

Hi

Here is a very low resolution sample file only.

Many parts have been removed for  
obvious reasons..



BUSH D.A.C. 90A

YIANNIS KARALIS

Download link will be sent to U, to download the  
actual high resolution printable pdf file (70MB)

Thank you



A few words about BUSH D.A.C. 90 A  
"EASY RESTORATION"  
by Yiannis Karalis

After long hours of work on legendary Vintage Tube Radio BUSH DAC 90A; I managed to design the layout of every component and wiring (Under-side and Top of chassis). **EASY RESTORATION** is by far the only way to locate a problem or completely repair – restore your Vintage BUSH D.A.C. 90A RADIO in minutes; even has NO wires or missing components. **Never use the plug and pray method.** Now you have a detailed reference to look at close up parts and wiring. At first glance, you can locate the problem as you know exactly which goes where, voltages, tips, hints etc! So, make your life easier when restoring such a set. "Easy Restoration Guide" by Yiannis Karalis is an ideal process before powering up the set as the previous owners might have attached several components in seemingly random positions underneath the chassis or disconnected something then reconnected it wrongly.

The easiest method to properly-quickly-fully repair and restore everything in this legendary set.  
**RESTORE ONCE AND DO IT RIGHT!**

Actual layout components - entire wiring routes - hints, tips, clever modifications...  
(for rookies and masters)



## Components on the Board (bottom view)

designed by Yannis Karalis.



image 2



10/10/2018

## Hidden wiring underneath the Board

designed by Yannisk Karalis.



image 3





Mains switch, Rectifier tube, Filaments & chassis wiring.  
Designed by Yannis Karalis

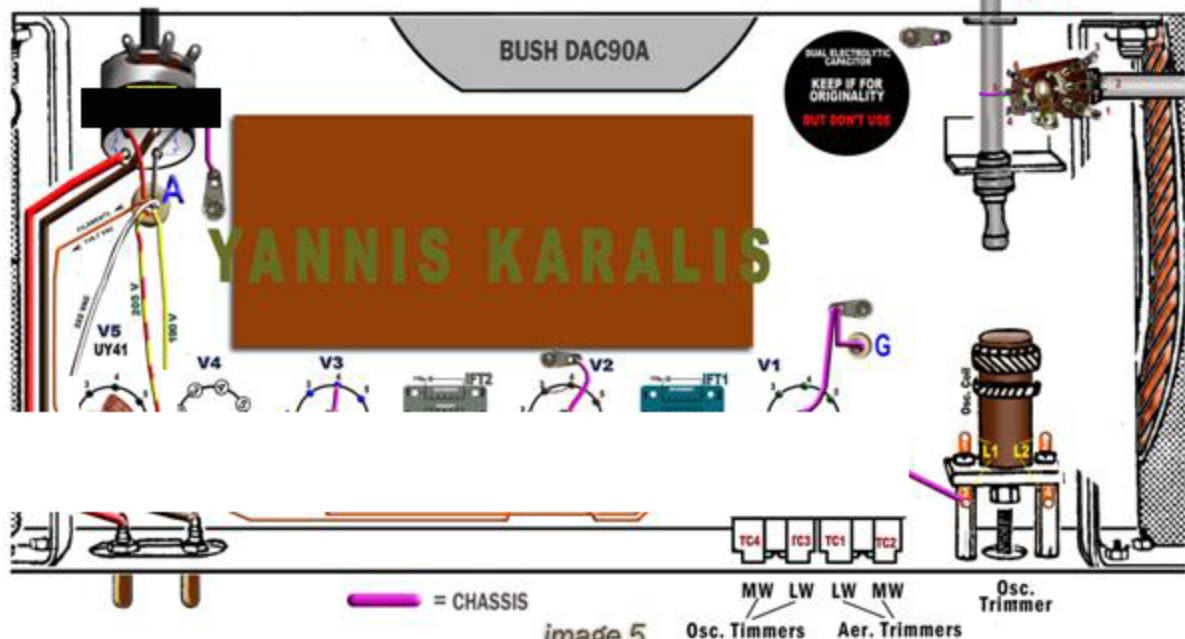


image 5





Prevent  
Hum

Designed by Yannis Karalis

Prevent  
modulation  
Hum

There should not be any components  
Follow my schematic

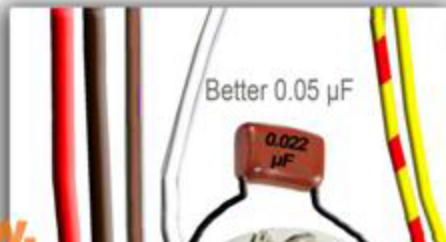


image 7





Focus on the Pot wiring.

