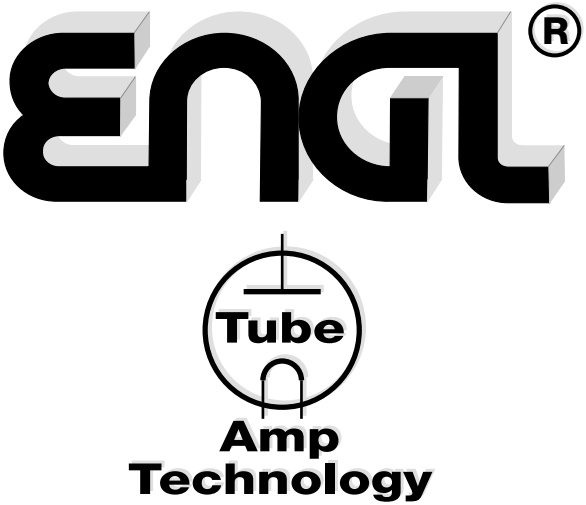
Special Edition

Full Tube
Guitar Amplifier
with MIDI-Control

Operator´s Manual

Please, first read this manual carefully!


ENGL
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CAUTION! Please read and heed the following:

You'll find an ancillary pamphlet accompanying this owner's manual entitled Instructions for the Prevention of Fire, Electrical Shock and Injury. Be sure to read it before you plug in and power up the amp!

Note: Technical specifications are subject to change without notice.

Congratulations! With the ENGL **Special Edition E670**, you now own one of the **most advanced** and **versatile amp heads** available today!
This **sophisticated guitar amp** marries the unrivalled tone of **all-tube technology** to the awesome sound-shaping might of control features powered by **state-of-the-art microchip circuitry**. This elegant combination puts at your fingertips **a vast range of great fundamental tones** and an all but inexhaustible reservoir of compelling variations all of which may be **controlled remotely via MIDI**.
What's more, the amp boasts a host of hip & practical features a bias switch that lets you run 6L6GC or EL34 power amp tubes and a bias indicator that lets technician know which configuration is currently selected; a quick-check system for speaker impedance and cords equipped with1/4 " jack plug; and three different types of FX loops, to mention just a few.

This affords you:

1. a logical control feature array, utmost **ease of use** and **remarkably intuitive handling**;
2. **excellent sound-shaping options** and **greatest flexibility** courtesy of the many voicing options and special features, and 128 MIDI presets offering a bevy of programming options;
3. **a gigging workhorse** that also sports a speaker simulation system, making it a handy tool for **studio** and **home recording**;
4. a combination of **finely-tweaked, MIDI controllable sound-shaping functions** providing instant access to a **wealth of disparate sounds**;
5. the **four basic sounds** Clean**,** Crunch**,** Lead I **and** Lead II; with two variable and switchable Gain levels and two voicing options (Modern and Classic) for each basic sound, you actually have 16 fundamental sounds to choose from;
6. the option of **switching power amp output on the fly**. The ability to go from Hi Power (100 watts) to Lo Power (50 watts) via MIDI while playing is yet another novel sound-sculpting tool that you have at your disposal!
7. an **ultra-advanced tone-generating machine** that will give you years of **playing pleasure** and **value to boot**.

Features and Functionality at a Glance

-> **Four basic channels**: Clean, Crunch, Lead I and Lead II with separate Gain, Treble and Volume knobs.
-> **Tube Driver circuit** for effect devices; it also serves as a separate fifth channel that can be selected directly (with or without EQ) in reciprocation with the four channels.
-> **Modern and Classic sound-shaping buttons**: Determine the basic voicing of all four channels, giving you a broader, deeper tonal spectrum to work with.
-> **Two Gain variants** for each of the basic channels: Gain Boost and Hi Gain let you active directly two different gain settings for every channel.
-> **Three voicing sections**: one EQ for Clean and Crunch (Main Channel 1), one for Lead I and Lead II (Main Channel 2) and another for the Tube Driver. As a special feature, every channel sports a dedicated Treble knob.

-> **Various sound-shaping buttons** tuned to match the tonal requirements of the given channels: Bright and Ultra Bright for Clean and Crunch, Contour and Mid Edge for the two Lead channels.
-> **Large spring reverb** for very natural-sounding reverb, with separate knobs for the two Main Channels.
-> **Three effect loops:** FX Loop I and FX Loop II are variable, switchable effect loops, while Serial FX Loop **is a separate circuit that can be used** in series with two main effect loops. Each effect loop may be activated for each channel as well as for the Tube Driver circuit.
-> **Two each power amp Master and Presence knobs**, accessible via MIDI. The amp can also be muted via MIDI controller 7.
-> **Variable, MIDI-switchable power amp output** (50 or 100 watts) with hot impedance adjustment (that is, on the fly); **A/B speaker switching** with separate impedance selector for connected speaker systems.
-> **Balanced, frequency-compensated XLR line output** for routing preamp or power amp signals to mixers or recording gear.
-> MIDI In and Thru ports serve to integrate the amp into a MIDI system.
-> **128 MIDI presets**, accessible via 16 MIDI channels.
-> The **Special Edition offers three different remote interface ports:** The Serial Amp Control Port accepts the Custom Z-9 Footswitch (optional); use it as a conventional switcher to select channels and two sound-shaping functions directly. Then there's the MIDI In, which accepts the Z-9 for use as a simple MIDI footcontroller or any other MIDI footcontroller. Finally, the amp is equipped with a stereo jack that takes a dual footswitch, allowing you to switch the four channels remotely.
-> **Programmable Noise Gate** for suppressing noise in the Crunch, Lead I and Lead II channels.

Among the hallmarks of this fine amp are painstaking workmanship and finishing as well as rigorously tested and carefully selected quality components. You'll find guidelines on care and maintenance of tube amps on page 41. Under the heading Tips from the designer, you'll come across practical tips on the aforementioned features throughout the manual. All critical information concerning the operation of this amp is preceded by "NOTE", "CAUTION", "Read and heed" or some other eye-catching comment. We're calling your attention to these remarks for reasons of safety or other compelling motives, so please give them due consideration.

Everyone at ENGL is confident that the **Special Edition tube amp's extraordinary versatility** and **outstanding features** are sure to delight you: **Simply plug in, play and be inspired by the tone of your ENGL amp!**

A few words of wisdom from the designer:
Though this amp head is relatively easy to handle and you're probably raring to give it a go, I recommend that you read the owner's manual thoroughly before you power it up. It is equipped with several safety features that require further explanation to prevent malfunctions.

Contents:

1. ENGL E670 Tube Amp Head;
2. mains cord;
3. this manual;
4. a pamphlet entitled Instructions for the Prevention of Fire, Electrical Shock and Injury.

Front Panel Features

At the back of the manual, you'll find fold-out diagrams of the front and rear panels. As you're reading the descriptions of the amp's features, you'll gain a better understanding of the topic of discussion if you unfold and refer to them as we go!

1 TUBE DRIVER

Activates the onboard Tube Driver, a circuit similar to a very simple preamp channel. Think of it as an active, tube-driven preamp defeat circuit. Pressing this button (1) activates the Tube Driver. Note that this circuit can be selected in reciprocation with the four channels, whereby reciprocation means that you can activate the Tube Driver irrespective of the currently active channel and vice versa. The LED above the button lights up to indicate the Tube Driver is active. It can also be activated via MIDI program change or Custom Z-9 Footswitch. Its control features are on the back of the amp.

A tip from the designer:

This new feature offers a couple of cool application options:

1. Use it as a pre effect device tube preamp stage (two triode stages) to enhance the dynamic range of your instrument's signal. The internal preamp and its Clean, Crunch, Lead I and Lead II channels are bypassed, and a practically linear signal is routed to the effect send jacks.

This lets you employ the Tube Driver without EQ as a preamp defeat or bypass, for example, if you want to use an effect device's preamp stage to drive the power amp.

2. Use it as an independent fifth preamp channel without tone controls to get a signal with very nearly linear characteristics. When you activate the Tube Driver without EQ, solely the power amp Presence knob and Depth Boost feature influence your the sound, giving you yet another tonal alternative to the Clean channel. Use the rear panel Sensitivity (85) and Level (80) knobs to set gain and volume levels, or the effect loops' send levels, for the activated Tube Driver channel. You can saturate the Tube Driver circuit by dialing in higher gain settings (depending on your guitar's pickup). This gives you another de facto Crunch channel with totally different tonal properties!

Please note that because this circuit takes a direct path from input to the effect loop, you cannot use the amp's preamp control features to shape its signal. The list of disabled features includes Reverb (22), Mega Depth Punch (21), the Noise Gate (45) and Modern/Classic (42). Power amp functions such as Master A/B, Presence A/B, Depth Boost (20), Power Lo/Hi (43) and Speaker A/B (44) remain enabled and have the same effect on the Tube Driver as they would on any other preamp channel.

2 T.D.EQ. (TUBE DRIVER EQUALIZER)

This function activates the onboard Tube Driver, a circuit similar to a very simple preamp channel. It could also be described as an active, tube-driven preamp defeat circuit, in this case with passive tone controls. Pressing the button (2) activates the Tube Driver with EQ. Note that this circuit can be selected in reciprocation with the four channels, whereby reciprocation means that you can activate it irrespective of the currently active channel and vice versa. The LED above the button lights up to indicate the Tube Driver plus EQ is active. The Tube Driver with EQ can also be activated via MIDI program change or Custom Z-9 Footswitch. Its voicing knobs are on the back of the amp.

A tip from the designer:

This new feature offers a couple of cool application options:

1. Use it as a pre effect device tube preamp stage (two triode stages) to enhance the dynamic range of your instrument's signal. The internal preamp and its Clean, Crunch, Lead I and Lead II channels are bypassed.

This lets you employ the Tube Driver with EQ as a preamp defeat or bypass, for example, if you want to use an effect device's preamp stage to drive the power amp, and to shape the Tube Driver signal to taste using the passive three-way voicing section on the rear panel.

2. Use it as an independent sixth preamp channel with dedicated tone controls. Because this circuit features a different design as well as independent voicing options, it gives you yet another tonal alternative to the Clean and Crunch channels. Use the rear panel Sensitivity (85), Treble (84), Mid (83) and Bass (82) knobs as well as the Contour button (81) to shape its signal.

Please note that because this circuit takes a direct path from input to the effect loop, you cannot use the amp's preamp control features to shape its signal. The list of disabled features includes Reverb (22), Mega Depth Punch (21), the Noise Gate (45) and Modern/Classic (42). Power amp functions such as Master A/B, Presence A/B, Depth Boost (20), Power Lo/Hi (43) and Speaker A/B (44) remain enabled and have the same effect on the Tube Driver as they would on any other preamp channel.

3 CLEAN GAIN

Clean channel Gain control. This knob determines the preamp's input sensitivity in Clean mode; use it to set the desired input level.

A tip from the designer:

The amount of distortion depends on your guitar's pickups and the Gain Boost (4) setting. In Clean mode, single-coil pickups may begin saturating the preamp when the knob is set to about the two o'clock position; pickups with very high output levels (humbuckers or active pickups) will evoke mild overdrive at even lower settings. If you want squeaky clean tone, simply back off the Gain knob accordingly.

4 GAIN BOOST

Boosts the input sensitivity of Main Channel 1, Clean and Crunch. The red LED above this button lights up to indicate Gain Boost is on. Gain Boost can also be switched via MIDI program change command or the Custom Z-9 Footswitch.

A tip from the designer:
As its name would imply, Gain Boost serves primarily to up Clean and Crunch channel input levels, extend both channels' gain ranges. In effect, this feature gives you two additional variations on these two channels' basic sounds. For example, you could set the Clean channel Gain knob to the highest setting at which your guitar signal remains distortion-free, just under the preamp clipping threshold. Then when you activate Gain Boost, you will overdrive the Clean preamp slightly, yielding a grittier tone well-suited for rock riffs.
Another Clean channel option is to use the Gain Boost as a volume booster. To do this, activate Gain Boost and dial in a Clean Gain knob setting, making sure not to push the preamp into clipping zone. Consider this your high-volume clean tone, say for clucking lead lines. Switching Gain Boost off gives you a softer clean tone for chord work. Switch back and forth between the two as desired.

5 CRUNCH GAIN
Gain control for the Crunch channel. This knob determines input sensitivity in Crunch mode; use it to dial in the desired amount of preamp distortion.
CAUTION: Extremely high gain and volume levels in Crunch mode can produce powerful feedback. Avoid feedback squeals; they can lead to hearing loss and damage speakers! At higher volumes, back off the Gain, Treble and Presence levels in order to prevent unchecked feedback!
A tip from the designer:
Single-coil pickups will evoke mildly overdriven sounds at settings somewhere between 11 and 3 o'clock. Try settings between 9 and 1 o'clock for pickups with high-output humbuckers or active pickups. Bear in mind the Gain Boost function. You can activate it via an ENGL Custom Z-9 Footswitch or a preprogrammed MIDI preset to get an even bigger, beefier crunch tone on the fly.

6 BASS
This is the preamp voicing section's passive low-frequency EQ for Main Channel I's Clean and Crunch modes.

7 MIDDLE
This is the preamp voicing section's passive midrange frequency EQ for Main Channel I's Clean and Crunch modes.

8 TREBLE CLEAN
This is the preamp voicing section's passive high-frequency EQ for Main Channel I's Clean mode.

9 TREBLE CRUNCH
This is the preamp voicing section's passive high-frequency EQ for Main Channel I's Crunch mode.
A tip from the designer:
To help you get acquainted with the amp's fundamental sounds, I recommend that you set all tone controls to or slightly higher than the center or 12 o'clock position. For

higher-gain Crunch sounds, your best bet is to turn the Treble Crunch knob down to prevent the pickups and speakers from generating feedback (a setting in the 10-to -1 o'clock range is recommended).
The Clean and Crunch channels are equipped with dedicated Treble knobs so you can tweak the top end of each of the two channels separately to suit your taste and the given sonic scenario. You will find that grittier tones generally sound better with a touch less treble because preamp saturation makes higher frequencies figure more prominently in the signal. Bear in mind that you also have the two Normal Bright (10) and Ultra Bright (11) buttons, as well as the two power amp Presence A and Presence B knobs, at your disposal for shaping the high frequency range. I suggest you get into the habit of dialing in lower Treble settings. That way, you can program various MIDI presets with higher Presence settings and activate them, as well as one or both Bright options, remotely and have plenty of tonal variations at your fingertips.

