Conic Systems Inc.

INSTRUCTION MANUAL
FOR
DATATRAN
C2547
UNIVERSAL AMPLIFIER
MODULE

FOR TECHNICAL OR SALES ASSISTANCE
CONTACT CONIC SYSTEMS INC.
AT
TEL: 845.856.4313 OR FAX: 845.858.2824

EMAIL: *INFO@CONICSYSTEMS.COM*

GENERAL DESCRIPTION:

This universal amplifier module is designed to provide the user with a collection of the most commonly used signal processing functions, preassembled on a single circuit board. All of the basic functions feature compatible signal levels, thus allowing them to be directly interconnected to produce the configuration required for a specific application. The module includes the following basic building block.

- Transducer power supply section, providing regulated positive and negative DC output voltages.

- Linear time controller, with ramp times from one to 250 seconds. The positive and negative rates can be adjusted separately within one of the three overlapping ranges.

- Servo amplifier with adjustable gain, bias and output voltage limit. The amplifier is suitable for either open or closed loop operation and provides a choice of either integral or proportional gain.

- Signal output section with three outputs. One output is bipolar and will track the amplifier signal for both positive and negative input signals. The other two will supply positive output signals only. Of these two, the active output is automatically selected by the polarity of the amplifier input signal. One will respond only to positive input signals while the other will respond only to negative inputs.

- Signal scaling amplifier with adjustable bias and gain. This amplifier is used to convert high voltage or 4 to 20 ma. current input signals from external transducers to levels that are suitable for additional processing as command or feedback signals.

- Difference amplifier that provides a output that is the result of the subtraction of one input signal from the other. This function block can be supplied with gains of one, five or ten. This section can also be used as a inverting or non-inverting buffer when the gain is set to one.

- Stability and low pass filter. This function can be used to remove the high frequency noise from external signal sources. The time constants are adjustable from 1.8 to 180 volts per second per second. Feedback is included to stabilize the gain at one.

The universal amplifier board is supplied so that the input and output signals for each block function are compatible. The output from each signal processing block can be directly connected to any outer block. This feature allows the user to construct most control signal processing applications using a single circuit board.

The universal amplifier module is supplied as a single, industrial grade circuit board assembly. All of the common user adjustment controls are heavy duty, single turn potentiometers with shaft locks. These devices are mounted on a bracket that is located for easy accessibility with the amplifier located and operating on the user's equipment. The universal amplifier module requires a bipolar 10 to 30 volts DC power supply for operation. All external power and signal wiring connections are made to a barrier type terminal block. All of the external connections to this terminal block as well as the adjustment controls and mode select jumpers are clearly marked on the circuit board.

INSTALLATION INSTRUCTIONS:

Once the equipment has been removed from the shipping container, inspect the unit to determine if any of the components have been loosened or damaged during shipment and storage. In the event that any items are damaged, missing or should loose parts be discovered, they must be repaired or replaced before proceeding with the installation.

In the event that the equipment is not to be used for a period of time it should be stored in the shipping carton. The storage area must be dry and protected. Severe humidity or temperature, vibration and dirt are adverse conditions that can be injurious to the equipment and must be avoided.

The location selected for mounting the equipment should be of the same nature as that selected for storage. The temperature should be such that the ambient does not rise above 55 degrees C. Note, that 55 degrees C is the maximum ambient surrounding the components inside the controller when it is operating at maximum load. Due to component dissipation it may be necessary to force cooling air through the

equipment if the plant temperature approaches 55 degrees C. In the event that forced air cooling is required, always install a good filter in the inlet stream ahead of the controller.

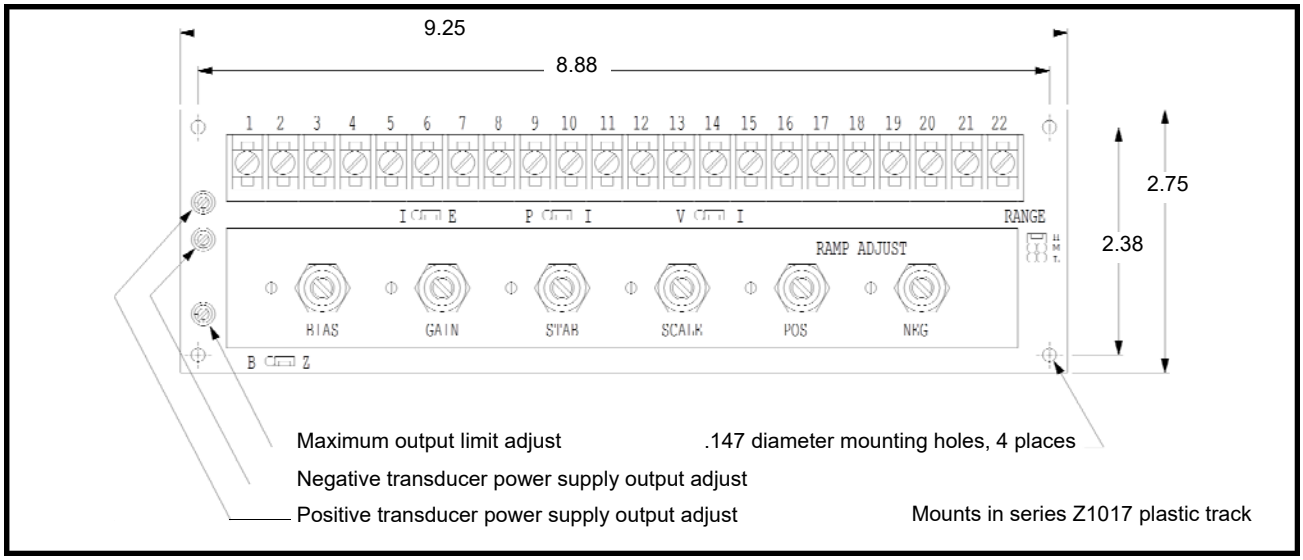
All electrical connections to the controller must be made in strict conformance with the connection diagram supplied and all applicable electrical and fire codes. Should conflicts occur between the connection diagrams and the local codes, Datatran's engineering department should be consulted prior to proceeding with the installation.

