

SOME COMMENT ON CORROSION.

A1

-some common metals are mined as oxides and are refined into pure metals/alloys

Ferric oxide-----Iron/Steel/ Stainless Steel

Copper oxide----copper/Bronze/Brass

Bauxite-----Aluminum

-some precious metal are mined in there metallic state and are processed for purity

Gold

Silver

Platinum ?

A2

Given suitable conditions common metals will corrode back to oxide state ,some (Aluminum) faster then others (SS,Bronze)

In general oxides **do not conduct electricity**

(remember aluminum house wiring)

A3

The precious metals(gold,silver,platinum)are more **robust** to corrosion .

Good Quality electrical connections are **gas tight joint** or are plated with **precious metals** ie aerospace,computers

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A4

Common corrosion

Metal + oxygen +heat =oxide

(RATE of corrosion from EXPLOSIVE to very long time!)

A5

Electrolytic corrosion with Voltage source

**external battery +metal in a aqueous solution=
Ion movement. (electro-plating in reverse)**

(positive ground does help here)

A6

Electrolytic corrosion with self generated voltage source.

GALVANIC PILE 101

**Two Different metals in a Aqueous solution
(water+salt/acid) will produce a voltage.**

A6 cont Oxidation Potentials

POSTER A6

Lithium	+3.05v (batteries)
Potassium	+2.92
Magnesium	+2.37v (batteries)
Aluminum	+1.66v
Iron (Fe)	+0.44v
Cadmium	+0.40v
Nickel	+0.25v
Gold	+0.80v
Tin	+0.14v
Lead	+0.04v
Copper	-0.34v (brass/Bronze)

HOOTER PROBLEMS section **B**

B1 General problems –pre 1964-5. (POSTER B1)

Explain – LEAKAGE

--Large Currents, 50 A fuse

--Fragile wire tr-3

--horn terminals suffer from A5 & A6 corrosion.

B2 General problems post 1964-5 (POSTER B2)

The horn relay and more efficient horns.

Explain –A5 type limited to relay

--horn terminal suffer from A6 corrosion.

B3 Horn types

Windtones TR-2/3 (B4)

Clear Hotters TR-4/6-? (B5)

Lucas 9H TR-4/6-? (B6)

Fiamm Air Horns (B7)

B4 **WINDTONES**

The Windtones come as wt-614@6 ½ amperes and the later more powerfull wt-618@8amperes.

They do suffer from A5(constant voltage),but this older design is good. Two adjustments may be required to tune them. A current probe ,oscilloscope and good ear protection ease this task along. The use of all brass terminals reduces A6 self generated corrosion.

Windtones use a carbon block (resistor) to suppress voltage spikes generated by the horns.

B5 CLEAR HOOTERS

The Clear hooters and the Lucas 9H for TR-4to TR-6 or about 1960-1976.

The main failure is a sever (A6) self corroding mode of the aluminum rivets that connect the brass LUCAR terminal to a brass washer inside the horn. (POSTER B5)

This Oxide can be broken with about **600 VOLTS**,but it leaves a resistive connection of 2 to 3 ohms per joint or about 5 ohms.

A repaired unit will have DCR of about 1ohm.

The average current is 5-6 Amperes,and the have loud clear output. (14v x 5A=70 WATTS per HORN)

HORN FREQUENY

Low Tone 400 Hz 2.5mS

High tone 500Hz 2.0mS

High,High tone 660Hz 1.5mS

Repair of Clear hooters (poster B5, Pix. Sheet B5)

Poster B5 -show failure mechanism

Pix Sheet B 5—Horn bypass **SURGERY**

a/drill out x6 rivets (small drill) ie 10-32 tap later

b/ clean & check diaphragm for problems
c/drill small (3/64)through both rivets

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B5 cont.

d/insert copper wires through both holes and wrap the wire
around the terminals ,solder these four joints.

