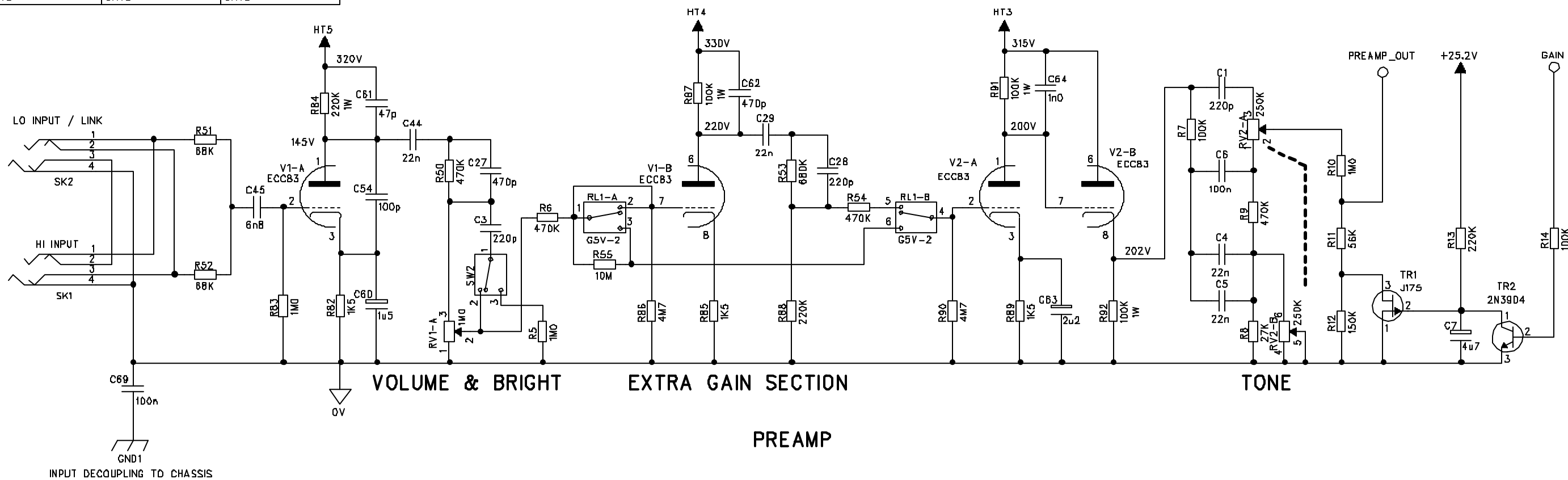



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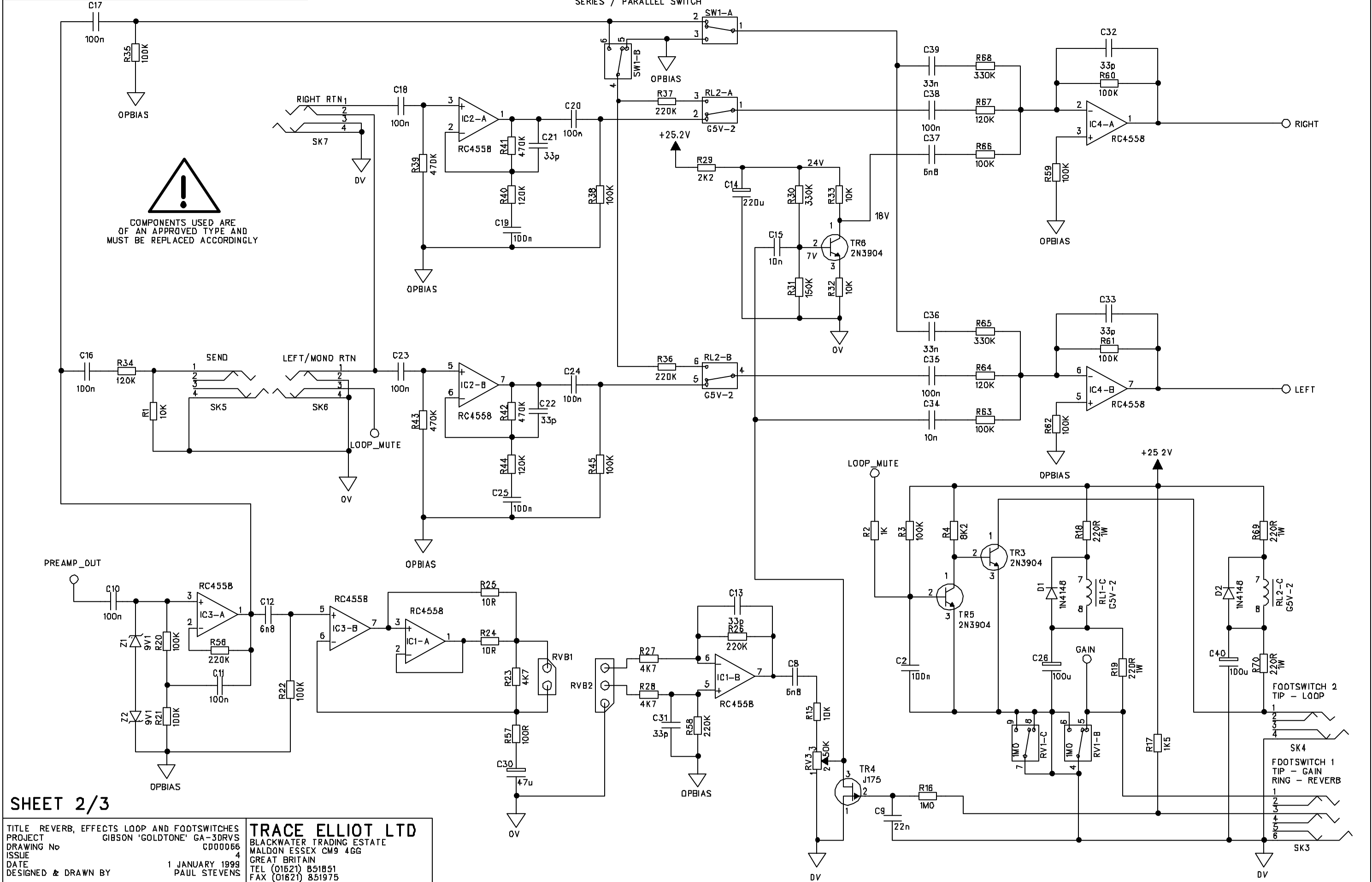
# GIBSON 'GOLDTONE' GA-30RVS GUITAR AMPLIFIER

