DARC Surface



Technical Manual

October 13, 2018

Dante AES67

Table of Contents

Introduction....3
Safety Instructions....4
Hazard / Warning Label....5
Identification....5
Warranty....6
Product Description....7
Standalone Configuration....8
AoIP Configuration....9
Operational Description....10
Technical Description....11
Operating Instructions....14
Mono Mic Level....15
Input Channels....15
Stereo Line Level....16
Input Channels....16
Telephone....17
Input Channels....17
Control Room....18
Monitor System....18
The Cue System....19
Soft Keys....20
OLED Displays....21
Installation Instructions....22
Unpacking....22
Before you start....23
Step by Step....25
Installation Instructions....25
DARC Virtual Logic I/O....34
Audio Calibration....35
Service & Maintenance....36
General Repair Considerations....36
Resetting the Console....37
Opening the Console....38
Replacing Slide Faders, Switches, and other parts....39
Replacing Rotary Faders....40
Replacing ICs....40
Replacing OLEDs....40
Motherboard Parts Layout....41
Replacing Processors....41
Warranty Replacement of Parts....41

Introduction

Thank you for purchasing this product by Arrakis Systems. Our company has provided professional audio equipment to the broadcast, commercial audio, and consumer audio markets for more than 30 years. Our products are sold worldwide and are well known for leading edge technology, quality, and reliability.

How to contact Arrakis Systems

Arrakis Systems inc. is located at:

Arrakis Systems inc
6604 Powell Street
Loveland, Colorado
80538

Business Hours: 8:00am - 4:30pm mountain time

Voice: 970-461-0730 x316

Fax: 970-663-1010

Email: consolesupport@arrakis-systems.com

Having difficulty contacting Arrakis?
Refer to the website (www.arrakis-systems.com) for current contact information

Safety Instructions

1. Read All Instructions. All safety and operating instructions must be read before operating the product.
2. Retain All Instructions. All safety and operating instructions must be retained for future reference.
3. Heed All Warnings. All warnings on the product and those listed in the operating instructions must be adhered to.
4. Follow All Instructions. All operating and product usage instructions must be followed.
5. Heat. This product must be situated away from any heat sources such as radiators, heat registers, stoves, or other products (including power amplifiers) that produce heat.
6. Ventilation. Slots and openings in the product are provided for ventilation. They ensure reliable operation of the product, keeping it from overheating. These openings must not be blocked nor covered during operation. This product should not be placed into a rack unless proper ventilation is provided through following the manufacturer's recommended installation procedures.
7. Water and Moisture. Do not use this product near water—for example; near a bath tub, wash bowl, kitchen sink or laundry tub; in a wet basement; or near a swimming pool or the like.
8. Attachments. Do not use any attachments not recommended by the product manufacturer as they may cause hazards.
9. Power Sources. This product must be operated from the type of power source indicated on the marking label and in the installation instructions. If you are not sure of the type of power supplied to your facility, consult your local power company.
10. Grounding and Polarization. This product is equipped with a polarized AC plug with integral safety ground pin. Do not defeat the safety ground in any manner.
11. Power Cord Protection. Power supply cords must be routed so that they are not likely to be walked on nor pinched by items placed upon or against them. Pay particular attention to the cords at AC wall plugs and convenience receptacles, and at the point where the cord plugs into the product.
12. Lightning. For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the AC wall outlet. This will prevent damage to the product due to lightning and power line surges.
13. Overloading. Do not overload AC wall outlets, extension cords, or integral convenience outlets as this can result in a fire or electric shock hazard.
14. Object and Liquid Entry. Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
15. Accessories. Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious damage to a child or adult, and serious damage to the product. Any mounting of the product needs to follow manufacturer's installation instructions.
16. A Product and Cart Combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and the cart combination to overturn.
17. Servicing. Refer all servicing to qualified servicing personnel.
18. Damage Requiring Service. Unplug this product from the wall AC outlet and refer servicing to qualified service personnel under the following conditions: a. When the AC cord or plug is damaged. b. If liquid has been spilled or objects have fallen into the product. c. If the product has been exposed to rain or water. d. If the product does not operate normally (following operating instructions). e. If the product has been dropped or damaged in any way. f. When the product exhibits a distinct change in performance. This indicates a need for service.
19. Replacement Parts. When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or that have the same characteristics as the original parts. Unauthorized substitutions may result in fire, electric shock, or other hazards.
20. Safety Check. Upon completion of any repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
21. Cleaning. Do not use liquid cleaners or aerosol cleaners. Use only a damp cloth for cleaning.

Hazard / Warning Label Identification

WARNING: SHOCK HAZARD - DO NOT OPEN
AVIS: RISQUE DE CHOC ELECTRIQUE - NE PAS OUVRIR

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK DO NOT REMOVE ANY COVER OR PANEL. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THE CONSOLE TO RAIN OR MOISTURE.



The Exclamation Point symbol, within an equilateral triangle, alerts the user to the presence of important operating and maintenance (servicing) instructions in product literature and instruction manuals.

The Lightning Flash With Arrowhead symbol, within an equilateral triangle, alerts the user to the presence of uninsulated dangerous voltage within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

WARNING— This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instructions in this manual it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device (pursuant to Subpart J of Part 15 FCC Rules), which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

Warranty

This console carries a manufacturer‘s warranty subject to the following guidelines and limitations:
A) Except as expressly excluded herein, Arrakis Systems inc. (“Seller”) warrants equipment of its own manufacture against faulty workmanship or the use of defective materials for a period of one (1) year from date of shipment to Buyer. The liability of the Seller under this Warranty is limited to replacing, repairing or issuing credit (at the Seller’s discretion) for any equipment, provided that Seller is promptly notified in writing within five (5) days upon discovery of such defects by Buyer, and Seller‘s examination of such equipment shall disclose to its satisfaction that such defects existed at the time shipment was originally made by Seller, and Buyer returns the defective equipment to Seller’s place of business in Loveland, Colorado, packaging and transportation prepaid, with return packaging and transport guaranteed.

B) Equipment furnished by Seller, but manufactured by another, shall be warranted only to the extent provided by the other manufacturer.

C) Thermal filament devices (such as lamps and fuses) are expressly excluded from this warranty.

D) The warranty period on equipment or parts repaired or replaced under warranty shall expire upon the expiration date of the original warranty.

E) This Warranty is void for equipment which has been subject to abuse, improper installation, improper operation, improper or omitted maintenance, alteration, accident, negligence (in use, storage, transportation or handling), operation not in accordance with Seller‘s operation and service instructions, or operation outside of the environmental conditions specified by Seller.

F) This Warranty is the only warranty made by Seller, and is in lieu of all other warranties, including merchantability and fitness for a particular purpose, whether expressed or implied, except as to title and to the expressed specifications contained in this manual. Seller’s sole liability for any equipment failure or any breach of this Warranty is as set forth in subparagraph (A) above; Seller shall not be liable or responsible for any business loss or interruption, or other consequential damages of any nature whatsoever, resulting from any equipment failure or breach of this warranty.

For the latest warranty information, please visit our website.

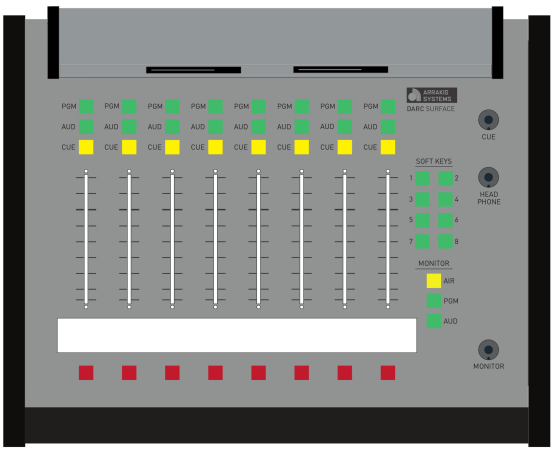
Product Description

DARC Surface 8 & 12

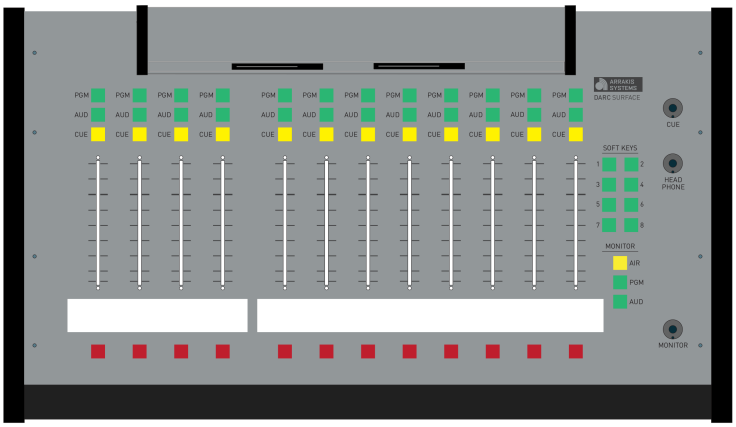
- 8 or 12 Channels (based on model purchased).
- Inputs - software selectable.
- Outputs - software selectable.
- 2 Stereo Outputs – Program & Audition.
- Connects and controls Simple-IP 8A & Simple-IP 8D audio inputs & outputs.
- Monitor, Headphone, and Cue system with external input for off air monitoring.
- Cue system autocues (with Program dimming) into the Monitor & Headphone systems.
- Mix Minus telephone interface through Simple-IP 8A & 8D.
- Conductive plastic slide faders and LED switch lamps for long life.
- 8 programmable buttons for controlling software, changing assignments, etc.
- OLED displays for channel inputs.

DARC Virtual Console Software: Every DARC Surface comes with the DARC Virtual Console Software. This software will be ran on a configured PC, and handles all mixing of Dante AoIP audio. Details on how to use this software may be found on our website.

DARC Surface 8



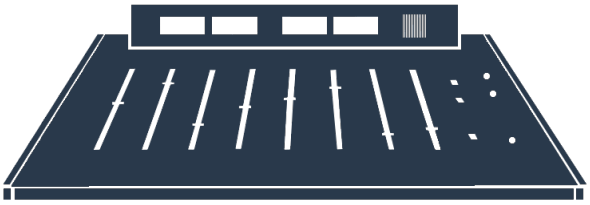
DARC Surface 12



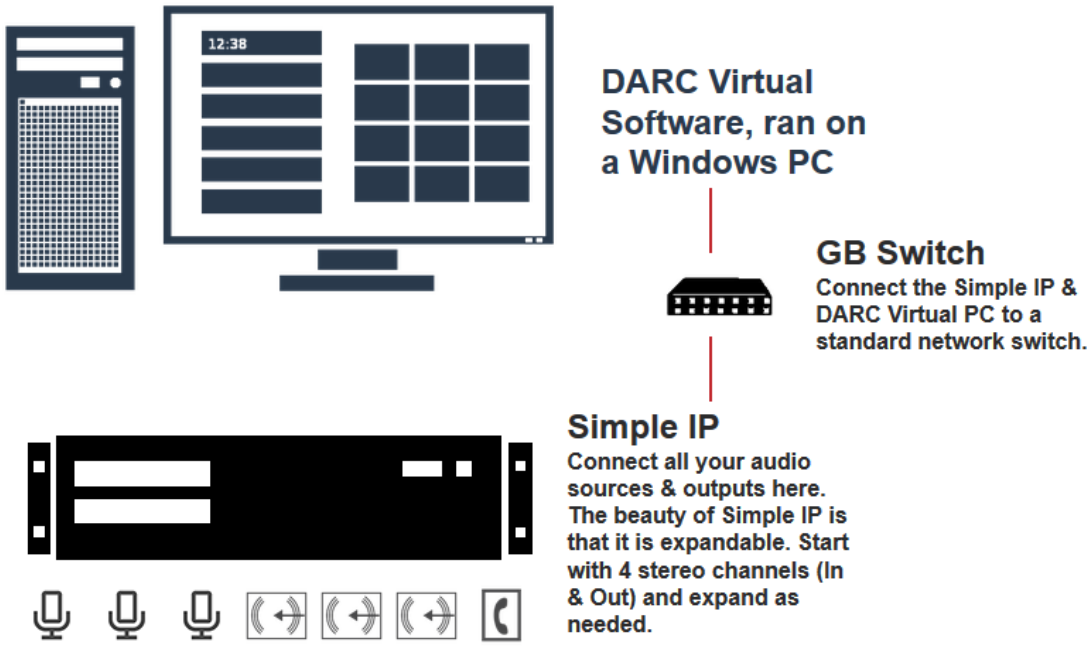
The DARC Surface, in conjunction with the DARC Virtual Console software and Simple IP, can be ran either in a standalone or AoIP multi-studio configuration. The backbone of DARC is that it is expandable for any user's needs.