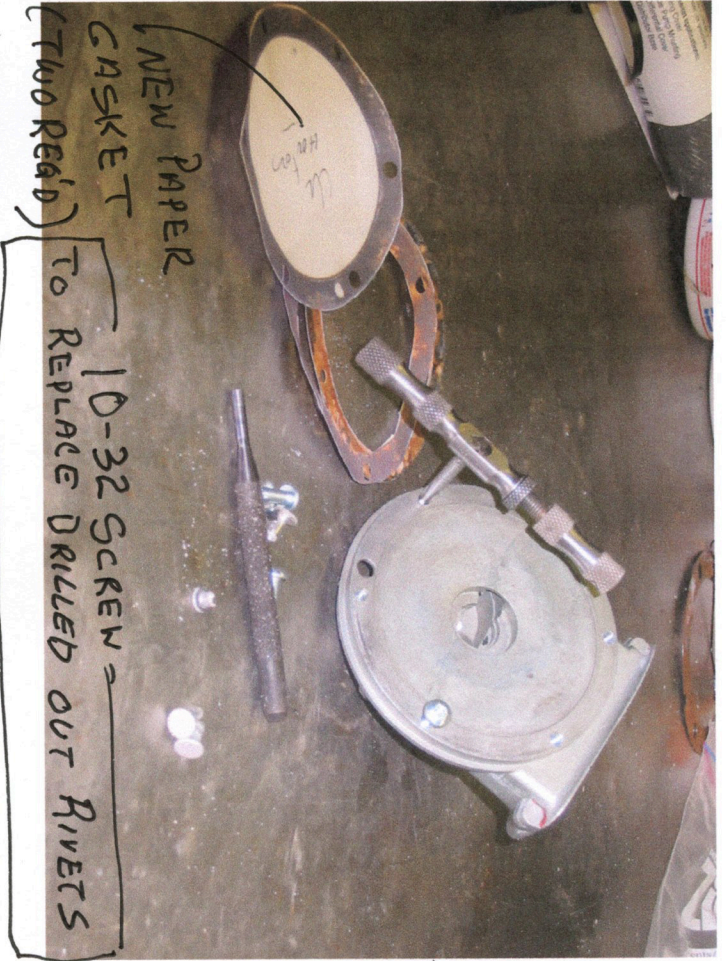
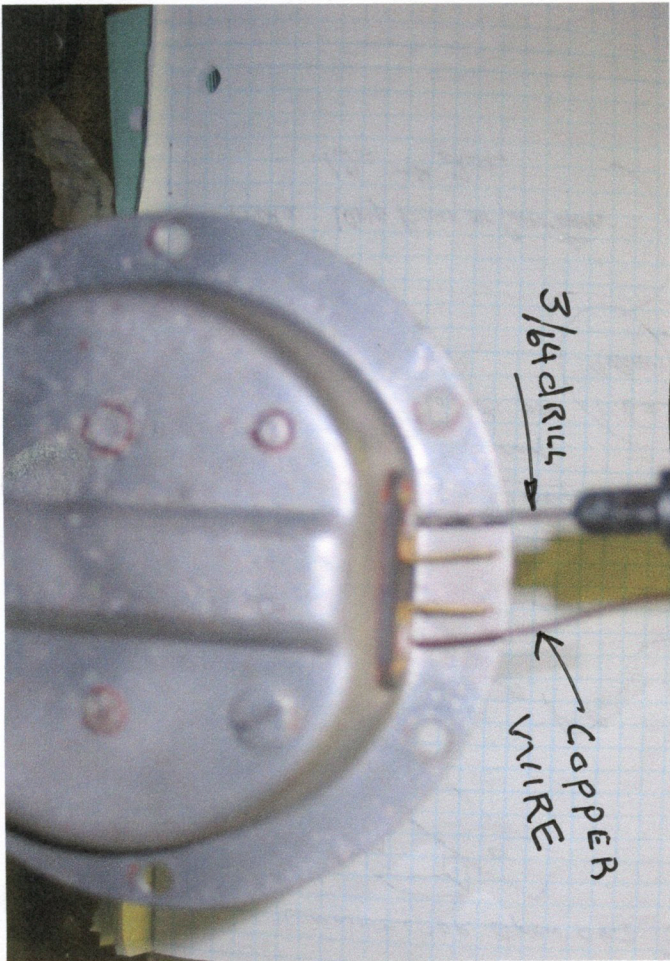
e/reassemble unit,test for current and frequency then paint.
Note paper gasket easy to make using a scanner and photo
paper in the printer.

