INVADER

4 Channel Full Tube Guitar Amplifier with MIDI-Control

Operator´s Manual

Please, first read this manual carefully!


Tube
Amp
Technology

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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 on your choice! With the **ENGL InVader tube-powered head**, you now own an **extraordinarily versatile** guitar amp. Featuring a **state-of-the-art design** and **packing a powerful punch**, it delivers both **contemporary** and **traditional vintage tones** in the **finest tube flavors** and quality!

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**.

The InVader amp offers **four independent channels** - tweaked to **deliver different tonal spectrums** for various styles and playing techniques, for instance, Channel 3 for **fast & heavy riffs** and an power chords; Channel 4 for **punchy lead tone** with an **assertive midrange kick**. All four channels offer Lo Gain / Hi Gain switching, as well as dedicated Gain and Volume knobs and a 3-band EQ for each channel that give you an even greater range of sound-sculpting options. The tonal palette ranges from **vintage clean** to **classic grind**, and from **creamy rock lead tone** with **thick, lush tube overdrive** to the kind of **aggressive hi-gain lead sound** it takes to cut through in **contemporary heavy styles**.

What's more, the amp boasts a host of hip & practical features:

A/B Master switching is a powerful option that has proven its merits in countless ENGL amps (it has featured in E920 power amps since the late '80s and in the legendary SAVAGE 120 head since '93!). Your **InVader Amp** head also sports **two switchable effect loops** and a **programmable Amp Mute**.

As an alternative to operating the amp remotely via a **MIDI foot controller** such as the ENGL Z-15, you can also plug in an ENGL *Z-9 Custom Foot Controller* and manipulate key functions directly. What's more, the amp comes with a stereo jack designed to take an **ENGL Z-4 dual footswitch** or a switching system for selecting the four channels. And the **exterior's compelling visuals** certainly match the interior's impressive appointments. This amp's elegant and stylish look is sure to turn heads wherever you play.

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. **fundamental sounds** in **excellent tube quality**: *Clean*, *Crunch*, and *Lead*. **Two Gain stages** in every channel **double** the count of **instant-access sounds**. **Remote MIDI Channel** and **Gain Lo/Hi switching** affords access to a wide range of sounds. **EQ adapting** (that is, automatic frequency response adaptation to suit the selected Gain stage and activated channel) fine-tunes two Gain stages to give you a much wider range of sounds.
4. **Separate Gain** and **Volume** knobs in each of the four channels and a **3-band EQ** for **channels 1, 2, 3 and 4** let you dial in distinct tones with surgical precision.

5. 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**: *Channel 1*, *Channel 2*, *Channel 3* and *Channel 4* with separate Gain and Volume knobs.
-> **Two Gain variants** for each of the basic channels: The Hi Gain feature lets you activate directly two different gain settings for every channel.
-> **Four voicing sections**: one EQ for each Channel featuring Bass, Middle and Treble.
-> ***Bright* sound-shaping button** for *Channel 1* and *Channel 2*: tuned to match the given channels' tonal characteristics.
-> **Two effect loops:** *FX Loop I* and *FX Loop II* are variable, switchable effect loops. Each effect loop may be activated for each channel.
-> The power amp's **A** and **B Master** knobs are **accessible via MIDI**. MIDI controller 7 accesses *Amp Mute*, and in addition *Amp Mute* **is MIDI-programmable**. These choices come in handy if you wish to use the **Pre Output** signal to **tune your guitar**.
-> *MIDI In* and *Thru* ports serve to integrate the amp into a MIDI system.
-> **128 MIDI presets**, accessible via 16 MIDI channels.
-> The InVader **amp 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 *Channel 2*, *Channel 3* and *Channel 4*.

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 24. 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 **InVader 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 new 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 InVader 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 Bright

This feature boosts the upper end of the high frequency range in Channel 1 and Channel 2. The red LED above this button lights up to indicate the 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 very crisp or glassy tone, activate the Bright feature. This setting brightens the sound of humbucking or muddy pickups.

I matched *Bright* to suit the two channels' Gain characteristics, which is why you get different sounds when you activate it. Its effect is strongest in Channel 1's Lo Gain range. As the name would indicate, the amp's gain level is lowest at this setting, so you can activate *Bright* to conjure sparkling clean sounds with Treble and Presence settings as low as the 12 o'clock position.

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.

Bright is not nearly as aggressive in Channel 1's Hi Gain range. I toned it down to prevent saturated sounds from growing too cutting or harsh, and tweaked it to deliver a rich, pleasing overtone spectrum in finest tube-approved quality.

I also matched *Bright* to Channel 2's tonal structure: Deactivate it for a more pronounced midrange; activate it – particularly in Lo Gain mode – for a sweet, riff-approved sound with a distinctively vintage tone!

The Bright functions in Channels 1 and 2, in combination with the two Gain choices Lo and Hi, give you eight markedly different sounds, all accessible via MIDI!

2 Gain 1

Channel 1 Gain control. This knob determines the preamp's input sensitivity for Channel 1; 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 (19) setting. In Channel 1, 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.

If your guitar sports single-coils and you want to add some grit to your tone and bite to your riffs, set the knob somewhere between 11 and 3 o'clock. For higher output pick-

ups such as humbucking or active jobs, dial in settings between 9 and 1 o'clock and activate *Hi Gain*.

3 Bass
This is the preamp voicing section's passive low-frequency EQ for *Channel 1*.

4 Middle
This is the preamp voicing section's passive midrange frequency EQ for *Channel 1*.

5 Treble
This is the preamp voicing section's passive high-frequency EQ for *Channel 1*.
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 preamp sounds, your best bet is to turn the Treble knob down to prevent the pickups and speakers from generating feedback (a setting in the 10-to -1 o'clock range is recommended). 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 Bright (1) button, as well as the power amp *Presence* (14) an *Depth Punch* (15) knobs, at your disposal for shaping the frequency range. I suggest you get into the habit of dialing in lower Treble settings. That way, you can program various MIDI presets with the Bright option remotely and have plenty of tonal variations at your fingertips.

