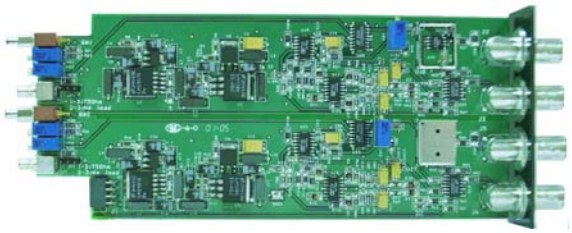
MODEL 2173 INTERFACER PRODUCT LINE

IOC801

AUTOMATIC GAIN CONTROLLED (AGC) AMPLIFIER

REAR VIEW



SIDE VIEW

FEATURES

- Two Independent Channels
- DC to 20 MHz Response
- Input Level Range 400 mV p-p to 20 V p-p into 75 Ohms
- Output Level: 2.83 V p-p Adjustable (Manual Mode) or Preset (AGC Mode)
- Output Impedance: 75 Ohm
- DC Coupled Amplifier
- Buffered Output Test Point per Channel
- DC Offset –Adjustable Output Offset ±4V
- Channel-to-Channel Isolation: ≥ 60 dB at 20 MHz; ≥ 80 dB at 1 MHz
- Signal Port Return Loss: ≥ 20 dB
- Contributed Noise: ≥ 60 dB Below Rated Output
- 3rd Harmonic Distortion:

  DC to 8 MHz ≥ 40 dB Below Rated Output

  8 MHz to 11 MH ≥ 30 dB Below Rated Output

  11 MHz to 20 MHz ≥ 20 dB Below Rated Output

OVERVIEW

The IOC801 module is a dual Automatic Gain Control (AGC) analog signal buffer and distribution amplifier. Front panel controls for each channel include an AGC mode selector (Fast / Slow attack / Manual); Offset control, and a Gain control. A Test Point connector provides an accurate buffered representation of the signal output. Front panel controls provide selection of Fast and Slow AGC modes, Manual Gain and Output Offset.

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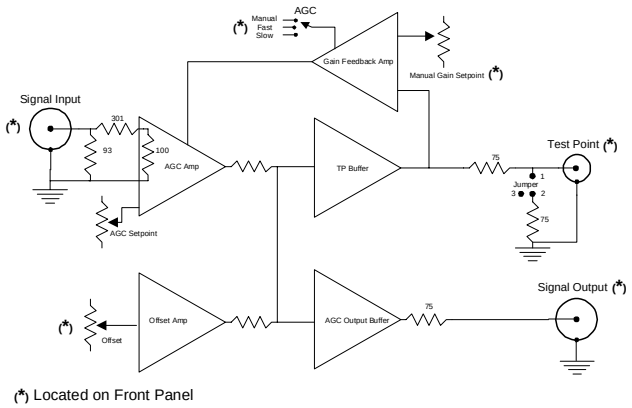

Figure 1 Model IOC801 Functional Block Diagram (1 of 2Ch)

SPECIFICATIONS

GENERAL

2 Independent DC-Coupled Channels

Single Slot Module (3" x 6" x 0.9")

Model 2173 Pluggable Interface

INPUT

Isolated BNC Connectors, One per Channel

75 Ohm Shunt Terminated

Minimum Input Level: ±200 mV

Maximum Input Level: ±10 V

Input Impedance: 75 Ohms

OUTPUT

Isolated BNC Connectors, One per Channel

75 Ohm Series Terminated

Maximum Output Level: 2.83Vp-p

Output Resistive Drive: 75 Ohms

DC Output Offset ± 4 Volts

FRONT PANEL TEST POINT

Isolated SMB, One per Channel

Series Termination: 75 Ohm

Shunt Termination: Jumper Enabled 75 Ohm

FREQUENCY RESPONSE:

DC to 20 MHz ± 0.5dB

3rd HARMONIC DISTORTION

DC – 8Mhz ≥40dB Below rated Output

8Mhz - 11Mhz ≥30dB Below rated Output

11Mhz – 20Mhz ≥20dB Below rated Output

NOISE

≥60dB below rated output

SIGNAL PORT RETURN LOSS

≥20dB

CHANNEL TO CHANNEL ISOLATION

60dB @ 20MHz; 80 dB @ 1Mhz

CONTROLS AND ADJUSTMENTS

Switch Selectable Modes

AGC FAST (10 Milli-Second)

AGC SLOW (1-Second)

MANUAL

Manual Adjustments

Gain -16dB to + 17 dB

Output Offset ±4Vdc

APPLICATION

The IOC801 is a buffer amplifier that may be used to automatically maintain the amplitude of wide band signals that vary in amplitude to 1V RMS.

Typical use of the IOC801 is as an automatic gain control for telemetry receiver outputs that must be input to recorders.