It is recommended that the system common (0 volt line) be operated at earth ground potential. This will provide the highest immunity to any electrical noise as well as the maximum safety for the operator. The system common terminal is clearly marked on the board connection drawings included in this manual. This point should be run directly to the plant earth ground with a wire no smaller then that used to connect the power line to the equipment. Connections to the hydrostatic drive controller should be in conduit separate from all other plant wiring for optimum performance and reliable operation in the high electrical noise environment typical in most industrial operations. This is particularly true for external command and feedback signal input lines.

Where shielded cable is called for on the connection diagram, expose the shield on the controller end only**.** If this cable is spliced at any point along its run be sure that the shield splice is covered and not grounded at any point along the run. Shielded cable should be in separate signal conduits only. They should not be run parallel to non signal conduits. If any signal conduits must cross non signal wires they should do so at an angle between 45 and 90 degrees.

All of the connections to the drive controller should be clearly marked and installed in conduit where possible. The importance of proper wire routing can not be overstressed; time spent on this operation is well worth it and will eliminate a number of possible problems and associated expense that can occur from improper connections during the operation of the equipment.

OUTLINE DIMENSIONS:



EXTERNAL WIRING REQUIREMENTS:

All external wiring shall be located in conduit or raceways. All shielded wiring must be located in it's own separate signal conduit. In general, all shielded wire should have the shield exposed and connected on one end only, as shown on the interconnection drawings. All of the power line or supply and earth ground connections to the drive controller circuit board can be made with 18 AWG or larger. Signal and output wires may be 20 AWG. All signal command input and feedback wiring should be twisted and shielded.

All external non-shielded wires should be of stranded copper with thermoplastic (PVC) insulation, rated for 600 volts and 90 degrees C. minimum. All external, multiconductor shielded cables should be of stranded copper with a foil shield and thermoplastic (PVC) insulation, rated for a minimum of 300 volts at 80 degrees C. The wire and cable ratings listed are the minimum. The user is expected to show a bit of common sense in the selection of the external interconnection wires, the voltage rating, current capacity and operating temperature must be suitable for the specific application. *All wires must be selected and installed as specified in the local electrical and fire codes.*

POWER LINE FUSE REQUIREMENTS:

All 10 to 30 volt DC powered models (suffix AAA = 100 or 150) are not supplied with any fuses on the circuit board. In this case the power supply connections to terminal numbers 1 and 3 should be protected by a fast blowing fuse in series with each wire. Fuses should be no larger than .5 amp. All external fuses should be equal to the Littelfuse series 312 (type 3AG, at 250 volts). Terminal number 2 is internally connected to the chassis and the system common (0 volt). It is recommended that this terminal be connected directly to the plant earth ground with a number 18 AWG or larger wire.

The user should note that a blown fuse in one of the power line connections or a short circuit on one of the transducer power supply output lines may cause the universal amplifier output signal lines to assume a maximum positive or negative output state.

Do not install fuses in any conductor that is connected to the system earth ground.

USER ADJUSTMENTS:

The devices listed below are single turn potentiometers that are located on the bracket mounted above the circuit board. These are the controls that are normally adjusted by the user to obtain the response required for a specific installation. Once the correct adjustments are obtained, the shafts should be locked in position, in order to prevent future changes due to vibration. The location of these devices is marked on the circuit board as well as the installation drawings on page number 2 of this manual.

AMPLIFIER BIAS (BIAS): Adjusts the magnitude of the output signal from the amplifier section when the command signal is set to zero.

The BIAS FUNCTION (ZB) jumper must be set to the "B" position.

OR

SCALE SECTION BIAS (BIAS): Adjusts the magnitude of the output signal from the scale section when the input signal is set to it's minimum value.

The BIAS FUNCTION (ZB) jumper must be set to the "Z" position.

AMPLIFIER GAIN (GAIN): Adjusts the magnitude of the output signal from the amplifier for a given amount of input signal in the open loop mode. Controls the stability and accuracy of the system in the closed loop mode.

SCALE SECTION GAIN (SCALE): Determines the amount of gain for the scale section.

STABILITY SECTION RESPONSE (STAB): Adjusts the frequency response of the stability and low pass filter section.

POSITIVE RAMP TIME (POS): Adjusts the rate at which the output signal from the linear time generator will change in the positive going direction. The adjustment range limits are determined by the LINEAR TIME RANGE SELECT (RANGE) jumper position.

NEGATIVE RAMP TIME (NEG): Adjusts the rate at which the output signal from the linear time generator will change in the negative going direction. The adjustment range limits are determined by the LINEAR TIME RANGE SELECT JUMPER (RANGE) position.

SUPPLEMENTARY ADJUSTMENTS:

The devices listed below are single turn potentiometers that are located on the circuit board. They are preset and sealed at the factory prior to shipment. They do not normally require any additional adjustment by the user. The function of these devices is included for reference only. The devices are marked on the component side of the circuit board.

