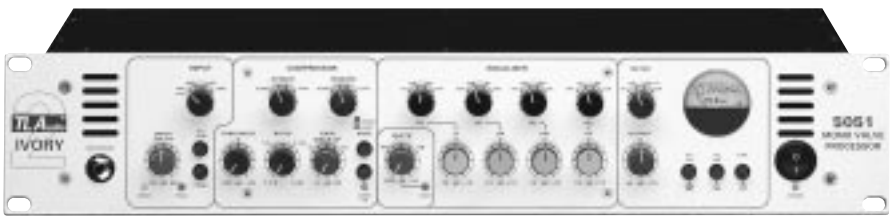
TL Audio®

user manual

Ivory 2 Series

5051



MONO VALVE PROCESSOR

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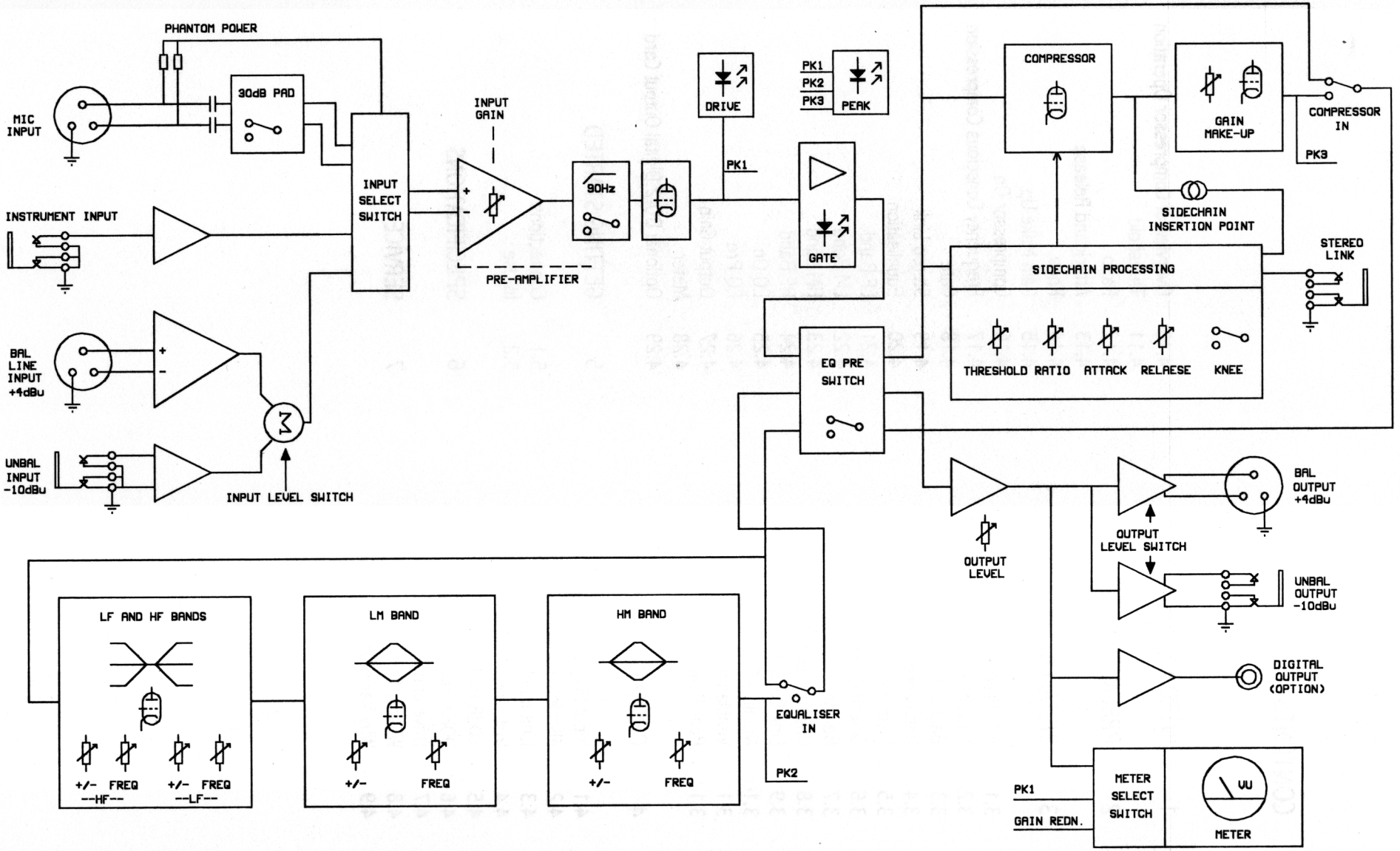
FIG.1: BLOCK DIAGRAM.



1. INTRODUCTION

Congratulations on purchasing the Ivory 5051 Mono Valve Processor by TL Audio!

The Ivory 2 Series consists of a range of hybrid valve signal processors, which utilise low noise solid state electronics in conjunction with classic valve circuitry to produce audio processing units offering very high quality signal paths with the unique valve audio character. The units offer comprehensive control facilities, whilst remaining straightforward to operate, and represent excellent value for money.

The 5051 is a single channel voice and instrument processor with mic, line and instrument inputs, a compressor, a four band equaliser and a noise gate. A single illuminated VU meter monitors the input level, output level or the compressor gain reduction. The optional DO-2 digital output card allows 24-bit analogue to digital conversion via an RCA phono type SPDIF output, with selectable 44.1 or 48 kHz sample rates and the option to clock the converter to an external word clock source.

