally, all products must be tested in flight conditions. Instrumentation used to monitor and record the test data must not only be rugged and compact but also able to withstand extreme temperature, shock and vibration. Scanivalve's high sample rate pressure, electrical, and thermocouple measuring products and data systems are ideally suited for Flight Test measurements. All of our flight test application scanners have been vibration and shock tested to MIL-STD-810.

PRESSURE MEASUREMENT

All pressure modules manufactured by Scanivalve are capable of recording most pressure measurements that must be made during Flight Tests. Our modules can measure wing leading edge pressure distributions, nacelle engine inlet distortion pressures, and gas turbine pressure measurements.

Scanivalve manufactures pressure scanners in 16, 32, and 64 input designs. These pressure scanners can be placed in the cabin, in the wing, or in the engine nacelle to minimize tubing length. All ZOC, MPS and DSA pressure scanners incorporate internal pneumatic valves to allow a user to:

1. Measure pressures
2. Zero correct all sensors
3. Multi-point calibration (pre-flight or flight)
4. Purge the input lines of condensation and other contaminants

Single systems are available up to 512 channels. Standard Full Scale Pressure ranges are available from 5 inches H_2O up to 750 psid. Limited absolute pressure ranges are also available.

ZOC and MPS pressure scanners may also be installed in an optional compact insulated Thermal Control Unit (TCU). The Thermal Control Unit has a heater circuit to regulate the temperature of the sensors for thermal stability in extreme temperatures.

ZOC analog pressure scanners may also be integrated into a user's data acquisition system. The maximum data sampling and throughput speed is 625 Hz.

ELECTRICAL MEASUREMENT

The ZOCEIM16 and ZOCEIM32 Electrical Input modules may be used to measure voltage signals. Full scale ranges are available from 10 millivolts to 10 volts DC. The ZOCEIM16 modules have an optional voltage supply to power strain gauges. ZOCEIM modules will interface to a DSM4000, ERAD4000 or to a user's data system.