Standalone Configuration

In a standalone configuration you would have a DARC Surface, a PC running the DARC Virtual Software, a network switch and then a Simple IP unit with your audio inputs & outputs.



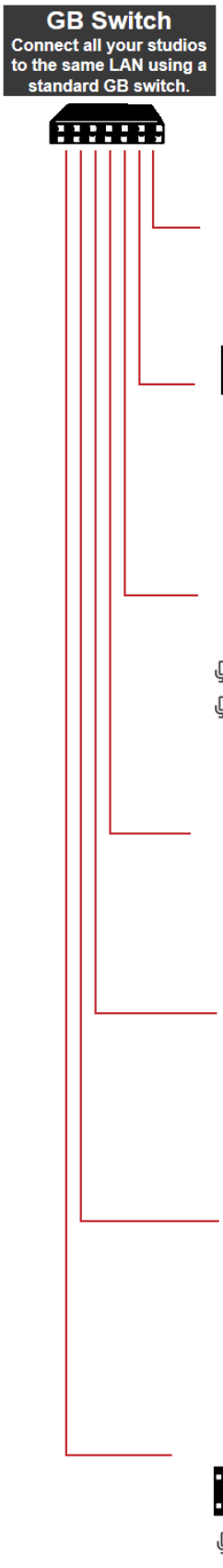
In this configuration, you do not need a large complex AoIP network, and it can be ran as a single unit. In time, if you wish, you may expand your network with additional Simple IP units along with control software and hardware.



<u>BASIC CONNECTION STEPS:</u>

1) **Connect your DARC Surface** console USB to the PC running your DARC Virtual Console.
2) **Connect your PC to your GB network** switch. Ideally this is a switch that is dedicated to your audio network, and is not connected to the network used by your office PC's.
3) **Connect all of your audio inputs and outputs** to your Simple IP units (or any Dante audio device). Connect the Simple IP units to your audio network.
4) **Use the Dante Controller to route audio** to your DARC Virtual Console software.

AoIP Configuration



As a digital console with AoIP capabilities, you can expand your operation at any time.

DARC Virtual Software
Controls any audio source on your Dante network.

Simple IP
Connect all your audio inputs and outputs here. Such as microphones, automation, MP3 players, phone systems, etc...

Rack Room
If you prefer your equipment centralized, you may bring your audio inputs and outputs to a rack room. All I/O will be accessible anywhere on your Dante network.

DARC Surface
Console control surface that utilizes DARC Virtual to control audio sources on your Dante network.

AES67 Studio
Connect any of your existing AoIP studios that are using AES67 compliant equipment, such as Wheatstone, Telos, or Lawo.

Auxiliary Studio
Connect any of your existing studios to the Dante network, either using Simple IP, or a Dante AVIO device.

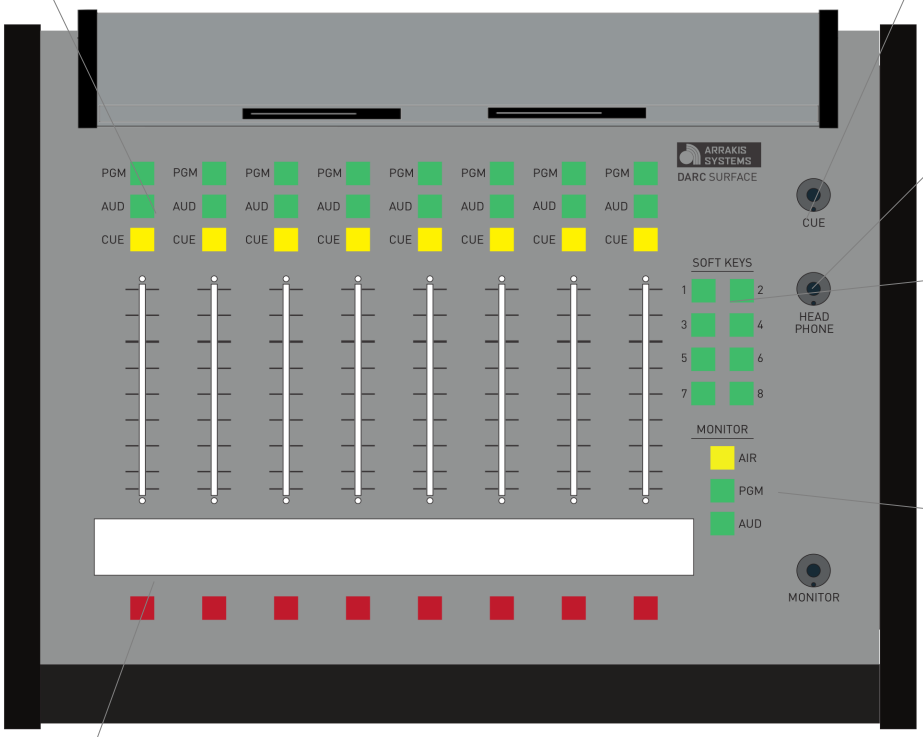
Analog Source
Connect any of your existing consoles to the Dante network, either using Simple IP, or a Dante AVIO device.

Operational Description

Lighted Switches.
5 Million operational LED lighted switches

VU Meters.
LED meters for accurate ballistics. Program & Audition meters.

Cue speaker & Volume
for cueing audio and Talkback from a Studio.



Headphones
listens to the control room monitor switch.

Programmable IO buttons.
Allows you to select user presets, control automation or other relay controlled devices.

Control Room monitor.
Selectable between (air) input, Program bus, and the Audition bus.

OLED Displays
show which input has been selected.

Programmable input channels
Choose from any source from your Dante network.

Any input for any channel.
Any channel can be mic, line, Mix-minus, etc.. You can make the assignments from the software, or directly from the board.

Number of Channels.
The base model is 8 channels. The DARC Surface 12 has 12 channels. All of which can be configured to your needs.

Technical Description

Mechanical

Switch type:	Momentary, 5 million operation, for all front panel switches.
Switch illumination:	LED, for long life.
Linear Fader type:	Conductive plastic for highest possible resolution and life. 30,000 cycles. 256 step digital resolution.
Rotary Fader type:	Conductive plastic for highest possible resolution and life. 15,000 cycles.
Rotary Fader attachment:	Ribbon cable to a plug on the motherboard.
PC Boards:	Single motherboard.
IC sockets:	All IC's are socketed for ease of service.
VU Meters:	Long life LED meters.

Electronic

Audio switching:	Digital switching handles all audio changes on your Dante Network.
Audio level adjust:	For peak audio performance, all audio is passed through the Simple IP units.
Operational amplifiers:	NE5532, found on the Simple IP Units.
Mic preamp:	External Mic preamps must be used in conjunction with the Simple IP units.
Phantom power:	The 3rd party Mic Preamp must support this feature.
Logic ICs:	Advanced CMOS logic for high noise immunity.

Logic

I/O:	Optional logic I/O may be connected to the DARC Virtual PC to control On-Air lights and other equipment.
Programmable buttons:	8 programmable buttons to cycle user profiles, control automation, or other external devices.

Back panel diagram for DARC Surface



Electronic Specifications

SIMPLE-IP-8A

Analog Line Inputs
Number 8 mono (or 4 stereo pairs)
Connectors RJ45 (2 balanced mono)
Frequency Respose 20-20kHz +(-) 0.0dB
THD+N 0.005% at +18dBu
Dynamic Range -100dB below +24dBu output
Max input +24dBu
S/N -80dB below +4dBu input
Crosstalk -100dB (1kHz), -90dB (20kHz)
Converter DR -114dB (24 bit)

Analog Line Outputs
Number 8 mono (or 4 stereo pairs)
Connectors RJ45 (2 balanced mono)
Frequency Response 20-20kHz +(-) 0.0dB
THD+N 0.005% at +18dBu
Dynamic Range 100dB below +24dBu output
Converter DR - 114dB (24 bit)
Max out +24dBu
S/N -80dB below +4dBu output
Crosstalk -100dB (1kHz), -90dB (20kHz)

Loop thru Performance (Line in to line out)
Dynamic Range 97dB below +24dBu output
THD+N 0.010% at +18dBu
Frequency Response 20-20kHz +(-) 0.1dB
Gain in-out -0.3dB

Digital
Sample rate: 48kHz

Notes
1) All test results are typical
2) All filtered tests are A-weighted
3) Codec is the high performance, balanced Cirrus Logic CS4272

SIMPLE-IP-8D

Digital Inputs
Number 8 mono, (4 stereo)
Connectors XLR (qty 4)
Sample rates 32/44.1/48/96/192kHz
Clock DANTE network clock

Digital Outputs
Number 8 mono, (4 stereo)
Connectors XLR (qty 4)
Sample rates 32/44.1/48/96/192kHz
Clock DANTE network clock

Note
The Simple-IP-8D does not have sample rate converters.
Whatever sample rate is received at a digital input will be
the sample rate sent out an assigned digital output.

Both Models
Power Supply
110vac - 220 VAC, 50-60 hz, autosensing
Certified: UL, CE, CS, CB
External inline module
3"W x 5 3/4"L x 1 3/4"D

Physical Specifications

CONSOLE DIMENSIONS:

Surface 8
Depth - 15 inches - 381mm
Height - 6 inches - 153mm
Width - 19 inches - 483mm

Surface 12
Depth - 15 inches - 381mm
Height - 6 inches - 153mm
Width – 26.25 inches - 667mm

SHIPPING DIMENSIONS:

Surface 8 & 12
Weight - 40 pounds - 18kg
Depth - 37 inches - 940mm
Height - 19 inches - 483mm
Width - 12 inches - 305mm
*These values may change at any time without notice.

PACKAGE CONTENT:

Surface 8, 12 Console
Operations Manual
Power Supply (110V / 220V auto-sensing)
USB cable

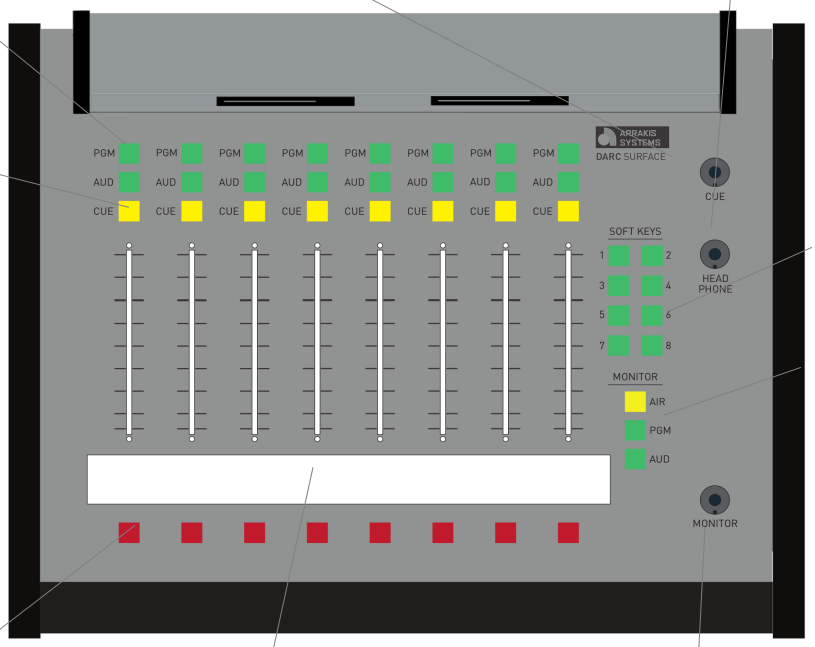
Operating Instructions

The DARC Surface console is designed to be very easy to use. The Monitor and Headphones follow the same selector switch to reduce on air confusion. OLED displays show selected input channels. The phone system is very easy to use for off line talking to the caller as well as supporting a Live call in show or off-line contest call applications.

