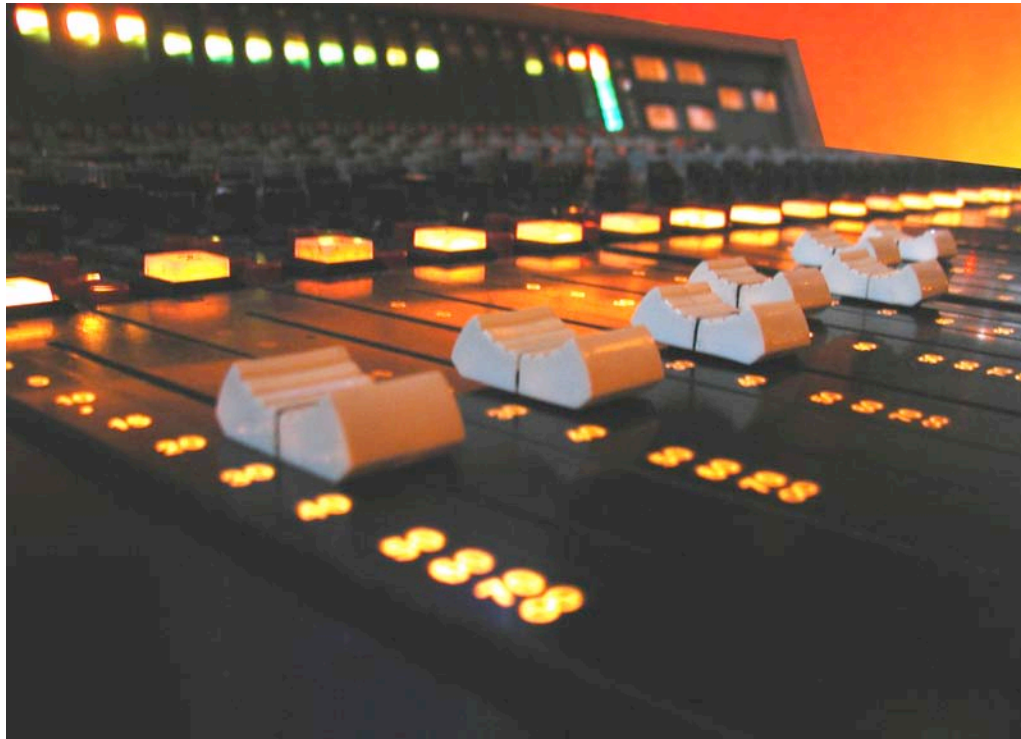


SE-DOT5™ discrete class A and class AB
RED and **BLUE** opamp(s)
installation guide



for MCI 400 series consoles

please contact us at;

sage

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54 Mulvagh Avenue, Ottawa, ON, Canada K2E 6M6

- **forward**
- **installation guide**
- **warranty**

Thank you for purchasing our SE-DOT5™ 'RED' and 'BLUE' discrete opamps for your MCI 400 series console.

It's always challenging to make the right decision when buying components for one's recording set up. We're glad to have this opportunity for you to own and use some sage gear and hope you will be too.

We sincerely hope you enjoy the results as much as we do in our MCI JH-416B here at bova sound <http://www.sageelectronics.com/bovasound>

Please take a moment to read the following few suggestions before commencing the upgrade process.

We know people are always impatient to plug 'em in right away and get going but it is essential to follow proper procedure to eliminate the unfortunate possibility of blowing up your happy little opamps before you have even had a chance to love them !

I would like to preface the following info about these opamps by telling you how much I love MCI 400 series consoles.

What we've always cherished about our beloved JH-416 <<http://www.sageelectronics.com/bovasound>> is its sound of big iron and its elegant simplicity.

These qualities remain unchanged with the installation of our SE-DOT5 discrete opamps.

What HAS changed ... is everything else.

Although there is little doubt that the slow grittiness of MCI 2001 opamps have a certain charm for rock and roll I have always felt that they limit the sonic possibilities of these consoles and so I designed two different discrete opamps to bring out the full potential of these great boards. One (the RED opamp) running pure class A - and the other (the BLUE opamp) running class AB

The 'RED' (pure class A) SE-DOT5™ and 'BLUE' (class AB) SE-DOT5™ are uniquely designed to replace any MCI 2001 or 2003 metal can IC opamp found in MCI 400 series consoles. These offer full rail + / - 24V operation and direct plug in compatibility. Any MCI 2001 or 2003 opamp in any stock 400 series console can be replaced with the RED or BLUE SE-DOT5 opamp specifically as follows.

channel strip(s)

(total of 7 opamp replacements / channel strip)

- the RED pure class A opamp replaces the four 2001s in the
 - o mic preamp
 - o fader buffer
 - o hi/lo eq an
 - o mid eqpositions
- the BLUE class AB opamp features a robust output stage and is used to replace the three 2001s in the
 - o channel summing amp
 - o monitor inverter an
 - o pan buffer positiondue to their heavier current-driving requirements

master section

(total of 4 or 8 opamp replacements)

- depending on whether you mix in stereo or quad

If you are using your console for stereo mixing only (ie: left and right front - vs. quad mixing with left and right front and back) you will only require;

- two RED class A opamps to replace both the
 - o front left and
 - o front rightsumming amps and

- two BLUE class AB opamps to replace both the
 - o front left and
 - o front rightpost fader output stages