2 x 15W CLASS A POWER STAGES FOOT SWITCHABLE REVERB, STEREO EFFECTS LOOP & GAIN BOOST



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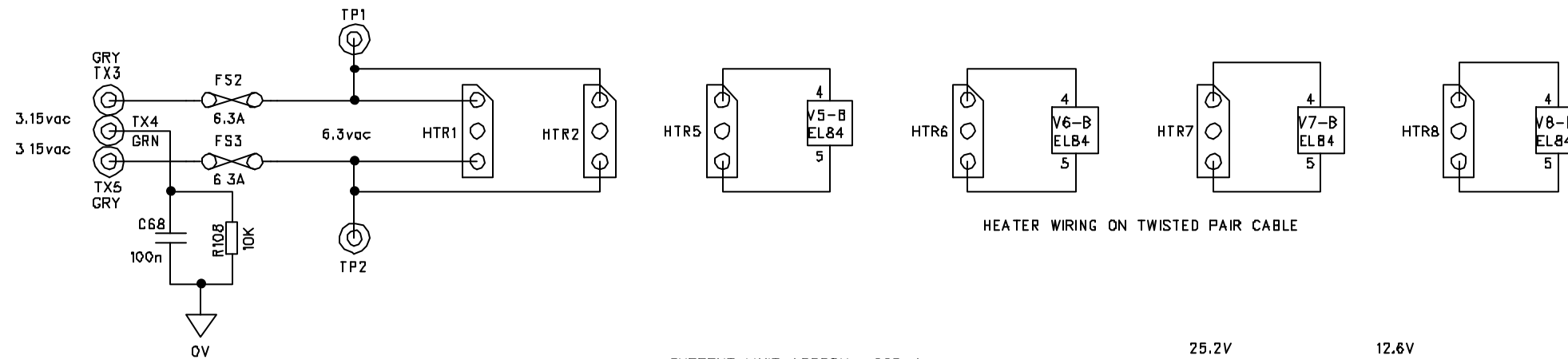
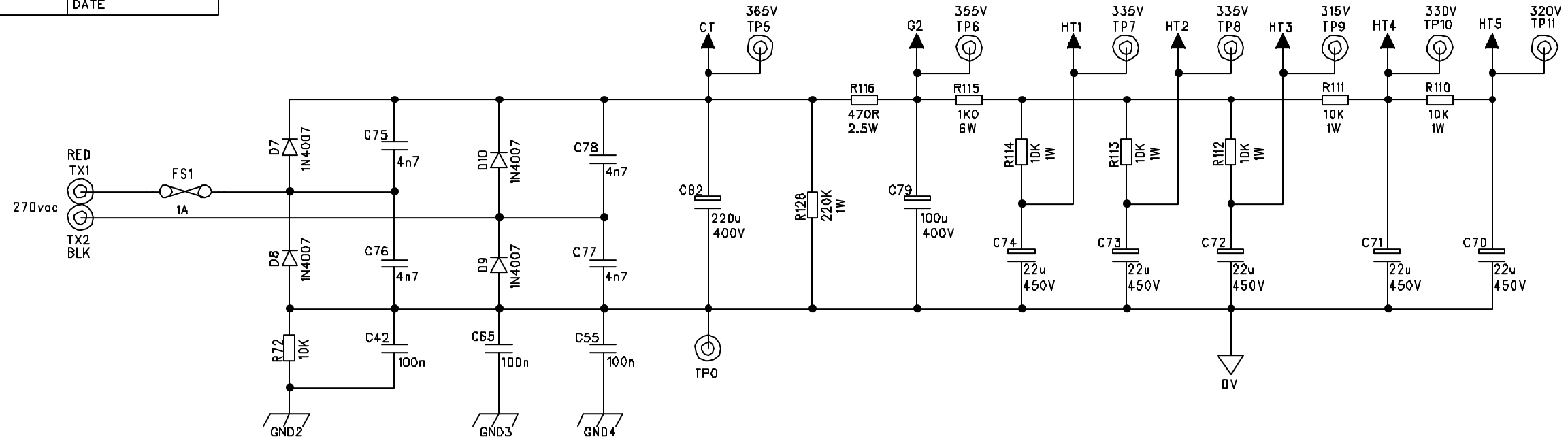
  