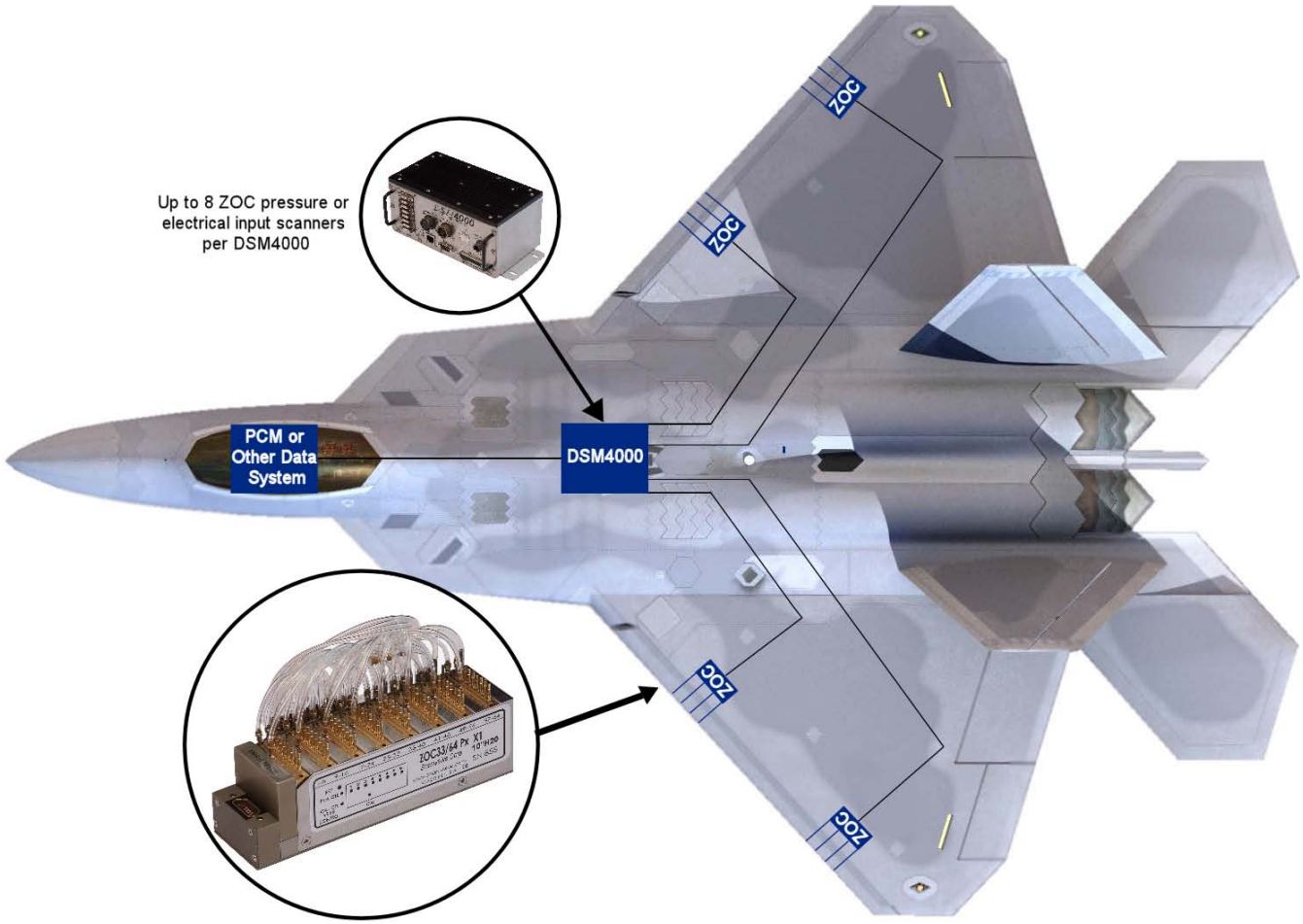
Temperature Measurement

Scanivalve also offers a high accuracy Thermocouple Scanner, Model DTS4050. This rugged unit is available in 16, 32, or 64 channels. These scanners should be mounted in the cabin with thermocouples run out to the engine. These temperature scanners communicate via Ethernet TCP/IP or UDP. Data is output in Engineering units.
All thermocouple modules manufactured by Scanivalve are capable of measuring all of the many temperature measurements that must be made during a Flight Test program. The thermocouple modules may be configured to measure all common thermocouple types. Additionally, each channel in a module may be configured to measure a different thermocouple type.

Applications

1. Complete Flight Test pressure measurement systems utilizing Scanivalve's model DSM4000 and ZOC pressure or electrical input scanners. Reference Flight Test Application No. 1 on page 3.
2. ZOC front end 16, 32, or 64 channel pressure scanners interfaced to commercially available PCM manufacturer's interface cards. Reference Flight Test Application No. 2 on page 4.
3. The intelligent MPS4264 miniature pressure scanner is equipped to handle all of the flight test pressure measurement needs with engineering unit conversion at the module. Reference Flight Test Application No. 3 on page 5.
4. Intelligent DSA3217 pressure and DTS4050 thermocouple scanners when space is available in the cabin or nacelle. Communication is Ethernet TCP/IP or UDP to users host or PC. Reference Flight Test Application No. 4 on page 6.

