Doppler Direction Finding Unit for Transmitter/Foxhunting - G3KMG

TECHNICAL FORUM

Simple heater-voltage stabilizer

Heater voltage stabilization is usually recommended for some specialized transmitting tubes/valves. In the January 1991 issue of *RADCOM* Stan Brown, G4LU, suggests the following simple circuit which he uses for a pair of 2C39s in a 23 cm power amplifier, the simple arrangement shown in Figure 1 running at just over 5 V DC output.

He writes: "The circuit is simplicity itself and the large-value capacitor across the adjusting resistor provides a slow rise characteristic. The LM338K needs a finned heatsink, which is augmented by being mounted on the aluminium bracket for fixing to the case."

G4LU also notes that RS are now offering the LM396K IC regulator which is rated at 10 A and incorporates internal current limiting.

Two metre Doppler D/F system

In the 1980s, in connection with some "repeater problems" in Scotland, Dave Plumridge G3KMG developed a simple 144 MHz Doppler direction-finder and has since produced the MkII version shown in Figures 3 and 4. While the basic principles, method of use and so on are the same as those described for the ZS6EF unit in the November 1991 "Technical Forum", the absence of RF pre-amplifiers as well as the use of "surface Automatic polarity selector David Angus devised the ingenious automatic polarity selector shown below to protect



Figure 1. G4LU uses this stabilized DC supply to power the heaters of two 2C39 valves in a 23 cm power amplifier, ruunning at just over 5 V DC output.

mount technology—ham style" (figure 2) rather than a PCB for the electronic switch makes this a simple project for home construction.

The two antennas are switched sequentially to the receiver at approximately 800 Hz. Whenever the signals reach the receiver outof-phase due to slight path length differences, the signal presented to the receiver will be phase-modulated at 800 Hz. Only when the boom is exactly broadside to the transmitter will the tone disappear, thus indicathis CB transceiver (from Electronics Australia, April 1990).

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The relay and D1 either let the power straight through or if the polarity is wrong, exchange the power connections. D2 is to stop the spike from the relay as the field collapses and guse and D3 are in case the device fails. The device draws very little current and has no appreciable voltage drop.

The author suggests that D1 and D2 be mounted on the relay and the whole assembly installed inside the transceiver.



ing the two possible directions of the transmitter (ie in front of, or behind, the observer). G3KMG reports that the "null" is very sharp and there may be harmonic effects (due to multipath reflections etc) so that it is necessary to listen for the disappearance of the fundamental 800 Hz tone.

He also comments: "Incidentally I was impressed by the accuracy of the design information on helical-wound antennas given in Volume 2 of the RSGB Handbook. They resonated almost spot on, and with balun feed as shown gave a return loss of nearly 20 dB, not that it mattered too much in this instance for reception only."

(Reprinted from RADCOM July 1991) Postscript:

G3VA's "Technical Topics" section in the December 1991 issue of *RADCOM* contains whole page of reviews and comments about 144 MHz D/F systems. It should be read by anyone seriously interested in the various units previously described.







Figure 3. The 800 Hz electronic switch for Doppler D/P.

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Schematic and Layout







Tips on Assembly

Notes

1. The layout shown below uses a piece of blank printed circuit board with the copper facing up, and this acts as "Ground" except for the strip at the top which is +9V.

Clean the copper until it's shiny. Steelo pads or fine sandpaper work well. Optionally, spray the cleaned copper with clear plastic spray. This will keep the copper shiny and stop it from oxidising. The "Helmar Crystal Kote" spray for drawings, artwork, photos etc. from the art section of Warehouse Stationery works well. It only takes about 10 - 20minutes to dry, then you can solder straight through it.

- 2. the 555 IC is upside down, so it's lettering is facing the printed circuit board, and the pins are pointing up (towards the viewer)
- 3. The toggle switch is a three-way with a centre-off position.



The Antenna Pair

The most important point about the antenna is to keep both sides symmetrical so it's balanced.

The little box with the switching unit is shown mounted down the handle but it could be at the top, halfway between the two antennas.

In use, the helical dipoles are vertical, and there'll be a null when the antennas (and and the Z-Z line) is at a right-angle to the transmitter



In Use



When transmitter is at A: no phase difference, so tone volume dips

Further resources

HomingIn - a site devoted to Radio Direction Finding -- <u>https://www.homingin.com</u>

Intro to Foxhunting on YouTube
-- https://www.youtube.com/watch?v=y-tLH0Hz08g

An extensive and practical guide -- <u>http://www3.sympatico.ca/alduncan/ham/RDFing.pdf</u>

Transmitter Hunting - Radio Direction Finding Simplified" - a book -- http://www.homingin.com/THRDFSinfo.html