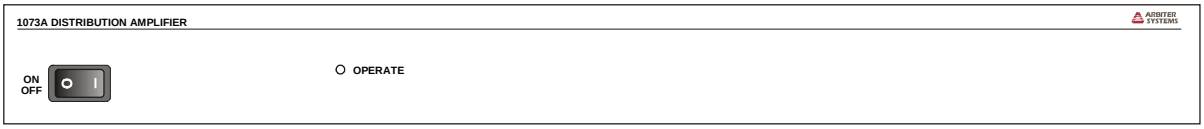
MODEL 1073A
DISTRIBUTION AMPLIFIER

OPERATION MANUAL



ARBITER SYSTEMS, INC.
PASO ROBLES, CALIFORNIA
U.S.A.

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Model 1073A
Distribution Amplifier

Operation Manual

PD0022300A

Table of Contents

1 General Information

1.1 Scope.

This manual describes Model 1073A Distribution Amplifier.

This manual is divided into five sections and two appendixes as follows:

Section 1. General Information.

Section 2. Technical Specifications and Operational Parameters.

Section 3. Physical Configuration and Installation.

Section 4. Operation.

1.2 Equipment Supplied.

The Model 1073A uses detachable connectors for Power and all Input/Output connections. The following components are provided with the Model 1073A.

Main Power Module: The Model 1073A configuration includes a user specified power input module. The three options available are:

Option 07: 85-264Vac, 47-440Hz or 110-270Vdc, 3VA, IEC-320 type power input module, with an IEC-320 cordset.

Option 08: 10-85Vdc, 3W typical, power module with SWC using a 3-pole terminal strip for power inlet.

Option 10: 85-264Vac, 47-440Hz or 110-270Vdc, 3VA typical, power module with SWC using a 3-pole terminal strip for power inlet.

Refer to paragraph 1.3 for a detailed description of each power module option.

Rack Mount Ears (P/N: HD0034900): Two identical rack mounting ears are provided to mount the instrument in an EIA standard 483 mm (19 inch) rack.

Self-Adhesive Rubber Feet (P/N: HP0006600): For bench-top applications, four self-adhesive rubber feet are included.

1.3 Options.

The Model 1073A allows for installation of options, which can enhance various aspects of performance and/or features. The following is a list of available options:

1.3.1 Option 01, Fiber Optic Input for Channel A:

Provides a fiber-optic input (channel A only) with ST connector and 820 nm receiver compatible with multi-mode fiber (50/125 or 62.5/125 μm). Accepts -25.4 to -9.2 dBm for +5V logic level and <-40 dBm for 0 V logic level for dc to 5 MHz.

1.3.2 Option 04, ON/OFF Switch:

Provides a line switch on the front panel.

1.3.3 Option 07, IEC-320 Power Inlet, 85-264Vac, 110-275Vdc:

Provides an ac/dc power module which includes an IEC-320 type inlet and mating cordset. Input voltages are: 85-264Vac, 47-440Hz or 110-270Vdc, 3VA typical. Various plug styles are available as Options P01 through P10.

1.3.4 Option 08, 10-85Vdc Terminal Power Strip, Surge Withstand:

Provides input surge protection (SWC) for compliance with ANSI C37.90-1 and IEC 801-4. Input voltages are: 10-85 Vdc, 3W typical. Utilizes a 3-pole terminal strip for power inlet.

1.3.5 Option 10: 110-275Vdc Terminal Power Strip, Surge W/Stand:

Provides input surge protection for compliance with ANSI C37.90-1 and IEC 801-4. Input voltages are: 85-264 Vac, 47-440 Hz, or 110-270 Vdc, 3VA typical. Utilizes a 3-pole terminal strip for power inlet.

2 Technical Specifications and Operational Parameters

2.1 2.1 Scope.

This section contains information pertinent to the functional and operational characteristics of the the Model 1073A Distribution Amplifier. Topics presented in this section are: Operator Interface(s), System Interface(s) and Physical Characteristics.

> **NOTE:** Specifications are subject to change without notice.

2.2 Operator Interface.

One front panel Status LED (green) indicates power on.

2.3 System Interface.

Configuration:

Three channels, each with one input and four outputs.

Modes:

Independent; each channel independently driven by its input.

Common A; All outputs driven by channel A input.

