THE WEST RAND AMATEUR RADIO CLUB

February 2010
Volume 10, Issue 8

ANODE

Inside this issue:

Editor's Comments

Volume 10, Issue 8
February 2010

This months Anode

This month contains some more "Circuit Ideas" from the Wireless World magazine of the 80's. I hope you find them stimulating.

Engineered Metamaterials Enable Remarkably Small Antennas
http://www.nist.gov/public_affairs/techbeat/tb2010_0126.htm#antenna

Direct Conversion Receiver using NE612 for HF Bands
http://www.qsl.net/vu2upx/Projects/dc_rx.htm

Building a Remote Controlled Jukebox with Linux
http://angerman.net/articles/jukebox/

LCDproc - Linux LCD display driver
http://lcdproc.omnipotent.net/index.php3

{—}

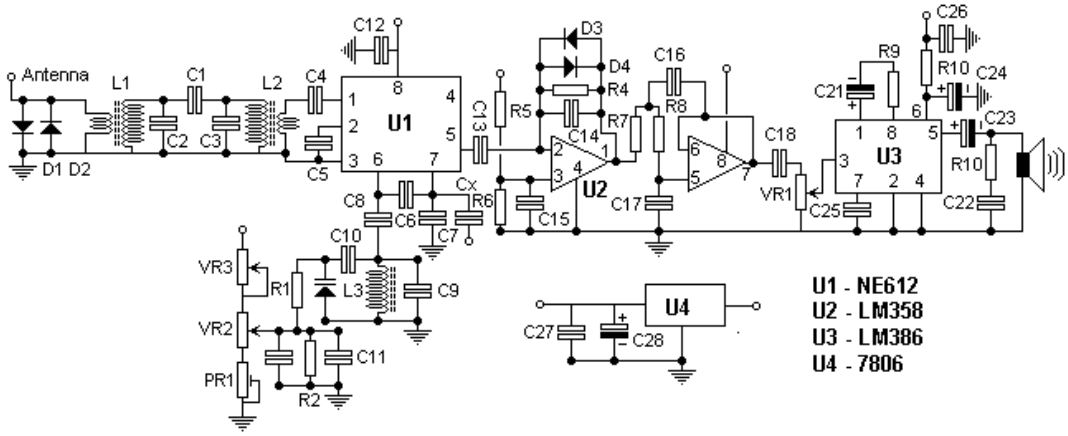
Two male engineers, one specialising in digital design and the other in analogue, are working together in the laboratory. A nude female appears at the door, attracting the attention of both men. The vision of beauty announces that every 10 seconds she will reduce the distance between herself and the engineers by one half. The digital engineer looks disappointed and states, "That's terrible she will

(continued on page 7)

A Direct Conversion Receiver using NE612

Special points of interest:

- Contact details on back page (corrected & updated Jan 2010)
- Ham-Comp Latest on web site.