PGM & AUD
Places the channel on either or both buses.

Cue Speaker Volume
For cuing audio and Talkback from a Studio.

Headphone Volume
Follows the control room selector switch.



Cue / Talk
If the source for the particular channel is selected as Line input, then the CUE button will play the selected audio out the Cue Speaker, and headphones.

If the source for the particular channel is selected as Mic input, then the CUE button will talk to another studio.

Soft Keys
Software assignable buttons for controlling the console, automation or other hardware.

Control Room Monitor
Selectable between an external (air) input, the Program bus, and the Audition bus. The output mutes when mic one or two are on.

On-Off
Push to turn the channel on and off.

OLED Display
Displays the input selected, using the name designated within the DARC Virtual Console software.

Monitor Volume
Controls the volume for your monitor output.

Software Selectable Inputs
All channels are software assignable. You may choose between Mic, Line and Phone (mix/minus) for any channel.

Mono Mic Level Input Channels

Any channel can be assigned as a Mic input. These assignments are made in the DARC Virtual Console software. All microphones should be connected to a 3rd party Mic Preamp and then connected to a Simple IP Surface node. Once on the Dante network, you can access that microphone anywhere on your Dante network.

Channel On & Off

To turn the channel on, simply push the red on switch at the bottom of the fader. When the channel is on, the switch will be lighted. To turn the channel off, simply push the red on button again.

Channel On & Off Mute Monitor

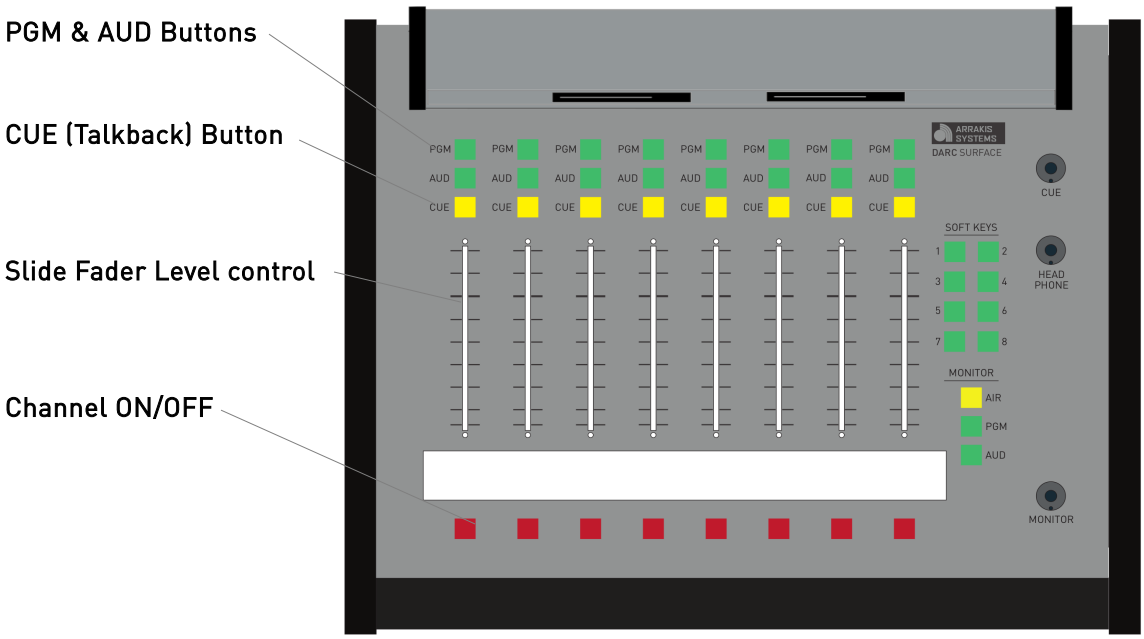
Mic channels are programmed to mute the Monitor speakers when activated. This prevents audio feedback through the mic channel.

Program & Audition Bus Assignment

The PGM & AUD buttons above the slide fader assign the channel to either (or both) of the main audio mixing buses. Push the button once to light the button and assign it to the bus. Push the lighted button again to unassign the channel from the bus. Program and Audition buses are software assigned to physical outputs on your Dante network.

Talkback (CUE button)

Talkback is a simple 2 way intercom system to communicate with another studio. An audio output on the Dante network can be software assigned to send mic audio to a networked studio. When the channel is selected as a Mic input, the CUE button on the channel will be assigned to this talk functionality.



Stereo Line Level Input Channels

Any channel can be assigned as a Line level input. These assignments are made in the DARC Virtual Console software. All line level audio inputs should be connected to the Simple IP unit to put it on the Dante network.

Channel On & Off

To turn the channel on, simply push the red on switch at the bottom of the fader. When the channel is on, the switch will be lighted. To turn the channel off, simply push the red on button again.

Program & Audition Bus Assignment

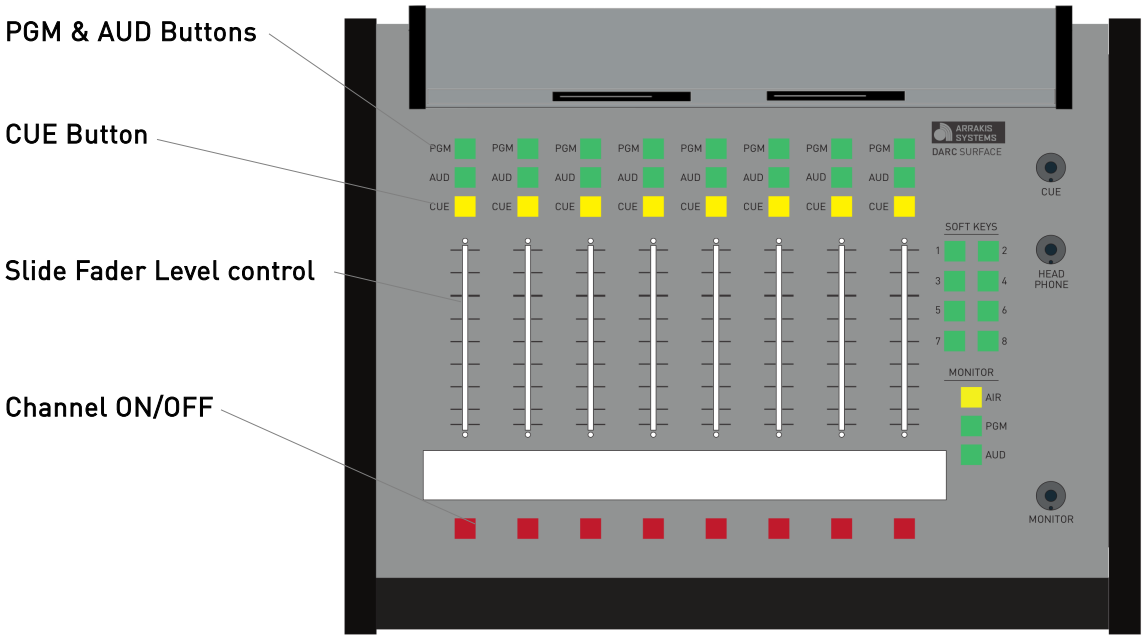
The PGM & AUD buttons above the slide fader assign the channel to either (or both) of the main audio mixing buses. Push the button once to light the button and assign it to the bus. Push the lighted button again to unassign the channel from the bus. Program and Audition buses are software assigned to physical outputs on your Dante network.

CUE

To activate cue, click on the CUE button above the fader. To exit the cue mode, click on the CUE button again.

Cue audio will be heard on the Simple IP Cue audio output, and in the Simple IP Headphones. Cue automatically switches the Headphones from the selected audio source to the cue audio bus whenever any channel is placed into cue.

Important note: The Cue output will be muted when a mic channel is turned on. This is used to prevent audio feedback.



Telephone Input Channels

Any channel may be assigned as a Telephone (mix/minus) input. These assignments are made in the DARC Virtual Console software. The telephone hybrid should be physically connected to the Simple IP input & outputs.

Channel On & Off

To turn the channel on, simply push the red on switch at the bottom of the fader. When the channel is on, the switch will be lighted. To turn the channel off, simply push the red on button again.

Channel On & Off Logic (Hybrid control)

The phone channel provides momentary, relay isolated logic to pick up the caller line (start) and to release the phone line (stop).

Program & Audition Bus Assignment

The PGM & AUD buttons above the slide fader assign the channel to either (or both) of the main audio mixing buses. Push the button once to light the button and assign it to the bus. Push the lighted button again to unassign the channel from the bus. Program and Audition buses are software assigned to physical outputs on your Dante network.

Hybrid Audio Feed

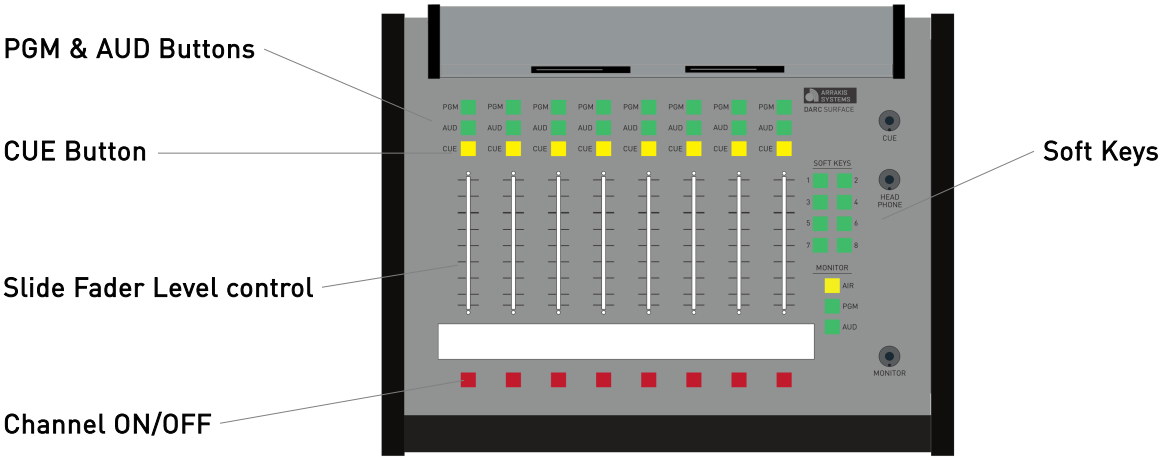
The output to the phone hybrid that the caller will hear is determined by the assigned phone channel's output bus assignments: PGM only, AUD only, or a mix of PM & AUD. The output to the phone hybrid will not include the phone callers voice which eliminates feedback. The physical output will be an output on the Dante network, such as a Simple IP 8A/D output.

Talking to the Caller (off line)

One of the Soft Keys may be designated as a 'Talk to Caller' button. When assigned, when the button is down, the program audio fed to the caller is muted and only the control room mic audio is heard. The button is momentary operation. Push down to talk, release the button to return the caller to the normal bus audio.

Listening to the Caller (off line)

To listen to the caller before airing (or during a talkback conversation), place the phone channel into cue by clicking on the CUE button.



Control Room Monitor System

The Control Room Monitor system is the main audio monitoring system for the studio. It features an input selector switch and a volume level control. The output of the monitor system will be coming from a Simple IP unit, and it is connected to an external audio power amplifier and speakers. The level control on the external amplifier should be set for the maximum sound level desired in the studio.

Monitor Muting

When a control room microphone is turned on, the monitor system will mute (audio is turned off) so that there will not be feedback from the speakers to the microphone.

