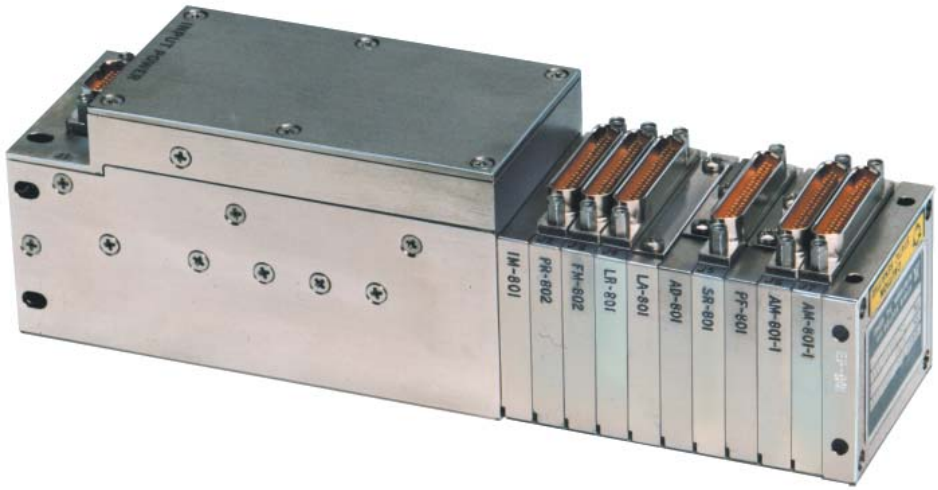
Technical Bulletin

MMSC-800

Micro Miniature Signal Conditioner/PCM Encoder

Airborne Data Acquisition Products



FEATURES

- Operates up to 10 Mbps (all digital data modules) 5 Mbps Analog/Digital Data Modules
- Missile, Fighter, Harsh Environmental Applications
- CAIS Compliant Version Available
- 8-16 BPW PCM Encoder with Integral Signal Conditioning Transducer Excitation and Multiplexing
- 0.5 % System Accuracy
  - Optional 0.3% System Accuracy
  - Available for Special Applications
- EEPROM Programmable Gain, Offset, Sample Rate and PCM Format
- Ruggedized Modular Construction
- System Operation as Stand-Alone or Master/ Remote. Data Acquisition unit without Changing Modules
- Extremely Small Size and light weight
- Military/Airborne Qualified
- User Friendly Programming Software

DESCRIPTION

The MMSC-800 is an integrated analog and digital signal conditioner and PCM Encoder. A complete family of modules provides signal conditioning for all types of sensors. EEPROM programmable gain/offset and sample rates provide user programmability of measurement characteristics and output data formatting. Utilizing proven thick film hybrid modular assemblies, the MMSC-800 has been qualified for missile and aerospace environments. The MMSC-800 has the ability to operate as a stand-alone unit or a master controller to various remotes such as the MMSC-800, MMP-900, PCU-800. The MMSC-800 can also operate as a remote to MMSC-800, PCU-800 or PMU-700 without the addition of any modules.

L3 communications

SPECIFICATIONS

System

Bit Rate:	10 Mbps maximum for wideband signal conditioners; 5.0 Mbps maximum for standard; ±0.02% stability.
Resolution:	8 to 16 bits per word (12 bits max. resolution for analog data)
Words/Major Frame:	8,196 maximum, EEPROM programmable
Subframe Depth:	Any depth to 256 maximum, EEPROM programmable
Sync Code:	Any pattern; any number of words, EEPROM programmable
SFID Code:	Any pattern; EEPROM programmable
Parity:	Even/Odd, analog/digital, user selectable.
Data Format:	Any format per IRIG-106-96; EEPROM programmable
PCM coding:	NRZ-L, BiØ-L, RNRZ-L
Output Levels:	PCM outputs and test points are TTL/5VCMOS: fully buffered and fault protected. PCM outputs also available as RS-422 differential
Data Coding:	MSB transmitted first; natural binary analog
Premod Filter:	6-pole bessel; output amplitude and cut-off frequency factory set
Output Impedance:	10 Ω unfiltered; 150 Ω for filtered out.
Fault Protection:	Protected against indefinite short to ground.
Input Power:	+28 ± 6VDC per MIL-STD-704D
Parallel Programming Port:	Provided for programming the EEROM. Connects to a PC with a DT2817 Parallel Interface installed. Optionally a PB-996 Serial/Parallel programming interface can be used to allow programming the MMSC from up to 164 feet (50m) away.