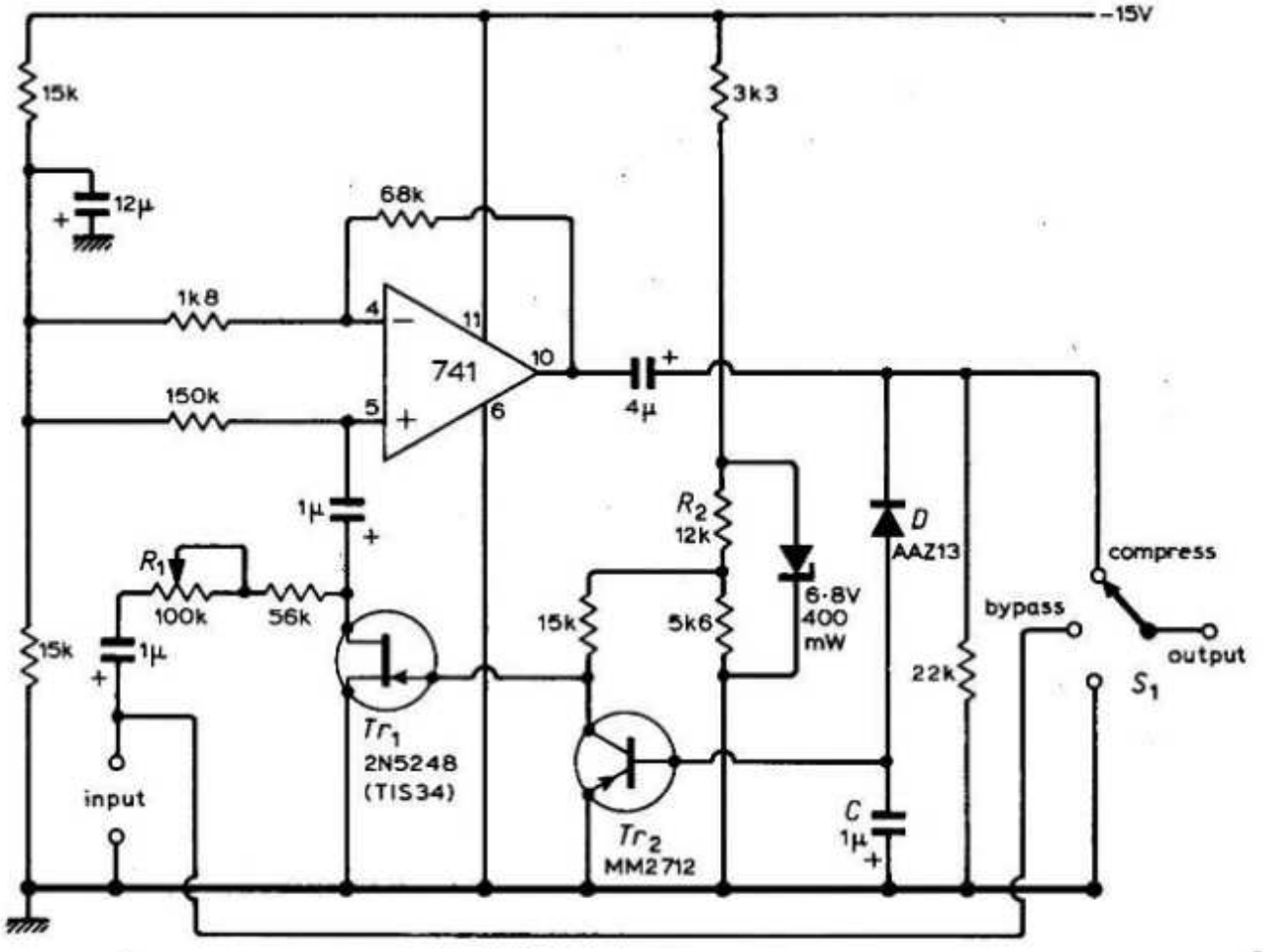


This is the circuit of the direct conversion receiver mentioned above. It is simple and easy to build. But requires an NE612 which is not so easy to source locally. The NE602 will not do as a substitute as the NE612 has an improved local oscillator circuit. JB

'Circuit Ideas' from Wireless World

Audio dynamic range compressor

This circuit was designed for use with tape recorders to reduce distortion occurring during transients and unforeseen crescendos, and to allow a higher average recording level, hence improving signal-to-noise ratios. It also gives interesting effects if fed excess signals, especially with pop music, as the recovery time of parable with the period of the lowest frequency encountered. The volt age at Tr2 collector should be between -2V and -2.3V, and is fairly critical as it defines the working point of the f.e. t. The sensitivity control R, adjusts the point at which limiting commences. If a stereo version is attempted, it is wise to equalize the operation of the two channels by adjustment of the collector voltage via R2, as R 1 is a fine control.



the a.g.c. mechanism appears as a modulation of the signal. It uses a readily available operational amplifier to provide a high input impedance and a well-defined gain. The low output impedance is used to drive the envelope detector D and its associated reservoir capacitor, Q thus giving fast reaction to spikes. The recovery time depends on C, (I have found 40-50 mS reasonable) and its minimum value must be com-

Gain of the circuit is around unity at low levels, reducing as the input signal approaches 350 mV. The output voltage remains a fairly constant 400 mV for input signals in the range 450 mV to 4V. There may be some room for adjustment in the circuit values, but I have found that a higher value of gain in the opamp stage slightly improves limiting, but reduces the up-