6 Volume 1
Determines the level for *Channel 1*. Use this knob to adjust the volume of *Channel 1* 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 for *Channel 1*. The green LED to the right of the knob lights up to indicate *Channel 1* is on.

7 CH 1
Push this button to activate preamp Channel 1 directly (in reciprocation with *Channel 2*, *Channel 3*, *Channel 4*). The green LED to the right of the Channel 1 Volume knob (6) lights up to indicate *Channel 1* is active. *Channel 1* may also be activated via MIDI program change, the ENGL Custom Z-9 Footswitch, or a dual footswitch.

8 Gain 2
Gain control for *Channel 2*. This knob determines the input sensitivity in Channel 2 mode; use it to dial in the desired amount of preamp distortion.
A tip from the designer:
Single-coil pickups will evoke mildly overdriven sounds at settings somewhere between 9 and 2 o'clock. Try settings between 8 and 12 o'clock for pickups with high-output humbuckers or active pickups. Bear in mind the Hi Gain 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.
CAUTION: Extremely high gain and volume levels in Channel 2 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!

9 Bass
This is the preamp voicing section's passive low-frequency EQ for *Channel 2*.

10 Middle
This is the preamp voicing section's passive midrange frequency EQ for *Channel 2*.

11 Treble
This is the preamp voicing section's passive high-frequency EQ for *Channel 2*.

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 sounds in *Channel 2*, your best bet is to turn the Treble knob down to prevent the pickups and speakers from generating feedback (a setting in the 10-to -1 o'clock range is recommended).
Each channel is equipped with a dedicated EQ so you can tweak its sound separately to suit your taste and the given sonic scenario. Bear in mind that you also have the Bright (1) button, as well as the two power amp Presence (14) and Depth Punch (15) knobs, at your disposal for shaping the frequency range. 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.

12 Volume 2
Determines the level for *Channel 2*. Use this knob to adjust the volume of *Channel 2* 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 for *Channel 2*. The yellow LED to the right of the knob lights up to indicate *Channel 2* is on.

13 CH 2
Press this button to activate preamp *Channel 2* directly (in reciprocation with *Chanel 1*, *Channel 3*, *Channel 4*). The yellow LED to the right of the Channel 2 Volume knob (12) lights up to indicate *Channel 2* is active. *Channel 2* may also be activated via MIDI program change, the ENGL Custom Z-9 Footswitch, or a dual footswitch.

14 Presence
Power amp Presence knob. This knob determines the power amp's high frequency response.

15 Depth Punch
This control shapes the lo frequency response in the power amp stage and affects all channels.

16 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 the ENGL 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). Note that in the signal path, *Master A* and *Master B* controls are post *FX Loop Return* and pre the power amp.

17 Noise Gate

Press this button to activate an onboard *Noise Gate* and suppress excess noise in channel 2, 3 or 4. Control the *Noise Gate* using the Level Threshold (48) knob 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 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 Hi Gain 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.

18 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).

19 Hi Gain

Pressing this button ups input sensitivity, thereby increasing the amplification factor and the amount of distortion in all four preamp channels *CH1*, *CH2*, *CH3* and *CH4*. 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:

Obviously, the difference between Lo and High Gain is the latter gives you more preamp juice. But I also tuned frequency response to suit each channel's gain structure, which is a long-winded way of saying the four channels give you eight great sonic choices. Depending on the selected channel and Gain knob setting, the spectrum ranges from pristine clean to ultra saturated lead tone, rich in overtones and gain reserves for screaming solos and crashing power chords. Whatever tones your style, genre and whims may demand, you'll find it between these two extremes. The options are too numerous to mention, so switch back and forth between Lo and High Gain in each of the four channels to get to know their tonal characteristics and make the most of these eight fundamental sounds.

20 Gain 3

Gain control for Channel 3. This knob determines Channel 3's input sensitivity; use it to dial in the desired amount of saturation level.

A tip from the designer:

Depending on Gain knob and Gain option (19) settings, Channel 3's gain ranges from middling to extreme, which translates to big power chords and mean leads. Note that Channel 3's midrange is scooped - that is, not as dominant as Channel 4's - lending Channel 3 a distinctive tone quite unlike the other.

CAUTION: Extremely high gain and volume levels in Channel 3 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!

21 Bass

This is the preamp voicing section's passive low-frequency EQ for *Channel 3*.

22 Middle
This is the preamp voicing section's passive midrange EQ for *Channel 3*.

23 Treble
This is the preamp voicing section's passive high-frequency EQ for *Channel* 3.

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).
Each channel is equipped with a dedicated EQ so you can tweak its sound separately to suit your taste and the given sonic scenario. Bear in mind that you also have the two power amp *Presence* (14) and *Depth Punch* (15) knobs at your disposal for shaping the frequency range.
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.

24 Volume 3
Determines the level for *Channel 3*. Use this knob to adjust the volume of *Channel 3* 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 Channnel 3 mode. The red LED to the right of the knob lights up to indicate the *Channel 3* is on.

25 CH 3
Press this button to activate the preamp's *Channel 3* directly (in reciprocation with *Channel 1* , *Channel 2*, *Channel 4*). The red LED to the right of the Channel 3 Volume knob (24) lights up to indicate Channel 3 is active. Channel 3 may also be activated via MIDI program change, the ENGL Custom Z-9 Footswitch, or a dual footswitch.

26 Gain 4
Gain control for *Channel 4*. This knob determines Channel 4's input sensitivity; use it to dial in the desired amount of saturation level.
A tip from the designer:
Like *Channel 3*, Channel 4's gain sweeps from middling to extreme. Unlike *Channel 3*, its midrange is boosted, making this a great choice for leads.
CAUTION: Extremely high gain and volume levels in Channel 4 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!

