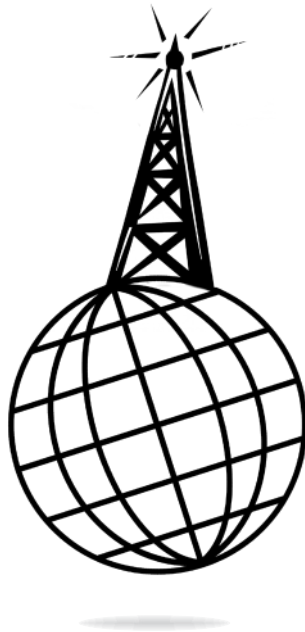


**TECSUN**  
RADIO AUSTRALIA

# Shortwave Listener's Guide



“Dedicated to those who seek to be better informed  
and gain more enjoyment out of life through the  
miracle of shortwave radio.”

THE HALLICRAFTERS CO.  
1961 Chicago Illinois.

Version 14

## Introduction

Virtually every country in the world has some sort of national radio broadcasting system. This can include Medium Wave (MW), FM or shortwave (SW).

Shortwave listening (commonly abbreviated to SWL) is the fascinating hobby of listening in to broadcasters around the world in real time.

This can be done at minimal cost from anywhere in the world without having to rely on anyone else. All that is required is a suitable Shortwave (SW) radio receiver and an antenna. Often the antenna is part of the receiver.

Shortwave listeners range from casual listeners seeking overseas news and entertainment to technical enthusiasts developing new antennas and reception methods. There are hundreds of millions of shortwave listeners around the world.

The Shortwave (also referred to as HF radio) bands are alive with a plethora of domestic and international broadcasts from around the world. These bands are also used by a wide range of operators including amateur radio operators, 4WD clubs, marine pleasure craft, commercial aircraft, the Royal Flying Doctor Service, airports, and coastal patrols to provide real time up to date information services.

To ensure maximum coverage of their signals, shortwave broadcasters operate at very high power and utilise directional antennas to cover areas with significant population.

Some radio enthusiasts prefer to concentrate their listening efforts on one band, hence there are dedicated listener groups for FM, MW and LW signals.

At Tecsun Radios Australia we aim to cater for all radio enthusiasts. In a blend of technologies, we have added internet radios, and amateur radio products to our range. So whatever your area of interest, we have you covered ! We test and use all the products we sell and can advise you on all aspects of this hobby.

Welcome to the world of shortwave listening !

## How Does it Work?

The mechanism that allows radio stations to be received from around the world is called the ionosphere.

The ionosphere is the region above the Earth's atmosphere located between 100 to 1000 Km above the surface of the Earth, and contains atomic particles that become ionised when exposed to X-ray and UV radiation from the Sun. It has the capability of influencing radio propagation around the world, by allowing signals to bounce off it and back to earth. The ionosphere is separated into several layers, depending on the altitude above earth. The most significant for shortwave listeners is the F2 layer, which occurs between 100 and 500Km above earth and is the densest part of the ionosphere. It is the layer responsible for most radio wave reflection. Reception via the ionosphere is called "skywave", in contrast to "groundwave" propagation which follows the surface of the earth. Long range reception varies between day and night due to the ionisation caused by the Sun. Skywave transmissions can be heard thousands of miles away from the broadcasting location.

### Shortwave Bands

The RF spectrum between 1800Khz and 30000Khz (1.8-30Mhz) is known as shortwave. This spectrum is broken down into the following shortwave bands:

49m band: 5900-6200kHz	41m band: 7200-7450kHz	31m band: 9300-9900kHz	25m band: 11600-12100kHz	22m band: 13570-13870kHz
19m band: 15100-15800kHz	16m band: 17480-17900kHz	15m band: 18900-19020kHz	13m band: 21450-21850kHz	11m band: 25600-26100kHz

Most shortwave receivers cover some or all of these bands. Between these bands are frequency allocations for "utility" stations.

## Utility Stations

Apart from shortwave broadcasters, other organisations use the HF spectrum. Generally these will be networks utilising SSB, established for communications purposes rather than providing entertainment signals. Organisations such as 4WD clubs, the Royal Flying Doctor Service, international aircraft, amateur radio operators, outback communications, ships at sea, Navy operations, and the Bureau of Meteorology.

## MW Stations

Long distance reception (called "DX") of domestic AM stations also falls under the umbrella of shortwave listening. During the night, when the radio wave absorbing E layer is thinnest, MW and lower frequency SW signals propagate long distances. This is why it is possible to pick up strong interstate AM stations at night. MW stations operate a variety of power levels from 50Kw to a few hundred watts. It can be an interesting technical challenge to receive some of these lower power stations.

## LW Stations

Many airports have a continuous non directional beacon (NDB) for pilot navigation. Normally identified by several letters in Morse Code referring to the airport location, these beacons often broadcast weather information for pilots. This is the most up to date weather information for the local area that is available. There are over one hundred NDB stations in Australia.

## FM Stations

Most cities and country towns have access to several FM stations. Often these can be Community Radio stations, ABC FM, or commercial stations. These stations have been allocated power levels to ensure they only broadcast in the area designated by their transmitter license. So it can be very interesting to see if any far away stations can be received. This is called long distance or "DX" reception. A directional antenna, similar to a conventional TV antenna can be used for this long distance reception. There have been instances where FM broadcast stations from New Zealand have been heard along the east coast of Australia, when conditions have been favourable. This phenomena is called "ducting".

## SW Stations

One of the great advantages of shortwave listening is that it allows you to listen to world events from a different perspective other than the local media. The Russian or Chinese interpretation of world events can be surprisingly different to that of the US and other Western countries. News items are normally broadcast in real time to give listeners the most up to date information.

Not all shortwave stations use English as their primary language, but almost all do have some English programming. If you are trying to learn a foreign language, shortwave broadcasts can be an ideal source of foreign language material. For immigrants, shortwave may be the only way to keep in touch with events from their mother country.

Travellers can stay in touch and obtain accurate road condition, bush fire, and flooding reports, by listening to the VKS 737 4WD radio network. News and entertainment services are regularly received in our region by shortwave radio broadcasters including the BBC, Radio New Zealand International (RNZI), and Voice of America (VOA), particularly useful when you are out of range of regular AM and FM stations.