10 NORMAL BRIGHT
This feature boosts the upper end of the high frequency range in Main Channel 1, Clean and Crunch. Its effectiveness decreases as Gain settings increase. The red LED above this button lights up to indicate the Normal Bright function is on. This feature can also be switched via MIDI program change or Custom Z-9 Footswitch.
A tip from the designer:
For a crisp or glassy tone, activate the Normal Bright. This setting brightens the sound of humbucking or muddy pickups. Don't let the names confuse you: Normal Bright actually addresses a higher frequency range than Ultra Bright. Note also that the Gain knob influences this sound-shaping function's intensity. Furthermore, its tonal impact varies slightly in Modern and Classic modes, particularly when you are driving the preamp into the clipping zone.

11 ULTRA BRIGHT
Located in the Clean and Crunch preamp stage of Main Channel 1, this sound-shaping function boosts slightly lower high frequencies. Unlike Normal Bright (10), its intensity remains the same irrespective of the Gain knob setting. The LED above the button lights up to indicate the Ultra Bright function is on. It can also be activated remotely via MIDI program change or Custom Z-9 Footswitch.
A tip from the designer:
This voicing option ups the twang factor inherent in certain types of guitars, and lets you put a set of sonic cow horns on those that lack it. Feel free to control this sound-shaping function remotely via MIDI. But whichever way you choose to use it, I recommend that you don't overstate top-end frequencies. Back off the two Treble knobs to avoid harsh, cutting or over-the-top brightness. In Classic mode, high-frequency peaks are dampened anyway when the amp starts clipping. In Modern mode, the tone can become very gritty and raw, particularly when Bright functions are activated. That's not necessarily bad; for some sounds, this effect can be quite compelling. I suggest you literally play it by ear experiment freely and you are sure to discover many interesting and inspiring top-drawer tones. Be sure to give the Modern/Classic sound-shaping functions, as well as the power amp Presence A and B knobs, a good work out. I suspect you'll be delighted by the array of tones, particularly as you add different guitars and pickups to the mix.

12 REVERB
Reverb intensity knob. Twist it to adjust the amount of reverb for Main Channel 1 Clean/Crunch. Activate Reverb (22) and twist the Reverb knob clockwise to increase the effect's intensity. The signal remains completely dry when the knob set to the 7 o'clock position or Reverb (22) is deactivated. The red LED above this button lights up to indicate Reverb is on. In addition, it can be activated and deactivated via MIDI program change or Custom Z-9 Footswitch.

13 CLEAN VOLUME
Determines the Clean channel's level. Use this knob to adjust the Clean channel's volume and dial in the desired balance in comparison with the other channels' levels. Because this knob is located pre effects loop, it also determines the effects send level in Clean mode. The green LED to the right of the knob lights up to indicate the Clean channel is on.

14 CLEAN
Push this button to activate the preamp's Clean channel directly (in reciprocation with Crunch, Lead I, Lead II, Tube Driver and T. D.EQ.). The green LED to the right of the Clean Volume knob (13) lights up to indicate the Clean channel is active. The Clean channel may also be activated via MIDI program change, the ENGL Custom Z-9 Footswitch, or a dual footswitch.

15 CRUNCH VOLUME
Determines the Crunch channel's level. Use this knob to adjust the Crunch channel's volume and dial in the desired balance with the other channels' levels. Because this knob is pre effects loop, it also determines the effects send level in Crunch mode. The yellow LED to the right of the knob lights up to indicate the Crunch channel is on.

16 CRUNCH
Press this button to activate the preamp's Crunch channel directly. (in reciprocation with Crunch, Lead I, Lead II, Tube Driver and T. D.EQ.), The yellow LED to the right of the Crunch Volume knob (15) lights up to indicate the Crunch channel is active. The Crunch channel may also be activated via MIDI program change, the ENGL Custom Z-9 Footswitch or a dual footswitch.

17 PRESENCE A
Power amp Presence A knob. This knob determines the power amp's high frequency response when Presence A is activated. The red LED next to the knob lights up to indicate Presence A is active.

18 PRESENCE A/B
Switches back and forth between Presence A and Presence B. The LED next to the given Presence control lights up to indicate it is on; red signifies Presence A is on; green signifies Presence B is on. Presence A/B may also be switched via MIDI program change or Custom Z-9 Footswitch.

19 PRESENCE B

Power amp Presence B knob. This knob determines the power amp's high frequency response when Presence B is activated. The green LED next to the knob lights up to indicatePresence B is active.

A tip from the designer:

The two Presence knobs afford you a host of interesting and worthwhile options for shaping sounds: You can dial in different settings on the Presence A and B knobs (for example, set Presence A to 10 o'clock and Presence B to 3 o'clock) and assign these two knobs to different preamp channels and sound modes (Modern & Classic) in various MIDI presets. Note that simply switching from Presence A to Presence B while the preamp setting remains the same yields different sonic results, not to mention all the other options. Again, I recommend that you explore and experiment freely to discover the untold combinations and configurations at your fingertips.

20 DEPTH BOOST

Push the Depth Boost button to beef up the bottom end by about 6 dB. The red LED above the button lights up to indicate the power amp Depth Boost feature is activated. It can also be activated remotely via MIDI program change or Custom Z-9 Footswitch.

A tip from the designer:

In contrast to the preamp feature Mega Lo Punch (21), Depth Boost is wired into the power amp circuitry (specifically in the feedback circuit). Though they both boost bottom-end frequencies, these two functions have different effects. In combination with the Presence A and B knobs, Depth Boost forms a separate power amp voicing section that you can mix and match with different preamp channel settings and the Tube Driver circuit, adding different hues to your sonic palette, and tweaking tones to suit your taste.

21 MEGA LO PUNCH

When activated, this function boosts low-end frequencies in all four preamp channels. The red LED above the button lights up to indicate this function is on. Mega Lo Punch does not influence the Tube Driver circuit. It may also be activated remotely via MIDI program change or Custom Z-9 Footswitch.

A tip from the designer:

Mega Lo Punch's effects vary, particularly in Lead channel Modern and Classic operating modes. When Modern is on, it boosts the bottom-end much in the way of the power amp feature Depth Boost, meaning that it audibly increases sound pressure. When Classic mode is activated, the effect depends on the Gain knob setting and is not nearly as pronounced. At very high Gain settings and depending on the type of pickup, the signal's low end may become rather muddy. When you configure the amp in Classic mode and dial in a high gain level, I strongly suggest you deactivate Mega Lo Punch.

22 REVERB

This button activates and deactivates the onboard spring reverb system. The red LED above the button lights up to indicate Reverb is active. This button is important when you're programming MIDI patches. Use it to assign the internal reverb signal to the

desired MIDI preset. Adjust the wet signal for the two Main Channels using the assigned Reverb knob (12, 35). Reverb can also be switched via MIDI program change or Custom Z-9 Footswitch.

23 FX LOOP I/II

This button switches to and fro between FX Loop I and FX Loop II. The red LED above the button lights up to indicate FX Loop II is on. You can also select loops via MIDI program change or Custom Z-9 Footswitch.

A tip from the designer:

Both effect loops can be configured in series (that is, 100% processed signal when Balance is set to wet) or in parallel (1% to 99% mix of preamp and effect signal when Balance is set somewhere between dry and wet), or be bypassed altogether (0 % wet balance when Balance is set to dry). You can connect an effect device to each of the effect loops and switch from one effect device to the other using the FX Loop I/II function, or employ just one of the two effect loops (for example, FX II Loop) and use FX Loop I/II to activate the effect. In the latter case, FX Loop I serves as a bypass (set its Balance knob to the dry position). You could also connect a further effect device to the Serial FX Loop and alternate between it and the effect device connected to FX Loop II (and FX Loop I, if it is in use), or combine the two. Note that in the signal path, FX Loop I and FX Loop II are post Serial FX Loop and pre the two master knobs.

24 SERIAL FX LOOP

Press this button to activate and deactivate the Serial FX Loop. The red LED above the button lights up to indicate Serial FX Loop is activated. You can also switch the Serial FX Loop on and off via MIDI program change or Custom Z-9 Footswitch.

A tip from the designer:

The Serial FX Loop is an auxiliary effects loop. As its name would indicate, it is wired in series with FX Loop I and FX Loop II. This setup lets you insert two effect devices in series, that is, one after the other, between the Special Edition's preamp and power amp. Another neat option is to put all effect loops to good use. For instance, you could insert three different effect devices into the amp's signal path, with one device connected to each loop. This lets you enable the devices (two of which can then be activated simultaneously) by simply switching loops.

25 INPUT

¼" unbalanced input jack. Plug your guitar in here using a shielded cord.

A tip from the designer:

Depending on the type of cord and its shielding, you may occasionally encounter interference from sources such as radio stations or powerful magnetic fields. When this occurs, try connecting your guitar to the amp using different cords. What's more, to minimize signal degradation due to high-frequency loss, use the shortest cords feasible (as a rule, the shorter the cord, the less susceptible it is to high-frequency attenuation).

26 LEAD I GAIN
This knob determines the Lead I channel's input sensitivity and preamp saturation level.
CAUTION: Extremely high gain and volume levels in Lead mode can produce powerful feedback. Avoid feedback squeals; they can lead to hearing loss and damage speakers! At higher volumes, back off the Gain, Treble and Presence levels in order to prevent unchecked feedback!
A tip from the designer:
The two Lead channels' fundamental tones are not worlds apart: Lead I boasts slightly less gain and bottom end, but its speedier response makes it a great choice for brisk riffing and lightning lead runs.

27 HI GAIN
Pressing this button ups input sensitivity, thereby increasing the amplification factor and the amount of distortion in both Main Channel 2's Lead I and Lead II modes. The LED above this button lights up to indicate Hi Gain is active. This feature can also be switched via MIDI program change or Custom Z-9 Footswitch.
A tip from the designer:
When activated, Hi Gain supercharges the amplification factor, switching from Soft Lead to Heavy Lead and putting both Lead channels into high gear. This doubles the number of basic sounds in Main Channel 2. The Soft Lead setting suffices for high-output pickups - even for playing leads - so you can leave Hi Gain off if your guitar is shred-approved. Soft Lead settings also work for chugging rhythm riffs or as alternative crunch sounds, so give 'em a try. But by all means, for scorching ultra high-gain lead sounds with truckloads of sustain or for power chords with a monster bottom-end, go for the Heavy Lead variant with Hi Gain activated.

28 LEAD II GAIN
This knob determines the Lead II channel's input sensitivity and preamp saturation level.
CAUTION: Extremely high gain and volume levels in Lead mode can produce powerful feedback. Avoid feedback squeals; they can lead to hearing loss and damage speakers! At higher volumes, back off the Gain, Treble and Presence levels in order to prevent unchecked feedback!
A tip from the designer:
The two Lead channels' fundamental tones are not worlds apart: Lead II boasts a bit more gain and bottom end than Lead I, and works very well for fat, in-your-face solos and chunky riffs with a big bottom end with plenty of low-frequency punch. Its response is not quite as speedy as Lead I's, and the low-end can turn muddy at high Gain settings in combination with high-testosterone pickups.

29 BASS
This is the preamp voicing section's passive low-frequency EQ for Main Channel 2's Lead I and Lead II modes.

30 MIDDLE
This is the preamp voicing section's passive midrange EQ for Main Channel 2's Lead I and Lead II modes.

31 TREBLE LEAD I
This is the preamp voicing section's passive high-frequency EQ for Lead I mode.

32 TREBLE LEAD II
This is the preamp voicing section's passive high-frequency EQ for Lead II mode.
A tip from the designer:
To help you get acquainted with the amp's fundamental sounds, I recommend that you set all tone controls to about the center or 12 o'clock position. For higher-gain, high-volume lead sounds, your best bet is to turn the Treble knob down to prevent the pickups and speakers from generating feedback (a setting in the 9-to-1 o'clock range is recommended).
The Lead I and Lead II channels are equipped with dedicated Treble knobs so you can tweak the top end of each of these two channels separately to suit your taste. Though this passive voicing section's controls range is narrower than that of a comparable active system, its EQ curve is tweaked specifically for its designated purpose, and will give you satisfying results. What's more, in combination with the two sound-shaping buttons Contour and Mid Edge, you have heaps of voicing options for tailoring basic sounds to taste.

33 CONTOUR ACTIVE
Contour shapes midrange frequencies for Main Channel 2's Lead I and Lead II modes. When activated, Contour boosts low mids from 300 to 600 hertz as well as the frequency at 1500 hertz. Note that the Contour setting influences the functionality and range of the Mid knob (30). The LED above the button lights up to indicate Contour is activated. This feature may also be switched via MIDI program change or the ENGL Custom Z-9 Footswitch.
A tip from the designer:
Though this voicing section is passive and its control range is therefore somewhat narrower, with Contour and Mid Edge you have two additional tools available for shaping the midrange. And for good reason music is made in the mids, and these frequencies are critical to dialing in happening lead tones. You can employ Contour to scoop mids radically and conjure rabid heavy metal tones or boost them to elicit assertive lead sounds.

34 MID EDGE
This sound-shaping tool addresses midrange frequencies by slightly lowering the Mid knob's frequency spectrum. The LED above the button lights up to indicate Mid Edge is activated. This feature can also be switched via MIDI program change or the ENGL Custom Z-9 Footswitch.
A tip from the designer:
Like Contour, Mid Edge is a passive voicing feature. Consequently, its effect on the soundscape is rather subtle. Technically speaking, it actually re-voices the Mid knob. Activating Mid Edge smoothes out lead tones' rough edges. Deactivating Mid Edge

and Contour thins out the lead tones' midrange, creating a more brittle tone. This brand of tone is better suited for rhythm work because it is not as aggressive or overly assertive. Different combinations of Mid Edge and Contour yield four additional tonal variants in Main Channel 2, and these variations can be programmed, stored and accessed via MIDI.

35 REVERB
Reverb intensity knob. Twist it to adjust the amount of reverb for Main Channel 2's Lead I and Lead II modes. Activate Reverb (22) and twist the Reverb knob clockwise to increase the effect's intensity. The signal remains completely dry when the knob set to the 7 o'clock position or Reverb (22) is deactivated. The red LED above this button lights up to indicate Reverb is on. In addition, it can be activated and deactivated via MIDI program change or Custom Z-9 Footswitch.