27 Bass
This is the preamp voicing section's passive low-frequency EQ for Channel 4.

28 Middle
This is the preamp voicing section's passive midrange EQ for *Channel 4*.

29 Treble
This is the preamp voicing section's passive high-frequency EQ for *Channel 4*.

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, 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 10-to -1 o'clock range is recommended).
Each channel is equipped with a dedicated EQ so you can tweak its sound separately to suit your taste and the given sonic scenario. Bear in mind that you also have the two power amp *Presence* (14) and *Depth Punch* (15) knobs at your disposal for shaping the frequency range. 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.

30 Volume 4
Determines the level for *Channel 4*. Use this knob to adjust the volume of *Channel 4* 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 *Channel 4*. The red LED to the right of the knob lights up to indicate *Channel 4* is on.

31 CH 4
Press this button to activate preamp *Channel 4* directly (in reciprocation with *Channel 1* , *Channel 2*, *Channel 3*). The red LED to the right of the Channel 4 Volume knob (30) lights up to indicate Channel 4 is active. Channel 4 may also be activated via MIDI program change, the ENGL Custom Z-9 Footswitch, or a dual footswitch.

32 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 (*Amp Mute)* via MIDI or the Z-9. To learn how to do this, see section 36 and section 45, page 17 in the *Rear Panel Features* chapter.

33 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 (*Amp Mute)* via MIDI or the Z-9. To learn how to do this, see section 36 and section 45, page 17 in the *Rear Panel Features* chapter.

34 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*.

A tip from the designer:

Here's a nifty option: Use *Master A* and *B* to set two different power amp levels and access these as you wish in tandem with the preamp's eight channel and Gain combinations. You can easily program combinations of different *Master A/B*, *Channel 1* to *4* and Low or High Gain (19) settings to different MIDI presets. Then you can conveniently access these configurations on stage using a MIDI footboard (for example, the ENGL Z-9, Z-12 or Z-15). This gives you many variations of the fundamental sounds for different playing techniques and musical situations. *Channel 1* is your first choice for clean and even grittier rhythm and lead work. Take advantage of the preamp saturation in Channels 2 to 4 for power chords and leads at diverse gain and volume levels. Try working your guitar's volume knob to extend your range of tones and musical expression. If a MIDI control unit and controller commands are available (for example, the ENGL MIDI Footcontroller Z-15) you can use the *Amp Mute* to silence the power amp quickly and conveniently for short breaks or to swap guitars.

35 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 (43) 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 37.
The Status LED serves a third display function. As described in section 37, it indicates that no speaker is connected to the power amp outputs.

36 Amp Mute

This red LED lights up to show *Amp Mute* is engaged, that is, the power amp is silenced. Activate this mode via *Standby* (set it to 0), a previously programmed MIDI preset, a MIDI controller #7 command (see chapter45 to learn more) or by sending the appropriate Z-9 command to the Serial Amp Control Port (46). Deactivate *Amp Mute* by setting Standby (37) from *0* to *Power Amp On* or sending the appropriate MIDI command to the MIDI In port (43) or via the respective Z-9 command (setting *F2-4*) send to the Serial Amp Control Port (46).
A very IMPORTANT note; please read and heed: When programming MIDI presets, ensure Standby switch is set to *On* (that is, the power amp is active) if you want this preset to disable *Amp Mute* and enable the power amp so the speaker renders your sound. If the Standby switch is set to 0 during programming, the amp will be muted when you select this MIDI presets precisely because the *Amp Mute* function was enabled during programming. Therefore the power amp will not boost the signal and the sound will not be audible over the speaker.
Note: You cannot deactivate *Amp Mute* to activate the amp via appropriate programmed MIDI presets, MIDI controller #7 commands or via the Z-9 when *Standby* is engaged to switch the power amp off. You must first flip the Standby switch.

37 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.
Amp Mute activates as soon as you set the Standby switch to the 0 position and the Amp Mute LED (36) shows this status by lighting up. You can easily program the Amp Mute function to MIDI presets to mute the amp using a simple MIDI footboard. To do this, set the Standby switch to 0 and start the programming process with the Write button (35).
IMPORTANT note; please read and heed: When programming MIDI presets, ensure

Standby is set to *On* (that is, the power amp is active) if you want this preset to disable *Amp Mute* and enable the power amp so the speaker renders your sound. If the Standby switch is set to *0* during programming, the amp will be muted when you select this MIDI presets precisely because the *Amp Mute* function was enabled during programming. Therefore the power amp will not boost the signal and the sound will not be audible over the speaker.

If you want the power amp to be enabled in a MIDI preset, you must program it with Standby set to *On*!

Do not engage the Standby switch when copying with the Write/Copy (35) button, as this launches a write operation. The control system treats the Standby switch much like a function button. If you use it to edit the stored settings, the Status LED will flash.

To learn more about this, see section 35 *Write/Copy* and *Programming sounds (Settings) to MIDI presents in individual steps* in the appendix on page 23.

Note:

If the amp is in Standby mode, deactivating the Amp Mute function via the Amp Mute Z-9 command will not activate it. The same goes for sending MIDI controller #7 commands and selecting MIDI presets programmed with *Amp Mute* deactivated. You must first flip the Standby switch.

More good-to-know info:

On the one hand, the amp's surveillance system monitors if speaker cords are plugged into *Poweramp Outputs 4 Ohms* (57, 58), *8 Ohms* (59, 60), and *16 Ohms* (61). 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. If the amp is powered up and the Standby switch is set to On, the Standby circuit is deactivated internally and the Status LED shows this by flashing rapidly.

In addition, an electronic surveillance system monitors the power tubes. 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, five times for V5 and six times for V6 (V5, V6: Invader 150 amp). 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.

38 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!

39 Mains Connector (AC Power Inlet)

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 alongside the mains port 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*.

40 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 shown on the type panel.**

41 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!