Designed by Yannis Karalis

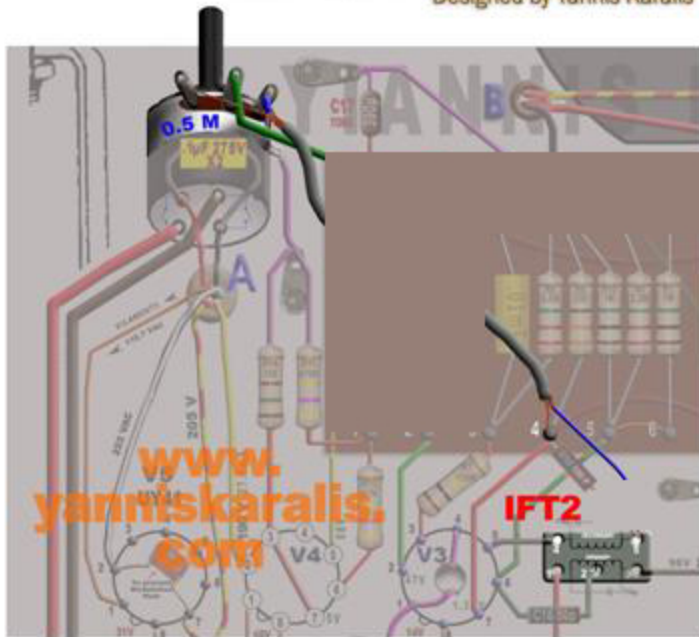


image 8



# 1. Top chassis layout (wiring)

designed by Yannis Karalis.



Image 9



## 2. Top chassis layout (wiring) designed by Yannis Karalis.



[www.yanniskaralis.com](http://www.yanniskaralis.com)



## NOTE

*earlier*

If you still have the original **SCALE BULBS**  
Note that: In first two years production

the limiting resistor was 150 Ohm

the shunt resistor was 250 Ohm

*later*

Later **FOR PROTECTING BULBS**  
they changed as follows:

the limiting resistor was 250 Ohm

the shunt resistor was 75 Ohm

[www.yanniskaralis.com](http://www.yanniskaralis.com)



About scale lamps..

**Of course you know  
the problem with these  
pilot lamp bulbs..**

**(3.5V @ 0.15A)**

**They were dim .. and no longer  
manufactured..**

There are some substitutes out there but NOT  
recommended as they could cause serious damage..

**ALL YOU NEED IS A TRICK !**



# SCALE LAMPS "TRICK" FOR BUSH DAC 90A

Designed by Yannis Karalis

WWW.YANNISKARALIS.COM



image 13

'JT OFF DIAL LAMPS WIRI'

'TION: FIRST MEASURE F

'YES! R3

Ti 'AL 30' .4

G 'F OP 'N

TH ' R3

(OR. ' HAT

Ti 'S. 'RICK"

NOW ' RICK"

'S. 'RICK"

OTHERW. 'RICK"

HAT 'RICK"

DON'T I 'RICK"

RES 'RICK"

IN THREE 'RICK"

962, 971 'RICK"

TAKE 'RICK"

THE TOTA' 'RICK"

POSSIF 'RICK"

REWIR' 'RICK"

MATI' 'RICK"

'TH 'RICK"

'TH 'RICK"

'TH 'RICK"

'TH 'RICK"

'TH 'RICK"

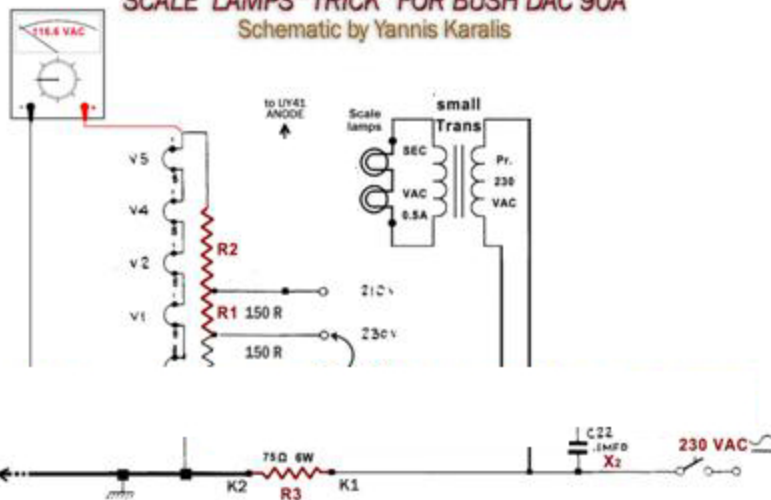
'TH 'RICK"

