

Trig-Tek™

201AP

Charge Amplifier

User Manual

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FOR YOUR SAFETY

Before undertaking any troubleshooting, maintenance or exploratory procedure, read carefully the **WARNINGS** and **CAUTION** notices.



CAUTION
RISK OF ELECTRICAL SHOCK
DO NOT OPEN



This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.



If this instrument is to be powered from the AC line (mains) through an autotransformer, ensure the common connector is connected to the neutral (earth pole) of the power supply.



Before operating the unit, ensure the conductor (green wire) is connected to the ground (earth) conductor of the power outlet. Do not use a two-conductor extension cord or a three-prong/two-prong adapter. This will defeat the protective feature of the third conductor in the power cord.



Maintenance and calibration procedures sometimes call for operation of the unit with power applied and protective covers removed. Read the procedures and heed warnings to avoid "live" circuit points.

Before operating this instrument:

1. Ensure the proper fuse is in place for the power source to operate.
2. Ensure all other devices connected to or in proximity to this instrument are properly grounded or connected to the protective third-wire earth ground.

If the instrument:

- fails to operate satisfactorily
- shows visible damage
- has been stored under unfavorable conditions
- has sustained stress

Do not operate until performance is checked by qualified personnel.

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DOCUMENT CHANGE HISTORY

Revision	Date	Description of Change
A	12/3/2012	Document Control release

Chapter 1

Introduction

The Trig-Tek™ 201AP Charge Amplifier (**Figure 1-1**) is designed to amplify the outputs from piezoelectric or mV type accelerometers, force gauges, microphones, and pressure pickups. The CHARGE output from the pickup, expressed in millivolts or picocoulombs per g, is then amplified and AC signal proportional to the input is brought out via a BNC connector. The AC voltage output can be used to operate vibration monitors, recorders, analyzers, etc.

The unit includes a four-section low pass filter. The cutoff frequency can be selected by changing resistor values on a plug-in assembly. (See **Figure 2-1**.) Nominal -3dB cutoff is 20 kHz. Cutoff frequencies up to 50 kHz and down to 500 Hz can be accomplished by changing the resistor values on the assembly.



Figure 1-1. Trig-Tek 201AP Charge Amplifier

Specifications

Input

PC or mV	Changed by a movable jumper on the PC board (S1 location). The 201AP is set to PC mode at the factory.
Frequency – 3 dB	1 Hz to 100 kHz (no filter)
Sensitivity	0.1 - 1.0, 1.0-11 mV/pC continuously in conjunction with the GAIN switch
Pyro Electric	Amplifier will not block
Input Shunt Resistance	Will operate with shunt resistance down to 1 MegOhm
mV Mode	3-5 mA current (optional)
Connector	10-32 microdot

AC Output

Impedance	Less than 50 Ohms (10 ma)
Voltage	5 Volts RMS full scale
Frequency Response	±5%, 5 Hz to 50 KHz (no filter)
Amplitude Linearity	0.5% of full scale
Harmonic Distortion	Less than 1%
Connector	BNC

Power

Power	±12 to ±18 Volts DC at approximately 15 mA
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Dimensions

Dimensions	5.25" long x 2.5" wide x 1.66" deep (13.3 cm x 6.3 cm x 4.2 cm)
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Chapter 2

Operation

The Trig-Tek 201AP Charge Amplifier provides a low cost unit, packaged in a rugged container, for mounting close to the accelerometer in the engine test cell or the vibration laboratory. It will accept at its input an accelerometer output and provides gain from 0.1 to 1.1 mV/pC, or 1 to 11 mV/pC as selected by the GAIN switch. The unit requires ± 12 to ± 18 Volts power at approximately 15 milliamps. The continuously variable gain adjustment should be set to accommodate the sensitivity of the pickup being used. The unit can operate with either picocoulomb or millivolt type pickups.

GAIN Setting

To properly set the gain of the amplifier it is necessary to know the sensitivity of the pickup being used, the full scale g range, and the mV/g required at the output. With this information, the proper gain can be set. Multiply the total full scale g range times the pickup sensitivity. This gives the total millivolts or picocoulomb at the input. Connect a generator to the input set for the determined level and set the gain for the required output level.

For instance, set the unit to accommodate a 50 pC or mV/g pickup and provide a 10 mV/g output, connect a pC or mV signal from a generator to the input of the Charge Amplifier, and set the generator for 1000 pC or mV at 100 Hz. Dividing 1000 pC or mV by 50 pC or mV/g equals 20 g's peak at the input to the Charge Amplifier. Connect a voltmeter to the output of the Charge Amplifier, and set the GAIN ADJ of the Charge Amplifier for a 200 mV Peak indication. This calibrates the unit for 10 mV/g.

Filter

The 201AP has a four-section low pass filter to roll off the high frequency end of the pass band. The resistors for the filter are on an 8-pin plug-in assembly (**Figure 2-1**). The unit is normally set for -3 dB cutoff at approximately 20 kHz. Should you want to change the cutoff; the four equal resistors on the assembly can be increased to lower the cutoff frequency, or decreased to increase the cutoff frequency.

Chapter 3

Performance

The following performance test should be run to verify that the unit is performing within the manufacturer's specifications.

Test Equipment

Note: Equivalent equipment can be substituted.

Digital Voltmeter	Fluke 8000A
Signal Generator	Astronics Test Systems 346B Synthesized Calibrator
Voltage-to-Charge Converter	Astronics Test Systems 2030 (built into the 346B)

Procedure

1. Connect the ± 12 to ± 18 Volts power of approximately 15 milliamps to the unit.
2. The 201AP has an internal jumper to select either pC or mV mode. When shipped, it will be in the pC Mode.
3. Connect a sine wave signal of 500 ± 10 mV RMS and about 100 Hz to the input. When in the picocoulomb mode connect the input through a voltage to charge converter.
4. Turn the GAIN potentiometer all the way clockwise and set the GAIN Switch to 1-11.
5. Connect the AC Voltmeter to the output terminal marked AC. (The meter common to the terminal marked COM.)
6. Observe an indication of 500 mV RMS or less.
7. Set the GAIN Switch to 0.1-1.1.
8. Observe an indication of 50 mV or less.
9. Turn the GAIN potentiometer all the way counterclockwise.
10. Observe indication of 500 mV or more.

11. Set the GAIN Switch to 1-11.
12. Observe an indication of 5.00 Volts RMS or more.
13. Change the input frequency to 20,000 Hz.
14. Observe an indication of 3.50 volts RMS ± 1.00 volts RMS on the AC Voltmeter.
15. The frequency response of the unit can be checked by changing the frequency in the pass band region and observing the AC output voltage. (If you go below 30 Hz, you have to use a DC coupled oscilloscope, because the frequency of the AC meter may deteriorate below 30 Hz.) It should be $\pm 5\%$ down to 5 Hz, and the high will be controlled by the cutoff frequency of the low pass filter.