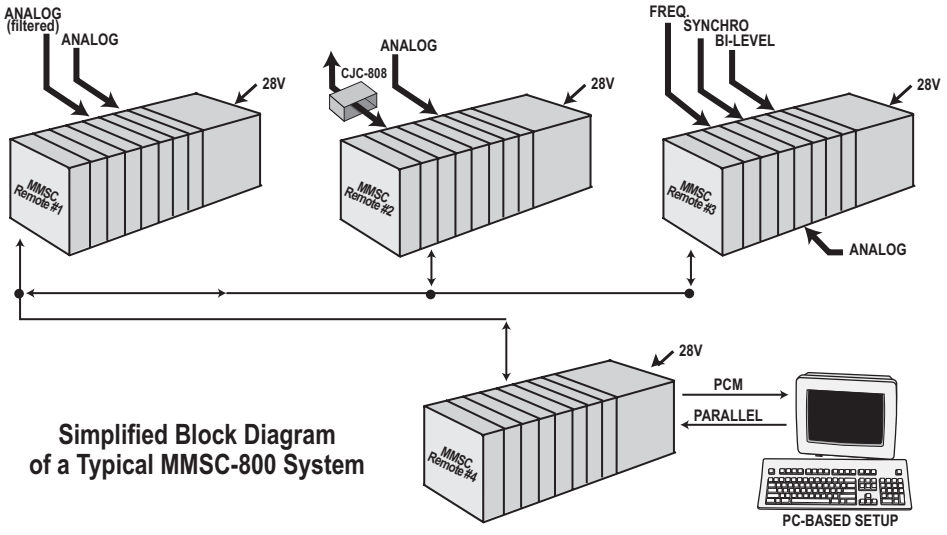
INPUT CHARACTERISTICS

Analog

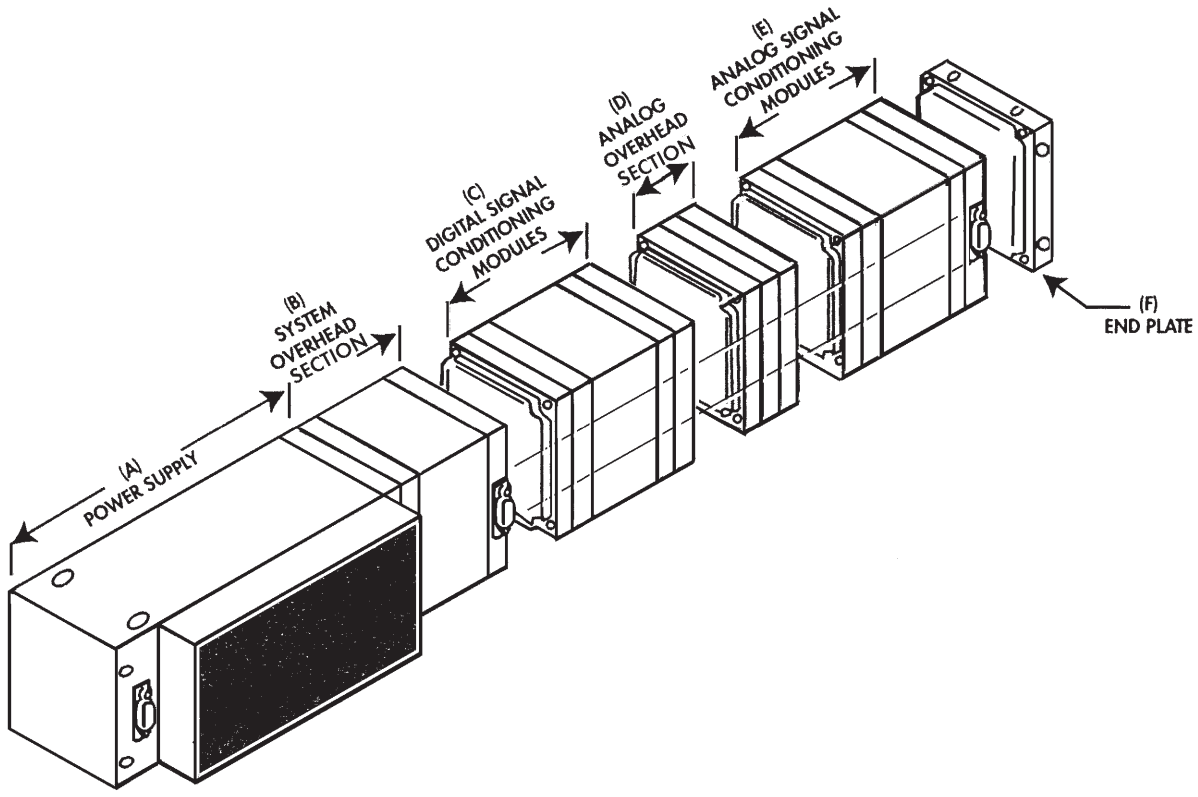
Sensor Types:	Thermocouple, thermistor, synchro resolver, accelerometer, RTD, strain gage, single ended, and differential analog. Built-in charge converter for piezo-electric accelerometers
Filtering:	Active 2- and 6-pole Butterworth as specified; frequency factory set or programmable according to module type.
Coupling:	AC and/or DC as specified

Digital

Inputs:	HCMOS compatible
Data Rates:	Up to 10 Mbps. Synchronous or Asynchronous operation as specified



Simplified Block Diagram of a Typical MMSC-800 System



MMSC-800 Micro Miniature Signal Conditioner/PCM Encoder

A) Power Supply:

One of several types available, depending upon required capacity; consult factory for applications details.

B) System Overhead Section:

Consists of modules necessary to communicate with either a master controller or portable computer. Three 1/4 inch (6.35 mm) thick modules which can operate the MMSC-800 system as either a stand-alone, master or remote. Consult factory for CAIS compatible four wire interface bus.

C) Digital Signal Conditioning Modules *(optional)*:

Any and all digital signal conditioners must be located on top of the system overhead section and below the analog overhead section. The sum total of the digital modules and analog modules must not exceed 31 per system stack. Each digital module is 1/4 inch (6.35 mm) thick.