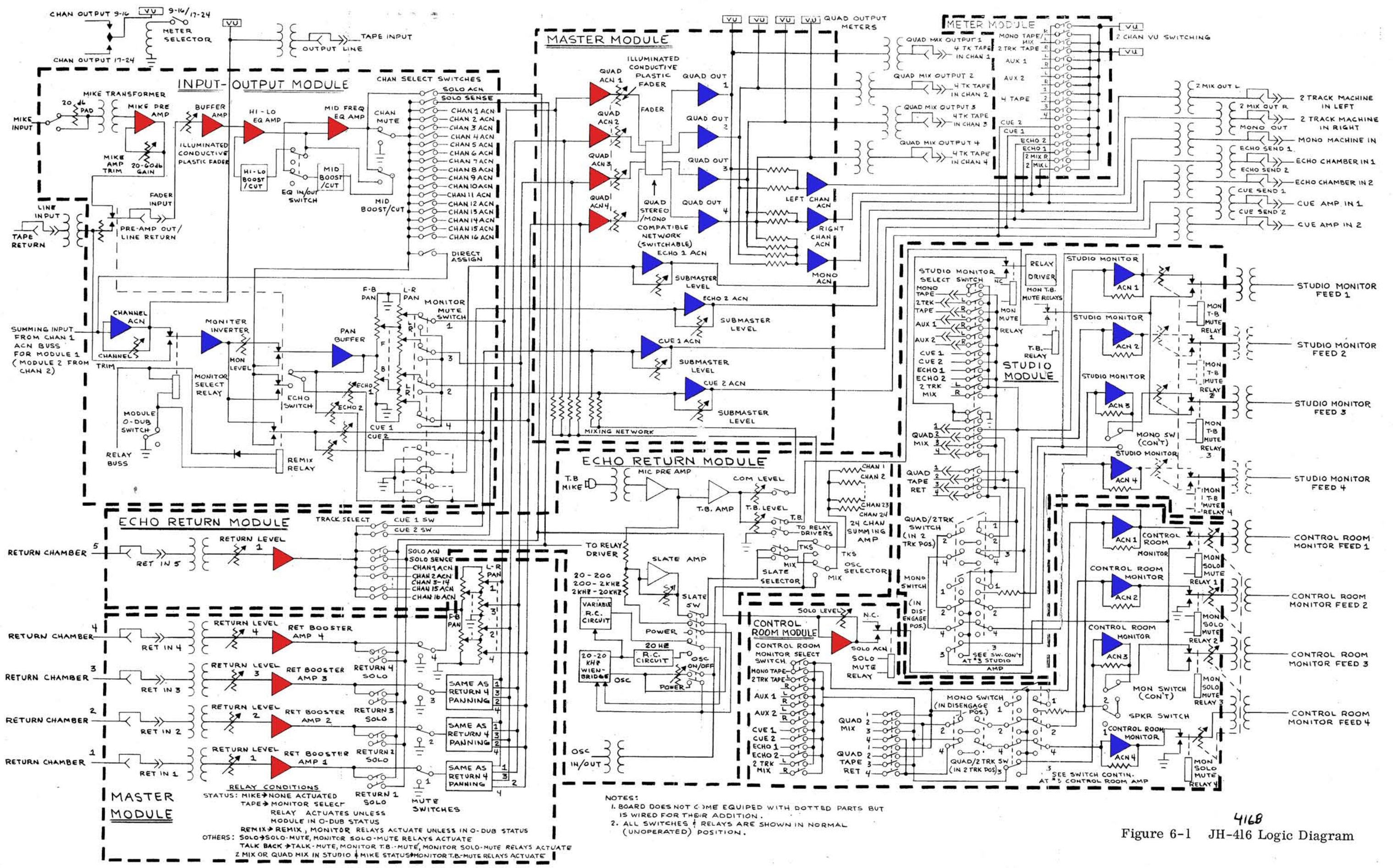
If you mix in quad you will require;

- four RED class A opamps for the pre-fader summing amps and
- four BLUE class AB opamps for the post fader output stages

A good initial replacement strategy might include a total of 20 SE-DOT5s (10 RED and 10 BLUE) to allow replacement of all 2001s in

- two channel strips (total of 8 RED + 6 BLUE)
- the master section (front left and right only ~ for stereo mixers) (total of 2 RED + 2 BLUE) - and
- the left and right front output amps in the control room monitor strip (2 BLUE)

This strategy will provide two excellent mic pres, two desirable eqs and an upgraded master section which will improve the sonics of all channels in the board ~ whether upgraded or not.



416B
Figure 6-1 JH-416 Logic Diagram

One other part of the console where an upgrade may be critical is the control room output amps. At our studio we monitor directly off the quad output amps, in order to hear the exact signal path leaving the console, so this is not an issue for us. However, if you enjoy the convenience of the control room output knob and assorted switch options, it is essential to upgrade this section to avoid a sonic bottleneck. What's the point of upgrading earlier sections if you are still monitoring all signals through an old MCI 2001 ? !

Other parts of the console can also benefit from upgrades. The stock cue/echo amp design is a bit on the economical side to be polite as it uses a single opamp to both sum and drive the 600 ohm output transformer. However if you aren't running anything mission critical through them, I would put them at the bottom of your upgrade wish list !

SE-DOT5 RED and BLUE opamps are painless to install. They run on the same +/- 24 Volts as the 2001s (and 2003s) and feature gold pins to match the premium gold contact octal sockets on the console circuit boards.

You don't have to add messy, instability-prone long legged DIP sockets, nor do you have to lower your PSU supply voltage as some other upgrade approaches demand.

Luckily we can all have our cake and eat it too ... because now after 35+ years these quad buss consoles once again offer intriguing new possibilities. On our 416B, we have upgraded 16 channel strips plus front left and right master busses. We've left 8 channels with stock MCI 2001s in place as well as the rear left and right rear busses. Those handy little Front / Back knobs (assuming they're not rusted in place due to disuse) now give us choice to mix and match old and new circuit topologies to our heart's content.

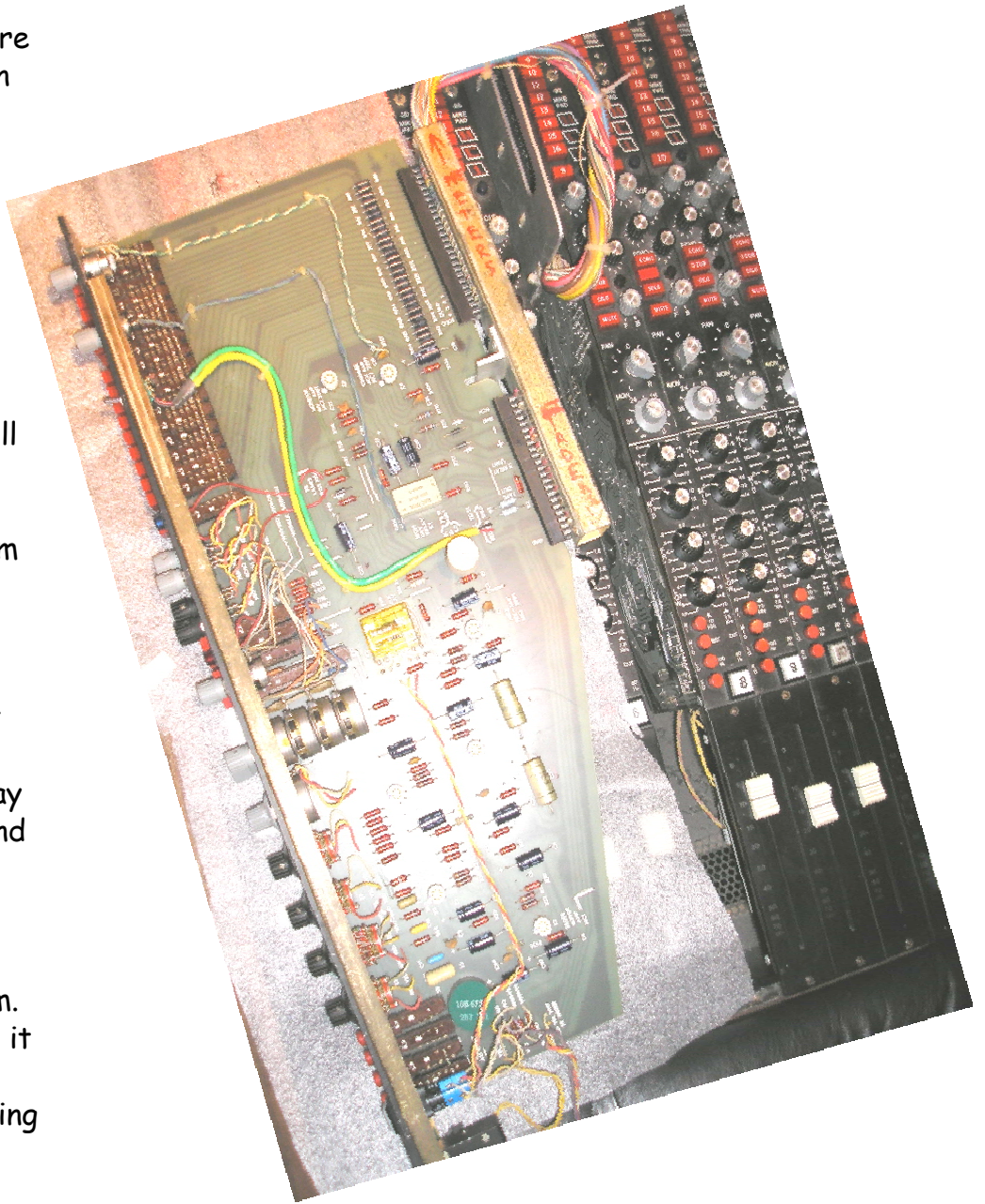
SE-DOT5™
the 'RED'
pure class A
discrete opamp