'TH 'RICK"



## SCALE LAMPS "TRICK" FOR BUSH DAC 90A

Schematic by Yannis Karalis



Other [redacted] Ohms

Perfect ! Now you can fearlessly proceed to Scale Lamps "Trick".  
Note that the Valve fillaments in series work now better than ever before !  
No more bulb failures caused by people switching off  
and then back on a few seconds later.

image 14



**BUY NEW OUTPUT TRANSFORMER  
FOR BUSH D.A.C. 90A**



[www.yanniskaralis.com](http://www.yanniskaralis.com)

**I MANAGED TO MAKE THE EXACT OPT RELACEMENT.  
SPECIAL MADE TO SUIT  
BUSH DAC90A.  
SAME HOLE CENTER SPACING  
CONTACT ME**

*image 15*





**"BUY GLASS DIAL SCALE for ALL  
BUSH D.A.C. 90A"**

Redesigned by Yanniskaralis.

**Excelland indishtinguishable  
Replacement**

You will receive a ready-to-use & easy-to-fit  
handmade glass, cut to the right size  
(164 x 70.5 mm).

It consists of two glasses and two lazer  
printed OHP high quality transparent films  
sandwiched between the glasses.

## INTERMEDIATE FREQUENCY CIRCUITS, 465 Kc/s

to Medium at 1000 Kc/s. Unscrew IFT cores.  
al GENERATOR to 465 Kc/s and connect

Sec. and then the Pri. of the 2<sup>nd</sup>

Trimmer to UCH42 pin 6 and adjust output. of  
the output.

Each component is adjusted once only.

## MEDIUM WAVE RANGE - 5

Receiver to Med

1. Set the Signal Generator to 600 Kc/s and connect the Calibrator to the "SINGLE" loop\*.
2. Adjust L1/L2 for maximum output.
3. Set the Signal Generator to 1500 Kc/s and adjust TC4 and TC3.
4. Check calibration. No further adjustment required.

## LONG WAVE RANGE - 158 Kc/s

Receiver to

1. Set the Signal Generator and receiver to 158 Kc/s and connect the Calibrator to the "SINGLE" loop\*.
2. Adjust L1/L2 for maximum output.
3. Check calibration.

The alignment is carried out in the above order. L2 (Osc. Coil) core or trimmer TC4 or TRC (Aerial) Medium and Long Wave Ranges. The receiver is removed from its cabinet by using the auxiliary calibration scale provided on the scale reflector plate.



## BUSH D.A.C. 90A ALIGNMENT

by Yannis Karalis.



### ALL YOU NEED.

The use of a Signal Generator with a variable and modulated output is essential for accurate alignment of the R.F. and I.F. circuits.

A SINGLE TURN LOOP of wire approximately 10" by 8" placed 12" to 18" (according to the output of the Signal Generator) away from and parallel to the frame aerial should be used when aligning the aerial and oscillator circuits. The signal is fed into the SINGLE TURN LOOP from the Signal Generator.