D) Analog Overhead Section:

Three (3) modules, consisting of a 12 Bit A/D converter with programmable gains of 1, 1.4, 1.8, and 2.2 or 1, 1.25, 1.5 and 2.0, a programmable offset module, and bus isolation module. These modules are only required if analog signal conditioning modules are to be used. Each of these modules is 1/4 inch (6.35 mm) thick.

E) Analog Signal Conditioning Modules *(optional)*:

The analog signal conditioners must be located on top of the analog overhead section and below the end plate. The sum total of the analog modules and digital modules must not exceed 31 modules per system stack. Each analog module is 1/4 inch (6.35 mm) thick.

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F) End Plate:

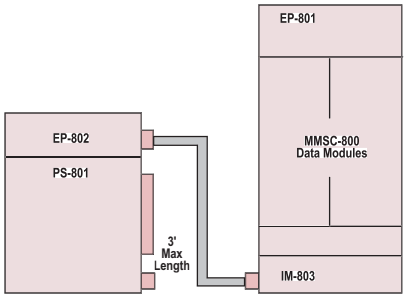
The end plate is a protective cap for the last module. The end plate, along with the power supply, provides the mounting surfaces for the stack.

The following is a listing of the optional overhead modules available for use in the MMSC-800 system. Each module adds 1/4 inch (6.35mm) to the stack length, except for the IM-803 which is 0.70 inches (17.78 mm).

OVERHEAD MODULES

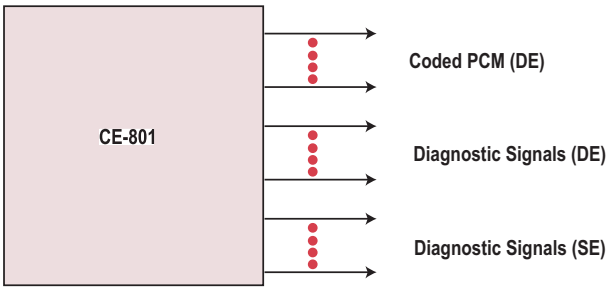
IM-803/EP-802 "Split Stack" Modules

Allows the MMSC-800 data stack to be separated from the PS-801 power supply. Provides the flexibility of locating the power supply within a three foot radius of the now shorter MMSC-800 data system.



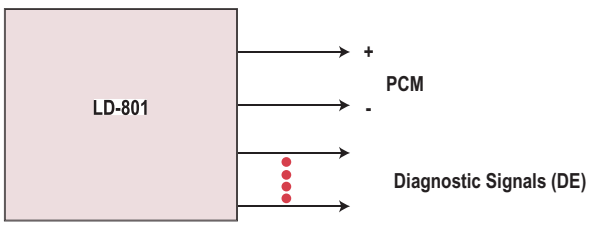
CE-801 Convolutional Encoder

The CE-801 is a multi-function-module. Providing Con-volutional Encoder PCM out, MMSC-800 clock outputs, PCM signals (differential & single ended) and Track Split for up to 4 PCM outputs.



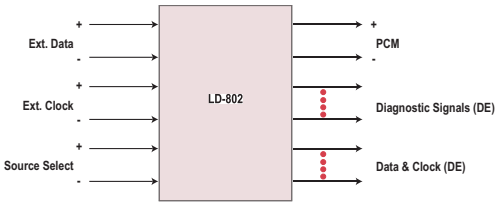
LD-801 Line Driver

The LD-801 module provides all the MMSC-800 PCM and clock signals as RS-422 differential pairs.



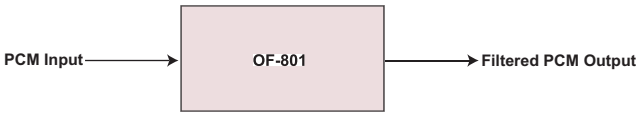
LD-802 Line Driver

The LD-802 module provides all of the features of the LD-801, in addition, the LD-802 accepts an external clock and data input and buffers them with the PCM data and bit clock from the MMSC-800. The user can select which signal pair is output through a separate RS-422 driver.



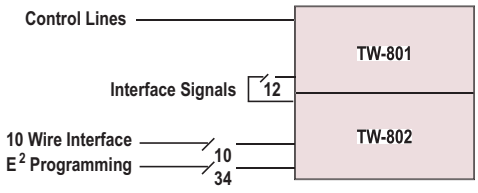
OF-801 Pre-Mod Filter

The OF-801 contains a single 6-pole Bessel pre-modulation filter for interfacing the PCM output to a transmitter. Multiple OF-801 modules can be inserted into a MMSC-800 stack, each assigned to filter a unique bit rate.



TW-801/802 Ten Wire Interface Module Set

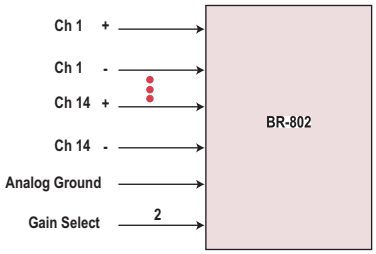
The TW-801/802 module pair provides a ten wire interface which can be used to control any remote system. Such remotes include MMSC-800, MMP-900, PCU-800 or RSU-700. The interface allows up to 512 data words to be sampled from the remote system at a bit rate that can differ from that of the host MMSC-800. The remote sample format is stored in EEPROM which is programmed by the same parallel interface type used for programming the PR-802. Multiple module sets can be used within a single MMSC-800 data system for independent control of a variety of remote systems. The TW-801/802 module set can contain two independent sample formats which are selected via the external control lines. The maximum sample rate for the module set is 50 KSPS. The TW-801/802 can be used to control a synchronous or asynchronous embedded format per IRIG-106, Class "2". The TW-801/802 is considered a data module, and therefore must be included in the total number of data modules (31 maximum). The module set can also be ordered with differential Line Drivers and Receivers for Time and Event inputs (TW-801A/802A).



