CA-500/1000
AUDIO AMPLIFIERS

CA-1050
PRE-AMP

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1.0   CA-500 / CA-1000 / CA-1050 Overview

The CA (controllable audio) series of products from Calypso bring high quality, fully controlled audio to classrooms, board rooms, training facilities and other small room applications in need of compact, easy-to-use integrated audio. The CA-500 and CA-1000 audio amplifiers deliver 32W of extraordinarily clean power, optimized for 4 ohm and 8 ohm speakers, while providing full IR and Serial control.   The CA-500 delivers a single balanced or unbalanced input and stereo output, while the CA-1000 offers three stereo and one mono input, with an on-board mixer for defining presets, digital gain control and automated "ducking" when microphone input is detected.   And when more power is needed, the CA-1050 pre-amp can be used for multi-channel control over nearly any consumer or professional quality amplifier, still within the same compact format.

CA Series setup is through its on-board serial programming port, using its companion CA-Config software utility, a simple, graphical interface used to configure all variable settings on CA-500, CA-1000 and CA-1050 units. This user manual reviews all three CA models and CA-Config software, which automatically detects which model it's connected to, and presents the appropriate configuration options for that model. CA-Config is not designed to function as an end-user interface, but is intended as a configuration utility used only by authorized Calypso resellers.

CA-500	CA-1000	CA-1050
32W Audio Amplifier	32W Audio Amplifier	Pre-Amp
IR and Serial Control	IR and Serial Control	IR and Serial Control
(1) Balance/Unbalanced Input	(1) Balance/Unbalanced Input	(1) Balance/Unbalanced Input
Headphone Jack	(2) Unbalanced Inputs	(2) Unbalanced Inputs
Speaker Out (L and R)	(1) Mono Input	(1) Mono Input
	Mixer Presets	Mixer Presets
	Audio Ducking (Microphone)	Audio Ducking (Microphone)
	PA Detect	PA Detect
	Headphone Jack	Headphone Jack
	Speaker Out (L and R)	Line Level Out

1.1 Program mode vs. Run mode

CA Series products have two (2) basic modes of operation:

     a)   <u>Program Mode</u> – allows general configuration of the device plus IR/Serial Trigger.

     b)   <u>Run Mode</u> – allows IR and SERIAL triggers to be recognized and decoded.

<u>The device MUST BE IN PROGRAM MODE in order for it to communicate with CA-Config software</u>.

If the serial settings on the device remain at their factory settings[1], and properly connected via a serial cable, the device will automatically be placed into Program mode by CA-Config software when the software is launched. Program mode is indicated by a blinking blue LED on the surface of the CA device.

If, however, the serial settings on the device have been modified, e.g., to enable remote, serial control of the amplifier or pre-amp, CA-Config will not be able to initiate communications with the device nor put it into Program mode. When this happens, the device must be forced into Program Mode, using the following steps:

- Unplug power
- Short a 2-pin terminal block by connecting a wire that runs between pin-1 and pin-2 (hint: a broken paperclip works well)
- Insert the shorted terminal block into the 3-pin serial connector slots on the right side of the device
- Power up the device
- Immediately remove the shorted jumper
- Connect the serial cable attached to the computer running CA-Config software
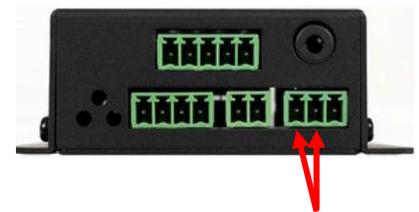
Short to Force PGM Mode

The unit will now be in Program mode and the top, blue LED will blink continually. The LED glows a steady blue when in Run mode.

1.2 Wiring Everything Up

1.2.1 Power

All CA series units require a minimum 12VDC, 3.3A power supply, which is provided with the unit. Insert the 2.5mm power supply plug into the receptacle located on the left side of the unit.