SE-DOT5™
the 'BLUE'
class AB
discrete opamp



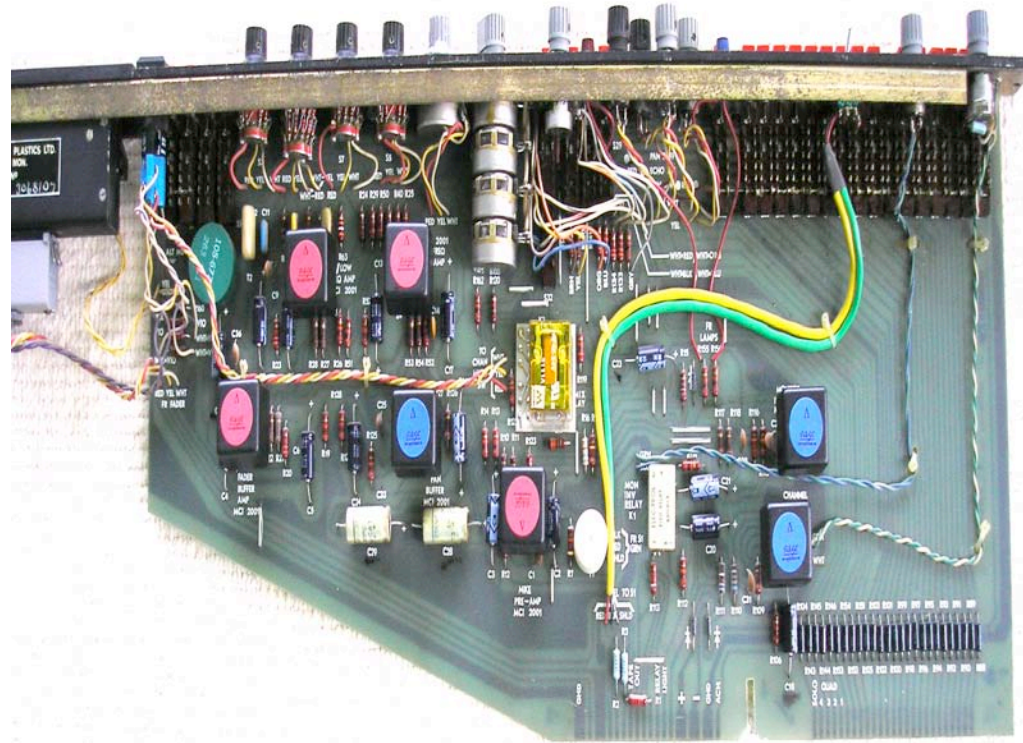
- We recommend starting the installation procedure by replacing the old MCI2001/2003 IC metal can opamps in an Input-Output Module [referred to hereinafter as "I/O Module"]. Seems most folks have a card extender module which allows you to remove a I/O Module from the console and reconnect it while lying on it's side with the components facing up.
- Its a very good idea to place a non conductive sheet of material under the I/O Module. This will prevent anything from short circuiting the PCB traces on the bottom of the I/O Module circuit board. It will also prevent the console knobs from being scratched or chipped.
- Always have respect for those hefty +/- 24 volt MCI power supplies and their ability to pump out lotsa current should you do something stupid. Although plugging in any component the wrong way usually results in merely a little puff of smoke and a bad smell, it is possible for more serious pyrotechnics...you do not want this!!!
- Turn off your console power supplies...all of them. If your supplies are in another room as ours are, it is a very good idea to get another person to help you coordinate turning your PSUs on and off during the installation.



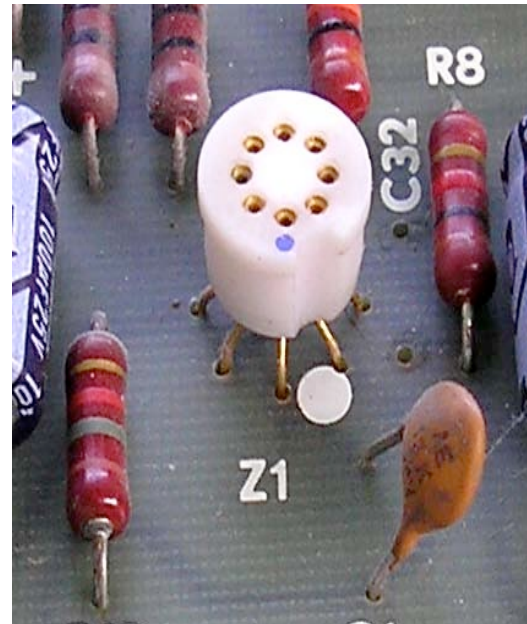
- To remove modules from MCI 400 series consoles you need:
 - a 1/16 " hex Allen key or similar (I happen to like the Xcelite P21 1/16")
- Unscrew the 2 small hex bolts, one at the top of the module and one at the very bottom.
 - do not remove the hex bolt at the top of the fader
 - be careful that you do not drop the bolts into the belly of the consol this can make you very grumpy as they must be retrieved before continuing ... If you are already feeling nervous get a qualified studio tech to do the work
- Remove I/O Module by grasping the furthest knob [Channel Trim] and the Pan Knob
 - gently but firmly, pull straight upward while slightly rocking the module top to bottom until it is free of the motherboard connector
 - now is a good time to vacuum out the multi-pin female connector which the the Channel Strip plugs into
 - I always treat this connector and the corresponding edge "fingers" on the circuit board with Stabillant 22 from DW Electrochemicals. This amazing product increases conductivity between tired contacts [that's our consoles I'm talking about] plus it's lubricating quality aids re-insertion of the module back into the motherboard.
- Plug one end of the I/O Module motherboard extender into the motherboard edge connector inside your console
 - there is a metal "key" on the motherboard that lines up with a slot on extender
 - plug the I/O Module edge "fingers " into the other end of your extender card
 - there is a metal "key" on the extender that lines up with a slot on the I/O Module edge connector