POSITIVE POWER SUPPLY: Adjusts the magnitude of the positive output voltage for the transducer power supply.

NEGATIVE POWER SUPPLY: Adjusts the magnitude of the negative output voltage for the transducer power supply.

Note: If the controls listed above are set to produce unequal positive and negative voltages or voltages that do not agree with the transducer power supply voltages listed in the specifications

SUPPLEMENTARY ADJUSTMENTS, CON'T:

section of this manual, the universal amplifier module may fail to operate within it's design specifications.

OUTPUT LIMIT: Sets the magnitude of the maximum voltage from the output section. It is factory preset to approximately 110% of the rated output voltage.

MODE SELECT JUMPERS:

These devices are two (2) position pin headers with shorting bars, they are located on the circuit board between the bracket and the terminal block. Their location is also shown on the drawing on page number 2 of this manual.

BIAS FUNCTION (Z-B): Selects the function of the "BIAS" control. The "B" position will direct this control to the amplifier section. The "Z" position will direct this control to the scale section.

GAIN MODE (P-I): Selects the amplifier operating mode. The "P" position is used for proportional gain. The "I" position is used to select the integral gain mode. Use the integral gain mode for closed loop velocity control only.

SIGNAL INPUT (E-I): Selects the input impedance for the signal applied to terminal number 7.In the "I" position, the input impedance at this terminal will be 100K ohms. In the "E" position, the input impedance at this terminal will be zero ohms. With this jumper in the "E" position, *the user must supply the required impedance value in series with the input signal applied to terminal number 7*. Do not connect signals to terminal number 7 without any external resistance.

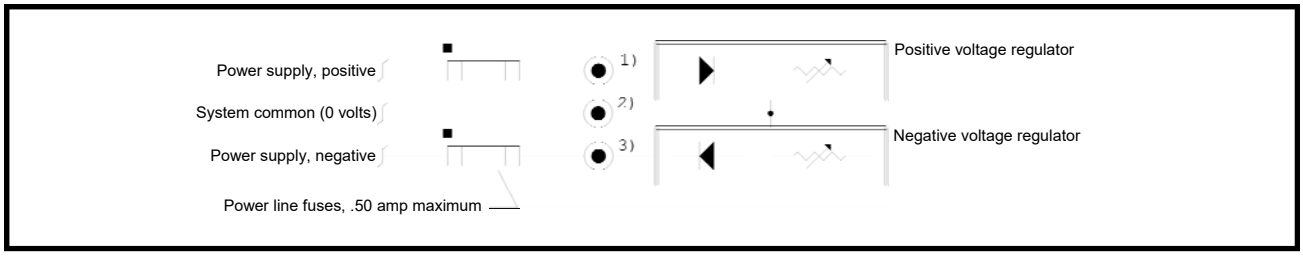
SCALE INPUT (V-I): Selects the type of input signal for the scale section. The "V" position is used for voltage signals up to 100 volts. The "I" position is designed to accept 4 to 20 ma. current signals. Note that the output from the scale section is of the opposite polarity from the input.

The device described below is a three (3) position, dual row pin header and shorting bar, it is located to the right of the bracket on the circuit board. It's location is also shown on the drawing on page number 2 of this manual.

LINEAR TIME RANGE SELECT (RANGE): Selects the adjustment range for the output signal from the linear ramp generator section. The "L" position will produce the fastest ramp times, the "M" position slower ramp times and the "H" position the slowest or longest ramp times. The ramp times available are listed in the "SPECIFICATIONS" section of this manual.

The ramp times specified are the times required for the linear ramp section output to go from 0 to 100% or from 100% to 0 as the input signal is varied over 100% of it's range, as specified by suffix BBB in the amplifier part number.

EXTERNAL POWER SUPPLY CONNECTIONS:



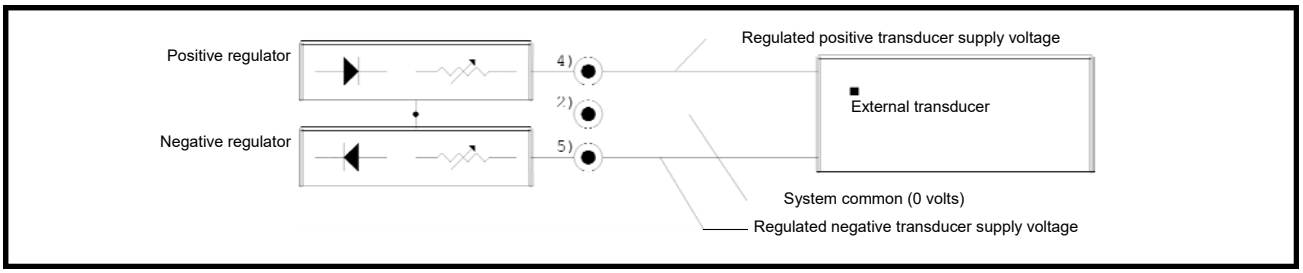
The fuses shown in the connections to terminal numbers 1 and 3 are not required if the user's external power supply includes the necessary short circuit protection devices.

Do not install fuses in* any *conductor that is connected to the system earth ground.

The minimum input voltage for amplifiers with suffix AAA equal to 100 is plus and minus 10 volts DC. The minimum input voltage with suffix AAA equal to 150 is plus and minus 15 volts DC.

The maximum input power supply voltage, for all amplifiers, is plus and minus 30 volts DC. For best operation the plus and minus power supply voltages should be within 2 volts of each other.