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[1] Default Settings: BAUD=19200, PARITY=NONE, STOP=1

1.2.2 Serial Programming/Control Cable

- Solder wires to pins 2, 3 and 5 of a female, 9-pin RS-232 connector
- Connect the wire on pin 2 (Rx) to pin 2 (Tx) of a 3-pin screw-down terminal block
- Connect the wire on pin 3 (Tx) to pin 1 (Rx) of a 3-pin screw-down terminal block
- Connect the wire on pin 5 (Gnd) to pin 3 (Gnd) of a 3-pin screw-down terminal block

Plug the terminal block into the 3–pin slot on the right side of the unit and plug the DB9 connector into your computer's serial port

1.2.3 Channel 1 Audio Input

Channel 1 input will accept a balanced or unbalanced stereo input via a 5-pin screw-down terminal block.

1.2.4 Channel 2 Audio Input (CA-1000 and CA-1050 only)

Channel 2 will accept an unbalanced stereo or mono input via an 1/8 inch mini audio jack.

1.2.5 Channel 3 Audio Input (CA-1000 and CA-1050 only)

Channel 3 will accept an unbalanced stereo or mono input via an 1/8 inch mini audio jack.

1.2.6 Channel 4 Audio Input (CA-1000 and CA-1050 only)

Channel 4 will accept a mono input via a 2-pin screw-down terminal block on the left side of the unit.

NOTE ON CHANNEL INPUTS: All channels are stereo (ch1, ch2, ch3) except channel4 (mono). Channel 4 has a permanent jumper linking its left and right sides. Channels 1 through Channel 3 have separate left and right stereo lines. While monitoring for microphone input levels (typically, but not necessarily on channel 4), the system searches only the LEFT side. Hence single channel microphones must be connected to the LEFT side input. Alternatively, the channel used for microphone input should be set to operate in mono mode.

1.2.7 Speakers (4 ohm and 8 ohm)

Left and right 4 or 8 ohm speakers are wired via a 5-pin screw-down terminal block found on the right side of the unit. Two pins are used for the left speaker, two are used for the right speaker and the middle pin can be used as a common ground.

1.2.8 IR Input

IR signals can be transmitted to the unit in two ways:

(a) The 3 triangular holes on the right side of the case allow for over-the-air IR reception, good for line-of-sight transmission, up to approximately 30 feet.

(b) IR signals may also be sent to the unit via hardwire, using the middle two pins on the 4-pin connector located on the right side of the unit, labeled IR- /GND and IR1+ IN. Note that pin 3 is a shared ground connector.

1.2.9 Headphones

Headphones may be plugged into the unit using the 1/8 inch mini jack located on the right side. Note that the headphone output remains active even when the amplifier output is muted on the CA-500 and CA-1000.

IR Window   IR Input Pins   Speaker Pins

Controller   IR or Serial   CA-1000   Output

PC Audio

DVD Audio

Audio Inputs
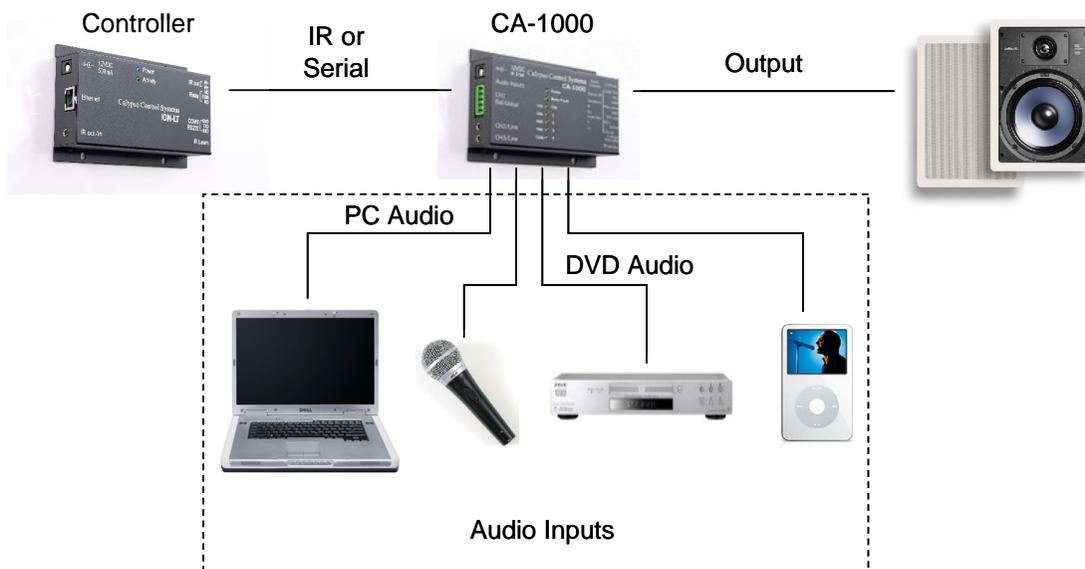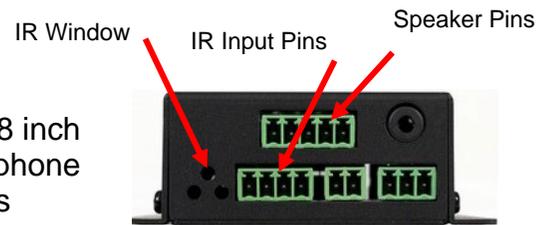
1.3 Using CA-Config Software