- If you don't have an I/O Module motherboard extender, you will have to carefully replace your I/O Module after each new opamp replacement in order to test it.
- Do NOT start unplugging MCI 2001s yet !!!
 - turn your console back on and verify that audio is playing through this specific channel strip
 - turn console Power Supplies OFF.
 - always wait 30 seconds minimum for all of the power to drain out of the console power supplies before removing or installing any part ... this will save untold grief
- I always recommend replacing one MCI 2001 at a time.
 - that way you can easily troubleshoot, knowing you are only one action away from when you last passed signal successfully through the Channel Strip
 - this method also helps you to avoid massive catastrophic component failure due to making several mistakes at once ... I speak from painful personal experience !

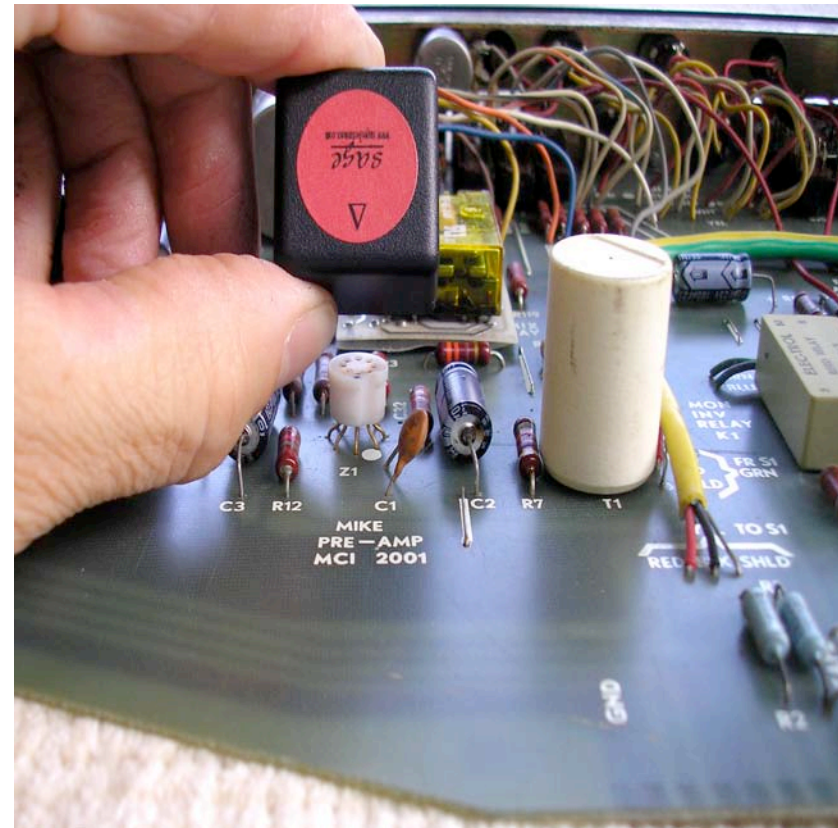
- If you are upgrading all 7 MCI 2001s in the I/O Module, I suggest starting with the mic pre. Remove the mic pre MCI 2001 by firmly but gently grabbing the metal can and pulling straight up from the circuit board. On some MCI 400 series consoles, the 2001s have a finned heatsink attached to the metal can. Make sure they don't fall inside the console.



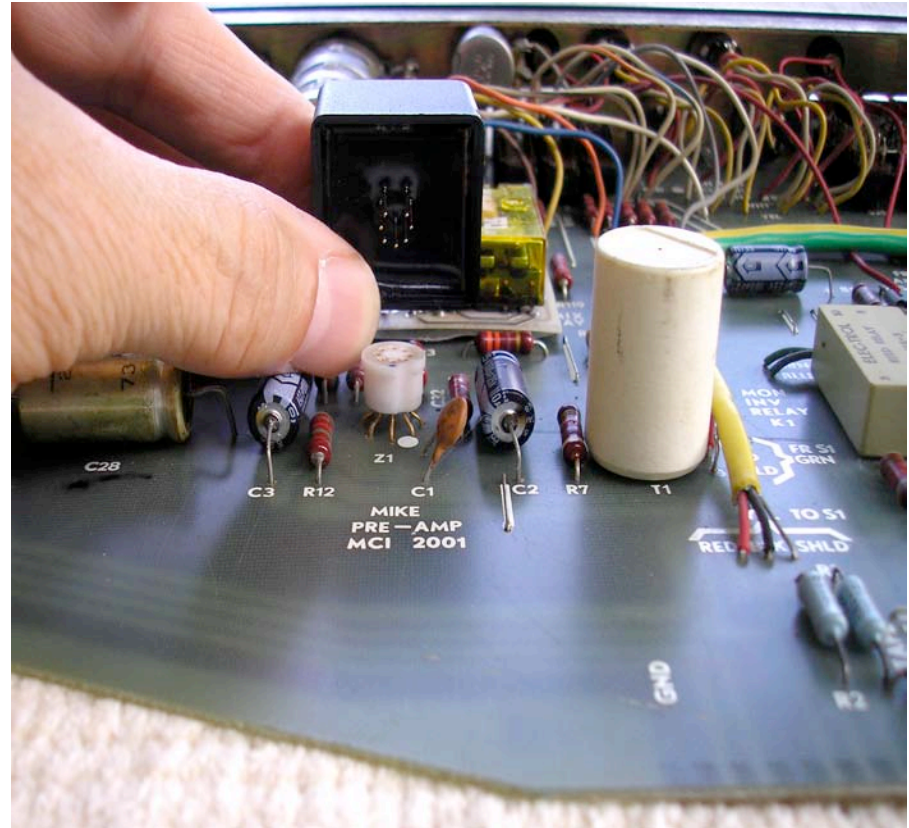
- Note that this empty octal [8 pin] IC socket has a blue mark indicating pin 8. Also note that on the circuit board right near the socket is a small white circle. This is between pin 1 and pin 8.