36 LEAD I VOLUME
Determines the Lead I channel's level. Use this knob to adjust the Lead I channel's volume and dial in the desired balance in comparison with the other channels' levels. Because this knob is located pre effects loop, it also determines the effects send level in Lead I mode. The red LED to the right of the knob lights up to indicate the Lead I channel is on.

37 LEAD I
Push this button to activate the preamp's Lead I channel directly (in reciprocation with Clean, Crunch, Lead II, Tube Driver and T. D.EQ.). The red LED to the right of the Lead I Volume knob (36) lights up to indicate Lead I channel is active. It may also be activated via MIDI program change, the ENGL Custom Z-9 Footswitch, or a dual footswitch.

38 LEAD II VOLUME
Determines the Lead II channel's level. Use this knob to adjust the Lead II channel's volume and dial in the desired balance in comparison with the other channels' levels. Because this knob is located pre effects loop, it also determines the effects send level in Lead II mode. The red LED to the right of the knob lights up to indicate the Lead II channel is on.

39 LEAD II
Push this button to activate the preamp's Lead II channel directly (in reciprocation with Clean, Crunch, Lead I, Tube Driver and T. D.EQ.). The red LED to the right of the Lead I Volume knob (38) lights up to indicate the Lead II channel is active. It may also be activated via MIDI program change, the ENGL Custom Z-9 Footswitch, or a dual footswitch.

40 MASTER A
Master A volume knob. Located post effect loops, it controls power amp output. The red LED to the right of the knob lights up to indicate Master A is enabled and determining the master level. You can also set the master level to 0 via MIDI controller 7. To learn how to do this, see section 55 in the Rear Panel Features chapter.

41 MASTER A/B
Switches back and forth between the Master A and Master B knobs. The LEDs next to the knobs light up to indicate which Master knob is active the red LED for Master A, the green LED for Master B. MASTER A/B can also be switched via MIDI program change or the ENGL Custom Z-9 Footswitch.

42 MASTER B
Master B volume knob. Located post effect loops, it controls power amp output. The green LED to the right of the knob lights up to indicate Master B is enabled and determining the master level. You can also set the master level to 0 via MIDI controller 7. To learn how to do this, see section 55 in the Rear Panel Features chapter.
A tip from the designer:
Remote control via (MIDI) footswitch is a nifty little utility: You can dial in different levels for Master A and Master B and assign these settings to any channel and mode that the amp has to offer. This gives you a range of variations that you can program for different playing styles and musical genres to great dramatic effect. You can use Main Channel 1 Clean & Crunch modes for rhythm or cleaner lead lines and the Main Channel 2's overdriven preamp stage for power chords and soloing, and go from soft to loud at the touch of a button. You can also broaden the volume and tonal ranges by working your guitars' volume knob. If your arsenal includes MIDI gear - for instance, the ENGL Z-15 MIDI Footcontroller - you can use the amp's master volume mute circuit to swiftly and conveniently set the power amp's level to 0 during short breaks or when switching axes.

43 MODERN/CLASSIC
This sound-shaping feature voices the basic tonal character of the four Clean, Crunch, Lead I and Lead II channels, the choices being a more contemporary sound or vintage-approved tone. The LED above the button lights up to indicate Classic is activated. Modern and Classic can also be activated via MIDI program change or the ENGL Custom Z-9 Footswitch.
A tip from the designer:
When set to Modern, the amp's response is a touch less dynamic, with fewer midrange frequencies in the mix. This voicing is particularly prominent when the preamp stage (Crunch, Lead) is overdriven, making Modern the right choice for heavier styles. Classic mode is the way to go for vintage tube tone. If you want your lead lines to pack a mightier punch, I recommend that you activate Contour in Lead/Modern mode, or generally opt for Classic mode. When in Classic mode and at higher Gain settings, deactivate Mega Lo Punch for a more focused, tighter low end. Though the difference in the two voicings is more subtle in the Clean channel, you will notice that Classic elicits a more dynamic response; this is attributable to the ECC 83 triode stage. The result is a slightly smoother, less edgy tone. Here's a hip Classic/Modern configuration for you: Set up your rig so that the preamp is right at the cusp of clipping that is, the point where the clean signal begins to break up and transition to a dirtier tone and turn up the Treble knob. In Classic mode, higher frequencies are dampened - an effect known as soft clipping yielding a more homogenous, balanced tone. You can achieve this kind of tone by dialing in higher Gain knob settings for the Clean channel knobs or

activating Gain Boost. The Crunch channel also puts out mild, rock-approved grind: Activate Crunch and dial in lower gain levels by setting Crunch Gain somewhere in the 9 - 1 o'clock range.

44 LO POW./HI POW.

Switches the power amp's output level from low (Low Power: 50 watts) to high (High Power: 100 watts) and back. In the former, the power amp operates with two power tubes; in the latter, with all four tubes. The LED above the button lights up to indicate High Power is on. Low and High Power can also be activated via MIDI program change or the ENGL Custom Z-9 Footswitch.

A tip from the designer:

The ability to vary the power amp's output comes in very handy, particularly at gigs: Low Power mode is great when you want power amp distortion to spice up your tone. The power amp saturates much sooner at half the output power and you don't have to dial in ridiculous levels to get it to break up. Besides, 50 watts is more than enough sonic muscle for many venues. If massive clean headroom is your thing, go for the Hi Power setting. It's also the better choice if you're running the Lead channel in Modern mode at higher volumes. That way, you can exploit the power amp's greater dynamic range. Note that when pushed to their limits, power amps tend to overstate midrange frequencies; you can avoid this by opting for greater headroom afforded by Hi Power mode. Best of all, you can switch from Low to High Power on the fly, going from 50 to 100 watts while you're playing! In combination with the two Master knobs and the various preamp channels, this feature harbors a tremendous amount of sound-shaping power.

Note also:

Only the two exterior V1 and V4 power tubes operate in Low Power mode. If you frequently run the amp in this mode, these two tubes are of course subjected to greater wear. In this case, you may find that the two external tubes require sooner replacement.

This amp is equipped with a microcontroller-driven, power tube monitoring system.

In the event that an active power tube fails when the amp is in Low Power mode, the appropriate interior tube is automatically activated, switching from V1 to V2 or V4 to V3 in order to maintain the 50-watt output level.

45 SPEAKER A/B

Switches from speaker output A to B back. A speaker must be connected to the Power Amp Output A1, A2 or the Power Amp Output B1, B2 jack before you can activate the respective output. The LED above the button lights up to indicate Speaker B is activated. Speaker A/B can also be controlled via MIDI program change or the ENGL Custom Z-9 Footswitch.

A tip from the designer:

This feature is very useful if you want to make the most of the vast range of sounds offered by the amp. It lets you match specific cabs to specific amp sounds. Alongside the amp itself, the speakers and even the cabinet's housing (say a closed-back E412 vs. an open-back E410) play a pivotal role in shaping sounds, so you can configure rigs to best match the sound you have in mind. For instance, the aforementioned E410 is a

great choice for clean or edgy rock riffs, while the E412 (Vintage) smokes for heavy rock shredding, wailing leads and chunky metal rhythm work in Lead mode.

Heads up, important note:

We endowed this baby with an electronic surveillance system to monitor Power Amp Output A1, A2, B1 and B2. If a plug is not inserted into one of these ports, the monitoring system automatically shuts the power amp down to ensure it is not operated without a connected load. The red Status LED above the Write button (47) will flash briefly in a distinctive pattern to alert you that this has taken place. If you plug a cord into either Power Amp Output A or B, the speaker switching option is disabled and that output is selected automatically. If you use a MIDI preset whose programming does not match the currently selected speaker output, the monitoring system automatically switches to the currently selected output. For example, if you programmed Speaker B/Output B for Preset 1, but have connected a speaker to Output A, the amp will automatically select Output A.

46 NOISE GATE

Press this button to activate an onboard Noise Gate and suppress excess noise in the Crunch channel or the two Lead channels. Control the Noise Gate using the two Level Threshold (59) and Mute Depth (58) knobs on the back of the amp. The LED above the button lights up to indicate the Noise Gate is activated. This feature can also be switched via MIDI program change or the ENGL Custom Z-9 Footswitch.

IMPORTANT note; please read and heed: The Noise Gate may open up inadvertently when the Noise Gate is activated, a high-gain Lead channel is selected, and the volume exceeds the Threshold knob setting. At very high volume and gain settings, this may generate instant feedback, particularly if your guitar is facing the speakers. Rather than musical and controlled, this is the shrill, unpleasant and potentially harmful variety of feedback squealing that sends your audience and fellow musicians packing. Though the amp is not more susceptible to feedback when the Noise Gate is activated, the fact that it suppresses extraneous noise means you can't hear those telltale signs that feedback is swelling and consequently can't take measures to suppress it. For this reason, make an extra effort to be careful when the Noise Gate is activated: Before you approach the amp and speaker cabinet with your guitar in hand, turn the guitar's volume knob to the far left position (to 0 so that no signal is audible) to prevent the pickups and speakers from interacting!

A tip from the designer:

Noise is a definite no-no in many situations. For example, studio etiquette demands that you keep a lid on extraneous noise during short breaks. It's in the nature of high-gain rigs to generate undesirable peripheral noise in overdriven channels. This is attributable to the physical properties of an amp's constituent components, in particular its active components. That's right; those cherished tubes are the culprits. The Noise Gate is a tool that lets you silence this noise during breaks by way of signal mute circuit. Note that electric guitars pick up interference signals, and these are amplified tremendously at high gain levels in Lead mode. The most common source of noise is 50 or 60 hertz mains hum, particularly when the guitar is positioned near transformers and power units. Because in worst-case scenarios this humming can attain extremely high levels, the Noise Gate can hardly distinguish between the

musical signal and noise. This makes it hard to find the right Threshold setting. It is entirely possible for this humming and other noise to rise to a level that deactivates the Noise Gate and therefore becomes audible. My advice is to stay as far away from transformers and power units as space allows.

47 WRITE/COPY

Press this button to store the modified setting of a programmable feature to a MIDI memory slot (generally called a preset). Here's how to distinguish between Write and Copy: with the former you're actually programming or writing a new MIDI preset, with the latter you're making an exact duplicate of an existing preset.

The system will select a Write operation whenever you edit a MIDI preset, that is, when you have modified a programmable feature. You'll know that this is the case because the Status LED flashes steadily when you edit one or several programmable features. If you press the button and did not edit a MIDI preset, the system will select Copy. This means that the given preset becomes the source, and its contents are dumped to another preset and stored there. When you press this button, the Status LED lights up continuously to indicate Copy is activated. The system quits Copy mode autonomously if you do not select a new MIDI preset within about 30 seconds.

The preset programming process -- the Write command, that is -- is not carried out as soon as you press the button. Pressing the button merely initiates the process. You must hold it down for about a second until the Status LED flashes three times in rapid succession. This mechanism is designed to prevent inadvertent programming. You can cancel the programming process at any time before the Status LED first illuminates by releasing the Write button. Again, the preset will only be programmed successfully if you press and hold the button until the Status LED flashes three times.

You'll have to go through a similar routine to copy a preset once you select a target preset: When the Status LED extinguishes, the copy operation is underway and can no longer be cancelled. The LED flashes three times to indicate the preset was copied successfully. You can cancel the copy operation by releasing the key, but only for as long as the LED lights up continuously.

IMPORTANT note; please read and heed:

MIDI preset 1 activates when the amp is powered up. If you want to edit and/or store other MIDI presets, you must connect a MIDI foot board or another MIDI send device to the MIDI In port (53) and use this outboard device to select the desired MIDI preset on the amp.

More good-to-know info:

Note that the Status LED also indicates the status of components unrelated to Write and Copy. The microcontroller runs a short system check after you switch the amp on. Should it find a defect in the memory chip (EEPROM), the LED will flash in a pattern of five short bursts.

Press the Write/Copy copy button to confirm that you got the message. Once you have done this, the system will be ready to run, although you may encounter problems when attempting to select or store MIDI preset.

Further indicator functions: Power Tube Monitor; description in section 48.

The Status LED serves a third display function. As described in section 45 on pages 17 and 18, it indicates that no speaker is connected to the power amp outputs.

48 STAND BY

Power amp standby switch: Use this switch to silence (0 position) the amp when you take longer break. The amp's tubes stay nice and toasty, and the amp is ready to roll immediately when you ramp it back up to full power.

More good-to-know info:

On the one hand, the amp's surveillance system monitors if speaker cords are plugged into Output Power Amp A1, A2, B1 and B2 (78, 76, 75, and 73). If none of these ports is in use, flipping the Standby switch will not activate the power amp. This ensures the amp is not operated without a connected load.

In addition, an electronic surveillance system monitors the active power tubes (that is, two or all four tubes depending on Lo/Hi Power setting). The Status LED flashes to alert you to a defective power tube, blinking in different patterns to identify the given tube. Specifically, it lights up briefly at regular intervals - once for V1, twice for V2, thrice for V3, and four times for V4. Because the tube monitoring system only works when the power tubes are up and running, this indicator is not enabled until you activate the power amp by flipping the Standby switch. To reset the power tube monitoring circuitry, press the standby switch briefly.

A tip from the designer:

I suggest you get into the habit of using standby during short breaks. In this mode, current is not piped through the power tubes, so they don't get as hot (due to the lack of anode dissipation) and are spared considerable wear. The amp is ready to run when you flip the Standby switch because the tubes are already warm and don't require time to heat up. For breaks of 30 minutes and longer, I recommend that you switch the amp off in order to conserve energy.

49 POWER

Mains power on/off.

Rear Panel Features

At the back of the manual you'll find a folded page offering diagrams of the front and rear panels. Please unfold and refer to it as you read through the descriptions of features and functions!

50 Mains Connector

Plug the mains cord in here. For European models, use a standard non-heating equipment connector cable.

CAUTION: Make sure you use an intact mains line cord with a grounded plug! Before you power the amp up, ensure the voltage value printed above the mains socket is the same as the current of the local power supply or wall outlet.

Please also heed the guidelines set forth in the separately included pamphlet, Instructions for the Prevention of Fire, Electrical Shock and Injury.

51 MAINS FUSE BOX:

The rear chamber contains the mains fuse and the front chamber a spare fuse.

CAUTION: **ALWAYS make sure replacement fuses are of the same type and have the same ratings as the original fuse! To this end, please refer to the fuse ratings table.**

52 MIDI THRU

This 5-pin DIN port patches incoming MIDI data from the MIDI In (53) to any other connected MIDI device.