Once the unit is wired and powered up, CA Series configuration is managed entirely by CA-Config software, which is provided on a CD with the unit. CA-Config software must be installed on the PC connected to the CA-1000 unit via the serial programming cable. After launching the software, select the appropriate serial port from the pull-down; it should automatically initiate communications with the CA unit[2]. Note that reselecting the serial port from the drop-down menu re-initializes the application. CA-Config is a single-screen interface that provides all settings and options with simple push buttons and pull-down menus.

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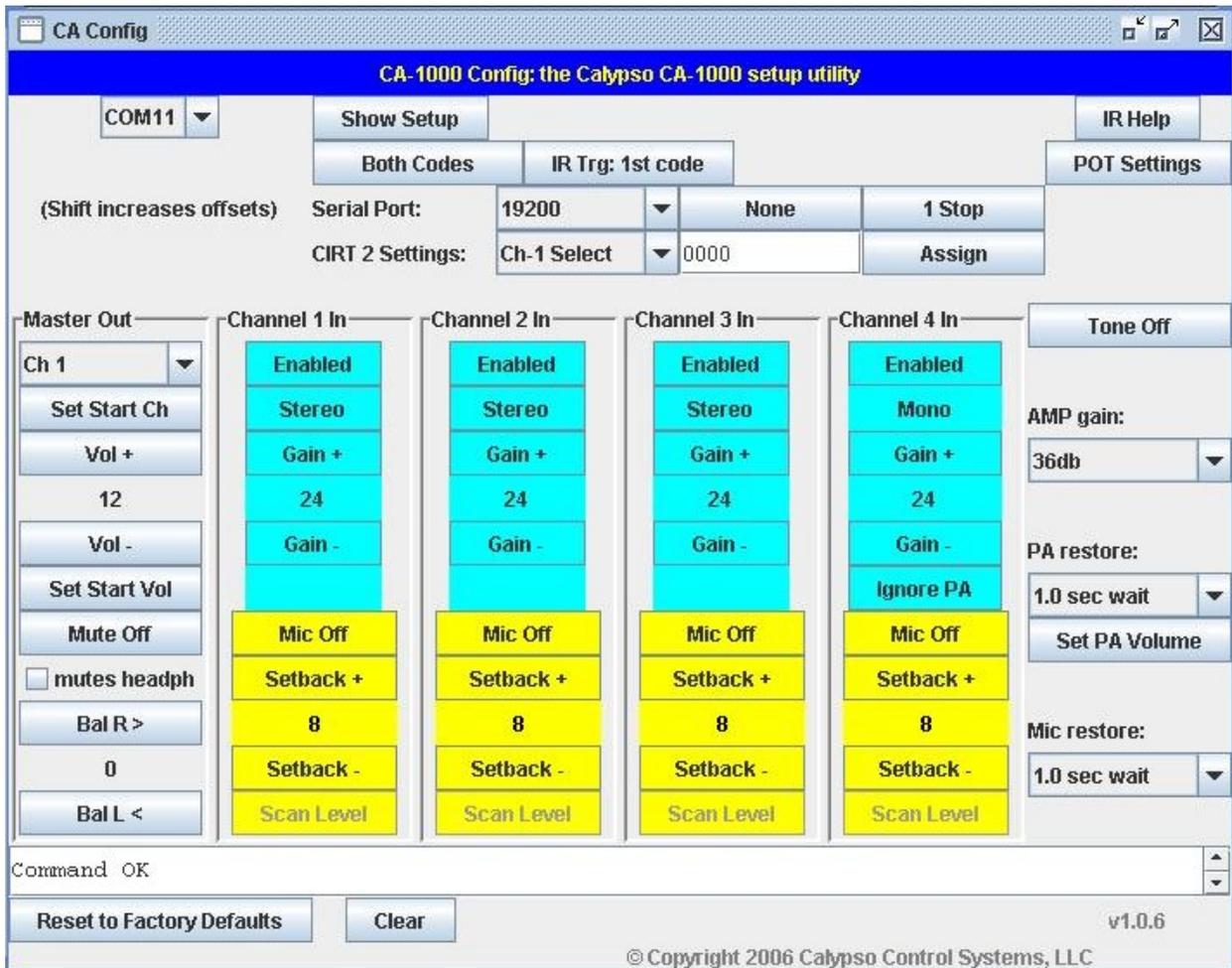
[2] Refer to section 1.1 for instructions on manually putting the unit into Program Mode.