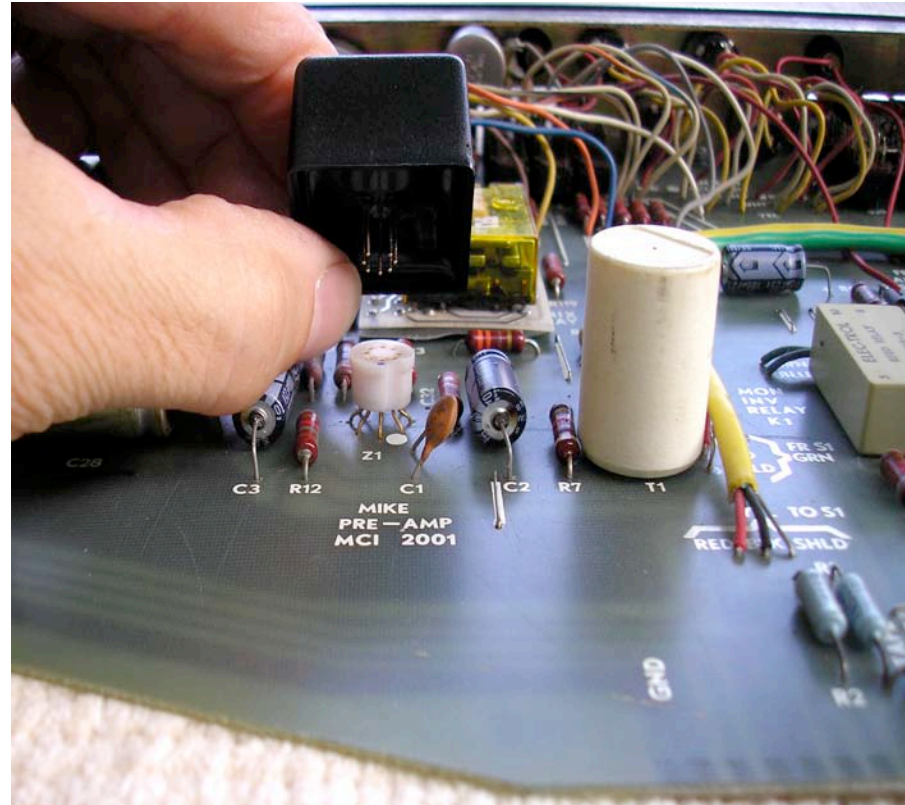
- The MCI 2001 mic pre will be replaced by a RED SE-DOT5 discrete opamp.
- Pick up a RED SE-DOT5 opamp
- Locate the arrow on the opamp label.



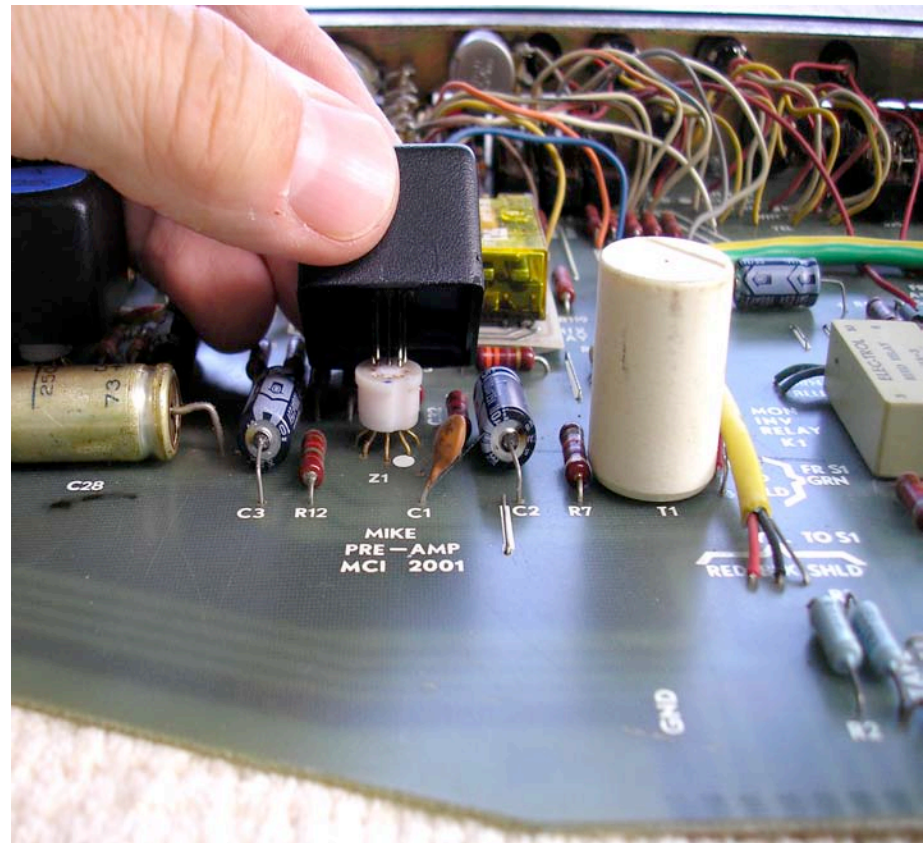
- Note that on the underside of the opamp there are only 7 pins. Pin #8 is missing on purpose.
- This allows you to easily verify that the opamp is oriented correctly.



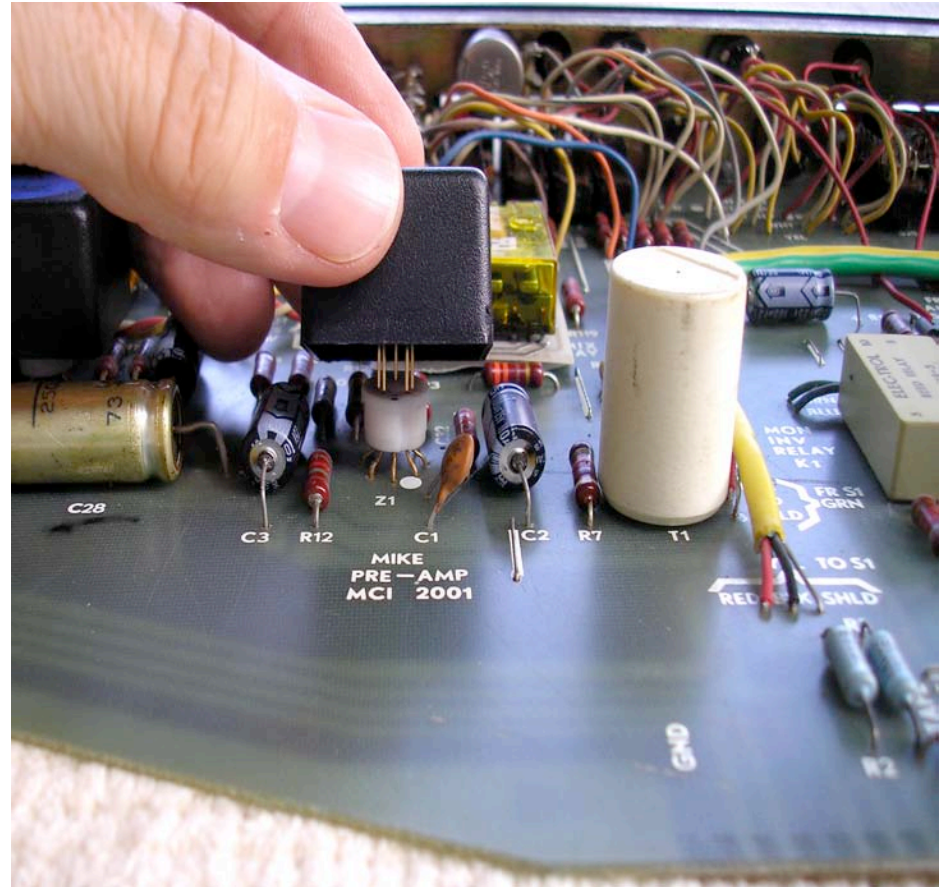
- Locate pin 8 on the empty socket using the blue dot on the empty white opamp socket.
- Line up the arrow on the opamp with pin 8 on the socket.