Common B; Channel B/C outputs driven by channel B input, channel A outputs driven by A input.

Input Connectors:

Three isolated 50-ohm BNC (one per channel), optional fiber optic (channel A only)

DC Coupled	Opto-isolator (HCPL2601) + 562 ohms	
Level		5mA at 5 Volts, nominal
Polarity		Center conductor positive
Frequency	DC - 5 MHz	
AC Coupled	RF transformer; 50 ohms	
Level		0 to +15 dBm (0.6-3.6 Vpp)
Frequency	100 kHz - 10 MHz	
Fiber Type	Option 01; 820 nm type-ST	
Level		-25.4 to -9.2 dBm for +5 V, -40 dBm for 0 V
Frequency	DC - 5 MHz	
Isolation		2000 Vrms, minimum, to common

Output Connectors:

Four 50-ohm BNC per channel

Driver Each output, 74HC125 quad buffer; all four gates paralleled

AC coupled

Level 5 Vpp, open-circuit, 2.5 Vpp (+12 dBm) into 50 ohms

Impedance 50 ohms + 0.1 μf capacitor, nominal

DC coupled

Level 5 Vpp, open circuit

Drive ±75 mA, maximum, per output

Impedance 15 ohms nominal

2.4 Physical Characteristics.

Dimensions:

Instrument: 430 mm W x 44 mm H x 260 mm D (16.9" x 1.7" x 10.05").

Weight:

Instrument: 2.0 kg (4.5 lbs.), net.

Shipping: 6 kg (13 lbs.) includes manual and accessories.

Power Requirements:

Option 07: 85 - 264Vac, 47 - 440Hz, or 110 - 270Vdc, 3VA typical. Including an IEC-320, fused; mating cordset. Plug Type specified as Options P1 through P10.

Option 08: 10 - 85Vdc, 3W typical. Using a 3-pole terminal strip with SWC for power inlet.

Option 10: 85 - 264Vac, 47 - 440Hz or 110 - 270Vdc, 3W typical. Using a 3-pole terminal strip with SWC for power inlet.

Temperature:

Operating: 0° to +50° C.

Storage: -40° to +75° C.

Electro-Magnetic Interference (EMI):

Options 07 and 10 Power Input Modules comply with FCC 20780, Class A and VDE 0871/6.78, Class A.

Options 08 and 10 Power Input Modules with SWC comply with ANSI/IEEE C37.90-1 and IEC 801-4.

3 Physical Configuration

3.1 Instrument.

3.1.1 Location Considerations.

The Model 1073A Distribution Amplifier is designed for operation in an environment having an ambient temperature range of 0° C to 50° C (32° F to 122° F). Operation is possible at temperatures of -20° to +70° C, typical. No external ventilation is necessary.

It is advisable to allow adequate clearance for rear-panel connections, especially in rack-mounting situations.

3.1.2 Power Requirements.

The standard AC input voltage range for the Model 1073A Distribution Amplifier is either 85Vac to 264Vac, 47 Hz to 440 Hz., 110 to 275Vdc; or 10 to 85Vdc. See Section 3.1.3.

3.1.3 Power Line Connection.

The Model 1073A is equipped with a *user specified* Power Input Module. The modules available are described in the following paragraphs.

3.1.3.1 Option 07, AC/DC Power Input Module (IEC-320 Inlet).

3.1.3.1.1 AC Operation.

This power inlet module operates across an ac input voltage range of 85-264Vac, 47-440 Hz. The mating cordset provided is dependent upon the cordset option (P1 through P10) which was specified at the time of purchase. For further information about cordset configurations contact Arbiter Systems.

To connect the input power, first plug the end of the power cord having the mating IEC connector into the power inlet module on the rear panel, then plug the other end into an appropriate power outlet.

WARNING: For maximum safety and best performance, always connect the input cord to a properly grounded power source.

3.1.3.1.2 DC operation.

For 110-270 Vdc operation, the dc voltage should be applied between the LINE and NEUTRAL terminals of the power inlet module, without regard to polarity (the internal power supply will accept either polarity). When viewing the power inlet module from the rear of the instrument, the LINE connection is the one nearest the bottom, and the NEUTRAL is nearest the top. The GROUND terminal is offset from the others, and protrudes slightly farther out of the connector.

WARNING: Connect input only to a properly grounded power source.