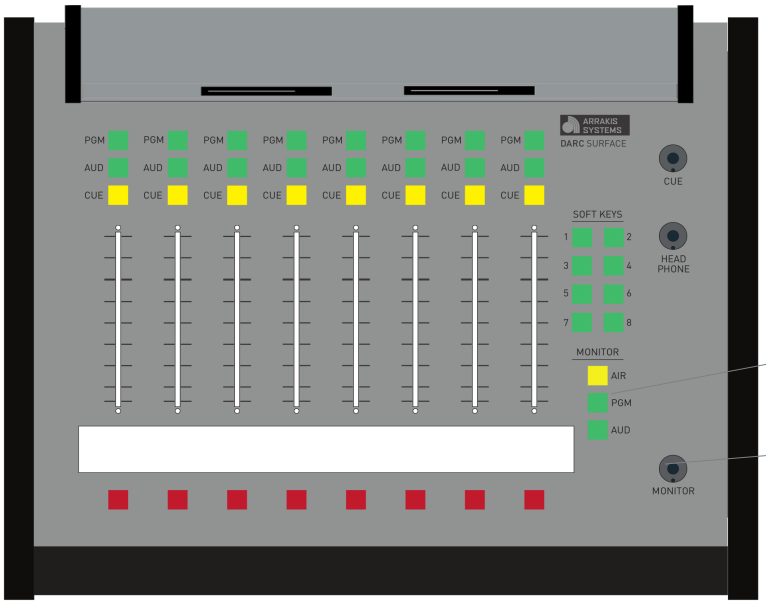
Monitor Selector Switch

This switch selects the audio source for the Monitor system.

1) AIR – This is usually an off air audio feed to monitor the actual transmitted signal. Setup for this is done in the DARC Virtual software, and instructions can be found in its manual.
2) PGM – The main Program output bus from the console.
3) AUD – A secondary Program bus that can be used for several purposes such as recording.

Monitor Volume Level Control

Sets the monitor level into the external audio amplifier and speaker.



The Cue System

The cue system is designed for monitoring an audio source without placing it on air. This feature is useful for listening to a network feed before bringing it to air. The Cue audio output will come from a Simple IP unit.

Activating Cue

To activate cue, click on the CUE button on an input source channel. To exit the cue mode, click on the CUE button again. The cue signal is PRE-fader and therefore the fader level and the channel ON-OFF status has no effect on the cue signal.

Cue Audio

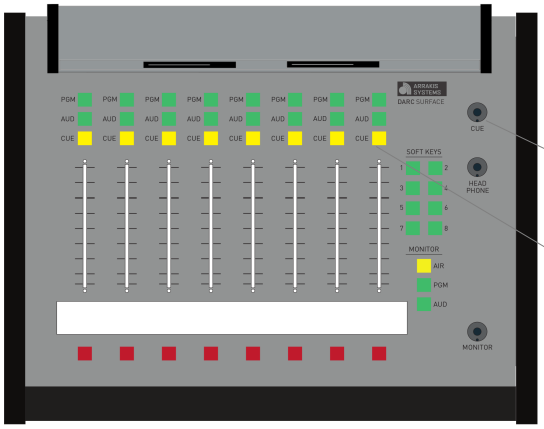
Cue audio will be played out the Cue output from the Simple IP node, and the Headphones. In the Headphone system, Autocue will mute the Program in the headphones and play the cue audio over top of program audio.

Cue Fader

The cue fader adjusts the level in the internal cue speakers. It does not adjust the level of the cue in the headphones.

Muting

The cue speaker audio will be muted to stop feedback whenever Mic channels are turned on by their respective On/Off switches.

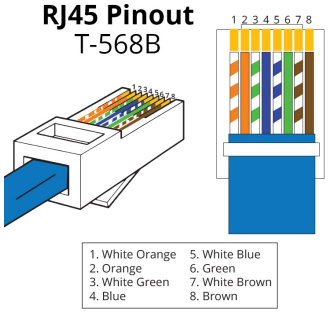


VU Meters

The DARC Surface features a pair of LED VU meters. These meters display the Program and Audition buses. The VU Meter connection on the rear of the Surface typically connects to the Simple IP **Unit A** with an RJ45 cable. Once connected, no other steps are necessary. If however you are not using the Simple IP units, you can connect a different Dante enabled output hardware to the Surface to display levels. There are two basic steps to this process:

STEP 1 – Connect the Dante enabled hardware to the DARC Surface **Meter** input on the rear of the Surface. Pinout for the Meter input on the Surface is:

PIN 1 – PGM Left
PIN 2 – PGM Right
PIN 3 – AUD Left
PIN 4 – Ground
PIN 6 – AUD Right



STEP 2 – Route the Dante Controller so the Program and Audition feeds are now going to the appropriate Dante hardware connected to your DARC Surface.

Soft Keys

The DARC Surface includes 8 programmable 'Soft Keys.' These keys can be assigned to perform various tasks. The functionality of these buttons are assigned within the DARC Virtual Console software.

FUNCTIONS:

Short Press

1 Turns the optional Keytronic 8 Channel Relay #8 on
2 Turns the optional Keytronic 8 Channel Relay #8 off
3 not assigned
4 not assigned
5 not assigned
6 not assigned
7 not assigned
8 not assigned

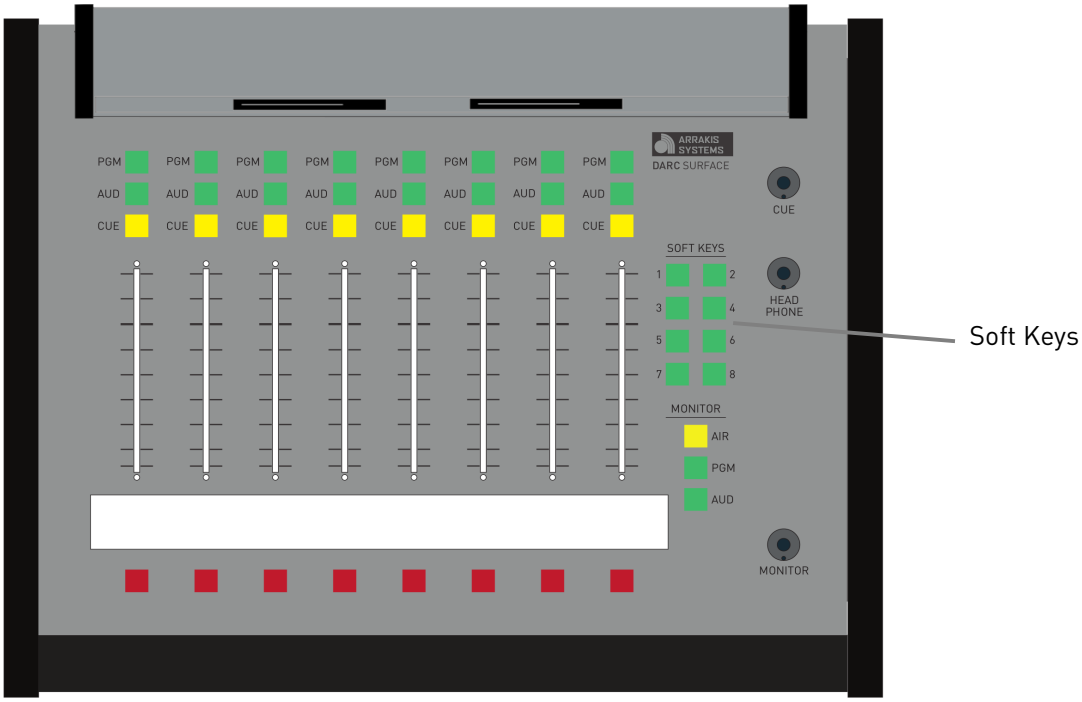
Long Press

1 Selects PGM on the Phone Hybrid bus select
2 Selects AUD on the Phone Hybrid bus select
3 not assigned
4 not assigned
5 not assigned
6 not assigned
7 not assigned
8 not assigned

Cycle User Profiles – A button may be assigned as a Cycle User Profile button. This would allow you to switch user presets for channel input assignments. These assignments will be displayed in the OLED windows for each channel.

OLED Wake – To increase the lifespan of the OLEDs, they will be designed to go to sleep after a given period of time. One of the Soft Keys may be assigned to bring it out of sleep mode.

Send Closure – A soft key button may be assigned to send a high then low closure via a specific Logic output pin.



OLED Displays

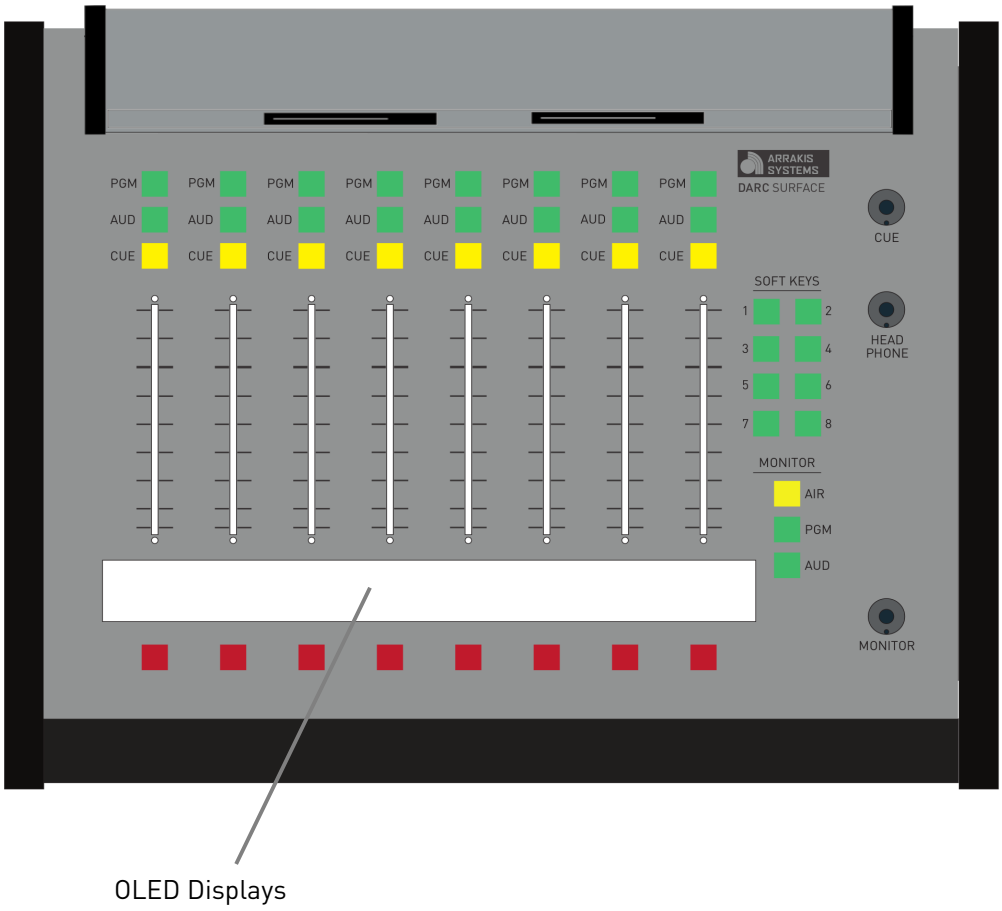
The DARC Surface includes high quality, long life, OLED displays for each channel. These OLED displays will show what source input has been selected via the DARC Virtual Console software. These will be custom labels that have been assigned within the software.

The first channel will also display the current firmware version when the console is first powered up.

To increase the lifespan, these OLED's may be set to sleep after a given period of time. By default, these OLED's will be reactivated when any button is pressed or fader adjusted.