The block diagram of the 5051 is shown in Figure 1. A solid state, electronically balanced input amplifier is used to achieve state of the art performance with very low noise, low distortion and wide bandwidth. An ECC83/12AX7A triode valve stage (run from a stabilised 150v DC supply) is used as a second stage voltage amplifier, to obtain the classic valve sound and gradual overdrive characteristics.
The preamp stage also features 48V phantom power, a 30dB pad and a high pass 90Hz filter. A Drive LED gives a visual indication of the signal level through valve stages (and thus the amount of ‘warming’ taking place) while a Peak LED warns that clipping is about to occur, and this monitors the signal at key points in the audio path.

The compressor section offers fully variable control of threshold, ratio and gain make-up, with four switchable attack and release times and both hard and soft knee options. A ‘Hold’ facility reduces LF distortion, and a side chain insert point is provided for frequency conscious compression. Like all other TL Audio compressors, the gain control element of the 5051 compressor stage is based around a special transconductance amplifier, which avoids the use of VCAs and helps contribute to the smooth, open sound of the unit. A stereo link facility is provided to allow the compressor control voltages of two 5051s to be linked, thus preventing image shift when processing stereo signals.

A four band valve EQ stage is included (with a triode valve stage in each filter), providing up to 12dB of cut or boost and a choice of four pre-selected frequencies on each band. The ‘EQ PRE’ switch places the EQ ahead of the compressor in the signal path. A simple but effective noise gate (with variable threshold) is provided to remove unwanted background noise.

Mic and line inputs are provided on electronically balanced XLR connectors, and the line input is duplicated on an unbalanced mono 0.25” jack connector. Balanced and unbalanced line outputs are provided (on XLR and jack respectively) and these can be used simultaneously. The operating level of the line input can be shifted from -10dB to +4dB (unbalanced) or +4dB to +18dB (balanced) via a rear panel switch, allowing the 5051 to accept very high levels - such as those from a digital recorder. A front panel instrument input is also provided, thus allowing guitars, basses and keyboards to feed directly into the 5051, removing the need for a separate DI box.

Please read this manual fully before installing or operating the 5051.

2. PRECAUTIONS

The Ivory 5051 requires very little installation, but like all electrical equipment, care must be taken to ensure reliable, safe operation. The following points should always be observed:

- All mains wiring should be installed and checked by a qualified electrician,

- Ensure the correct operating voltage is indicated on the rear panel before connecting to the mains supply,

- Never operate the unit with any cover removed,

- Do not expose to rain or moisture, as this may present an electric shock hazard,

- Replace the fuse with the correct type and rating only.

Warning: This equipment must be earthed.

3. INSTALLATION

3.1 AC Mains Supply.

The unit is fitted with an internationally approved 3 pin IEC connector. A mating socket with power cord is provided with the unit, wired as follows:

Brown: Live.

Blue: Neutral.

Green/Yellow: Earth (Ground).

All mains wiring should be performed by a qualified electrician with all power switched off, and the earth connection must be used.

Before connecting the unit to the supply, check that the unit is set for the correct mains voltage. The unit is internally set for 110-120V 60Hz or 220-240V 50Hz operation, and should only be changed by an authorised service centre. The mains fuse required is 20mm anti-surge, 1AT rated at 250V. If it is ever necessary to replace the fuse, only the same type and rating must be used. The power consumption of the equipment is 25VA.

Warning: attempted operation on the wrong voltage setting, or with an incorrect fuse, will invalidate the warranty.

3.2 Microphone Input.

The microphone input is via 3 pin female XLR connector, suitable for balanced or unbalanced microphones. The mating connector should be appropriately wired as follows for balanced or unbalanced operation:

Balanced inputs:

- Pin 1 = Ground (screen).

- Pin 2 = Signal Phase (also known as “+” or “hot”).

- Pin 3 = Signal Non-Phase (“-” or “cold”).

Unbalanced inputs:

- Pin 1 = Ground (screen)

- Pin 2 = Signal Phase (“+” or “hot”).

- Pin 3 = Signal Ground.

3.3 Balanced Line Input.

The 5051 has a 3 pin XLR socket on the rear panel, which will accept both balanced and unbalanced line level inputs. The mating connector should be appropriately wired as follows:

Balanced inputs:

- Screen = Ground,

- Tip = Signal Phase (“+” or “hot”),

- Ring = Signal Non-Phase (“-” or “cold”).

Unbalanced inputs:

- Screen = Ground,

- Tip = Signal Phase (“+” or “hot”),

- Ring = Ground.

When using unbalanced signals, the signal ground may be obtained by linking pins 1 and 3 in the mating XLR connector. If this connection is not made, a loss in level may result.

3.4 Unbalanced Line Input.

An unbalanced line level input at a nominal level of -10dBu is also provided, on a 0.25” mono jack socket. The mating plugs should be wired as follows:

- Tip = Signal Phase (“+” or “hot”).

- Screen = Ground.

3.5 Instrument Input.

Each channel has a 0.25” jack socket on the front panel (see Figure 2). A 2 pin (mono) jack plug is required, which should be wired as follows:

- Tip = Signal Phase (“+” or “hot”),

- Screen = Ground.

3.6 Sidechain Insert Point.

The sidechain insert point is provided on a 3 pin, 0.25” switched jack socket on the rear of the unit. The pin connections are:

- Sleeve = Ground.

- Tip = Send.

- Ring = Return.

The insertion point is unbalanced, and operates at a nominal level of -2dBu. If used as an additional send only (e.g. as a send to a tape machine or monitor mixing desk), the Tip and Ring should be wired together, to preserve the signal path through the insertion point. When used in this manner, the send will be post-compressor. Please note that the sidechain insert is normally used for frequency conscious compression only (see section 4.17) and doesn’t break into the signal path in the same manner as a standard console insert point. It doesn’t for instance allow you to insert an EQ “in-line” between the 5021 line input and compressor sections.

3.7 Balanced Output.

The output is via a balanced, 3 pin male XLR connector. The mating connector should be wired as follows:

- Pin 1 = Ground (screen).