(Continued on page 3)

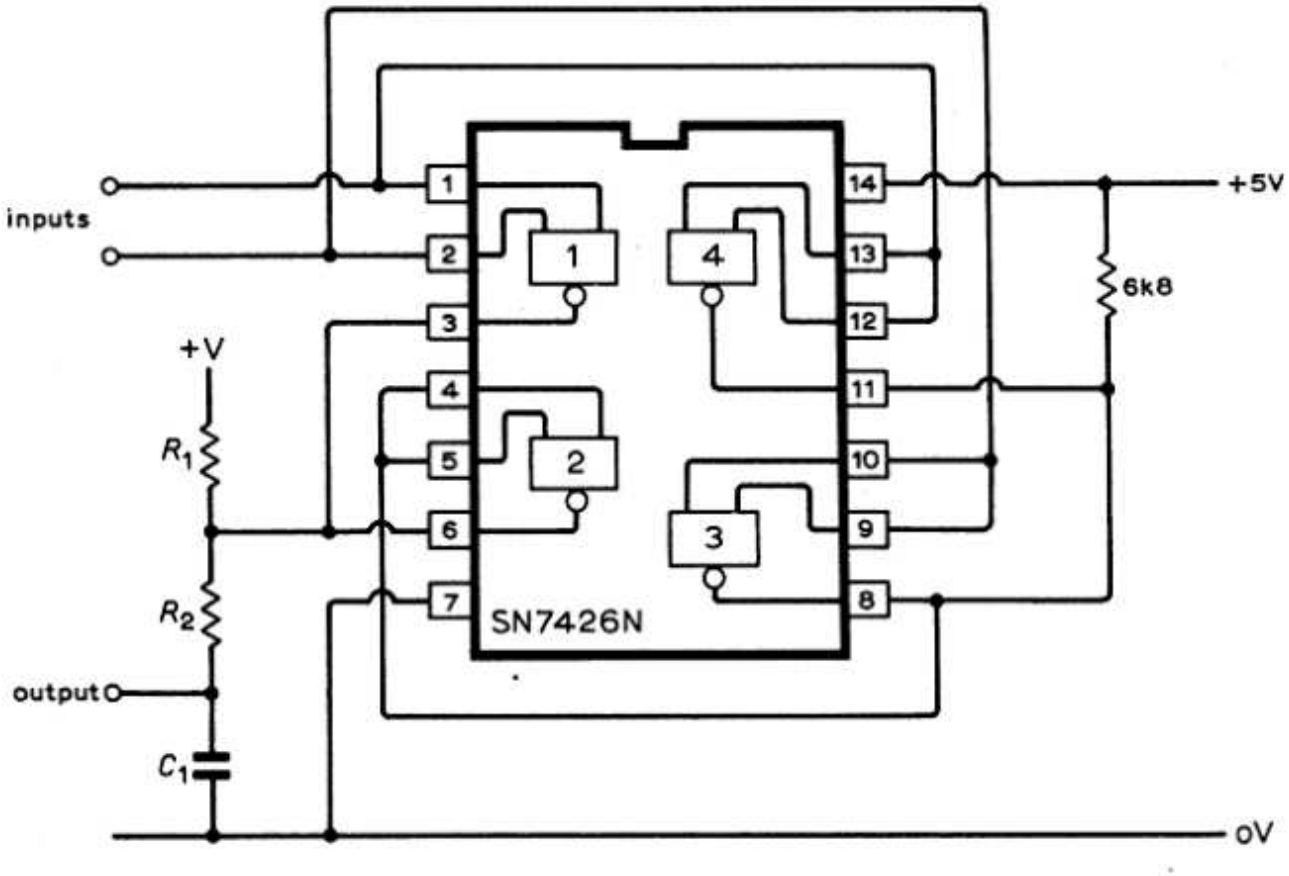
'Circuit Ideas' from Wireless World

(continued from page 2)

per limit at which the limiting action ceases. Reducing the gain just causes the amplitude. to "hunt" in response to large input signals. Consumption of a stereo version is around 6 mA. P. Hanson, University of Kent.

