CETEC SERIES 2000 AUDIO CONSOLE

SCHEMATICS AND PARTS LAYOUT NOTES

PLEASE READ BEFORE USING THESE DRAWINGS

Thank you for taking the time to read this before using my drawings. All of the drawings in this PDF were done by myself in CAD using a Cetec Model 001-2001 console, serial number 2049. This is a mono five channel console given to me about 20 years ago and was slated for conversion to stereo with new electronics, but that project never got off the gnd.

I know very little about the 2000 series consoles other than for some odd reason, Cetec actually decided to build them. I am a big fan of the Sparta consoles, the B series especially. The Sparta consoles pretty much represented the mid level consoles of the 1970's. This Cetec board is a good example of a company that said 'Let's design a cheap console and then decide how to make it cost 10dB less!'. In my humble opinion as a broadcast engineer with 45 years of experience it's a terrible design. It probably is directly responsible for Cetec's demise*. The circuit boards look like they were designed by someone who just purchased a 'My First Circuit Board' kit from Radio Shack. It uses LM378 power amps. Only LM380's would be worse. There is weirdness through-out. As you can tell, I was not impressed.

That being said, here are the important points to remember. All of the drawings were done from a mono five channel board. I did this by actually laying out the circuit boards for the Input cards and Output Motherboard. This allowed me to do parts placement drawings and figure out where the right channel components went. I think I got pretty close to reality. The Monitor Select/Level Control board and the Meter board were done by ohming out the connections as it was too difficult to remove components from them so I could get a picture to drag into my PCB program to copy. Consequently, I do not have a parts layout for them but if you look at them they are pretty straight forward. The Power Connector on the back was drawn carefully but my console was not in good enough shape for me to power up so ***check the power supply connections on your console against what I have drawn before you power up your board!***

Now for the first of many warnings that you'll see on each drawing.

1: All of these drawings were done by looking at my console. I have tried to be as accurate as possible but with a project like this, errors can and probably have, crept in.

2: Use these drawings at your own risk. I am not responsible for your console going up in smoke if you take these drawings as the solemn truth. Check, check, check your console against what is presented here before you power up.

3: Most every component designation you see here are my own. A few are from the circuit board and match what you would see on an original Cetec drawing. So, if you use my drawings and then come across a real Cetec drawing, they will not match.

4: The drawings represent my console. I have no idea if Cetec made any production changes on serial numbers before or after mine. Once again use caution.

5: The circuit board layouts were done by removing components and photographing or scanning the board and then using it as an overlay in my PCB program. Some of the component placement was done by measuring the location of the pads so they might be 0.1" or so off from the real board. Traces and ground planes pretty much follow what's on the board but I did move them a little to make things line up.

6: If there was something I found that I felt deserved attention, I called it out in the notes on each drawing.

7: This is the most important. Remember, I drew these from my console by just circuit tracing. There might and probably are errors. I present the drawings for your use to help you get a good idea of how the console is wired but you should check your console against my drawings to make sure they agree. I am not responsible for errors or your console melting into a tired little puddle of aluminum and epoxy glass on your workbench.

OK. This was a fun project and I hope helpful to you. Should you find errors, please contact me and let me know what you found and I'll correct the drawings. Together we can get a good reference up on the web for others to use. The circuit boards were done with ExpressPCB Plus and if you really need a copy of the file for the boards I will be happy to send it to you but the above warnings will apply. The boards you see now are the rough copies. I will clean them up and make the traces look nicer in time.

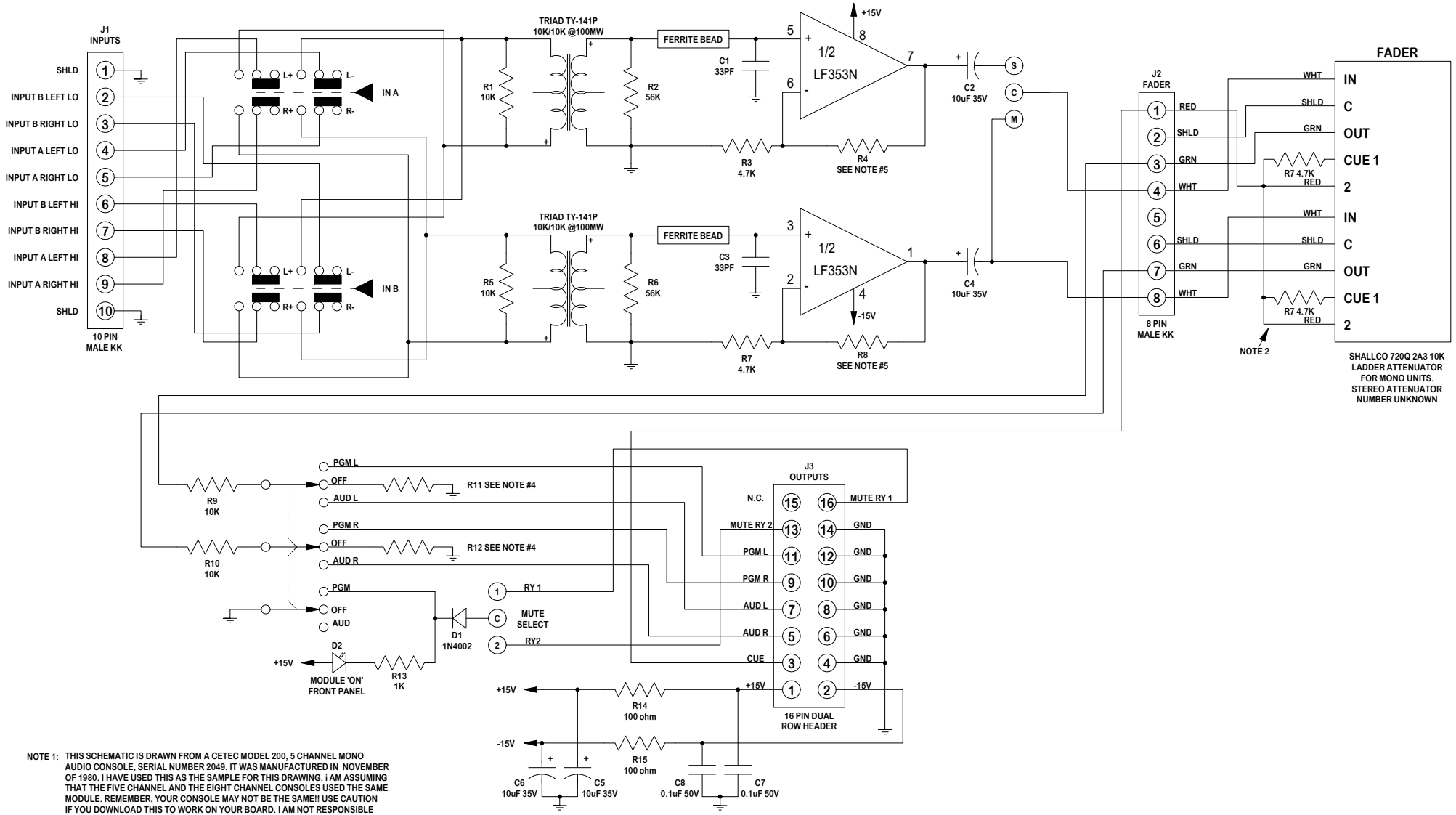
Should you have any information on the Cetec boards, I would love to have contributions to the site. Promotional info, manuals, etc. are always welcome. Please contact me if you wish to help out.