FIG 2: FRONT PANEL

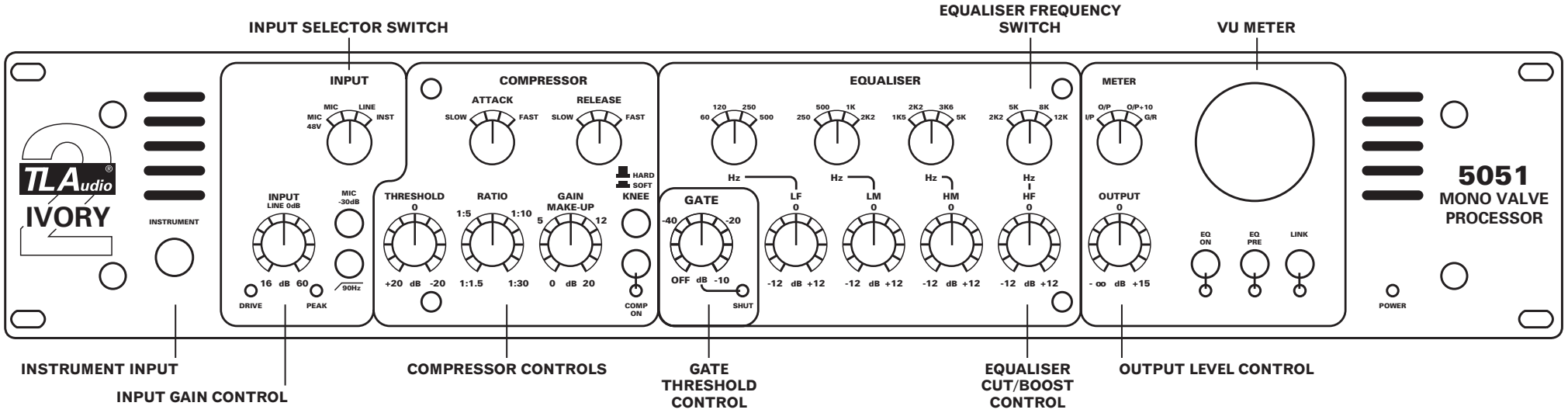
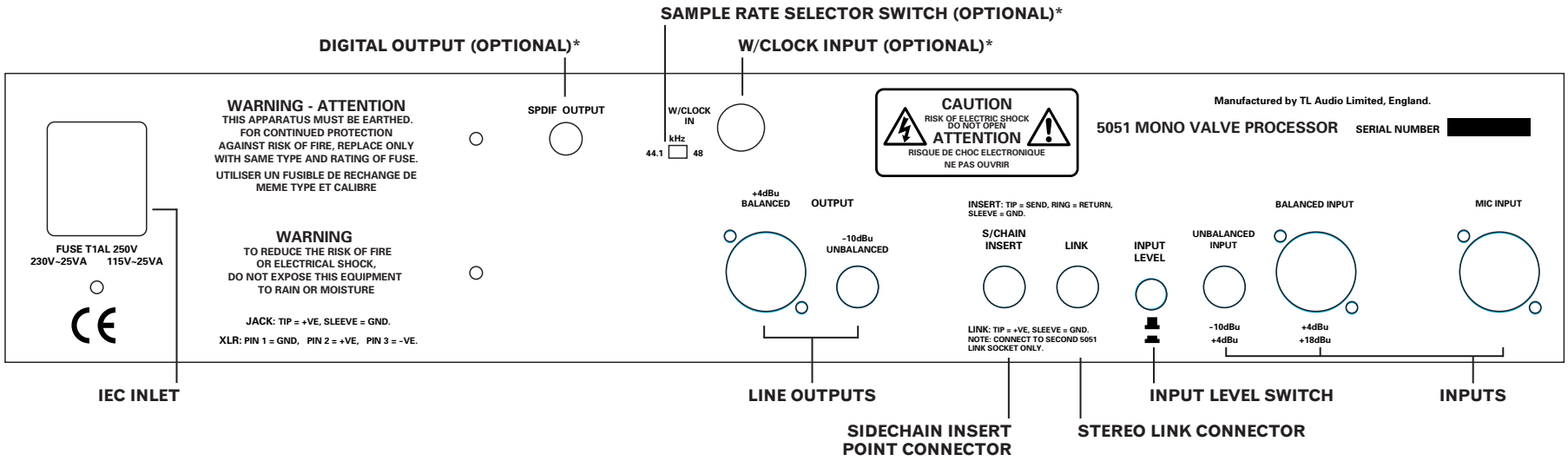


FIG 3: REAR PANEL



* VIA DO-2 DIGITAL OUTPUT CARD

- Pin 2 = Signal Phase (“+” or “hot”).

- Pin 3 = Signal Non-Phase (“-” or “cold”).

3.8 Unbalanced Output.

An unbalanced line output is provided on a 0.25” mono jack socket.

- Tip = Signal Phase (“+” or “hot”).

- Screen = Ground.

3.9 Link Connection.

The compressor section stereo link facility is via an unbalanced jack socket. The mating connector should be wired as:

- Tip = Signal Phase (“+” or “hot”)

- Screen = Ground.

Note: The link signal is a DC control voltage. Do not connect the link socket to an audio signal connector. It is only suitable for connection to the link socket on another 5051 processor.

3.10 Nominal Operating Level.

A switch on the rear panel allows the line inputs to be matched to equipment at a nominal operating level of +4dBu or -10dBu for unbalanced signals and +18dBu or +4dBu for balanced signals. Most professional equipment requires +4dBu (approximately 1.2V rms), but some small mixing consoles, portable tape recorders or domestic audio equipment require -10dBu (approximately 225mV rms). Digital multitrack recorders have very high signal levels due to the digital scale of 0dBfS usually matching +18dBu in the analogue domain. If a machine of this type is connected to the 5051 line input and distortion is experienced even at low input gains, then the +18dBu setting should be selected.