CONFIGURATION

There are two classes of controls that are associated with the IOC801. There are controls and jumpers located on the body of the card that are intended to be set once and rarely thereafter. Controls that are used often are located on the front edge of the module and made accessible through the front panel of the chassis into which the card is installed. Table 1 lists the two controls for each channel that are not accessible to the user during normal operation. These are the AGC Setpoint potentiometer and the jumper that is used to install a terminator across the Test Point output. The AGC Setpoint is adjusted at the factory and normally, does not require readjustment. **Error! Reference source not found.** describes the components that are accessible through the front panel of the host chassis. Figure 2 illustrates the location of each of these components on the module.

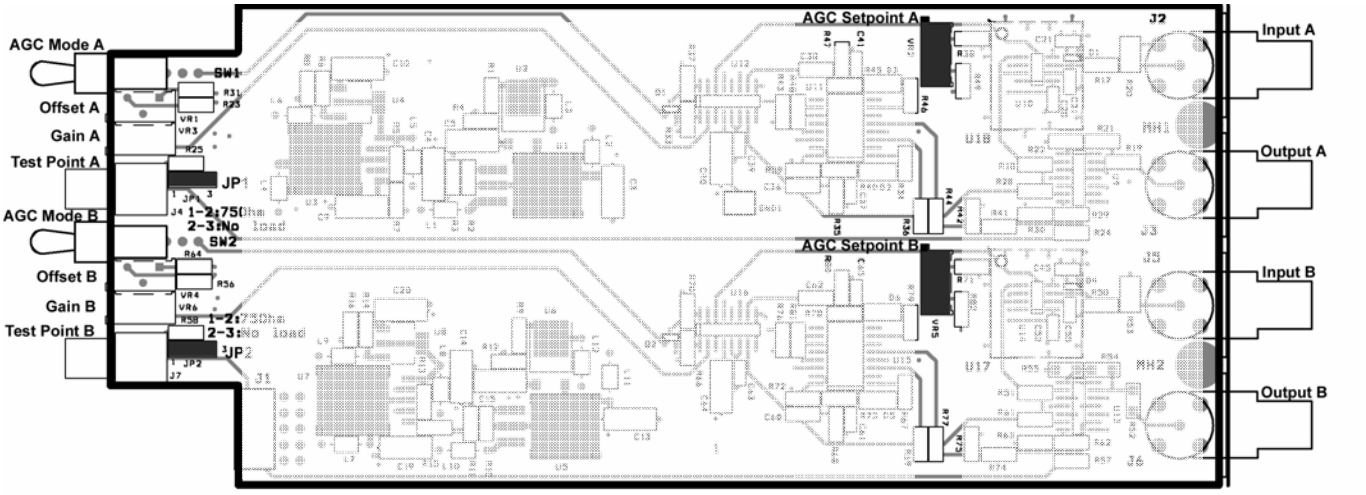

Figure 2: Component Location Diagram

Table 1: On-board Controls

Component	Function
Jumper JP1	Permits the application of a 75 Ohm parallel termination to the Test Point for channel A. Placing the jumper between pins 1 and 2 selects the termination. Placing the jumper between pins 2 and 3 de-selects the termination.
Jumper JP2	Permits the application of a 75 Ohm parallel termination to the Test Point for channel B. Placing the jumper between pins 1 and 2 selects the termination. Placing the jumper between pins 2 and 3 de-selects the termination.
AGC Setpoint Potentiometer VR2	Sets the nominal AGC output level for channel A. This control is set at the factory for an output of 2.83 Vp-p with a sine-wave input and the output terminated into 75 Ohms.
AGC Setpoint Potentiometer VR5	Sets the nominal AGC output level for channel B. This control is set at the factory for an output of 2.83 Vp-p with a sine-wave input and the output terminated into 75 Ohms.

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Table 2: Front Panel Controls

Component	Function
AGC MODE SWITCH SW1	AGC Mode Switch for Channel A. Three settings are available: Fast (10 milli-seconds), Slow (1 second) and Manual. In the Manual mode the Manual Gain Setpoint control is active.
AGC MODE SWITCH SW2	AGC Mode Switch for Channel B. Three settings are available: Fast (10 milli-seconds), Slow (1 second) and Manual. In the Manual mode the Manual Gain Setpoint control is active.
GAIN A Potentiometer VR3	Manual Gain Setpoint control for Channel A. With the AGC MODE SWITCH for Channel A set to Manual, this control is active and allows the user to set the gain / attenuation of the amplifier.
GAIN B Potentiometer VR6	Manual Gain Setpoint control for Channel B. With the AGC MODE SWITCH for Channel B set to Manual, this control is active and allows the user to set the gain /attenuation of the amplifier.
OFFSET A Potentiometer VR1	DC Offset control for Channel A. This control permits the adjustment of the DC offset of the output signal on Channel A. The adjustment range is up to ±4 Volts. The sum of the peak-to-peak output-signal amplitude plus the DC offset may not exceed ±10 Volts.
OFFSET B Potentiometer VR4	DC Offset control for Channel B. This control permits the adjustment of the DC offset of the output signal on Channel B. The adjustment range is up to ±4 Volts. The sum of the peak-to-peak output-signal amplitude plus the DC offset may not exceed ±10 Volts.