ANALOG MODULES

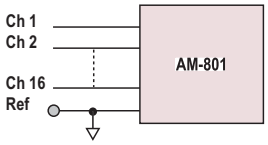
BR-802 Bridge Resistor Multiplexer Module

The BR-802 is a 14 channel RTD or half bridge multiplexer (13 channels when completion resistors are used). The BR-802 contains a multiplexed constant current source and can be utilized for either single ended measurements or differential measurements. Multiplexed current excitation not only saves system power but also reduces transducer self heating errors. Three sets of Four user selectable gains of 1, 2, 4 & 8 or 2, 4, 8, & 16 or 1, 10, 100 & 1000 are available via the two control lines at the mating connector. Optionally the BR-802 can be supplied with an internal completion resistor for single ended measurements.



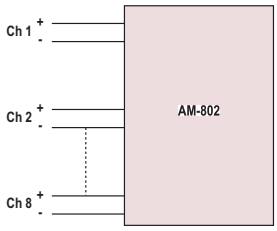
AM-801 Analog Multiplexer

16 Channel single ended inputs with user-specified gain and attenuation capability (factory set).



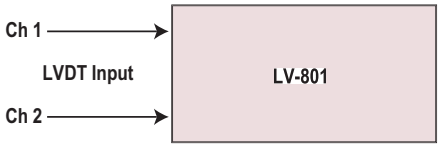
AM-802 Analog Multiplexer

8-Channel differential inputs with user-specified gain and attenuation capability (factory set).



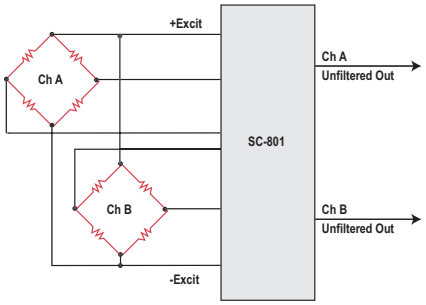
LV-801 LVDT Interface

The LV-801 is a 2-channel LVDT interface. It contains a 6 pole pre-sample low pass filter, and an LVDT-to-analog converter circuit. Reference input 0.1 to 32 VRMS. Filter cutoff frequency (-3 dB) at 60 Hz.



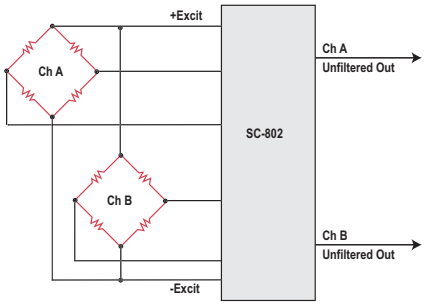
SC-801 2-Channel Bridge Conditioner

Each channel provides: 8 programmable gains; 6-pole Butterworth filter; input zero set (for calibration). Each module also provides one bipolar constant voltage excitation source (± 5 VDC) which can supply up to 40 mA of current. Unfiltered analog outputs are provided for test purposes. SC-802 2-Channel Bridge Conditioner. The same features as the SC-801 except that each channel has its own sample/hold amplifier for simultaneous sampling. The module can be set for simultaneous or sequential sampling under software control. Unfiltered analog outputs are provided for test purposes.



SC-802A 2-Channel Bridge Conditioner

The SC-802A is a 2 channel, programmable gain, bridge conditioner with a 6-pole Butterworth filter and externally controlled sample & hold amplifier for simultaneous sampling. Unfiltered analog outputs are provided for test purposes.



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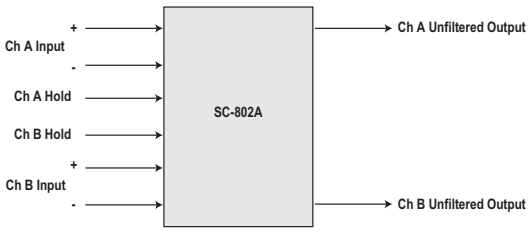
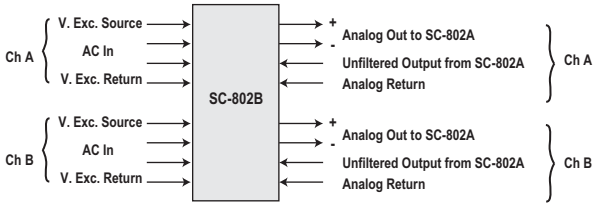


ANALOG MODULES

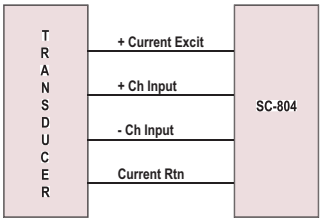
SC-802B AC Couple Module

The SC-802B works in conjunction with the SC-802A to provide an AC coupled input with a 1 pole passive high pass filter. The module also provides offset correction for high gain applications.