3.11 Ventilation.

The 5051 may be free standing, or mounted in a standard 19” rack. Always ensure that the cooling vents on the front and sides are clear of obstruction, and do not subject the unit to an external source of heat (by mounting immediately above a power amplifier, for example). If used free standing, ensure that the equipment is protected against rain and spillage of liquid.

3.12 Rear Panel.

The rear panel connectors are identified in Fig.3. Make sure that all settings, mains and audio connections have been made as described above before attempting to operate the equipment.

4. OPERATION

4.1 Input Stage.

The input gain control sets the level of the mic, line and instrument signals into the 5051. The signal source is selected by the 4-position switch above the input gain knob. Input choices are ‘Mic 48V’ (for condenser microphones that require phantom power), ‘Mic’ (for dynamic or most ribbon microphones), ‘Line’ and ‘Instrument’. The Instrument input allows high impedance instruments such as guitars or a bass etc to connect directly into the 5051 and eliminates the need for a DI (Direct Injection) Box. A wide range of signals can be fed into the 5051, and the input gain control also allows the valve stages to be driven to a variable degree. After the preamp stage the signal passes through a triode valve stage positioned between the input circuit and the compression stage. Increasing the input gain pushes more signal level into the valve, thus generating more harmonic distortion and creating that special “valve sound”. At the same time the output level can be turned down to preserve the same level at the 5051 output, so a choice of sounds is available. For a more pronounced valve sound, turn up the input gain and reduce the output gain, and vice versa for a cleaner sound. Don’t be afraid to push the 5051 hard!

As well as driving the valves harder, increasing the input gain control setting will also have a pronounced effect on the amount of compression, as the threshold will remain constant as the input level increases. If the input gain is adjusted the threshold can be re-adjusted accordingly to maintain a similar amount of compression.

4.18 Microphone Input.

When using the 5051 with a microphone source, care should be taken not to apply too much gain at the input. Start with the input gain control set to minimum, and the output master at the mid-point (12 o’clock position). The input gain can then be gradually increased until the VU meter registers about 0VU on normal signal level, when set to read ‘I/P’. The master output level should then be adjusted to produce the required output.

CAUTION: Never switch phantom power on or off, or plug/unplug a microphone with phantom power applied unless the output level control

is turned down. Failure to do so may result in a thump in your monitor loudspeakers or PA system.

4.3 Line Input.

A line level signal should already be at about the correct operating level, but this may be checked by monitoring the level on the output meter, with the compressor bypassed and the output gain at 0dB. The input gain should be adjusted until the meter reads about 0VU at normal audio level, when set to read ‘I/P’.

4.18 Instrument Input.

The front panel instrument input socket is suitable for low level sources such as hi impedance microphones, pick ups or passive guitars, and higher level sources such as active guitars and keyboards. To cater for this wide variety of sources, the 5051 has a large amount of gain available, and care should be taken to avoid applying excessive input gain with a high level source.

4.19 30dB Pad.

Occasionally – when using sensitive condenser microphones – the source signal may be too loud for the input preamp. In this situation, to avoid any overloading or distortion of the mic preamp stage, the 30dB pad can be used to reduce the input gain to a more manageable level. The 30dB pad only applies to the microphone input.

4.20 90Hz Filter.

The high pass filter switch restricts the low frequency response of the preamp, to effectively remove rumble of LF noise from the signal. The filter can be useful in restricting ‘popping’ on vocals or even low frequencies caused by contact with microphone stands or microphone cables. Popping is an undesirable thump that is caused by close-miking certain spoken or sung letters, namely “P” or “B”. These particular letters cause a sudden expulsion of air that can result in an audible thump. As this thump has a lot of low frequency content the high pass filter can help to reduce the problem, as can using a pop filter (a device usually made out of nylon material similar to stockings) suspended in front of the microphone. The 90Hz filter is active on the mic, line and instrument inputs.

4.21 Drive and Peak LEDs

The yellow Drive LED provides a visual indication of the signal level through the valve stages, and therefore the extent of “warming” or valve character being introduced. The drive LED will gradually illuminate as the input level or gain is increased, over the range 0dB to +12dB.

The red Peak LED operates as a conventional warning that clipping is about to occur. The operating level of the entire signal chain is monitored, and the LED illuminates when there is less than 5dB of headroom remaining. Normal operation would be to set the input gain so that the drive LED is regularly illuminating, with occasional lighting of the red Peak LED on transients.

If the input and output gain controls are set to their centre (0dB) positions and there is no EQ boost applied, the Peak LED will illuminate some 8dB after the Drive LED has reached its full intensity. However, it is possible to add gain further down the chain (EQ boost or output level gain), which will cause the Peak LED to illuminate at a lower level of Drive. This situation implies that a high level of “clean” signal is present, without driving the valves hard.

4.8 What is Compression?

Compression is an essential but often misunderstood process in modern recording. Put simply, compression reduces the difference between the loudest and the quietest levels of an audio signal. This is known as reducing the “dynamic range” of that signal and is a powerful tool for an engineer helping to avoid overloading, distortion problems as well as raising the level of the quieter parts of the audio signal. Before the introduction of compressors the only way this could be achieved was by “gain riding”, whereby an engineer would control the fader manually in order to try and anticipate very large levels (which might distort the signal) or very low levels (which may get lost in noise). The introduction of compression devices meant that this process could be controlled automatically, allowing the engineer to get on with more productive jobs!

Many instruments and voices have a very wide dynamic range that need to be controlled. A singer, for instance, may be singing quietly one moment and very loudly the next, and unless compression is applied the vocal won’t “sit” correctly in the mix, in addition to the problems of distortion on loud passages and noise on quiet ones. Compressors effectively turn down the loud bits and turn up the quiet bits, to achieve a more even and controllable level.