### BUSH D.A.C. 90A SCHEMATIC

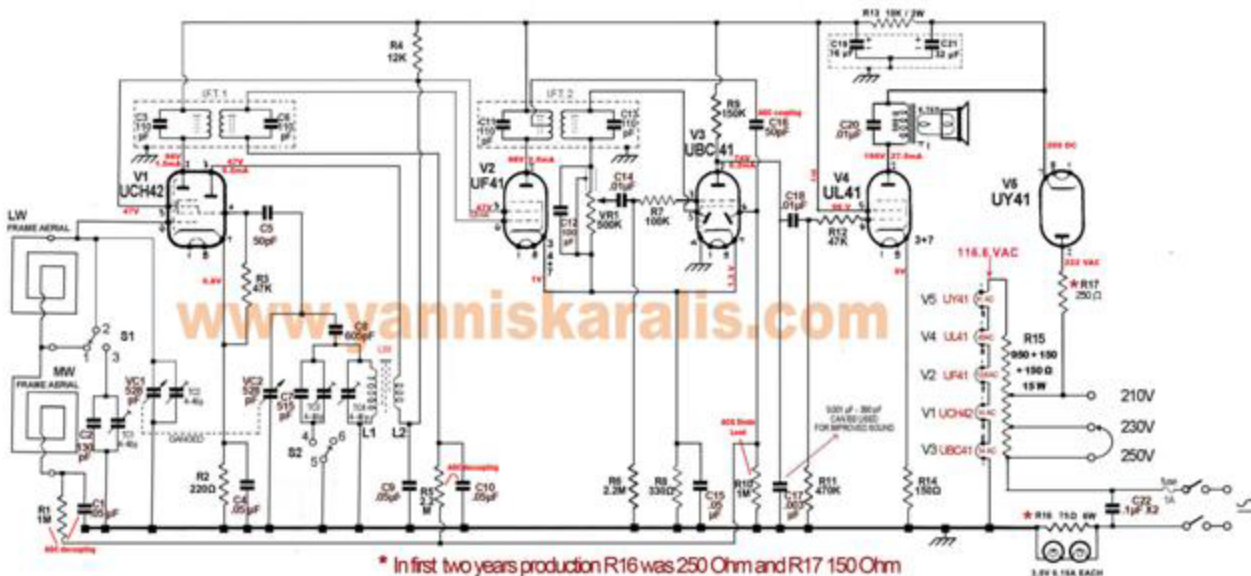


image 18

## CAPACITORS

Ref.	Value		Tolerance ± %	Type	D.C. Working Voltage	Description.
	mfd.	mmfd				
C 1	·05	—	20	Tubular	350	V1. A.V.C. decoupling.
C 2	—	—	1	Silvered Mica	350	L.W. Frame aerial fixed tuning capacitor.
C 3	—	—	2	" "	350	1st I.F.T. primary capacitor.
C 4	·05	—	20	Tubular	350	V1. Cathode by-pass capacitor.
C 5	—	—	20	Moulded Mica	350	V1. Oscillator grid capacitor.
C 6	—	—	2	Silvered Mica	350	1st I.F.T. secondary capacitor.
C 7	—	—	1	" "	350	L.W. Oscillator fixed tuning capacitor.
C 8	—	—	1	" "	350	L.W. and M.W. Oscillator padding capacitor.
C 9	·05	—	20	Tubular	350	Decoupling capacitor V1. Osc. & V1. & V2, G2.
C10	·05	—	20	"	350	V2. A.V.C. decoupling.
C11	—	—	2	Silvered Mica	350	2nd. I.F.T. primary capacitor.
C12	—	—	20	Moulded Mica	350	I.F. Filter.
C13	—	—	2	Silvered Mica	350	2nd. I.F.T. secondary capacitor.
C14	·01	—	25	Tubular	500	Coupling to V3.
C15	·05	—	20	"	350	V2. and V3. Cathode by-pass.
C16	—	—	20	Moulded Mica	350	Coupling to A.V.C. diode V3.
C17	·003	—	25	Tubular	500	I.F. by-pass.
C18	·01	—	25	"	500	Coupling to V4.
C19*	16	—	—	Electrolytic	275	H.T. Line smoothing.
C20	·01	—	25	Tubular	500	Fixed tone corrector.
C21*	32	—	—	Electrolytic	275	H.T. Line reservoir capacitor.
C22	·1	—	20	Tubular	500	Mains filter capacitor.

\* C19 and C21 are in one container.

## RESISTORS

Ref.	Value in Ohms.	Rating in Watts.	Description.
R 1	1 meg.	1/2	V1 A.V.C. decoupling.
R 2	220	1/4	V1 Cathode bias.
R 3	1000	1/4	V1 Oscillator grid bias.
R 4	1000	1/4	V1 and V2 Screen and V1 Oscillator anode feed.
R 5	neg.	1/4	V2 A.V.C. decoupling.
R 6	neg.	1/4	V3 Grid cathode return.
R 7	1000	1/4	V3 Grid stabiliser.
R 8	330	1/4	V2 and V3 Cathode bias.
R 9	1000	1/4	V3 Anode load.
R10	neg.	1/4	V3 A.V.C. diode load.
R11	1000	1/4	V4 Grid cathode return.
R12	1000	1/4	V4 Grid stabiliser.
R13	1000	2	H.T. line smoothing.
R14	150	1/4	V4 Cathode bias.
R15	950 0 + 150	15	V1-V5 Heater circuit ballast.
R16	250	6	Scale lamps shunt.
R17 †	150	1	V5 Surge limiter.
VR1	neg.	—	Volume control with S3. ganged.