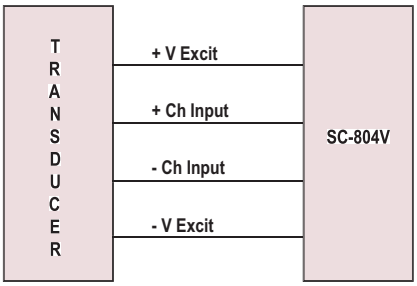
SC-804 1-Channel Automatic Gain Ranging Bridge Conditioner

Programmable Functions: Six gain ranges, auto range or downrange-only programmable; 6-pole Butterworth filter with 4 cutoff frequencies; AC or DC input coupling. It provides constant current excitation (customer specified, factory set) The SC-804 allows maximum flexibility in an environment where the expected magnitude of transducer output is unknown or for where the fixed Gain/Offset adjustments to the MMSC-800 are not practical. Module requires special MMSC-800 overhead modules. The output coding of this module is two's complement, and the full scale output range is from zero to 4095 counts.



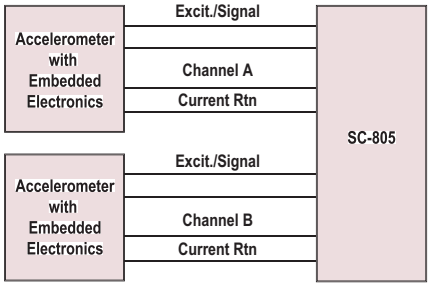
SC-804V AGRA Bridge Conditioner

The SC-804V is a single channel Automatic Gain Ranging Amplifier (AGRA) with six programmable gains, four programmable filter cutoff frequencies (six-pole Butterworth). Direct input coupling and constant voltage excitation (±5V). The output coding and full scale range is the same as the SC-804.



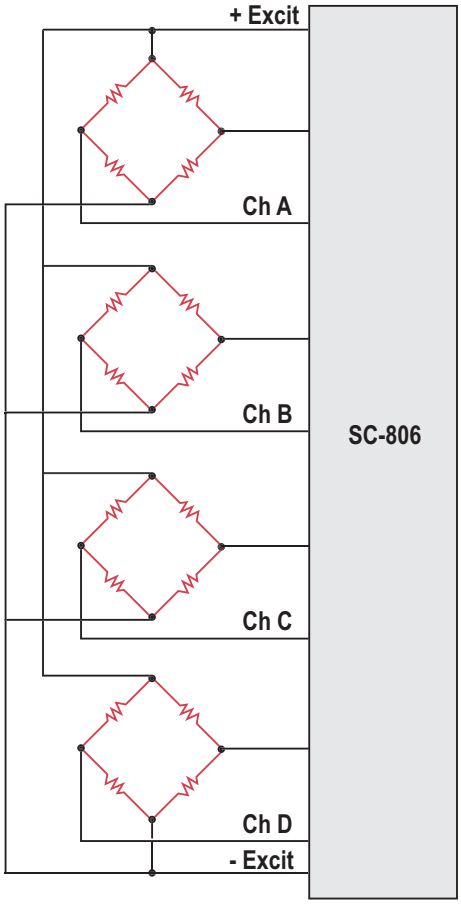
SC-805 2-Channel Signal Conditioner with Constant Current Source

Same features as the SC-801 except that each channel has constant current excitation instead of constant voltage and the SC-805 does not contain the input zero calibration circuitry. Inputs are AC coupled. Compatible with charge type sensors which have integral electronics.



SC-806 4-Channel Bridge Conditioner

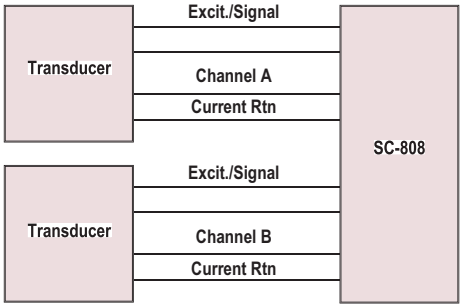
Each channel has four programmable gains and a 2-pole low pass Butterworth filter. The SC-806 also provides one constant voltage bipolar excitation source (±5V) at up to 40mA of current.



ANALOG MODULES

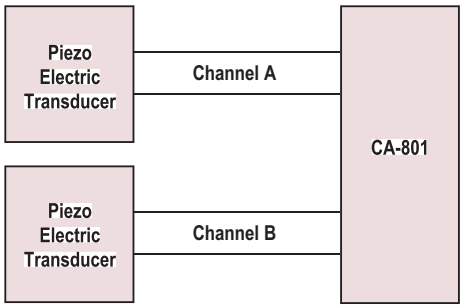
SC-808 2- Channel Signal Conditioner with Constant Current Source

Each channel provides 8 programmable gains, a 6-pole low pass Butterworth filter and a constant current excitation source. Inputs are DC coupled, whereas those of the SC-805 module are AC coupled.



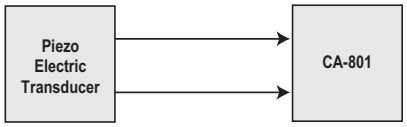
CA-801 2-Channel Accelerometer Conditioner with Charge Amplifier

± 150 to ± 6000 picocouloumb/G full scale, eight programmable ranges. Each channel contains a 6-pole low pass Butterworth filter.