TRANSDUCER POWER SUPPLY CONNECTIONS:



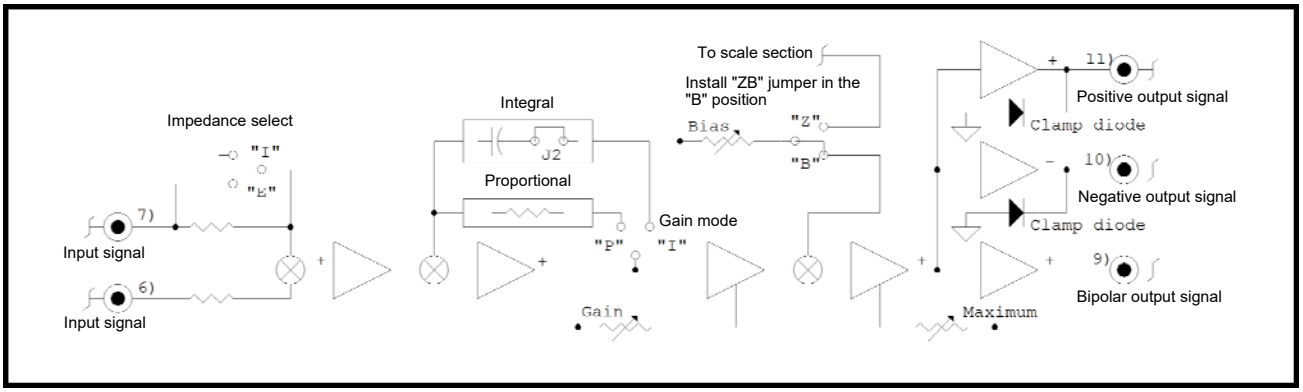
The transducer power supply output current is limited by the regulators ability to dissipate heat. The maximum output current at all ambient temperatures can be determined from the formula given below:

$$\text{Maximum current (amps)} = \frac{125 - \text{Ambient temperature (degrees C.)}}{30.2 * (\text{Supply voltage} - \text{Transducer voltage})}$$

In order to prevent possible damage to the voltage regulators, the maximum current drawn from either output should not exceed .4 amps under any load or temperature condition.

The minimum differential voltage between the power supply inputs and the transducer outputs must be equal to 2.5 volts. In addition, the transducer voltage must exceed the rated signal output voltage by at least 2.5 volts. Failure to provide the voltage differentials specified may cause excessive ripple on the transducer supply lines as well as a limited signal swing on the outputs.

AMPLIFIER SECTION CONNECTIONS:



The clamp diodes shown on terminal numbers 10 and 11 will limit the negative signal on these terminals to approximately .3 volts DC

The value of the output voltage signal from the amplifier for a specified input signal can be determined from the formulas given below:

$$\text{Pregain output (\%)} = \frac{(\text{Volts on terminal 6} + \text{Volts on terminal 7}) * 100}{\text{Rated input signal (suffix BBB)}}$$

$$\text{Output (\%)} = \text{Pregain output (\%)} * \text{GAIN}$$

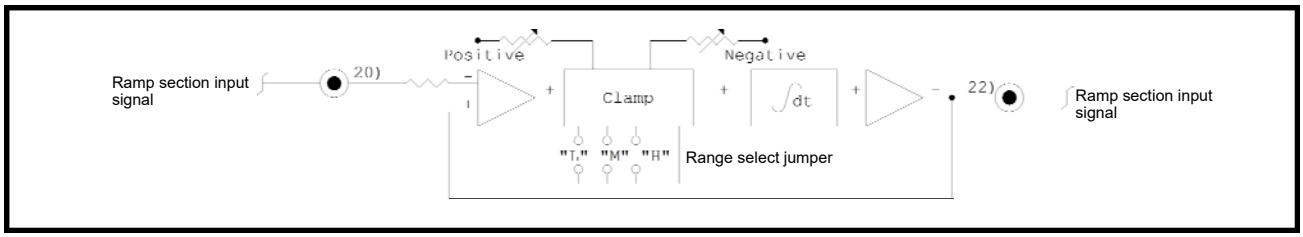
GAIN (proportional) Adjustment range = .5 to 20 GAIN (integral) Adjustment range =1 to 42

$$\text{Amplifier output} = \frac{\text{Output (\%)} * \text{Rated output volts (suffix CCC)}}{100} + \text{BIAS setting}$$

The amplifier output with proportional gain is in volts. The output with integral gain is in volts per second, plus the fixed BIAS volts.

The output voltage signal will appear on terminal numbers 9, 10 and 11. Terminal number 10 will be active with negative input signals only. Terminal number 11 will be active with positive input signals only.

LINEAR RAMP GENERATOR CONNECTIONS:

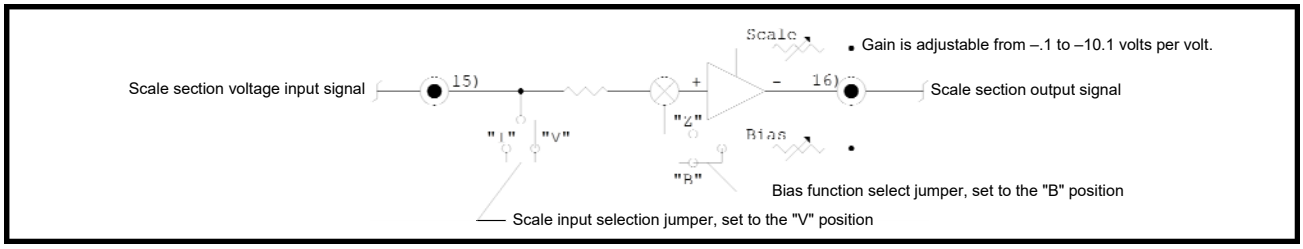


The stabilized voltage output signal on terminal number 22 will be of the same polarity and magnitude as the input signal on terminal number 20.