1.3.1 Input Channel Settings

The CA-500 CA-Config interface will provide access to "Channel 1 In" only, whereas all channels will be active for CA-1000 and CA-1050 products. For each active channel, the column of push buttons provide the following functions:

- **Enable / Disable** – turns the channel on or off

- **Stereo / Mono** – set the channel to stereo or mono input (channels 1-3 only)

- **Gain + / Gain -** Use this setting to normalize volume across multiple inputs, with 32 steps.

- **Ignore PA**[3] – available as an input to channel 4 (mono) only, this feature detects activity on a PA system and automatically triggers an automated mute on input channels 1, 2 and 3.   The PA Detect circuit is triggered when the corresponding input on channel 4 exceeds the defined Threshold setting. This button rotates between three states:

    - **Ignore PA** – do nothing

    - **PA w/norm** – upon PA detect, mute channels 1,2 and 3 and amplify channel 4 input as per most recent (current) channel 4 settings. Note that "current" amplifier settings may include low volume (determined by channel 4 Gain and Master Volume) and/or mute, either of which would compromise the effectiveness of the PA announcement.

    - **PA w/preset** – upon PA detect, mute channels 1,2 and 3 and amplify channel 4 input as per a preset channel 4 PA volume. Use the "Set PA Volume" button to define the PA preset volume condition, as per Master Out settings. Note that when using the PA w/preset condition, channel 4 mute is automatically turned off upon detection of a PA input.

In addition,

    - The **PA Restore** pull down defines the amount of time the amplifier waits between the end of an active PA signal and un-muting other channels

- **Mic Off / Mic On** – use to define whether a microphone is connected as the input device to the channel. Note that the system allows for only a single microphone input.

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[3] Microphone detect and PA detect are mutually exclusive channel 4 conditions

In multi-channel audio applications, microphones are often treated as a special input device, capable of triggering automated "ducking", where the volume of other inputs automatically drop to preset levels, allowing microphone audio to be the dominant source. Accordingly, when a "Mic On" button is selected the Level setting for the active microphone channel is changed to a "Threshold" setting, which is the microphone gain threshold at which automated ducking of other channels initiates. Note that the microphone threshold setting can be set manually, using the Thresh+ and Thresh- buttons, or automatically, using the "Scan Level" button for the appropriate (i.e., microphone) channel.

Note: While monitoring for microphone input levels (typically, but not necessarily on channel 4), the system searches only the LEFT side. Hence single channel microphones must be connected to the LEFT side input or plugged into a input set to operate in mono mode.