Thanks and happy console restoration!

Dave

Steam Powered Radio, 2019

*I don't know that this board actually contributed to the failure of Cetec or not. It was just a joke. But it probably played a significant role.



NOTE 1: THIS SCHEMATIC IS DRAWN FROM A CETEC MODEL 200, 5 CHANNEL MONO AUDIO CONSOLE, SERIAL NUMBER 2049. IT WAS MANUFACTURED IN NOVEMBER OF 1980. I HAVE USED THIS AS THE SAMPLE FOR THIS DRAWING. i AM ASSUMING THAT THE FIVE CHANNEL AND THE EIGHT CHANNEL CONSOLES USED THE SAME MODULE. REMEMBER, YOUR CONSOLE MAY NOT BE THE SAME!! USE CAUTION IF YOU DOWNLOAD THIS TO WORK ON YOUR BOARD. I AM NOT RESPONSIBLE FOR ANY ERRORS IN THE DRAWING OR YOUR BOARD ERUPTING IN FLAMES!

NOTE 2: I BELIEVE THAT THE TWO CUE BUSSES IN THE STEREO VERSION OF THIS CONSOLE WERE TIED TOGETHER WITH 4.7K RESISTORS USING THE "2" PIN ON THE POT AS A TIE POINT. I COULD BE WRONG SINCE I DON'T HAVE A SCHEMATIC BUT THAT'S HOW I WOULD HAVE DONE IT.

NOTE 3: ALL PART NUMBERS HAVE BEEN ASSIGNED BY MYSELF WHEN I DREW THE SCHEMATIC. THE ONLY EXCEPTIONS ARE TWO TRANSFORMERS. ALSO, THE #1 PIN ON THE MOLEX CONNECTORS DO NOT SEEM TO MATCH THE MOLEX STANDARD BUT I USED THE CETEC NUMBERING ANYWAY. AND YES, J1 DOES INDEED OVERHANG THE EDGE OF THE CIRCUIT BOARD.

NOTE 4: THERE ARE HOLES FOR R11 & R12 BUT THE PARTS ARE NOT STUFFED.

NOTE 5: R4 & R8 SET THE GAIN OF THE OP-AMP. 150K FOR A MIC LEVEL INPUT GAIN OF 32. USE A JUMPER FOR UNITY GAIN LINE INPUT. ANY OTHER GAIN Rf/Rin. MAKE Rf GREATER THAN Rin FOR NEGATIVE GAIN.

NOTE 6: REFER TO THE SEPARATE CIRCUIT BOARD DRAWING FOR PARTS LAYOUT.