Additionally, many of the shortwave radio broadcasts can be used to obtain useful information for example Aerodrome longwave (LW) Non Directional Beacons are a good source of local weather conditions and the Bureau of Meteorology's marine weather broadcasts provide accurate and timely coastal and offshore weather information for mariners. Of course this information can also be useful for land based travellers.

## Amateur Radio

In addition to shortwave broadcast stations, amateur radio operators share the shortwave spectrum. The bands in which "amateurs" can operate are set by international convention. Radio amateurs tend to be technically minded, sharing their technical achievements with others. Even though much lower power levels are generally used, world-wide communications can easily be achieved by using directional antennas and specialised transmission modes. Listening to amateur radio operators can open a whole new world to shortwave listeners, often providing the impetus to obtain an amateur radio license and talk to other like minded people around the world.

## **Sample Shortwave Listening with your computer**

Newcomers to shortwave listening might like to sample the hobby by connecting to our on-line shortwave receiver. You can do this with your computer and most popular web browsers. Simply visit: [www.tecsunradios.com.au](http://www.tecsunradios.com.au) and click the “Tecsun SW Radio Online” button on top of the page. This will link you to our on-line SDR receiver in regional NSW where you can view all available signals in the shortwave spectrum, and listen to any one of them.

## **Digital Audio Broadcasting (DAB+)**

DAB+ radio is a relatively new technology that uses an advanced digital and robust transmission system to overcome the problems of interference on MW (AM) signals and multipath distortion on FM. This improves performance over conventional broadcasting systems by offering improved building penetration and reception on the move, such as when using Public Transport.

There are 540 AM transmitters in Australia radiating from 50W to 50kW and almost 2,500 FM transmitters radiating from 1W to 250kW.

Each transmitter carries just a single program with some transmitting Radio Data Service (RDS) for the display of a line of text.

In Australia DAB+ transmissions are made in band III VHF spectrum on Ch 9 and Ch 10. As each transmitter can carry up to 26 programs, DAB+ has the potential to offer a huge range of programming and many traditional MW broadcasters already simulcast in this mode to achieve a larger audience, including those who are unable to receive satisfactory MW signals.

In addition, DAB+ radios include a visual display which can show news and weather information as well as current programming information.

DAB+ digital radio transmission provides superior audio quality when compared to traditional AM/FM radio signals and due to the compression system used, offers the listener a greater number of radio stations from which to choose.

## **Digital Radio Mondiale(DRM): The broadcasting system of the future**

Digital Radio Mondiale (DRM) is a revolutionary broadcasting system, suitable for medium and short wave bands. Since the earliest days of broadcasting these bands have been filled with signals that are amplitude modulated. These transmissions have limited audio quality, and particularly in recent years interference from consumer electronics products has created havoc with AM reception. Broadcasts in the FM band have received far more listeners with the result that audience figures are dropping for AM broadcasting.

Now DRM, (Digital Radio Mondiale) is becoming available in many countries and this has set a new standard in broadcasting. The next stage is the large scale implementation of these transmissions on the medium and short wave bands. DRM offers near-FM sound quality. This improvement over AM is immediately noticeable. DRM can be used for a range of audio content, and has the capacity to integrate text and data. This additional content can be displayed on DRM receivers to enhance the listening experience. This includes programming information, news, weather forecasts etc.

For listeners in remote locations the capability of DRM receivers to display information such as news, weather alerts, bushfire, flood and tsunami warnings is invaluable. This is a method of conveying information to listeners immediately and as it becomes available.

For international broadcasters, DRM allows access to a huge audience across the world at the much lower operating cost when compared to a regular analogue (AM) shortwave system. DRM on Medium Wave is perfect for broadcasters aiming for a national audience, especially in countries covering a sizeable geographical area.

In our part of the world Radio New Zealand International (RNZI) broadcast DRM signals into the Pacific. These signals can be heard in Australia, New Zealand, Vanuatu, PNG, Solomon Islands, Tonga, Fiji and most of other Pacific Islands.

**What you can listen to now- all frequencies in Khz.**

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<b>New Zealand:</b>	7390, 9700, 9765, 11725, 11690 (DRM), 13690, 13755, 13730, 13840 (DRM), 17675
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<b>BBC (SE Asia):</b>	5980, 6035, 7430, 9410, 11850, 15295, 21630, 15110 (DRM)
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<b>America (Radio Free Asia):</b>	7515, 15110, 15245, 11795, 12055, 13750, 13685.
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<b>Australia:</b>	4K2 5055, Shortwave Australia 4835, 2310. Bay Islands Radio 15045 Unique Radio: 3210, 5035
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<b>Solomon Islands:</b>	5020
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<b>Guam (KWTR):</b>	9320, 9870, 9900, 9910, 9975, 11550, 11965, 12120, 12160, 13740, 15400.
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<b>Vanuatu:</b>	3945, 9960.
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<b>Taiwan (Radio Taiwan International):</b>	5010, 5800, 5900, 6005, 6075, 6105, 6140, 6145, 6180, 7300, 7430, 9400, 9405, 9490, 9525, 9540, 9558, 9610, 9660, 9680, 9695, 9700, 9735, 9740, 9885, 9900, 11815, 11915, 12065, 13825, 15300, 15770.
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<b>Japan (NHK World Radio)</b>	11815, 6190, 9750, 11610, 13705, 15170, 15280, 17810
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<b>China (Radio China International)</b>	6060, 6090, 6135, 7325, 7325, 7420, 9535, 9600, 9645, 9730, 9870, 9880, 11790, 11885, 11910, 11925, 11980, 13125, 13590, 13660, 13645, 13720, 17710.
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<b>Palau</b>	9965, 15680.
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<b>Philippines (Radio Philippines Worldwide)</b>	9475, 9925, 12120, 15640, 15790, 17820.
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<b>Thailand (Radio Thailand World Service)</b>	7475, 9385, 9940, 13750, 17640.
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<b>United Kingdom (BBC World Service)</b>	7485, 9560, 9580, 11825, 15110 (DRM)
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<b>South Korea (KBS World Radio)</b>	6095, 7215, 7275, 9540, 9670, 9770.
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www.tecsunradios.com.au



## **When to Listen**

All shortwave schedules are based on Universal Time Co-ordinated. Until the 1970s this was known as GMT (Greenwich Mean Time), because the 0 degree line of longitude passes through Greenwich in London. There will be a variation from UTC for your local area. On the east coast of Australia the offset is +10 hours (+11 hours during Daylight Savings). UTC can easily be checked by listening to one of the many time signal stations broadcasting around the world. Such stations are WWV Colorado and WWVH in Hawaii which broadcast continuously on 2.5Mhz, 5.00Mhz, 10.00 Mhz, 15.00Mhz and 20.00Mhz. To differentiate between the 2 signals, WWVH uses a female and WWV uses a male voice announcement.