42 Midi Thru

This 5-pin DIN port patches incoming MIDI data from the *MIDI In* (43) to any other connected MIDI device.

43 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. 44 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. 44 is set to the right to avoid damaging the device.

44 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 page31 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!

45 Midi Channel & Amp Mute

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 (*Amp Mute* active). 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 (*Amp Mute* deactivated).

MIDI controller #7 assignment to encoding button number 6:
Setting the encoding button 6 to ON enables the MIDI controller #7 *Amp Mute* access capability.
Setting the encoding button 6 to OFF disables the MIDI controller #7 *Amp Mute* access capability.
Note:
You cannot deactivate *Amp Mute* to activate the amp via an appropriate MIDI controller #7 command when *Standby* is engaged to switch the power amp off. You must first flip the Standby switch.

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.

46 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. A configuration table for the functions of the InVader amp is printed on page 34.
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. It also lets you control any other two switchable amp functions, for example, *Master A/B*, *FX Loop*, *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!

47 Footswitch: Channel Up / Down, 1–3 / 2-4

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 *Channel 1*, *Channel 2*, *Channel 3* und *Channel 4*. Read *Up* and *Down* to mean switching among channels arrayed at the top and bottom of the amp's front panel. One button switches between the top (-> *Channels 1* and *2*) and bottom (-> *Channels 3* and *4*) channels, while the

other activates *Channel 1* or *2* (-> the top channels) and *Channels 3* or *4* (-> the bottom channels). The onboard channel switching facility, is disabled when you plug a footswitch into this jack. The MIDI In port (43) and the Z-9 Port (46) are both disabled when a plug is connected to 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 stereo jack plug's mono contact (*tip*) controls up and down channel selection (CH1-CH2 / CH3-CH4), while the other contact (*ring*) accesses channels 1/2 - 3/4 (: CH1/CH2 - CH3/CH4) controlled. For details on wiring, see Pin Assignments on page 31.

48 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 *Channel 2*, *Channel 3* and *Channel 4* by pushing the front panel button (17).
A tip from the designer:
The Lo and Hi Gain options generate different levels of noise, and I tuned the ENGL InVader's Noise Gate accordingly. However, there is some minor matching variance between the two. *Hi Gain* stands to benefit most from the Noise Gate, so I suggest that you tweak its two knobs for this mode.

49 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 (16) button, which switches between these two loops. In the signal path, *FX Loop I* is located post preamp and pre the two power amp Master knobs.

50 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 (16) button, which switches between these two loops. In the signal path, *FX Loop I* is located post preamp and pre the two power amp Master knobs.

51 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!

52 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 (16) button, which switches between these two loops. In the signal path, *FX Loop II* is located post preamp and pre the two power amp Master knobs.

53 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 (16) button, which switches between these two loops. In the signal path, *FX Loop II* is located post preamp and pre the two power amp Master knobs.

54 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!

55 Pre Out

This is the InVader's preamp auxiliary out. It delivers a signal with almost the same level and frequency response as the signal patched into the amp's input. A low-impedance circuit, Pre Out is great for applications like addressing a guitar tuner. The Pre Out signal is patched out to jack 55 even when Amp Mute is engaged. It can also serve as an effect device send, whereby the amp's preamp (and EQ and gain stages) is bypassed.

56 Line Out

This jack taps into the power amp circuit to retrieve its signal. The frequency response of the Line Out's and the Power Amp Output's signals are identical (-> and they are not frequency-compensated). Use it to do things like drive another linear power amp or frequency compensation filter, say to simulate a 4/12 cabinet and feed this signal to a recording system or PA.

57, 58 Poweramp Output, 4 Ohms Parallel

4 ohms speaker output jacks, internal connected parallel. For diverse cabinet options see the chapter *Cabinet options* on page 21 !

59, 60 Poweramp Output, 8 Ohms Parallel

8 ohms speaker output jacks, internal connected parallel. For diverse cabinet options see the chapter *Cabinet options* on page 21 !

61 Poweramp Output, 16 Ohms

16 ohms speaker output jack. For diverse cabinet options see the chapter *Cabinet options* on page 21 !
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 *4 ohms* (57, 58), *8 ohms* (59, 60) and *16 ohms* (61). If a plug is not inserted into one of these 5 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!

Cabinet options
1. One 4-ohm cabinet connected to a 4-ohm jack;
   Summary: 4 Z, -> connected to 4-ohm output.
2. Two 8-ohm cabinets connected to the 4-ohm jacks;
   Summary: 8 Z + 8 Z, -> connected to 4-ohm + 4-ohm output.
3. One 8-ohm cabinet connected to an 8-ohm jack;
   Summary: 8 Z, -> connected to 8-ohm output.
4. Two 16-ohm cabinets connected to the 8-ohm jacks;
   Summary: 16 Z + 16 Z -> connected to 8-ohm + 8-ohm output.
5. One 16-ohm cabinet connected to the 16-ohm jack;
   Summary: 16 Z -> connected to 16-ohm output.
6. An 8-ohm cabinet connected to one of the 4-ohm jacks in combination with a 16-ohm cabinet connected to one of the 8-ohm jacks
   Summary: 8 Z + 16 Z -> connected to 4-ohm + 8-ohm output.