53 MIDI IN

This 5-pin DIN port accepts data sent by a MIDI sender (for example, the ENGL MIDI Z-12, Z-15, or Z-9 foot controllers) or from or routed through another MIDI device.

Switch no. 54 lets you activate the amp's power supply if you have an ENGL MIDI foot controller connected to this port.

CAUTION: Before you connect any other MIDI footswitch or effects device, always make sure that switch no. 54 is set to the right to avoid damaging the device.

54 POWER SUPPLY FOR THE ENGL MIDI FOOTCONTROLLER

This selector activates a MIDI In port power supply for connected ENGL MIDI foot boards. Power is fed to the board via the MIDI circuit. When the switch is set to the left position, power is routed to the MIDI In port's pin 1 and pin 2 (refer to page 46 for pin assignments). If you choose to use another MIDI foot board, be sure to set the switch to the right to avoid damaging it. If the foot board you are using is designed to handle phantom power, consult its operating manual to learn how it is wired (that is, which pins carry its power supply) and what its voltage and current specifications are. If the voltage and current specifications and wiring match, you may set the switch to the left to power this foot board via the MIDI cable.

Please read and heed: Note that a MIDI foot board may not draw more than 200 milliamperes of current if you want to power it via this port. You must also check and verify if this MIDI foot board is able to handle 11 volts of alternating current (AC)! If you are in any doubt, be sure to consult a specialist, meaning an amp technician or electronics engineer who earns a living with a screwdriver!

55 MIDI CHANNEL & VOL.0

Use this set of encoding buttons (1, 2, 3, 4 and 5) to assign the MIDI channel. This tells the amp's MIDI system over which channel it will receive MIDI program change commands. Your choices are the standard 16 MIDI channels (numbered from 00 to 15), as well as OMNI mode (whereby all MIDI data is received regardless of the MIDI send channel). The encoding button settings for a specific channel and OMNI mode are listed in the following table.

Encoding button number 6 lets you program the amp so that it is muted when it receives a MIDI controller 7 command. When this command has a value of 0 (and less than and equal to 5), the amp's master volume is muted. At values greater than or equal to 5, the amp is back on line at the volume level determined by the currently active Master knob.

Setting the encoding button to ON activates Master Volume Mute.

Setting the encoding button to OFF deactivates Master Volume Mute.

MIDI channel assignment using the encoding buttons:

MIDI-channel:	S 1	S 2	S 3	S 4	S5	S6
OMNI	OFF	XX	XX	XX	XX	XX
CH 1	ON	OFF	OFF	OFF	OFF	XX
CH 2	ON	OFF	OFF	OFF	ON	XX
CH 3	ON	OFF	OFF	ON	OFF	XX
CH 4	ON	OFF	OFF	ON	ON	XX
CH 5	ON	OFF	ON	OFF	OFF	XX
CH 6	ON	OFF	ON	OFF	ON	XX
CH 7	ON	OFF	ON	ON	OFF	XX
CH 8	ON	OFF	ON	ON	ON	XX
CH 9	ON	ON	OFF	OFF	OFF	XX
CH 10	ON	ON	OFF	OFF	ON	XX
CH 11	ON	ON	OFF	ON	OFF	XX
CH 12	ON	ON	OFF	ON	ON	XX
CH 13	ON	ON	ON	OFF	OFF	XX
CH 14	ON	ON	ON	OFF	ON	XX
CH 15	ON	ON	ON	ON	OFF	XX
CH 16	ON	ON	ON	ON	ON	XX

A tip from the designer:

As the table indicates, encoding button 1 switches between Poly and OMNI mode. Bear this in mind for practical applications, because this is a fast way to go from a preset Poly channel to OMNI mode and vice versa.

56 FOOTSWITCH: SERIAL AMP CONTROL PORT

This serial data input accepts the Custom ENGL Z-9 Footswitch (optional), which lets you control various amp functions remotely. Connect the Z-9 Footswitch to the amp port using a cord equipped with stereo ¼" jack plugs. This MIDI-enabled foot board is a custom design that switches every amp feature designated as footswitchable in this manual. To learn if a given feature may be controlled remotely, refer to its description herein. The MIDI In port is disabled when the Z-9 Footswitch is connected.

CAUTION: Connect only the ENGL Z-9 Footswitch to this 6.3 mm (1/4") stereo jack! Connecting any other switching device may damage it and/or the amp's circuitry!

A tip from the designer:

The Custom Z-9 Footswitch was designed with the non-MIDI guitarist in mind. It's sure to delight if you don't or won't use MIDI systems. Based on a rather nifty switching concept, it provides direct access to the four channels, Tube Driver and the T.D.EQ. As an alternative to switching the two Tube Driver options, you can opt to control any other two switchable amp functions, for example, Master A/B, Power Lo/Hi, Hi Gain, etc. Another tremendous benefit of this microcontroller-driven foot board is that it connects to the amp via an easily obtained, standard stereo cord. But that's not the last of the Z-9's advantages: At some point, you may decide to ramp up or connect to a MIDI system. This won't render the Z-9 obsolete because it also serves as a simple MIDI foot board with a MIDI OUT (5-pin DIN connector) that selects 10 MIDI patches (or presets, if you prefer). Again, I want to emphasize that you should never connect another foot board to this jack: The Z-9 controls the amp via a proprietary ENGL serial data protocol, and the Serial Amp Control Port was developed exclusively for ENGL amps. No other foot board will work and in fact is likely to damage the foot board or amp's circuitry!

57 FOOTSWITCH: CH 1 /CH 2, SUB I/II

Use this jack to connect a conventional footswitch with two switching functions (for example, the ENGL Z-4) that let you access the four channels Clean, Crunch, Lead I and Lead II. One of the two switches activates Main Channel 1 and 2, while the other activates the selected Main Channel's two subordinate channels, Clean and Crunch or Lead I and Lead II, as the case may be. The onboard channel switching facility, to include Tube Driver / T.D.EQ switching, is disabled when you plug a footswitch into this jack.

Note also: A footswitch may be equipped with LEDs indicating the given switching status. Each of the two switches is provided with 15 milliamperes current, which suffices to power a standard LED.

The jack's mono terminal selects the Main Channel, while the stereo terminal selects the sub channel (refer to Pin Assignments on page 46).

58 MUTE DEPTH

This knob setting determines to which extent the level drops when the active Noise Gate mutes the signal; in other words, it sets the residual volume level. The further you twist the knob clockwise, the greater the drop in (noise) level when the Noise Gate mutes the signal.

59 THRESHOLD LEVEL
Use this knob to set a threshold value (that is, the noise level) at which the Noise Gate activates to suppress the signal. The further you twist the knob to the right, the higher the signal level at which the Noise Gate kicks in. The Noise Gate can be activated and deactivated as required for the Crunch channel and the two Lead channels by pushing the front panel button (46).
A tip from the designer:
Crunch, Soft Lead and Heavy Lead generate different levels of noise, and I tuned the ENGL Special Edition's Noise Gate accordingly. However, there is some minor matching variance between the three. Heavy Lead (Lead channel and Hi Gain activated) stands to benefit most from the Noise Gate, so I suggest that you tweak its two knobs for this mode.

60 SERIAL FX LOOP SEND
Connect this Serial FX Loop output to a signal processor's input/return jack using the shortest possible shielded cord equipped with 1/4" plugs. Activate and deactivate it via the Serial FX Loop (24) button. In the signal path, the Serial FX Loop is located post preamp and pre the two main effect loops FX Loop I and FX Loop II.

61 SERIAL FX LOOP RETURN
Connect this Serial FX Loop input to a signal processor's output/send jack using the shortest possible shielded cord equipped with 1/4" plugs. Activate and deactivate it via the Serial FX Loop (24) button. In the signal path, the Serial FX Loop is located post preamp and pre the two main effect loops FX Loop I and FX Loop II.

62 FX LOOP I SEND
Connect this FX Loop I output to a signal processor's input/return jack using the shortest possible shielded cord equipped with 1/4" plugs. Activate and deactivate it via the FX Loop I/II (23) button, which switches between these two loops. In the signal path, FX Loop I is located post preamp, post Serial FX Loop and pre the two power amp Master knobs.

63 FX LOOP I RETURN
Connect this FX Loop I input to a signal processor's output/send jack using the shortest possible shielded cord equipped with 1/4" plugs. Activate and deactivate it via the FX Loop I/II (23) button, which switches between these two loops. In the signal path, FX Loop I is located post preamp, post Serial FX Loop and pre the two power amp Master knobs.

64 BALANCE
FX mix control for FX Loop I. When the knob is set to Dry, the amp signal is routed through with no processed signal (0% wet balance) added to the mix. Twist the knob clockwise to blend in the processed signal (parallel/passive, wet balance 1-99%, depending on knob position). When the knob arrives at the Effect position, only the wet signal (that is, the processed signal generated by the connected effect device) is patched to the power amp (serial, 100% wet).
NOTE: Set this knob to Dry when this loop is not in use!

65 FX LOOP II SEND
Connect this FX Loop II output to a signal processor's input/return jack using the shortest possible shielded cord equipped with 1/4" plugs. Activate and deactivate it via the FX Loop I/II (23) button, which switches between these two loops. In the signal path, FX Loop II is located post preamp, post Serial FX Loop and pre the two power amp Master knobs.

66 FX LOOP II RETURN
Connect this FX Loop II input to a signal processor's output/send jack using the shortest possible shielded cord equipped with 1/4" plugs. Activate and deactivate it via the FX Loop I/II (23) button, which switches between these two loops. In the signal path, FX Loop II is located post preamp, post Serial FX Loop and pre the two power amp Master knobs.

67 BALANCE
FX mix control for FX Loop II. When the knob is set to Dry, the amp signal is routed through with no processed signal (0% wet balance) added to the mix. Twist the knob clockwise to blend in the processed signal (parallel/passive, wet balance 1-99%, depending on knob position). When the knob arrives at the Effect position, only the wet signal (that is, the processed signal generated by the connected effect device) is patched to the power amp (serial, 100% wet).
NOTE: Set this knob to Dry when this loop is not in use!

68 LEVEL
This knob determines the level of the frequency-compensated Line Out (72). Use it to adjust the amp's line output signal level to match the input gain of the mixing desk or recorder's input.
A tip from the designer:
The following factors determine Line Out level (72):
1. When button 70 is set to Preamp, input level (Gain), the given channels' Volume knobs, and to some extent, the tone controls and sound-shaping buttons' settings.
2. When button 70 is set to Poweramp, all the above as well as the activated Master, Presence knobs' settings and Depth Boost.
Those are a lot of variables, so I recommend you proceed as follows: Configure buttons as desired and dial in the desired settings on the front panel. Adjust the levels of connected FX devices and signal processors. Finally, use the Level control to adjust the line level. The Line Out is not overloaded until the Overload LED (69) lights up continuously. You can push the level up to this point to match a mixer desk or recorder's input level requirements. Use the given device's input sensitivity or gain control to fine-tune the line level.

69 OVERLOAD
This LED lights up to tell you the Line Out is saturated. If it illuminates, simply roll back the signal level using the Level knob (68).

70 LINE OUT STATUS
This button selects the signal source for the Line Out signal routed to the XLR port (72). When set to OFF, the line signal is tapped from the preamp.
When set to ON (pushed in), the line signal is tapped from the power amp. At least one speaker must be connected for this option!
A tip from the designer:
The ENGL Special Edition's preamp and power amp supply two different signals. The reason for this is that the Presence control, Depth Boost button, power tubes and output transformer all shape the power amp signal's tone. You may have to adjust the voicing controls on your amp, mixer desk or recorder to adjust the line out signal accordingly.

71 XLR GROUND
This switch assigns pin 1 of the XLR port (72) to ground (Ground to Pin 1). You'll find that this is a handy option when you want to earth the circuit you have routed to a mixing console or recording device.
IMPORTANT NOTE: You encounter something called a ground loop if your amp is connected to a mixing console or recording gear and pin 1 of both devices' XLR connectors serve as ground terminals (the XLR Ground button on the amp is set to Ground to Pin 1). A ground loop is readily identified by the infernal humming emanating from your speakers. Set this button to Ground Lifted to solve the problem!

72 LINE OUT BALANCED & FREQU. COMP.
This is a frequency-compensated, balanced XLR line output. Pins 2 and 3 of the XLR jack carry the signal, pin 1 = N.C. or ground depending on the position of the Ground switch (71). Refer to page 46 to learn more about this. The signal routed to this output limits the response of a 4x12" cab. Dial in the desired signal level for the balanced Line Out by adjusting the Level knob (68).
A tip from the designer:
You can patch signals routed through these outputs directly to the balanced inputs a mixing console or recording gear. The advantage of a balanced circuit is that it is immune to ground loops, provided of course it is wired correctly. You can also patch the line out signal to an unbalanced input using an adapter. To do this, you'll need a shielded cord equipped with an XLR connector and an RCA connector or ¼" plug that bridges the signal (pin 2 or 3) and ground circuits. Be sure to set the button to Ground to Pin 1.

73 POWERAMP OUTPUT B: OUTPUT B2
This is Poweramp Output B's B2 jack, which is wired in parallel to B1. A speaker must be connected to this or the B1 jack for the Speaker A/B switching option to be enabled. The power amp signal is routed to outputs B2 and B1 when Speaker A/B is activated.
Use Impedance Selector B (74) to set the impedance for the speaker connected to this output or the overall impedance when two cabinets are connected to Output B2 and B1.

74 IMPEDANCE SELECTOR B

Impedance selector for Poweramp Output B. Use this rotary selector to set the overall power amp output impedance for the two speaker outs B1 (75) and B2 (73). Your options are 4, 8, and 16 ohms. The selected impedance applies to both the B1 and the B2 outputs! That means if one cabinet is connected to Output B1 and another to Output B2, their actual overall impedance and the impedance setting selected on the amp must match!