From:
Wireless World, March 1973

{—}



Inexpensive phase sensitive detector

A digital phase-sensitive detector with an output swing of up to 15 volts can be constructed for as little as 40p, using one SN7426N quadruple two-input nand-gate i.c. and a few passive components. The relationship between phase difference and d.c. output level is absolutely linear, so the circuit may find application in the construction of low-cost phase-lock loops and in phase-shift keyed demodulation.

The required logic function for phase detection is that of exclusive-or, i.e. '0' output for similar input levels and Voutput for dissimilar inputs, achieved by connecting the SN7426N as shown. Gate 1 gives the 'nand' function, while gates 3 and 4 act as inverters with their outputs combined by sharing a common load resistor. This combined output is fed to gate 2, inverted, and combined with that of gate 1, again by sharing a common load resistor.

The waveform produced by the detector is a rectangular wave whose mark-space ratio is proportional to the phase difference between the input square waves. This rectangular wave

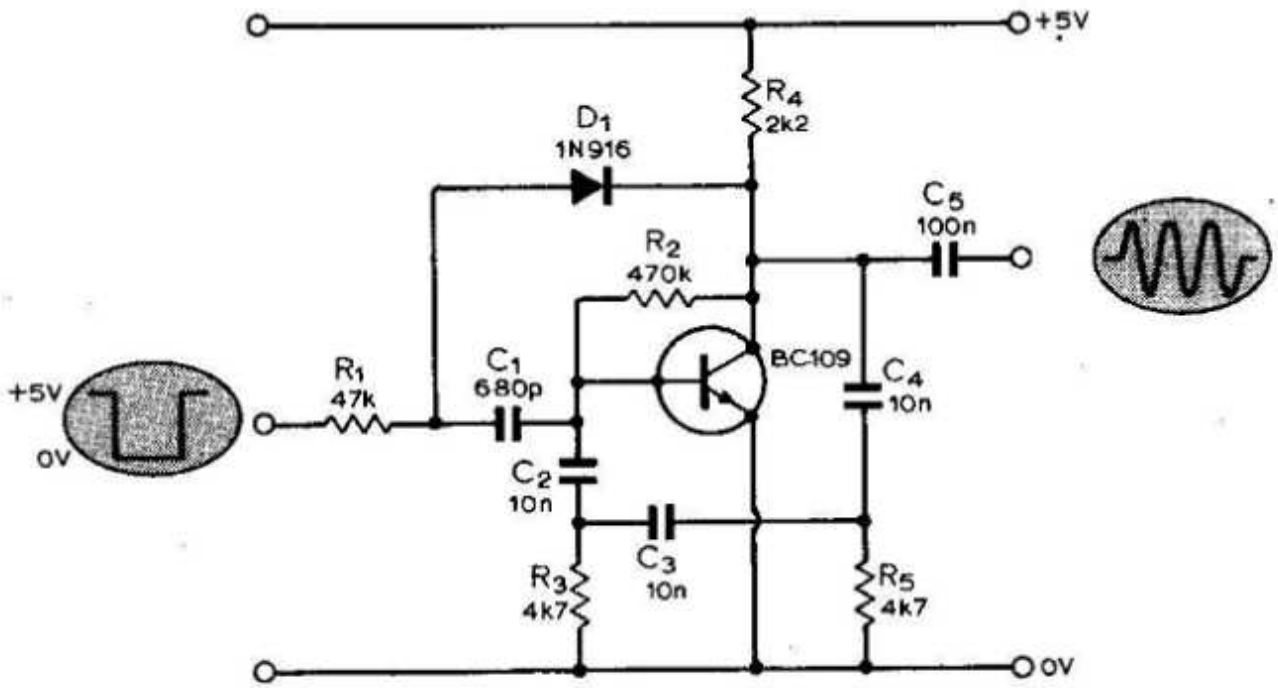
(Continued on page 4)

'Circuit Ideas' from Wireless World

(Continued from page 3)

is applied to a low-pass filter formed by R2 and C,, whose values should be chosen to suit the operating frequency and required output resistance. As the SN7426N has high-voltage open collector outputs, the voltage for the common load resistor R, may be chosen to give the required output swing, to a maximum of 15 volts. Note that the open collector outputs are rated. to sink a maximum current of 16 mA.