Compressors are often judged by their ability to control the dynamics without creating noticeable audible side effects. Heavy compression can cause the signal to pump or breathe with the onset and release of the compression. Some compressor designs can dull the signal and lose the top end of the signal. The 5051 compressor design, as with other TL Audio compressors, uses a technology based around a transconductance amplifier rather than a VCA design. This transconductance amplifier design is known for being able to retain the full frequency range and natural character of the audio signal, even when compressing the signal quite heavily. The Ivory 2 5051 is also capable of more severe compression based around the optional Hard Knee mode if this is desired.

There are other benefits of compression as well as just controlling the peaks and raising the quiet parts, applied properly, it can add punch and excitement

to music, as well as fattening up sounds and creating a more professional sounding recording. With the 5051, you have the added benefit of valve stages in the signal path, which create a warmth and presence just not obtainable with solid state or digital products.

4.9 Why Valve Compression?

Valve compression yields a particularly special sound which has become very sought after, particularly with the widespread use of digital products. The reason valve equipment sounds special is due to two things: harmonic distortion and natural compression. When the signal through a valve is increased, it tends to generate a particular type of subtle and desirable distortion, called “second harmonic” distortion. This has the effect of thickening and warming the sound, and the more the level you feed to the valve stages, the more of this harmonic distortion will be produced. You should be able to hear this effect as you increase the Input Gain on the 5051.

Secondly, valves will tend to naturally compress an audio signal, again particularly as the signal level is increased. This itself also contributes to the warmth produced by the 5051.

4.10 Overview of Compressor Operation.

To operate the 5051 successfully an understanding of each control will help to obtain the best results. If you are unfamiliar with the effect of compression it may help to adjust the controls to extreme settings and listen to the sonic effect. Generally compressors are used in two different ways: either to enhance the signal and control the dynamic range as unobtrusively as possible, or used more severely to specifically to create an effect.

4.11 Threshold.

The Threshold is the point measured in decibels that any compression comes into operation. The Threshold control is variable from +20dB in the most anticlockwise position to -20dB at the most clockwise position. Any signal below the Threshold passes through the unit unaffected; while signals above the Threshold are reduced in gain (and are thus ‘compressed’). This does depend on the Soft or Hard knee to some extent as the Soft knee is more gradual around the Threshold point.

Unlike some compressors, the Threshold control on TLA units including the 5051 starts at a ‘plus’ value in the counter-clockwise position, and decreases to a ‘minus’ value as you rotate the control clockwise. The reason for this is as you turn the Threshold control on the 5051 clockwise (i.e. towards the negative region) then the degree of compression will increase. We think this is logical, whereas the common method of turning the control ‘down’ to achieve more compression is not - but beware, some other compressors may work in the opposite direction!

4.12 Ratio.

Once the input signal has crossed the threshold, the degree of gain reduction is determined by the Ratio control. The Ratio control is calibrated in decibels and is simply the change in output level that results from a given change in input level. An uncompressed signal will have a 1:1 compression ratio - every 1dB change in input level results in the same 1dB change in output level. A compression ratio of 1:3, for instance, means that a 3dB change in input level will only give a 1dB change in output level. For more severe compression, simply turn up the Ratio control.

The 5051 offers a wide range of ratios from 1:1.5 (gentle compression) through to 1:30 (limiting). Limiting effectively clamps the input signal at the threshold level no matter how much the signal is increased: this can be useful when trying to ensure that the signal doesn't exceed a certain level - for instance to prevent a digital recorder distorting through overload.

4.13 Attack and Release.

The Attack time sets how quickly the compression is applied once the threshold has been exceeded, and the Release time sets how quickly the compression is released (and the signal returns to normal) once the signal drops back below the threshold. The 5051 Attack and Release controls each allow a choice of four switched positions between 'Slow' and 'Fast'. For Attack this covers the range 0.5mS to 40mS, while the Release control spans 40mS to 4S. There is an element of automatic operation of the Attack and Release on the 5051: for instance, should a very short transient occur the time constants tend to become shorter, to prevent a slow release leaving a "hole" in the signal after the transient. Also, a fast release setting will be extended by a slow attack setting. Due to this automatic nature of the time constants, the controls are simply labelled 'Slow' to 'Fast'.

The speed of the Attack and Release should in general be able to work with the tempo of the signal. For example if the signal is a snare drum, by monitoring the gain reduction it is possible to set the Release to allow the compression to fully recover (i.e. the gain reduction needle will settle back to 0dB) before the next snare beat. This prevents the second snare beat being reduced in level in comparison to the first. One side-effect of having an incorrect release setting is distortion on low frequency signals, which can particularly occur when using a fast release setting on bass heavy signals - the compressor is forced in and out of compression during one cycle of the waveform, and distortion results. The 5051 has a built-in "Hold" facility which delays the onset of release for approximately 10mS after the input signal falls below the threshold. If distortion is still experienced, a slower release time should be used.

4.14 Knee.

The Knee switch enables the 5051 to be operated in two different modes - soft Knee or hard Knee. Soft knee mode offers a gentle compression curve around the threshold point, and is traditionally employed to yield a more subtle, musical type of compression effect. The hard knee setting causes the full compression ratio to be applied immediately the signal has passed the threshold point, so tends to produce more pronounced and severe compression.

4.15 Gain Make Up.

While the subjective sound quality of the signal can be improved by compression, the overall signal level will be reduced when gain reduction is taking place. The Gain Make Up control is designed to boost the compressed signal by between 0 and 20dB, in order to bring back the level to the same loudness as the uncompressed signal. Without this control, comparing the original and compressed signals becomes difficult, since there would be a level drop each time the compressor is switched in: therefore it is normal to adjust the Gain Make Up control so that when the ‘compressor on’ switch is activated, the audio signal remains constant in level.