FLIGHT TEST APPLICATION NO. 1

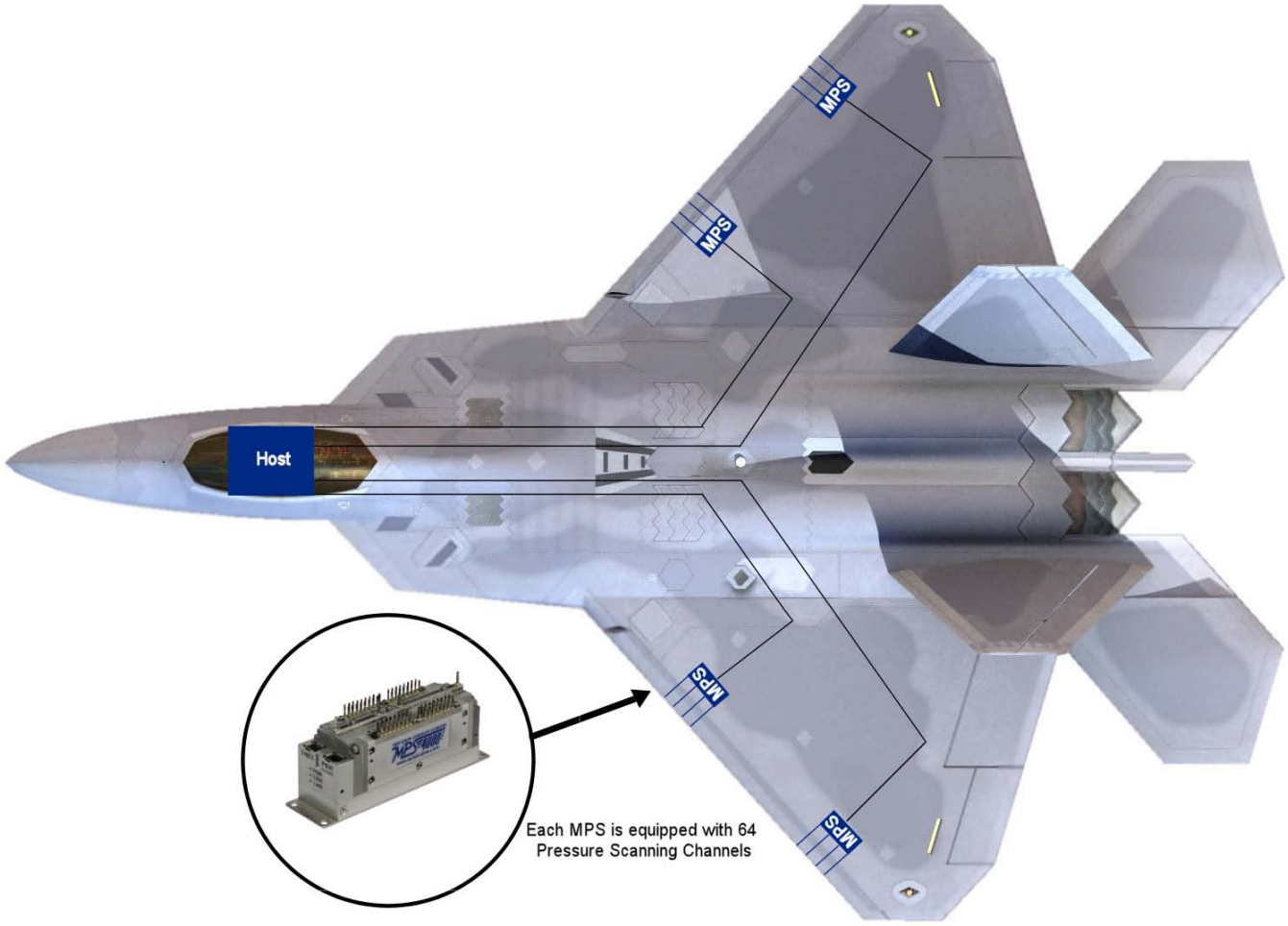


The DSM4000 Digital Service Module is designed to be used with Scanivalve ZOC pressure and electrical input scanners. The DSM4000 contains 8, 16 bit A/D's with each A/D supporting one ZOC module. Communication is enabled via Ethernet or optional ARINC429. Data is output in temperature corrected engineering units.