Impedance table for two cabinets connected in parallel:
(|| stands for a parallel circuit)
16 ohms || 16 ohms -> 8 ohms overall impedance: OK;
the correct selector setting is 8 ohms.
8 ohms || 8 ohms -> 4 ohms overall impedance: OK;
the correct selector setting is 4 ohms;
4 ohms || 4 ohms -> 2 ohms overall impedance: definitely not OK;
not an option because 2 ohms lies below the 4-ohm minimum;
16 ohms || 8 ohms -> 5.3 ohms overall impedance: not recommended;
the closest selector setting would be 8 ohms, but the output power
would not be distributed equally to the two cabinets!
16 ohms || 4 ohms -> 3.2 ohms overall impedance, not recommended;
the closest selector setting would be 4 ohms, but the output power
would not be distributed equally to the two cabinets!
8 ohms || 4 ohms -> 2.6 ohms overall impedance: definitely not OK,
not an option because 2.6 ohms lies below the 4-ohm minimum.

75 POWERAMP OUTPUT B: OUTPUT B1

This is Poweramp Output B's B1 jack, which is wired in parallel to B2. A speaker must be connected to this or the B2 jack - or in parallel mode, to both - for the Speaker A/B switching option to be enabled. The power amp signal is routed to outputs B1 and B2 when Speaker A/B is activated.

Use Impedance Selector B (74) to set the impedance for the speaker connected to this output or the overall impedance when two cabinets are connected to Output B1 and B2.

76 POWERAMP OUTPUT A: OUTPUT A2

This is Poweramp Output A's A2 jack, which is wired in parallel to A1. A speaker must be connected to this or the A1 jack - or in parallel mode, to both - to switch the amp from Standby to ON. The power amp signal is routed to outputs A2 and A1 when Speaker A/B is deactivated.

Use Impedance Selector A (77) to set the impedance for the speaker connected to this output or the overall impedance when two cabinets are connected to Output A2 and A1.

77 IMPEDANCE SELECTOR A

Impedance selector for Poweramp Output A. Use this rotary selector to set the overall power amp output impedance for the two speaker outs A1 (78) and A2 (76). Your options are 4, 8, and 16 ohms. The selected impedance applies to both the A1 and the

A2 outputs! That means if one cabinet is connected to Output A1 and another to Output A2, their actual overall impedance and the impedance setting selected on the amp must match!
Impedance table for two cabinets connected in parallel:
(|| stands for a parallel circuit)
16 ohms || 16 ohms -> 8 ohms overall impedance: OK;
the correct selector setting is 8 ohms.
8 ohms || 8 ohms -> 4 ohms overall impedance: OK;
the correct selector setting is 4 ohms;
4 ohms || 4 ohms -> 2 ohms overall impedance: definitely not OK;
not an option because 2 ohms lies below the 4-ohm minimum;
16 ohms || 8 ohms -> 5.3 ohms overall impedance: not recommended;
the closest selector setting would be 8 ohms, but the output power
would not be distributed equally to the two cabinets!
16 ohms || 4 ohms -> 3.2 ohms overall impedance, not recommended;
the closest selector setting would be 4 ohms, but the output power
would not be distributed equally to the two cabinets!
8 ohms || 4 ohms -> 2.6 ohms overall impedance: definitely not OK,
not an option because 2.6 ohms lies below the 4-ohm minimum.

78 POWERAMP OUTPUT A: OUTPUT A1
This is Poweramp Output A's A1 jack, which is wired in parallel to A2. A speaker must be connected to this or the A2 jack - or in parallel mode, to both - to switch the amp from Standby to ON. The power amp signal is routed to outputs A1 and A2 when Speaker A/B is deactivated.
Use Impedance Selector A (77) to set the impedance for the speaker connected to this output or the overall impedance when two cabinets are connected to Output A1 and A2.
IMPORTANT NOTE, please read and heed: Never operate the power amp without a sufficient load, otherwise you may damage or destroy it!
An electronic surveillance system constantly monitors if a plug is inserted into the speaker outputs A1, A2, B1 and B2 (78, 76, 75, and 73). If a plug is not inserted into one of these jacks, the power amp is disabled and the Status LED flashes in a distinctive pattern to alert you to this. However, the system cannot check if a speaker is actually connected to the other end of the cord. That's your job.
Always check and verify that the amp's output impedance matches the connected cabinets' impedance! You can use the Impedance Test System (87) to do this.

79 GROUND LIFT SWITCH
This switch severs the circuit connecting the amp's internal ground to the wall receptacle's ground terminal. You can set the switch to Ground Floated when you have connected a signal processor or power amp and want to prevent the two devices' grounds from forming a ground loop that manifests in annoying humming.
Please note: A ground loop is an extraordinary condition. Under ordinary circumstances, ensure the button is set to Ground to earth the amp to the mains ground, thereby preventing ungrounded line noise!

80 TUBE DRIVER: LEVEL
This knob determines the Tube Driver circuit's output level as well as the effect loops' send level. It is enabled only when Tube Driver or T.D.EQ are activated. Note that unlike a volume knob, it cannot turn the signal level all the way down to 0.

81 TUBE DRIVER: CONTOUR
Contour is an ancillary voicing option that shapes midrange frequencies when T.D.EQ is enabled. When activated, Contour slightly boosts low mids from 300 to 600 hertz as well as the frequency at 1500 hertz. Note that the Contour setting influences the functionality and range of the Mid knob (83). Again, this sound-shaping feature only works T.D.EQ. is activated.
A tip from the designer:
Contour gives you another option for tweaking the midrange spectrum when T.D.EQ. is activated. This is a passive circuit, so its effect is relatively subtle. Because the Tube Driver's EQ is voiced somewhat differently than the Main Channel 1 tone controls, this feature does more than merely offer another sound-sculpting option. Though we're talking about nuances here, it does offer a unique tonal flavor and therefore another distinctive basic sound to add to your arsenal of tones.

82 TUBE DRIVER: BASS
This is the Tube Driver voicing section's passive low-frequency EQ. It works in T.D.EQ. mode only.

83 TUBE DRIVER: MID
This is the Tube Driver voicing section's passive midrange EQ. It works in T.D.EQ. mode only.

84 TUBE DRIVER: TREBLE
This is the Tube Driver voicing section's passive high-frequency EQ. It works in T.D.EQ. mode only.

85 TUBE DRIVER: SENSITIVITY
This knob determines the Tube Driver circuit's sensitivity when the amp is in Tube Driver and T.D.EQ. modes. Note that unlike a Gain knob, this control does not turn the input level all the way down to 0.
A tip from the designer:
In terms of sensitivity, the Tube Driver's is comparable to the Clean channel. Depending on the type of pickup, you can dial in a touch of tube overdrive in the 1-to-3 o'clock zone. This is a nice option to have when the musical situation calls for differently voiced clean channels, one squeaky clean and the other with a touch of tube-driven crunch.

86 CABLE RETURN
To check out a cord equipped with 1/4" plugs, connect one end to this jack, the other to the Test Jack (87). It checks the mono circuit only (that's the wire soldered to the tip of the plug).

A tip from the designer:
You'll find that this test circuit is a very convenient utility, as it lets you check speaker, guitar, and signal processor patch cords (only the mono wire is tested!). Due to the higher resistance of longer cables, you may find that the 12 Z LED (92) rather than the 8 Z LED (91) indicates that the cable is O.K.

87 TEST JACK
Connect a speaker cabinet (or daisy-chained cabinets) to this jack for an impedance check using a cord with ¼" plugs. For the cable test, insert one end of the cord to this jack.
VERY IMPORTANT INFO: Before testing a cable, ensure that its other end is not connected to a power amp output, because this can damage the test circuit. The same applies to cabinets equipped with a thru jack. Ensure that it is not connected to a power amp output before you plug into the test circuit. Disconnect the cord or cabinet after you have tested it to avoid placing unnecessary strain on the internal power circuit.
PLEASE NOTE: During an impedance check, you may find that several LEDs illuminate or flicker at the same time. Possible causes include faulty contacts between the plug and jack. High-level noise can induce voltage in the speakers, which also affects the test circuit. Deviations in speaker impedance values are possible because the circuit measures a speaker's DC resistance, and this merely provides an approximation of the actual speaker resistance. This explains why there may be a discrepancy between the indicated and actual values. When you are sure you know the impedance of a cabinet (or of several cascaded cabinets), set the impedance selector (74, 76) to this value. In practice, the indicated value should not vary by more than one LED bar from the actual value. Use thick, short cords for the impedance test to minimize flawed measurements due to higher cable resistance.

88 < 4 Z; CABLE SHORT CIRCUIT
This red LED flashes to indicate the following results:
1. During an impedance check, this signifies that the impedance is lower than 4 ohms, and possibly a short circuit in the cord (test it separately!) or cabinet.
2. During a cable check, this signifies a short circuit in the cord's wires or in one of the plugs.

89 4 Z
This green LED indicates the following results:
During an impedance check, it signifies an (overall) impedance of 4 ohms.

90 6 Z
This yellow LED indicates the following results:
During an impedance check, it signifies a relatively unusual (overall) impedance of 6 ohms. This may be attributable to speaker tolerance (perhaps you're dealing with an 8-ohm system), faulty cables, or a poor contact between plugs and jacks (in this case, it may be a 4-ohm system), or a parallel setup consisting of three 16-ohm speakers or one 16-ohm and one 8-ohm speaker.

91 8 Z; CABLE O.K.
This green LED indicates the following results:
1. During an impedance check, it signifies an (overall) impedance of 8 ohms.
2. During the cable check, it signifies the cord is intact.

92 12 Z
This yellow LED indicates the following results:
During an impedance check, it signifies a relatively unusual (overall) impedance of 12 ohms. This may be attributable to speaker tolerance (perhaps you're dealing with a 16-ohm system), faulty cables, or a poor contact between plugs and jacks (in this case, it may be an 8-ohm system), or a serial setup consisting of one 4-ohm and one 8-ohm speaker.

93 16 Z
This green LED indicates the following results:
During an impedance check, it signifies an (overall) impedance of 16 ohms.

94 > 16 Z; CABLE BREAK
This red LED flashes to indicate the following results:
1. During an impedance check, this signifies an impedance greater than 16 ohms, a break in the connector cable (test the cord separately!), or a break in the cabinet's internal wiring.
2. During a cable check, it signifies a break in the wire or one of the plugs.

BIAS Control Panel
This feature serves to check and adjust the bias (that is, the idle current) of 6L6GC and EL34 power tubes. The control and indicator panel is on top of the amp chassis and is accessible only when the amp's rear panel is removed.
Important note: The elements on the BIAS Control Panel are not standard control features for use in normal operation. Designed for purposes of convenience and fast, easy power tube replacement, they may be accessed and adjusted by qualified and authorized specialists only!

95 BIAS CHECK V1
Press this button to check the V1 power tube's bias (idle current). The LED chain comprising Hi BIAS (99), In Range (100), and Lo BIAS (101) indicates the results.

96 BIAS CHECK V2
Press this button to check the V2 power tube's bias (idle current). The LED chain comprising Hi BIAS (99), In Range (100), and Lo BIAS (101) indicates the results. This tube is operative in Hi Power mode (100 watts) only, that is, when function 44 is activated!

97 BIAS CHECK V3
Press this button to check the V3 power tube's bias (idle current). The LED chain comprising Hi BIAS (99), In Range (100), and Lo BIAS (101) indicates the results. This

tube is operative in Hi Power mode (100 watts) only, that is, when function 44 is activated!

98 BIAS CHECK V4
Press this button to check the V4 power tube's bias (idle current). The LED chain comprising Hi BIAS (99), In Range (100), and Lo BIAS (101) indicates the results.

99 LED BIAS HI
When checking a power tube's bias by pressing one of the four buttons, this red LED lights up to indicate the idle current is too high.
The BIAS Adjust and BIAS Fine Adj. serve to adjust the idle current accordingly.

100 LED BIAS IN RANGE
When checking a power tube's bias by pressing one of the four buttons, this green LED lights up to indicate the idle current is within the permissible range.

101 LED BIAS LO
When checking a power tube's bias by pressing one of the four buttons, this green LED lights up to indicate the idle current is too low. The BIAS Adjust and BIAS Fine Adj. serve to adjust the idle current accordingly.

102 BIAS TUBE TYPE SELECT
This button selects the BIAS range (negative voltage) for 6L6GC or EL34 tube. Refer to the Tube Map on page 43 to learn more about selector settings.

103 BIAS ADJUST
This control serves to dial in a coarse adjustment of the negative grid bias for the power tubes, thereby determining bias (idle current).

104 BIAS FINE ADJ.
This control serves to dial in a fine adjustment of the negative grid bias for the power tubes, thereby determining bias (idle current).

Additional information and important notes on checking and adjusting bias. Please read and heed:
In order to check and adjust power tube bias (idle current), the following conditions must be given:
1. The power amp must be activated: The Standby button must be set to ON with a speaker or an ohmic load (for a signal check when servicing the amp) connected to one of the outputs. Otherwise, the power amp will not activate.
2. The selected Master knob may be set to the far left (Master: 0) to prevent the signal from being routed to the power amp.
3. Hi Power (44) must be activated in order to check all four power tubes.
4. The amp should be switched on at least five minutes before a bias check or adjustment to allow the power tubes to heat up to operating temperature.
5. When adjusting bias, the following must be taken into account: The settings of the

two BIAS Adjust and BIAS Fine Adj. potentiometers apply to all four power tubes. Idle current varies from tube to tube. Selected tube sets with matching idle current must be installed to adjust bias properly. The permissible range for every tube is roughly 25 milliamperes (minimum) to 33 milliamperes (maximum), which is equivalent to12 to 16 watts anode dissipation per tube.
Before adjusting bias, the correct tube type (6L6GC or EL34) must first be selected. The selector must be used to do this before the power amp is activated via the Standby switch. The second step is to adjust bias coarsely using the BIAS Adjust control. To this end, the tube's idle current must be checked by pressing the corresponding button. The LEDs light up only when one of the four buttons is pressed. If none of the three LEDs illuminate despite having pressed a button, this tube's bias is well outside the currently adjusted range. The Adjust BIAS control selects the correct range. To this end, the button is pressed and held while the control is slowly rotated clockwise or counterclockwise until the green LED lights up. The BIAS Fine Adj. control serves to fine-tune the setting, if necessary. All four power tubes should operate within the permissible range (as described in point 5 above), otherwise this can result in unbalanced signals (when using unselected tubes with different characteristics), transient distortion (when bias is too low), or anode plate overheating (when bias is too high), which shortens tube life. Because LEDs cannot indicate idle current with the accuracy of a measuring device, I recommend that the technician checks bias by measuring the cathode resistor's voltage drop or at the individual tube sockets using a tube check adapter when servicing the amp.