B6 Lucas 9H Horns

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B7 FIAMM AIR HORNS

20 Ampere Compressor= 1/3 H.P very loud,cheap and effective.



P14 B5 CLEAR HOOTERS

3/64 drill
COPPER WIRE

NEW PAPER CASKET (Two Read)
10-32 SCREW
TO REPLACE DRILLED OUT RIVETS

Ag

Oxidation Potentials

(HITECK BATTERY)

LITHIUM + 3.05 VOLTS

POTASSIUM + 2.92v

MAGNESIUM + 2.37v

ALUMINUM + 1.66v ←

IRON (STEEL, SS etc) + 0.44

CADMIUM + 0.40

NICKLE (SS) + 0.25

GOLD + 0.80

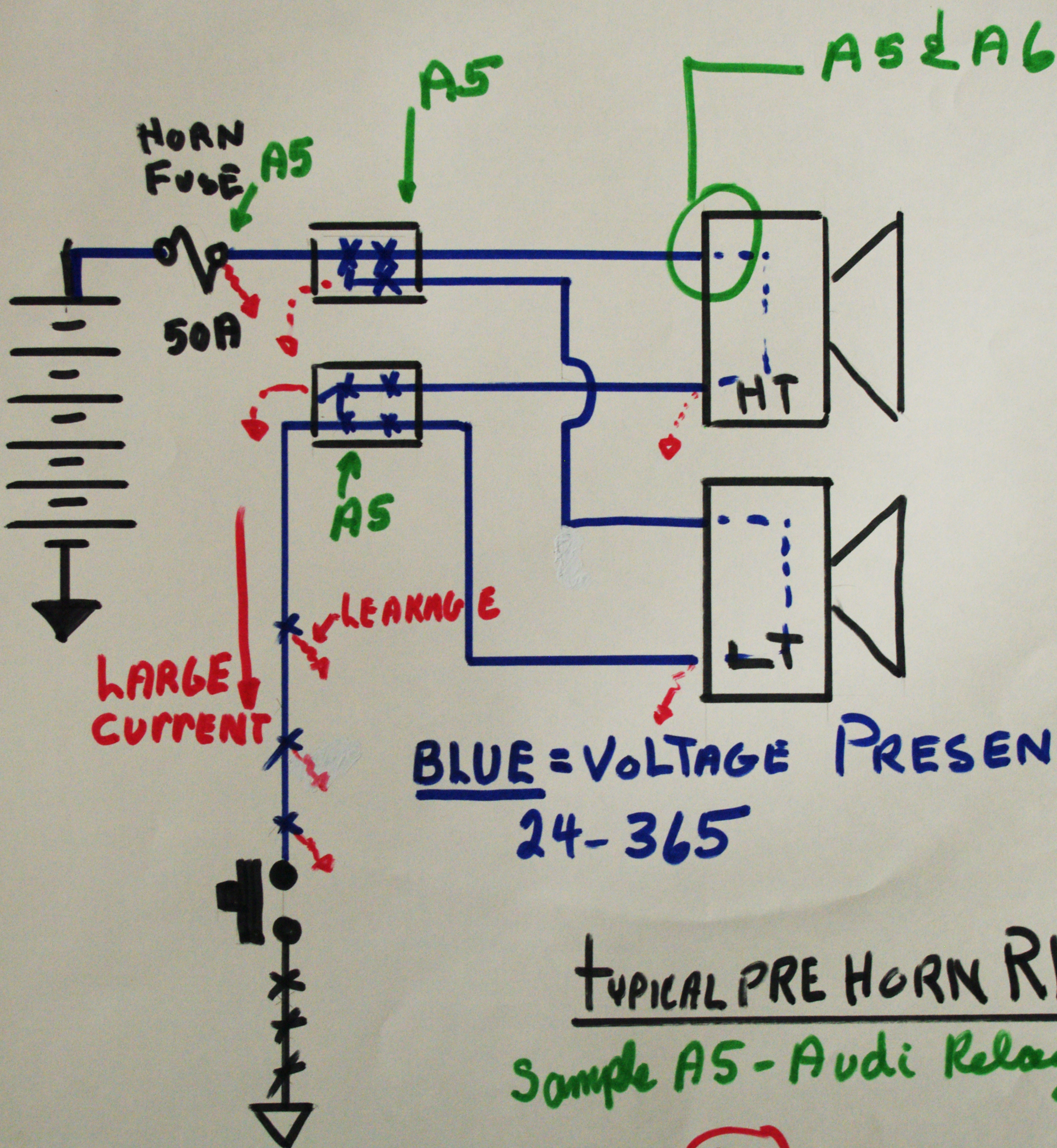
TIN + 0.14

LEAD + 0.04

COPPER (BRASS BRONZE) - 0.34 ←

Δ = 2V

POSTER Ag
GVTC TALK
25 APRIL 2006
BRIAN MILLS



BLUE = VOLTAGE PRESENT
24-365

TYPICAL PRE HORN RLY
Sample A5 - Audi Relay

POSTER **B1** OUTL 25ARR-2006

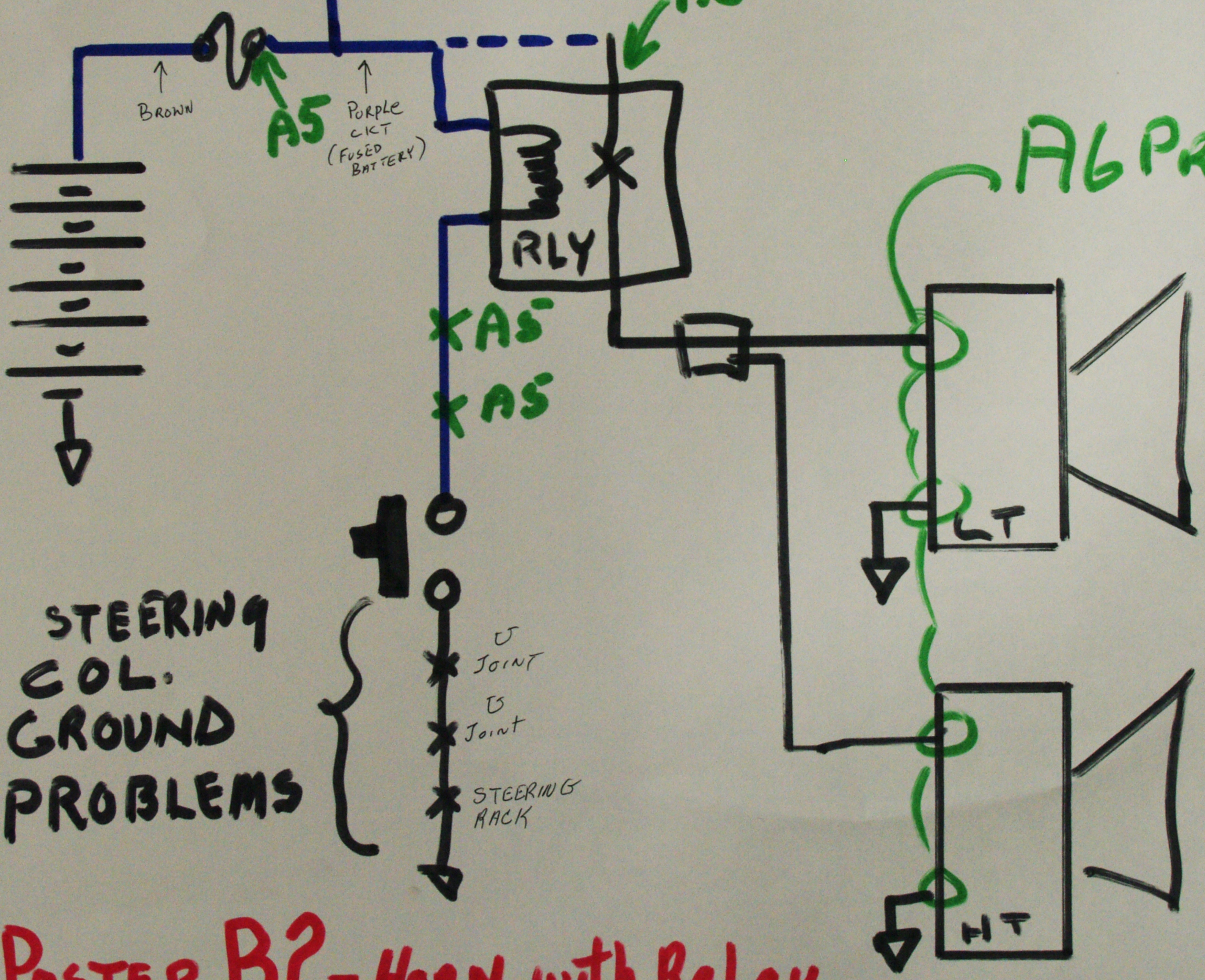
SHOW
 Gold Fuse Holder
 Audi Relay with fault.
 CONNECTOR - Corroded.
 - NEW BRASS