Unlike the Output Level control, the Gain Make Up control is active *only when the ‘compressor on’ switch is engaged.* Once the Gain Make Up has been adjusted, use the Output Level control to set the overall output level of the 5051.

4.16 Compressor On.

This switch enables or disables the compressor stage, thus allowing an A/B comparison to be made between the original untreated signal and the compressed signal. Any gain make up applied to the signal only becomes active when the “Compressor On” is enabled. An associated status LED indicates when the compressor is active. The Gain Reduction on the VU meter will monitor the level of compression regardless of the compressor stage being active or non active.

4.17 Frequency Conscious Compression.

The provision of a sidechain insert point on the 5051 allows the unit to perform frequency conscious compression, such as ‘de-essing’. This is achieved by patching an equaliser (normally a parametric or graphic type) into the sidechain (the insert point works on a send-and-return principle whereby the insert ‘send’ connects to the equaliser input, and the equaliser output connects to the insert ‘return’, thus completing the circuit). Once connected, any frequency boosted on the equaliser will effectively lower the compression threshold at that frequency. To de-ess, for instance, use a parametric EQ patched into the insert point and try boosting the sibilant frequency (normally 3-5kHz) using a narrow bandwidth setting on the EQ. This should make the

5051 more sensitive to the boosted frequency, thus compressing it to a greater degree.

4.18 Gate.

A gate (or noise gate) is a device that can completely shut off or mute the signal path in order to prevent unwanted low level signals from passing. The closing of the 5021 gate is triggered by the level of the input signal falling below an adjustable threshold point (in this case the threshold is adjusted by the ‘Gate’ control over the range -10dB to ‘OFF’). Gates are commonly used to shut out background noise or hiss from noisy signals or to isolate a louder signal from other quieter signals. An example of this would be when miking up a drum kit with a number of individual mics on specific drums. Each mic will pick up not only the drum it is directly miking but also all the neighbouring drums. By gating out the quieter neighbouring drums each drum track can be “cleaned up”. The trick to using the gate successfully is to adjust the threshold to the point where the desired signal opens the gate and the undesirable signal is below the threshold point and is gated out. This is never an easy task as the threshold point remains constant but the point between desirable signal and undesirable signal is continuously changing. Gating can be a tricky process to get right as success depends a great deal on the signal characteristics.

The gate on the 5021 is situated before the compressor stage and has a red LED indicating when the gate is active (i.e. shut). At the fully anti-clockwise position the gate is at its ‘off’ position and is completely inactive. Turning the gate clockwise towards the -10dB maximum setting raises the threshold point so that the signal needs to be increasingly louder (as the threshold is raised) to open the gate. At the lowest setting, just above the ‘off’ position, low level signals such as background noise can be gated. Raising the threshold point allows gating of higher level signals such as drums. If you are having trouble selecting the threshold point, one tip is to select different threshold points suitable for specific parts of the signal and mark them with a chinagraph pencil. For example the intro to the signal may be quite strong - so the threshold can be set quite high - and the end of the signal may have a gradual fade out, so the threshold can then be adjusted to suit this ending. This of course is only practical with recorded signals where the track can be constantly replayed to practice the settings.

4.19 Stereo Link.

Two 5051s can be used to process a stereo signal by inserting a link cable between the two (see section 3.9) and depressing the ‘Link’ switch on both units. This feature links the compressor control voltages of the two units, ensuring that the same amount of gain reduction is applied to both - even if the signal exceeds the threshold on one side only.

Stereo linked compression is essential to avoid imbalances in the stereo image (known as “dips”) to appear on one side of a stereo signal, if the signal exceeds the threshold on that side only. If a compressor has not been stereo linked, the “dipping” of one channel can sound very obvious and unnatural. In linked mode, if either signal crosses the threshold setting, both channels will react together and will be compressed by the same amount. For best results, both channel settings should be made the same to maintain a consistency over the stereo image.

A variation on this is when two units are used to perform Ducking or Gating, where the gain of one 5051 is controlled from another, but without reciprocal action. This is useful where one 5051 is used to reduce the gain of background music when the microphone signal is present, for example. The link cable should be fitted, as for stereo operation, but the Link switch should only be engaged on the ‘slave’ 5051 (the background music channel in the example above). If the compressor is switched out on the ‘master’ unit, gain reduction will only occur on the slave unit. The threshold and ratio controls on the master 5051 will determine the amount of compression performed by the slave.

4.20 Equalisation.

The 5051 equaliser section has four bands, each with a continuously variable cut and boost control. Each band has a four position switch to select the nominal corner frequency for the shelving bands (LF and HF), or centre frequency for the peaking mid bands (LM and HM). The Q (or bandwidth) of the equalisers is approximately 0.5 (2 octaves), giving a broad effect and allowing a good degree of overlap between bands. Remember that there is a good deal of gain available from the EQ section, and greatly boosting one or more bands can cause the red Peak LED to illuminate as the 5051 is driven towards clipping. In this case you need to compensate by bringing down the 5051 output level control until the Peak LED is extinguished.

4.21 LF Band.

The LF (Low Frequency) band of the equaliser has a shelving characteristic - i.e. it extends from the selected frequency to the extreme low frequency limit of the equaliser’s response.

The corner frequency of the LF band is selected by a rotary switch from 60Hz to 500Hz, and the cut or boost is controlled by a continuously variable, centre-detented rotary knob. At the selected corner frequency, up to 12dB of cut and boost are available. The slope of the shelf is 12dB/octave, and typical response curves are shown in the specification section of this manual.

4.22 LM Band.

The LM (Low-Mid Frequency) band has a peaking characteristic - i.e. it boosts or cuts a section of the audio spectrum around its selected centre frequency only. The centre frequency of the LM band is selected by a rotary switch from 250Hz to 2.2kHz. The mid bands possess a fairly low Q value of approximately 0.5, for a response which results in effective equalisation without harshness.