A few words from the designer on your ENGL Special Edition Amp's sounds and settings as well as some practical tips:

On the Subject of Sounds and Settings

A great deal of effort went into tuning this tremendously versatile amp head; I devoted particularly painstaking attention to the details: The Clean and Crunch channels are matched so that their Gain ranges overlap somewhat; the same goes for Lead I and Lead II. This is intentional, and serves very sensible sound-sculpting purposes. For instance, higher Gain settings (in the 12-to-3 o'clock range, depending on pickups) push the Clean channel into moderate overdrive, and activating Gain Boost propels this channel into the dirt zone that much earlier. This means you can use this channel for ultra clean chord work, jazz-style comping and clucking chicken-picked lead lines. And courtesy of that typical tube overdrive, it means the same channel is great grittier riffs and leads, with the amount of dirt hinging upon how hard you attack the strings. If you add the guitar's volume knob to the sonic equation, you get a vast spectrum of fine tonal distinctions in just this one channel. The same goes for the Crunch channel: Its spectrum ranges from clean (when Gain is set no higher than about 10 o'clock, depending on pickup) to fat, wooly, and warm tube overdrive at higher Gain settings. High-output pickups such as humbuckers will even serve up enough oomph for punchy leads. Though these application areas overlap somewhat, the Crunch and Clean channels are voiced differently. Crunch features an additional triode, making it a tad more dynamic and eliciting a slightly different frequency response. When used in combination with high-output pickups, I recommend that you roll off the bottom-end (and give Mega Lo Punch a wide berth) a touch to forestall low-end mud.

Main Channel I (Clean and Crunch) voicing controls respond differently than those of Main Channel II. In consequence, I suggest that you start by dialing in settings between 12 and 3 o'clock, tweaking each to taste and comparing the differences. Again, I opted for passive tone controls, which puts each knob's control range at about 10 dB. As you're experimenting with modifying settings, you may notice that when the Crunch or Lead channels are in Classic mode and you are pushing the preamp hard, the EQ seems slightly less assertive than in Modern mode.

The Tube Driver circuit is in effect an excellent auxiliary channel: T. D. EQ's dedicated voicing section lets you set up an alternative Clean channel with a totally different tone. For instance, you could dial in lots of high-end for one channel (with the Clean channel being predestined for this because its two Bright sound-shaping buttons offer tremendous top-end reserves) for crisp, spanky clean sounds, and roll back T.D.EQ's treble for a darker, throatier tone, say for, jazz comping. For even more variety, you can dial in different power amp Presence settings and mix and match them with the Tube Driver with and without EQ, thereby multiplying the number of subtle variations in sound at your disposal. Try this on for size: To get a very midsy tone that colors but does not mask the given pickup's characteristic sound, send the Tube Driver signal directly to the power amp (bypassing its EQ). This yields some very distinctive sonic flavors that depending on personal preference and musical genre, may well ring your bell. What's more, the fundamental tone of the Tube Driver circuit with EQ is not synonymous with the Clean channel's basic sound. The differences between the two are most prominent in low-end and midrange frequencies.

All these options harbor vast and musically meaningful sonic potential. I'm confident that the Gain knobs, tone controls and sound-shaping buttons will let you conjure all the sounds you have in mind and that you'll discover a world of tones while you're tweaking.

On top of all that, with Modern and Classic, you have two voicing options for every preamp channel: Particularly in the high-gain channels, these give you two very distinctive distorted sounds for each channel. The contrast between the two sonic flavors is not merely a matter of different gain levels. The structures of the saturated signals differ, and each is fine-tuned to work its tonal magic with a specific genre. Modern packs a mighty low-end thump and boasts truckloads of gain that's the way to go to for heavy-duty, power chord riffing typical of contemporary styles.

Note that you can tighten up and focus Lead channel tones using the two sound-shaping buttons Contour and Mid Edge. Tweaked for a fatter, warmer sound, Contour adds a healthy help of mids around the 500-hertz mark. The three parameters Bass (preamp tone control), Depth Boost (power amp sound-shaping button) and Mega Lo Punch (preamp sound-shaping button) put a remarkable array of low-end tweaking options at your fingertips. The two sound-shaping buttons are programmable, providing instant MIDI access to a host of sonic configurations.

In addition, I made a point of tuning the two Lead channels to respond slightly differently: Lead I's response is a bit more aggressive, faster and more precise it all but lunges when you attack strings. Lead II, on the other hand, is not quite as testy. Its response is not as rabid, and with an extra sprinkling of low end added to the sonic recipe, it also delivers warmer tone. Lead II demands rather precise technique, while the more forgiving Lead I is easier to handle. In comparison to the E660 predecessor model, this revamped version gives you two more voicing options for each of the two

Lead channels - Soft Lead (moderate Gain level) and Heavy Lead (ultra high Gain shred). What's more, you can even tweak each individually using the dedicated Gain, Volume and Treble knob. This brings a bunch of benefits to you, including greater freedom and more precision in sound-shaping. The four Soft Lead variants (Lead I + Modern, Lead II + Modern, Lead I + Classic, Lead II + Classic) run the gamut of crunch tones from light (with the Gain knob set no higher than 11 o'clock) to heavy crunch (with the Gain knob somewhere between 10 and 1 o'clock), with tonal properties differing quite markedly from Crunch channel sounds. These modes even let you dial in relatively lean clean sounds. So if clean is your thing and your music mandates a range of different clean variants, simply set the Gain knob below the 9 o'clock mark and select Soft Lead (Lo Gain) to see what you can come up with.
Because it is chock full of tone-tweaking tools, this amp is sure to surprise you time and again with new sonic variants. However, there's no need to panic in face of its sophisticated functionality. At ENGL, ease of use is paramount. We design all our amps so that players can dial in great sounds from the start - without hours spent researching the manual and struggling with settings. Despite being so easy to use, the ENGL Special Edition Amp puts into the hands of the innovative, creative guitarist an all but inexhaustible bonanza of sound-shaping resources. And I am convinced that guitarists with more traditional leanings are equally well-served with this amp's smorgasbord of tasty tube tone!

A few comments on the Noise Gate:
The advantage of a Noise Gate that is installed in and matched to the amp is that it lets you fine-tune its threshold with extreme precision, thereby separating the useful, musical signal from useless background noise. Indeed, this Noise Gate was designed to address the signal the most beneficial spot in the signal chain - the preamp - to make it more effective. First and foremost, it is designed to suppress ambient noise such as hissing and humming during breaks when the Lead channel is in Heavy Lead mode. For this reason, I tuned its threshold (that's the level at which the gate triggers) range to suit this amp mode, and then adjusted it for Soft Lead (Lead channel, Hi Gain deactivated) and Crunch configurations. To get acquainted with how the Noise Gate works, I suggest you start by setting the Threshold knob to the far left (Noise Gate opens at low signal levels) and slowly twist it clockwise to gradually raise the gate's trigger threshold. When the knob arrives at the far right position, the Noise Gate will not trigger until the signal reaches a very high level. This means that the preamp must amplify the guitar signal considerably to open up (or deactivate) the Noise Gate. In practice, your best bet for suppressing loud noise when running Lead channels at high Gain levels is to set the Threshold knob higher than 12 o'clock. If you're doing the low-gain thing in Crunch or Soft Lead modes, dial in a lower Threshold knob setting (below 12 o'clock) to prevent the gate from throttling notes (that is, the musically useful sounds) as they decay particularly if you like to work the guitar's volume knob.

On the subject of effect loops:
Are three effect loops an exercise in overkill or can they actually be put to sensible use? Well, sign me up for the useful camp. This amp's nerve center offers such sophisticated sound-forging options that it would defy reason to deprive it of a modest little loop system. The order of the effect loops in the signal chain alone offers manifold

configuration possibilities. Case in point: You could insert an outboard preamp into the Serial FX Loop as an alternative to the onboard preamp, and connect a multieffector to FX Loop I or II. Then you could use the external preamp with the Tube Driver or T.D.EQ. as a sound expander of sorts and activate the multieffector in the downstream effect loop as required. Another interesting configuration option is to run the Special Edition's internal preamp with or without an effects device. In this variant, FX Loop I serves as a nifty, MIDI-controlled hardware bypass. Another possibility is to connect two effect devices one each to FX Loop I and FX Loop II - and assign them freely to the preamp channels and the Tube Driver circuit.

Speaker A/B and power switching:
Responding to the wishes of many guitarists, I split the two A and B speaker outputs. What this means is that you have two outs available for connecting directly to the amp two cabinets that lack Thru ports. In addition, both the A and B speaker circuits feature a dedicated Impedance Selector, which is a huge advantage when you want to connect speakers of different impedance to output A and B. If that seems a tad farfetched, allow cite an instances: You could connect to output A two E412Vs in parallel with 4 ohms overall impedance to satisfy your metal mayhem urges and connect an open-back E410 cabinet to the B output with 8 ohms to do the clean-to-crunch thing.
Note that though Hi Power offers twice the wattage of Lo Power, it doesn't deliver twice the volume. This is due to physics upping output power doesn't yield a linear increase in level. Beyond that, "loudness" is relative; a single watt's worth of output can be perceived as loud by some. In any case when the power amp is in 50-watt Lo Power mode, you will push the power amp to its limits a lot sooner by dialing in high Master settings and feeding it a high-level input signal. When switching from Lo to Hi Power and back, switching noise that's that telltale crackling sound - is a fraction higher than in other switching processes. Not to worry; due to the nature of the circuitry, this is normal.

Electronic safety systems:
We endowed the amp with MIDI functionality and programmable settings, which mandate a microprocessor. This afforded me the opportunity to put that processor to even better use and employ it to power a couple of reassuring protection systems. One is Power Tube Monitoring, which checks every power tube individually; the other is a speaker output surveillance system designed to prevent the potentially destructive operation of the power amp without a load. For reasons of operating safely, amps require a load such as a speaker cabinet connected to the output. Be aware, though, that as sophisticated as these features may be, they can't relieve you of all responsibility. For example, the system can't detect if a cabinet is connected to the other end of the cord. Please make a habit of checking this before powering the amp up. As a rule, always exercise due caution when operating this baby.

A few thoughts on tubes:
The amp ships ex factory with 6L6GC power tubes. As an alternative, the power amp can be loaded with EL34s. The circuitry is optimized for 6L6GC tubes, meaning that

some parameters respond somewhat differently when the amp is equipped with EL34s. For example, the EL34 boosts output power by about 15%. This subjects the amp's components, including tubes, to greater wear and tear. More power spells higher volume, which culminates in more aggressive power amp saturation. Though this may sound tempting, I advise against driving the amp with EL34s over longer periods. Note also that when the amp is equipped with EL 34 tubes, is in Lo Power mode, and is running at extremely high volumes, the electronic Power Tube Monitoring System may shut the power tubes down.

Programming sounds (settings, actually) to MIDI presets:
For reasons of convenience and handling ease, we made programming sounds to MIDI presets a piece of cake. Because this amp offers so many programmable switching functions, Copy is indeed a handy tool. It lets you copy the settings of one MIDI preset to another. You'll come to appreciate its utility when you begin programming your own presets. Dumping a stored setup from one MIDI preset to another, and editing and storing changes in the target preset, is so must faster and more convenient than programming from scratch every time. MIDI preset 1 is called up automatically when you switch the amp on. This ensures that when you power up, the settings for programmable sound-shaping functions are immediately enabled in the configuration stored in the most recent programming session - without having to first connect a MIDI foot board.

The programming process in steps:
1. Select the desired MIDI program (also called a preset or patch) using a MIDI foot board connected to the amp's MIDI In.
2. Set all programmable features as required, configuring Hi Gain, Countour, Lead I, Master A, Presence B, Mega Lo Punch, Power Lo, Noise Gate, and so forth as you please. All programmable functions are designated as such in their descriptions herein.
3. The Status LED flashes to indicate you have edited one or several settings.
4. Press and hold the Write/Copy button (47) for about one second until the Status LED extinguishes, and then flashes three times in rapid succession. The current settings of all programmable functions are now stored in the selected MIDI patch.

Copying:
1. Select the desired MIDI preset using a MIDI foot board connected to the amp's MIDI In port. This is the preset that you want to copy, which is why in geek-speak it is called the "source."
2. Press the Copy/Write button briefly. It is essential that during this routine you do not change the settings of programmable functions in the selected source preset. That Status LED lights up continuously to indicate that Copy is activated.
3. Select the target preset via the MIDI foot board; you have approx. 30 seconds to do this. (The amp automatically quits Copy mode 30 seconds after it is activated.)
4. Press and hold the Write/Copy button (47) until the Status LED extinguishes, and then flashes three times in rapid succession. The current settings of all programmable functions stored in the source MIDI patch (that's the preset you selected first when you activated Copy) have now been dumped to the newly selected target preset.

Handling and Care:

Keep the amp safe from hard knocks and shocks. Tubes are fragile and tend to suffer when exposed to mechanical stress!

Let the amp cool down before you transport it. Ten 10 minutes or so will do to spare the tubes.

Tubes take some 20 seconds to warm up after you switch the power on, and about two to three minutes before they are able to pump out full power. Make a habit of giving your amp plenty of time to get toasty and of flipping the Standby switch for short breaks.

Avoid storing the amp in damp or dusty rooms to spare jacks, switches and potentiometers. If you don't use the amp all the time, I recommend that you drape a covering over it to prevent the intrusion of dust. Even better, keep it in a transport cover or flight case.

Never use caustic or scouring detergents to clean the amp's housing, front or rear panels. Use a soft, damp cloth or sponge with diluted soapsuds or a standard brand of mild dishwashing liquid instead. Never use solvents they can corrode the amp's vinyl skin and dissolve the front and rear panel labels. Keep liquids well away from the amp, particularly the interior of the housing.

Make sure air can circulate at the front and top of the amp to allow for adequate cooling, which increases component life.

Never operate the amp without an adequate load (a speaker, cabinet or suitable terminating resistor).

High ambient temperatures place an additional strain on diverse components; so if at all possible, avoid operating the amp at temperatures far higher than 30°C for longer periods. Running the amp at mains voltages exceeding the nominal mains input voltage over longer periods can also shorten component life.

Replace tubes with selected tubes that satisfy ENGL selection criteria to forestall microphonic properties, undesirable noise and unbalanced power amp signals. Because power tubes' idle current (bias) must checked and possibly adjusted when replacing tubes, this is a job best left to experienced and authorized specialists.