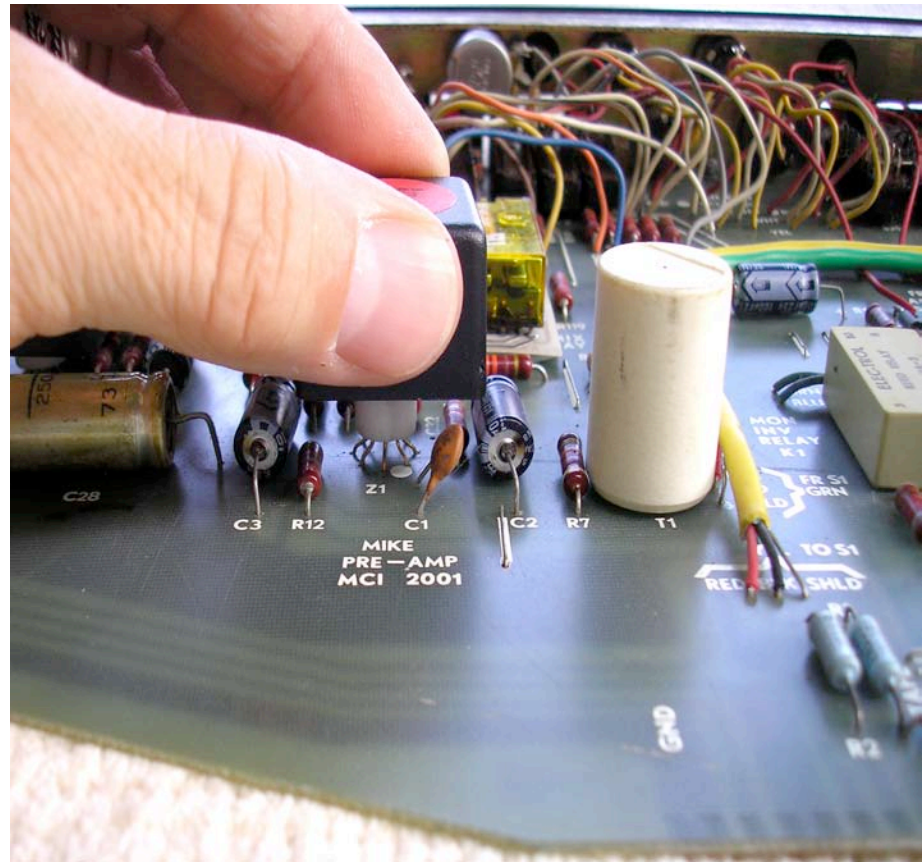
- When oriented properly, opamp pins 1 and 7 will straddle unused pin hole 8 on the socket.



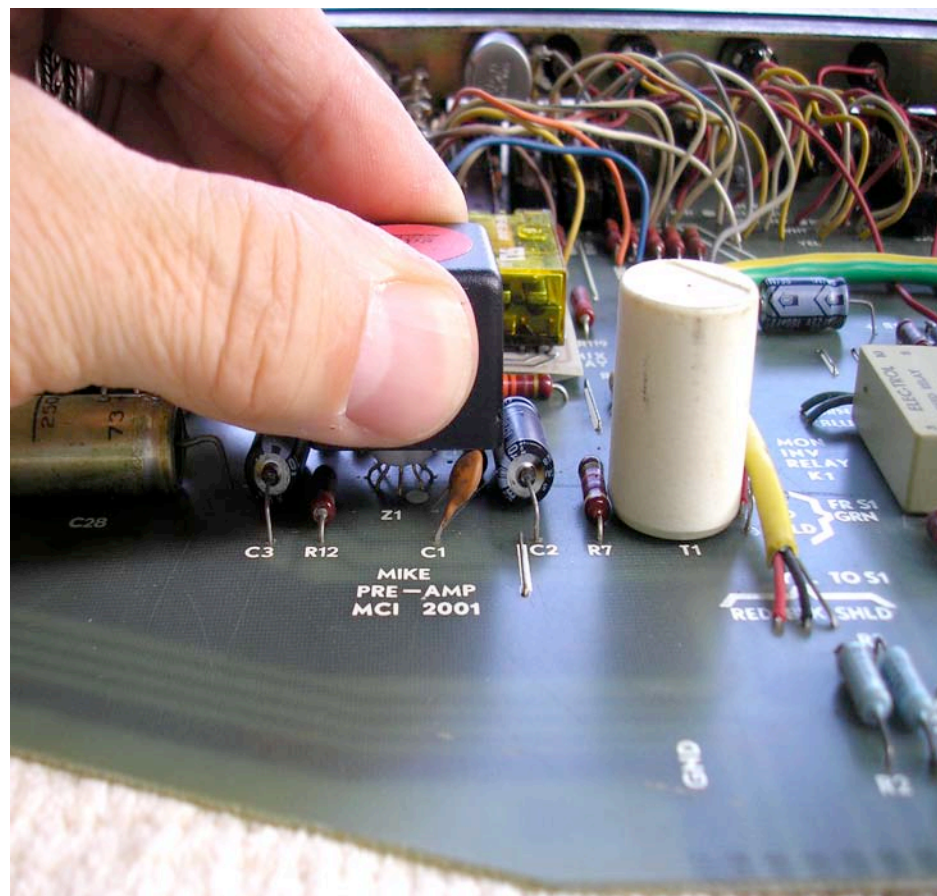
- Very gently line up the pins in each hole of the socket using minimal pressure
- I find it handy to line up pin #4 [the one directly opposite missing pin #8] with the matching socket hole #4 and gently guiding the other pins into position.