## **Other time signals**

### **Canada**

CHU is a radio station in Canada that broadcasts time of day information in a similar manner to WWV. CHU transmits on 3330 kHz, 7335 kHz, and 14670 kHz using AM compatible single-sideband full carrier modulation. Between 31 and 39 seconds (inclusive) past the minute, CHU transmits a computer readable timecode.

### **\*Japan**

JJY (domestic Japanese time signal)

There are 2 broadcasting sites utilising 60 Khz and 40 Khz respectively. The standard radio signals are broadcast in the LF band, which is less susceptible to ionospheric conditions. This allows signals to be received with an uncertainty of  $1 \times 10^{-11}$  when measured over 24 hours. That is only 1 part in 100,000,000,000.

### **\*Germany.**

DCF77 is a longwave time signal broadcast station located about 25 km south-east of Frankfurt. The radio signals are derived from an atomic clock, and broadcast on 77.5 kHz. The signal can be received up to a distance of 2000 km.

**\*China**

BPC transmits a time signal on 68.5 kHz, which can be used for synchronizing radio controlled clocks. As opposed to other time signal transmitters, the signal format is not published openly; a special license is required. The transmission site is situated near Shangqiu, Henan Province. BPC broadcasts at 90 kW for 20 hours per day, with a 4-hour break from 05:00–09:00 (China Standard Time) daily (21:00–1:00 UTC). BPC includes both conventional amplitude modulated time code and additional spread-spectrum time code, about which little is known.

**\*UK**

The MSF radio time code signal is broadcast from Cumbria, UK, and is intended to cover the whole of the of the British Isles. Previously broadcast from Rugby and known as the Rugby Clock, the time code signal can be received up to 1500km from Cumbria. This covers most of Western Europe, including the UK, Ireland, France, Netherlands, Belgium, Denmark. The signal is broadcast on 60kHz.

**\*USA**

WWVB Fort Collins Colorado USA broadcasts a 51 Kw digital time code on 60 kHz using 2 transmitters. The signal has been received as far away as New Zealand !

\*Primarily designed for the synchronization of radio controlled clocks.

**\*Russia**

RWM Moscow emits a CW signal on 4996kHz, 9996 kHz and 14996 kHz. There are no voice announcements. Transmission mode is CW however between 0 and 8 minutes past the hour, the station broadcasts an unmodulated carrier. At 9 minutes past the hour the station ID is transmitted in CW.

**\*France**

TDF is a phase modulated time signal, callsign ALS 162 on 162 kHz, broadcasting with a power of 800 kW from Allouis in France.

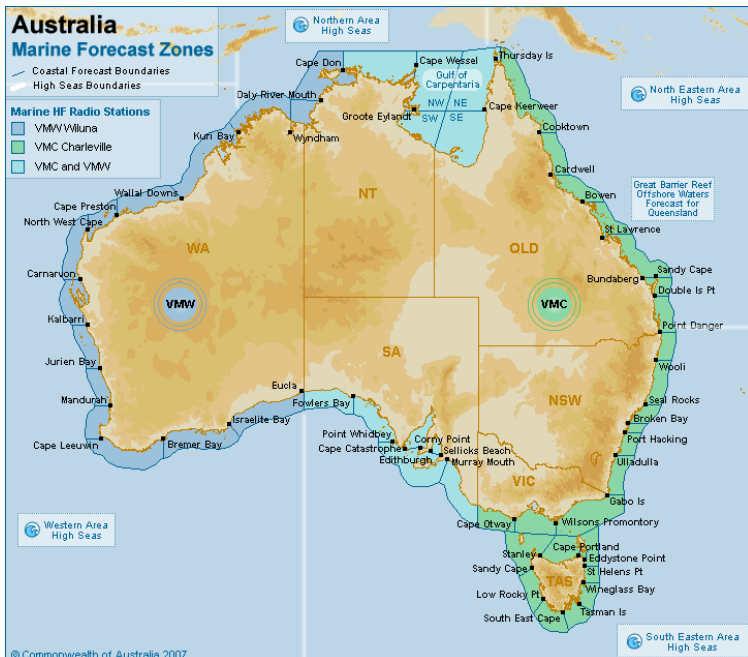
## Marine Weather Services

The Bureau of Meteorology provides 2 weather services for Australia: VMC for the East coast and VMW for the West coast. These services are designed for mariners and operators of leisure craft. However the weather forecasts are also relevant for land-based residents and travellers.

VMC is on 4426, 8176, 12365 and 16546 kHz during the day (7am to 6 pm) and 2201, 6507, 8176 and 12365 kHz at night (6pm to 7am).

VMW operates on 4149, 8113, 12362, and 16528 kHz during the day from 7 am to 6pm, and at night on 2056, 6230, 8113 and 12362 kHz.

Both services broadcast bulletins or warnings on the hour. Weather forecasts for coastal waters and high seas followed by coastal observations are broadcast using a program that is repeated every four hours. Special announcements are made 5 minutes before every hour.



## Aviation - Domestic

For those of us interested in aviation, there are a number of HF USB stations that can easily be heard.

### **Royal Flying Doctor Service**

The Royal Flying Doctor Service (RFDS) is the largest and most comprehensive aeromedical organisation in the world and uses the latest in aviation, medical and communications technology to deliver extensive primary healthcare and 24-hour emergency service to those who live, work and travel throughout regional Australia.