The amount of cut or boost is again controlled by a continuously variable, centre-detented rotary knob, with up to 12dB of cut and boost available at the centre frequencies. Response curves for the mid bands are also shown in the specification section of this manual.

4.23 HM Band.

The HM (High-Mid Frequency) band is similar in operation to the LM band, except that the centre frequencies are obviously higher and concentrated in the critical upper vocal region of the spectrum. The available frequency range is 1.5kHz to 5kHz.

4.24 HF Band.

The HF (High Frequency) band has a shelving characteristic, complimenting the LF band. Corner frequency selection is by rotary switch from 2.2kHz to 12kHz.

4.25 EQ On.

The ‘EQ On’ switch allows the EQ section to be bypassed for comparison of the equalised and original, unprocessed signal.

4.26 EQ Pre.

The ‘EQ Pre’ switch places the equaliser ahead of the compressor section in the signal path. This enables more flexibility in sound, since the compressor will become more sensitive to any frequencies that have been boosted by the EQ section. The effect may be compared by toggling the EQ Pre switch.

4.27 Output Gain.

This controls the level at the 5051output. The nominal level is 0dB at the centre detented position. This control effectively acts like an output fader, and is very useful when recording direct to tape or hard disc through the 5051. You

may find that some digital recorders require a good deal of input level in order to register a 0dB reading on their meters (+18dBu analogue usually matches 0dBFS in the digital domain). This is normal, since many digital recorders are designed to preserve headroom and keep the signal well below the 0dB clip point - thus preventing the recorder distorting. The 5051 provides a further 15dB of gain at the output fader to drive digital recorders. It is important to distinguish the difference between the output gain knob and the gain make-up knob in the compressor section. The gain make-up control is only active when the compressor is switched on, whereas the output gain control is always active but will have no effect on the compression characteristics of the signal.

4.28

4.17 Digital Output.

The digital output is an option for the Ivory 2 5051. The card converts the analogue signal at 24-bit resolution and is selectable to 44.1 or 48 kHz sample rates. The digital connector is a coaxial SPDIF format on an RCA phono type connector. The card also has a word clock BNC connector for clocking to an external digital source. This is useful for 'slaving' the 5051 A/D card to an existing digital setup without the 5051 needing to be the digital master in the system.

5. GETTING STARTED

5.1 Connections.

There are various ways that the 5051 can be connected into your audio system. The three most common are:

a) As an instrument front end
b) Connected to a channel insert point on a mixing desk
c) Connected to a group or master insert point on a mixing desk

To use the 5051 as an instrument front end, connect the output of the 5051 directly to the line (not mic) input of your console, recorder or sound card. A common mistake is to plug the 5051 line output into the XLR mic input of a console. This will cause the console mic inputs to overload very easily and may result in a loss of quality. Once the output is connected, simply feed your mic or instrument into the relevant input on the 5051. Recording direct to the

multitrack recorder (thus bypassing the console) is a common technique these days as it keeps the signal path short, and of the highest quality. No unnecessary console stages are passed through, thus maintaining quality.

Many mixers have sockets called ‘insert points’, which allow processors such as dynamics devices and EQs to be patched in-line into the mixer signal path at various points. The mixer’s channel insert point usually ‘sends’ the input signal out directly after the mixers preamp stage- allowing connection to the line input of the 5051 - and then returns the processed signal from the line output of the 5051 back into the mixer at the same point in the signal path. This is commonly achieved using a special insert cable (sometimes known as a ‘Y’ lead or split lead usually a stereo 0.25” jack connector at one end split into two mono jack or XLR connectors – one for send and one for return). The most likely positions that insert points are located on a mixer are in the channel, group and stereo master sections. Patching the 5051 into the channel insert point means that any signal passing through that channel will pass directly though the 5051. Compressing an off-tape signal on mixdown, for instance, can be achieved by connecting the tape machine to the mixer tape returns, then connecting the 5051 into the relevant console channel insert point. The off-tape signal will then be fed into the 5051’s line input via the mixer insert ‘send’ connection. The line output of the 5051 connects back to the insert ‘return’ connection, thus returning the processed signal to the mixer and ensuring continuous signal flow.

Group insert points are used to process sub-grouped signals such as drums or backing vocals. It’s possible to mix a group of voices or instruments to a single group, and then use that group fader to control the overall level, rather than having to adjust each individual voice or instrument level. If you then wish to compress the overall group signal, you can connect a 5051 to the relevant group insert point, using the same ‘send and return’ technique as the channel insert.

The optional digital output will allow high quality 24-bit A/D conversion of the 5051 mono output on a coaxial SPDIF connector. The DO-2 can feed directly into digital recorders such as Digital Multitrackers, Hard Disk Recorders, DAT Recorders, Minidisk and CD-Recorders, bypassing any A-D conversion stages on the way. When connecting the DO-2’s SPDIF output it is advisable to use cables less than 5 metres in length and of high quality. The digital output can be used simultaneously with the 5051’s analogue output.

5.2 In Use.

Having connected the 5051, it’s time to put it into action! Here’s a simple step by step guide:

1. We’ll assume that a condenser microphone is connected to the 5051 mic input, and the +48V phantom power is engaged. The first stage is then to set up the gains of the 5051. With the compressor, EQ and gate

stages switched out, start with the 5051 input gain at minimum and output gain at 0dB.

2. Gradually bring up the 5051 input gain until the Drive LED illuminates with the chosen source material - this should also generate a healthy reading on the 5051 VU meter (when set to 'I/P'). Then switch to meter 'O/P' and check that around 0VU is being produced, and adjust the output level control if necessary.

3. Try engaging the 30dB pad and 90Hz filter switches. You should notice that the pad greatly reduces the mic gain and the filter reduces the LF response of the mic (try those 'B' and 'P' letter sounds as outlined in section 4.6).