OPERATION AND SETUP

The AGC Setpoints are adjusted at the factory to approximately 2.8 Volts peak-to-peak. The front panel Test Point termination jumpers are left in position to impose the 75 Ohm terminations. The IOC801 modules are usually delivered already installed as a part of a model 2173 chassis. Input and output signal connections are available on isolated BNC connectors on the rear panel of the module(s).

Select the desired mode of operation for each channel using the AGC mode switch(es) on the front panel. Connect a signal monitor (oscilloscope) to the Test Point. If either the Fast or Slow attack AGC mode is selected, only the Offset control is active and may be adjusted to position the output signal in DC space. If the Manual AGC mode is selected, the Gain control is also active. In this case, automatic dynamic amplitude control is not imposed by the amplifier.

Input signals that contain a DC level offset can, in specific cases, be compensated by the OFFSET control setting.

The IOC801 is designed to accept bipolar signals, that is, signals that swing above and below ground. Since the Variable Gain Amplifier (VGA) operates directly on the input signal (it is DC coupled) any offset present will also be amplified. Thus, for small voltage inputs which require high gain to reach the 2.8Vp-p output level, amplifying the signal and offset combined may produce clipping of the output signal.

An output offset adjustment is available on the card to re-center signals that have an offset that does not produce input clipping, or it can be used to offset the output as needed. Note that this output offset adjustment is independent of the VGA stage and so will not be affected by changes in the manual gain control or the AGC operation.

As a guide to the level of input offset that can be accommodated before clipping occurs the following definitions and equations are offered. Care must be taken to be sure that the input signal falls within the amplitude and offset constraints.

- Peak-to-Peak input signal voltage is the maximum voltage minus the minimum voltage:
  - $Vp\text{-}p=V_H-V_L$.
- DC Offset is defined as the DC level of the mid-point of the peak-to-peak amplitude of the input signal:
  - $Voffset= (Vp\text{-}p / 2)+V_L$.
- As long as the solution of the following equation remains less than or equal to 6, the input signal characteristics are met:
  - $(2.8 / Vp\text{-}p)*Voffset \leq 6$

FUNCTIONAL DESCRIPTION

The IOC801 Pluggable Interface Module (PIM) accepts two analog signals and applies automatic gain control. The IOC801 contains two independent amplifier channels each of which presents one BNC input connector and one BNC output connector at the rear panel of the model 2173 chassis when the card is installed. The module accepts bipolar input signals ranging in amplitude between 400 mVp-p and 20 Vp-p and maintains the output level at 2.83 V p-p (factory set) in the Fast and Slow AGC modes. Setting the module to Manual mode allows the user to set a fixed value of gain / attenuation using the front panel potentiometer. Also, on the front panel is a potentiometer control that permits the adjustment of the DC Offset level of the output signal. The inputs are 75 Ohm terminated, while the outputs drive 75 Ohm cable and/or devices. -The input frequency range is DC to 20 MHz. Front panel controls are provided to permit the user to select the gain control mode (automatic fast / slow or manual), and set the gain and offset for each channel. A buffered test point presents the gain controlled signal for each channel. Located on the card is a jumper that is used to apply a 75 Ohm termination to the test point(s) and a potentiometer (factory set) that establishes the AGC set-point for each channel. The IOC801 requires 1 slot of the 14 available slots in the Model 2173 chassis.

Figure 1 depicts the functional block diagram of a single channel of the IOC801. The input signal is applied to a 75 Ohm termination to the AGC amplifier. This amplifier adjusts its output based on the amplitude of the sampled output as compared to the AGC setpoint. This setpoint is factory set to produce an output of 2.83 Vp-p with a sine-wave input and the AGC switch in either the Fast or Slow positions. With the AGC switch set to manual, the gain is set by means of the Manual Gain Setpoint potentiometer on the front panel.

The DC offset of the output signal is adjustable within the range of ±4 Volts. The sum of the offset and the peak-to-peak amplitude of the output must be in the range of ±10 Volts. This control is located on the front panel and is active in all AGC modes.

The output signals of the module are presented through 75 Ohm series terminations to isolated BNC connectors. The front panel test point presents a buffered version of the output signal also through a 75 Ohm series termination. An on board jumper allows shunt termination of the test point. Each of the two test points is independently terminated. It is recommended that these terminations be enabled if the test points are not in use or are terminated externally.

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