This whole circuit function could, of course, be achieved by using one circuit of a SN7486N quadruple two-input exclusive-or, but this would require the use of an external transistor to achieve an output swing of greater than 2.5 volts, as well as being more expensive. R. A. Harrold, Leicester.



Gated oscillator with rapid start

The transistor is used as a conventional phase-shift oscillator, with its operating frequency determined by C2, C3, C4 , R5, R3 , and the input impedance of the transistor. With the components shown the frequency of operation is about 1 kHz.

With + 5V present at the input, diode D, is forward biased via R,, thus almost 100% negative feedback is applied to the oscillator via D, and Cl preventing oscillation. When the input signal goes to OV, diode D, is reverse biased, removing the negative feedback. At the same time, the edge of the input pulse is applied to the transistor base, thus "kicking-off" the oscillator on its first half-cycle.

The value of C, is chosen so that the oscillator starts rapidly, but with no overshoot on the first half-cycle.

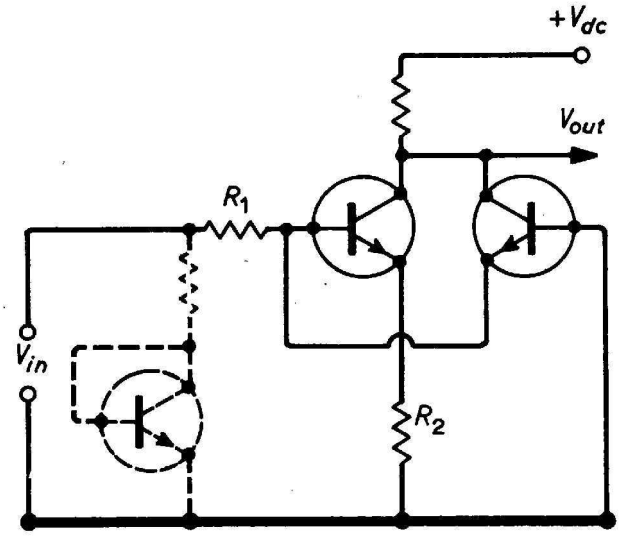
The first half-cycle is always in phase with the falling edge of the input signal.

G. F. Butcher, Cheltenham, Glos.

(continued on page 5)

'Circuit Ideas' from Wireless World

(Continued from page 4)

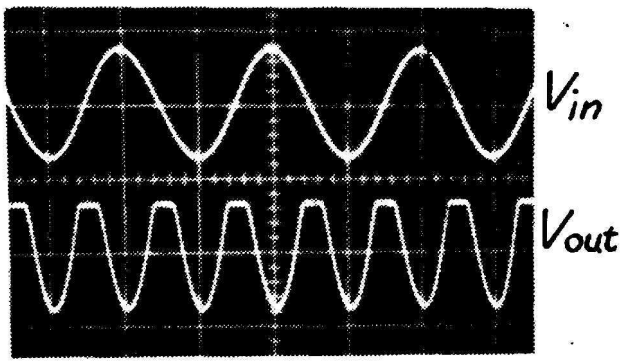


Simple frequency doubler with unbalanced Input

Known aperiodic frequency-doubler circuits require a push-pull balanced input, or have internal push-pull circuit arrangements. The circuit shown in the next column is a simpler solution to the problem, and gives excellent doubling action, as shown in the photograph, provided R1 = R2. Input voltage was 2.5V pk-pk. If the source of Vin has appreciable internal resistance, R, should be reduced accordingly.

The input impedance of the circuit is higher when Vin goes positive than when it goes negative, and this leads to unsymmetrical operation if Vin is supplied via a coupling capacitor. This trouble may be cured by adding a "transdiode" and resistor as shown in broken-line, the resistor value being the same as that of R, and R2. (An ordinary silicon diode may be used, but gives a less perfectly symmetrical input impedance.) With this modification, the internal resistance of the Vin source is no longer critical.