REDRAWN BY DAVID WIGFIELD 2019

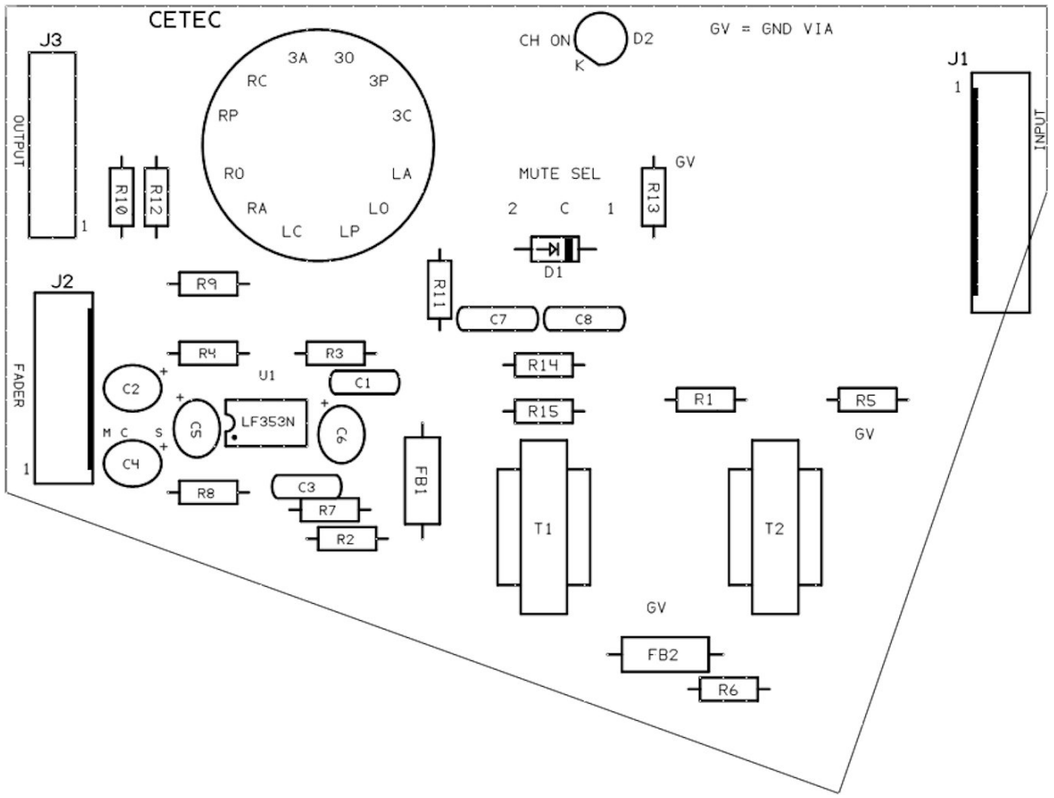
SPARTA ELECTRONIC CORPORATION
SACRAMENTO, CALIFORNIA

TITLE
CETEC MODEL 2000
SERIES AUDIO CONSOLE
INPUT MODULE

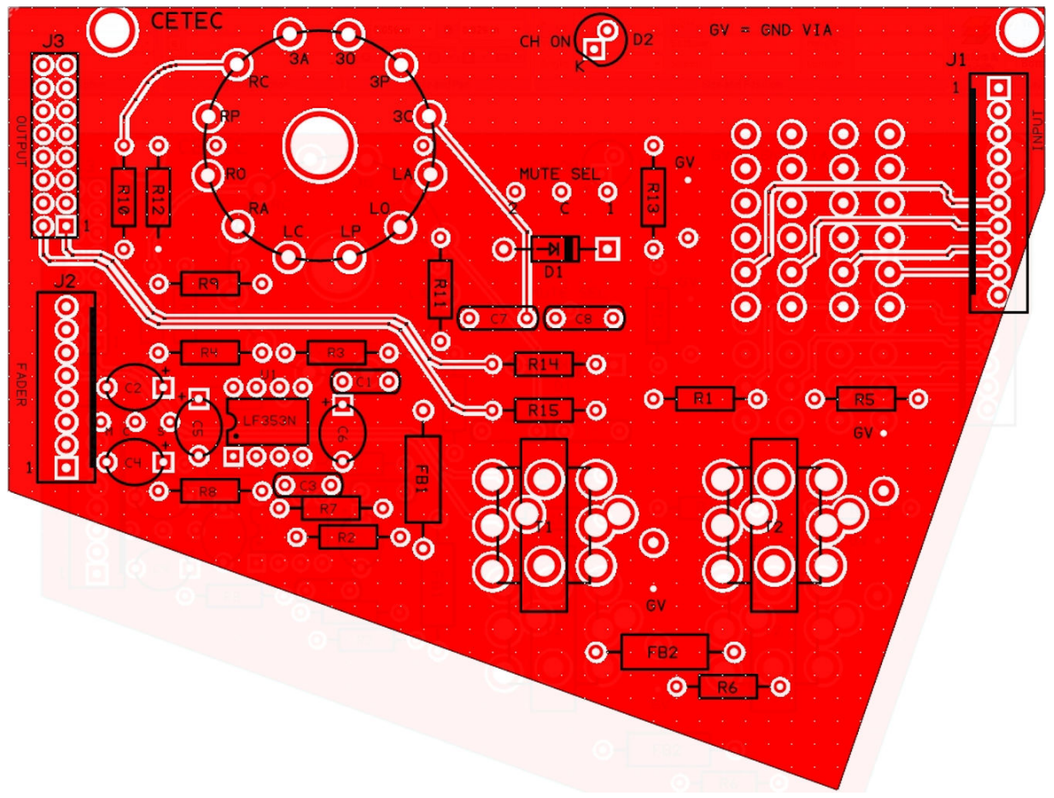
P.C. BOARD #?

DRAWN.	DATE. 1980	SHT 1 OF 1	DWG. NO. SPR-2001-I
APPD.	DATE.		