BLUE
 IS ON 24/365

OTHER
 CKTS

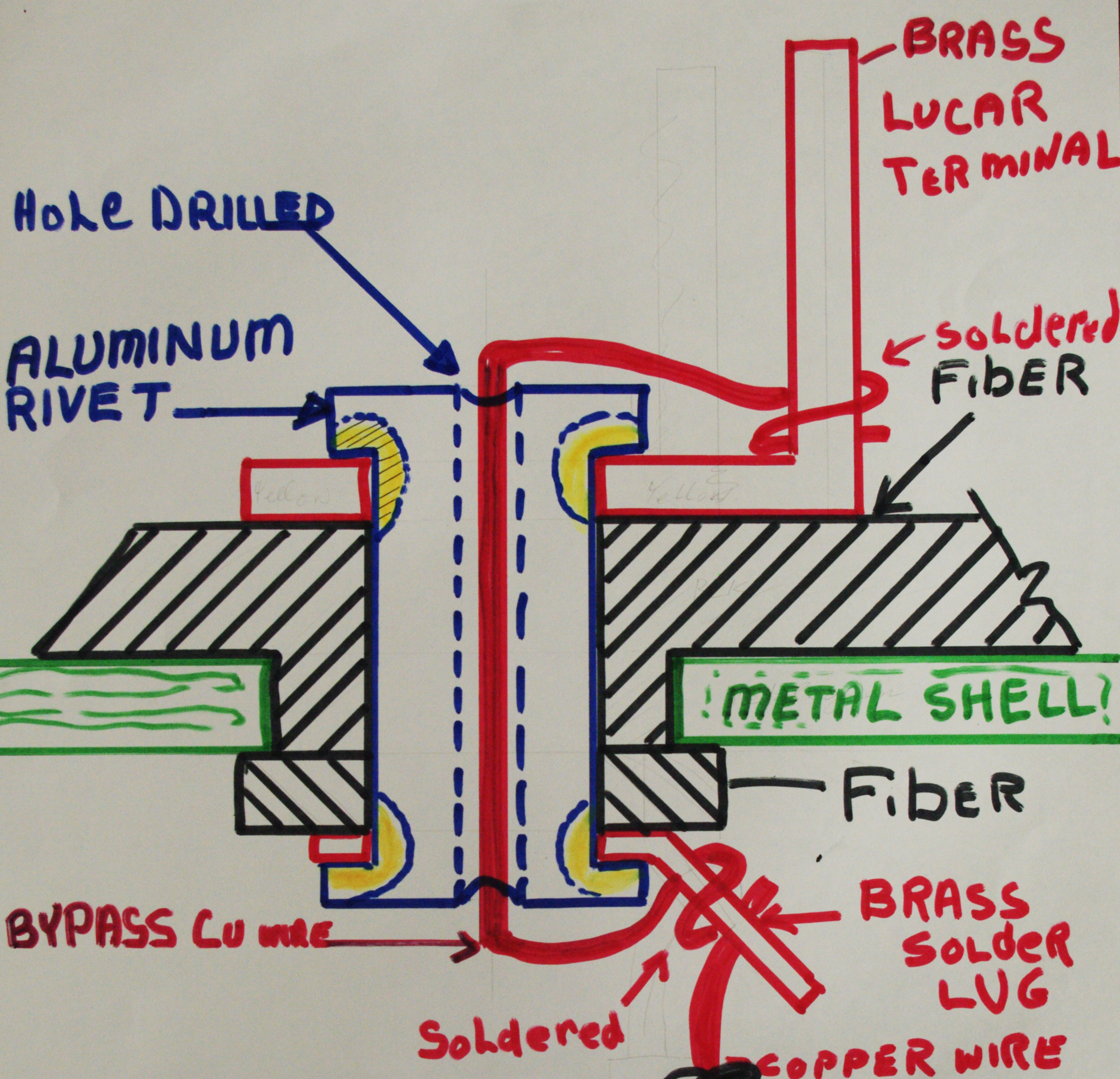
A5 PROBLEMS.

A6 PROBLEMS



STEERING
 COL.
 GROUND
 PROBLEMS

POSTER B2 - HORN with Relay



BYPASS SURGERY FOR CLEAR HOTTERS HORNS



POSTER B5
 OVERTALK B. MILLS
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