The RFDS operate from a number of locations across outback Australia and can be heard on the following frequencies:

Derby-VJB	6945, 5300, 2792 kHz
Port Hedland-VKL	6960, 4030, 2280, 5300, 5360 kHz
Carnarvon-VJT	6890, 4045, 2280, 2656, 5360 kHz
Meekatharra-VKJ	6880, 6825, 4010, 2280, 5300, 5360 kHz

## **International Air Routes**

Vast areas of the world lack the necessary local VHF radio communication systems needed to provide reliable radio coverage between aircrews and air traffic controllers. The lack of VHF coverage within most of these areas is due to the very remote location of these regions, for example much of the airspace over the Atlantic and Pacific oceans lacks VHF communications as it is impossible to install transmitters on a reliable platform within these regions.

As a result a network of shortwave (HF) frequencies have been allocated to provide long range voice communications between aircrews and ATC facilities. Aircraft arriving and departing from these locations: Auckland, Brisbane, Nadi, Pascua (Easter Island), Port Vila, Raratonga, San Francisco, Tahiti, Wallis can be heard on 3467, 5643, 8867 13261 and 17904 kHz.

## HF VOLMET - International

VOLMET aviation broadcasts contain critical meteorological information for aircraft in flight. Broadcasts include; TAF (Terminal Aerodrome Forecast), SIGMET (Significant Meteorological Information), and METAR (Meteorological Terminal Aviation Routine) information.

HF VOLMET broadcasts generally cover a large geographical area and are intercepted by flight crews whilst en-route to an area and out of local VHF ATIS (Automatic Terminal Information Service) broadcast range. The information received is used to determine possible flight route deviations by evaluating predicted weather conditions along their flightpath, which are out of aircraft weather radar range.

VOLMET terminal information for Brisbane, Calcutta, Bangkok, Karachi, Singapore, and Bombay is broadcast sequentially on 6676 kHz beginning on the hour and 30 minutes past the hour.

VOLMET terminal information for Tokyo, Hong Kong, Auckland, and Honolulu is broadcast sequentially on 8828 kHz beginning 10 minutes past the hour. All broadcasts are made using USB (upper sideband).

VOLMET broadcasts originate from the location on which they are reporting and can provide shortwave enthusiasts with a good indication of propagation conditions.

## Australian Longwave or Non Directional Beacon (NDB) Frequencies

These broadcasts are made to provide aviators with weather conditions at their point of arrival or departure and for navigation purposes. There are over 100 NDB transmitters operating in Australia, the list below provides some examples.

Bankstown 416, Richmond 347, Camden 281, Nowra 359, Brisbane 302 Archerfield 419, Mt Isa 338, Ballarat 239, Avalon 404, Moorabbin 398, Adelaide 362, Parafield 416, Perth 272, Darwin 344, Tindal 356, Alice Springs 335, Hobart 362, Launceston 242, King Island 332, Lord Howe Island 272, Broken Hill 332, Mildura 272, Nowra 359. (All frequencies are in kHz and use AM modulation.)

## HF Networks for Outback Travellers.

The Australian outback is a popular destination for travellers who want to see the real Australia and get off the beaten track. However, the isolation of remote areas is a constant concern and regular communications can help to identify potential hazards and ensure travelling safety.

There are several 4WD club networks operating on HF frequencies, that provide a safety network for people traversing through outback areas.

The VKS-737 4WD shortwave radio network provides a communication service for travellers including updates of the latest road conditions, weather forecasts, bushfire reports and a messaging service for travellers throughout Australia's most remote areas. [www.vks737.on.net](http://www.vks737.on.net)

The network operates on 3995, 5455, 6796, 8022, 10180, 11612 and 14977Khz depending on the time of day, from base stations located in Perth WA, Derby WA, Darwin NT, Alice Springs NT, Charters Towers QLD, St Marys TAS, Newcastle NSW and Swan hill SA.

The VKE-237 HF radio club operates on 3890.5, 5135, 6790, 7899, 9985, 11487, 12197, 14662 and 15972Khz. The club offers SMS, GPS tracking, phone patch and regular network skeds, operating from Wiluna WA, Alice Springs NT, Sapphire QLD and Cobar NSW. [www.hfradioclub.com.au](http://www.hfradioclub.com.au)

VMS-469 Reids Radio Data/ Bush Telegraph operates on 3995, 5455, 7899, 11612, and 14977Khz. The network offers HF email, phone patch and daily voice skeds. [www.reidsradiodata.com.au](http://www.reidsradiodata.com.au)

The Austravel HF Safety Network VMD 750 provides daily skeds, GPS tracking, HF SMS, phonepatch and HF email services. The network operates base stations from Alice springs NT, Casino NSW, Perth WA, Kununurra WA, and Shepparton VIC. The network operates on 3175, 5127, 5270, 6793, 7652, 9323, 10203, 13910, and 17463Khz. [www.austravelsafetynet.org.au](http://www.austravelsafetynet.org.au)

The Australian HF Touring Club AXD-888 provides access to emergency services through base stations located in the Hunter Valley NSW, Sapphire QLD, Perth WA, and Alice Springs NT. The network operates on 3760, 3885, 5105, 5264, 5734, 6820, 6910, 7999, 8043, 8160, 11013.5, 11016.5, 11407, 11450, 12216, 15890.5Khz. <https://aussiehf.club>

## Australian Domestic Shortwave Services

Since the demise of ABC domestic shortwave transmissions in 2017, several private operators have begun broadcasting. Unique Radio in Gunnedah, NSW, are operating on 5045Khz and 3210Khz USB, at 200W, Shortwave Australia has established a presence on 4835 and 2310Khz operating at 200 watts, and and Radio 4KZ is operating from Innisfail on 5055 Khz, at a power level of around 1000W.

## What is a QSL Card ?

QSL is the radio telegraph code meaning “I confirm” or “I acknowledge receipt”. In shortwave listening, a QSL is a card or letter from a radio station confirming that the recipient indeed heard the station. Most broadcasters will respond to listener reception reports with QSL cards or letters. Many SWL’s (Shortwave Listener) have amassed impressive, colourful collections of these souvenirs of their listening experiences. To receive a QSL from a station, you need to send a “reception report” to the station giving information about what you heard. A good reception report should include the following:



### Radio New Zealand International

1948-2008 Proud to serve the Pacific for 60 years  
The Voice of New Zealand, Broadcasting to the Pacific  
Te Reo Irirangi O Aotearoa, O Te Moana-Nui-A-Kiwa

#### QSL CONFIRMATION

To: Gary Cratt

Greetings from the South Pacific!

