GRUNDIG SATELLIT INTERNATIONAL 650

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The Grundig Satellit International 650 is a very versatile receiver being equally at home as a high quality portable or as a communications receiver. The frequency coverage includes l.w., m.w., v.h.f. f.m. and short wave from 1.6MHz to 30MHz.

My first surprise when the International 650 arrived was the size of the parcel which was about 600 x 340 x 270mm. Although there was plenty of protective packaging, the receiver itself was quite large at 504 x 242 x 202mm.

Once I had unpacked it, I sat down and read the manual, a good quality, A4 booklet with 54 pages. As is usual with this type of receiver, the manual was multilingual with six pages devoted to each language. Despite this seemingly small allocation, the features of the International 650 were explained adequately. There was also a fold-out sheet inside the front cover which could be referred to in order to locate the various controls.

I was delighted to see that the International 650 was able to work with a wide range of power sources. Probably the most common selection for this size of radio would be to use mains power. The International 650 was very well equipped being able to handle 110-127V and 220-240V a.c. at 50 or 60Hz. This should enable the receiver to be used almost anywhere in the world without any difficulties, which is a big plus point for the traveller. There was even a neat compartment next to the battery section which could be used to store the mains lead, though it wasn't quite big enough to hold the lead and a 13A mains plug!

If you enjoy working portable, there are yet more options as the International 650 can either operate from an external 10-16V d.c. supply or from internal batteries. When using batteries you have two options - either fit six R6 cells in the battery compartment or use a Dry-fit lead-acid battery. This latter option is very unusual on domestic equipment, but can be extremely useful as it allows extended periods of operation.

Regardless of which power source you use you will need to fit two R6 cells to provide back-up power for the clock and memories.

Having sorted out the power the next stage was to set-up an antenna. The simplest solution of course is to use the internal antennas which comprised the usual feritte rod for l.w. and m.w. and a 1440mm telescopic antenna for v.h.f. and the short waves. An interesting point with this antenna is that there is a stop at 810mm which is designed to be used for v.h.f. reception whilst the full length is used for short wave listening. Although these antennas work well within their limitations, best performance, on short wave can only really be obtained by using an external antenna. The connection for the external antenna could either be made via an unusual (at least in the UK) DIN 45325/75 type or alternatively wire connectors for antenna and earth.

The main benefits of using an external antenna are the potential reduction in interference, achieved by careful placing of the antenna, combined with increased signal strength. In order to realise these benefits, it is essential that the internal antenna is disconnected when using an external antenna. This is achieved on the International 650 by operating a small push-button next to the antenna sockets which selects either internal or external antenna. When receiving stations on l.w. it can be useful to be able to rotate the antenna for best reception. The sheer size and weight of the International 650 make it impractical to turn the receiver around so Grundig have fitted an additional socket and switch on the front panel marked DF to allow the connection of an optional, external l.w. directional antenna. This is a rather neat solution to this problem.

In addition to these basic connections the International 650 has one or two other useful features. The first is the provision of phono jacks on the rear panel for line in and out, this is matched with a DIN socket which is configured for connection to a tape recorder or record player. These sockets make it very easy to make recordings off air. One other feature is an external speaker socket which is designed for a 4Ω speaker, though it will work quite happily with the more common 8Ω types. Once an external speaker has been connected you can switch between internal, external or both speakers using a three way switch on the front panel.