Define ducking levels for non-microphone inputs

Change from Level to Thresh when Mic On
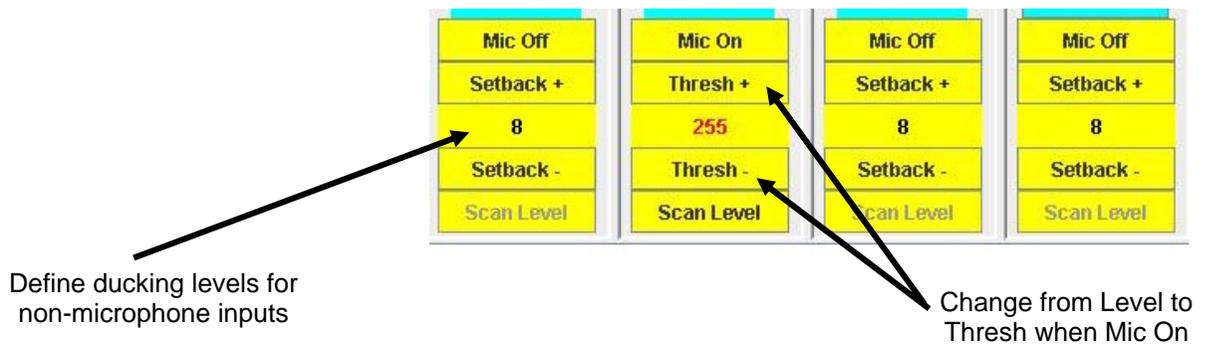
After defining the ducking threshold level, one must also set the setback level of the other audio inputs, using the existing, yellow Setback + and Setback - buttons.

Finally, the "Mic restore" pull down defines the amount of time the amplifier waits between the end of an active microphone signal and resetting the other channels to their normal volume levels.

1.3.2 Master Out

Note: The amp waits 2 seconds after power on until output is enabled.

The settings on the Master Out menu bar determine audio output from the device.

CA

1. Channel Pull Down - use the pull down to switch between available input channels.

age 9
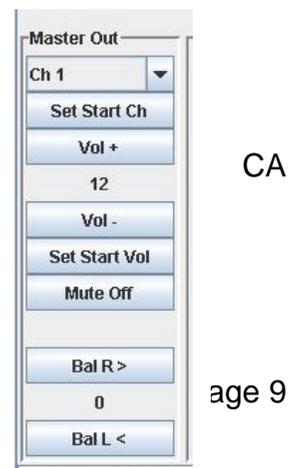
2. Set Start Ch – assign the current channel as the default channel used upon system start up.

3. Vol + / Vol - increase and decrease output volume through 32 steps.

4. Set Start Vol – assign the current volume setting as the default volume used upon system start up. Warning: This allows full power start.

5. Mute Off - toggle mute on and off

6. Bal R > / Bal L <   - balance left and right outputs through 16 steps (8 on each side).

1.3.3 Other Settings
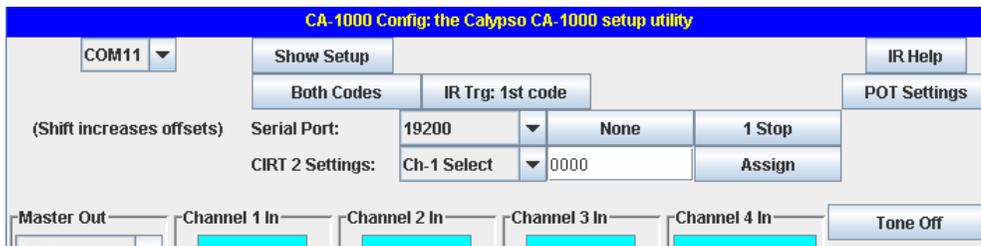
CA-Config includes a number of additional variable settings.

1. Both Codes - toggle button selects whether the unit is scanning for CIRT1 IR codes, CIRT2 IR codes, or Both CIRT1 and CIRT2 codes. A complete description of CIRT codes is provided in section 2.0 of this manual, which covers IR control.

2. IR Trg: 1st code – toggle the IR receiver to process the 1st, 2nd or 3rd IR code, transmitted from a single IR remote control "burst".

3. IR Help – shows CIRT1 and CIRT2 IR codes (hex) and their corresponding CA commands.

4. POT Settings – assists with remote diagnostics and troubleshooting

5. Serial Port – define serial port communications settings

6. Tone Off – toggle to turn a 900Hz test tone on and off. The goal is to provide an output signal for testing speaker connections.