OLED SPECIFICATIONS:

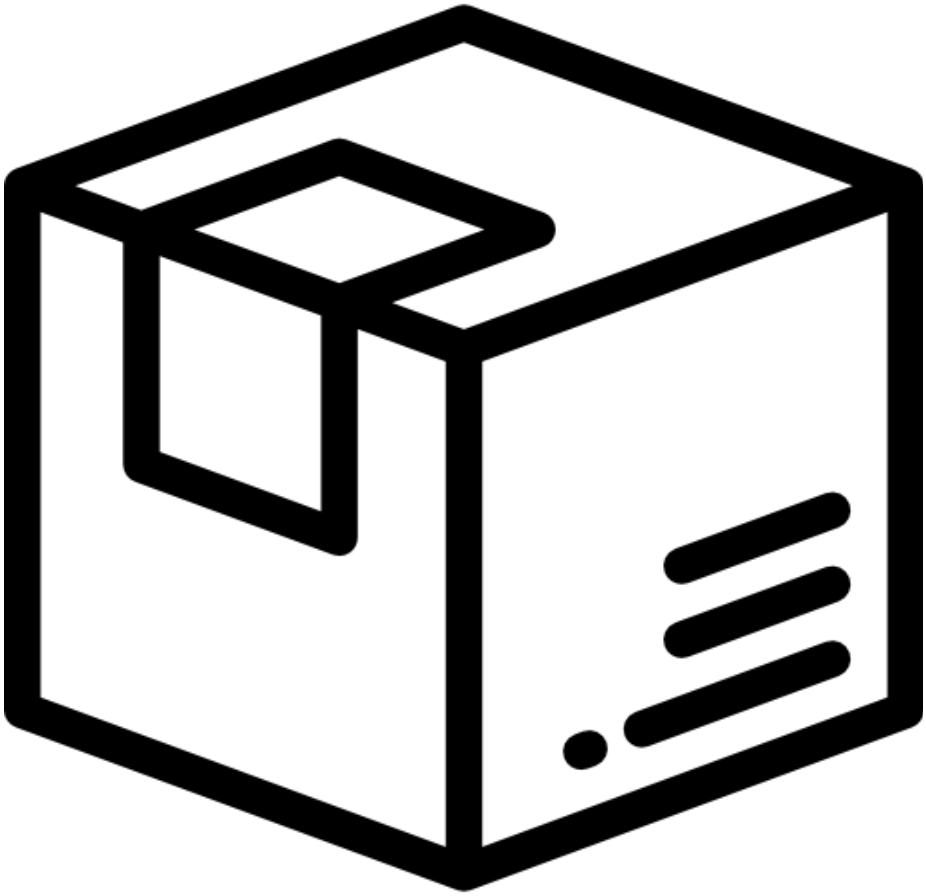
Ultra-low power consumption: consumes 0.08W when fully lit, and 0.06W average consumption (far lower than TFT or LCD displays).
High contrast: allows for great viewing even in strong sunlight.
Resolution: 128*64 Dot matrix.
Large viewing angle: maximum visual angle 160°.
Industrial-grade operating temperature: -30 ~ 70 ℃.



Installation Instructions

Unpacking

A) Packing slips – Check the packing slips that come with the shipment, to be certain that all packages have been received.



B) Check for damage – Check all packages and equipment for damage immediately upon receipt. If damage is found, contact Arrakis Systems immediately to report the damage. Refer to the website for the latest contact information.

C) Carefully go through each box – Arrakis inspects every shipment for accuracy. You will receive all of the appropriate documentation, install kit, spare parts kit, and equipment. Be very careful to not throw away anything if you decide to throw out shipping materials.

D) Keep all packing materials – Arrakis consoles are shipped in custom shipping containers. Keep all containers at least until the installation is complete. This is in case some piece of equipment may need to be returned to the factory for service.

It is a good idea to keep the shipping materials for the life of the product. Arrakis is not responsible for shipping damage to products not shipped to the factory in the original packing materials.

Before you start

A) Physical space – It is important to install the console with sufficient space around it to operate and service the console easily.

B) Adequate ventilation – It is important to provide adequate ventilation to electronic equipment. High temperatures can reduce the life of the equipment.

C) 110V – 220VAC Operation – The console comes with a 110VAC – 220VAC autosensing external power supply as standard equipment.

D) Static – Static discharge to electronic devices can cause damage, reduce performance, or cause noise in the system. Proper choice of carpet is important consideration when building a studio. There are ways to reduce static in rooms, and should be researched and implemented prior to installation.

E) Console power supply – The console is powered by an external, regulated power supply. The supply simply plugs into the back of the console. There are no high voltages within the console.

F) AC Power considerations – If possible, plug all of the equipment in your studio into a single AC Power strip. If your Simple IP units are in a separate room, then this may not be possible. A good policy would be to have each room on the same AC outlet. A single power outlet will have a 1500-2000 watt capacity. That is plenty of power for most studios. Simply plug a multi-outlet AC power strip into the single wall outlet and then all of your equipment into the power strip. If possible, the power strip should be the kind that has internal surge protection, and battery backup.

G) 60 Cycle Hum & Audio interference – Most consumer audio equipment will have a 2 prong AC power plug. Some equipment has a 3 prong AC power plug. The third plug on a 3 prong plug is a "Safety Ground" which grounds the chassis to reduce shock hazard. The 3rd prong must never be removed even though it creates a 2nd ground path along with the audio cable shield ground. Two ground paths creates a Ground Loop antenna, which picks up 60 cycle AC hum. If possible, use only equipment that has 2 prong AC power plugs. This is often less expensive than making custom audio cable with audio transformer isolation.

If there are no other ground connected to the studio, a single piece of equipment with a 3 prong AC plug does not create a ground loop. However, if there is another ground, or a 2nd piece of equipment with a 3 prong AC power plug, then a ground loop is completed. If you can not change to two prong equipment, it may be necessary to use an audio isolation transformer on the audio cable to break the audio ground path. Contact a technician or factory on how to build a transformer isolated audio cable.

In some stubborn cases of hum (or RF interference), the best solution is to make the ground resistance between ALL of the equipment as low as possible. To do this, connect all of the equipment chassis' together with #12 stranded, insulated wire. Each piece of equipment is to have its own wire that returns in a star configuration to a single point in the studio. That single point should return by a single ground wire back to the main station ground. A 2"-4" copper ground strap to station ground is best.

IMPORTANT NOTE: Audio cables should be kept well away from AC power cables. A magnetic field is created by an electric current. The larger the current, the larger the magnetic field. AC ground and power wires have large currents and create significant AC magnetic fields. If an audio cable is physically close to an AC ground or power cable, then a 60 cycle AC noise voltage can be magnetically coupled into the audio signal cable.

H) Connecting multiple studios - When connecting multiple studios, long audio cables are sometimes necessary. These long cables can introduce AC hum into your audio. In these cases, it may be necessary to use distribution amplifiers with balanced inputs and outputs (or audio isolation transformers) to break the ground path and to cancel the AC hum.

I) Setup your studio, one piece at a time - When building a studio, it is important to be able to isolate problems that may be causing noise, hum, or even not passing audio. To do this properly, the studio should be assembled and tested one piece of equipment at a time. Each problem is detected and eliminated as it occurs. This manual provides a basic step by step process to assemble and test your studio.

Step by Step
Installation Instructions

IMPORTANT NOTE: The DARC Surface is a pure digital control board. Channel On/Off, volume control & Program/Audition assignments on the DARC Surface merely control the audio sources that are on the Dante network. If you are experiencing audio quality issues, you will want to investigate the source equipment, along with audio inputs & outputs on your Dante network.

IMPORTANT NOTE: Follow this step by step procedure. Each step has specific tests to determine if the console installation has been performed correctly to that point.

STEP 1 – Basic Setup Recommendations.

The DARC Surface has 3 main components.

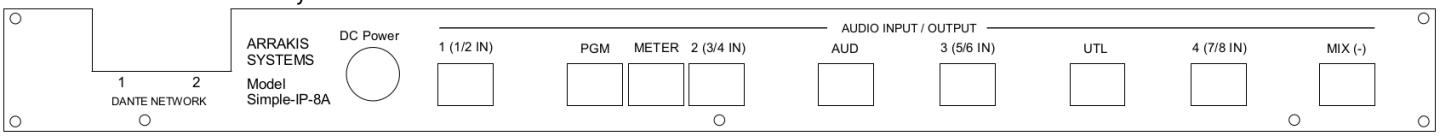
1 – **DARC Surface console.** This console should go in your main studio where you will be operating it from.

2 – **DARC Virtual software**. This software is what digitally controls your Dante audio sources. It handles all audio mixing, along with the Dante Controller software, controls the routing of your audio. The PC running the software should be located in the main studio as well. Use the DARC Virtual manual for installation and operation instructions.

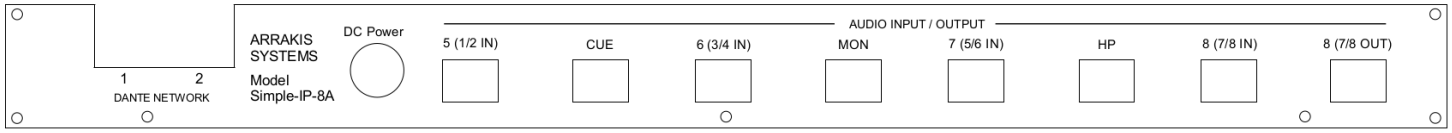
3 – **Simple IP & Dante Audio Sources**. All of your audio inputs and outputs will be ran to the Simple IP nodes. Other Dante audio sources on your audio network will be available as well. Connect the Simple IP units using the Simple IP manual for reference.

If you purchased the DARC Surface 8 bundle, you will have received 2 Simple IP units, A & B.

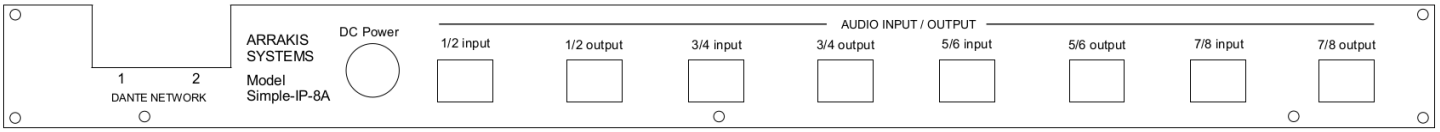
Unit A has the **Meter** output that connects to the DARC Surface **Meter** input. This provides the signal so that you can view the meter levels for Program & Audition. As such, it is recommended to have Simple IP Unit A in your main studio.



Unit B has your Cue (CUE), Monitor (Mon) and Headphone output (HP). These outputs will feed your studio for monitoring your audio feeds. It is recommended to have this unit in your main studio as well.



If you have purchased the DARC Surface 12, then it will come with an additional Simple IP unit with 4 more stereo inputs & outputs. It is referred to as **Unit C**. Unit C can be located in a rack room with other source equipment, or anywhere on your Dante network.



IMPORTANT NOTE: All units on the Dante network should be set to a 48k sample rate. Simple IP is set to 48k by default.

STEP 2 - Power Supply Installation. The console power supply should be plugged into a surge protected outlet, with battery backup if possible. First plug the power supply into the back of the console, and then plug the power supply into the AC outlet. It is highly recommended to have all of your studio equipment in your main studio on the same Surge Protector, on the same outlet. This will eliminate the possibility of adding noise to your audio chain.

When the DARC Surface is first powered up, it should display the firmware on the far left OLED.