Operation

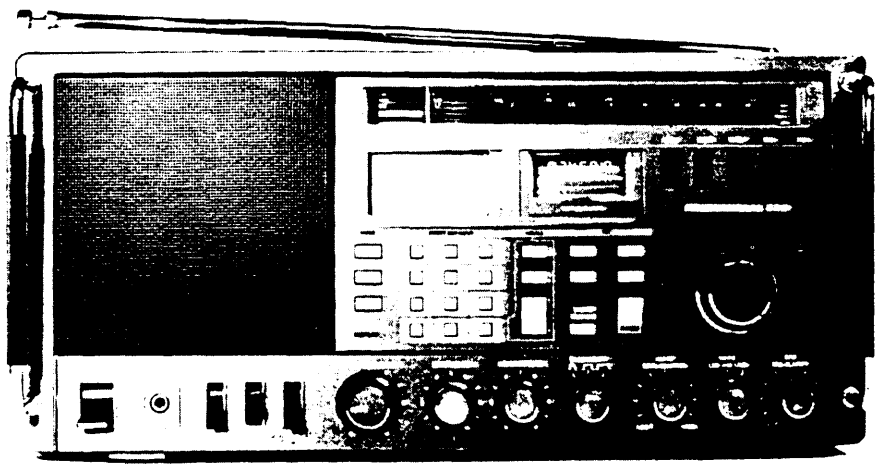
The front panel is positively bristling with controls and buttons, 44 in all!. The power switch has three positions, centre off, down for on and up for timer. The timer option is quite versatile as it allows up to three separate on - off sequences to be programmed using the internal clock.

There is a choice of three speaker options, external speaker only, internal speaker and internal speaker with tweeter. I must say it's unusual to have a switchable tweeter but this could of course be useful when listening to poorer quality signals where disabling the tweeter will reduce the hiss.

If you're using the International 650 with batteries, there is a useful battery check switch on the front panel which when ooperated gives an indication of the battery condition on the S meter. This feature has been well thought out as there are two markings on the meter one for use with dry cells and the other for Dry-fit lead acid batteries. The second position on this centre weighted switch turns on the panel illumination, making the frequency scales and S meter very easy to read. If you are using mains power, where economy is not so important, the panel illumination remains on permanently.

Separate volume, treble and bass controls are provided to allow the user maximum control of the sound quality, which seems to be a hallmark of Grundig. In addition to providing good control of music on v.h.f. signals, these controls are also very useful on short wave as you can tailor the response to suit the signal. There was also a very useful three position bandwidth control which gave a choice of narrow, wide or extra wide i.f. response. This filtering is very useful for reducing interference from adjacent stations on the crowded short wave bands.

No short wave communications receiver would be complete without the ability to receive s.s.b. and c.w. transmissions and the International 650 achieves this using the familiar b.f.o. The selection of s.s.b. is done with a three position rotary switch on the front panel which caters for a.m., l.s.b. and u.s.b. The b.f.o. tuning control is immediately to the right of this control has has quite a wide range. This wide b.f.o. tuning range is



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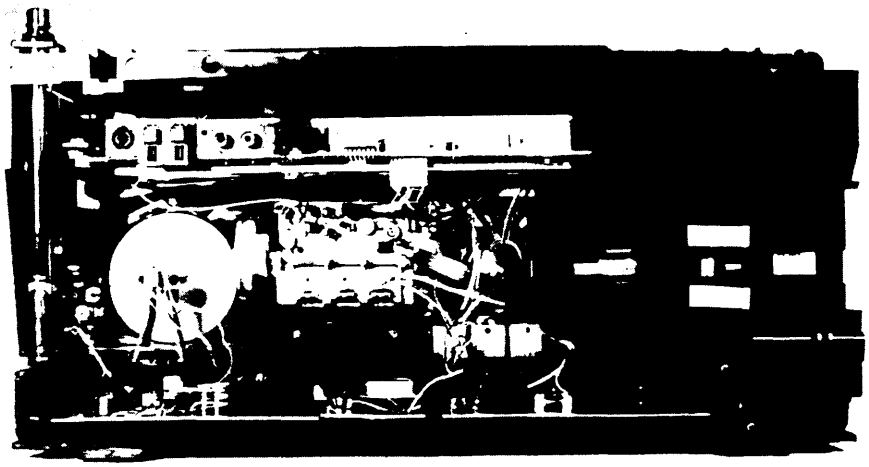
necessary as the smallest receiver tuning steps available are 1kHz. From this you can see that a b.f.o. range of at least 1kHz is required to fill in the gaps.

Another useful feature for s.s.b. and c.w. reception was the provision of a manual r.f. gain control. This rotary control can either be turned fully counter clock wise past the click stop for normal automatic gain control or advanced for manual r.f. gain control. Its main use is to reduce the r.f. gain in the presence of very strong signals and thus reduce the risk of internally generated interfering signals.