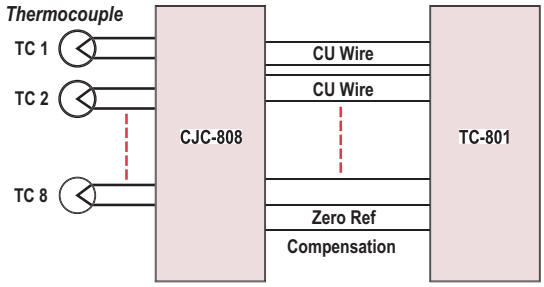
CA-804 AGRA Charge Amplifier

The CA-804 is a 1-channel, AC coupled, Automatic Gain Ranging Charge Amplifier with programmable 6-pole Butterworth low pass filter. The module has an internal track-and-hold and a 12-bit A/D converter. Data length is 16 bits where the 12 MSB's are the 2's representation of the analog data, the next three bits represent the gain and the LSB is a flag to indicate that the amplifier has changed ranges in the last millisecond. The CA-804 is compatible with isolated or non-isolated accelerometers. The full scale output range is from 0 to 4095 counts.



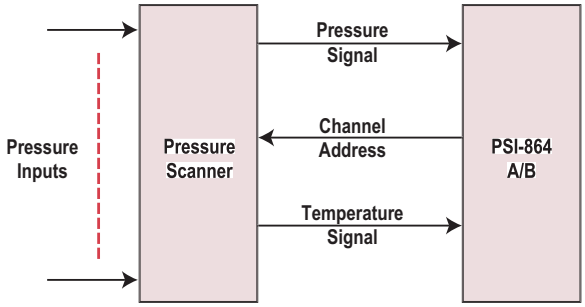
TC-801 8- Channel Thermocouple Conditioner / Multiplexer

Provides conditioning/scaling and cold junction compensation for up to 8 thermocouples of one type. Requires the use of an L-3 Communications Telemetry-East CJC-808 which is an ice-point reference block and forms the thermocouple to copper wire transition.Each TC-801 module includes a CJC-808.



PSI-864 A/B Pressure Scanner Interface Module Set

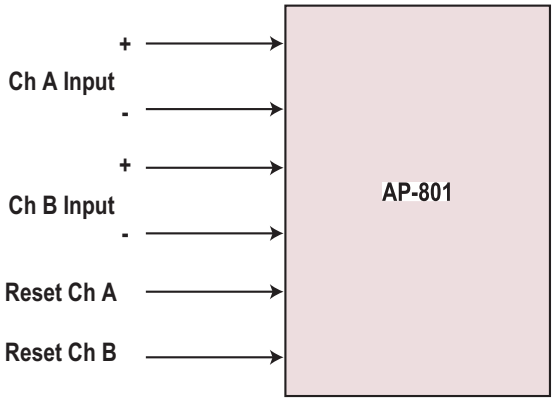
The PSI-864 A/B module set is designed to interface with Pressure scanners with up to 64 channels. Designed for use with scanners having pressures of ±5 psi to 100 full scale.



DIGITAL MODULES

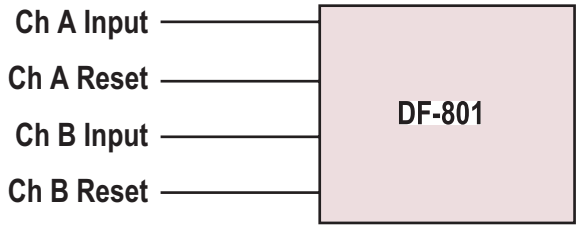
AP-801 Frequency Counter

The AP-801 is a 2 channel Frequency/Period Counter. Each channel provides a 16-bit counter that can be read as multiple words in the PCM stream. Each channel's operating mode can be individually programmed to perform as a period counter, a frequency counter, or as a totalizer.



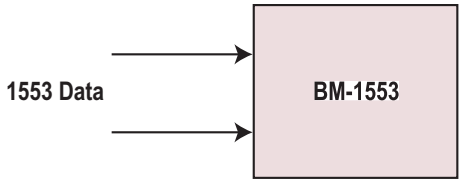
DF-801 Frequency Counter

The Frequency-to-Digital converter module provides two frequency counter channels with 12-bit (4095 counts) capacity each. Inputs to the module are amplified so that they can be activated by low level signals typical of fuel-flow and engine RPM sensors. The module offers user-selectable reset on sample (read), reset on external command, or totalizer modes. The two counters can be cascaded to form one 24-bit counter for added resolution/capacity.



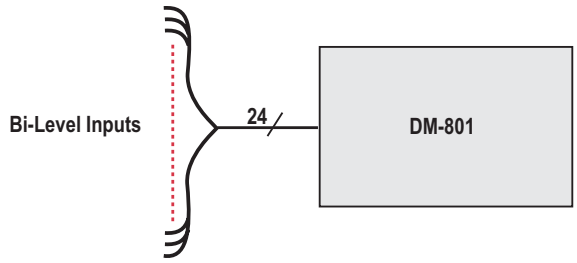
BM-1553 Bus Monitor

The BM-1553 bus monitor can be used in any all-digital MMSC-800 system with an LR-802 module (no analog modules and no analog overhead). It accepts one dual redundant 1553 A/B channel and merges selected messages into the PCM data stream. The BM-1553 is the smallest 1553 bus monitor available from L-3 Communications Telemetry-East. 1553 Data can be time tagged using the TCR-801/802 module set.