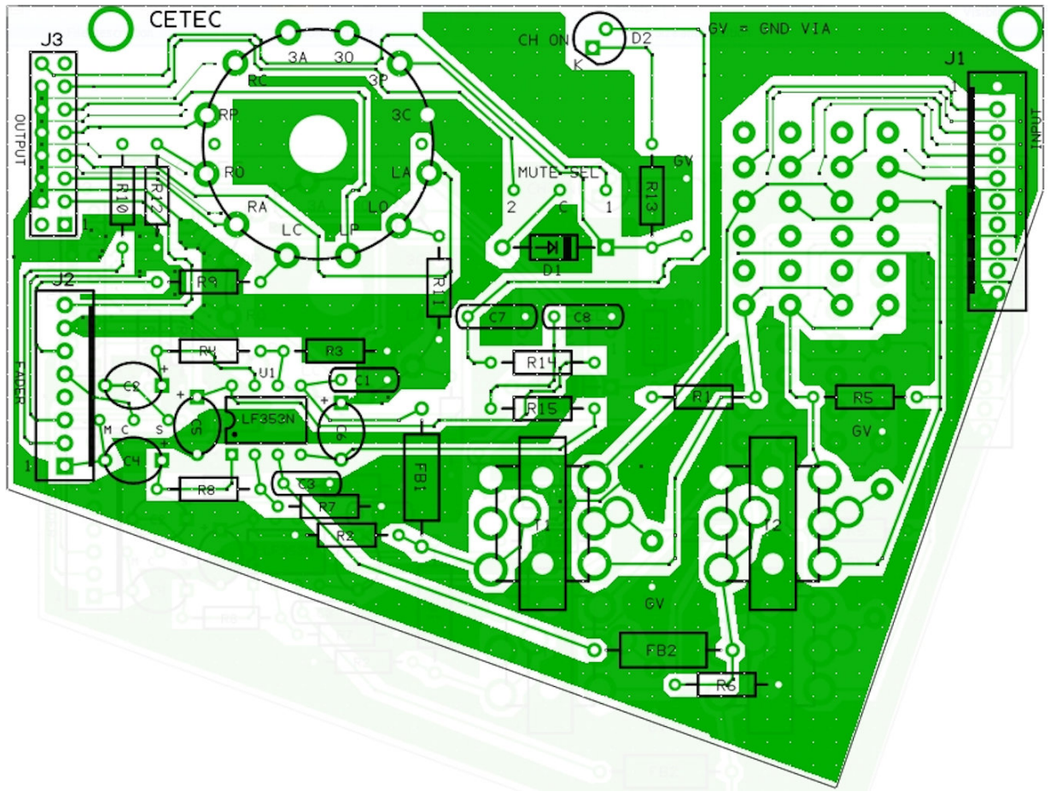
TOP SILKSCREEN AND COMPONENT LAYOUT



TOP COPPER TRACE AND SILKSCREEN

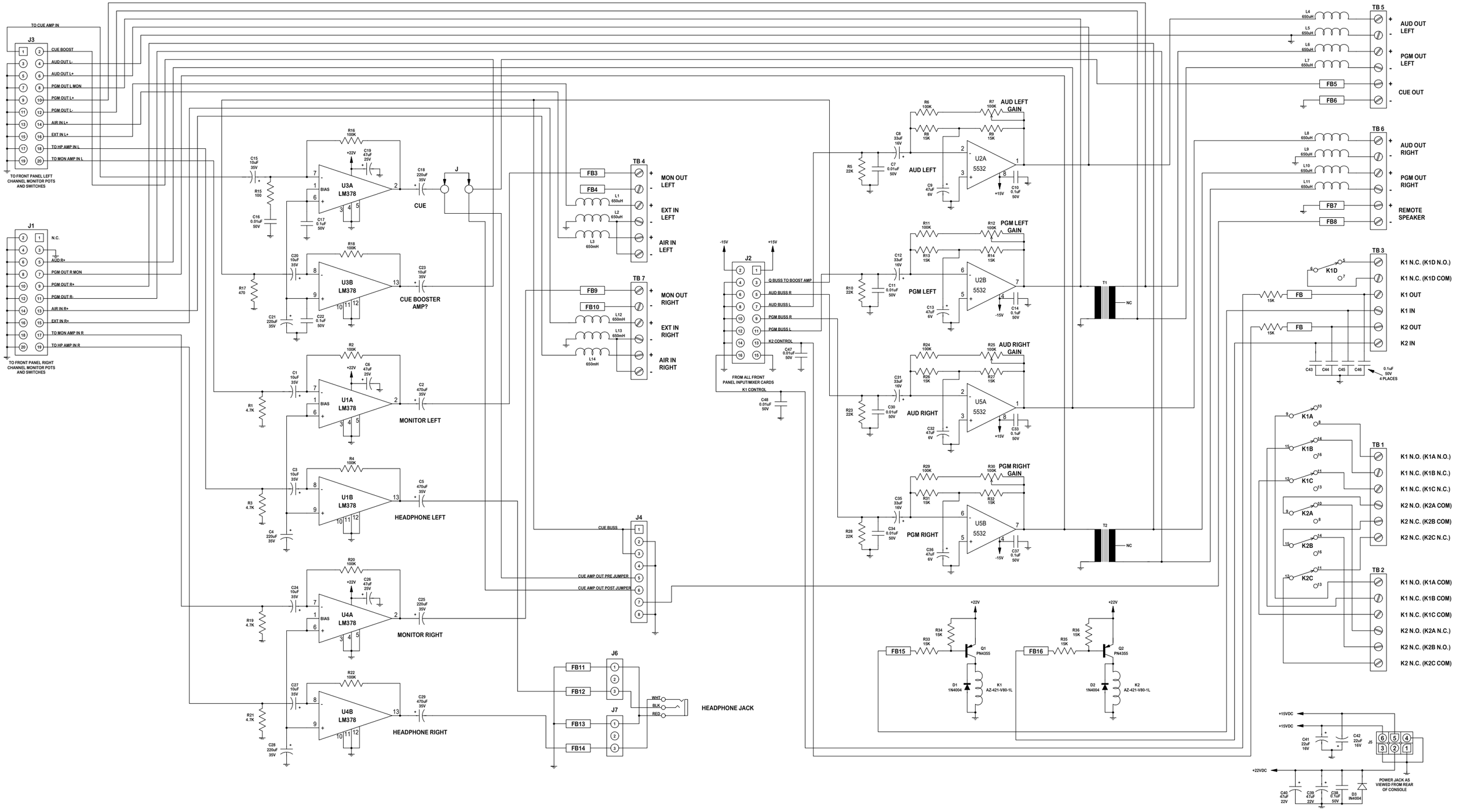


BOTTOM COPPER TRACE AND SILKSCREEN



FastCAD NOTES: UNLESS OTHERWISE SPECIFIED

DESIGNED BY: CETEC	DATE 1980'S	**STEAM POWERED RADIO** PINOLE CALIFORNIA	
DRAWN BY: DAVID WIGFIELD	09/2019	CETEC SERIES 2000 AUDIO CONSOLE INPUT CARD COMPONENT AND TOP/BOTTOM COPPER TRACE LAYOUT	
APPROVED BY: KATIE WIGFIELD	09/2019	SIZE B — FILENAME:STEAM POWERED RADIO ENGINEERING\	REV A
		SCALE: NONE	SHEET 1 OF 1



READ! READ! READ!

THIS DRAWING WAS MADE FROM A CETEC MODEL 2001 5 CHANNEL AUDIO CONSOLE IN MY POSESSION. IT IS SERIAL NUMBER 2049. THE DRAWING WAS MADE BY TRACING THE CIRCUIT BOARD AND REDRAWING IT IN CAD. I HAVE TRIED TO BE AS ACCURATE AS POSSIBLE BUT THERE MAYBE AND PROBABLY ARE ERRORS IN THE SCHEMATIC OR THE SUPPLIED CIRCUIT BOARD LAYOUTS. SORRY, BUT THIS WAS RATHER DIFFICULT TO DO. CONSEQUENTLY, USE THIS AS A BASIC ROAD MAP TO YOUR CONSOLE. DO NOT TAKE THIS DRAWING AS THE GOSPEL TRUTH! YOU HAVE BEEN WARNED! I AM NOT RESPONSIBLE FOR ANY DAMAGE TO YOUR CONSOLE! DO NOT BLAME ME IF SOMETHING DOES NOT MATCH UP TO YOUR CONSOLE. I REPEAT, YOU HAVE BEEN WARNED!!

D REDRAWN BY DAVID WIGFIELD AUGUST 2019

C HERE'S ANOTHER WORD OF WARNING. NEAR AS I CAN FIGURE R8, 9,13,14,26,27,31 AND 32 AND CAPACITORS C9, 13,32 AND 36, HAVE NO REASON TO EXIST. BUT, IF ANY OF THOSE CAPACITOR SHOULD OPEN, YOU WILL LOSE 14dB OF GAIN ON THE PGM/AUD OUTPUT AMPS.

B MY CONSOLE WAS A MONO UNIT. ALL OF THE CIRCUIT BOARDS CAN BE USED IN MONO OR STEREO UNITS. I DID MY BEST TO TO PLACE THE RIGHT CHANNEL COMPONENTS CORRECTLY, BUT, WELL WITHOUT A STEREO BOARD TO LOOK AT, THERE MIGHT BE ERRORS.

A COMPONENT ID NUMBERS ARE MY OWN AND DO NOT REFLECT ANY CETEC PART NUMBERS. THE ONLY COMPONENT ID NUMBERS THAT MATCH ORIGINAL CETEC NUMBERS ARE THE HEADERS AND IC'S. THAT'S BECAUSE THEY ARE ETCHED ON THE CIRCUIT BOARD.

IF YOU DIDN'T GET THIS FROM MY SITE, THEN IT WAS STOLEN FROM WWW.STEAM POWERED RADIO.COM 2019

SPARTA ELECTRONIC CORPORATION SACRAMENTO, CALIFORNIA

TITLE: CETEC SERIES 2000 STEREO AUDIO CONSOLE OUTPUT BOARD

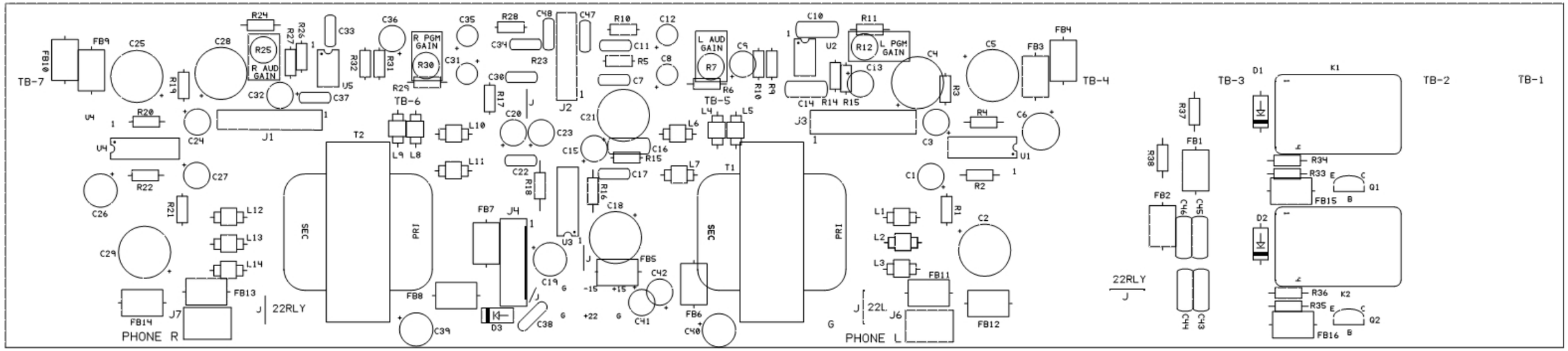
DRAWN. DATE. 11/24/80

APPD. HIGHLY IMPROVED! THE CONSOLE EVEN WAY DATE.