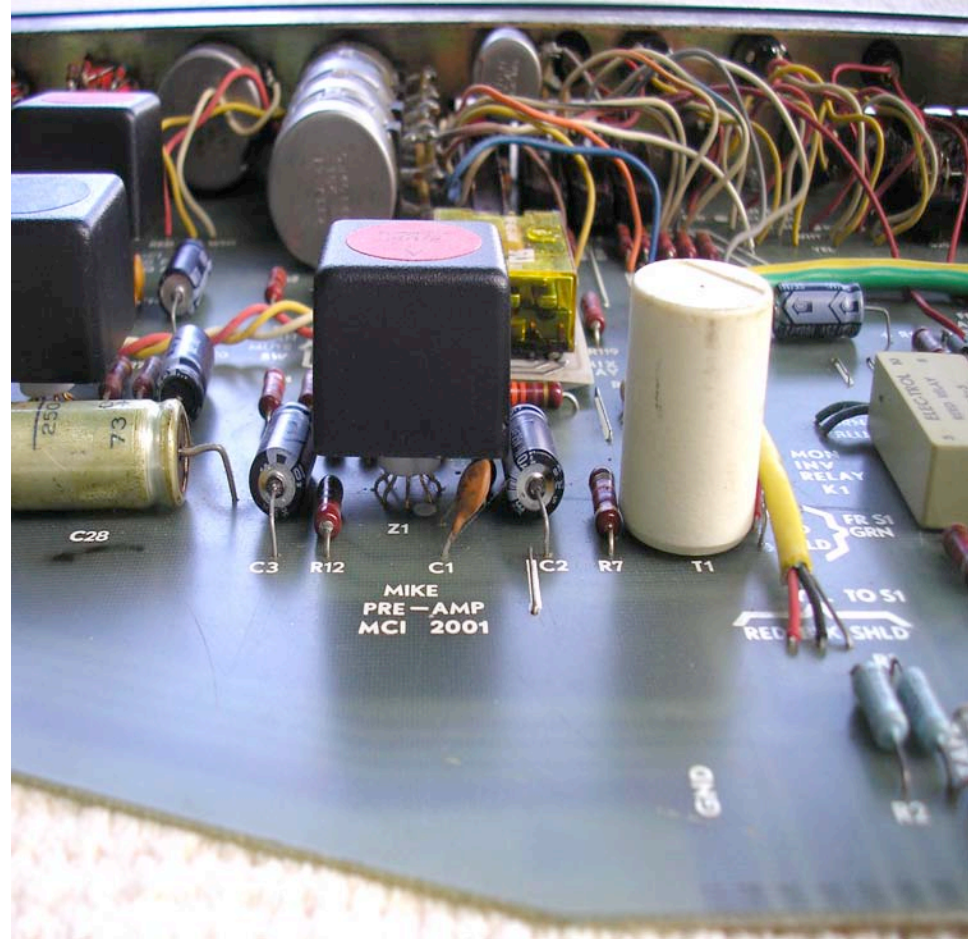
- When you are SURE all the pins are lined up with their respective socket holes, press down firmly.
- The opamp should travel about 3/16" or 0.5 cm into the socket before bottoming out.



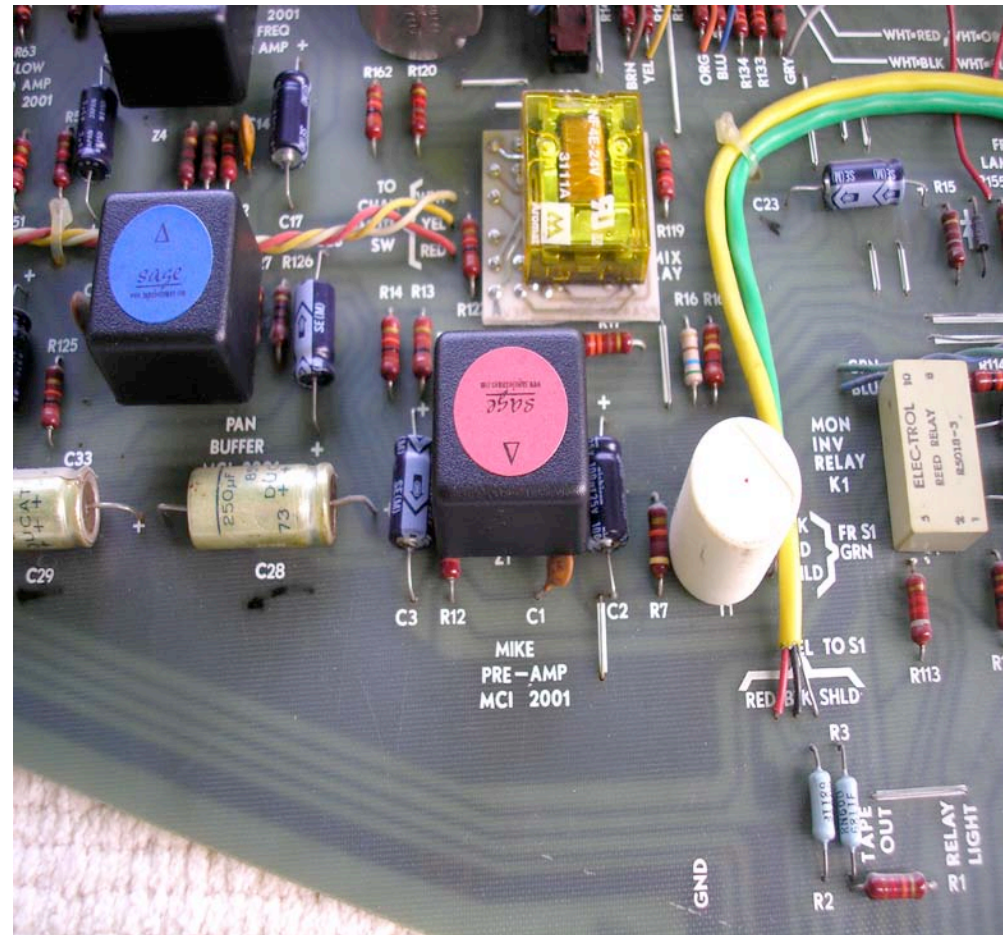
- You shouldn't have to use your full body weight for this !!!
- If you are a bit nervous, practice inserting and removing a 2001 a few times until you get the feel for it.



- Check for bent pins! Don't be alarmed if the RED DOT5 label looks slightly off square in relation to the circuit board.
- Sockets are often soldered in slightly awry. If the RED DOT5 label looks really weird ... BE alarmed ... remove, recheck, reinsert.



- A properly installed RED SE-DOT5 mic pre opamp
- If everything looks good, fire up the power supplies and run signal through the I/O Module as before.
- It's a good idea to use a consistent signal level for all testing.
- Listen for any weird noises, chirps etc
- If all is well turn the power supplies OFF and continue with the next opamp replacement.



- replace the Hi/Lo EQ 2001 with a Red DOT
- turn Power Supplies on. Listen
- test with signal
- turn Power Supplies off

- replace the Mid EQ 2001 with a Red DOT
- turn Power Supplies on
- listen
- test with signal
- turn Power Supplies off

- replace the Fader Buffer 2001 with a Red DOT
- turn Power Supplies on
- listen
- test with signal
- turn Power Supplies off

- replace Channel Summing EQ 2001 [or 2003] with a Blue DOT
- turn Power Supplies on
- listen
- test with signal
- turn Power Supplies off

- replace Pan Buffer 2001 with a Blue DOT
- turn Power Supplies on
- listen
- test with signal
- turn Power Supplies off

- replace Monitor Inverter with a Blue DOT
- turn Power Supplies on
- listen
- test with signal
- turn Power Supplies off

- run some music through the fully upgraded I/O Module and have some fun EQ tweaking !