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 four channels are matched so that their Gain ranges overlap somewhat or are somewhat similar (*CH3* and *CH4*). 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 *Channel 1* into moderate overdrive, and activating the *Hi Gain* feature 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 Channel 2: Its spectrum ranges from clean (when Gain is set no higher than about 10 o'clock, depending on pickup) to a touch of vintage-style grit (when Gain is set no higher than about 1 o'clock) and 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, *Channel 1* and *Channel 2* are voiced differently. *Channel 2* features an additional triode, making it a tad more dynamic and eliciting a slightly different frequency response.
The tone controls in the four channels respond differently, so I suggest you perform an initial sound-check by setting the knobs between 11 and 3 o'clock and auditioning the results. This amp employs passive EQ. Note that its range is narrower than a comparable active EQ. I opted for passive tone controls because the passive design is better suited to tube tone.
On this amp, the *Hi Gain* option affects all preamp channels. It lets you conjure two sounds with markedly different voicings and gain levels for each channel. The difference between the two is greatest in *Channels 3* and *4*. I also voiced *Channels 3* and *4* differently. Channel 3's midrange is scooped, and its hair-trigger response to your string attack is fast and true.
Channel 4, in contrast, packs more mids, with a slightly less accurate response to your attack. *Channel 4* demands more precise playing technique, while *Channel 3* is easier to handle.
All these options harbor vast and musically meaningful sonic potential. I'm confident that the *Bright* and *Hi 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.
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 InVader 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 Preamp is in Hi Gain 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 Lo Gain (*Hi Gain* deactivated) 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 channels 2, 3, and 4 at high Gain levels is to set the Threshold knob higher than 12 o'clock. If you're doing the low-gain thing in Lo Gain mode, dial in a

lower Threshold 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:
An interesting configuration option is to run the InVader'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.

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, tube 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.

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 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* (43).
2. Set all programmable features as required, configuring *Hi Gain*, *Master A/B*, *Noise Gate*, *Amp Mute* via *Stand By* 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 (35) 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* (43) 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 (35) 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, *Amp Mute*:
This option lets you access the amp's Amp 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 *Amp 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 (35) 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*; further information on page 28.

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*; further information on page 28.

7. Power Tube Monitor: A problem or overload in power tube V3
(-> InVader 100 & 150);
Indication: LED flashes in 3 short bursts;
What to do: Activate and deactivate *Standby;* further information on page 28.

8. Power Tube Monitor: A problem or overload in power tube V4;
(-> InVader 100 & 150);
Indication: LED flashes in 4 short bursts;
What to do: Activate and deactivate *Standby*; further information on page 28.

9. Power Tube Monitor: A problem or overload in power tube V5 (-> InVader 150);
Indication: LED flashes in 5 short bursts;
What to do: Activate and deactivate *Standby*; further information on page 28.

10. Power Tube Monitor: A problem or overload in power tube V6
(-> InVader 150);
Indication: LED flashes in 6 short bursts; What to do:
Activate and deactivate Standby; further information on page 28.

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 (43)?

-> Is the MIDI cord you are using intact and wired properly? (Refer to page 31 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 (45) 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 *4 Ohms* (57, 58)*, 8 Ohms* (59, 60) or *16 Ohms* (61)?

-> Is the power amp activated (Standby switch to ON)? Standby / power amp off => The Amp Mute LED (36) on the front panel indicates the Amp Mute status.

-> Are all cords (guitar, effect, and speaker) connected properly and are they functional?

-> Unplug connected effectors and see if the preamp works fine without these peripheral devices.

-> Is the *Noise Gate* activated in one of the channels *CH2*, *CH3* or *CH4* and the Threshold (48) knob set to a high value? Deactivate the *Noise Gate* (17) 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 select a MIDI preset programmed with *Amp Mute* enabled? The front panel Amp Mute LED (36) lights up to indicate *Amp Mute* is active.

-> Did you send via MIDI foot board a MIDI controller #7 command with a value less than or equal to 5? This activates A*mp Mute*, thereby silencing the amp. The front panel Amp Mute LED (36) lights up to indicate *Amp Mute* is active.

-> 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 loud humming noises:

-> Is the Ground Lift switch (41) 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.

-> Note that feeding the amp's signal via the Out (55) or Line Out (56) jacks to a tuner or ancillary power amp may create a ground loop. Set the Ground Lift (41) switch to the *Ground Floated* position.

The electronic power amp protection circuit has tripped:

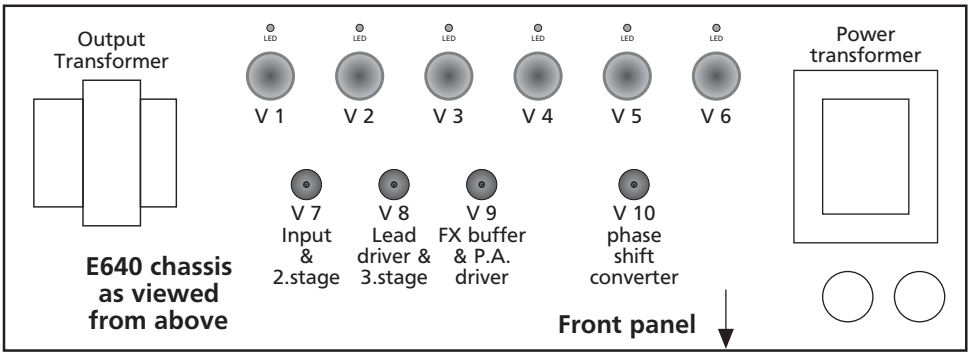
-> The given power tube is defective and must be replaced if the electronic circuit breaker continues to trip after several attempts to reset the Tube Monitoring System by flipping the Standby switch off and back on again.

-> 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).

Technical Data

Output power:	approx. 150 watts; 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.
Pre Out:	-20 dB bis ca. + 3 dB max.;
Line Out:	approx. 0 dB at nominal power output;
Power consumption:	approx. 550 watts max.;
Fuses:	
external:	
at 230/240 mains voltage	2.5 ATL (2.5 amps slo-blo)
at 100/115/120 mains voltage	5 ATL (5 amps slo-blo)
internal:	
at 230/240 mains voltage	3.15 ATL (3.15 amps slo-blo)
at 100/115/120 mains voltage	6.3 ATL (6.3 amps slo-blo)
Important:	**Replace these with fuses of the same type and rating only!**
Tubes:	
V1, V2, V3, V4, V5, V6:	EL34, matched sets;
V7:	ECC83 F.Q., input tube;
V8, V9:	ECC83 selected;
V10:	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. 24 kg, 52.9 lb