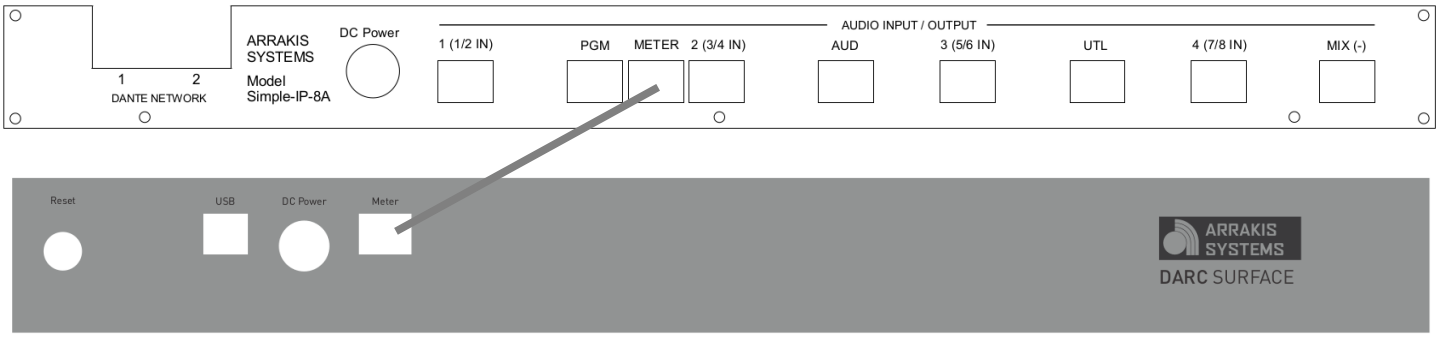
Plug in power for the DARC Virtual PC as well as for each of the Simple IP units that are being used. Reset the network switch connecting your Simple IP units after all the units have been powered on.

IMPORTANT NOTE – Be certain to ground the chassis' of the Simple IP units to eliminate damage from static discharge.

Test – The console should now be powered. To test for power, simply push one of the console channel On/Off switches to see that the Channel On LED lights. The rear Reset button should also be lit.

STEP 3 – Connect the USB. Connect the USB on the DARC Surface to the designated PC that will be running the DARC Virtual Console software. Power up your PC, and turn on the DARC Virtual Console software. The software should auto-connect to the DARC Surface.

STEP 4 – Connect the audio output from the Simple IP labeled **Meter**, to the rear of the DARC Surface labeled **Meter**. This will allow the DARC Surface to display levels for the Program and Audition outputs.



STEP 5 – Setup your DARC Virtual Console PC. Details to these steps can be found on our website or in the DARC Virtual Manual. The reason these steps are not included are because the software will be updated and changed on a regular basis, and steps may change. The basic steps are:

1) Install the DARC Virtual Console PC software. This step may already be done if you have purchased a configured PC from Arrakis.
2) Install the Dante Virtual Sound Card on the PC. This step may already be done if you have purchased a configured PC from Arrakis.
3) Connect the PC to the network via the PC ethernet connection. This should go to your network switch that is connected to your Simple IP nodes.

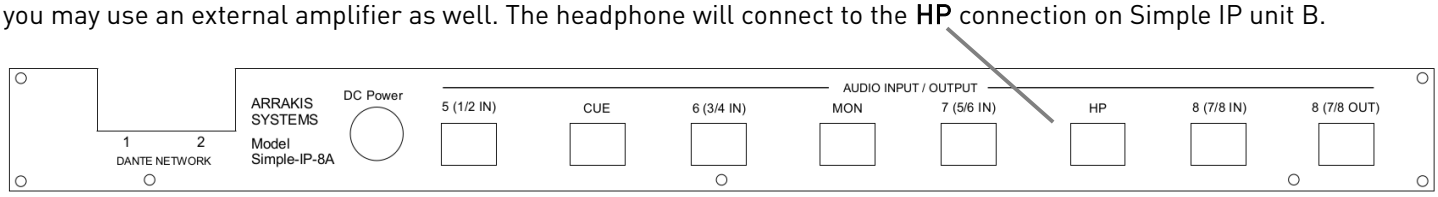
STEP 6 – Assign audio to one of the audio input channels on the DARC Surface. This may be done from the DARC Virtual Console software, or using the Dante Controller software. Details to these steps can be found in the DARC Virtual manual.

Be sure to have an audio source playing audio on your Dante network. This can be through one of our Simple IP devices, and then assigned via the Dante Controller software.

Once a source has been assigned to a channel on the DARC Surface, place that channel on Program and Audition by pressing the applicable PGM & AUD channel buttons.

Test – You should now see audio levels playing on the VU meters for both Program & Audition.

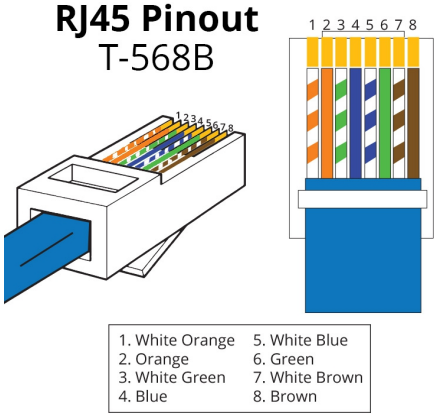
STEP 7 – Listen to audio on the headphones. Headphones can directly connect to the Simple IP HP output, or you may use an external amplifier as well. The headphone will connect to the **HP** connection on Simple IP unit B.



Headphone Out Pinout

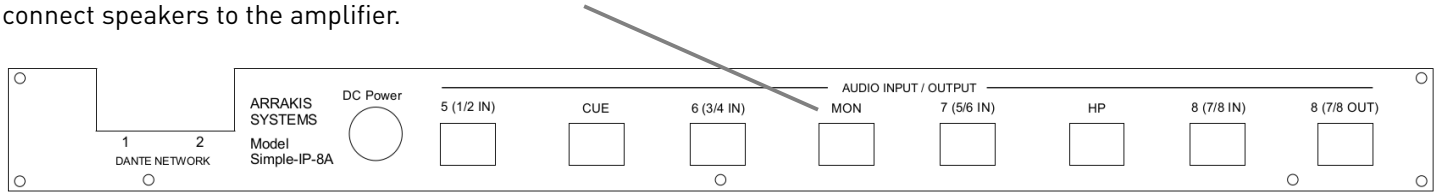
Pin 1 – Left (+)
Pin 2 – Left (-)
Pin 3 – Right (+)
Pin 4 – Ground
Pin 5 – NC
Pin 6 – Right (-)
Pin 7 – NC
Pin 8 – NC

RJ45 Pinout
T-568B



Test – Turn on an audio channel on the board that has audio playing through it. You should hear the audio on the channel clearly. If you notice distortion, you should first check the audio quality at the audio source equipment (such as CD player, Mic, etc...), and then the input to the Dante network (such as a Simple IP 8A or Simple IP 8D unit). Audio is not passed through the DARC Surface, and therefore will not be a possible source to any audio issues.

STEP 8 – Monitor Speaker Connection. The Simple IP unit has a low level monitor audio output that is designed to connect to an external audio power amplifier. The Simple IP output will not directly drive speakers. Connect the audio amplifier input to the Simple IP Monitor Output on the back panel of the unit. Follow the amplifier's instructions and connect speakers to the amplifier.

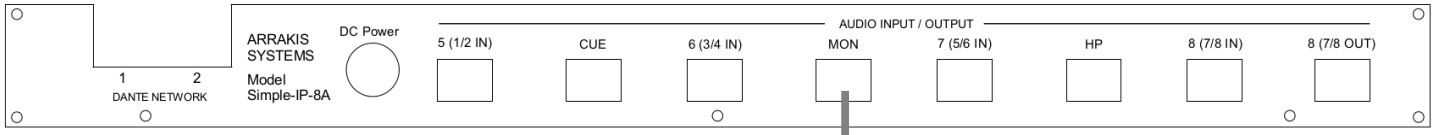


On the console, select PGM on the Monitor Selector switch and rotate the Monitor Volume control to 1/2.Set the audio power amplifier level and front panel switches per the amplifier instruction manual.

WARNING- do NOT have all level controls at maximum. Too much audio level through your speakers can damage the speakers.

There should be an audio source (such as CD player) connected to a Dante input source, as described in Steps 1-6. Turn the console source channel on and play a song. The VU meters should move with the audio and audio should be present at the headphone jack. Be certain that any mic channel is turned off because it will mute the audio out of the speakers so that there is no feedback. Audio should now be audible through the monitor speakers.

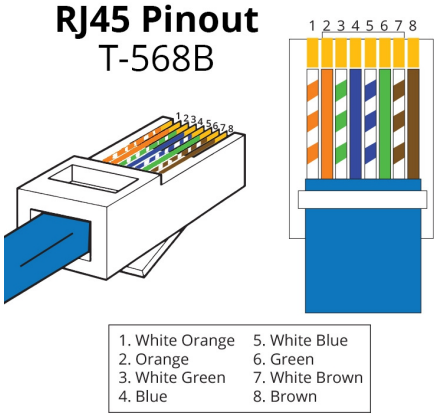
TEST- The audio through the monitor speakers should be clear and without significant noise or hum.



Monitor Out Pinout

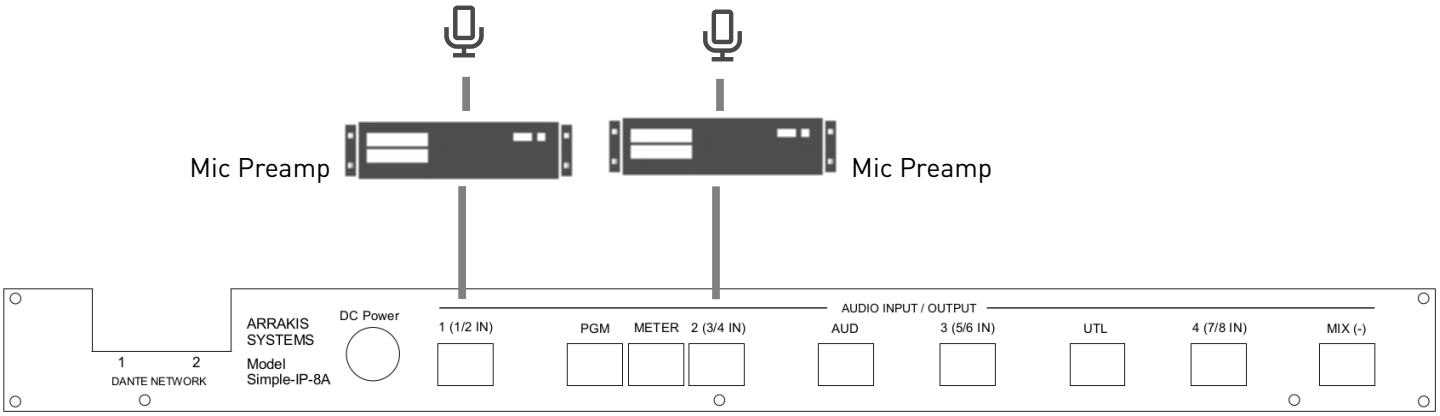
Pin 1 – Left (+)
Pin 2 – Left (-)
Pin 3 – Right (+)
Pin 4 – Ground
Pin 5 – NC
Pin 6 – Right (-)
Pin 7 – NC
Pin 8 – NC

RJ45 Pinout
T-568B





STEP 9 – Connect a mic to the Simple IP unit. The Simple IP units have Line Level inputs built in. Connect your microphone to your 3rd party mic preamp. The mic preamp output then connects to a Simple IP input.



Change channel 1 in your DARC Virtual Console software to Mic. It is necessary to change the channel to a mic input in the DARC Virtual software so that it will automatically mute the monitor speakers. Path the Mic input on your Simple IP to play out channel 1 in the Dante Controller software.

Turn Channel One on (the red LED should be on) and set the channel one fader to the in hand position (middle).

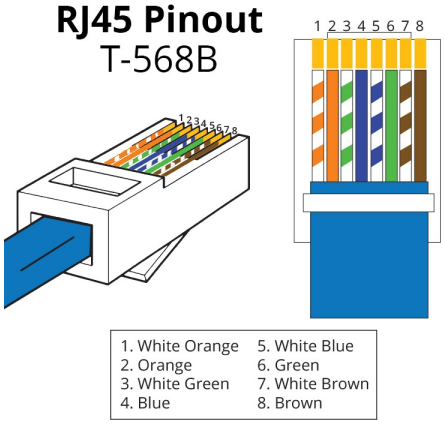
If the mic itself has an on/off switch, then turn it on. Select PGM on Channel 1 of the DARC Surface.