Clockwise rotation of the "POSITIVE" and "NEGATIVE" controls will increase the ramp times.

Input signals on terminal number 20 that will cause the output signal on terminal number 22 to become more positive or less negative are adjusted by the "POSITIVE" control. Input signals on terminal number 20 that will cause the output signal on terminal number 22 to become more negative or less positive are adjusted by the "NEGATIVE" control.

SCALE SECTION VOLTAGE INPUT CONNECTIONS:

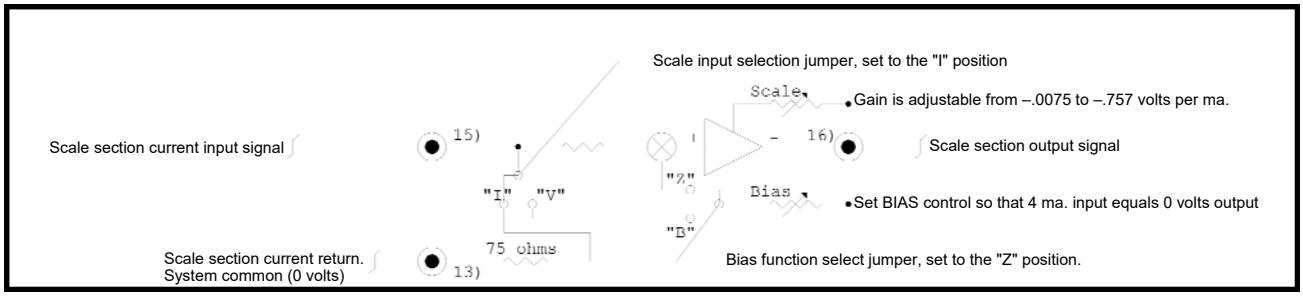


The output voltage signal from the scale section can be determined from the formula below:

Output (Volts) = -.1 to –10.1 volts per input volt

SCALE adjustment range = -.1 to -10.1 volts per volt.

SCALE SECTION CURRENT INPUT CONNECTIONS:

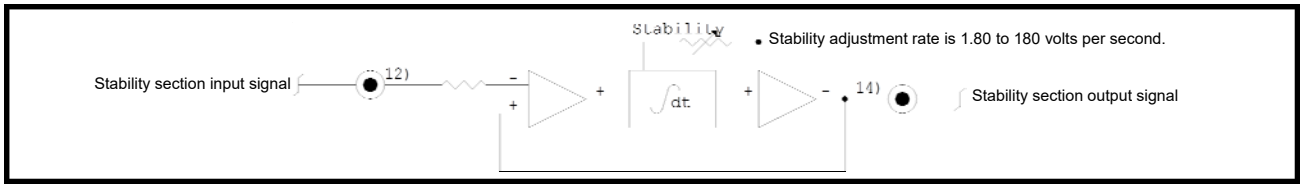


The output voltage signal from the scale section can be determined from the formula below:

$$\text{Output (Volts)} = \left[\frac{\text{Ma. on terminal number 15} * 75}{1000} + \text{BIAS} \right] * \text{SCALE}$$

SCALE adjustment range = -.0075 to -.75 volts per ma.

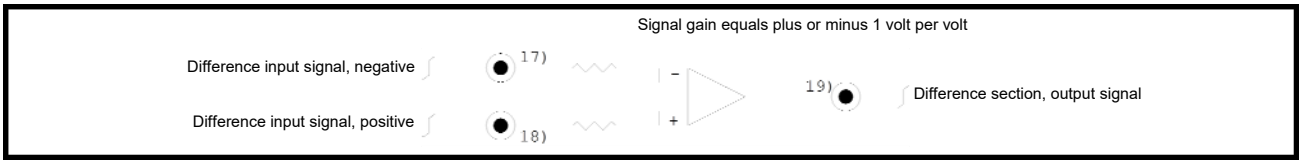
STABILITY SECTION CONNECTIONS:



The stabilized voltage output signal on terminal number 14 will be of the same polarity and magnitude as the input signal on terminal number 12.

Clockwise rotation of the "STAB" control will lower the filter cutoff frequency (increase the time required to respond to a change in the input signal).