A tolerance of  $\pm 20\%$  is permissible on all resistors with the exception of R4, R8, and R14  $\pm 10\%$  and R16  $\pm 5\%$

† On later receivers R17 is 250 ohms  $\pm 20\%$  4 watt



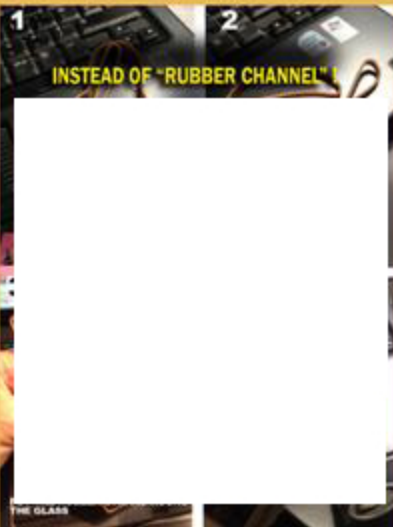
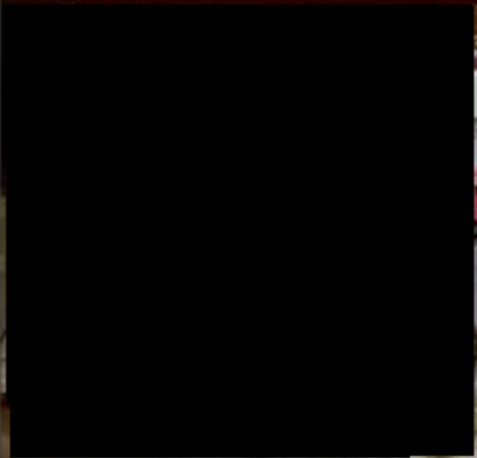
## a. TIPS by Yannis Karalis





b. TIPS by Yannis Karalis

ENOUGH SPACE TO INSTALL A BULKY **CHOKE FILTER**  
**INDUCTOR** OR A SUITABLE (BIGGER) **OPT** REPLACEMENT



INSTEAD OF "RUBBER CHANNEL" !



c. TIPS by Yannis Karalis

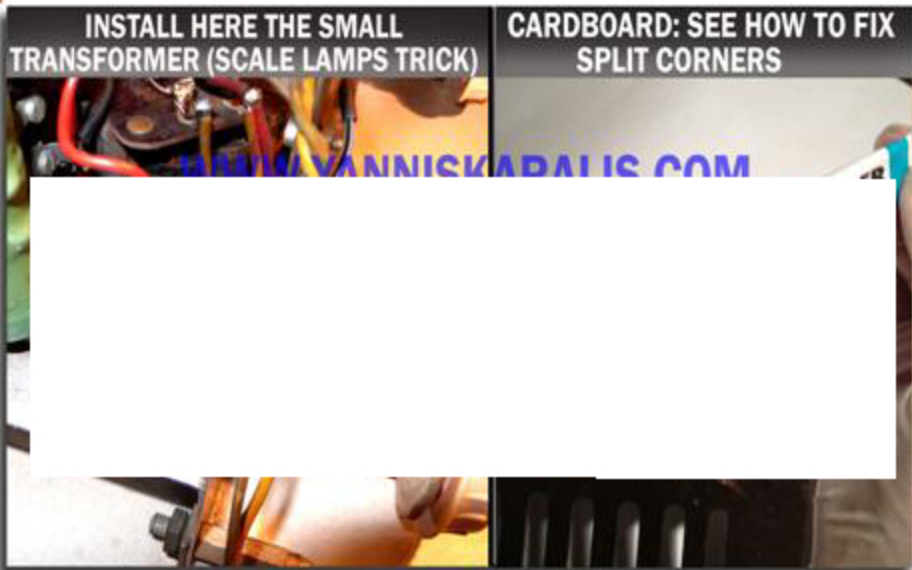


image 23





#### d. TIPS by Yanniskaralis

##### CLEANING THE VARIABLE CAPASITOR

Some times the sound is cracking badly...

##### CLEANING THE POTENTIOMETER

Some times the Pot is annoyingly scratchy.

and rotating areas.



e. TIPS by Yannis Karalis



print it out to replace the tortured one

<b>DATUM</b>	<b>500</b>	<b>1400</b>	<b>300</b>	<b>1200</b>	<b>200</b>	<b>METRES</b>
	<b>600</b>	<b>214</b>	<b>1000</b>	<b>250</b>	<b>1500</b>	<b>Kc/s</b>

**KEY TO CALIBRATION**



## BUSH DAC90A – EASY RESTORATION by Yonah Kessler

Be overly careful as the chassis CAN BE HOT

This is the latest and more analytic version of the restoration guide from 2015. Just print it out on A3 paper.