TEST- Speak into the microphone and the console VU meters should follow your voice. There should be no audio out of the monitor speakers (they are muted to eliminate feedback) but there should be audio in the Headphones.
If mic level is low, refer to "Calibration" later in this section.

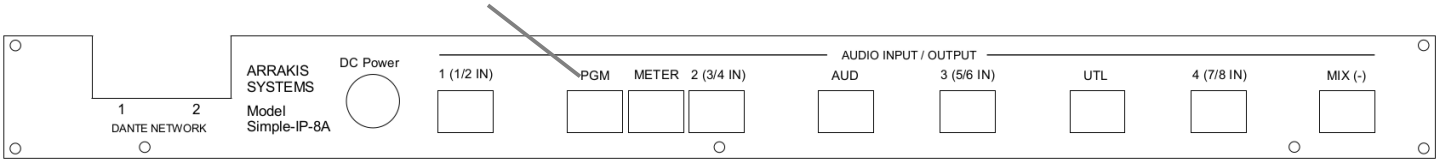
Mic 1 Input (Simple IP 8A) Pinout
Pin 1 – Mic 1 (+)
Pin 2 – Mic 1 (-)
Pin 3 – NC
Pin 4 – Ground
Pin 5 – NC
Pin 6 – NC
Pin 7 – NC
Pin 8 – NC

Mic 2 Output (Simple IP 8A) Pinout
Pin 1 – Mic 2 (+)
Pin 2 – Mic 2 (-)
Pin 3 – NC
Pin 4 – Ground
Pin 5 – NC
Pin 6 – NC
Pin 7 – NC
Pin 8 – NC

RJ45 Pinout
T-568B



STEP 10 – Connect the Simple IP Program (PGM) output. The Simple IP unit has a balanced RJ45 Program output. It is located on the back panel, and is calibrated to +4dBu. Connect this output to your signal chain, such as your Studio Transmitter Link or streaming PC.

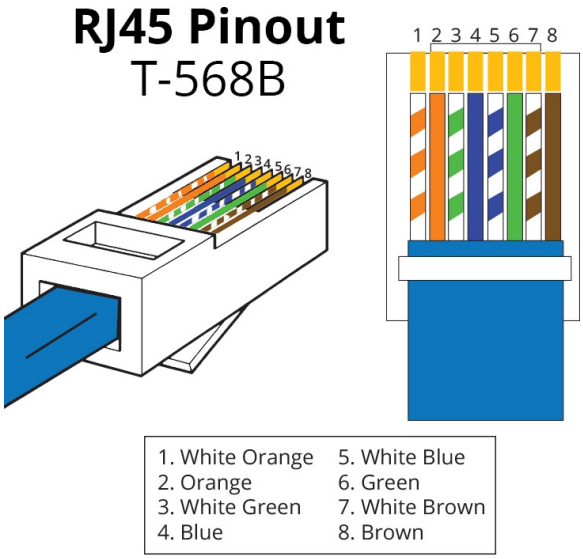


The DARC Virtual software can play out any assigned Dante output, but the default will be this PGM output on the rear of the Simple IP unit.

TEST- The Program output of the Simple IP is connected to additional equipment (processor, distribution amp, etc) to form a signal chain. Check for presence and quality of audio at each point along the signal chain.

Program & Audition Pinout

Pin 1 – Left (+)
Pin 2 – Left (-)
Pin 3 – Right (+)
Pin 4 – Ground
Pin 5 – NC
Pin 6 – Right (-)
Pin 7 – NC
Pin 8 – NC



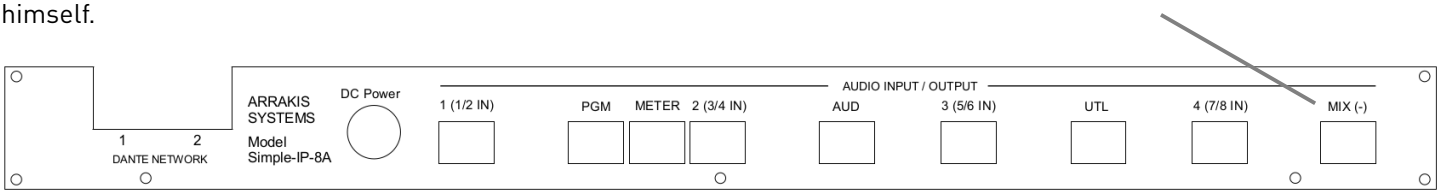
STEP 11 – Connect the console Audition (AUD) output. You may also connect the Audition output using the same steps from STEP 10.

STEP 11 - Connect a Telephone Hybrid

Your phone hybrid will be connected to hardware on the Dante network, such as one of our Simple IP nodes.

1) CONSOLE PHONE INPUT- A telephone hybrid has an audio input and an audio output. The hybrid audio output is the callers voice and is connected to a source input on the Simple IP unit. More details will be found in the Simple IP manual.

2) CONSOLE MIX MINUS OUTPUT- The input to the hybrid is from the Simple IP output connector on the back. A mix minus bus is a special audio mixing bus that contains all audio on the console program bus MINUS the callers voice. In this way the caller hears everything except himself. If he was not "minused" from the mix, then the caller would feed back to himself.



3) CONTROL LOGIC- The hybrid has two ways to "answer" the caller and pick up the telephone line: front panel manual control of the hybrid itself and remote control. For manual control, an On and Off button will be located on the front panel of the hybrid. For remote control, you will need the optional USB logic relay. This relay can be purchased on our website. Instructions for setup may be provided by our support team.

⚠ NEVER DIRECTLY CONNECT ANY PHONE LANDLINE TO THE SIMPLE IP CONNECTORS. THIS WILL LIKELY DAMAGE BOTH THE SIMPLE IP AS WELL AS THE PHONE HYBRID.

4) CALIBRATION- The Simple IP input and output connectors are set for +4dBu levels. These connectors have trim pots next to their respective connectors. Instructions on calibrating the Simple IP units will be included in the Simple IP manuals.

5) FACTORY CABLES AND RELAYS- Arrakis has prebuilt relays & cables for audio and logic available for a variety of source equipment. Refer to the Arrakis website for more details and pricing (www.arrakis-systems.com)

6) The desired channel needs to then be changed to a 'Phone' channel within the DARC Virtual Console software. These steps can be found in the DARC Virtual manual.

STEP 12 - Talkback to another Studio

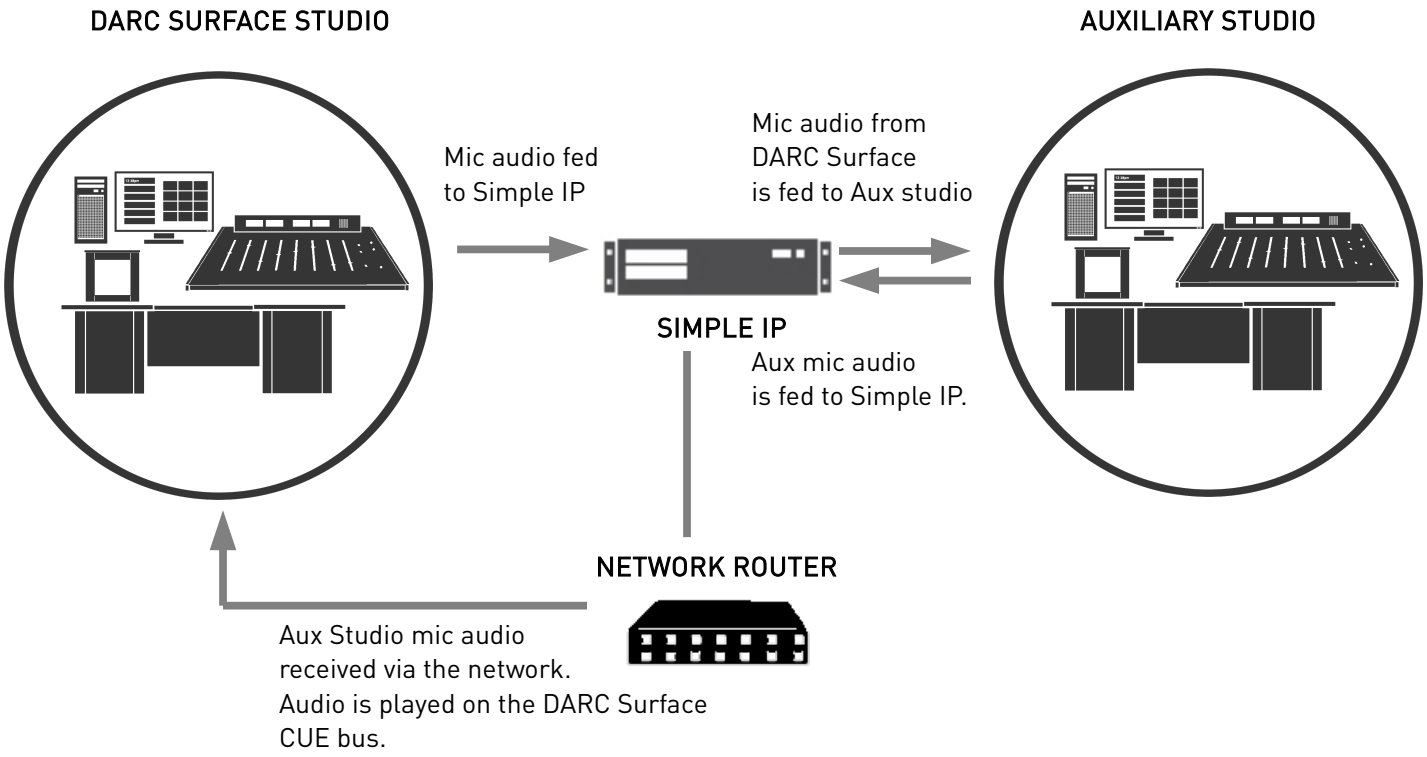
The Talkback feature is designed so that a console can easily communicate with another studio. In the DARC Surface studio, the operator pushes the CUE button on a mic channel and speaks through his control room mic into the Monitor/cue system of the other studio. The second studio responds back to the DARC Surface studio and the audio is heard through the CUE system.

INSTALLATION

The DARC Surface utilizes the Dante AoIP network with Simple IP hardware.

OUTPUT – The audio output feeding the Auxiliary studio will be one selected from one of the Simple IP audio outputs. This audio output would be ran to your Auxiliary studio. The assignment of which audio output needs to be assigned via the DARC Virtual Console software. For wiring, please refer to the Simple IP installation manual.

INPUT – The mic from the Auxiliary studio would need to be connected to a Simple IP (or any Dante) input.The audio fed from the remote Auxiliary studio to your DARC Surface studio, will then be fed over the network to the CUE output on the DARC Surface console. This audio will play out to the headphones. The specific input assigned as the studio to be fed to the DARC Surface console will need to be assigned with the DARC Virtual Console software.



STEP 13 - External Monitor Input

The Monitor Selector Switch on the DARC Surface has an External Input position (AIR). This position is usually used to monitor the actual radio station on air signal from a radio tuner. NOTE: it is important to monitor the actual signal from the radio station and not just the output of the console. This is so as to monitor the entire radio chain from the console to the transmitter.

INSTALLATION

Setup instructions may be found in the DARC Virtual manual.

DARC Virtual Logic I/O

The DARC Virtual software has the ability to receive and send relay closures from external hardware. The logic functions would be for operations such as:

1) On-Air Light on/off.
2) Phone Hybrid accept & drop call.
3) EAS Interrupt.
4) Channel on/off control from remote location.
5) Switch between presets.
6) Switch from Surface control to DARC Virtual software control.

Instructions may be found in the DARC Virtual manual for setup and operation.

Audio Calibration

The DARC Surface console has no audio passing through it for inputs or outputs. All audio will be passed through the Dante network and then controlled programmatically via the DARC Virtual Software & Dante Controller. Therefore, there is no audio calibration on the DARC Surface. More details on how to calibrate the Simple IP node may be found in the Simple IP manual.

VU METER ADJUSTMENT

The VU meters are factory set for +4dBu at 0VU. These levels should not be changed from factory settings unless directed by factory service technicians.