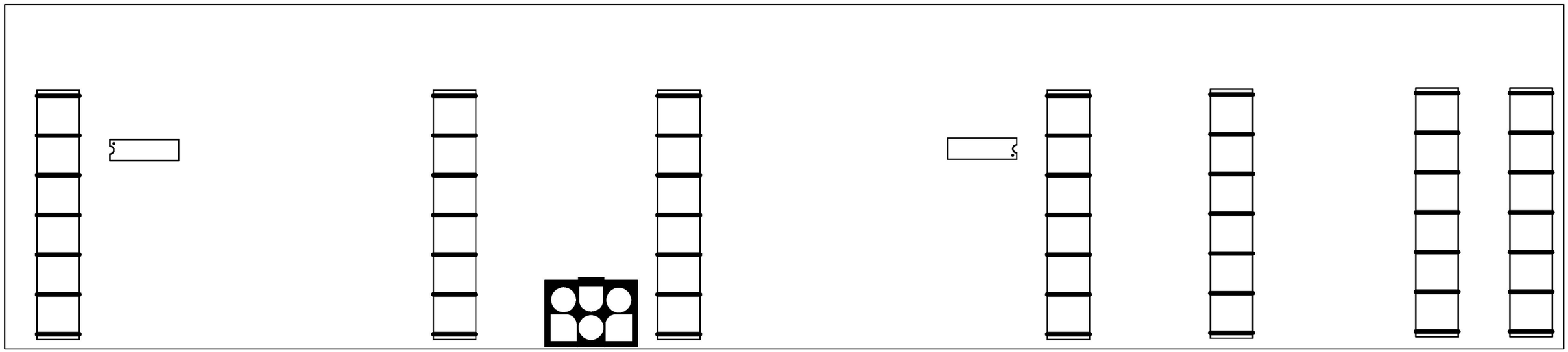
SHT 1 OF 1

DWG. NO. S-31C

TOP COMPONENT LAYOUT AND SILKSCREEN



BOTTOM COMPONENT LAYOUT AND SILKSCREEN



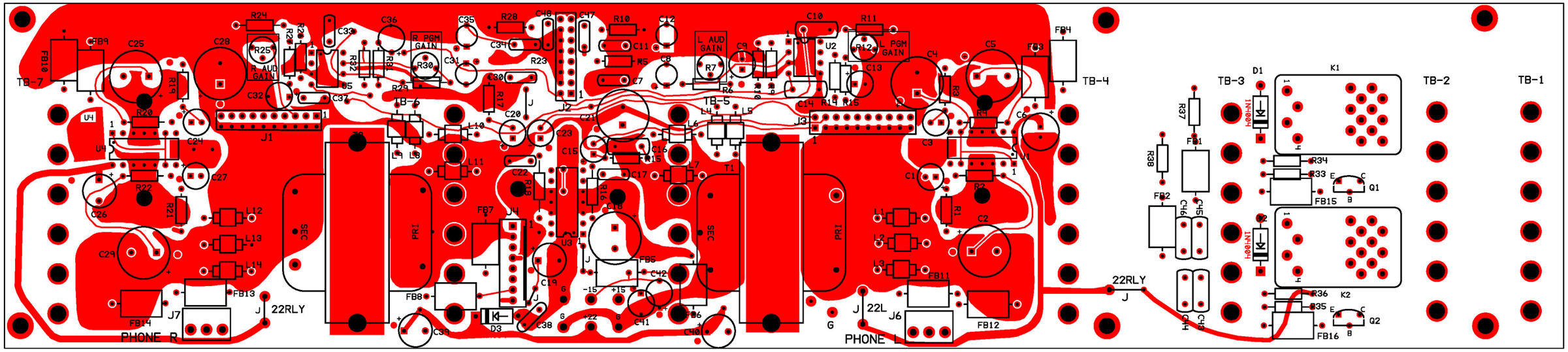
AS VEIWED FROM COMPONENT SIDE

IF YOU DIDN'T GET THIS FROM MY SITE.....
THEN IT WAS STOLEN FROM
WWW.STEAMPOWEREDRADIO.COM

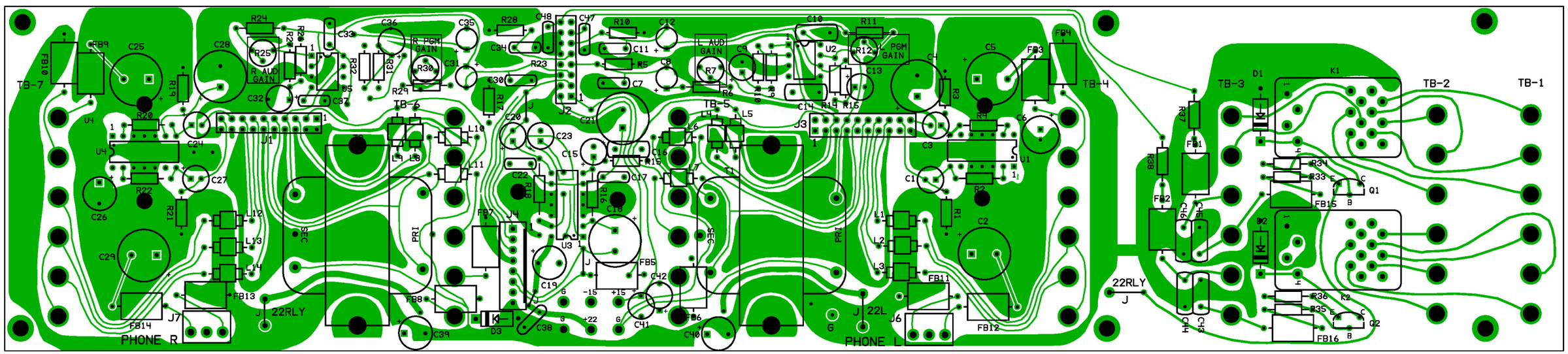
FastCAD NOTES: UNLESS OTHERWISE SPECIFIED

DESIGNED BY: CETEC	DATE 1980'S	**STEAM POWERED RADIO** PINOLE CALIFORNIA
DRAWN BY: DAVID WIGFIELD	09/2019	CETEC SERIES 2000 AUDIO CONSOLE AUDIO MOTHERBOARD TOP/ BOTTOM COMPONENT LAYOUT
APPROVED BY: KATIE WIGFIELD	09/2019	SIZE B · FILENAME:STEAM POWERED RADIO ENGINEERING\ · REV A
		SCALE: NONE · SHEET 1 OF 1

TOP COPPER TRACE AND SILKSCREEN



BOTTOM COPPER TRACE AND SILKSCREEN



BOTTOM LAYER AS VIEWED FROM COMPONENT SIDE!