Thank you for your report on our transmission which we are pleased to verify.



Date: 2009/08/18

Time: 2000-0500 GMT UTC

Frequency: 13730 DRM kHz

Our Thompson CSF 100 kw transmitter is located at Rangitaki, east of Lake Taupo, and is linked to our studios in Wellington, 340 kms south of the town Taupo.

For QSL response by airmail please see QSL information at [www.rnz.com](http://www.rnz.com)

Best 73's

Adrian Sainsbury

Frequency Manager

1. The date and time (in UTC) you heard the station
2. The frequency on which you heard the station
3. Details about what you heard sufficient to establish that you indeed heard the station; these are things like names of announcers and programs, titles of musical selections, station slogans, etc.
4. An evaluation of the signal quality, including strength, degree of fading, and any interference you were experiencing (include the names and frequencies of interfering stations)
5. The make and model of radio you are using, along with any external antenna you use.

### SINPO-Signal Quality Evaluation Code

There is a universally used format for evaluating signal reception, when submitting a signal report and QSL card request, called the SINPO code. It calls for 4 reception parameters to be logged and a final evaluation of overall reception made. SINPO, is an acronym for signal, interference, noise, propagation, and overall, is used to describe the quality of radio transmissions, especially in reception reports written by shortwave listeners (SWLs). Each letter of the code stands for a specific factor of the signal, and each item is graded on a 1 to 5 scale.

Rating scale	S	I	N	P	O
	Signal strength	Degrading effect of			Overall rating
		Interference	Noise	Propagation disturbance	
5	Excellent	Nil	Nil	Nil	Excellent
4	Good	Slight	Slight	Slight	Good
3	Fair	Moderate	Moderate	Moderate	Fair
2	Poor	Severe	Severe	Severe	Poor
1	Barely audible	Extreme	Extreme	Extreme	Unusable

Many of people enjoy short-wave listening without bothering to send reception reports and collecting QSLs, and indeed there are listeners (and stations) that consider the entire practice to be a waste of time and energy. However, for those seeking immediate gratification, many stations now issue E-QSL cards, available by email immediately ! Today, QSLs cards from stations in countries like the USSR, Czechoslovakia, East Germany, Yugoslavia and other countries that no longer exist, are pieces of history



## The Phonetic Alphabet for Radio Communications.

The development of the modern phonetic alphabet for radio communication was developed and refined over the period from 1927 until 1965. Practical experience over both World Wars and subsequent conflicts involving voice radio communications have led to the final version used today, known officially as the NATO Phonetic Alphabet.

The phonetic alphabet consists of a collection of 26 code words, each representing a single letter of the alphabet. This system was devised and revised to ensure the use of the phonetic alphabet would eliminate any ambiguity during the passing of messages by radio (or telephone), and that the letters and numbers would be easily distinguishable from one another. Over radio, the names of many letters sound similar, for instance “n” and “m”, “f” and “s” etc. Using the codeword for each letter improves readability in poor radio conditions.

The 26 code words of the phonetic alphabet are:

Alfa, Bravo, Charlie, Delta, Echo, Foxtrot, Golf, Hotel, India, Juliett, Kilo, Lima, Mike, November, Oscar, Papa, Quebec, Romeo, Sierra, Tango, Uniform, Victor, Whiskey, X-ray, Yankee, Zulu. Emphasis is placed on the letters shown in capitals.

There are also codewords for numbers, to minimise miscommunication. These code words are used today by amateur, aviation, marine and both civilian and armed forces.

Number/Symbol	Codeword	Pronunciation
1	One	WUN
2	Two	TOO
3	Three	TREE
4	Four	FOW er
5	Five	FIFE
6	Six	SIKS
7	Seven	SEVen
8	Eight	AIT
9	Nine	NINer
0	Zero	ZE RO
00	Hundred	HUNdred
000	Thousand	TOU SAND
Decimalpoint	Decimal	DAY SEEMAL

Letter	CodeWord	Pronunciation
A	Alpha	AL fa
B	Bravo	BRAH voh
C	Charlie	CHARlee
D	Delta	DELL Tah
E	Echo	ECK oh
F	Foxtrot	FOKS trot
G	Golf	Golf
H	Hotel	ho TELL
I	India	IN dee ah
J	Juliet	JEW lee ETT
K	Kilo	KEY lo
L	Lima	LEE mah
M	Mike	Mike
N	November	No VEM ber
O	Oscar	OSS cah
P	Papa	Pah PAH
Q	Quebec	Keh BECK
R	Romeo	ROWme oh
S	Sierra	SeeAir rah
T	Tango	TANG go
U	Uniform	YOU nee form
V	Victor	VIK tah
W	Whiskey	WISSkey
X	Xray	ECKsray
Y	Yankee	YANGkey
Z	Zulu	ZOO loo

## A Practical Guide to Locating Sources of MW and SW Interference.

The introduction of switch mode power supplies, light dimmers, flat screen TV sets, computers and their monitors, printers, modems, USB hubs etc and energy saving light bulbs has brought with it a range of interference problems for users of AM and HF shortwave bands. RFI or radio frequency interference as it is formally known normally manifests itself on the AM broadcast and shortwave bands as harmonics of the fundamental interfering frequency.

A primary source of these interfering harmonics, are “AC adaptors” or “plugpacks”, these are the little power supplies used as battery charges for smartphones, radio receivers themselves, battery chargers etc. Although these devices operate at 200 kHz, the internal oscillator or more accurately the “chopper” circuit can generate harmonics well into the HF bands. Most of these devices are housed in a plastic case, free to radiate interference to nearby receivers.

Assuming you are experiencing such interference, the first step is to locate the source. First, ensure the receiver is being operated off its internal batteries, and tune to part of the AM or HF band where you can hear the interference but no radio signal is present. Turn off all room lights and see if there is any reduction in interference. Energy saving light bulbs contain electronic circuitry in the base of the light globe, which can cause interference. Dimmers are also a source of interference as well as fan controllers.

It is prudent to only try one thing at a time, so turn the lights back on, and then systematically unplug every smart-phone battery charger in your house. A smart-phone charger generating interference on the AM band can be heard several rooms away, either by being radiated back down the house wiring, or by being radiated in free space.