7. CIRT 2 Settings – assign a specific 4-char CIRT (Calypso IR Trigger) code to specific CA Series functions. Use the pulldown menu to select a specific function, type in a 4-char CIRT code and click the Assign button to associate the function with the code. Refer to section 2.1 of this manual for detailed information on CIRT codes.

8. <u>AMP gain</u> – use to limit maximum power output.

2.0   IR and Serial Control

The CA Series of products are designed to be controlled by external devices that are capable of transmitting IR or serial commands. For example, one could steer IR commands from a Calypso CW-1000 button panel to a CA-1000 IR input, and use the buttons to control audio channel selection and volume. Similarly, a Pro I/O or ION controller could transmit IR or serial commands to a CA-500, CA-1000 or CA-1050 to provide PC-based amplifier or pre-amp control from PowerPoint, desktop icons or from other graphical interfaces. These tools make it relatively easy to integrate audio control into a full range of AV presentation applications.

2.1   IR Command Protocol

CA Series devices support libraries of IR codes known as CIRT (Calypso IR Trigger) codes. There are two distinct sets of CIRT codes, known as CIRT1 and CIRT2, both of which are derived directly from standard, Sony 12-bit CD player IR commands (model CDP-C715) and re-encoded as 2-byte hex strings for processing efficiency.   All Calypso controllers with on-board IR learning have the ability to automatically convert the actual 12-bit Sony code into the corresponding CIRT code.

CIRT1 codes are "fixed", in that each code is pre-mapped to a specific CA Series function. CIRT2 codes are "variable", in that an integrator may define a valid CIRT code and then map it to any CA Series function.

To implement IR control, an external device (e.g., Calypso CW-1000, Pro ION, ION controllers) must transmit CIRT codes to the CA unit, either through the air to the IR receive window, or wired directly through the IR input terminal block. As a matter of convenience, CA products are designed to boost the power of incoming CIRT commands, and re-transmit commands out to another device. See section 1.2.9 for wiring details.

2.1.1   <u>CIRT1 Codes - Fixed</u>

Each CIRT1 code, shown in the table below, is mapped to a specific CA Series function. Accordingly, the controlling device may be a Calypso ION, Pro I/O, UT-500 controller or any other controller or IR transmitter that can be configured to send valid CIRT1 codes.

CIRT1 (hex)	Function	Corresponding Sony CDP-C715 Button
0880	Switch to input 1	Button 1
0881	Switch to input 2 (CA-1000, CA-1050 only)	Button 2
0882	Switch to input 3 (CA-1000, CA-1050 only)	Button 3
0883	Switch to input 4 (CA-1000, CA-1050 only)	Button 4
08B1	Next channel	Next track
08B0	Previous channel	Prev track
0892	Vol Up (-2db step)	Master Vol Up
0893	Vol Down (-2db step)	Master Vol Down
08B4	Vol Up (-4db step)	Shuttle FF
08B3	Vol Down (-4db step)	Shuttle Rev
08B2	Toggle mute	CD Play
08B9	Mute off	CD Pause
08B8	Mute on	CD Stop

2.1.2 CIRT2 Codes – User Defined

When necessary, you may configure the CA device to respond to ANY valid CIRT code, which amounts to creating your own CIRT2 library. For example, the Calypso CB-1000 wall mount button panel contains the following built-in CIRT codes.

CB-1000 CIRT1 Codes   CB-1000 CIRT2 Codes

Button 1 = 01E1   Button 1 = 02D1
Button 2 = 01E2   Button 2 = 02D2
Button 3 = 01E3   Button 3 = 02D3
Button 4 = 01E4   Button 4 = 02D4
Button 5 = 01E5   Button 5 = 02D5
Button 6 = 01E6   Button 6 = 02D6
Button 7 = 01E7   Button 7 = 02D7
Button 8 = 01E8   Button 8 = 02D8

By mapping the CB-1000 CIRT codes to CA functions, the CB-1000 button panel can be configured to control volume, channel, mute and other audio functions. CIRT code mapping is done using the "CIRT 2 Settings" pull down menu.