IF YOU DIDN'T GET THIS FROM MY SITE.....
THEN IT WAS STOLEN FROM
WWW.STEAMPOWEREDRADIO.COM

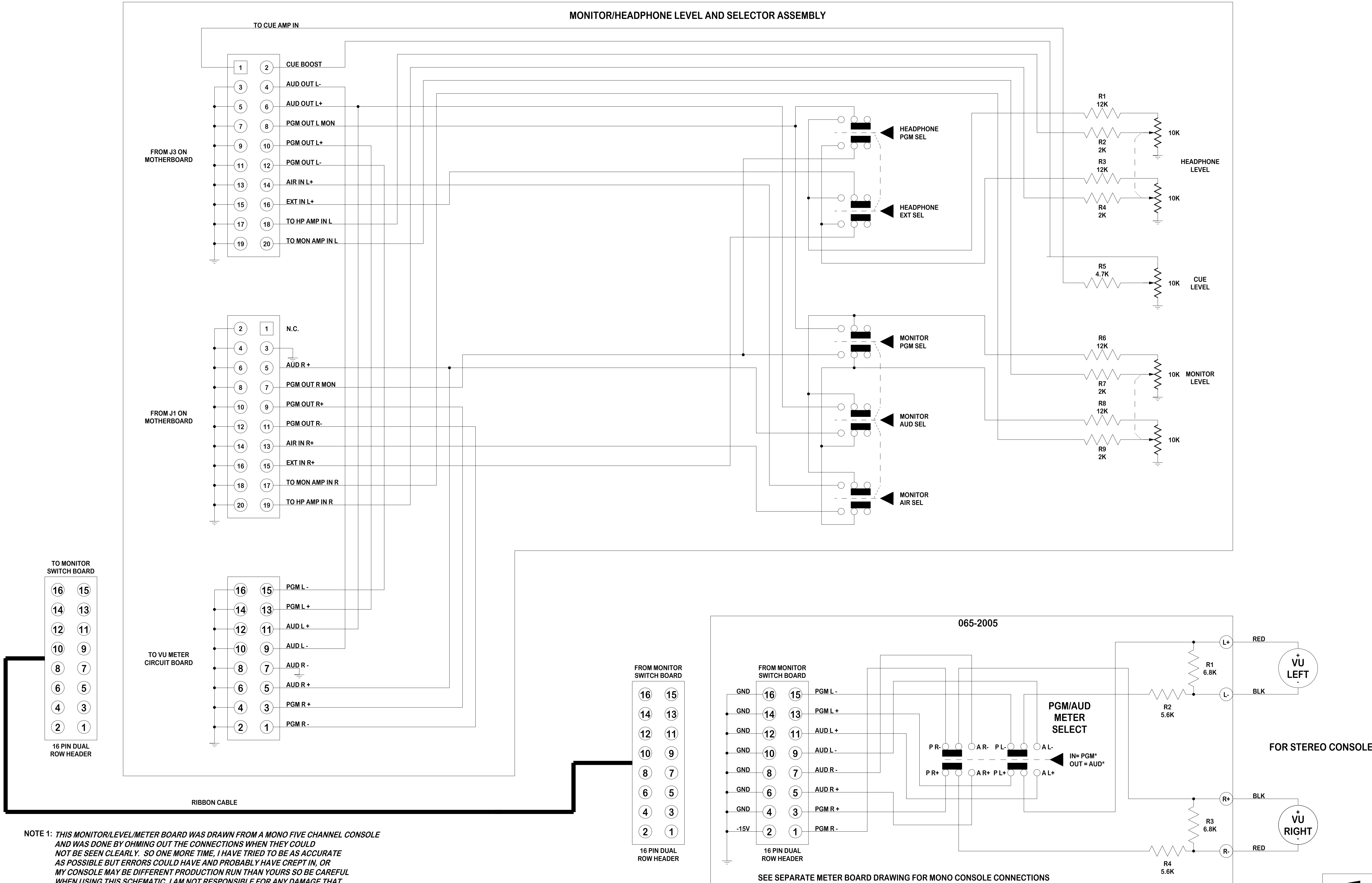
FastCAD NOTES: UNLESS OTHERWISE SPECIFIED

STEAM POWERED RADIO

PINOLE CALIFORNIA

CETEC SERIES 2000 AUDIO CONSOLE
AUDIO MOTHERBOARD TOP/
BOTTOM COPPER TRACE LAYOUT

DESIGNED BY: CETEC	DATE 1980'S		
DRAWN BY: DAVID WIGFIELD	09/2019	SIZE B	FILENAME:STEAM POWERED RADIO ENGINEERING\ REV A
APPROVED BY: KATIE WIGFIELD	09/2019	SCALE: NONE	SHEET 1 OF 1



NOTE 1: *THIS MONITOR/LEVEL/METER BOARD WAS DRAWN FROM A MONO FIVE CHANNEL CONSOLE AND WAS DONE BY OHMING OUT THE CONNECTIONS WHEN THEY COULD NOT BE SEEN CLEARLY. SO ONE MORE TIME, I HAVE TRIED TO BE AS ACCURATE AS POSSIBLE BUT ERRORS COULD HAVE AND PROBABLY HAVE CREPT IN, OR MY CONSOLE MAY BE DIFFERENT PRODUCTION RUN THAN YOURS SO BE CAREFUL WHEN USING THIS SCHEMATIC. I AM NOT RESPONSIBLE FOR ANY DAMAGE THAT MIGHT OCCUR FROM USE OF THIS SCHEMATIC!!!!*

