MSB Design

Specification For The MSB Design Ringing Test Generator RTG-1

Introduction

On the British Telecom Public Switched Telephone Network (PSTN) the call indication received by the subscriber consists of a cadenced sinewave of nominally 25Hz at from 50v to 100v RMS, depending on the distance from the exchange source of ringing.

However, in some locations, and in countries other than Great Britain, different ringing voltages, frequencies and cadences are used, and equipment designed to respond to, (or ignore), these signals must be tested under those conditions, and that is why the Ringing Test Generator RTG-1 was designed.

As will be described in detail later on, the unit provides the means to supply the apparatus under test with the desired ringing conditions, so that both design and testing for compliance with BS or other specifications can be undertaken.

Let's look in more detail at the unit :-

Features

The RTG-1 is in effect a high voltage, variable frequency, variable output sinewave oscillator, but with several additional features. The unit provides a high purity sinusoidal output which is fully variable, via the front panel control, from 0v to 100v RMS, after which some clipping occurs before the control limit is finally reached. In addition, the frequency is fully variable, again via the front panel control, from 10Hz to 50Hz, with no degradation in waveform quality over the entire range.

Both the output voltage and frequency are continuously displayed on the front panel by 3-digit LED displays. When the output voltage exceeds 99.9v then the second decimal point on the display illuminates to indicate that the reading is in excess of 100v RMS. Thus, a reading of 102.5v would show as '0.2.5'.

The output can be a continuous signal, or may be cadenced by selecting one of the four choices on the front panel, these choices being :-

a) continuous

b) PSTN cadence (400mS, 200mS, 400mS, 2S)

c) PABX cadence (1S, 2S)

d) gated cadence

This last cadence option allows the user to provide a custom cadence by applying a voltage to the gate input. This voltage can be anywhere in the range of 2v to 100v dc, and the output is enabled when the voltage is present. In addition, there is provided a +5v output so that either a switch or a relay can connect this voltage to the gate input to allow remote or automated cadencing.

(There is also available from MSB Design a Cadence Generator CG-1 which can be connected to the gate terminal, and this allows the generation and storage of up to 10 custom cadences).

The cadence choice is reflected by an LED on the front panel which flashes in sympathy with the output signal.

Output connectors provided are a master line jack, 4 off auxillary line jacks and 3 off 4mm screw terminals. The master line jack has screw terminations enabling access to all six pins of the connector, so that extra signals can be connected to the unused pins, or the lines can be interrupted for loop measurements and the like. Note that the pin 3 ringing signal is derived by the master jack and any interruption of this pin will affect the other outputs as well.

The 4mm screw terminals carry the pin 2,3 and 5 signals from the main master line jack.

In the event of a short circuit across the output terminals, as would occur when a handset under test was taken off-hook, in order to protect both the unit and the apparatus under test the output current is monitored and if it exceeds 100mA then the output is disconnected by the use of a relay, and a hold period of approximartely 5 seconds maintains the disconnection; at the end of this period, if the short persists then the relay immediately re-trips, and this situation will repeat until the short-circuit has been removed. A front panel LED indicates this condition.

Operation is quite straightforward; both the output and frequency are set via the front panel controls and shown on the LED displays. There are two points worth mentioning here regarding these contols. The first is that the frequency control has a logarithmic response such that it becomes more active as the frequency increases; this means that the areas most used, those being the lower half of the range, have an extended resolution.

The second point regards the display of output voltage. Due to the requirement for a continuous display of output, even during cadenced operation, a sample-and-hold circuit operates on the output measurement section. This has to have a long time constant to cope with the 2S off period, so you will note that the display lags behind the adjustment by a maximum of 3S, although in practice it will mostly be much less than that. The actual ouput varies in time with the control. Choosing the Continuous cadence option will give a faster display update.

One last point about the controls; due to the stability of the oscillator output being maintained by the use of a thermistor, when the frequency is altered there will be some bouncing of the output until the circuit stabilizes, a period of 2 or 3 seconds, so on switch-on, and after making adjustments, wait a few seconds before taking output readings.

The unit is floating with respect to earth, thus allowing connection to earthed apparatus without regard to polarity. However, the internal 0v is capacitively coupled to earth to provide extra stability, and this will cause no problems. Note though that if the output polarity is changed such that the output is earthed, say by attaching a grounded lead, then the capacitor will discharge and a small spark may be noticed. Also, the output current sensor may trip, but will return to normal after it has timed out.

The output stage is a low impedance emitter-follower stage, with a 100 ohm current sense resistor in series before the output terminals. No capacitor is used to couple the output to the master line jack, so that the pin 2 connection is full voltage. The master jack's internal capacitor is used to derive the pin 3 ringing connection.

Uses

The uses that the unit is put to will depend obviously on the requirements of the user, but there follow a few suggestions :-

a) BS6305 test section D1 - REN determination

b) Ringing Detector response

c) Answer-Machine performance

d) Modem auto-answer response

etc.

Specification

Variable Frequency	10Hz to 50Hz	
Variable Voltage	0v to 100v rms	
Waveform	sinusoid to 100v rms	
Display	2 off LED 3-digit displays	
Outputs	1 off Master Line Jack 4 off auxillary Line Jacks 3 off 4mm screw terminals	
Short Circuit	indefinite	
Cadence Options	continuous PSTN PABX user defined	
Output Impedance	approximately 100 ohms	
Output	symmetrical about 0v dc offset nominally 2v	
Tolerances	voltage frequency cadence level	+/- 1% +/- 5% +/- 1% +/- 5%

The unit is housed in a steel / aluminium enclosure, with all switches and connectors on the front and rear panels. It is mains powered, via an IEC connector on the rear panel. Enclosure dimensions are 425mm x 260mm x 95mm.