 COMPONENTS USED ARE  
 OF AN APPROVED TYPE AND  
 MUST BE REPLACED ACCORDINGLY




**SHEET 2/3**

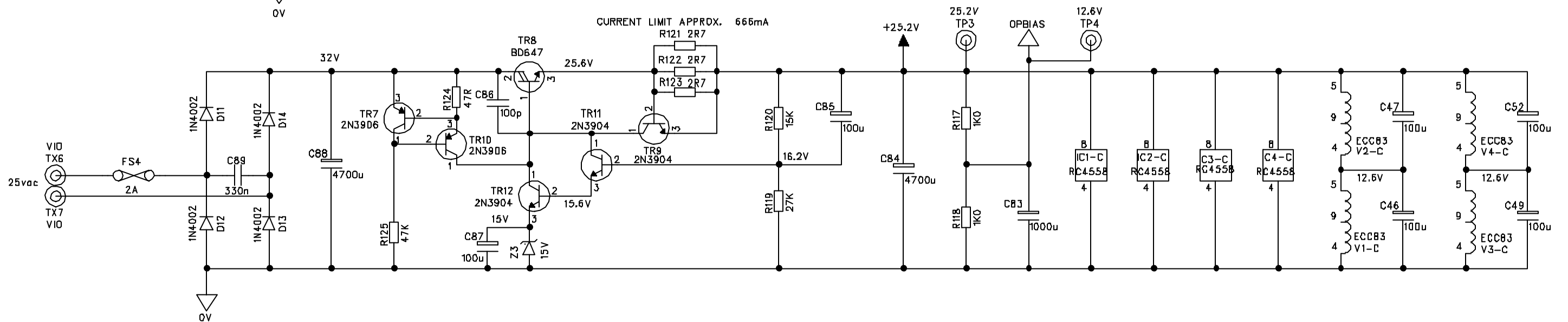
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| TITLE REVERB, EFFECTS LOOP AND FOOTSWITCHES<br>PROJECT GIBSON 'GOLDTONE' GA-3DRVS<br>DRAWING No CD00066<br>ISSUE 4<br>DATE 1 JANUARY 1999<br>DESIGNED & DRAWN BY PAUL STEVENS | <b>TRACE ELLIOT LTD</b><br>BLACKWATER TRADING ESTATE<br>MALDON ESSEX CM9 4GG<br>GREAT BRITAIN<br>TEL (01521) 851851<br>FAX (01621) 851975 |
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 COMPONENTS USED ARE  
 OF AN APPROVED TYPE AND  
 MUST BE REPLACED ACCORDINGLY

HEATER WIRING ON TWISTED PAIR CABLE



**SHEET 3/3**

|                     |                               |   |
|---------------------|-------------------------------|---|
| TITLE               | HT, HEATER AND DPAMP SUPPLIES | <b>TRACE ELLIOT LTD</b><br>BLACKWATER TRADING ESTATE<br>MALDON ESSEX CM9 4GG<br>GREAT BRITAIN<br>TEL (01621) 851851<br>FAX (01621) 851975 |
| PROJECT             | GIBSON 'GOLDTONE' GA-3DRVS    |   |
| DRAWING No          | C000066                       |   |
| ISSUE               | 4                             |   |
| DATE                | 1 JANUARY 1999                |   |
| DESIGNED & DRAWN BY | PAUL STEVENS                  |   |

# GIBSON 'GOLD TONE' GA-30RVS CIRCUIT DISCRPTION

**Please refer to circuit diagram for DC voltages and other information**

## **INPUT SECTION AND PREAMP**

SK1 and SK2 are the HI and LO sensitivity inputs respectively. When the LO socket is used R51, R52 and R83 act as a potential divider to reduce the input level to the preamp.

C45 has two purposes, firstly to block any DC from the input that may unintentionally be present, this would otherwise change the bias point of the first valve stage, secondly the value of the capacitor has been chosen so that there is a slight roll off of lower frequencies, this prevents the sound from getting too muddy.

V1a is the first gain stage and is configured as a cathode bias, common cathode, voltage amplifier with bypassed cathode resistor for increased gain.

R50 and C27 give a slight presence lift and the frequency of the Bright effect is set by C3, which, when switched in, is across pins 2 and 3 of RV1 (Volume). Obviously connected like this the amount of brightness added will decrease as RV1 is turned up.

RL1 switches the extra gain stage in or out of the signal path. The relay itself is switched on or off by the push/pull switch on RV1. With RV1 pulled out the relay can also be switched on or off by the tip connection of SK3, Footswitch 1.

V1b is the extra gain stage configured similar to V1a but without the cathode bypass capacitor. C62 is added across the anode resistor R87 to smooth out the top end, and R53, R88 and C28 set the amount of signal sent to the next stage as well as giving a slight presence lift.

V2a is the next gain stage configured similar to V1a but with C64 across the anode resistor R91 again to smooth out the top end. The signal is then fed into V2b which is configured as a cathode follower. This reduces the impedance to drive the tone network.

The Tone network is passive and controlled by RV2. This is a dual ganged potentiometer, one part of which effectively controls the mids (RV2B) while the other part inversely controls the treble (RV2A).

R10, R11 and R12 act as a potential divider to lower the signal sent to the reverb and effects loop circuitry. The J175 FET, TR1, is used to effectively short out R12 when the extra gain stage is not in use. This sets the volume level difference between the two preamp configurations.

## REVERB AND EFFECTS LOOP SECTIONS

The signal from the preamp is fed into IC3A which is configured as a boot strapped voltage follower. Z1 and Z2 have been added to prevent any nasty spikes from damaging the opamp, this should in practise never happen.

The output of IC3a is fed to the reverb and effects loop sections.