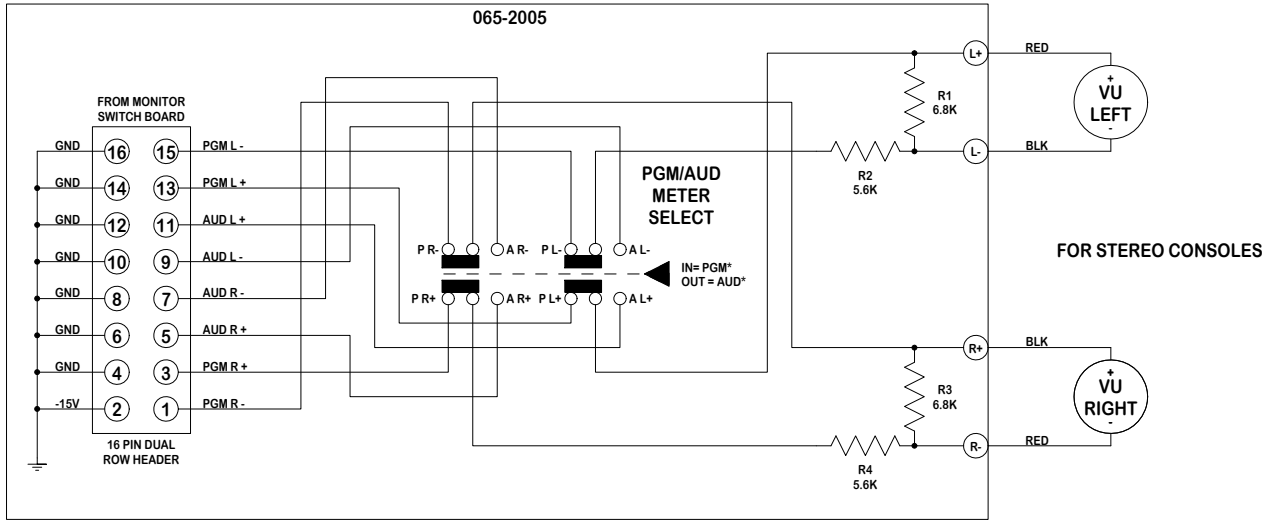
NOTE 2: ALL PART NUMBERS HAVE BEEN ASSIGNED BY MYSELF WHEN I DREW THE SCHEMATIC.

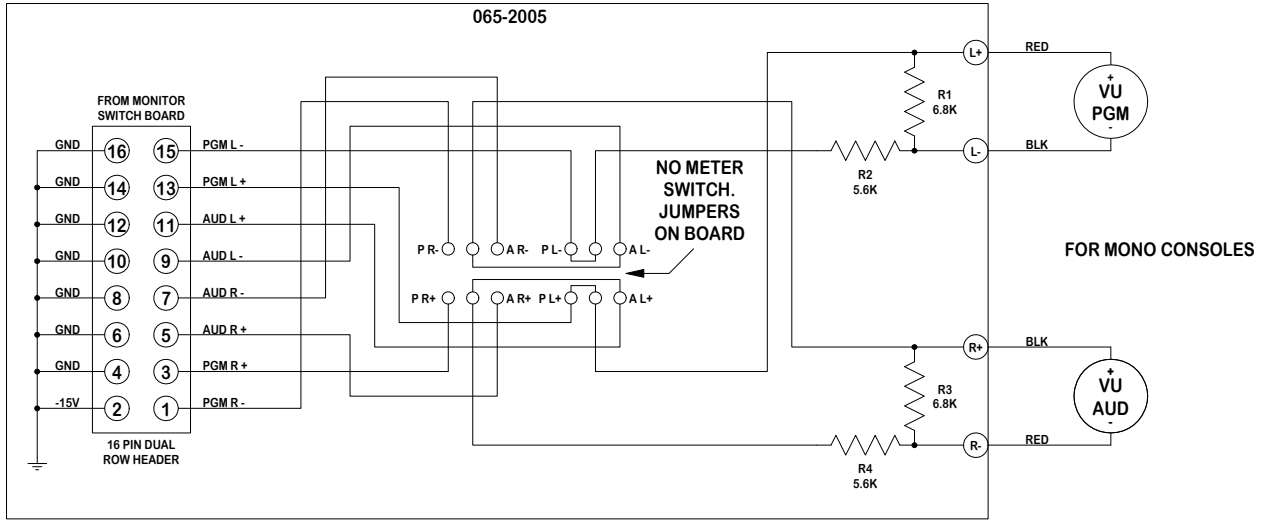
NOTE 3: YES INDEED, THE COLORS ON THE 8451 ARE REVERSED BETWEEN THE LEFT AND RIGHT METERS. THIS IS DUE TO A ERROR ON THE OUTPUT MOTHERBOARD.

SPARTA ELECTRONIC CORPORATION SACRAMENTO, CALIFORNIA

TITLE: CETEC SERIES 2000 AUDIO CONSOLE MON/HP LEVEL AND INPUT SELECT BOARD WITH VU METER BOARD

DRAWN.	DATE. 11/24/80	SHT OF	DWG. NO.
APPD. HIGHLY SURPRISED THE CONSOLE EVER WORKED	DATE.	1 1	S-31C





NOTE 1: *THIS METER BOARD WAS DRAWN FROM A MONO FIVE CHANNEL CONSOLE AND WAS DONE BY OHMING OUT THE CONNECTIONS WHEN THEY COULD NOT BE SEEN CLEARLY. SO ONE MORE TIME, I HAVE TRIED TO BE AS ACCURATE AS POSSIBLE BUT ERRORS COULD HAVE AND PROBABLY HAVE CREPT IN OR MY CONSOLE IS A DIFFERENT PRODUCTION RUN THAN YOURS SO BE CAREFUL WHEN USING THIS SCHEMATIC. I AM NOT RESPONSIBLE FOR ANY DAMAGE THAT MIGHT OCCUR FROM USE OF THIS SCHEMATIC!!!!*

NOTE 2: ALL PART NUMBERS HAVE BEEN ASSIGNED BY MYSELF WHEN I DREW THE SCHEMATIC.

NOTE 3: YES INDEED, THE COLORS ON THE 8451 ARE REVERSED BETWEEN THE LEFT AND RIGHT METERS. THIS IS DUE TO A ERROR ON THE OUTPUT MOTHERBOARD.

REDRAWN BY DAVID WIGFIELD 2019

SPARTA ELECTRONIC CORPORATION SACRAMENTO, CALIFORNIA

TITLE

CETEC MODEL 2000 SERIES AUDIO CONSOLE VU METER BOARD

P.C. BOARD #065-2005

DRAWN.	DATE. 1980	SHT 1 OF 1	DWG. NO.
APPD.	DATE.		

THAT PROGRAM AND AUDITION AMP

One of the things that confused me when I first drew out the schematic was the PGM and Aud amps. Just what was that capacitor doing going to ground from the junction of the two 15K resistors. Why was it there? My first thought was that Cetec was doing some EQ in the feedback network.

So I decided to breadboard the amp and make some measurements. Once I did it was very obvious. Here's what I found.