The next potential culprits to eliminate are TV sets. Unplug each one from the wall (turning the power point off is OK) and see if there is any change in interference. If you have progressed through the above steps without results, the next step is to turn off the power to your house at the fusebox. Whilst this normally means resetting all the clocks, microwave ovens etc. it will conclusively prove if the interference is coming from your house.

## S-2200x Communications Receiver



The Tecsun S-2200x receiver features the latest DSP technology blended with the classic desktop appearance that has been popular for decades. Featuring LW,MW,SW,FM and VHF airband, this is a fully featured receiver that offers fantastic performance. This receiver offers 5 user selectable IF bandwidth settings for LW,MW,SW and VHF airband as well as 10Hz tuning steps in SSB mode. The receiver allows the connection of separate external low impedance antennas for MW,SW and VHF/FM as well as a Hi impedance HF antenna. The receiver operates from 2 x 18650 LiOn batteries or 4 alkaline D cells, and has a standby current of only 100uA. Over 9000 stations can be stored in memory. Cat # S2200

## H-501x Communications Receiver



The Tecsun H501x, often promoted as the pinnacle of Tecsun's design efforts, covers LW,MW,FM and SW bands, is SSB capable, and has 3150 memory positions. 9 User selectable bandwidths for both AM and SSB modes ensure the best possible reception under all conditions, and the SYNC feature helps overcome fading when conditions are less than optimum. Powered by two 18650 Li-ion batteries, this receiver also allows playback from a micro SD card and BT. The large LCD screen makes the receiver easy to operate under all light conditions. The twin speaker configuration provides true stereo on the FM band. Supplied with leatherette carry case, earbuds, USB charging lead and charger, and 2 x 18650 li-ion batteries. Cat # Q3048

## PL-368 receiver



The PL-368 is the latest handheld version of the PL-360/365 series of slimline receivers. The form factor makes it ideal for grab bag or glovebox. This receiver features direct frequency entry via the keypad and synchronous detector to help overcome fading on shortwave broadcasts. The SSB capability offers 10Hz tuning steps and independent USB/LSB selection. The external antenna socket allows connection of external antennas on MW and SW, a great feature for Dx'ers. The receiver operates from a BL-5C Li-ion battery. This receiver features Teccsun's ETM system which creates time specific memories for convenient listening. Supplied with carry pouch, belt clip, battery, charging lead and earbuds. Cat # Q3028

## HS 4 10 Metre Band Amateur Transceiver



The HS 4 10 metre amateur transceiver covers 28.0-29.7MHz, and is programmed with all international simplex and Australian repeaters. This transceiver represents a very economical entry point into the world of Amateur Radio. This band allows regular international communications using simple antennas. The HS 4 offers multimode capabilities (CW,AM,SSB,FM) and has user adjustable RF output power, making it suitable for QRP, mobile or base station operations. This transceiver has many features including a large LCD display, Tx and Rx clarifier, CTCSS tone encode and decode and "Roger Beep" end of transmission function to name few. Supplied with microphone, mounting bracket, DC and programming cables and our comprehensive User Manual. Cat # Q4999

## 28 Mhz Halfwave Base Station Antenna



This 28 Mhz half wavelength base station antenna covers the entire 10 meter amateur band and comprises 9 aluminium tubes, which screw together ensuring easy assembly. Supplied with 10 metres of RG-58 coaxial cable, and terminated with BNC connectors. We also include 2 x BNC female to PL-259 adaptors. This combination will suit most transceivers. The antenna covers 28.0-29.7Mhz and has a power rating of 100 watts and gain of 3.5dBi. Total length is 5.6 metres with a centre frequency of 28.875 Mhz. We recommend the antenna be mounted on a vertical pipe several metres above the ground, for best results. Cat # Q5009



## HF Dipole Antenna



The Tecsun Radios Australia HF amateur radio dipole covers the popular 5/7/10/14/18/21/24/28 and 50Mhz bands. The antenna is rated at 100 Watts PEP power handling capability and is supplied in a convenient canvas carry bag. The antenna comprises a 1:1 balun and 2 bobbins containing the appropriate amount of wire to cover the specified bands. The wire elements are marked for each band. Cat #Q5005

## WR-390 FM/DAB+/Internet Radio



The WR-390 FM/DAB+/Internet Radio is our latest offering to enthusiasts. Featuring full DAB+/FM and Internet radio coverage by WiFi, Bluetooth connectivity, dual alarms, sleep timer, display dimmer, and audio equaliser. The unit is powered by an inbuilt Li On (2200mAh battery) which is charged via a USB C port. The receiver utilises 802.11b/g/n WiFi standard and has a Bluetooth range of up to 10 metres. This is the ideal solution where traditional radio is unavailable. Programmed with over 30000 stations worldwide. Cat # Q3062P.

## WR-18 Portable Internet/FM Receiver

The WR-18 is our first palm sized internet radio, allowing the user to take over 30000 radio stations anywhere WiFi is available. Ideal for travellers, listen to your local radio station whilst you are far away. Features FM, BT streaming, dimmer, clock, sleep timer and favourites storage. Wi-Fi range over 10 metres. Powered by a 3.7v 1800mAh battery. Supplied with USB C charging cable. Cat # Q3062H



## Gospell GR-216 DRM Radio



The GR-216 DRM Shortwave Radio is primarily designed to receive and decode DRM Shortwave Radio signals but the receiver can also be used to receive traditional Shortwave (AM) broadcasts, FM, and AM (MW) broadcasts. In FM mode this receiver also decodes RDS where broadcast. In slow tuning mode, the frequency step is reduced to 1 kHz. This is an advantage when tuning the extended MW band (530-1710 kHz) to receive specialised broadcasters in Australia. Cat # Q3061

## PL-990x Communications Receiver



The Tecsun PL-990x is capable of receiving the AM and FM broadcast bands, Longwave, Mediumwave and the Shortwave bands. This high performance receiver can receive AM, CW, SSB communication signals. There are a total of 9 user selectable IF bandwidth settings on HF modes to ensure the best possible reception, regardless of propagation conditions. Supplied with leatherette carry case, earbuds, USB charging lead and charger, and 1 x 18650 li-ion battery. Cat # Q3054

## PL-880 Communications Receiver



The Tecsun PL880 Radio is one of the most popular portable radios in the Tecsun range. It offers a very economical entry point for new shortwave listeners and has a proved track record over several years. The PL-880 offers 4 AM and 5 SSB user selectable bandwidth settings for optimum reception under all conditions. The PL-880 offers 3050 memory storage positions, and is powered by a single 18650 lithium ion battery. Battery, USB charger, cable, leatherette carry case and earbuds included. Cat # Q3053.