3.1.3.2 Option 08, DC Power Input Module.

If Option 08 is ordered, the power module accepts dc input voltages from 10-85 Vdc. The standard IEC-320 inlet is replaced with a 3-Pole Terminal Strip with input surge protection (SWC). The terminal strip is intended for connection to dc power sources. When connecting power to a clock with Option 08, **BE SURE TO OBSERVE CORRECT POLARITY**, as the power supply used with Option 08 will not accept reverse input polarity.

NOTE: Do not connect Option 08 module to any ac voltage source.

3.1.3.3 Option 10, AC/DC Power Input Module.

3.1.3.3.1 AC Operation.

This option provides a input power module which operates across an ac input voltage range of 85-264Vac, 47-440 Hz. Line connection is via a 3-Pole Terminal Strip which provides SWC. This terminal strip is intended for connection to dc power sources, although the unit is capable of operation from both ac and dc sources.

3.1.3.3.2 DC Operation.

The input power module supplied with this option also accepts dc voltages from 110-270 Vdc via the 3-Pole Terminal Strip (with SWC).

3.1.3.4 Fuse Replacement.

The IEC-320 input power connector assembly includes a 1A, 250V fast-acting 5 x 20 mm fuse. The fuse is contained in a small compartment with a snap-fit latch, which also has a compartment for a spare fuse.

CAUTION: For continued protection, replace the input fuse only with one of the same type, voltage rating, and current rating as originally supplied.

The fuse compartment is located directly adjacent to the input connector socket, and can be opened by pulling both sides directly upward, or by gently prying with a small flat-blade screwdriver. To replace the fuse, first disconnect the line cord from the power source and then remove the cord from the rear-panel IEC connector. The in-circuit fuse is the innermost one; inspect it to determine whether it is open. As required, replace with fuse in the outer compartment.

For instruments supplied with Option 08 or 10, the fuse is located in the fuse holder on the rear panel near the power inlet terminal strip. The fuse is a 1A, 250V fast-acting (Option 10) or time-delay (Option 08) 5 x 20 mm fuse. No spare fuse is provided for Options 08 or 10.

3.1.4 Rear Panel Layout.

When viewed from behind, the rear panel of the Model 1073A is arranged in the following manner, left to right (see Figure 3-1):

- Five BNC type connectors, corresponding to channel C outputs and input.
- Five BNC type connectors, corresponding to channel B outputs and input.
- Five BNC type connectors, corresponding to channel A outputs and input.
- One opening for an optional fiber-optic input connector (Option 01). If not used, it is covered by a plastic hole plug.
- For Option 07, an IEC-320 power inlet connector with built-in fuse holder is provided. For Options 08 or 10, a 3-Pole-Terminal Strip and separate fuse holder is provided.

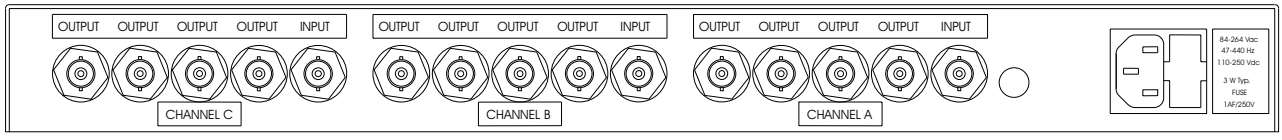

Figure 3-1. Model 1073A Rear Panel

3.2 Rack Mounting.

Rack mounting ears are included with the 1073A, to facilitate mounting the instrument in a standard 483 mm (19 inch) equipment rack. To install the rack mounting ears, observe the following steps:

1. Using a T-25 driver, remove the two screws on one side of the unit. Leave the cover in place.
2. Position one of the rack mounting ears on the side of the unit, so that the rack mounting flange is at the front of the instrument and extends away from the front panel.
3. Replace the cover screws by routing them through the lower set of holes in the rack-mounting ear, and back into the threaded holes in the instrument.
4. Repeat the above steps for the opposite rack mounting ear.

3.3 Cover Removal.

To change jumper configurations, the instrument cover must be removed. Remove top cover as follows:

1. Disconnect the power cord.
2. Using a T-25 driver, remove the four screws securing the cover (and rack mount ears, if used). Lift the cover off.