Hope I'll make your life easier as many others have. I have fully easily repaired this awesome set using these RESTORATION SHEETS.

Make sure the output transformer hasn't arced out of the circuit. Also check the speaker as a lot of times the spider plate **comes unglued**, thus causing r

Mains cables (230VAC) usually act as an antenna for shortening these cables if they are long.

Capacitors.

1.

Make sure to replace the audio coupling capacitor **C18** and Also replace ALL the wax capacitors.

Replace the mica capacitors as very rarely go bad. If you replace them it is possible to throw off the timing. Replacing the mica caps sometimes will do the trick. Only replace mica capacitor if you are

0.1  $\mu$ F CLASS **X2** >275VAC across mains switch.

Electrolytic capacitors.

Replace all dual electrolytic capacitor in place and resolder the connections and install

which nowadays has become a great problem. Places are full of those electric appliances. We have the same problem with an anti-surge main tension and with economic light bulbs as and was humming!



Also, your area (*radar, airport..*), TV, *machine*), lights, transformers, mobiles, computer etc. Connect and disconnect one by one appliances and turn on/off the lights to the culprit. Try moving the radio from room to room (sockets) to see what happens.

Note that just a little hum at low and zero volume for these sets but the HUM goes away as you increase volume.. so it's normal.

Critical replacement: **R2, R3, R8, R11, R12, R13 and grid stabilizer..**)

### **Antenna.**

Bush DAC90A bears a large and sensitive Loop Antenna. The larger the more (gain) sensitive it is. This Loop Antenna has directional properties. So before shelving this set consider to turn the radio in different directions to see which direction it performs better.

Use stranded or solid core wires. The good thing about stranded wires is that you can route it along a path (also for shielding).

For speakers we use stranded wires for speakers and for filaments wiring I'd suggest solid core.

Wire is shrink handy for fine work. Wire insulation is as the set doesn't carry large currents (the heater wires through the heater wires (100 mA).

It has been properly aligned when it was first aligned. It could require realignment either due to misalignment or because somebody has been misaligned previously.

at least one (weak) station on MW band -

You need to align the IFT (cans on top of ferrite core trimmers each) even without an antenna.



3.

Start from IFT2 secondary first and proceed to IFT1 secondary first and trim slowly for higher reception level. Use a trimming tool (don't forget TO RECALIBRATE first).

Take great care when attempting to trim, as it is easy to damage components previously adjusted.

"Alignment" can be useful if you need RF Signal.

Never touch the chassis without RF shield.

If you are lucky, you can get it all at once - leave it alone.

#### **Cleaning**

Use air blown to get the fuzz off the chassis. Use anything i.e. a brush on chassis and it will rub off.

#### **Bakelite**

Bakelite may become discolored with aging, before

**Avoid using** harsh cleaners. These will ruin the finish. DON'T

first clean Bakelite with a non alkali, non abrasive mild cleaner like dishwashing or hand washing liquid. Use a soft used toothbrush.

#### **Use sandpaper on bakelite!**

Remove the radio Bakelite cabinet by rubbing away with fine sandpaper or Bake-o- Bryte Bakelite or Magnolia Glayzit polish. Finish off with a really soft cloth like you could a pair of socks. You are going to get a new shine with just a bit of

rd.

The only way to remove the dust from the back side and you add to the

The cardboard pair of pliers of instant glue

You can use a cardboard cover.

Hope that helps.  
Yannis Karalis

ing or just

d cleaners.  
permanently

isture and  
steam the  
less water

eze with a  
le amount  
n  
cardboard



## CAUTION

The contents of this work (Bush DAC90A Easy Restoration) is a copyrighted content (intellectual property) protected by law; thus can be used only by the buyer.

Buying this work you undertake not to disclose; publish; upload or offer for sale any content of this work.

Copyright 2013 – Yannis Karalis



BUSH D.A.C. 90A

*ATTENTION: AC line voltage may be switched on to the chassis if plugged in one way. Don't attempt repair work if you don't have much experience in radio or electronics. This is an EXTREMELY DANGEROUS SITUATION.*

**The Author will not be held liable for any errors, damage, or other unexpected events resulting from the use of this "BUSH DAC90A Easy Restoration".**