Glossary

MIDI-Preset:
In this manual, MIDI programs are called presets and patches.
Though the MIDI standard defines program numbers 000 to 127, almost all MIDI devices and foot boards indicate and control these programs using a 1-to-128 numbering scheme.

MIDI Channel:
MIDI specifications define 16 channels for sending and receiving MIDI data. The encoding buttons on the back of the amp determine the MIDI data receiver channel. MIDI channels: 1 to 16, or OMNI (meaning that all 16 channels receive MIDI data).

MIDI-Volume and Master Volume Mute:
This option lets you access the amp's Master Volume Mute function via a suitable MIDI foot board. This foot board must like the ENGL Z-15 - be able to send MIDI controller 07 data. In order to afford access to Master Volume Mute, this function must be enabled using the corresponding encoding button on the back of the amp.

Power Tube Monitor:
An electronic surveillance system that monitors each power tube's current and shuts the given tube down when it detects a value that is too high.

The Status LED above the Write/Copy (47) button indicates the following conditions:

1. Memory error (possibly a defect in the EEPROM); Indication: LED flashes in five short bursts; What to do: Press the Write/Copy button (this resets the LED, but does not solve the problem).

2. No speaker connected; Indication: The LED flashes in a distinctive pattern, illuminating briefly at regular intervals; What to do: Connect a speaker.

3. A programmable function's (or functions') setting(s) has (have) been edited; Indication: LED flashes regularly; What to do: If desired, restore this MIDI preset's original configuration (e.g. by selecting it again); the Status LED also extinguishes once the new setting has been stored.

4. Copy process was activated by pressing the Write/Copy button;
Indication: LED lights up continuously; What to do: If desired, cancel the Copy operation by changing the setting of a programmable feature; the Status LED also extinguishes once the preset has been copied.

5. Power Tube Monitor: A problem or overload in power tube V1;
Indication: LED flashes in 1 short burst, followed by a longer pause, etc.;
What to do: Activate and deactivate Standby.

6. Power Tube Monitor: A problem or overload in power tube V2;
Indication: LED flashes in 2 short bursts; What to do: Activate and deactivate Standby.

7. Power Tube Monitor: A problem or overload in power tube V3;
Indication: LED flashes in 3 short bursts; What to do: Activate and deactivate Standby.

8. Power Tube Monitor: A problem or overload in power tube V4;
Indication: LED flashes in 4 short bursts; What to do: Activate and deactivate Standby.

Troubleshooting

Programmable features fail to respond when you change settings:
-> Powerful static charges, strong radio signals or mains voltage spikes can affect microcontroller-driven systems, setting them to an undefined status (commonly called a hung chip). In this event, your only choice is to reset the system. Simply switch the amp off and on again.
-> If a reset doesn't solve the problem that is, the chip is still hung there is a defect in the control system (presumably on the logic board holding the microcontroller). In this case, consult an authorized service center or a professional specialist.

The amp fails to respond when you try to switch presets via MIDI foot board.
-> Is the MIDI foot board connected to the MIDI IN port (53)?
-> Is the MIDI cord you are using intact and wired properly? (Refer to page 46 for pin assignments.)
-> Is the amp set to the MIDI channel over which the MIDI foot board is sending program change commands? You can set the encoding button (55) to OMNI reception to check if the preamp is actually receiving data.
-> Is another foot board (the ENGL Z-9 or a two-way footswitch) connected and therefore blocking MIDI reception?

The amp is not providing an output signal / no sound is emanating from the speaker.
-> Is at least one speaker connected to the speaker outputs A1, A2, B1 or B2 (78, 76, 75, 73)?
-> Is the power amp activated (Standby switch to ON)?
-> Are all cords (guitar, effect, and speaker) connected properly and are they functional? Use the Cable Check System (86, 87) to determine the latter.
-> Unplug connected effectors and see if the preamp works fine without these peripheral devices.
-> Is the Noise Gate activated in one of the Lead channels and the Threshold (59) knob set to a high value? Deactivate the Noise Gate (46) for a quick check.
-> Are the active Master knob and the Gain and Volume knobs set to a value

greater than 0? If any of these knobs is set to 0, no signal is routed to the amp's outputs.

-> Did you send via MIDI foot board a MIDI controller 7 command with a value less than or equal to 5? This activates Master Volume Mute, thereby silencing the amp.
You can check this by deactivating the Master Volume Mute by resetting the appropriate encoding button (55) accordingly.

-> You may be looking at a faulty tube or another defect. In this case, be sure to take the preamp to an authorized, professional service center.

The speaker is emitting humming noises:

-> Is the Ground Lift switch (79) set to Ground? If you are operating the amp without other grounded gear (power amp, effect devices) connected, this switch must be set to the Ground position; otherwise, it's goodbye silence, hello humming! In this case, the amp will hum even without a guitar connected.

-> The amp and mains grounds are not connected properly or are altogether disconnected. Have an experienced specialist check this.

-> Cords connected to the input or effect loops may not be shielded properly. Replace them to check if this is indeed the case.

-> The amp or speaker cords may be picking up interference from powerful magnetic fields (for example, of nearby power transformers or electrical motors). Reposition the amp and connector cables.

-> The amp or speaker cords may be picking up radio signals, for example, from activated mobile telephones or powerful local transmitting stations nearby. Switch off mobile phones while troubleshooting noise problems.

-> If you are feeding the signal to recording equipment or a mixing console via the amp's Line Out and the XLR Ground (71) button is set to Pin 1 to Ground, the problem may be a ground loop that has been formed with the connected device's ground. Set the button to Ground Lifted.

The electronic power amp protection circuit has tripped:

-> The given power tube is defective and must be replaced if the electronic circuit breaker continues to trip after several attempts to reset the Tube Monitoring System by flipping the Standby switch off and back on again.

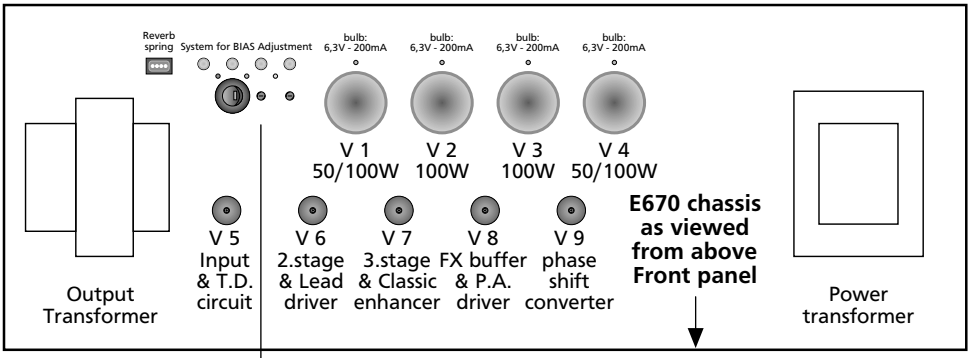
-> The amp has been overloaded, perhaps by excessive volume levels, mains over-voltage, or the wrong output impedance (the impedance setting does not match the connected speaker's impedance).

-> When the amp is loaded with EL 34 tubes, in Lo Power mode, and set to extremely high volumes, the electronic monitoring system may trip and shut the power tubes down.

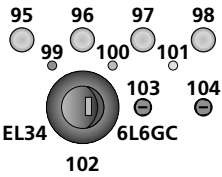
Technical Data

Output power:	approx. 100 watts in Hi Power mode, adjusted accordingly to 4, 8 and 16 ohms; approx. 50 watts in Lo Power mode adjusted accordingly to 4, 8 and 16 ohms
Input sensitivity	
Input:	from -20 dB, nominal, max. 0 dB
Effect Return:	from -20 dB nominal, max. 0 dB
Output level	
SEND, level range:	from -20 dB to approx. 0 dB max.
Frequ.Comp. Line Out:	+6 dB max.;
Power consumption:	approx. 390 watts max., equipped with 6L6GC power tubes;
Fuses:	
external:	
at 230/240 mains voltage	2 ATL (2 amps slo-blo)
at 100/115/120 mains voltage	4 ATL (4 amps slo-blo)
internal:	2 x 2.5 ATL (2 amps slo-blo)
Important:	**Replace these with fuses of the same type and rating only!**
Tubes:	
V1, V2, V3, V4:	6L6GC (factory loaded) or EL34, matched sets;
V5:	ECC83 F.Q., input tube;
V6, V7:	ECC83 selected;
V8, V9:	ECC83 standard;
Consult Tube Map to view tube array	Replace tubes with selected sets only!
Logic control system:	AT89C52 µC with internal 8K Flash Memory for
Processor, software:	software source code; Upgradeable with external Programmer;
Memory:	EEPROM 93C66 for data retention;
System interfaces:	
MIDI:	Asynchronous data protocol according to the MIDI standard; MIDI program changes 0 - 127; MIDI channels 1 - 16 MIDI controller 7 (main volume), value 0-5 = Master Volume Mute, Mute, value > 5 = default Master Volume level;
Serial Amp Control:	Proprietary ENGL asynchronous data protocol.
Dimensions:	approx. 71 x 28 x 29 cm (l x h x d);
Weight:	approx. 26 kg

Tube Map:



Bias adjustor viewed from **the front of the** chassis:



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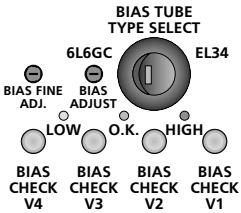
Bias adjustor viewed from **the back of the** chassis:



Use buttons to ascertain each tube's bias;
Set bias range using Bias Tube Select button
Tune using BIAS Adjust and BIAS Fine Adjust.
Yellow LED: BIAS Lo (too low)
Green LED: BIAS in Range (Ok)
Red LED: BIAS Hi (too high)

Tube replacement report:

1. Replaced on: _ _ _ _ _ _ _ 20 _ _ _ Replaced by: _ _ _ _ _ _ _ _ _ _ _ _ _ _

Replaced tubes: _

Reason: _

2. Replaced on: _ _ _ _ _ _ _ 20 _ _ _ Replaced by: _ _ _ _ _ _ _ _ _ _ _ _ _ _

Replaced tubes: _

Reason: _

3. Replaced on: _ _ _ _ _ _ _ 20 _ _ _ Replaced by: _ _ _ _ _ _ _ _ _ _ _ _ _ _

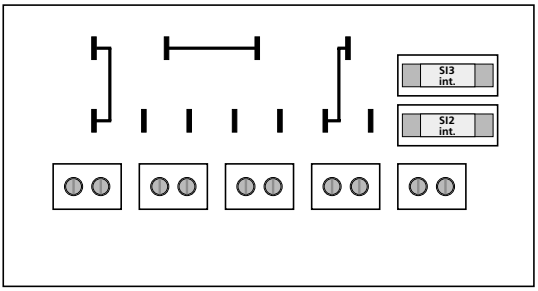
Replaced tubes: _

Reason: _

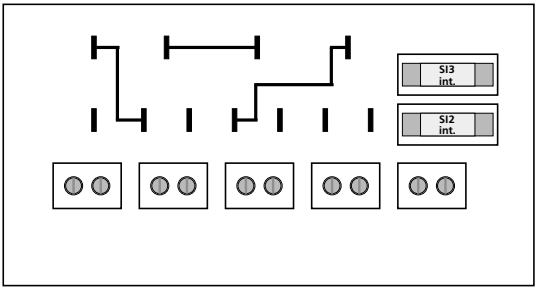
Mains voltage configuration: 230 or 240 Volts

The device's mains voltage setting can be adjusted to 100 volts, 115 volts, 120 volts, 230 volts and 240 volts inside the device using plug-in connectors. The two illustrations of the voltage configuration board below show the respective configurations for each of the two mains voltages 230 and 240 volts.
IMPORTANT! Read and heed: The device must be opened to set its mains voltage. This may be done by an authorized professional technician only! You will void the warranty by opening the device or damaging it by configuring its voltage incorrectly!

Configuration for 230 volt mains voltage:



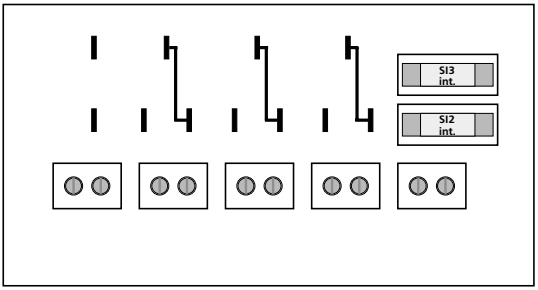
Configuration for 240 volt mains voltage:



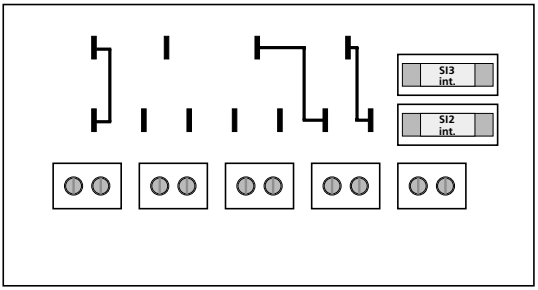
Mains voltage configuration: 100, 115, 120 Volts

The device's mains voltage setting can be adjusted to 100 volts, 115 volts, 120, 230 or 240 volts inside the device using plug-in connectors.
The three illustrations of the voltage configuration board below show the respective configurations for each of the three mains voltages 100, 115 and 120 volts.
IMPORTANT! Read and heed: The device must be opened to set its mains voltage. This may be done by an authorized professional technician only! You will void the warranty by opening the device or damaging it by configuring its voltage incorrectly!