3.4 Jumper Configuration.

Input and output configuration of the Model 1073A Distribution Amplifier is set using jumpers and selectable shunts. Functions which may be selected include ac and/or dc coupling of inputs and outputs, and bussing the inputs of the three channels of the unit. A brief indication of each jumper's function is given on the PC board silk-screen, near the jumper.

The Model 1073A has three channels, and the configuration of each is identical, except for selections which determine input bussing. Input bussing is the ability to have the B or C channel outputs driven by a signal at the A channel (or B channel, for the C channel outputs) input; see Section 3.5.5.

3.4.1 AC/DC Coupling of Inputs.

AC or dc coupling of the inputs is selected using jumpers JMP1 and JMP2 (channel A); JMP7 and JMP8 (channel B); and JMP14 and JMP15 (channel C). (Note that the A channel is the group of five BNC connectors which are rightmost when facing the rear panel.) Both jumpers must be set correctly for the input to function properly.

AC coupling is normally used for time base signals, such as 5 or 10 MHz derived from a satellite-controlled clock. These signals are generally square waves, or (with some limitations; see below) sine waves. DC coupling is normally used for signals such as unmodulated IRIG time codes, and asymmetric pulse outputs such as 1PPS. DC coupling may also be used with square wave input

signals up to 5 MHz, if the input level is 0 to 5 volts, CMOS-compatible level. For ac-coupled inputs, the nominal operating level of the input circuit is 0 to +15 dBm (0.6 to 5 Vpp).

To select dc coupling of the channel inputs, set both jumpers to the 'A' position. To select ac coupling, set both jumpers to the 'B' position. (For channel A, this is jumpers JMP1 and JMP2; for channel B, JMP7 and JMP8; for channel C, JMP14 and JMP15.)

Also, for channel B and C, to enable the channel's input amplifier and disable bussing, JMP9 (channel B) or JMP16 (channel C) must be set to the 'A' position. The 'B' position enables the bussing function; see Section 3.4.5.

3.4.2 Input Characteristics.

In ac-coupled mode, the approximate input impedance of the Model 1073A is 100 ohms, and the input is transformer isolated. AC-coupled inputs may be driven with sine or square waves having levels of 0 to +15 dBm, or 200 mVrms to 1.2 Vrms from a 50-ohm source. For a low-impedance source, recommended levels are 600 mVpp to 5 Vpp. DC bias levels of up to 25 volts are rejected by a series capacitor (1 microfarad) and will have no effect on operation.

Lower signal levels may also work properly if the input has sufficient slew rate. The ac input limiting amplifier has high gain, and will oscillate if no input is present, or if the applied signal crosses too slowly through the transition level. To prevent this, apply 0 dBm at 100 kHz or above, sine wave or square wave.

AC-coupled mode is intended for use with signal frequencies of 100 kHz and above.

In dc-coupled mode, the input is a 562-ohm resistor in series with a 6N137 optocoupler LED, with a 6.8 V Zener diode (1N4736A) in parallel with the input for protection against overvoltage, overshoot and ringing, or reverse voltage. Drive the dc-coupled input with a CMOS-compatible, 0 to +5 volt signal. The input will draw approximately 5 mA when driven at 5 volts. DC-coupled mode may be used with any signal up to 5 MHz.

Both ac and dc coupled inputs are isolated from the instrument chassis and from each other with isolation of 2000 Vrms minimum.

3.4.3 AC/DC Coupling of Outputs.

Each output BNC connector may be individually selected for ac or dc coupling. AC coupling is normally used for time base signals, such as 5 or 10 MHz. The output signal will be a leveled square wave, even if the input signal is a sine wave (a limiting amplifier is used to control output level). DC coupling is normally used for signals such as unmodulated IRIG time codes, and asymmetric pulse outputs such as 1PPS. DC coupling may also be used with square wave signals, if signal levels of 0 to 5 volts (CMOS-compatible levels) are required.

To select dc coupling for an output, set the associated jumper to the 'A' position. For ac coupling, set the jumper to the 'B' position. Table 3-1 lists the correspondence between each jumper and the

corresponding output connector; however, each jumper is located adjacent to the respective output connector.