Tube Map, InVader 150 Amp:



Tube replacement report:

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

Replaced tubes: _

Reason: _

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

Replaced tubes: _

Reason: _

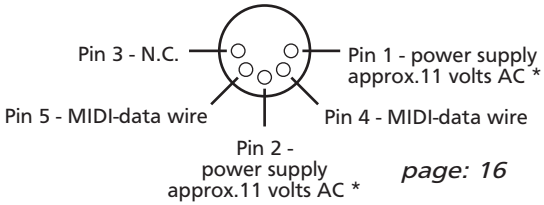
3. Replaced on: _ _ _ _ _ _ _ 20 _ _ _ Replaced by: _ _ _ _ _ _ _ _ _ _ _ _ _ _

Replaced tubes: _

Reason: _

Wiring of Principal Connectors

MIDI IN (43), DIN connector



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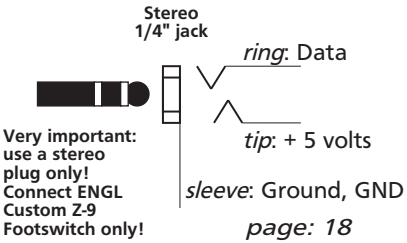
*: AC voltage is routed to pin 1 and 2 only when button 44 is set to ENGL MIDI Footcontroller.

Serial Amp Control Port (46)



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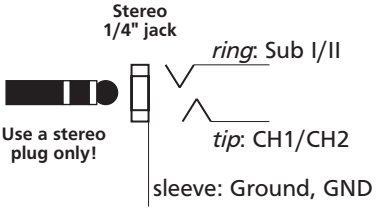
Dual Footswitch (47)



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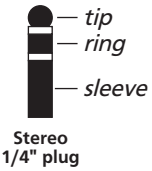
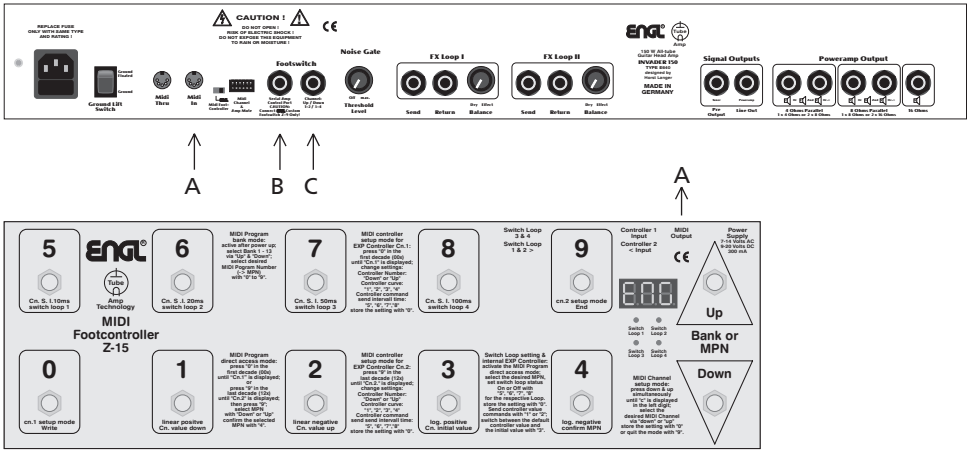
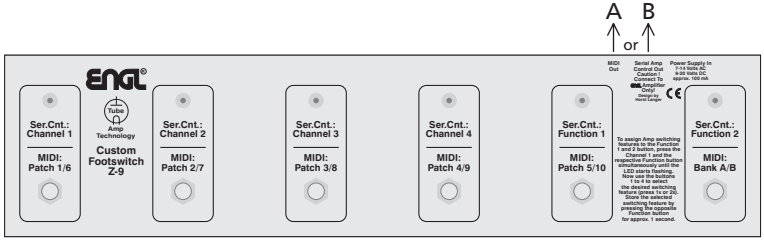


Options for controlling the ENGL InVader amp remotely:

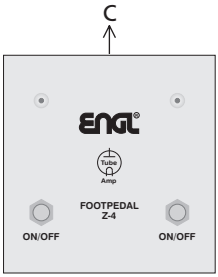


1. MIDI foot board (for example, the ENGL Z-12 or ENGL Z-15 pictured above): Connect the foot board to the amp using a standard 5-pin DIN cable. All 5 terminals of both connectors must be wired in a 1:1 configuration: MIDI data transmission requires two wires, and the ENGL MIDI foot board uses two more 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 Amp Mute via MIDI controller #7.

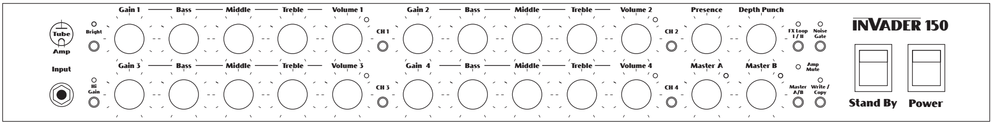


2. ENGL Custom Z-9 Footswitch: This special foot board connects to the amp via a ¼" stereo cord plugged into the Serial Amp Port (46) or via a 5-pin DIN cord plugged into the MIDI IN port (43). The former option affords switching access to channels and two special functions (for example, *Hi Gain* or *FX Loop I/II*), the configuration table is shown on page 34. 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. 47.
Functions: Channel switching Up/Down (CH1-CH2/CH3-CH4) and 1-2/3-4 (CH1/CH2 - CH3/Ch4); see page 18 chapter 47 for more details.
This does not afford direct access to each of the four channels. As an alternative to a two-way footswitch, you can connect a MIDI switcher (the ENGL Z-11 will do nicely) to this jack (47) to control the two switching functions.

