Australian Scanner's World

$5.95*
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Computer-sorted Frequency Listings:

- State By State
- Beacons, Satellites
- Emergency Services
- Overseas DX Beacons

Setting Up Your Antenna

The Latest Rigs

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SCAN AUSTRALIA with AR 2001.

The year 2001 scanner in 1984

World's first continuous coverage three mode communications

RECEIVER & SCANNER
AR2001

FEATURES:

- 25-550 MHz continuous
- NBFM — for communication
- WBFM — for BC & TV monitoring
- AM — for Air band monitoring
- 20 CH memory
- Priority Channel
- Clock

SPECIFICATIONS:

Frequency Range:	25MHz-550MHz Continuous
Search Frequency Increments:	5KHz. 12.5 MHz. 25KHz
Mode:	Narrow band FM Wide Band AM
Number of Memory	20 including
Sensitivity	Narrow FM 03uV 12 DB SINAD Wide 1M 10uV 12 DB SINAD AM 05uV 10 DB SN
Selectivity:	NFM 7.5 kHz at 6DB 20 kHz at 70 DB WFM 500 kHz at 6 DB 250 kHz at 60 DB AM 50 kHz at 6 DB 10 kHz at 70 DB
Spurious and Image rejection	50DB
Modulation Acceptance	NFM 7.5KHz WFM 50KHz AM 100%
IF Frequencies:	1st IF 750MHz SAW Filter 3rd IF 455KHz Ceramic Filter 2nd IF 45.0275MHz Crystal Filter (WFM) 5.5MHz Ceramic Filter
Reference Oscillator	(Synthesiser) Crystal Controlled
Scanning Rate	Approx 5 Channels per Second
Search Scanning Rate	Approx 6 Seconds per mega-Hertz
Scan Delay:	Normal Approx 1 second With Delay Option Approx. 2.5 seconds
Search Delay:	Approx 2.5 seconds
Priority Sampling Rate	Approx 2 seconds
Audio Output:	1W at 10% or less Distortion
Speaker (Internal):	8 Ohms
Power Requirements	12V-14V DC
Frequency and Message Readout	LCD Type
Size:	138mm Wide x 80mm High x 200mm Deep
Weight:	1.1 kgs

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SX-150

Freq: 26-88 MHz
138-176 MHz
380-512 MHz

NEW

Bearcat 100 FB

Freq: 66-88 MHz
138-174 MHz
406-512 MHZ

Write for Full Specifications

SYNTHESIZED AIR BAND MONITOR

ATC-720 SP

Freq: 118-136 MHz/AM
720 Channels
25 kHz Steps

Top Quality Receiver

Write for full specs.

THE REGENCY HX-1000.

The ultimate in versatility is yours with this new keyboard programmable hand held scanner, 20 ch. memory, 6 bands, search/scan, priority control, liquid crystal display with clock. Sealed rubber keyboard, lock out, scan delay, Lithium battery, wall charger, flexible antenna, Nicad battery — and with the die-cast aluminium chassis — HX-1000 is the BEST hand held on the market. Freq 30-50, 144-174, 440-512 MHz.

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***$5.95 is the recommended and maximum price only.**

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Scanner's World

Here is the first edition of *Scanners' World* — a publication for hobbyists and services interested in using or monitoring communications.

The major part of this and future editions consists of computer-sorted listings of services and their allocated frequencies. These have been cross-checked where possible but we make no claim that the listing is complete.

Listings have been sorted numerically (ascending frequency) and also alphabetically, and are presented separately for each State, and for New Zealand. There is also a short listing — at the end of the book — for services originating outside Australia and New Zealand but likely to be received by scanning receivers.

Where known, the modulation mode — frequency modulation (FM) or amplitude modulation (AM) — has been indicated. Note some channels are shared, but the services geographically separated.

Channels which are common nationally, including beacons, satellites etc, are listed under 'National'.

Maritime channels around 156 MHz are also commonly used nationally and activity may be heard in the vicinity of almost any major port. These have been included separately in State listings.

Public Automatic Mobile Radio Telephone Service frequencies have been omitted as it is an offence to monitor these frequencies.

The frequencies used by many emergency and disaster services, particularly bushfire brigades have been included. Listening to local channels (during for example a bushfire outbreak) may warn of events and developments well in advance of broadcast news announcements.

For those interested in 'anomalous' or enhanced propagation at VHF, services on certain channels in strategic areas can warn of developing propagation conditions — a favourite pastime of the VHF amateur after long distance (or DX) contacts. Strategically located overseas beacons have been included for this purpose.

These lists have been compiled from many sources, generally (but not all) publicly available. It should be noted that the listings as presented herein are covered by the Copyright Act and may not be copied in any form without the express permission of the publishers.