Table 3-1. Output Jumper List

Channel	Jumper	Connector
A	JMP3	J2
A	JMP4	J3
A	JMP5	J4
A	JMP6	J5
B	JMP10	J7
B	JMP11	J8
B	JMP12	J9
B	JMP13	J10
C	JMP17	J12
C	JMP18	J13
C	JMP19	J14
C	JMP20	J15

3.4.4 Output Characteristics.

Four drivers of a 74HC125-bus buffer in parallel drive each output. This gives each output the capability of sourcing (or sinking) up to 75 mA. In dc-coupled mode, the driver has a 10-ohm series resistor, which provides some current limiting in the event of a short circuit, reducing driver power dissipation. The output impedance of the buffer itself is around 5 ohms at the rated current levels of 0 to 75 mA, for a total source impedance of approximately 15 ohms. DC-coupled mode may be used for any signal.

In ac-coupled mode, the driver has a 45-ohm resistor and 0.1 microfarad capacitor in series, providing approximately 50 ohms source impedance to match 50-ohm coaxial cables. The driver will deliver a signal level of +10 to +13 dBm, nominal, into a 50-ohm load. AC-coupled output mode is recommended for use at 100 kHz or above.

3.4.5 Input Bussing.

An input signal applied to channel A, in addition to driving the four A-channel outputs, may also drive the B- and/or C-channel outputs. Likewise, an input signal applied to channel B may also drive the C-channel outputs. JMP9 and JMP16 (for the B and C-channel outputs) select this function, called bussing.

To select the A-channel signal on the B-channel outputs, set JMP9 to the 'B' position. The position of JMP7 and JMP8 has no effect on operation.

To select the A-channel signal on the C-channel outputs, set JMP15 to the 'A' position and JMP16 to the 'B' position. The position of JMP14 has no effect on operation.

To select the B-channel signal on the C-channel outputs, set JMP15 to the 'B' position and JMP16 to the 'B' position. The position of JMP14 has no effect on operation.

3.5 Fiber Optic Input (Option 01).

When Option 01 is installed, the Model 1073A also has a fiber-optic receiver which is connected in parallel with channel-A input, dc-coupled optocoupler's output. To use the fiber-optic receiver, connect an optical signal meeting the requirements listed in section 3.5.1, and follow the instructions above for a dc-coupled input on channel A. All of the same features and restrictions apply, including an upper frequency limit of 5 MHz and the bussing features.

When Option 01 is installed, the normal dc-coupled input may still be used. The signals from the optical input and the dc-coupled optocoupler are wire-OR’ed, so to ensure proper operation (and to protect the fiber input connector from damage), make sure that the protective cover supplied with the optical receiver is installed whenever the optical receiver is not being used.

3.5.1 Optical Input Characteristics.

The optical input is a type-ST connector, compatible with 820 nm, multi-mode fiber such as 50/125 or 62.5/125 um. An optical power input of -25.4 to -9.2 dBm is required to generate a logical '1,' i.e. +5 volts at a (dc-coupled) output. An optical input of -40 dBm or less will guarantee a logical '0.' These characteristics are compatible with the multi-mode fiber outputs available for the Arbiter Systems satellite-controlled clock products. The optical receiver is compatible with any signal up to 5 MHz.

4 Operation

4.1 4.1 Front Panel Controls and Indicators.

The Model 1073A front panel is illustrated in Figure 4-1 and described in the following paragraphs.

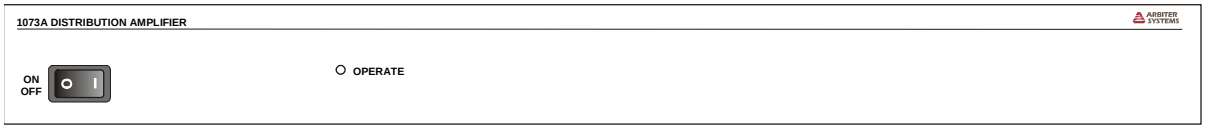

Figure 4-1. Model 1073A Distribution Amplifier Front Panel

4.1.1 LED Status Indicators

The Model 1073A is provided with a single LED, which illuminates when power is applied to the Model 1073A.

4.1.2 Front Panel Line Switch (Option 04).

When Option 04 is installed, the Model 1073A is provided with a front-panel line switch. When this option is not installed, a hole plug is mounted in this location.

4.2 Operator Control Functions.

No operator control functions (other than the Option 04 line switch, if installed) are provided or necessary. All configuration of the Model 1073A is performed with internal jumpers. See Section 3.4.