Resistors R , or R2 may, of course, be made adjustable, and set for total elimination of fundamental-frequency output. though this will not usually be necessary. The gains of the circuit to positive and negative inputs are well controlled by negative-feedback action.



If the collector load resistor is replaced by a tuned circuit of only moderate Q-value, say. 10, a clean double-frequency sinewave output may be obtained.

Peter J. Baxandall Malvern Worcs.

{—}

T.T.L. monostable maintains pulse width

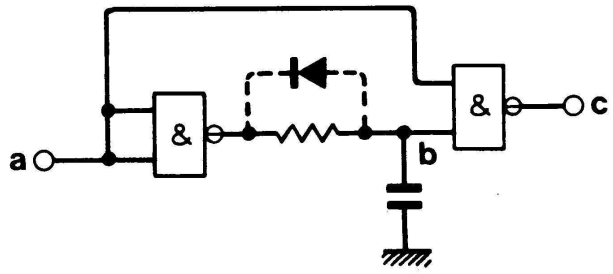
Addition of a single diode allows a monostable circuit to be used with much shorter input pulses. Introduction of an RC delay is a useful means of producing short pulses at the leading and trailing edges of an input pulse (e.g. H.A. Cole, WW January 1972 pp. 31-2) The delay introduced by RC limits the minimum usable input pulse width; for an input pulse of duration around RC the width of the output pulse is reduced. Addition of the diode restores the pulse width, as shown dashed.

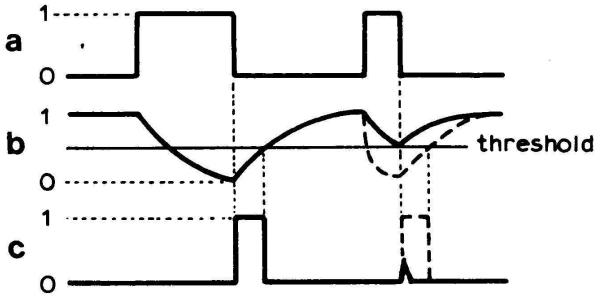
The general principle of using an RC delay in this way is acceptable only if adequate rise and fall times are maintained. For ordinary t.t.l. a rate of change of voltage at the logic threshold

(Continued on page 6)

'Circuit Ideas' from Wireless World

(Continued from page 5)

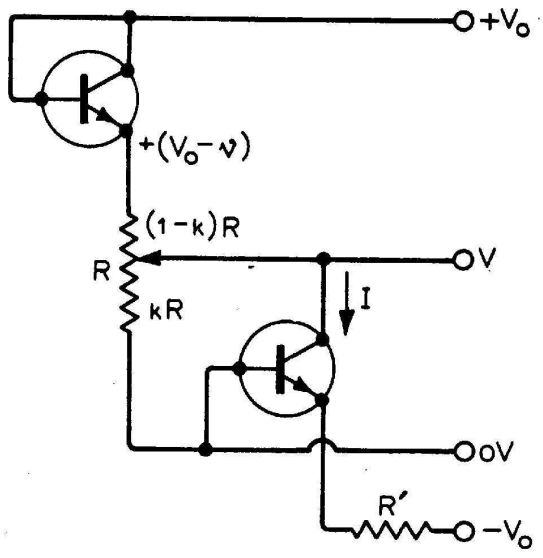




equivalent to a rise or fall time of more than about a microsecond may give rise to spurious oscillation.

J. V. Yelland, Didcot, Berks.

From:
Wireless World, March 1973



Square-law potentiometer

The circuit shown was developed to give a. bias for a varicap diode, varying as the square of the angle of rotation of a potentiometer control. If this angle is 0 and k = theta / theta0 where theta0 is the full angle of rotation, we have, letting v be the offset voltage for the second transistor.

Vo - v = (1 - k) R (I + V/ k R) + V
V = k (Vo - v - IR) + k^2 IR.

Thus if R' = R so that I = (Vo - v) / R
we obtain V = k^2 (Vo - v).

An experimental test using transistors of type 2N5172, a 10-k Ohm helipot and V,, = 9 volts yields a square-law response to better than ±1% over the range 0. 1 < V < 8.5 volts.
F. N. H. Robinson, Clarendon Laboratory, Oxford.

