

Replacing A Worn Out Rotary Converter in a 62 Set with A Solid-State DC to DC Power Supply

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The Prologue

I would like to quote an unfinished limerick by the great Spike Milligan who, sadly, died recently (I was a big fan, especially of his WW2 memoirs):

*There was a young man called Wyatt,
Whose voice was remarkably quiet,
Then, one day it faded away.....*

Background

I was fortunate to acquire a very tidy and completely original WS62 Mk2. It didn't take much to get it working and soon a good many AM QSOs were enjoyed on 160m and on 80m.

Then, one day the rotary converter started making strange noises and I could hear the revolutions, and see the HT voltage, dropping. Despite my best efforts with light oil to the bearings and a hint of Electrolube to the commutator, I decided the kindest act would be to retire the poor old thing and have a go at designing and building a solid state DC to DC converter to go in its place.

I should point out at this stage that I am not a professional engineer, but a humble apothecar. Anyway, this is what I came up with; it worked for me, so I thought I'd write it up for the benefit of others whose gear might be suffering from old age in the rotary or vibratory PSU departments.

Circuit Development

The 62 set runs from 12 volts DC and the proper HT is about 320 volts, with a measured current of about 90mA on transmit.

I figured that if I could get hold of a fairly compact transformer with the right ratios, that would be a good starting point. Maplin stock a nice range of toroidal mains transformers. I calculated that 12V applied alternately to a pair of 9v windings should induce about the right voltage in the (240V) mains winding. So, such a transformer, type VS08J, rated at 30VA, was purchased from said emporium for about £13.

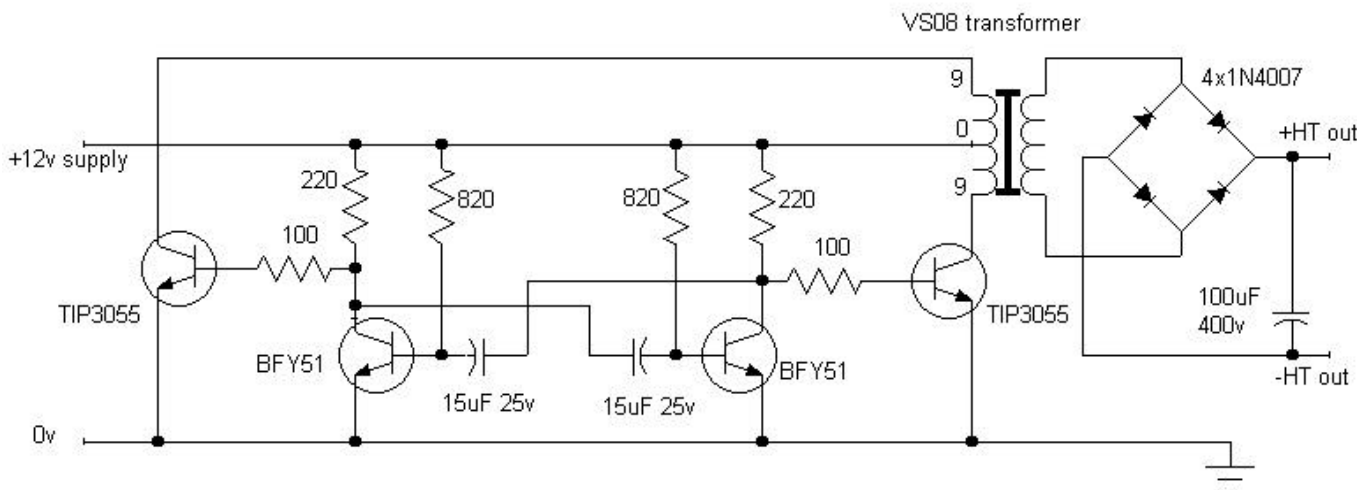
I built an astable multivibrator using a pair of BFY51s, set to switch at about 50Hz by judicious choice of base RC values. The output voltage of this is used to switch on and off alternately a pair of TIP3055s. These alternately earth either end of the two 9v windings connected as a 9V-0-9V primary, with the +12V supply applied to the centre. (It is important to connect the windings in the correct phase relationship. To check, before installing the transformer, I applied mains to the 240V winding and checked for 18V ac across the two secondaries, when connected in series. Of course, wrong connection would result in no volts.)

At this stage, I was delighted to measure about 360V AC off load. I then connected a 15W mains pygmy lamp, which lit to full brilliance with 260V AC measured. Quite encouraging.

I then added a bridge rectifier and a 100µF smoothing capacitor. With a 3,900 ohm load, it achieved 270V DC, which is slightly down on the 320V target, but good enough.

Installation

Removal of the rotary unit from the 62 set created a space of about 4 x 5 x 2 inches. There probably



62 set power supply (continued)

wouldn't be room for a smoothing capacitor. So instead, I upgraded the existing adjacent 8 μ F electrolytic with a modern one of roughly the same size, but rated at 100 μ F at 450V. The bridge rectifier was soldered to this. The toroidal transformer easily fitted into the space and was mounted elegantly by means of the mounting kit supplied with it, requiring only one hole. The multivibrator was built on a small piece of Veroboard, soldered onto a length of tag strip, which in turn was secured to the chassis.

The reason for choosing TIP3055s as opposed to 2N3055s is that they are well suited to bolting (with insulating kits and heat-sink compound) to the inside of the back of the chassis, each by means of one hole only.

Testing

The circuit was wired up, checked and checked again. A 12V (well, 13.8V really) supply was picked up from the rec-ON switch position. Time to switch

on! The receiver quickly came to life, with a total absence of hum and 270V shown on the set's voltmeter.

All-ON was selected and once warmed up, transmit was tried on 1963kHz AM, monitoring on my AR88LF receiver. Good modulation was heard with just a trace of somewhat raspy hum. Indicated HT was 260V. Power out was measured at about 2W, slightly down on the 3W with the old rotary. The circuit was soak tested on receive for a few hours and held up well. There was little heat apparent in the vicinity of the power transistors.

Overall, I am fairly satisfied with the results. I guess one key factor in the project's success is the use of a toroidal transformer, which is compact and also has the advantage of not allowing much hum-inducing magnetic flux to escape. Presumably, using a 50Hz transformer, whilst being bigger than the higher frequency ones often seen in switch-mode power supplies, means that the low switching rate generates little RF hash.

I am hoping that this modification will keep the set on the air for many years to come.