## PL880/990x Protective Hardcase



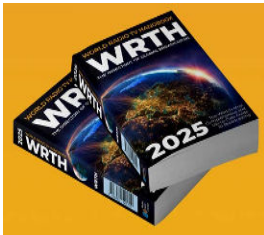
Protect your PL-880/PL-990 with this protective ABS carry case lined with high density foam. Closefit moulded case halves ensure resistance to moisture and the inbuilt feet allow the equipment to be stored vertically. The case can accommodate your receiver, battery, and battery charger, and is supplied with the AN-03L 7 metre retractable onwrig antenna. A must have option for travellers, hikers, campers and those who simply want to take care of their receiver. Dimensions 355mm(W) x 260mm (H) x 90mm (D). Cat # Q3122





FDP Pro 80CH 5W UHF Handheld Transceiver CB is one of the most (if not the most) feature packed IP67 certified waterproof & dust proof handheld radios available for both the Citizen Band Radio Service and Land Mobile Radio Service, being AS/NZS Approved for both. Allows up to 128 Channels for the LMRS covering 430 – 500 Mhz. This compact and stylish transceiver represents superb value when you consider the list of extensive features that include Multi Battery Save, VOX, Frequency Receive Mode, Keypad access CTCSS/DCS, Voice Prompt Guide, PTT ID, Scrambler, Alpha Tagging and so much more. The special 'Function Button Disable' feature can also lock the radio to being Software Defined\* only, making the radio very simple to use if required. Many of these have been sold to remote communities as "emergency" radios. Cat # Q6000

### 2025 World Radio and TV Handbook



This 79th edition is the most recent printed edition of the famous World Radio and Television Handbook, used by shortwave enthusiasts around the world since 1947. Over 800 pages contain the following:

An A-Z country by country directory of national radio stations with SW, MW and FM frequencies and contact details, websites etc. International Radio – full details of the broadcasters and their shortwave frequency schedules.

\*Frequency Lists – MW by frequency within region, SW by frequency including DRM broadcasts.

Technical Articles

\*Reviews of the latest receivers & equipment, including many Tecsun models.

\*Alphabetical listing of TV broadcasters by country.

\*Colour Maps showing SW transmitter sites.

\*Reference pages including domestic and International Shortwave transmitters, DX Clubs, Standard Time & Frequency transmissions, Internet resources etc.

Cat # B1035

### S-8800 LW/MW/SW/FM Receiver



The Tecsun S-8800 has been designed as a Broadcast Listeners Radio to provide optimum sound quality on all bands. The receiver is equipped with bass and treble controls, and an RF gain control to ensure the best possible fidelity, regardless of band conditions. Capable of receiving LW,MW,SW and FM this receiver is supplied with a remote control to allow the receiver to be positioned and then operated without touching the unit. Connection to external antennas for MW,SW and FM bands is also facilitated. This receiver operates from two 18650 lithium ion batteries. USB charger included. Cat # Q3042

## Communications Headphones



These Communications Headphones have been specially selected with user comfort in mind. This is essential for long periods of shortwave listening. The over ear closed cavity design is fitted with leather earpads and ultra soft memory foam to ensure listening comfort. Good dynamic range is achieved by the use of efficient 50mm NdFeB magnet drivers. The 3m connection cable means there is always sufficient length for headphone monitoring whilst engaged in other activities in your radio shack. The durable, vacuum formed carry case, ensures your headphones are protected when not in use. Cat # Q2500

## TECSUN PL330 Radio



The Tecsun PL-330 is the latest pocket sized portable receiver offering SSB capability. This feature, coupled with direct frequency entry makes the PL-330 the ideal receiver for those wishing to listen to shortwave radio utility stations, amateur radio transmissions as well as regular shortwave broadcasts. The Tecsun PL-330 offers ETM+, a search function that populates the 24 ETM memories according to the hour of day in which the signal was received. Pressing the ETM button once the initial frequencies have been stored, automatically selects the frequencies previously stored at that time of day.

Cat # Q3040

## XH Data D-808 SW Receiver with VHF Airband



This receiver covers LW,MW,SW FM and VHF airband. It is SSB capable and has RDS function of FM. VHF airband listening is enhanced by the provision of the squelch control muting the receiver when no signal is received.

There are 6 user selectable IF bandwidth settings for HF reception and 500 memory positions to store your favourite stations. supplied with USB C charging cable, soft carry pouch, wire antenna and our own instructions.

Cat # Q3051R

## BEST Emergency Radio



The Best Emergency Radio is a high performance AM/FM/SW Solar Powered Radio with inbuilt Hand Crank Dynamo Charging. Suitable for the reception of AM, FM and International shortwave stations, this receiver has an LCD display, so the frequency to which the receiver is tuned is always known. The receiver also includes a LED torch, personal alarm, and siren. The unit can be used to charge a mobile phone through the standard USB port on the side of the unit. Cat # Q 3002

## De13DSP Emergency Receiver



The Tecsun DE13DSP economy Emergency AM/FM/SW Solar Powered Radio is the perfect radio to keep in touch with the outside world whilst camping or bushing walking. The Tecsun DE13DSP Emergency AM/FM/SW Solar Powered Radio includes a inbuilt Solar Panel and Dynamo hand crank charger that allows charging the internal battery or any other device by USB or mini USB including your mobile phone. This radio has amazing sensitivity. Cat # Q3000

## TECSUN AN-100 AM Loop Antenna



The Tecsun AN-100 AM Loop Antenna is designed to improve the reception of weak AM radio signals. This AM Loop Antenna acts as a high Q pre-selector that can be tuned to the desired frequency/station. The Tecsun AN-100 AM Loop Antenna will increase the audio quality and clarity when compared with the internal antenna, by reducing noise. Supplied with a connection cable fitted with 3.5mm plugs for receivers without a ferrite rod antenna.\*\* May require modification. Cat Q3052



## Shortwave Outdoor Antenna

This end-fed 10 metre longwire outdoor antenna significantly enhances reception of signals in the Medium wave and Shortwave bands covering 0.5-30Mhz compared to a 10m length of wire. The antenna utilises a 9:1 weatherproof balun to ensure the correct impedance match to all Tecsun portable receivers, and is supplied with a 10m detachable length of RG/58 coaxial cable with coaxial adaptors. Supplied with nylon cord, egg insulator and popular coaxial adaptors. Cat # Q3070AU



## AN-03L Retractable 7 metre wire antenna

This compact, retractable longwire antenna allows the user to clip one end onto an elevated fixture inside a room and then plug the other end directly into the 3.5mm external antenna socket found on most Tecsun receivers.