4. Now depress the Compressor 'On' switch, and using the compressor controls you will need to adjust settings to suit the instrument you are listening to. A good starting point is set the Attack and Release to 'Fast', Ratio to 1:3, Knee to 'Soft', and Threshold to +20dB.

5. As you start turning the Threshold control clockwise towards 0dB, the 5051 meter should now register that some gain reduction is taking place. Aim to get around a maximum 3-4dB of gain reduction occurring as a starting point, by lowering the Threshold further if necessary. You should also notice that increasing the Ratio setting causes more gain reduction to occur.

6. When gain reduction is taking place, you should notice that the output level is reduced. By switching the compressor 'in' and 'out', you can compare the levels and the subjective sound quality of the original and compressed signals. With the compressor active, use the Gain Make-Up control to set the level so that when disabling the compressor, there is no level drop. This way you can A/B the original and compressed signals without the levels changing.

7. At this stage if you are unfamiliar with compression you should experiment with each control to see how it affects the sound. If in doubt, aim to use compression gently as it can be difficult to compensate for over-compression, if you later decide that too much effect was used. On the other hand there are no rules, so if extreme settings get you the effect you are after, the choice is yours. Let your ears be the guide.

8. Try setting the gate so that it opens when phrases are sung or spoken into the mic. Do this by starting at the 'OFF' position and raising the threshold gradually. You should find as the threshold is raised that the effect of the gate becomes more severe.

9. Engage the EQ section and experiment with applying some EQ. You should find that the LF & HF bands are useful for adding some low end ‘warmth’ and high end ‘air’, while the mid bands are more useful at removing ‘boxiness’ or nasal tones from mic sources. Unlike other EQ’s, you should find that you can apply quite drastic amounts of EQ boost and the unit will still retain its musicality – and not introduce unwanted harshness.

6. SPECIFICATIONS

Microphone Input: Gain range +16dB to +60dB,
Noise -127dBu (EIN with 150 ohm source,
22Hz - 22KHz and maximum gain),
Switchable 30dB pad,
Maximum input level +4dBu (+30dBu with pad).

Phantom Power: +48V at 10mA maximum.

Line Inputs: Balanced XLR, switchable +4dBu/+18dBu nominal level.
Unbalanced jack, switchable -10dBu/+4dBu nominal.
Gain range +/-20dB.
Maximum input level +26dBu.

Instrument Input: Via front panel 0.25” jack socket,
Input Impedance 1Mohm,
Gain range -2dB to +38dB,
Maximum input level +10dBu.

High Pass Filter: -3dB at 90Hz, 12dB per octave,
Active on all inputs.

Outputs: Balanced XLR, nominal level +4dBu,

	Unbalanced jack, nominal level -10dBu.
Output Gain Control:	Rotary fader, +15dB maximum gain.
Maximum Output Level:	+26dBu (XLR), +12dBu (Jack).
Gate:	Threshold variable -60dBu to -10dBu.
Compressor:	Threshold -20dBu to +20dBu, Attack 0.5msec to 40msec, Release 40msec to 4 seconds, Ratio 1:1.5 to 1:30, Hard / Soft Knee switch, Gain Make-Up 0 to +20dB.
Equaliser:	
LF Band:	+/-12dB at 60Hz to 500Hz. Shelving response.
LM Band:	+/-12dB at 250Hz to 2K2Hz. Peaking response, Q = 0.5.
HM Band:	+/-12dB at 1K5Hz to 5KHz.. Peaking response, Q = 0.5.
HF Band:	+/-12dB at 2K2Hz to 12KHz. Shelving response.
Drive LED:	Increasing intensity to reflect valve drive,

	commencing at +4dBu to full brightness at +14dBu (Output level control at 0dB).
Peak LED:	+20dBu. Monitors Input and Output Levels.
VU Meter:	Switchable to Input level, (0VU = +4dBu), Output level, (0VU = +4dBu), Output +10dB, (0VU = +14dBu), Gain Reduction (Compression).
Frequency Response:	10Hz to 40KHz, +0, -1dB.
Distortion:	Predominately second harmonic, increasing with “Drive” level. Typically 0.2% @ 0dBu.
Noise:	-80dBu, 22Hz to 22KHz, line input selected at 0dBu input and output gain, Compressor and EQ on at 0dB.
Dynamic Range:	106dB (Line input @ 0dB gain).
Sidechain Insertion Points:	Unbalanced, switched 3 pin jack socket, tip = send, ring = return, Nominal level -2dBu, Output impedance 47 ohms, Return input impedance 10Kohms.
Power Requirements:	Internally set to 230V 50Hz or 115V 60Hz operation, Detachable IEC power cord,

	Power consumption 25VA typical.
Dimensions:	19” rack mounting, 2U high. W x D x H = 483 x 88 x 200mm (19.0” x 7.9” x 3.5”).
Shipping Weight:	6 kgs.

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7. SERVICE

Should the 5051 require service, it must be taken or posted to an authorised dealer with a description of the fault. Please retain the original packing for possible future use, and ensure the unit is suitably protected during transit. The manufacturer cannot accept responsibility for damage caused during transportation.

The 5051 is supported by a limited warranty for a period of one year from the date of purchase. During this period, any faults due to defective materials or workmanship will be repaired free of charge. The warranty excludes damage caused by deliberate or accidental misuse, tampering, operation on the incorrect mains voltage, or without the correct type and value of fuse fitted. It is the user’s responsibility to ensure fitness for purpose in any particular application. The warranty is limited to the original purchase price of the equipment, and excludes any consequential damage or loss. When claiming service under warranty, proof of purchase date must be included with the equipment for repair.

Please record the following details, and retain proof of purchase:

Serial Number.............................

Date purchased...........................

Dealer...