C12 and R22 roll off a lot of the lower frequencies before the signal gets sent to IC3B and IC1A. These opamps are configured for current gain, the actual gain being dependant on the impedance/frequency curve of the reverb tray. Because of this it is crucial to the correct operation of the reverb that the right reverb tray is used. This should be an Accutronics 8CA3B1B.

The output of the reverb tray goes into IC1B. This is configured as a differential amplifier as a way of reducing any hum that may be picked up on the sensitive reverb return leads.

RV3 controls the level of the reverb. Across pins 1 and 2 is TR4, a J175 FET. When the ring connection on SK3 is shorted out, i.e. by a footswitch, TR4 is also effectively shorted which results in the reverb being turned off.

The reverb signal is then split and sent to the two mixer stages in IC4, however one side goes through a unity gain inverting transistor stage, TR6, just before the mixer stage. This obviously puts one of the reverb returns out of phase which produces the 'surround sound' reverb effect.

The signal from the output of IC3a is split two other ways for the effects loop. One goes to the series/parallel switch, SW1A, the other goes to the SEND socket. R34 and R1 are a potential divider to reduce the nominal send level to about -20dBu.

SK6 and SK7 are the LEFT/MONO and RIGHT RETURN sockets respectively. Each of these are fed into the two sections of IC2 which are both configured as non-inverting gain stages. The outputs of these then go into RL2. This relay basically turns the effects loop on or off. Without a jack is inserted into SK6, LEFT/MONO RETURN, the 'LOOP\_MUTE' line is held down at 0V, this keeps TR5 turned off, which turns on TR3 and effectively shorts R70 to 0V. This turns RL2 which means the effects loop is bypassed and cannot be switched on. When a jack *is* inserted into SK6 the reverse happens, TR5 is turned on, TR3 is turned off and the effects loop is activated. In this mode, shorting out SK4, Footswitch 2, will turn the relay on and again bypass the effects loop. TR5 and TR3 were needed to isolate the 'LOOP\_MUTE' line from the relay circuit to reduce switching noise.

## MIXER SECTIONS

The two halves of IC4 are used as standard virtual earth mixer sections. Here the dry, effects loop and reverb signals are mixed together depending on the settings of the series/parallel switch and RL2. The outputs from each half of IC4 then provide the left and right signals sent to the two power stages.

## **POWER STAGES**

The two phase splitters (V3 and V4) are differential input splitters which each produce the anti phase signals necessary to drive the push pull output stages.

The outputs from V3 drive the EL84 power valves V5 and V6 for the left side power stage. V4 drives V7 and V8 for the right side power stage. The two pairs of EL84 output valves are configured as push pull, cathode biased, class A power amplifiers.

The quiescent current of each power stage is set by R71 and R73, which are bypassed by C41 and C43 for extra gain.

D3, D4, D5 and D6 have been added to give protection to the output transformers should a fault arise.

## **OUTPUT TRANSFORMERS AND SPEAKER CONNECTIONS**

The output transformers have secondary taps for 16Ω and 8Ω.

The four LINK positions are provided on the PCB so that different impedance internal speakers can be used in production. Depending on whether the internal speaker is 16Ω or 8Ω the correct LINK should be fitted. This has been done purely so that different impedance speakers can be used if there are any problems with supply.

SW3 selects the output impedance of the External Speaker Outputs, SK8 and SK9. These can be set to either 16Ω or 8Ω. When a jack plug is inserted into either of these sockets the corresponding internal speaker is disconnected.

## **POWER SUPPLIES**

All three supplies, HT, ac heater, and DC supplies have secondary fusing on the PCB. This is for approvals and to protect the mains transformer.

The HT supply is a simple bridge rectifier diode network, with 4n7 1KV capacitors across each diode for EMC reasons, which is then smoothed by C82, to supply the centre taps of the output transformers. R126, C81, R127 and C80 have been added to isolate the two centre taps at high frequencies. The main supply is then further smoothed to supply the screen grids, phase splitters and preamp.

R128 is added to discharge the high voltage capacitors when the unit is turned off.

The ac heater supply is simply connected via two twisted pair connecting leads to V5, V6, V7 and V8, after first going through the secondary fuses.

The 25.2V DC supply is a highly regulated supply using a BD647 (TR8) as the main regulating device. (Please ensure that the heat sink is attached to TR8 and heat sink compound has been used)

TR7 and TR10 provide a constant current source for Z3 the 15 volt zener.

The output voltage is set by the ratio of R119 and R120 which provide the feedback to TR8 via TR11 and TR12 to stabilise the whole circuit. TR9 with R121, R122 and R123 form a current limiter. This allows the supply voltage to ramp up at switch on when the heater filaments of the preamp valves draw considerably more current while cold.

R117 and R118 halve the supply voltage to provide the opamp bias voltage, and as shown on the circuit diagram the DC supply is routed through the filaments of two of the valves in series. This will result in each filament having the nominal 6.3 volts across them.

Paul Stevens  
30 June 1999

# VELOCETTE TWIN VALVE GUITAR AMPLIFIER

## Introduction

Congratulations on your purchase of a Velocette Twin.

The Velocette Twin is part of the Trace Elliot Velocette range. This is basically a range of no nonsense, compact, valve guitar amplifiers with the minimum controls necessary to produce a good range of sounds. However, with the addition of such features as a switchable gain boost, stereo effects loop, pseudo-stereo reverb, and a stereo power stage, the 'Twin' model takes the range as far as it could possibly go while still justifying a 'Velocette' badge.

The circuit topology has been based on traditional guitar amplifier designs, with new ideas incorporated where beneficial.