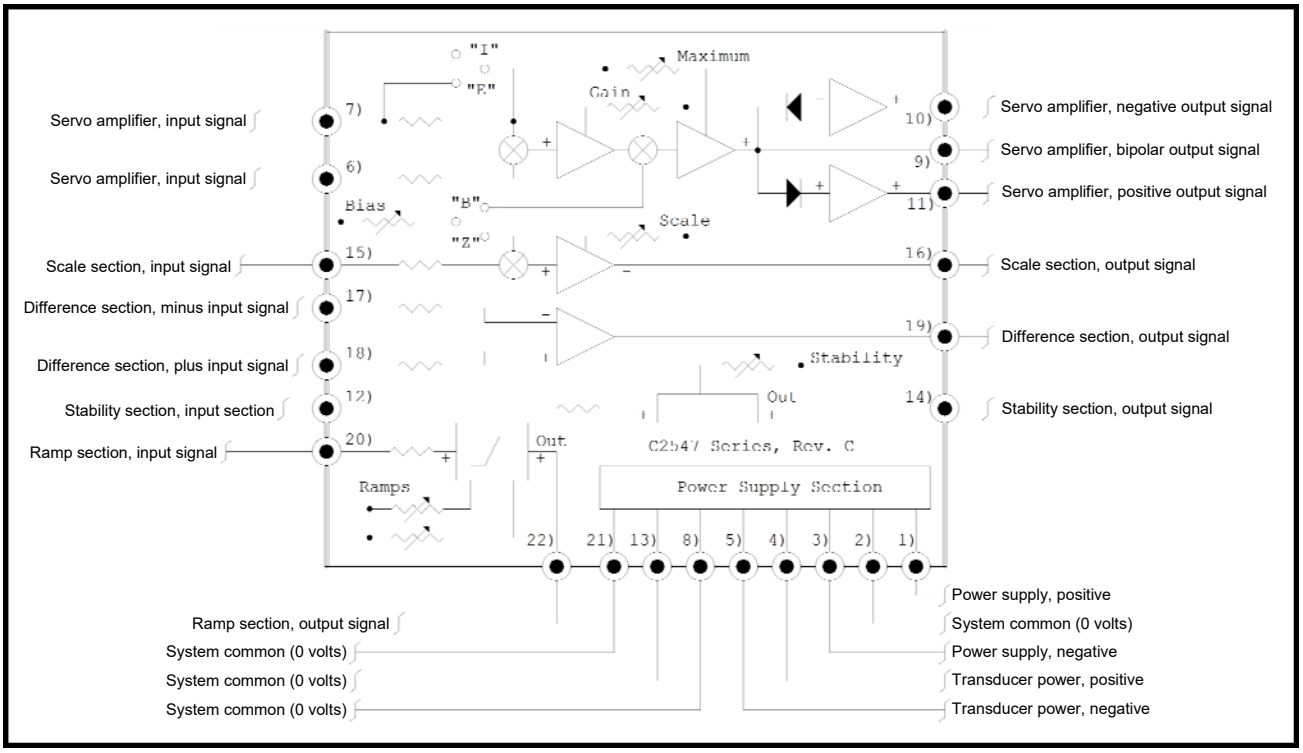
DIFFERENCE AMPLIFIER SECTION CONNECTIONS:



The output voltage signal from the difference amplifier section can be determined from the formula below:

Output volts = (Volts on terminal 18 - Volts on terminal 17)

FUNCTIONAL DIAGRAM:



SERVO AMPLIFIER STARTUP AND CALIBRATION INSTRUCTIONS:

The instructions below refer to the adjustment of the servo amplifier section only. The user must make the correct connections between the required function blocks to provide the necessary "COMMAND" and "FEEDBACK" signals to the servo amplifier inputs. Application assistance is available from Datatran's engineering department upon request.

! ! ! ! ! WARNING ! ! ! ! !

The tuning instructions in the next section are for use by qualified service personnel only. You must be trained to startup electronic control systems, have read and understand the warnings in this manual and all supporting literature, prior to proceeding.

Voltage will exist on the equipment at any time the power line is connected. In addition, the process may move, rotate at high speed or oscillate during the tuning process.

The universal amplifier and any test equipment connected to it during the startup process may not be grounded. A high voltage potential with respect to earth ground may exist at any time the power line is connected.

To avoid possible injury or death do not attempt to tune or service this equipment unless you have been properly trained to do so.

SERVO AMPLIFIER STARTUP AND CALIBRATION INSTRUCTIONS, CON'T:

The startup and tuning instructions below are described in a number of simple steps. They should be followed in sequence. Although, the number of operations shown may appear to make the process a complicated affair, this is not the case. If you take them step by step, the startup and tuning will proceed quickly. Do not proceed with any step unless you fully understand the operation that is being described and the desired results. In the event that you are confused or require clarification of a specific operation, you should contact Datatran's technical support department for assistance.

1) Remove the input power from the universal amplifier.
2) Inspect the wiring and option jumper select positions. Be positive that everything agrees with the expected mode of operation before proceeding with the calibration process. Set the "GAIN MODE" option jumper to the "P" position. If closed loop operation is being used disconnect the feedback signal.
3) Set the "BIAS" and "GAIN" potentiometers to their mid positions. If the acceleration and deceleration ramps are being used, set the "POS" and "NEG" ramp time adjust potentiometers to their c'clockwise position. Set the "RANGE" option select jumper to the "L" position.
4) Set the input command signal to zero.
5) Apply the input power to the system and adjust the "BIAS" potentiometer to the position where the output is zero. The external load should be stationary. ***The will move in the following steps.***
6) Set the "GAIN" potentiometer to it's c'clockwise position..
7) Set the command input signal to it's maximum value..
8) Adjust the "GAIN" potentiometer until the external load is operating at it's maximum value.
9) Set the input command signal to it's zero value. The external load should be stationary.
10) If the acceleration and deceleration ramps are being used, proceed with the steps below. If not proceed to step number 15.
11) Set the "RANGE" jumper to the desired ramp time range.
12) Set the command input signal to it's maximum value and observe the time that it takes for the external load to accelerate to it's maximum operating value.
13) Set the command input signal to zero and observe the time that it takes the external load to decelerate to a stop.
14) Repeat step numbers 12 and 13, adjusting the "POS" and "NEG" ramp controls until the acceleration and deceleration times are at the desired values..