FIGURE 1
PGM AMP CIRCUIT

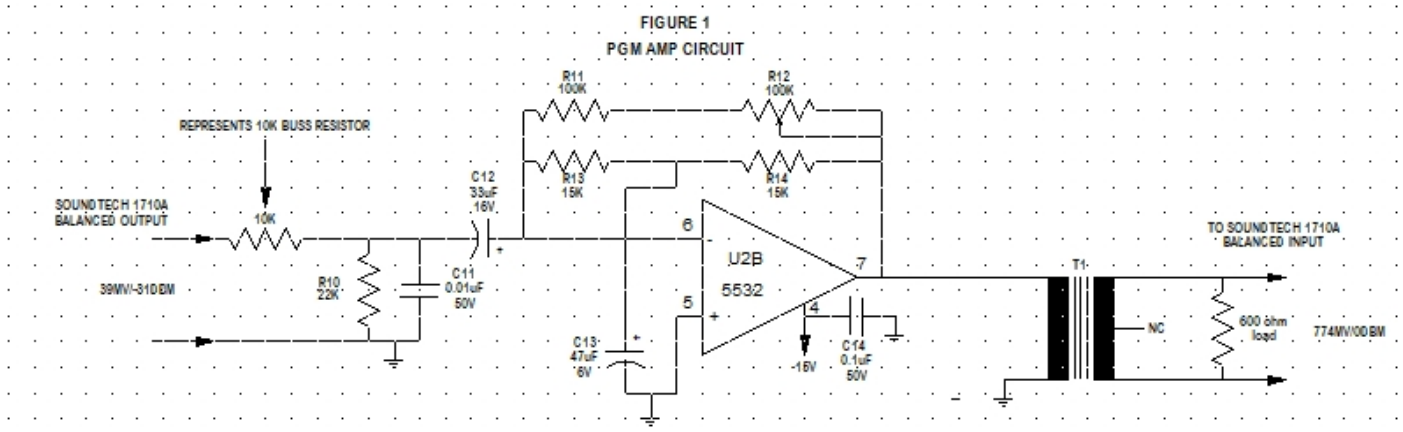
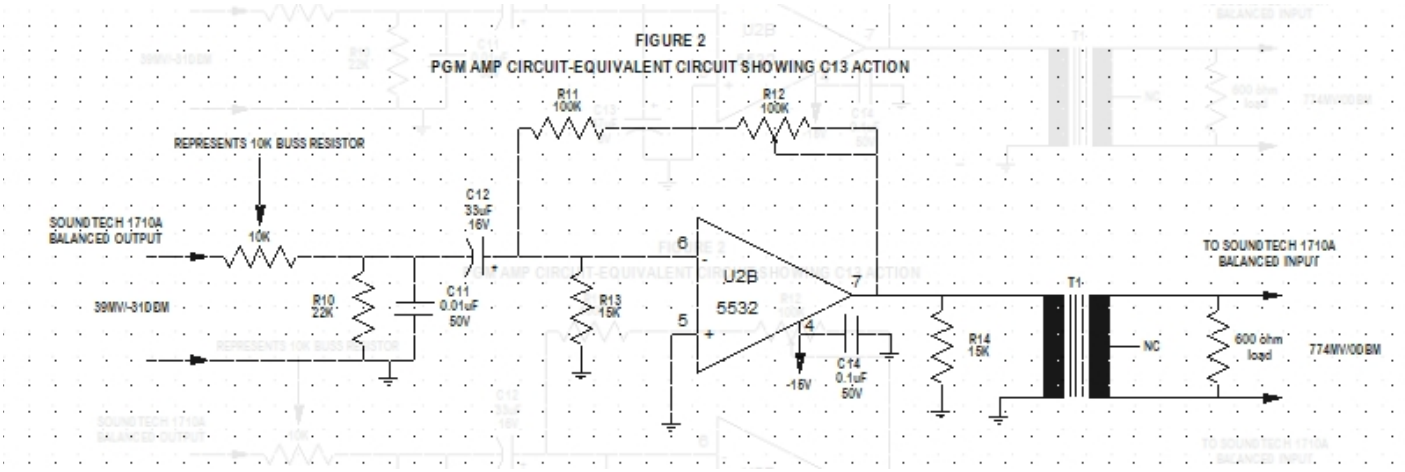


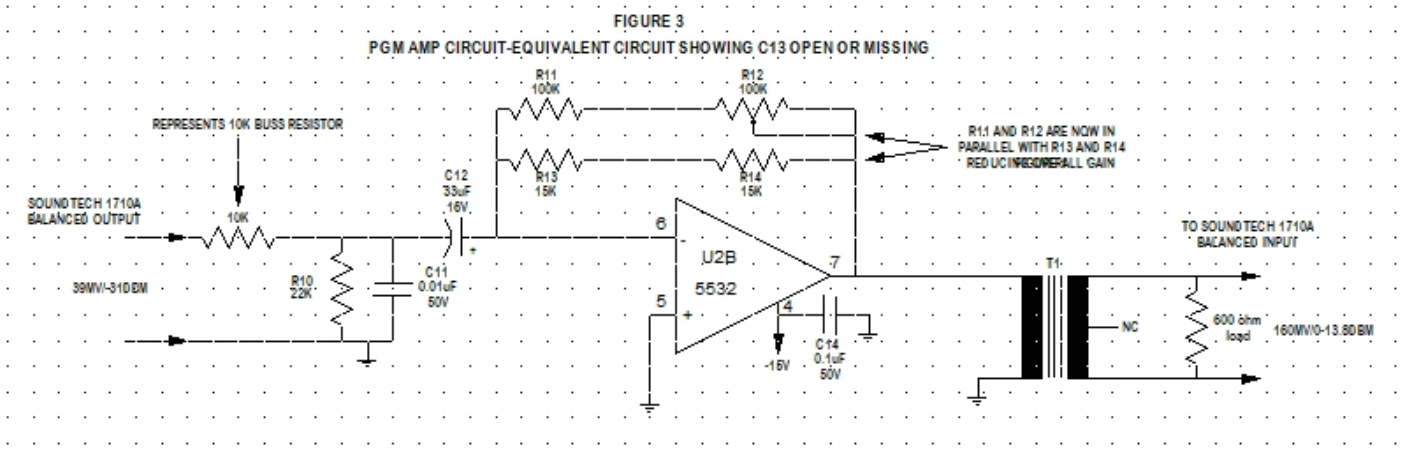
Figure 1 shows the program amp as it is normally. So just what does C13 do and why the two 15K resistors. You can see the measured in and out levels. C13 is merely bypassing all audio to gnd. The junction of the two 15K's are at gnd potential. The Xc of the cap is 169 ohms at 20 HZ and 0.169 ohms at 20KHZ. So the circuit looks like Figure 2 below with the 15K's acting as load to gnd on the in and out of the op-amp

FIGURE 2
PGM AMP CIRCUIT-EQUIVALENT CIRCUIT SHOWING C13 ACTION



Now, what happens if C13 misbehaves….

If C13 should open or be removed from the circuit, the junction of those two 15k resistors are not at gnd potential. This puts them directly in parallel with the two 100k resistors in the feed back loop. The resistance drops to around 26K reducing the gain by about 14dB!



I had to breadboard this because I was expecting one thing when I drew the circuit and got another. My brain got stuck in a do loop of 'It must be some kind of EQ'. Once I breadboarded it and made some measurements it was obvious what was going on.

But, why design the circuit like this. I can't see what it adds and neither can anyone else I talked to. Why build in an obvious failure point that will drastically reduce the channels gain? If you know, please let me know.