The main preamp and both power stage sections are 100% valve. The valves used are four ECC83/12AX7's and four EL84/6BQ5's run in Class A in stereo (two EL84's per side).

## REAR PANEL CONTROLS

### INPUTS - HI & LO/LINK

Two jack sockets are provided for connection to your instrument.

The HI input is a high impedance, high sensitivity input. This can be used with both passive and active guitars and, depending on the level of output from the guitar and the VOLUME setting, allows the amplifier to be driven hard into overdrive, if desired.

The LO/LINK socket can be used in two ways. Firstly as a lower impedance, low sensitivity input, for use with high output guitars when the user wishes to keep the overdrive under control. Alternatively this socket can be used as a LINK to chain together two or more Velocettes, simply plug your guitar into the HI socket, take an output from the LO/LINK socket and plug this into the input of the next amplifier in the chain.

### BRIGHT

The BRIGHT switch adds more high frequencies when selected. It works in the traditional way, therefore it has more effect at lower VOLUME settings.



## **VOLUME PULL GAIN**

This is a push/pull potentiometer. Pushed in the control acts like a normal volume control on a typical non-master volume amplifier, therefore it sets the overall volume level of the amplifier and has a huge effect on the tone and the amount of overdrive. From low to about halfway, depending on the output level of the guitar and which input socket is used, the sound should remain reasonably clean. Increasing the control further will progressively increase the level of power amp overdrive in the sound, obviously being a valve amp it will respond to the player's dynamics and use of the instruments volume.

Pulling the control out activates the additional valve preamp stage therefore effectively turning the control from a VOLUME into a GAIN control. This extra gain stage makes it possible to produce a fuller overdrive sound especially when turned up as this blends preamp distortion with power amp distortion. With the control pulled out the extra gain stage is also footswitchable. This enables the user to footswitch between clean and dirty sounds.

Setting the VOLUME at about 12 o'clock gives lovely warm clean sounds which can then be switched to a nice, not too saturated overdriven tone.

For total and instant control over a range of clean and overdriven tones we recommend turning the VOLUME control all the way up. Without the extra gain stage switched in the player can then back off the volume on their guitar for clean sounds, turn up fully for some crunchy, responsive power amp overdrive, and then kick in the extra gain stage for thick lead tones with lots of sustain.

## **TONE**

Unlike other single tone controls on other amplifiers, which act merely as a treble roll off, this control works in a different way. It is a dual gang potentiometer which controls two functions simultaneously. In the fully anti-clockwise position the midrange is dominant in the sound, turning the control clockwise decreases the mids while at the same time increasing the higher frequencies.

Start with it in the 12 o'clock position and try different settings with or without the BRIGHT switch to find the settings that you like. Bear in mind that as the VOLUME is turned up the BRIGHT switch has less effect.

## **REVERB**

This single control is for adjusting the amount of reverb effect in the sound. The effect is produced by a three spring reverb tray inside the cabinet. However due to a simple but extremely effective modification to the signal between the reverb tray and the stereo power stages, what you actually hear is a huge pseudo-stereo reverb that seems to fill the whole room. It is even more noticeable when using extension cabinets.

## **FOOTSWITCH SOCKETS**

These sockets are for connecting to latching footswitches. The first one is dual function and operates the extra gain stage (with VOLUME pulled out) and reverb. The second turns the effects loop on or off if used.

## **EFFECTS LOOP**

This has sockets for SEND, LEFT/MONO RETURN and RIGHT RETURN as well as a switch for SERIES or PARALLEL configuration.

The SEND is for connection to the input of effects units and can drive floor type battery powered effects pedals or 19" rack type studio effects units.

The RETURN sockets are for connection to the outputs of effects units. If a mono effect unit is used then use the LEFT/MONO RETURN.

The SERIES/PARALLEL switch alters the configuration of the effects loop.

In SERIES mode the whole signal comes out of the amp, into the effects unit and then back into the amp, whereas in PARALLEL mode the effected signal is mixed in with the original dry signal, thus retaining tonal purity of the dry signal.

The choice of which mode to use will depend on what kind of effects unit is used and what overall effect is desired. But generally if time delay effects are used, such as delay (echo), chorus, flanging, phasing, etc., then the PARALLEL setting is usually preferred. If volume or EQ related effects are used, such as overdrive/distortion, compression, graphic equalisation, wah-wah or volume pedals, or if a multi-effects unit is used with a combination of time delay and volume related effects, then it is usually best to set the switch to SERIES. There are no rules, it is best to experiment and see what you prefer.

If PARALLEL configuration is used then if possible it is recommended that the dry/direct signal from the effects unit is turned off.

The effects loop is not activated unless a jack plug is inserted into the LEFT/MONO RETURN socket. The loop is then footswitchable if a suitable latching footswitch is connected to the appropriate footswitch socket.

It is also possible to use the Velocette Twin purely as a stand alone mono/stereo power amp. To do this set the loop to SERIES configuration, this will effectively eliminate the preamp and plug signal source(s) into the RETURN socket(s).

## **EXTERNAL SPEAKER OUTPUTS**

These have been provided throughout the Velocette range so that the user can connect them to external 16Ω speaker cabinets, such as 4x12s, for different sounds. This is useful for both live and studio use and will radically change the sound and volume of the amplifier.

As the Velocette Twin has two power stages two external speaker outputs are provided, as is a 8Ω or 16Ω impedance selector switch which sets the output impedance for both sockets. (N.B. This does not change the impedance of the internal speaker connection)

When a jack is inserted into each socket the corresponding internal speaker is disconnected, either or both can be used at once.

