

COLLINS 30L-1[©]

Universal Soft-Start

Description of modification :

INRUSH CURRENT PROTECTION (SOFT-START).

List of required parts : (for 220 – 240 VAC mains 10 Amp fuse)

See schematic

Introduction

When your **COLLINS 30L-1** Power Amplifier is switched **ON**, the initial current drawn from the mains is many times that even at full power. There are two main reasons for this, as follows ...

- Transformers will draw a very heavy current at switch on, until the magnetic flux has stabilised. The effect is worst when power is applied as the AC voltage passes through zero, and is minimised if power is applied at the peak of the AC waveform. This is exactly the opposite to what you might expect
- At power on, the filter capacitors are completely discharged, and act as a short circuit for a brief (but possibly destructive) period

These phenomena are well known to manufacturers of very high power amps used in PA applications, but 'soft start' circuits are not commonly used in consumer equipment.

This high inrush current (as it is known) is stressful on many components in your amp, especially ...

- Fuses - these must be slow-blow, or nuisance fuse blowing will be common
- Transformer - the massive current stresses the windings mechanically and electrically. It is not uncommon to hear a diminishing mechanical buzz as the chassis and transformer react to the magnetic stress
- Rectifiers - this must handle an initial current way beyond the normal, because it is forced to charge empty filter capacitors - these look like a short circuit until a respectable voltage has been reached
- Capacitors - the inrush current is many times the ripple current rating of the caps, and stresses the internal electrical connections

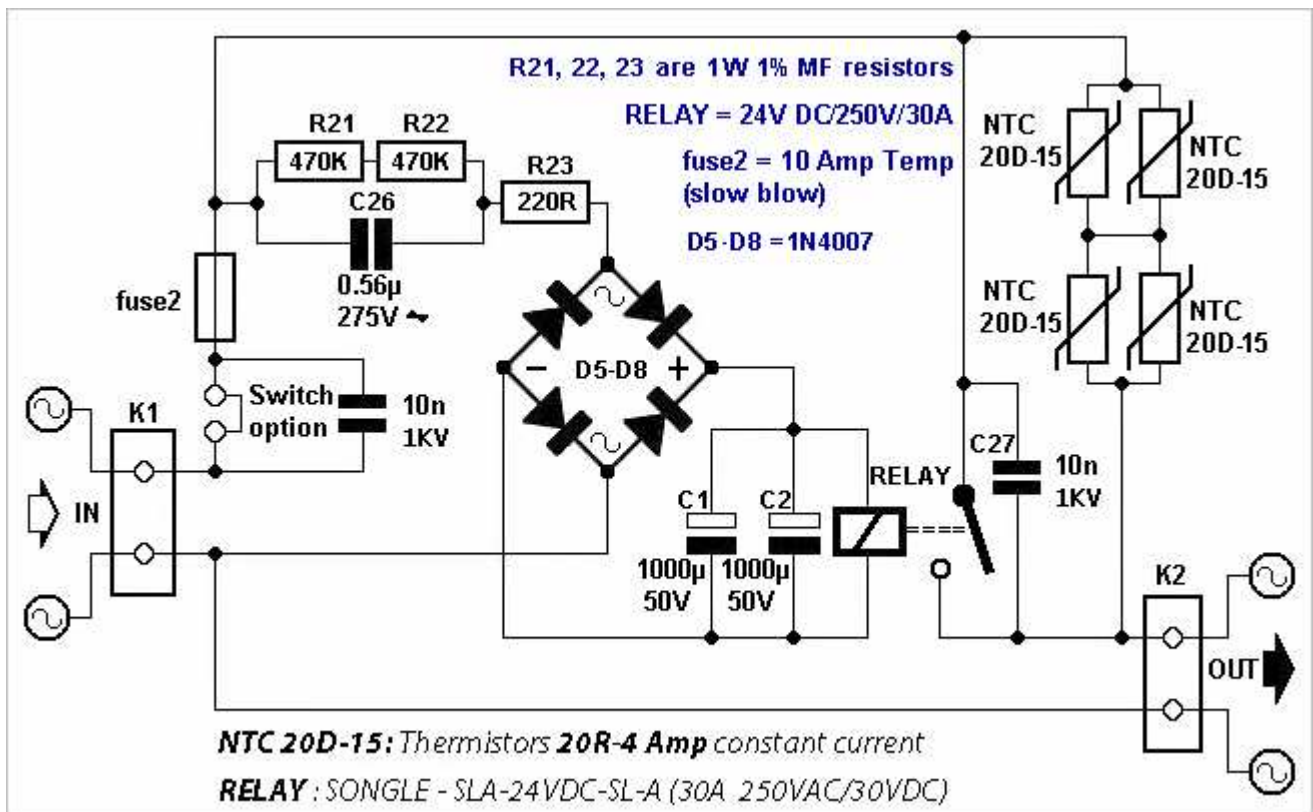
This unit is a **delay unit** that should be connected directly to the mains power supply, it has a delay circuit and for the delayed time the mains power is supplied through **NTC Thermistors** minimizing in this way the big inrush current due to capacitors and transformers in the power supply. When everything is stable it shorts the **NTC resistors** and supplies the mains power directly.