FLIGHT TEST APPLICATION NO. 2

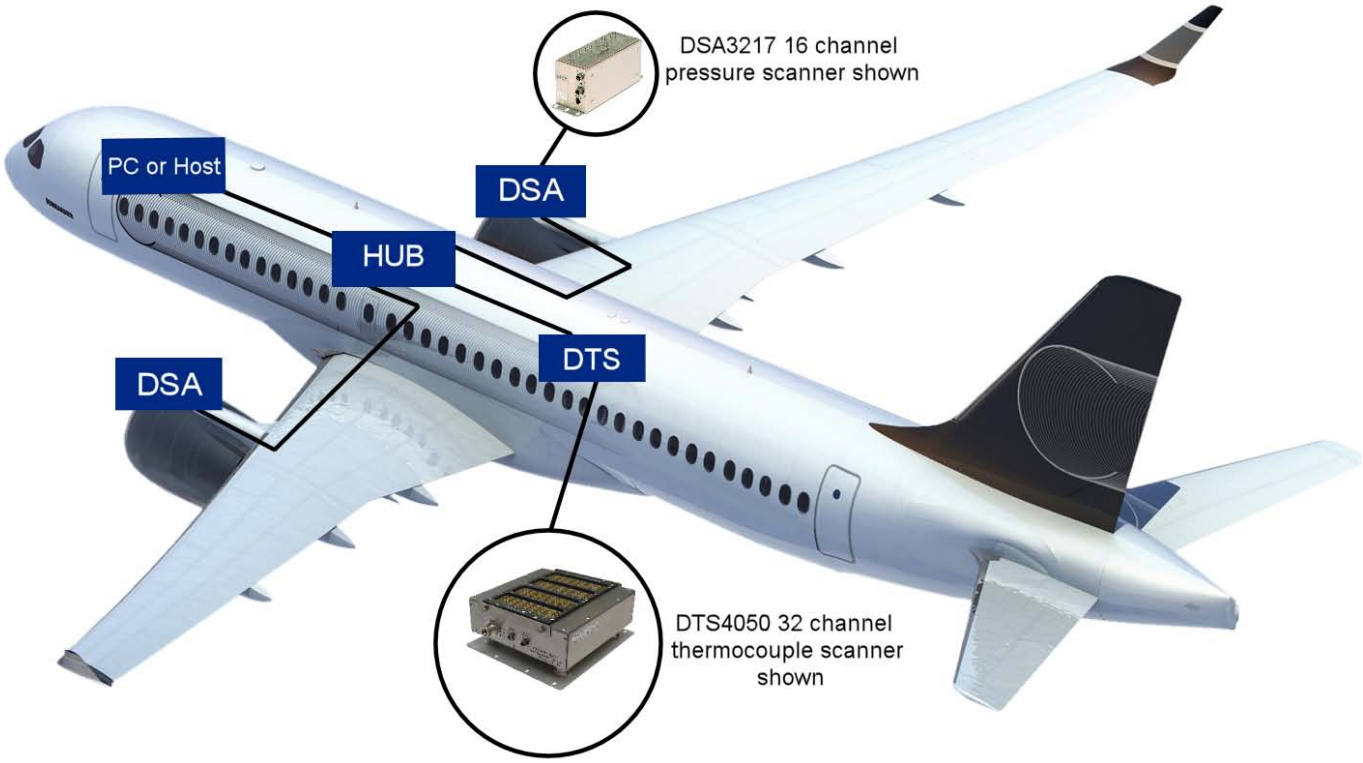
There are commercially available interface cards from flight test data system companies designed to work with Scanivalve products. ZOC scanners output an amplified analog signal which is then collected by the interface cards.

FLIGHT TEST APPLICATION NO. 3



The MPS4264 is an intelligent 64 channel pressure measurement device. This device is a stand-alone scanner and handles all of the A/D conversion at the module level. Communication to the module is Ethernet TCP/IP or UDP. A TCU (Thermal Control Unit) is available to help stabilize sensor temperature in extreme conditions.

Flight Test Application No. 4



When space is available in the cabin, or in the nacelle, our rugged model DSA3217 16 channel pressure scanner is meets the application needs. Users may choose between our standard DSA modules, or our compact flight test versions. When multiple temperature measurements are required, Scanivalve's 16, 32, or 64 channel thermocouple scanner, DTS4050, is the right choice. Both DSA & DTS scanners communicate directly to the user's host PC via TCP/IP or UDP. Data is output in temperature corrected Engineering units.

Scanivalve
1722 N. Madson St.
Liberty Lake, WA 99019

Phone: 1-800-935-5151
1-509-891-9970
Fax: 1-509-891-9481

scanco@scanivalve.com
www.scanivalve.com