The final aid to reception was the provision of an automatic noise limiter. This was enabled by a switch on the front panel and was mainly of use on the short wave bands to reduce impulsive interference.

The International 650 was also equipped with an internal clock and timer functions. The provision of a timer can be very useful either as an alarm clock (though you would need a pretty big bedside table!) or for recording programs when you are away from home. The timer can be set for up to three separate on/off sequences during any 24 hour period. Unfortunately these sequences cannot be spread over more than one day. This limitation seems rather a shame as the International 650's clock also has a calendar, so it knows what day it is!

If you happen to own a Grundig tape recorder with remote start/stop facility, you can use a special lead to connect the tape recorder to the radio so that it automatically starts recording when the radio turns on.



Tuning

The International 650 features some interesting and well thought out tuning options. The choice of band was achieved by five pushbuttons on the front panel for l.w., m.w., s.w. and v.h.f. The fifth button was marked AUX and, if selected, allowed an external tape recorder or record player to be played through the International 650's audio stages.

Probably the most common tuning mode is manual and this is accomplished using the large knob on the front panel. The first thing you notice about this knob is that it is of the dual concentric type with the outer controlling the frequency, whilst the inner tunes an r.f. preselector covering the short wave bands. Separately tuned preselectors are something of a rarity these days, though they used to be very popular.

For those who have never come across a preselector, it is simply a set of tuned circuits close to the antenna input which act as a variable band pass filter. The object is to prevent all but the wanted signal from entering the signal processing stages of the receiver. By doing this you help to minimise distortion generated within the receiver. The International 650 displays the pre-selector tuning on a conventional analogue tuning scale which is some 250mm long and is placed at the top of the front panel.

I'm sure many of you are now thinking that in order to tune around the bands you have to tune both the main dial and the preselector. Fortunately, Grundig noticed this problem and have provided a neat solution in the form of a switchable motorised drive for the preselector. The default condition is for the drive to be on and this is indicated by the words AUT PRESEL appearing on the digital frequency display. When in this mode, the pre-selector dial automatically tracks the main tuning frequency. The tracking is not continuous, but follows the main frequency in approximately 50kHz steps. If you want to disable the automatic tracking and return to manual control you simply press the large button in the centre of the tuning knob. Actually, I found the auto-tracking quite fascinating and it's certainly a feature to impress your friends with!

Getting back to the tuning options, the frequency is shown by a five digit digital liquid crystal display near the centre of the front panel. The digits on this display are 16mm high so they are very easy to read, even under quite difficult lighting conditions. The resolution of the display was 1kHz on l.w., m.w. and s.w. whilst on v.h.f. it was reduced to 10kHz.

The second tuning option is to use direct frequency entry via the numerical keypad, again on the front panel. This method is particularly useful for large frequency changes and involves entering the most significant digits of the required frequency and pressing the red frequency set button. Like most modern receivers, the International 650 automatically inserts the trailing zeros.

Most modern receivers with digital tuning feature some form of frequency memory and the International 650 is no exception. In this case there are a total of 60 memories called station stores which are allocated to particular bands as shown here: l.w. 4 memories; m.w. 8 memories, v.h.f. 16 memories and s.w. 32 memories. This seems to be a pretty reasonable allocation which should prove adequate for most listeners. Entering a frequency into a memory was very simple and involved tuning to the required frequency entering the memory number on the key pad and pressing STATION STORE button. Unlike many receivers, there was no facility provided to scan through the memories which may dissappoint some readers.

Performance

Once I had made room for the International 650 in the shack it did perform remarably well. I mentioned earlier that Grundig are well know for producing portable radios with good sound quality and this was born out with the International 650. Fairly obviously, the best sound quality was obtained when listening to a local v.h.f. f.m. broadcast station. The 150mm speaker combined with the large case meant that the bass response was very healthy without being too boomy. The use of a separate tweeter also added clarity to the higher frequencies. When listening to a.m. broadcast stations I found it very easy to obtain optimum quality by careful adjustment of the bandwidth and tone controls. The bandwidth control was also very effective for reducing interference from adjacent stations.