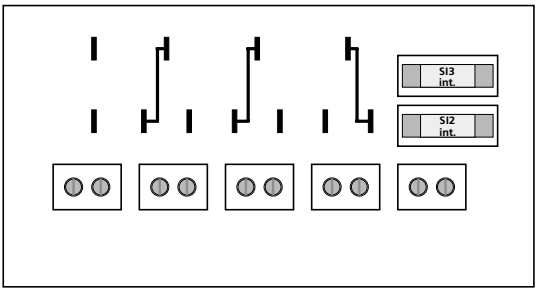
Configuration for 100 volt mains voltage:



Configuration for 115 volt mains voltage:

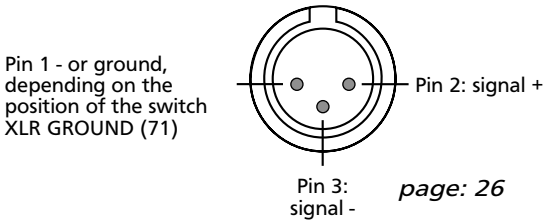


Configuration for 120 volt mains voltage:



Wiring of Principal Connectors

LINE OUT BALANCED (72), XLR male connector



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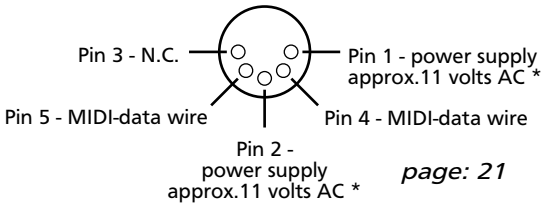
MIDI IN (53), DIN connector



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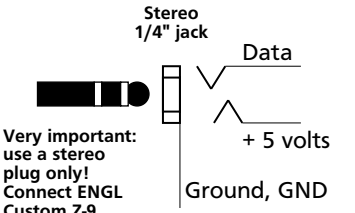
*: AC voltage is routed to pin 1 and 2 only when button 54 is set to ENGL MIDI Footcontroller.

Serial Amp Control Port (56)



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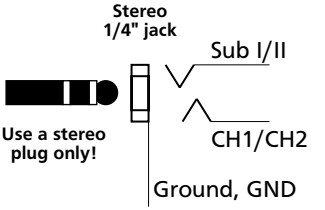
Dual Footswitch (57)



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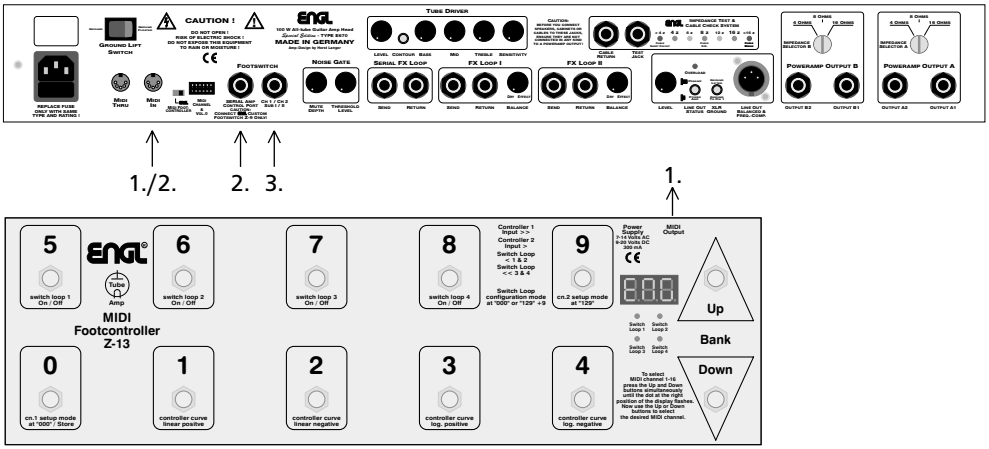
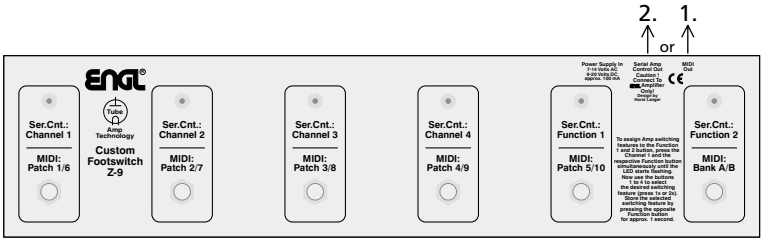
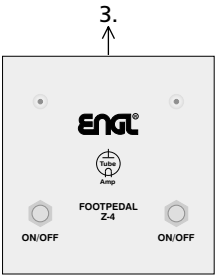
Options for controlling the ENGL Special Edition amp remotely:



1. MIDI foot board (for example, the ENGL Z-12 or ENGL Z-15 pictured above): Connect the foot board to the amp using a standard 5-pin DIN cable. All 5 terminals of both connectors must be wired in a 1:1 configuration: MIDI data transmission requires two wires, and the ENGL MIDI foot board uses two more wires for purposes of power supply. This combination affords access to all of the amp's 128 MIDI presets.
The Z-15 foot board also lets you control Master Volume Mute via MIDI controller.

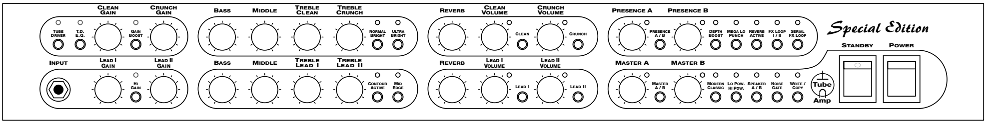


2. ENGL Custom Z-9 Footswitch: This special foot board connects to the amp via a ¼" stereo cord plugged into the Serial Amp Port (56) or via a 5-pin DIN cord plugged into the MIDI IN port (53). The former option affords switching access to channels and two special functions (for example, *Hi Gain* or *Lo Hi Power*). In the latter setup, the Z-9 serves as a MIDI foot board that accesses the first 10 MIDI presets.



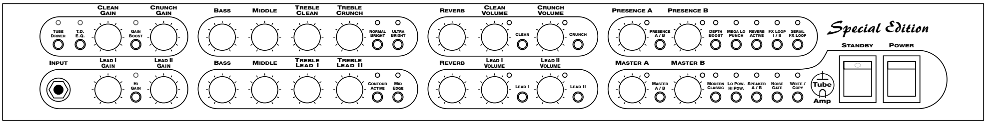
3. Two-way footswitch (e.g. ENGL Z-4): Connect two-way footswitches to the amp by plugging a stereo ¼ " cord into jack no. 57.
Functions: Ch. 1/2 Ch. 1/2 (Main Channels) and Sub Gain I/II Clean - Crunch and Lead I - Lead II.
This means you can't activate sub channels directly, and must first switch to the other Main Channel.
As an alternative to a two-way footswitch, you can connect a MIDI switcher (the ENGL Z-11 will do nicely) to this jack (57) to control the two switching functions.

Noting Settings:



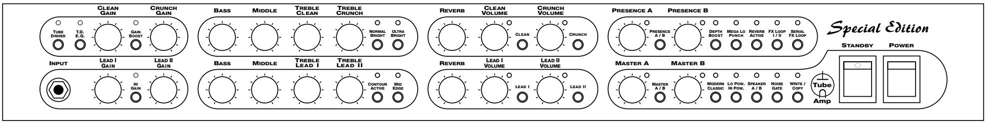
Sound title: _ Preset: _ _ _ _ _ _ _ _ _ _

comment: _



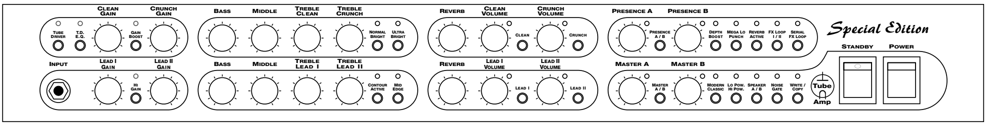
Sound title: _ Preset: _ _ _ _ _ _ _ _ _ _

comment: _



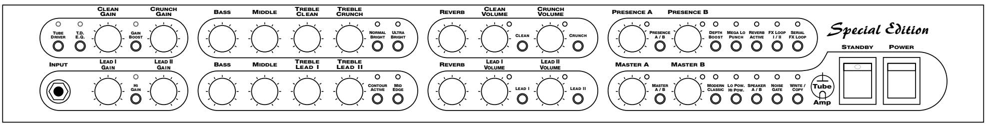
Sound title: _ Preset: _ _ _ _ _ _ _ _ _ _

comment: _



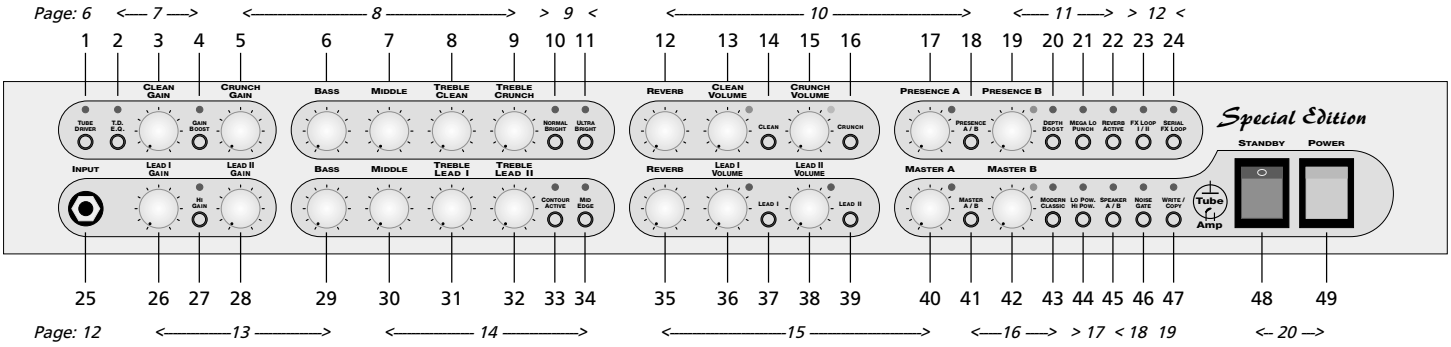
Sound title: _ Preset: _ _ _ _ _ _ _ _ _ _

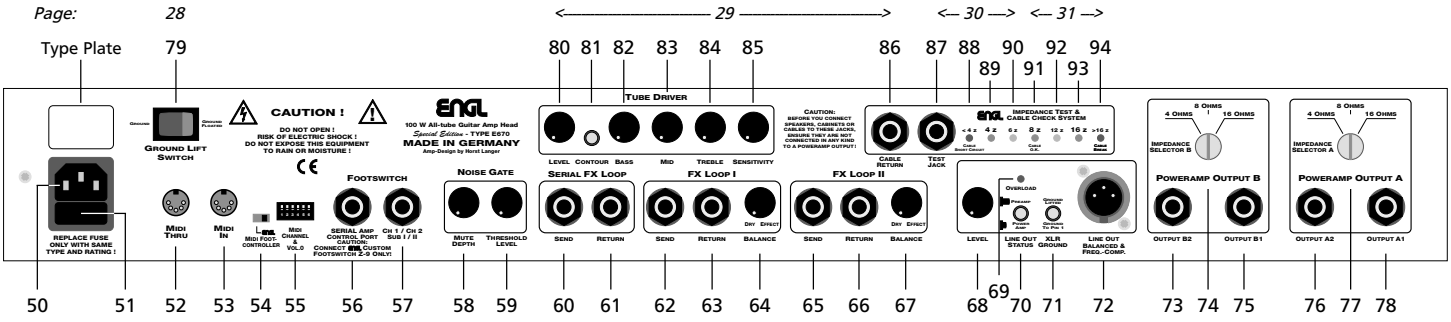
comment: _

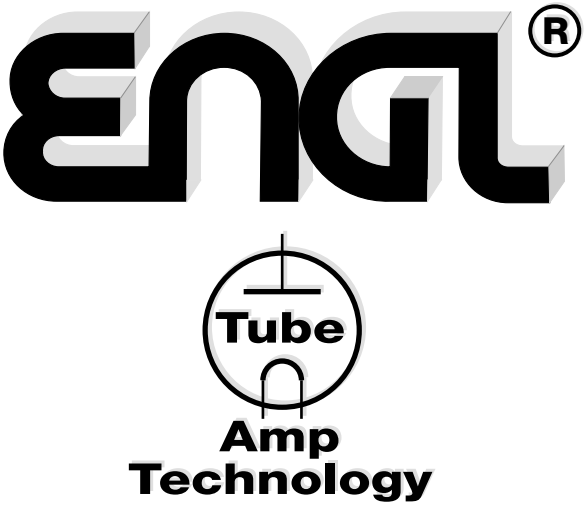


Sound title: _ Preset: _ _ _ _ _ _ _ _ _ _

comment: _


Page: 6
Page: 12
Special Edition
STANDBY
POWER
INPUT
CLEAN GAIN
CRUNCH GAIN
LEAD I GAIN
LEAD II GAIN
BASS
MIDDLE
TREBLE CLEAN
TREBLE CRUNCH
TREBLE LEAD I
TREBLE LEAD II
REVERB
CLEAN VOLUME
CRUNCH VOLUME
LEAD I VOLUME
LEAD II VOLUME
PRESENCE A
PRESENCE B
MASTER A
MASTER B


Page: 28
Type Plate
GROUND LIFT SWITCH
CAUTION !
DO NOT OPEN !
RISK OF ELECTRIC SHOCK !
DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE !
100 W All-tube Guitar Amp Head
Special Edition - TYPE E670
MADE IN GERMANY
Amp-Design by Horst Langer
REPLACE FUSE ONLY WITH SAME TYPE AND RATING !
MIDI THRU
MIDI IN
MIDI FOOT-CONTROLLER
MIDI CHANNEL & VOL.0
FOOTSWITCH
SERIAL AMP CONTROL PORT
CAUTION: CONNECT ENGL CUSTOM FOOTSWITCH 2-9 ONLY!
Ch 1 / Ch 2 Sus 1 / II
NOISE GATE
MUTE DEPTH
THRESHOLD LEVEL
TUBE DRIVER
LEVEL CONTOUR BASS MID TREBLE SENSITIVITY
SERIAL FX LOOP
SEND RETURN
FX LOOP I
SEND RETURN BALANCE
FX LOOP II
SEND RETURN BALANCE
CAUTION: BEFORE YOU CONNECT SPEAKERS, CABINETS OR CABLES TO THESE JACKS, ENSURE THEY ARE NOT CONNECTED IN ANY KIND TO A POWERAMP OUTPUT !
CABLE RETURN
TEST JACK
IMPEDANCE TEST & CABLE CHECK SYSTEM
LEVEL
OVERLOAD
LINE OUT STATUS
XLR GROUND
LINE OUT BALANCED & FREQ.-COMP.
8 OHMS
4 OHMS
16 OHMS
IMPEDANCE SELECTOR B
POWERAMP OUTPUT B
OUTPUT B2
OUTPUT B1
IMPEDANCE SELECTOR A
POWERAMP OUTPUT A
OUTPUT A2
OUTPUT A1



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