However, always ensure that the amplifier is correctly loaded when in use and never plug both power sections into the same speaker cabinet unless it is a stereo cabinet and you are sure that the speakers are separately addressed.

Probably the most popular way to use these outputs is to sit the unit on top of a stereo 4x12 cabinet, such as our GSC412, set the switch on the Velocette Twin to 8Ω, the cabinet to 8Ω STEREO and connect the two speaker outputs to the two cabinet inputs for a big stereo sound.

Alternatively if you really want to create an impression set the Velocette Twin to 16Ω and get TWO 4x12's, set to 16Ω MONO, to plug into. With the cabinets spaced apart a reasonable distance the sound is huge! Especially considering that the cabs are being driven by two fifteen watt amps. Adding a stereo chorus or delay to the effects loop at this stage is quite simply more than a poor boy can take!

## **POWER SWITCH (OFF/STANDBY/ON)**

As the name implies, this switches the amplifier from OFF to STANDBY mode, where only the valve heaters are on, to ON for actual use. This should be used correctly every time the unit is used to prevent problems with valves and to increase their life.

Before mains is applied to the unit, check that it is the correct voltage and make sure the POWER switch is in the OFF position. Connect power lead to mains outlet then switch to STANDBY and wait about a minute before switching to ON. This will ensure that the valves have time to warm up before large voltages are applied to the plates. During short breaks the amplifier can be switched to standby and will therefore be ready to play when next needed.

After switching off it is recommended, as with all valve amplifiers, that it does not receive any sudden physical shocks while the valves are still hot, i.e. through moving the unit. If possible try to give the amplifier a few minutes to cool down before transporting it.

## **IEC SOCKET/MAINS FUSE**

The IEC socket is for connection to universally used IEC mains leads to connect to appropriate domestic mains supply.

In the event of having to replace the mains fuse always use the same rating and type as marked on the unit's rear panel. Using one of higher rating will invalidate the guarantee.

If after replacement the mains fuse should blow a second time, immediately refer the unit to a TRACE ELLIOT approved service engineer for checking.

## ORIENTATION OF VALVES

Looking at the VELOCETTE TWIN from the rear with the rear panel removed you will see eight valves, the four on the left (V1, V2, V3 & V4) should be ECC83/12AX7's while the four on the right (V5, V6, V7 & V8) should be EL84/6BQ5's.

V1 is used for the input gain stage and 2<sup>nd</sup> gain stage

V2 is used for the 3<sup>rd</sup> gain stage and cathode follower that drives the tone network

V3 is used for the left side phase splitter

V4 is used for the right side phase splitter

V5/V6 are the left side power stage valves

V7/V8 are the right side power stage valves

If the need should arise to replace any of the valves we recommend the following types:-

V1, V2, V3 & V4

Sovtek 12AX7 **WB** or 12AX7 **WA**

V5, V6, V7 & V8

Tesla EL84 or Sovtek EL84

For improved performance and reliability V5 & V6 and V7 & V8 should be matched pairs respectively.

## TECHNICAL SPECIFICATIONS

INPUT IMPEDANCE

HI - 1M $\Omega$

LO/LINK - 136K $\Omega$

|                  |  |
|------------------|--|
| TONE CONTROL     | SINGLE DUAL FUNCTION PASSIVE CONTROL   |
| REVERB           | 3 SPRING TRAY WITH MODIFIED OUTPUT TO PRODUCE PSEUDO STEREO REVERB EFFECT                            |
| SEND             | IMPEDANCE 10K $\Omega$<br>NOMINAL SIGNAL LEVEL -20dBu  |
| LEFT/MONO RETURN | IMPEDANCE 470K $\Omega$<br>NOMINAL SIGNAL LEVEL -20dBu   |
| RIGHT RETURN     | IMPEDANCE 470K $\Omega$<br>NOMINAL SIGNAL LEVEL -20dBu   |
| CIRCUIT TOPOLOGY | PREAMP AND POWER STAGES 100% VALVE<br>REVERB AND EFFECTS LOOP SECTIONS DRIVEN BY INTEGRATED CIRCUITS |
| SPEAKER          | TWO 10" CELESTION VINTAGE 10'S   |
| POWER RATING     | ~ 2x 15WRMS PER SIDE STEREO (~ 30WRMS TOTAL)   |