Cat # Q3298



## U-600 USB to 6V Voltage Converter

This USB charger converts 5V standard USB voltage to 6V DC, suitable for charging the NiMh batteries supplied with the Tecsun PL 600, PL 660 and PL 680. The output plug (1.7 x 4.0 x 9.5mm) is wired centre negative to suit these models. Cat # Q3034

## MLA-30+ Active Loop Antenna



The MLA-30+ Shortwave Loop Antenna is an affordable active loop antenna that allows people without the luxury of a large backyard the ability to use an external antenna to boost the performance of their shortwave radio and increase the number of radio stations and that can be received. The MLA-30+ Shortwave Loop Antenna can be mounted indoors on any non-conductive rod or tube, such as PVC conduit or fibreglass rod. The loop element of the MLA-30+ has a diameter of 60cm and is connected to the active amplifier housing by two stainless steel wing nuts. Cat # Q3069

## Discone Ultra-Wideband Antenna



Our upgraded Discone is an ultra-wide-band antenna capable of covering 25-1300MHz. Supplied with 8 metres of low loss RG-58 coaxial cable terminated with a type N plug and a BNC plug. This antenna is easy to assemble, requiring only one hex key (provided). Two support brackets and U bolts to allow mechanical mounting onto a pipe up to 50mm diameter are included. We also supply a BNC female to PL-259 coaxial adaptor for connection to many popular receivers and transceivers. Cat # Q3071

## PL-368 External Ferrite Antenna

Simply plug this antenna into the external antenna socket for enhanced MW reception. Although the PL-368 does have a small, internal ferrite rod antenna, this larger antenna will provide superior performance. Connection is made via the 3.5mm mono antenna socket on the top of the receive. Supplied with the PL-368 and available as a spare part. Cat # Q3127



## Commonly Used Coaxial Adaptors

P1425



SO-239 to BNC male adaptor

P1426



BNC female to PL-259 male

P1502



BNC female to BNC female

### SMA Coaxial Adaptors



These SMA adaptors are used to convert the growing number of antennas utilising SMA output connectors to commonly used BNC and 3.5mm configurations. Cat # P1431 and P1432 (sma female to 3.5mm plug)

### BNC to 3.5mm Adaptor



Our BNC to 3.5mm Adaptor allows any external antenna fitted with a BNC plug to be connected to our range of Tecsun Radios including the S-2200x, PL-990x, H-501x, PL-880, PL-330, S-2200x and PL368. Cat P1423

### BNC to BNC Adaptor



This BNC female to BNC female coupler allows the connection of two BNC cables together, like our Q5006 ten metre antenna cable, to achieve an extended feed length. Cat # P1502

### TECSUN 18650 Li-ion Battery



The Tecsun 18650 Li-ion Battery provides 3.7V at 2000mAh and is specifically designed for the PL880, S-8800, H-501x, S-2200x and PL990x. The Tecsun Li-ion Battery provides approximately 50 hours of operation on a full charge. Overcharge protected. Cat # Q3300

### TECSUN 10m Longwire Antenna



The AN-06 10m wire antenna is perfectly suited to any model receiver with an external antenna socket. Just extend the length or wire, clip the end to a curtains window frame or other elevated fixture and plug the other end into the receiver. An economical solution where space is limited. Perfect for use indoors or in locations with high levels of background interference. Cat # Q3301

### Australian USB Power Adaptor



This USB Power Adaptor 240V features a compact design. This great, little power adaptor offers fast, efficient charging for any Tecsun model requiring a USB power source and should be used with the USB cable that is provided with each receiver. Cat # Q3302

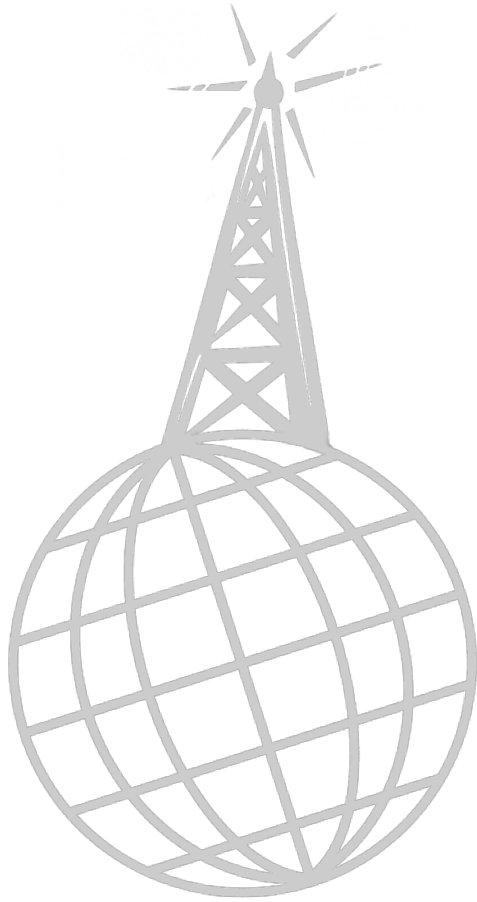




We stock Tecsun genuine replacement telescopic antennas for H-501x, PL-990x, PL-880, S-8800, S-2200x, PL-368 PL-330, De 13DSP

We stock replacement battery compartment lids and back stands for PL-880, PL-990X, H501x.

Others Available on Request



[www.tecsunradios.com.au](http://www.tecsunradios.com.au)