2.2   Serial Command Protocol

The CA Series of products supports a fixed library of Serial commands, which can be transmitted directly to the RS-232 port on the unit, which is also for CA-Config communications. Note that each command must end with a carriage return (HEX = 0D).

Command	Description
#ACHx	Select Audio Channel
x	1 = Channel 1 2 = Channel 2 3 = Channel 3 4 = Channel 4

Command	Description
#ACH?	Return current channel selection

Command	Description
#ACF	Forward to next available channel

Command	Description
#ACR	Reverse to available channel

Command	Description
#AVIs	Increase volume, range 1-32 (-2db/step), steps 1-3
s	1 = 1 step 2 = 2 steps 3 = 3 steps

Command	Description
#AVI	Increase volume 1 step, range 1-32 (-2db/step)

Command	Description
#AVDs	Decrease volume, range 1-32 (-2db/step), steps 1-3
s	1 = 1 step 2 = 2 steps 3 = 3 steps

Command	Description
#AVD	Decrease volume 1 step, range 1-32 (-2db/step)

Command	Description
#AVAv	Absolute volume setting, range 1-32 (-2db)
v	1 thru 32

Command	Description
#AVA?	Return current volume setting

Command	Description
#AVMx	Mute and un-mute output
x	0 = mute 1 = un-mute

Command	Description
#AVM	Toggle mute state

Command	Description
#AVM?	Return current mute setting

3.0   Technical Specifications

Audio Inputs

CA-500 Connectors/Channels	(1) 5-pin 3.81 Terminal Block Header (CH1) balanced/unbalanced Stereo
CA-1000 / CA-1050 Connectors/Channels	(1) 5-pin 3.81 Terminal Block Header (CH1) balanced/unbalanced Stereo (2) 3.5mm Stereo Jack TRS (CH2 & CH3) unbalanced Stereo (1) 2-pin 3.81 Terminal Block Header (CH4) balanced/unbalanced Mono
Impedance	>13k ohms unbalanced, >20k ohms balanced
Nominal levels	+4 dBu (1.23 Vrms) balanced or -10 dBV (316 mVrms) unbalanced
Maximum level	+11dBu (2.75 Vrms) balanced or 2.9 dBV (1.4 Vrms) unbalanced
Input level sensitivity for maximum output	
Amp Gain Setting 36db (max)	-26 dBV (50mVrms) balanced / -32 dBV (25mVrms) unbalanced
Amp Gain Setting 20db (min)	-9 dBV (350mVrms) balanced / -15 dBV (175mVrms) unbalanced

Audio Output (Speakers)

Number / Signal type	1 stereo or 2 mono (2 channels total)
Connectors	5-pin 3.81mm screw down term block
Minimum load impedance	4 ohms min
Amplifier type	Improved 92% Efficient Class D
Continuous power @ 1% THD	16 watts (rms) per channel @ 4 ohms, 8 watts (rms) per channel @ 8 ohms
Damping factor	>50 up to rated power with 4 ohm load
Frequency response	+/-1 dB, 20 Hz to 20 kHz, 1 watt output
THD + Noise	0.1% @ 1 kHz, at nominal level (1 watt, 8 ohm load)
S/N	>84 dB @ 20 Hz to 20 kHz at maximum output (unweighted, with balanced input)
Stereo channel separation	>65 dB @ 1 kHz, >58 dB @ 20 kHz
CMRR	>80 dB
Protection Circuits	Thermal and Short Circuit protected (Yellow fault LED)
Output Limiter	4 settable gain levels (20db, 26db, 32db, 36db)

Headphone Outputs

Connector	3.5mm Stereo Jack TRS
Max output	-2.0 dBV (0.8Vrms) into 32 Ohms
Frequency response	+/-1 dB, 20 Hz to 20 kHz,
THD + Noise	0.025% @ 1 kHz, at maximum volume
Signal to noise ratio	>85 dB @ 20 Hz to 20 kHz at maximum output (unweighted, with balanced input)
Crosstalk	>65dB, 1kHz, channel-to-channel
Output impedance	75 Ohms
Working headphone impedance	32 to 600 Ohms

Audio Outputs (Line Out)