- plug in a mic

- check all I/O Module functions

- Ideally you should monitor directly from the line out of the I/O Module. This bypasses the sonic bottleneck which exists if the master section has not yet been upgraded. Even if you can't do this, you'll still hear a difference through the master buss.

- turn console Power Supplies OFF

- disconnect Upgraded I/O Module from extender

- remove extender from console motherboard

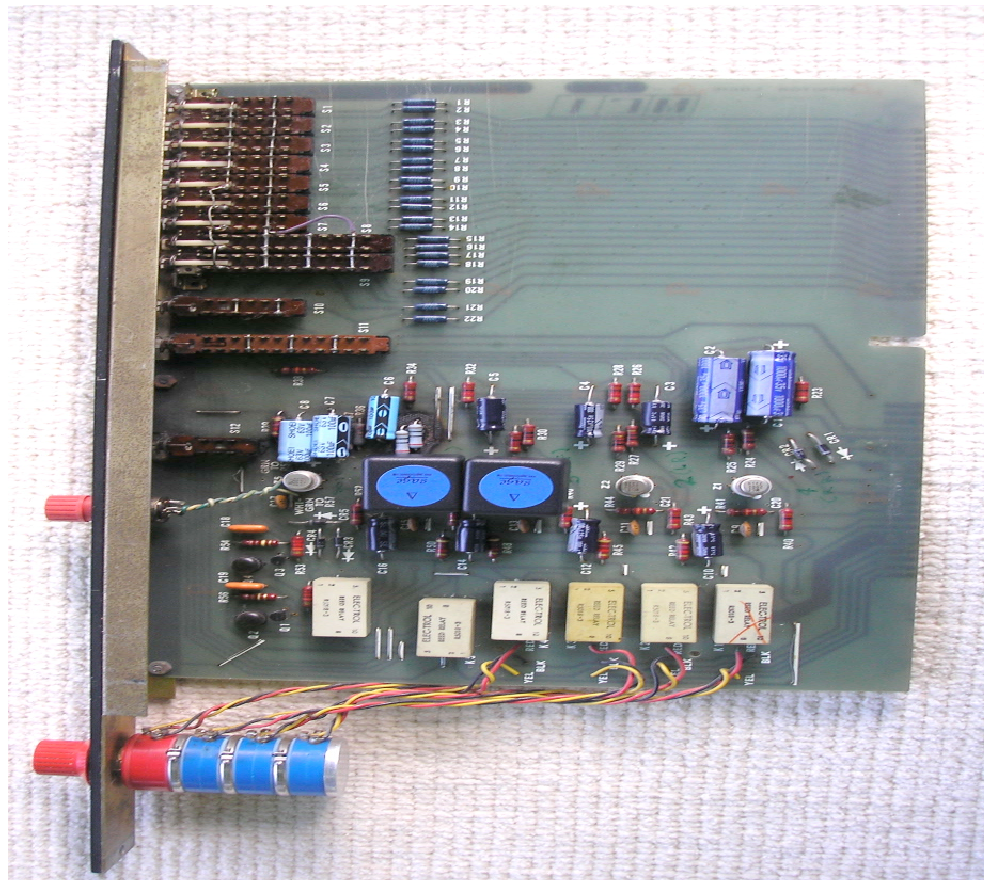
- insert I/O Module back into motherboard edge connector
(there is a metal "key" on motherboard that lines up with a slot on I/O Module)

- replace bolts. Don't over tighten !

- continue upgrade of additional I/O Module[s] using the same method above

Control Room Monitor Upgrade

- The standard stereo upgrade of the Master Strip involves replacing ACN 1 [left front channel] and ACN 3 [right front channel] with Blue DOTs. See photo illustrations. Installation uses same basic procedure as I/O Module Upgrade.



SE – DOT5™
'RED' and 'BLUE'
DISCRETE OPAMPS

WARRANTY

CONTENTS

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WARRANTY

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Features and specifications subject to change without notice.

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purchase date:

purchased from:

WARRANTY

sage ELECTRONICS® warrants its products to be free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of purchase. This warranty extends only to the original purchaser. This warranty does not apply to fuses, lamps, batteries, cables, or any products or parts that have been subjected to misuse, neglect, accident, or abnormal operating conditions.

In the event of failure of a product under this warranty, sage ELECTRONICS® will repair in Canada, at no charge, the product returned to its factory. sage ELECTRONICS® may, at its option, replace the product in lieu of repair.

This limited warranty covers failures due only to defects in materials and workmanship which occur during normal, intended use and does not cover damage which occurs in shipment or failures which are caused by products not supplied by sage ELECTRONICS®. This limited warranty does not cover failures which arise from accident, misuse, abuse, neglect, mishandling, misapplication, faulty installation, improper adjustment, alteration or modification of product, incompatibilities, line-power surges, acts of God, or service performed by anyone other than sage ELECTRONICS® or its authorized agent.

If the failure has been caused by misuse, neglect, accident or abnormal operating conditions, repairs will be billed at the normal shop rate. In such cases, an estimate will be submitted before work is started, if requested by the customer.

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There are no express warranties except as listed above. sage ELECTRONICS® shall not be liable for special, subsequent, incidental, consequential, or punitive damages, including, but not limited to: damage to recordings, microphones, mixing consoles, or any associated equipment, downtime costs, loss of goodwill, or claims of any party dealing with purchaser for such damages resulting from the use of this product. All warranties, express and implied, including the warranties of merchantability and fitness for a particular purpose are limited to the applicable warranty period set forth above.

Some provinces / states do not allow the exclusion or limitation of incidental or consequential damages, or length of time an implied warranty remains in effect. As such, the above exclusions may not apply. This warranty gives you specific legal rights and you may also have other rights which can vary from province to province ~ state to state.

Should your sage ELECTRONICS® product require service or repair please email us at: sage@sageelectronics.com or call us at (613) 228-0449 ~ with the following information:

- **your name**
- **your return shipping address**
- **your telephone number(s)**
- **your product's model number (example: SE-DOT5)**
- **your product's serial number ~ where applicable**
- **date and location of purchase**
- **description of problem or the service required**

Upon sage ELECTRONICS®' receipt of the above information from you we will provide you with your return authorization number. From this point we ask that you please;

pack your modules carefully. Use your original packing if possible. If you do not have the original packaging, make sure your module(s) have adequate protection. Tight thick bubble wrap and foam is best if you do not have the original packing

include a note in the box describing your problem or the service that your module requires. Be sure to **include your return authorization number** on this note

write your return authorization number on the outside of your package / carton
packages without a return authorization number will be returned to sender

Customer is responsible for paying shipping and insurance to sage ELECTRONICS® facility. sage ELECTRONICS® will pay the return freight and insurance via FEDEX or UPS ground or Canada Post.

end