{—}

Simulating high-capacitance electrolytics

The first two circuits below are nearly equivalent, excepting that the drain of current is drastically reduced in the second. For small-scale applications, a BC107 with hFE of about 300 can be used, with up to 300 mW dissipation.

Either can be used to feed an a.f. preamplifier, or to partially stabilize a battery supply (e.g. a car battery), but the second has very little drain on the battery. By having a capacitor of about 100 uF with a BC 101, an apparent capacitance of about 3000MF is put across the output. The second circuit is cheaper and far less bulky than the first. I used this with certain audio equipment and it has completely eliminated the tendency of the preamp W' motor-boat".

The last two circuits are also almost exactly equivalent. Resistor R, is to cut down the leakage current of the circuit, and can be a very

(continued on page 7)

'Circuit Ideas' from Wireless World

(continued from page 6)

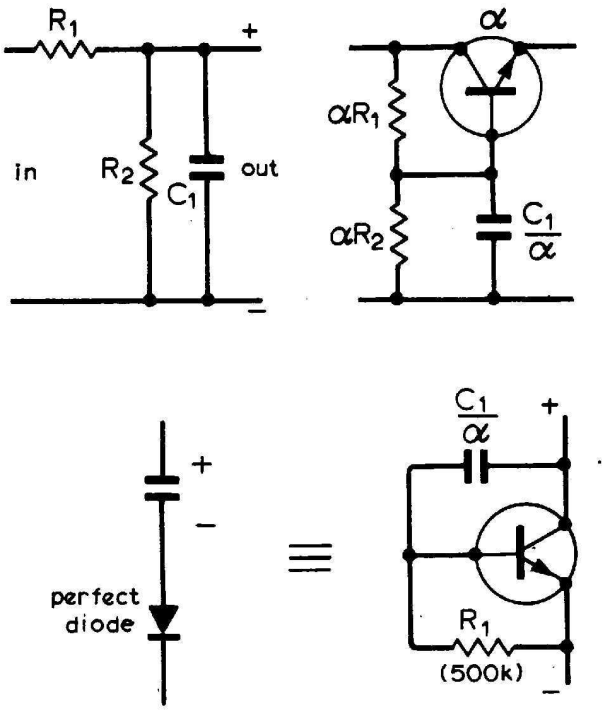
high value. The leakage current Of the second circuit is now. About 10 mA, using a BC 107 and 100MF.

I found the second circuit useful in switch-on-protection of loudspeakers.

Other circuits, using higher rating transistors (e.g. 2N3055) or p-n-p transistors, can be used.

Even bearing in mind that hFE for 2N3055 is only about 30, a cost saving of about 40% can be obtained.

R. M. Brady, Urmston, Manchester.



Editor's Comments

never get here." The analogue engineer smiles and then replies, "That's okay, she will get close enough."

That is the essence of analogue design - all else is explanation.

{—}

Morse Code still dashing through the Cordillera

By Desiree Caluza
Inquirer Northern Luzon
First Posted 04:17:00 12/23/2009

BAGUIO CITY There is no mountain high enough to block a Christmas greeting because highland communities that have no mobile telephone signals can still be reached by Morse Code.

In this day and age, the Commission on Information and Communication Technology (CICT) in the Cordillera Administrative Region is still operating a telegraph system that serves clients here.

Nothing beats the old technology, according to telegraph operators working at the Baguio City Post Office, never mind that each word transmitted costs a customer P2.40. (Mobile or landline telephone calls cost P10 a minute.)

Customers who use the telegraph to send Christmas greetings use 'broken English' to shorten their messages, rather like today's text messages, according to samples obtained by the Philippine Daily Inquirer.

Still profiting

Remarkably, the Baguio telegraph station still earns P3,000 a month, said Aurea Bilag, acting chief operator at the CICT.

'Editor's Comments

(Continued from page 7)

Bilag said the station's profits used to reach P10,000 a month until almost every resident in the Cordillera acquired a mobile telephone.