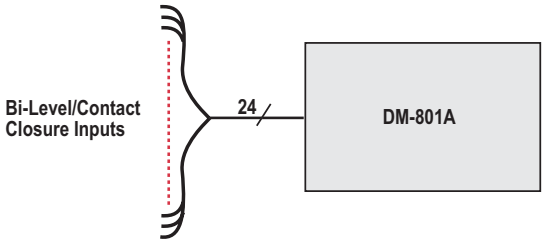
DM-801 Bi-Level Multiplexer

Provides two words of up to 12 bits per word for encoding of discrete logic inputs. Threshold is factory set to TTL/5V CMOS levels. Input level to ± 40 volts.



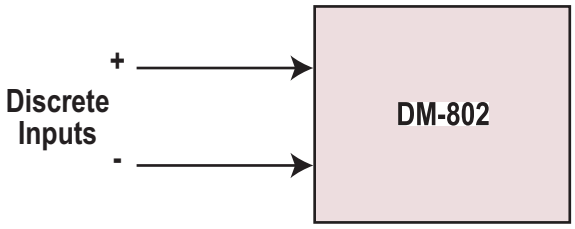
DM-801A Bi-Level Multiplexer

Provides two words of up to 12 bits per word for encoding of discrete logic inputs. Threshold is customer specified, factory set. Input level to ± 40 volts. Each word (12 bits) is jumper selectable for pull up or pull down configuration.



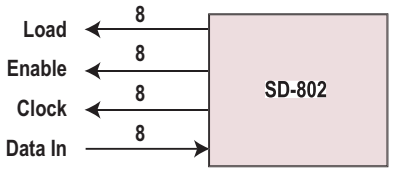
DM-802 Differential Digital Bi-Level Multiplexer

Provides one word of up to 12 bits of differential bi-level inputs. The 12 inputs are fully differential, with an input impedance greater than 5 megohms. The threshold is customer specified (factory set). Common Mode Voltages can be up to ±10 VDC.



SD-802 Serial Digital Multiplexer

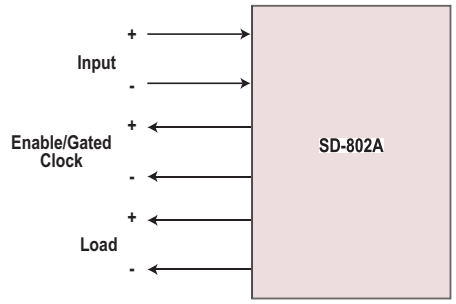
Provides 8 channels of serial data multiplexing with five software programmable transfer modes. Synchronous transfer of up to 8 channels operating at 8 to 16 bits per word. External interface connections are HC/TTL compatible.



DIGITAL MODULES

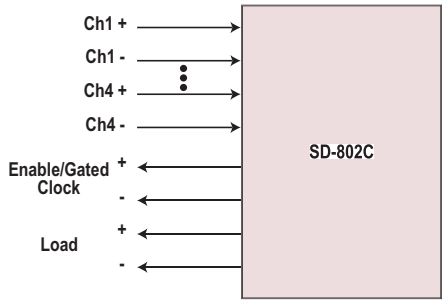
SD-802A Serial Digital Multiplexer

The SD-802A is a single channel programmable serial digital multiplexer module. It contains five software controlled transfer modes. The module design allows for its use in systems operating from 8 to 16 bits per word. I/O are RS-422 compatible.



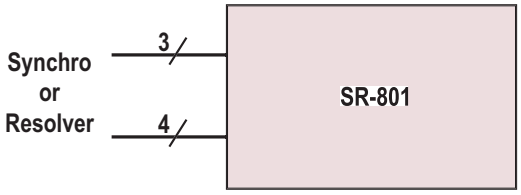
SD-802C Serial Digital Multiplexer

The SD-802C is a four channel programmable serial digital multiplexer module. It contains five software controlled transfer modes. The module design allows for its use in systems operating from 8 to 16 bits per word. I/O are RS-422 compatible.



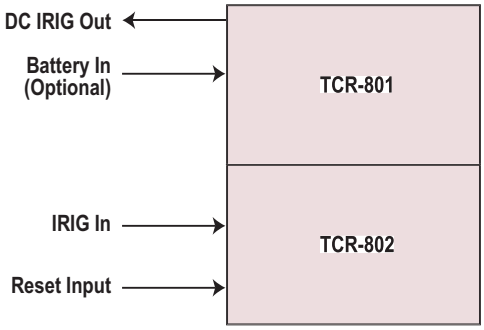
SR-801 16-Bit Synchro/Resolver

With an on-board electronic “Scott T”. The module is configured to accept 1 channel of 3-wire (synchro) and 4-wire (resolver) inputs directly.



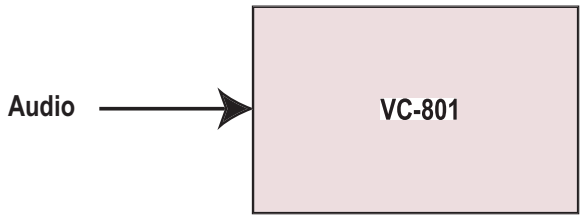
TCR-801/802 Serial Time Code Reader Module Set

Provides a way to insert time information into the PCM data stream. Accepts IRIG-B, A or G modulated serial time code for direct readout into any word of the PCM format. Can operate in a internal time base mode for “flywheel” operation. Three different operating modes are available and an optional external battery back-up is also available. A version is available with differential inputs (TRC-801A/802).