The sensitivity was also very good and I was pleasantly surprised by the performance on the internal antenna. When connected to an external antenna, in my case a nest of dipoles covering from 3.5MHz to 28MHz, the performance was also very good. I did find that when used with an efficient external antenna system it was very easy to overload the receiver and cause all manner of spurious signals to appear. The newcommer can easily confuse this with appently good performance as there appears to be more stations on the band, the snag is that they are birdies. The solution to this problem is either to include a switchable attenuator in the antenna lead or to revert to manual r.f. gain control. The snag with using the manual gain control is that you experience the full effect of any fading and this can make to station very difficult to listen to. I think a receiver of this quality really ought to have an attenuator built in as standard. Despite my criticism, if you

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use the International 650 with its internal antenna or a relatively short external antenna you will rarely have a problem.

Moving on to s.s.b. reception, I tried the International 650 on various amateur and commercial signals and managed to resolve all signals with very little difficulty. I did find that I needed some practice before I could resolve all signals. The main problem was the 1kHz main tuning steps as it was very easy to tune either side of the signal but not quite hit the right point. The secret was to use the wide tuning range of the b.f.o. to fill-in the gaps betwen the 1kHz slots. The recovered audio quality was good when receiving strong signals but tended to be rather warbly with weak signals, though they were still quite readable. I found that the narrow bandwidth position was best suited to s.s.b. reception.

As the International 650 is capable of receiving utility transmissions, the next operation was to check c.w. RTTY, FAX and Packet data modes. The reception of these modes is very similar to receiveing s.s.b. but you need some additional decoding equipment. The one exception to this of course is c.w. which can be read by ear. I found that it was very easy to produce a good stable note using the b.f.o., which was fine for human or computer c.w. decoding.

Moving on to RTTY, I connected-up my BBC B computer, G3LIV terminal unit and G3WHO software to the audio output available from the DIN socket on the rear panel. The provision of this socket is particularly useful to the utility listener as the output level is independant of the volume control setting so you can turn the volume right down and still decode RTTY etc. Whilst testing the performance on RTTY I tried all the common frequency shifts of 170Hz, 425Hz and 850Hz and with careful use of the b.f.o. I was able to decode all modes with no particular problems. FAX and amateur Packet reception was also successful using an ICS Electronics FAX-1 and a Siskin Electronics TNC-220.

I found the tuning options to work very well and it was very easy to quickly change frequency by using direct frequency entry. The automatic preselector tuning was quite effective but never seemed to be quite in tune and a small manual adjustment was usually required to give best sensitivity.

One point I did find rather irritating was the two stage tuning control. If the tuning control was moved quickly the control logic selected a higher tuning rate of 3kHz steps on l.w., 5kHz on s.w., 110kHz on v.h.f. On s.w. there was a two stage shift of 11kHz followed by 111kHz. In addition to the higher tuning rate the audio stages are muted. Although this does allow fast and silent frequency changes, I found that the threshold was set far too low and it was very easy to all of a sudden find yourself way off frequency. The problem may have been due to me being too impatient, but I think prospective purchasers should bear this in mind when testing the receiver prior to purchase.

Summary

Although I had a few minor moans, if you fancy a top of the range Grundig then this model is certainly a very capable receiver. The performance on broadcast reception was very good and it has the potential for utility station monitoring, making it a good all round performer. The versatile power supply options are a big plus point and mean that it can operate in a wide range of conditions. I can well imagine the International 650 being used by people living in isolated areas anywhere in the world.

The International 650 is available from any Grundig dealer price £450. My thanks to Grundig UK and Johnsons Shortwave Radio for the loan of the review model.□

Specifications

Frequency Range:	f.m. 87.5 - 108MHz l.w. 148 - 420kHz m.w. 510 - 1620kHz s.w. 1.6 - 30MHz
Filters:	f.m. 3 ceramic. a.m. 2 crystal + 1 ceramic.
Output:	30 watts peak
Power Requirements:	220-240V a.c. 50/60Hz 110-127V a.c. 50/60Hz 10-16V d.c. 6 x R20 cells Grundig Dry-fit lead-acid
Dimensions:	504 (w) x 242 (h) x 202mm (d)
Weight:	8.5kg without batteries.

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