REMEMBER THE VOLTAGE PRESENT WITHIN THIS SECTION IS DEADLY. DEATH IS A PERMANENT CONDITION. MAKE CERTAIN ALL POWER SOURCES HAVE BEEN DISCONNECTED AND ALL FILTER CAPS DISCHARGED FOR A MINIMUM OF 15 MINUTES.

That's it!

Please refer to the schematic and pictures for further clarification.

This circuit no needs voltage supply

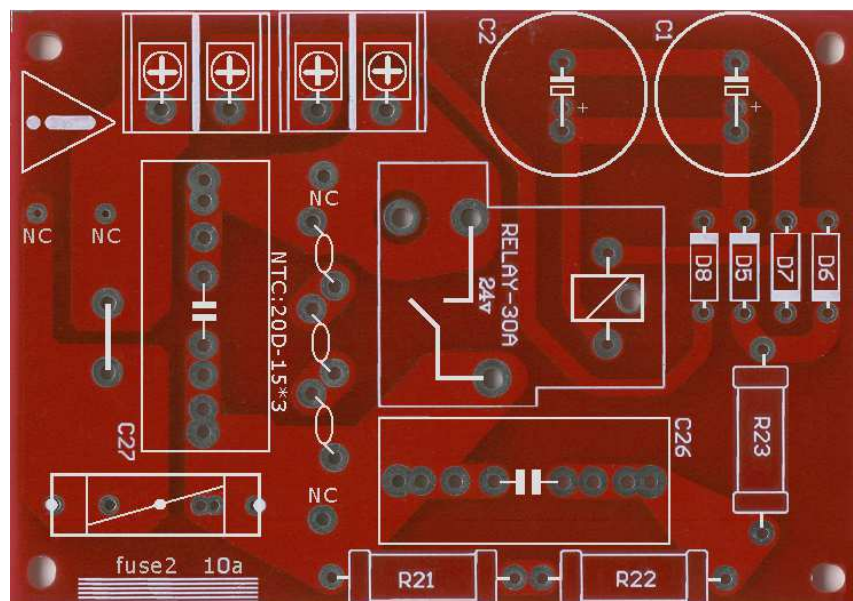


Operating

The inrush current is suppressed down through the **NTC resistors** right after power up. After the delay time that is determined from capacitors **C1** and **C2** the relay shorts the **NTC resistors** and all the current is supplied to the transformer. The relay in this circuit can work easily with transformers till **3600 VA**.

The voltage for the supply of this circuit comes directly from the mains power supply through **C26**, **R23** and **D5 to D8** so it is **very dangerous** to **touch** this **part** of the circuit. The dimensions of the **PCB** equipped are exactly : **9.4 x 6.6 x 2.5** centimeters.

PCB x-ray view with components



NOTE: To use the possibility "**switch option**" strap on the connector should be replaced by a connection to the two poles of the unipolar switch to mains input

It is not possible to give exact installation instructions for the Universal "Soft Start" module because I have neither the schematic nor the physical layout of your specific amplifier or equipment. I can give you enough information, together with the theory of operation of the Universal "Soft Start", to help you install this module.