Connector	5-pin 3.81mm Terminal Block Header
Max output (unbalanced)	+2.0 dBV (1.26Vrms)
Frequency response	+/-1 dB, 20 Hz to 20 kHz,
THD + Noise	0.025% @ 1 kHz, at maximum volume
Signal to noise ratio	>84 dB @ 20 Hz to 20 kHz at maximum output (unweighted, with balanced input)
Crosstalk	>65dB, 1kHz, channel-to-channel
Output impedance	150 Ohms

Remote Control

Control port	RS232, 3-pin 3.81mm screw down terminal block header IR remote input & IR wired, IR Repeater output

General

External Universal Power Supply	100-240 VAC, 50/60 Hz, 1.5A; 12 VDC, 3.3A (nominal), regulated
Power input requirements	12VDC – 15VDC max, up to 3.5A
Power Output	12VDC – 15VDC max, up to 0.5A (Active fuse)
Temperature/humidity	Storage: -40 to 158 °F (-40 to +70 °C) / 10 - 90%, non condensing Operating: -32 to 122 °F (0 to +50 °C) / 10 - 90%, non condensing
Enclosure type	Metal (Al), baked powdered black
Enclosure dimensions	1.2" H x 3.25" W x 5.1" D 3.1 cm H x 8.3 cm W x 13.0 cm D
Product weight	0.5 lbs (0.2 kg)
Shipping weight	3 lbs (2 kg)
Warranty	3 years

4.0   Warranty

CA-500/CA-1000/CA-1050   3-Year Warranty

Calypso Control Systems 3-year Product Warranty Statement

This Non-Transferable warranty is provided to original purchasing end user, herein referred as "customer", of Calypso Control Systems product line defined as: Pro I/O, ION-e, ION-LT1, ION-LT2, UT-500, ION-4s, ION-8r, ION-16i, CB-1000, CR-1200R, CA-500, CA-1000, and CA-1050, herein referred as "product".

This warranty is applicable to product sold or distributed to customer by an authorized Calypso Control Systems Dealer, OEM, Value Added Reseller or sold directly to the end user by Calypso Control Systems, LLC. This warranty becomes effective from the moment the end user completes purchase and receives product. This warranty shall remain in effect for 3 years from the moment of purchase as long as the original customer of the product continues to own and use the product. <u>This warranty does not apply to accessories such as power supplies and cables, which carry standard 12-month manufacturer warranties</u>.

Terms

Calypso Control Systems warrants that product shall be materially free of defects in material and workmanship under normal use and service during the warranty period. In the event that Calypso Control Systems receives notice from the customer during the warranty period that product does not conform to this warranty, Calypso Control Systems shall, at its sole option, either repair or replace the non-conforming product. The warranty on the replacement or repaired product shall continue for the duration of the original warranty. All returned product becomes the property of Calypso Control Systems.

Procedures

A product may only be returned with the prior written approval of Calypso Control Systems. Such approval shall reference a Return Material Authorization number (RMA) issued by authorized Calypso Control Systems technical support personnel. Transportation costs, if any, incurred in connection with the return of a defective item to Calypso Control Systems shall be borne by the Customer. Transportation costs incurred in connection with the re-delivery of a repaired or replaced item to the Customer shall be borne by Calypso Control Systems. However, such costs shall be borne by the Customer if Calypso Control Systems, reasonably determines that the product is not defective. If Calypso Control Systems determines, in its sole discretion, that the allegedly defective product is not covered by the terms of the warranty provided hereunder, or that a warranty claim is made after the warranty period, the cost of repair by Calypso Control Systems, including all shipping expenses, shall be reimbursed by the Customer. Calypso Control Systems shall have no liability with respect to data contained in any

system returned to Calypso Control Systems.

Exclusions

The foregoing warranties and remedies are for the Customer's exclusive benefit and are non-transferable. Any and all warranties shall be void regarding System components that are damaged or rendered unserviceable by: (1) acts or omissions of non-Calypso Control Systems personnel; (2) misuse, theft, vandalism, fire, water, or other peril; (3) alterations of or additions to the System or any element thereof performed by personnel not certified by Calypso Control Systems to perform such alterations and additions or (4) the Customer's failure to operate the product in conformance with Calypso Control Systems published operating parameters, including environmental specifications.

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