But the highlands are not always hospitable to Internet satellite or cellular phone signals, so the CICT continues to maintain 80 telegraph stations in Benguet, Ifugao, Abra and Kalinga, said CICT operator Helen Damasco.

The telegraph machines were purchased way back in the 1960s but the government has kept them working, Damasco said.

To facilitate communication among these towns when mobile telephones are inaccessible, local officials reach each other by Morse Code using these machines, she said.

According to Damasco, the machines are also active during typhoons, when more sophisticated facilities fail to operate.

"CW" machines

This Christmas, the telegraph office offers straight holiday message packages.

"Our Christmas telegrams are categorized [as] social telegrams," Damasco said. She said they used to send out telegram cards as their special Christmas message package, except that these had been phased out.

"Our visitors from Manila would see our [old technology] and they would laugh. And then they'd ask, "You still use CW (continuous wave) machines?" she said.

Continuous wave is the most common medium for transmitting messages to telegraph stations by Morse Code a sonic alphabet composed of dots (shorts) and dashes (longs).

The code was named after its inventor, American artist Samuel Morse, who developed the first successful electric telegraph in 1838.

The telegraph offices in the mining town of Itogon in Benguet province still use a World War II telegraph model called the "straight key," which is known in the United States as J-38.

Morse Code courses

Damasco, a telegraph operator for the past 39 years, said the telegram began to descend into obscurity in the 1990s because of the mobile phones and the Internet.

But vocational schools continue to keep Morse Code courses alive because the demand for the telegram has not disappeared completely, she said.

"Other operators learn Morse Code from the Internet" or by enrolling in the Telecommunication Training Institution in Valenzuela City in Metro Manila, Damasco said.

Christmas card sales are also brisk, indicating that the postal service remains busy during the Yuletide season. A Baguio bookstore has sold 200 cards daily in the run-up to Christmas Day.

The West Rand Amateur Radio Club
Established in 1948
KG33XU 26.14122 South - 27.91870 East

P.O. Box 5344
Weltevreden Park
1715

Phone: 082 342 3280 (Chairman)
Email: zs6wr.club@gmail.com
Web page: www.jbcs.co.za/ham_radio

Bulletins (Sundays at …)
11h15 Start of call in of stations
11h30 Main bulletin start

Frequencies
439.000MHz 7.6MHz split
Input: 431.4MHz (West Rand Repeater)
145,625 MHz (West Rand Repeater)
10,135 MHz (HF Relay)

Radio Amateurs do it with more frequency!

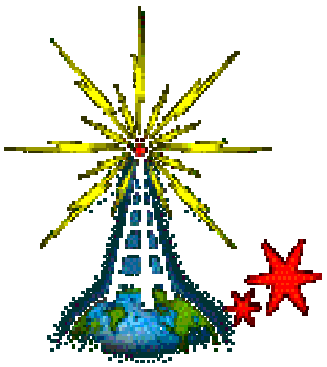
Chairman	Joop Hesp	ZS6C	082 342 3280	**zs6wr.club@gmail.com OR joophesp@telkomsa.net**
Vice Chairman	Geoff Levey	ZS6GRL	082 546 5546	glevey@gmail.com
Secretary	Phillip van Tonder	ZS6PVT	083 267 3835 (H)	phillipvt@sse.co.za
Treasurer	Craig Woods	ZS6CRW	083 449-4886	craig.woods@absamail.co.za
Member	Romeo Nardini	ZS6ARQ	082 552 4440	roshelec@global.co.za
Member (Anode)	John Brock	'PieRat'	011 768 1626	brockjk@gmail.com
Member	Ron Eva	ZR6RON	082 902 8343	ronnie@calidus.co.za
SARL Liaison (technical)	Willem Weideman	ZS6WWJ	082 890 6775	willem@zs6wwj.co.za

West Rand members - we need your input!

To make this the best ham radio magazine in South Africa we need your input. Please submit articles, comments, suggestions etc.

Please send plain text with no formatting to the email address below.

In July 2003, we re-published an Anode Compendium on CD. It has the issues from July 2000 until June 2005. This included the new Adobe reader. It has been updated, check with the chairman for details.



We need your input! Email us articles, comments and suggestions please.
zs6wr.club@gmail.com