## C32-PCB-PC00068x4

**LINKS CHANGED FOR USE ON GIBSON GA-30RVS**

**ISSUE 4 17/12/98 PS**

| Description | Part Code       | Qty | Where Used  |
|-------------|-----------------|-----|---|
| PCB         | PC00068         | 1   |   |
|             |                 |     |   |
| RESISTORS   |                 |     |   |
|             |                 |     |   |
| 0 ohm link  | 72-RCZERO       | 2   | R47 R49 (16 Ohm x2)   |
| 2R7 1/4W    | 72-RM2R7        | 3   | R121 R122 R123  |
| 10R 1/4W    | 72-RM10R        | 4   | R24 R25 R126 R127   |
| 47R 1/4W    | 72-RM47R        | 1   | R124  |
| 100R 1/4W   | 72-RM100R       | 1   | R57   |
| 220R 1W     | 72-RM220R-1WATT | 4   | R18 R19 R69 R70   |
| 1K0 1/4W    | 72-RM1K         | 3   | R2 R117 R118  |
| 1K2 1/4W    | 72-RM1K2        | 2   | R96 R102  |
| 1K5 1/4W    | 72-RM1K5        | 8   | R17 R75 R77 R79 R81 R82<br>R85 R89                              |
| 2K2 1/4W    | 72-RM2K2        | 1   | R29   |
| 4K7 1/4W    | 72-RM4K7        | 3   | R23 R27 R28   |
| 8K2 1/4W    | 72-RM8K2        | 1   | R4  |
| 10K 1/4W    | 72-RM10K        | 6   | R1 R15 R32 R33 R72 R108   |
| 10K 1W      | 72-RM10K-1WATT  | 5   | R110 R111 R112 R113 R114  |
| 15K 1/4W    | 72-RM15K        | 1   | R120  |
| 27K 1/4W    | 72-RM27K        | 2   | R8 R119   |
| 47K 1/4W    | 72-RM47K        | 3   | R93 R99 R125  |
| 56K 1/4W    | 72-RM56K        | 1   | R11   |
| 68K 1/4W    | 72-RM68K        | 2   | R51 R52   |
| 100K 1/4W   | 72-RM100K       | 15  | R3 R7 R14 R20 R21 R22<br>R35 R38 R45 R59 R60 R61<br>R62 R63 R66 |
| 100K 1W     | 72-RM100K-1WATT | 7   | R87 R91 R92 R95 R98 R101<br>R104                                |
| 120K 1/4W   | 72-RM120K       | 5   | R34 R40 R44 R64 R67   |
| 150K 1/4W   | 72-RM150K       | 2   | R12 R31   |
| 220K 1/4W   | 72-RM220K       | 11  | R13 R26 R36 R37 R56 R58<br>R74 R76 R78 R80 R88                  |
| 220K 1W     | 72-RM220K-1WATT | 2   | R84 R128  |
| 330K 1/4W   | 72-RM330K       | 3   | R30 R65 R68   |
| 470K 1/4W   | 72-RM470K       | 8   | R6 R9 R39 R41 R42 R43<br>R50 R54                                |
| 680K 1/4W   | 72-RM680K       | 1   | R53   |
| 1M0 1/4W    | 72-RM1M         | 8   | R5 R10 R16 R83 R94 R97<br>R100 R103                             |
| 4M7 1/4W    | 72-RM4M7        | 2   | R86 R90   |
| 10M 1/4W    | 72-RM10M        | 1   | R55   |
| 100R 4W     | 72-RWW100R-4W   | 4   | R105 R106 R107 R109   |

|                |               |                 |    |   |
|----------------|---------------|-----------------|----|---|
| 120R           | 6W            | 72-RWW120R-6W   | 2  | R71 R73   |
| 470R           | 2.5W          | 72-RWW470R-2.5W | 1  | R116  |
| 1K0            | 6W            | 72-RWW1K-6W     | 1  | R115  |
| SEMICONDUCTORS |               |                 |    |   |
| 1N4002         |               | 72-D-IN4002     | 4  | D11 D12 D13 D14   |
| 1N4007         |               | 72-D-IN4007     | 4  | D7 D8 D9 D10  |
| 1N4148         |               | 72-D-IN4148     | 2  | D1 D2   |
| GP02-40 (4KV)  |               | 72-D-GP02-40    | 4  | D3 D4 D5 D6   |
| 9V1 ZENER      |               | 72-D-BZX55C9V1  | 2  | Z1 Z2   |
| 15V ZENER      |               | 72-D-BZX55C15V  | 1  | Z3  |
| 2N3904         |               | 72-T2N3904      | 7  | TR2 TR3 TR5 TR6 TR9 TR11<br>TR12  |
| 2N3906         |               | 72-T2N3906      | 2  | TR7 TR10  |
| J175           |               | 72-FET-J-175    | 2  | TR1 TR4   |
| BD647          |               | 72-TBD647       | 1  | TR8   |
| RC4558         |               | 72-IC-RC4558P   | 4  | IC1 IC2 IC3 IC4   |
| CAPACITORS     |               |                 |    |   |
| 33p            | 100V axial    | 72-C33P-100VCA  | 6  | C13 C21 C22 C31 C32 C33   |
| 6n8            | 100V axial    | 72-C6N8-100VCA  | 3  | C8 C12 C45  |
| 10n            | 100V axial    | 72-C10N-100VCA  | 3  | C15 C34 C37   |
| 22n            | 100V axial    | 72-C22N-100VCA  | 3  | C9 C48 C51  |
| 33n            | 100V axial    | 72-C33N-100VCA  | 2  | C36 C39   |
| 100n           | 100V axial    | 72-C100N-100VCA | 20 | C2 C10 C11 C16 C17 C18<br>C19 C20 C23 C24 C25 C35<br>C38 C42 C55 C65 C66 C67<br>C68 C69 |
| 330n           | 50V axial     | 72-C330N-50VCA  | 1  | C89   |
| 47p            | 500V ceramic  | 72-C47P-500VCD  | 3  | C50 C53 C61   |
| 100p           | 1KV ceramic   | 72-C100P-1KVCD  | 2  | C54 C86   |
| 220p           | 1KV ceramic   | 72-C220P-1KVCD  | 3  | C1 C3 C28   |
| 470p           | 1KV ceramic   | 72-C470P-1KVCD  | 2  | C27 C62   |
| 1n0            | 1KV ceramic   | 72-C1000P-1KVCD | 1  | C64   |
| 4n7            | 1KV ceramic   | 72-C4700P-1KVCD | 4  | C75 C76 C77 C78   |
| 22n            | 400V poly box | 72-C22N-400VP   | 8  | C4 C5 C29 C44 C56 C57<br>C58 C59  |
| 100n           | 250V poly box | 72-C100N-250VP  | 1  | C6  |
| 1u0            | 400V poly box | 72-C1-400VP     | 2  | C80 C81   |
|                |               |                 |    |   |
|                |               |                 |    |   |
|                |               |                 |    |   |