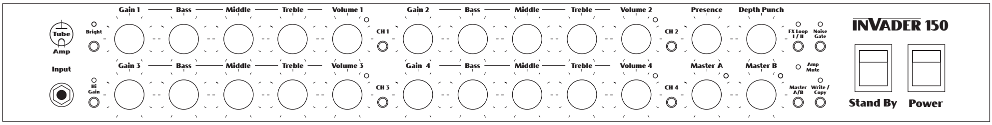


Noting Settings:



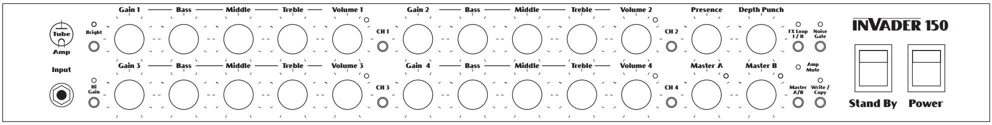
Sound title: ________________________ Preset: __________

comment: ____



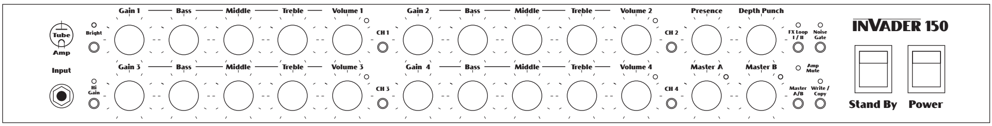
Sound title: ________________________ Preset: __________

comment: ____



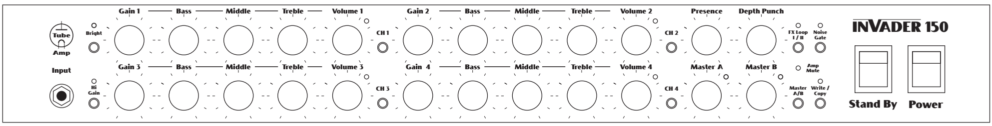
Sound title: ________________________ Preset: __________

comment: ____



Sound title: ________________________ Preset: __________

comment: ____



Sound title: ________________________ Preset: __________

comment: ____

Configuration table for assigning the ENGL InVader's sound-shaping and special functions to the Z-9 Custom Footswitch's *Functions 1* and *2* :

Button	Functions InVader	Setup	Indication	S.A.C.
Function 1	*Master A/B*	1: *Channel 1*	LED 1 lights	*F1-1*
Function 1	no	1: *Channel 2*	LED 2 lights	*F1-2*
Function 1	no	1: *Channel 3*	LED 3 lights	*F1-3*
Function 1	no	1: *Channel 4*	LED 4 lights	*F1-4*
Function 1	no	1: *Channel 1*	LED 1 flashes	*F1-5*
Function 1	*Hi Gain*	1: *Channel 2*	LED 2 flashes	*F1-6*
Function 1	no	1: *Channel 3*	LED 3 flashes	*F1-7*
Function 1	*Noise Gate*	1: *Channel 4*	LED 4 flashes	*F1-8*
Function 2	no	2: *Channel 1*	LED 1 lights	*F2-1*
Function 2	no	2: *Channel 2*	LED 2 lights	*F2-2*
Function 2	no	2: *Channel* 3	LED 3 lights	*F2-3*
Function 2	*Amp Mute*	2: *Channel 4*	LED 4 lights	*F2-4*
Function 2	no	2: *Channel 1*	LED 1 flashes	*F2-5*
Function 2	*Bright*	2: *Channel 2*	LED 2 flashes	*F2-6*
Function 2	*FX Loop I/II*	2: *Channel 3*	LED 3 flashes	*F2-7*
Function 2	no	2: *Channel 4*	LED 4 flashes	*F2-8*

Comments:

Column 1 lists the Function button on the Z-9. Column 2 lists the sound-shaping and special functions that can be assigned to it.

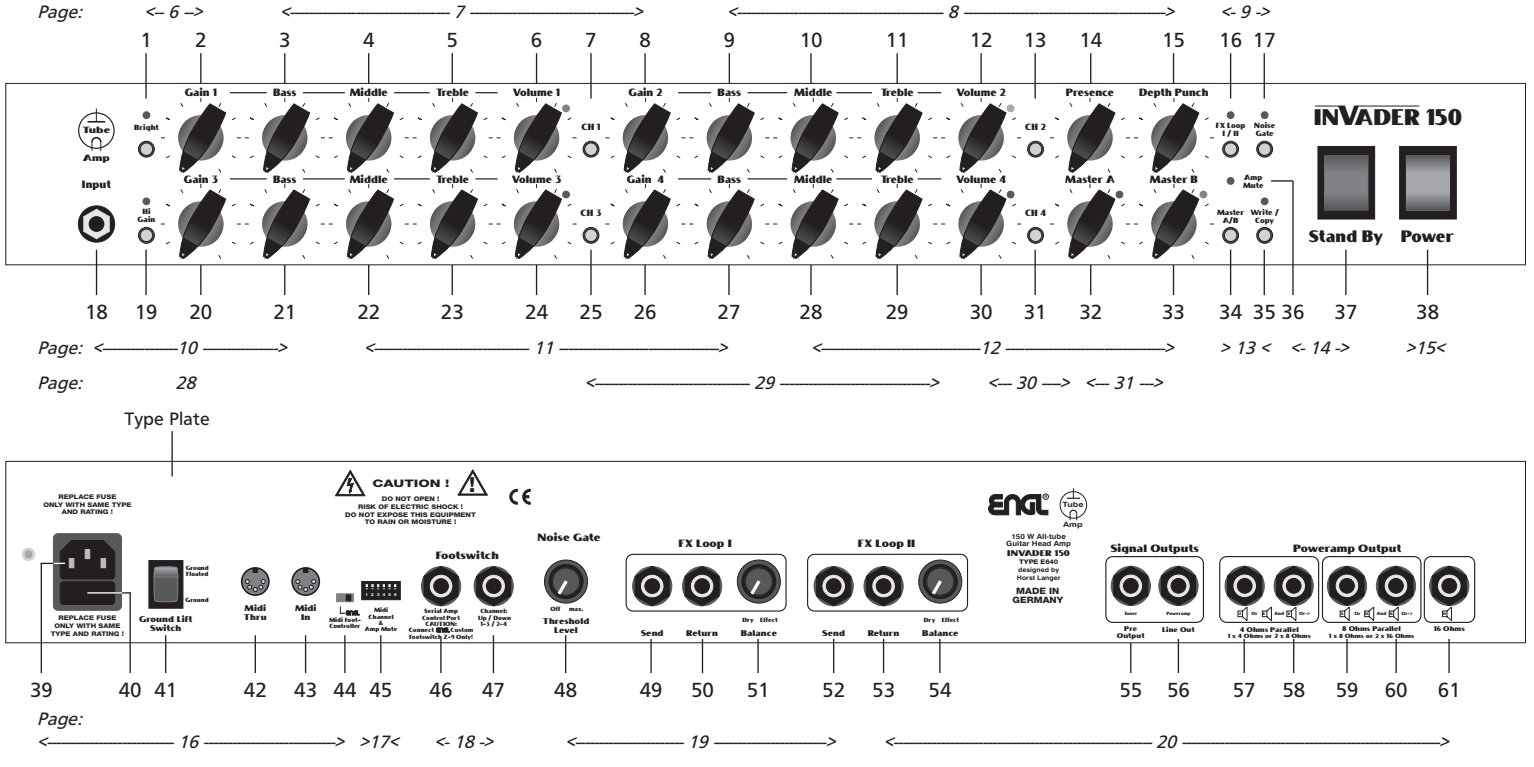
Column 2 lists sound-shaping and special functions on the ENGL InVader Amp that can be controlled remotely via the Z-9 Custom Footswitch.