Service & Maintenance

General Repair Considerations

WARNING

The console should be repaired by qualified, professional, & experienced, audio technicians ONLY. Before beginning any type of repair or opening the console CALL Arrakis customer support for recommendations.

DESIGNED FOR MODULAR PART REPLACEMENT

The ARC series console is designed for modular replacement rather than repair. The power supply is external and plug in. The rotary faders are plug in. All ICs are plug in. ICs can be individually replaced to test for functionality. A small amount of disassembly is required.

PC BOARD COMPONENT LEVEL REPAIR

If possible, PC board component level repair requiring soldering should be performed at the factory. In particular, replacement of slide faders and switches should be performed at the factory. If the repair must be made in the field, then extreme care must be taken to not damage the PC board or other components. Arrakis can not warranty non-factory service.

POWER SUPPLY

The power supply is a sealed module that must be replaced in whole if there is a problem. Using the incorrect power supply, not supplied by Arrakis, will void the warranty.

REPEATED EQUIPMENT FAILURES

If a specific part of the console is failing regularly, it is likely that it is being subject to unusual stresses. Examples are;
(1) Switch or fader failure- rough physical treatment.
(2) Mic channel IC failure- static discharge to mic.
(3) Input op amp failure- lightning, power surge, or other transient on this cable.
(4) Output op amp failure- lightning, power surge, or other transient on this cable.
(5) Power Supply failure- lightening, power surge, or other transient on the AC power line.

Resetting the Console

Since the console is digital, it may need to be reset on occasion. This would be done in the following steps:

STEP 1 – Shut down the DARC Virtual software & PC. Shut off the DARC Virtual software, and then shut down the PC running the DARC Virtual software.

STEP 2 – Reset the DARC Surface. Press the **Reset** button on the DARC Surface. This is located on the rear, and is lit via LED. You may need to hold the reset button for 1 second. Make sure the LED goes off when you are pressing the button. The reset light should come back on after being pressed. You may need to check your power supply and power outlet if the Reset LED does not light up.

STEP 3 – Turn your DARC Virtual PC on. Startup your DARC Virtual software. It should auto-connect to the DARC Surface.

Please contact our console support department if you have any problems connecting the DARC Surface to the DARC Virtual Console.

Opening the Console

WARNING

The console should be repaired by qualified, professional, & experienced, audio technicians ONLY. Before beginning any type of repair or opening the console CALL Arrakis customer support for recommendations.

ACCESSING THE MOTHERBOARD

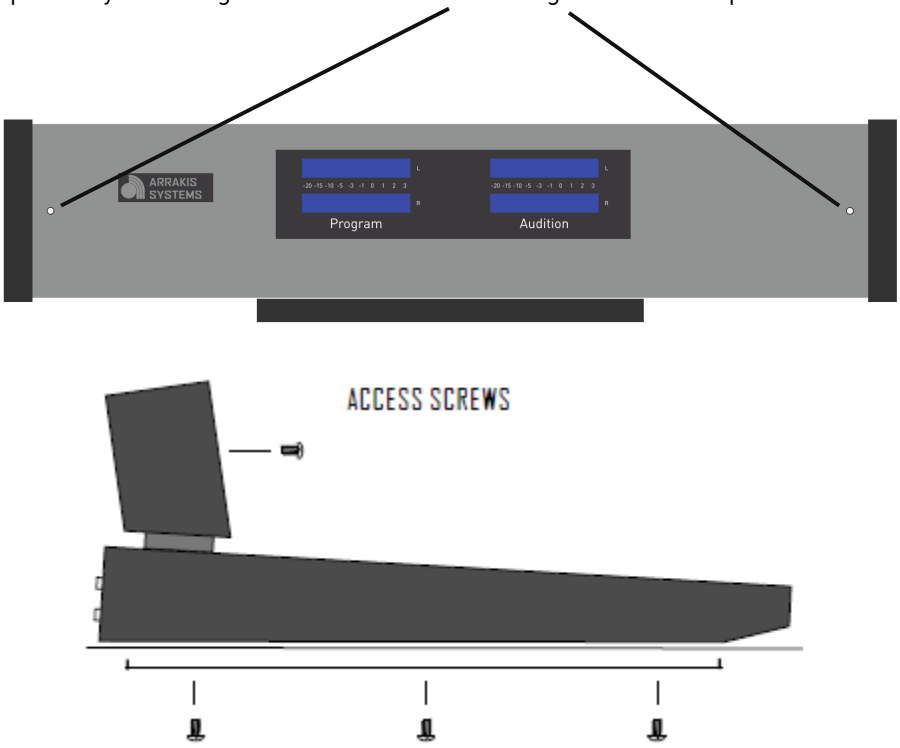
The motherboard is accessed from the bottom of the console. Six screws must be removed from the bottom panel to have access to the console electronics for test and IC replacement. Be careful to not scratch the console when turning the console over.

REMOVING THE MOTHERBOARD

The motherboard is attached on the top of the front panel (slide fader screws) and with screws on the bottom of the motherboard, requiring access to the inside of the console. When replacing the motherboard, be certain to replace all of the screws so that switches and faders will operate properly.

ACCESSING THE INTERIOR OF THE VU METER PANEL

The VU meter panel is opened by removing the screw at the left and right front of the panel.



Replacing Slide Faders, Switches, and other parts

Slide faders and switches are soldered onto the PC board and should be replaced at the factory if at all possible. The procedure requires proper tools, and it can be difficult to remove the parts without damaging traces or pads on the PC board. Also, the switches are very sensitive to temperature and duration during the soldering process and can be electronically damaged or destroyed when being soldered. If a slide fader, switch, or other part must be replaced in the field, then extreme care must be taken.

Tools required:
1) Hand held solder sucker (stranded solder wick is not suggested)
2) Temperature controlled soldering iron with pencil tip (soldering guns should not be used)

Procedure:
1) Suck the solder from all holes until the damaged component is entirely free from the PC board. Remove the damaged part.
2) Place the new part onto the PC board. Slide faders and switches (and some other parts) ARE oriented and MUST be replaced in the correct orientation.
3) Carefully solder the new part to the PC board.
    a) Clean the tip of the soldering iron on a wet sponge.
    b) Tin the tip of the soldering iron (cover the tip of the soldering iron with a small amount of solder).
    c) Set the soldering iron to 734 degrees Fahrenheit (390 degrees Celsius).
    d) Touch the tip of the 'soldering iron' to the junction of the PC board pad AND the component lead.
    e) Immediately touch the 'solder' to the junction of the soldering iron and the PC board pad.
    f) Flow only enough solder to fill the hole. Immediately remove the soldering iron from the part.
    g) Do not keep the soldering iron on the part for more than 2 seconds.
    h) Clean the solder rosin from the PC board if required. (See Note #1 below)

Note: Arrakis uses aqueous core (water soluble) solder that requires the solder joint to be cleaned by water after soldering. Aqueous core solder is acidic and must be cleaned so as to not damage the PC board over time. Rosin core solder is not water soluble and requires a flux remover if it is to be cleaned. The rosin residue however does not have to be removed for rosin core solder.

Warranty: Arrakis can only warranty service performed at the factory. All field service is performed at the customer's risk.

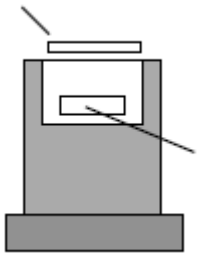
Replacing Rotary Faders

All 3 rotary faders are in a single wiring harness that plugs into the motherboard. The entire harness should be replaced with all three pots. Contact the factory for a replacement harness.

To remove a rotary fader
(1) Remove the knob cover as illustrated
(2) Remove the nut and nut plate.
(3) The pot will now remove from the rear of the front panel.
(4) Unplug the pot from the motherboard.

To put a new rotary fader in place: Reverse the removal procedure

Knob Cover



Pry cover from top of the knob to reveal a lock nut. Unscrew the lock nut to remove the knob.

Replacing ICs

ICs must be replaced with care. All ICs in the console are socketed so that they can be replaced.

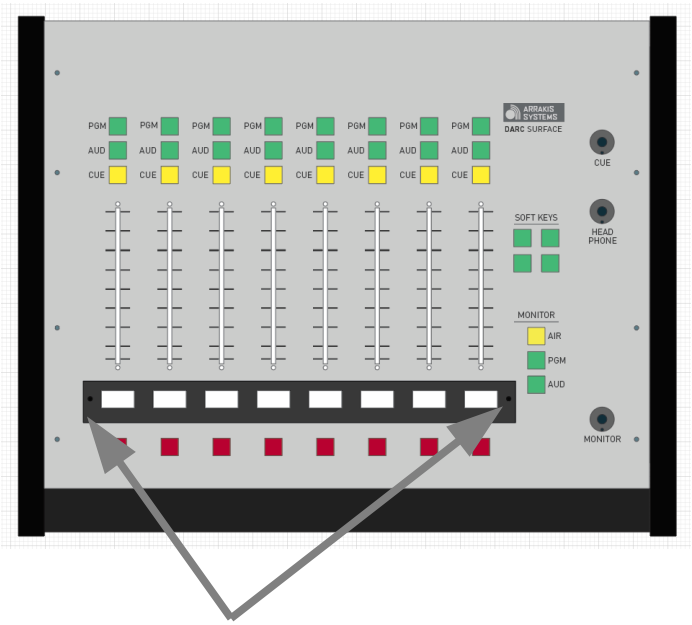
When replacing an IC, be careful to not bend legs under the IC or outside the socket. Be extremely careful to not shock an IC or the motherboard with a static discharge. In some cases, you must use a grounded arm or anklet if there is a possibility of a static discharge.

In all cases, retain the old IC because it may be found to not be damaged.

Replacing OLEDs

OLEDs are designed to be extremely easy to replace. These replacement OLEDs may be purchased from Arrakis Systems.

To replace an OLED:
1) Power down the console.
2) Unscrew the two screws that hold the acrylic cover.
3) Unscrew the two screws holding the OLED to be replaced.
4) Pull the OLED out, and replace with the new OLED. Make sure to match the pins to the correct location on the socket.
5) Place the acrylic cover back over the OLEDs. Screw the two screws back in to finish the replacement steps.



Screw for acrylic cover

Motherboard Parts Layout

A copy of the motherboard parts layout may be found online in our support pages. This will give the layout and labels for all replaceable socketed ICs.

Replacing Processors

The DARC Surface has two or more processors built in. These are socketed and can be easily replaced. It is recommended to have these replaced at our factory. If it is required to replace a processor in the field, then it will be important to:
1) Match the pin assignments of the processor and the board.
2) Each processor has specific firmware and cannot be swapped with other processors on the board. They will likely get damaged as a result of misplacement. Therefore, it is required that the correct processor gets placed in the correct location. Each processor is labeled. Contact our support department for guidance.

Warranty Replacement of Parts

To have a part replaced under warranty, you must:
1) Provide a valid product serial number that is within the warranty period

2) Contact the Arrakis customer service department and describe what parts need replacement and the circumstances of the failure. (The customer service department may require on site test by your technician to confirm the part replacement is appropriate for your problem.)

3) A Return Merchandise Authorization Number (RMA #) will be issued when a part s to be returned to the factory.

4) Return ALL defective parts to the factory (shipping prepaid) to the attention of the "Customer Service Department" with a letter including your name, address, call letters, serial number, date, and valid RMA #.

5) Parts replaced under warranty will be shipped at Arrakis expense by UPS ground. Any expense over and above UPS ground will be born by the customer.

IMPORTANT- If the defective parts are not returned to the factory within 30 days, you will be invoiced for them and it will be assumed that they do not fall under warranty. Further customer service will be denied until the defective parts are returned of paid for.

Purchased Parts
An Arrakis customer may purchase spare or replacement parts from the factory. The cost of the parts will include a service charge, the cost for the parts, and the cost of the shipping.

Details for purchasing parts may be found on our website.

IMPORTANT- Non payment or late payment for parts will result in refusal of further customer service until the problem is resolved.