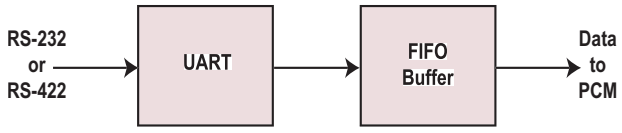
VC-801 Voice Conditioner

The VC-801 is a single channel voice conditioning module which acquires pilot analog voice and digitizes it using the Continuously Variable Slope Delta (CVSD) modulation technique. It has four user-selectable input ranges, an input band pass filter, and uses a 10 to 40 Kbps conversion clock.



RS-801 RS-232/422 Serial Receiver

The RS-801 is a UART-based Serial Receiver module which is used to accept RS-232 words, buffer these words, and place them in the PCM output stream. Data “Full” and “Empty” flags are provided to verify data integrity.



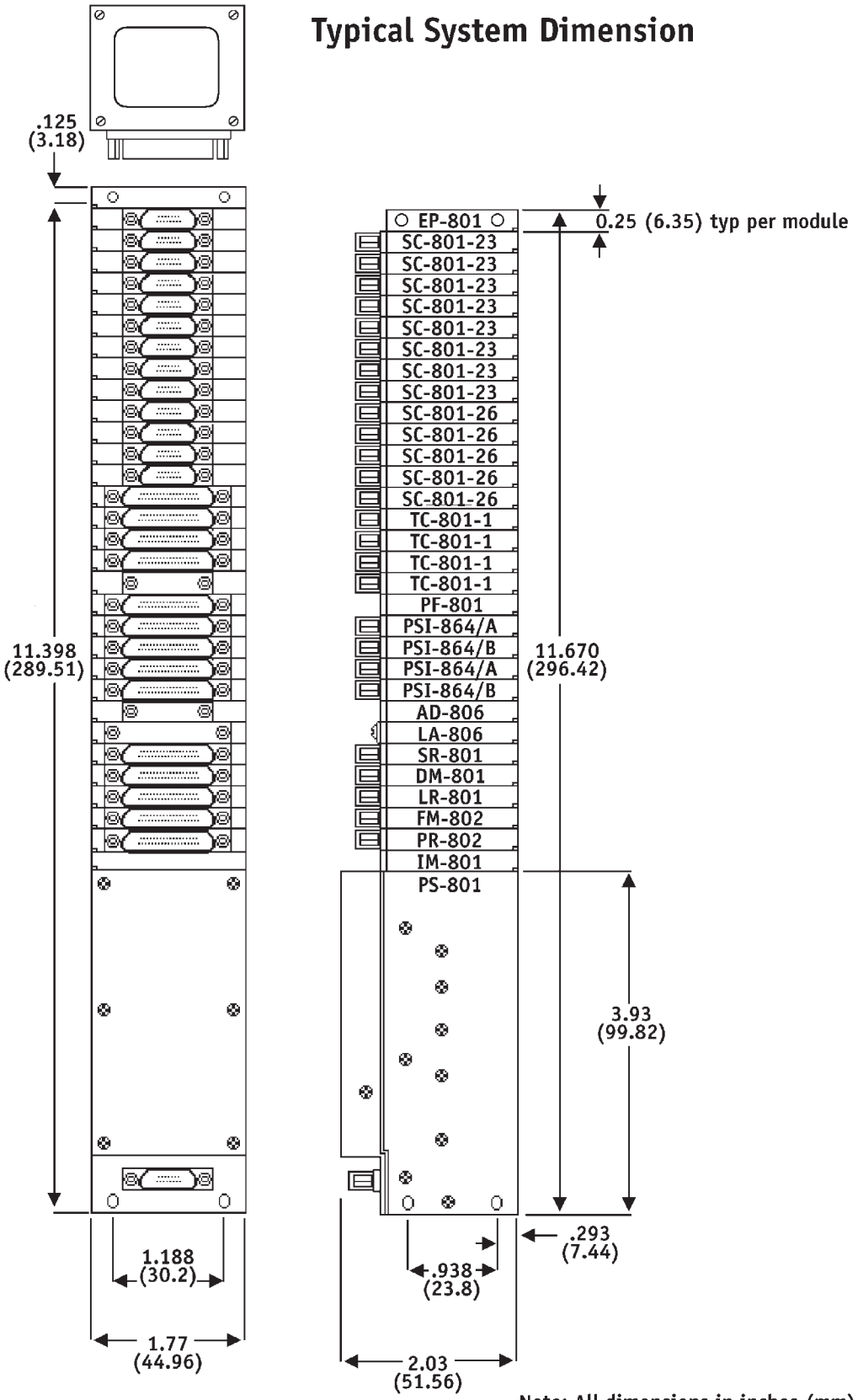
ENVIRONMENTAL INFORMATION

Temperature:	-35°C to +85°C operating (Standard) -54°C to +100°C non-operating
Vibration:	Sine: 30g, 10 Hz to 2,000 Hz
Random:	35g 10 Hz to 2,000 Hz
Shock:	100g, 11 mS, any axis
Acceleration:	100g steady state, any axis
Humidity:	To 95 % RH, non-condensing
Altitude:	Unlimited

ORDERING INFORMATION

When ordering, refer to the model number given in the module description section. For a list of current versions or special applications contact L-3 Communications Telemetry-East or the nearest Field representative. L-3 Communications Telemetry-East has its foundation in strong customer support. We can supply custom designs to meet specific needs. Let us help to satisfy your particular measurement requirements.

Typical System Dimension



Note: All dimensions in inches (mm)

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