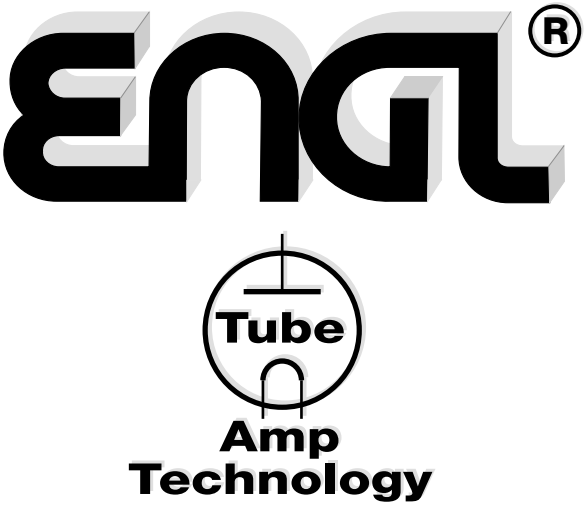
Column 3 lists the configuration or setting required to remote-control sound-shaping or special functions on the ENGL InVader amp.
The first digit indicates the *Function Setup* routine, that is,
1: for *Function 1* Setup and 2: for *Function 2 Setup*.
Channel 1 to *Channel 4* denotes the Z-9 button used to enter the setting.

Column 4 indicates the currently or newly selected configuration. For example, if LED 3 flashes when the Z-9's *Function 2* Setup routine is activated, then the InVader's *FX Loop I/II* switching feature is currently assigned to *Function 2*; the corresponding S.A.C. command is *F2-7*. The Function 2 button of the Z-9 will remote control *FX Loop I/II* on the amp.

Column 5 lists the shorthand designations for specific configurations that appear throughout the Z-9 Operator's Manual. For detailed information, please refer to the Z-9 Custom Footswitch Operator's Manual.

Please note: The ENGL Z-9 Custom Footswitch is an optional accessory. The afore mentioned Function buttons, LEDs and setup routines pertain to the Z-9.


Page: <-- 6 --> <---------- 7 ----------> <---------- 8 ----------> <- 9 ->
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Tube Amp
Input
Bright
Hi Gain
Gain 1 Bass Middle Treble Volume 1
Gain 2 Bass Middle Treble Volume 2
Gain 3 Bass Middle Treble Volume 3
Gain 4 Bass Middle Treble Volume 4
CH 1
CH 2
CH 3
CH 4
Presence
Depth Punch
Master A
Master B
FX Loop I / II
Noise Gate
Master A/B
Amp Mute
Write / Copy
INVADER 150
Stand By
Power
18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Page: <---------- 10 ----------> <---------- 11 ----------> <---------- 12 ----------> > 13 < <- 14 -> >15<
Page: 28 <---------- 29 ----------> <-- 30 --> <-- 31 -->
Type Plate
REPLACE FUSE ONLY WITH SAME TYPE AND RATING !
REPLACE FUSE ONLY WITH SAME TYPE AND RATING !
CAUTION !
DO NOT OPEN !
RISK OF ELECTRIC SHOCK !
DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE !
CE
Ground Lift Switch
Ground Floated
Ground
Midi Thru
Midi In
Midi foot-Controller
Midi Channel & Amp Mute
Footswitch
Serial Amp Control Port CAUTION: Connect ONLY Custom Footswitch Z-9 Only!
Channel: Up / Down 1-3 / 2-4
Noise Gate
Off max.
Threshold Level
FX Loop I
Send Return Dry Effect Balance
FX Loop II
Send Return Dry Effect Balance
ENGL Tube Amp
150 W All-tube Guitar Head Amp
INVADER 150
TYPE E640
designed by Horst Langer
MADE IN GERMANY
Signal Outputs
Pre Output
Line Out
Poweramp Output
4 Ohms Parallel 1 x 4 Ohms or 2 x 8 Ohms
8 Ohms Parallel 1 x 8 Ohms or 2 x 16 Ohms
16 Ohms
39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61
Page: <---------- 16 ----------> >17< <- 18 -> <---------- 19 ----------> <---------- 20 ---------->



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