    Note, that the universal amplifier has only two ramps. On reversing applications, those in which the input command signal goes negative, the ramps will be reversed. The acceleration rate in the forward direction will be equal to the deceleration rate in the reverse direction. This is not generally a problem, however the user should be aware of it. For those applications that require separate acceleration and deceleration rates in both the forward and reverse directions, the model series C2716, Quad Linear Ramp Generator will provide this function.
15) This completes the open loop adjustment, cycle the command input signal over its entire range and check for smooth operation under all input signal conditions. If the system is to be operated with closed loop velocity feedback proceed with the next step, if not, you are finished, proceed to step 32.
16) Set the command input signal to it's maximum value.
17) Measure the polarity of the feedback signal. It must be the opposite polarity of the command signal. If the command signal is positive, the feedback signal must be negative. All signals use terminal number 2 as the reference or common potential. The magnitude of the feedback signal must be the same as the command signal with the load operating at it's maximum velocity, pressure or when it reaches it's maximum travel position. The scale section can be used to equalize the magnitudes of the command and feedback signals if necessary.
18) Set the input signal to zero, allow the output to reach zero and then remove the input power from the universal amplifier.
19) Connect the feedback signal to the universal amplifier.
20) If the feedback signal is wired through the scale section the following steps must be done. If the scale section is not used proceed directly to step 27.
21) Remove any connections between the scale section output and the servo amplifier feedback signal input terminal.
22) Place the "BIAS FUNCTION" select jumper in the "Z" position. Turn the "SCALE" potentiometer all the

way c'clockwise.

23) Apply the input power to the universal amplifier, with the command input signal at zero and the feedback transducer at it's minimum value, adjust the "BIAS" potentiometer to produce zero output on terminal number 9. ***The load will move in the next steps.***

24) Slowly, increase the command input signal to maximum and allow the output to reach it's maximum value. Adjust the "SCALE" potentiometer so that the output from the scale circuit is exactly equal to the input signal in magnitude but opposite in polarity.

25) Set the command input signal to zero and check the output voltage on terminal number 9. It should be zero and the output load should be stopped or at it's zero value. If the output is not zero repeat steps 23 and 24 until the correct range is obtained.

26) Remove the input power from the universal amplifier and connect the scale circuit output to the servo amplifier feedback signal input terminal.

26) *For velocity and flow feedback applications only*. Set the "GAIN MODE" option select jumper to the integral or "I" position. Pressure and position control applications should operate with the "GAIN MODE" option select jumper in the proportional or "P" position.

27) Apply the input power to the universal amplifier and slowly increase the command input signal. If the universal amplifier goes to maximum output with a small input signal, remove the input power and reverse the feedback transducer polarity. Reapply the input power and try again.

28) Set the command input signal to about one half of it's maximum.

29) Slowly, adjust the "GAIN" potentiometer until the output to the servo control valve starts to become unstable, at this point reduce the "GAIN" setting until stable operation is observed. .

30) Adjust the command input signal over it's entire range and observe the output. If any hunting or instability of the output occurs, the "GAIN" control must be adjusted to produce stable operation at all times. In the event that the system can't be stabilized with a reasonable gain setting it is recommended that Datatran's engineering department be consulted for specific application assistance.

31) Set the command input signal to zero and remove the input power from the universal amplifier.

32) Remove any test equipment used in the calibration procedure and tighten the adjustment potentiometer locknuts.

THE AMPLIFIER OUTPUT MUST BE STABLE UNDER ALL CONDITIONS!

Any process that oscillates or rings in an uncontrolled manner is not only not working, it may damage the equipment or cause injury to personnel.. If you are forced to choose between regulation and stability, always set the process for stable operation.

This completes the startup and calibration procedure. The universal amplifier is now ready for operation.

! ! ! ! ! CAUTION ! ! ! ! !

The universal amplifier described in this instruction manual is designed to be applied by experienced user's in both open and closed loop applications.

Although each individual component in a system may function perfectly by itself, once they are interconnected, closed loop operations can sometimes be difficult or in extreme cases impossible to stabilize.

The type of external load, it's location, the process control element gain as well as the system time constants and electrical noise all contribute to the stability considerations in any closed loop application.

Due to the numerous external factors acting upon the controller, Datatran is not able to guarantee that satisfactory operation can be obtained in all closed loop applications.

SPECIFICATIONS:

POWER SUPPLY REQUIREMENTS: +/- 10 VDC minimum with suffix AAA = 100

+/- 15 VDC minimum with suffix AAA = 150

The maximum power supply voltage for all models is +/- 30 volts DC. The power supply at terminal numbers 1 and 3 must deliver a minimum of 40 ma., plus the transducer load requirements.

TRANSDUCER POWER SUPPLY VOLTAGE: +/- 8 volts dc with suffix AAA = 100

+/- 12.5 volts dc with suffix AAA = 150

TRANSDUCER POWER SUPPLY CURRENT: +/- 400 ma. dc, maximum

TRANSDUCER POWER SUPPLY REGULATION: Line regulation = .8% maximum.

Load regulation = .5% maximum.

Thermal regulation = .07% per watt, maximum.

Line regulation is specified with the input power supply voltage from 10 to 30 volts dc for units with suffix AAA = 100 or from 15 to 30 volts dc for units with suffix AAA = 150.
Load regulation is specified with the transducer power supply load from 10 to 400 ma.