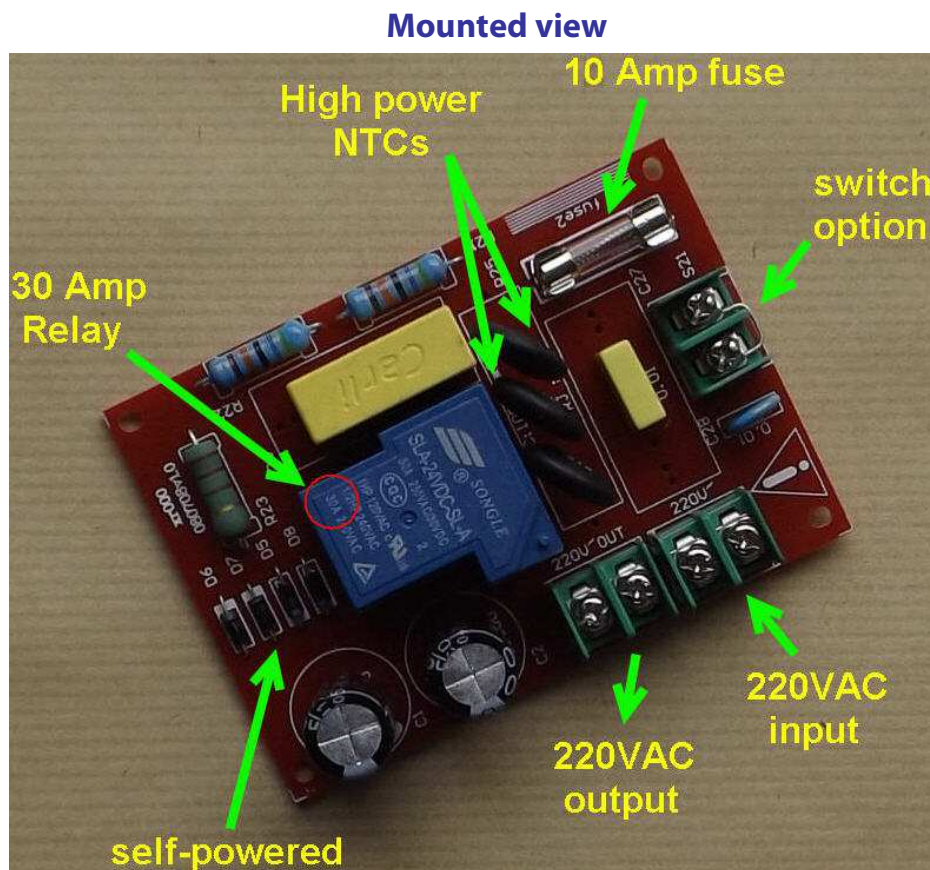
NOTE: This module is designed for a **220/240 VAC** single or dual-primary transformer system. See the installation diagram for amplifiers below.

*This module is provided with "switch option" for **single pole** power switches.*

Please examine the **Universal SS3K** module. Note that there are **two** connectors **components side** that designate the leads to be connected.

The "**220V ~**" leads (**K1**) will be connected to the **switched** power input. The "**220V ~ OUT**" (**K2**) leads will be connected to the **load** (transformer). For the input & output power line you can use fork spade crimp terminals (not necessary). The module can be mounted as well using silicone adhesive relay side to the chassis, or with screws and spacers.

The overall operation is quite simple. When the power switch is turned **ON**, 220 volts is applied to the load through three serial mounted **NTC 20D-15 (20Ω / 4 A)** Thermistors in one side of the AC input lines. The voltage for supply this circuit comes directly from the mains power through **C26, R23** and **D5 to D8**. The delay time that is determined from capacitors **C1** and **C2**. When this voltage reaches approximately 24 volts, the relay shorts the **NTC resistors** and all the current is supplied to the transformer. Now the power circuit is back to its **full power state** and the soft start circuit is **locked out** of operation.



This module is provided with switch option.