|                        |                  |                 |                                      |
|------------------------|------------------|-----------------|--------------------------------------|
|                        |                  |                 |                                      |
|                        |                  |                 |                                      |
| 1u5                    | 35V tant         | 72-C1.5-35VT    | 1 C60                                |
| 2u2                    | 35V tant         | 72-C2.2-35VT    | 1 C63                                |
| 4u7                    | 35V tant         | 72-C4.7-35VT    | 1 C7                                 |
| 22u                    | 450V elect rad   | 72-C22-450VER   | 5 C70 C71 C72 C73 C74                |
| 47u                    | 63V elect rad    | 72-C47-63VER    | 1 C30                                |
| 100u                   | 16V elect rad    | 72-C100-16VER   | 8 C26 C40 C46 C47 C49 C52<br>C85 C87 |
| 100u                   | 400V elect rad   | 72-CAP-100400V  | 1 C79                                |
| 220u                   | 35V elect rad    | 72-C220-35VER   | 3 C14 C41 C43                        |
| 220u                   | 400V elect rad   | 72-CAP-220400V2 | 1 C82                                |
| 1000u                  | 35V elect rad    | 72-C1000-35VER  | 1 C83                                |
| 4700u                  | 35V elect rad    | 72-CAP-470035V  | 2 C84 C88                            |
|                        |                  |                 |                                      |
| CONNECTORS             |                  |                 |                                      |
|                        |                  |                 |                                      |
| 3way 0.1"              | 72-HEAD-3W-2     | 6               | HTR1 HTR2 HTR5 HTR6<br>HTR7 HTR8     |
|                        |                  |                 |                                      |
| SOCKETS                |                  |                 |                                      |
|                        |                  |                 |                                      |
| 1/4" MONO JACK SKT     | 72-SKT-JCKBNBG   | 8               | SK1 SK2 SK4 SK5 SK6 SK7<br>SK8 SK9   |
| 1/4" STEREO JCK SKT    | 72-SKT-JCKBBBG   | 1               | SK3                                  |
|                        |                  |                 |                                      |
| SWITCHES               |                  |                 |                                      |
|                        |                  |                 |                                      |
| Mini Toggle DPDT vert  | 73-SWT-M-TGL-VCO | 1               | SW1                                  |
| Mini Toggle SPDT vert  | 73-SWT-M-TGL-PCB | 1               | SW2                                  |
| Large slide DPDT horiz | 73-SWT-SLIDER-DP | 1               | SW3                                  |
|                        |                  |                 |                                      |
| POTENTIOMETERS         |                  |                 |                                      |
|                        |                  |                 |                                      |
| 1M0 PULL SWITCH        | 73-POT-A1M-PS    | 1               | RV1                                  |
| 250K LIN DUAL GANG     | 73-POT-B250K-DG  | 1               | RV2                                  |
| 50K                    | 73-POT-50KB      | 1               | RV3                                  |
|                        |                  |                 |                                      |
| RELAY DPCO             | 73-RELAY-47W     | 2               | RL1 RL2                              |
|                        |                  |                 |                                      |
| VALVE BASES            |                  |                 |                                      |
|                        |                  |                 |                                      |
| B9A PCB valve base     | 73-VAL-SOCKET    | 8               | V1 V2 V3 V4 V5 V6 V7 V8              |
|                        |                  |                 |                                      |
| FUSE HOLDERS           |                  |                 |                                      |
|                        |                  |                 |                                      |
| CRIMP CONNECTORS       | 72-CRIMP-PCB-TAB | 23              | TX1 -19 LS1 (2) LS2 (2)              |
| 0V TEST POINT PIN      | 73-TERM-PIN      | 1               | TP0                                  |



|                     |                  |   |                                       |
|---------------------|------------------|---|---------------------------------------|
|                     |                  |   |                                       |
|                     |                  |   |                                       |
| HEATSINK ETC        |                  |   |                                       |
|                     |                  |   |                                       |
| TO220 HEATSINK      | E13-HS-TV2       | 1 | Part of heat sink assembly            |
| M3 SCREW            | 71-SCR-M3X12PPB  | 2 | see diagram supplied                  |
| M3 SHAKE PROOF      | 71-WAS-M3INTSP   | 2 | “                                     |
| M3 PLAIN WASHER     | 71-WAS-M3ABLK    | 1 | “                                     |
| M3 NUT              | 71-NUT-M3-ZINC   | 2 | “                                     |
| INSULATING KIT      | 72-MOS-PAD-TO220 | 1 | “                                     |
| Heat sink compound  |                  |   | Put between TR8, heat sink & chassis  |
|                     |                  |   |                                       |
| FLYING LEADS        |                  |   |                                       |
|                     |                  |   |                                       |
| Cathode heater lead | C00-LEAD-V12-HTR | 1 | connect to HTR2 HTR7 HTR8             |
| Cathode heater lead | C00-LEAD-VTN-HTR | 1 | connect to HTR1 HTR5 HTR6             |
| Reverb input        | C00-FLY-TRAMP-R  | 1 | RVB1                                  |
| Reverb output       | C00-FLY-V12R     | 1 | RVB2                                  |
| Grommet             | 45-GROMM-2       | 1 | Put over RVB1 & RVB2 before soldering |
|                     |                  |   |                                       |