INPUT VOLTAGE SIGNALS FOR ALL FUNCTIONS EXCEPT THE SCALE SECTION: +/- 3 volts dc with suffix BBB = 030

+/- 5 volts dc with suffix BBB = 050

+/- 10 volts dc with suffix BBB = 100

All inputs will withstand up to plus or minus 100 volts dc without damage.

INPUT VOLTAGE TO THE SCALE SECTION: +/- 100 volts dc, maximum..

INPUT CURRENT TO THE SCALE SECTION: + 4 to + 20 ma., maximum.

INPUT SIGNAL IMPEDANCE: All voltage input terminals are 100K ohms. The current input to the scale section is 75 ohms. Note that the input impedance at terminal number 7 can be set to 0 ohms by setting the "SIGNAL INPUT" (E-I) option select jumper in the "E" position. With the "E-I" jumper in the "E" position, the user must add external resistance in series with any signal applied to terminal number 7.

OUTPUT VOLTAGE SIGNALS, ALL SECTIONS: +/- 3 volts dc maximum with suffix CCC = 030

+/- 5 volts dc maximum with suffix CCC = 050

+/- 10 volts dc maximum with suffix CCC = 010

The output voltages on terminal number 11 is positive going only. The output voltage on terminal number 10 is negative going only. These terminals are clamped and will not exceed .4 volts of opposite polarity with input signals within the specified range.

OUTPUT CURRENT, ALL SECTIONS: +/- 5 ma., maximum with all suffix CCC versions.

The output current is specified with the input power supply at 10 volts dc.

OUTPUT VOLTAGE STABILITY AND DRIFT: Better than 1% at unity gain settings.

SERVO AMPLIFIER SECTION PROPORTIONAL GAIN: .5% to 20% volts per 1% input volts.

SPECIFICATIONS, CON'T:

SERVO AMPLIFIER SECTION, INTEGRAL GAIN:	1% to 42% volts per second per 1% input volts.
SERVO AMPLIFIER SECTION, OUTPUT VOLTAGE LIMIT ADJUSTMENT RANGE:	20% to 150% of rated output range.
SCALE SECTION, VOLTAGE GAIN	-.1 to – 10.1 volts per input volt.
SCALE SECTION, CURRENT GAIN:	- .0075 to – .75 volts per input ma.
STABILITY SECTION, RESPONSE TIME	1.8 to 80 volts per second.
BIAS OR ZERO CONTROL ADJUSTMENT RANGE:	+/- 50% of rated input range.
TRANSDUCER POWER SUPPLY ADJUSTMENT RANGE:	+/- 10% of nominal value.

LINEAR RAMP GENERATOR POSITIVE AND NEGATIVE RAMP TIMES: The times shown are with a 100% step change on the input.

Range select jumper set to:		
	Low range (L):	1 second (fast) to 10 seconds (slow).
	Mid range (M):	5 seconds (fast) to 50 seconds (slow).
	High range (H):	25 seconds (fast) to 250 seconds (slow).

The positive and negative ramp times are separately adjustable within the select range.

ADJUSTMENT POTENTIOMETERS (BRACKET MOUNTED): Single turn with shaft lock. Totally enclosed and sealed against dirt and other contaminates per MIL-STD-202, Method 103.

OPERATING TEMPERATURE: - 20 degrees to + 55 degrees C..

Extended temperature range operation is available, contact Datatran's Sales Department for details.

APPLICATION NOTE:

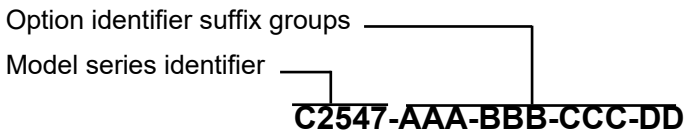
The universal amplifier is not specifically designed for operation as a closed loop variable speed drive or flow controller. Normally, velocity and flow loops operate with integral gain. The universal amplifier has an integral gain mode, however it does not include a way to disable the gain a zero output. Accordingly, any noise on the input or feedback signals will be integrated and may cause the output to oscillate or creep with a zero command signal. In addition, these types of control operations may require a combination of integral and proportional gain as well as a derivative function in order to provide satisfactory operation. If the application does not require closed loop operation or the universal amplifier is to be operated in the proportional gain mode, these problems do not occur.

For closed loop velocity or flow control applications that require three mode, proportional, integral and derivative, or just integral operation the model series C2844, PID controller with feedforward compensation may be a better choice. For variable speed drive applications the model series C2660 Drive controller will operate in either the integral or proportional gain mode and includes a circuit to inhibit the integral gain a zero speed.

Interested user's are encouraged to contact Datatran's Engineering Department with their specific closed loop requirements.

PART NUMBER IDENTIFICATION:

All universal amplifiers utilize the same basic model series identifier number. This number is modified with a suffix to indicate a particular combination of options. The format for the complete part number is illustrated in the example below:



PART NUMBER SUFFIX GROUP EXPLANATION	
SUFFIX	**DESCRIPTION**
AAA	Minimum power supply voltage
BBB	Maximum rated input signal voltage
CCC	Maximum rated output voltage signal
DD	Factory installed option

Parts shipped from the factory will have the correct alphanumeric option identifier in place of the suffix letters indicated in the table above.

ORDERING INFORMATION:

Purchase orders must include a complete part number. Refer to the C2547 model series selection sheet for a complete listing of all available models.

DS2547 issued 7/11/2006, replaces 2/8/2002

11 REBEL LANE, PORT JERVIS, NY 12771
TEL: (845) 856-4053 FAX: (845) 858-2824
www.conicsystems.com