The publishers make no claims regarding the accuracy or completeness of the listings and welcome any additions, deletions or corrections for future editions.

SCANNING the world beyond shortwaves

Roger Harrison

A whole other 'world' of communications exists beyond 'the shortwaves'. There are thousands of communications channels in the very high and ultra high frequency bands (VHF and UHF). Aircraft, carphones, customs, taxis etc. What's it all about? Read on!

SHORTWAVE LISTENING has a history as long as the history of broadcasting, perhaps longer. In the 1930s, when 'the ultra highs' were first explored — that part of the spectrum beyond 30 MHz — radio amateurs did much experimenting, along with a few research and development teams. Short range communications began then, getting a great boost during World War II. The rapid development the war brought to VHF and UHF communications went beyond the cessation of hostilities and air-to-ground, mobile-to-mobile and base-to-mobile communications burgeoned.

Some radio hobbyists, using war surplus communications gear began 'listening around the ultra highs'. However, as most users of the radio spectrum above 30 MHz employed it for utilitarian purposes, and as the amount of on-air 'traffic' was very low, interest remained low. Nonetheless, commercially-made general coverage VHF-UHF receivers were available — hands up who remembers the Hallicrafters S27! During the late 1950s and the 1960s, the British Eddystone Co. produced several general coverage VHF-UHF receivers.

It seems that, in the 1960s, journalists discovered that ex-commercial VHF mobile transceivers could be bought cheaply and used to eavesdrop on 'useful' VHF channels occupied by the fire brigade, ambulances and police . . . gaining a jump on their colleagues for hot news stories.

Sitting listening to a VHF transceiver, rotating the channel switch for hours on end is not really a journalist's idea of fun, so it wasn't long before they sought out people who could modify the receivers of the equipment to provide automatic channel selection in sequence — scanning was born.

The J.I.L. model SX-200 is a popular scanner having many features. Covering a frequency range of 26-88, 108-180 and 380-514 MHz, it uses a keyboard providing a selection of over 33 000 channels. Up to 16 frequencies may be placed in a non-volatile memory. Scanning can be carried out over a specific frequency range by programming upper and lower frequency limits.

Unique squelch circuitry is employed, having three modes, allowing the receiver to (a) stop scanning with open audio on carrier only, (b) to stop on carrier with closed audio until modulation is applied to the carrier, or (c) not stop at all until carrier and modulation are detected.

A front panel-mounted fine-tuning control ensures that all Australian-allocated two-way radio frequencies are covered. AM or FM reception is possible on all bands. Direct operation from 240 Vac or 12 Vdc is provided for.

ETI staff have used this scanner and found it very sensitive, free from spurii and easy to use. It has the greatest frequency coverage of any scanners we have seen.

A kit to expand the memory channels to 32 is available as is one for auto-AM reception.

Details from **G.F.S. Electronic Imports, 15 McKeon Rd, Mitcham 3132. (03)873-3939.**

The Saiko SC7000 is another scanner with very wide coverage that runs from 60-89 MHz, 108-138, 140-179 and 380 to 519 MHz. You can store up to 70 channels in memory or search between preset limits within a band. You can manually select any frequency or any of the memory channels. Both AM and FM signals can be received.

Control is via a calculator-like keyboard. A 'priority' channel feature is included so that you can program a particularly interesting frequency into memory channel 1. Any time you hit the 'priority' key, the receiver selects that channel. An 'aux.' function allows you to turn on an attached cassette recorder.

A single squelch delay of two seconds holds the scanner on a channel for that time when a signal is received. Certain channels may be 'locked out' of a scanning sequence via a lockout control.

We found this scanner relatively easy to use after a little practise, and it appears quite sensitive. It has the greatest number of memory channels on any scanner we've seen.

The SC7000 can be operated from the mains or 12 Vdc.

Contact **Imark, 167 Roden St, West Melbourne 3003. (03)329-5433.**

Clearly, some enterprising electronic equipment manufacturers got onto this and produced some equipment specifically for the purpose. Advertisements for scanning receivers seem to have first appeared in the US electronics press in the late 1960s.

Meanwhile, some dedicated VHF-UHF listeners were chasing long distance (DX) signals propagated way beyond the normal range by some abnormal means. Occasionally the lower atmosphere 'ducts' VHF and UHF signals beyond the horizon some hundreds to thousands of miles. The ionosphere — the electrified layers lying from 100 km to 800 km or so above the earth — will also 'bounce' VHF signals beyond the horizon on occasion. Some special modes conduct the signals almost half way round the earth.

'Sporadic E' (lying at 100 km) propagation will bounce signals distances of 500 km to 2000 km (see ETI, May 1978, p.82), while 'transequatorial propagation' (literally, across the equator) carries signals distances of 3000 km to 14 000 km (see ETI, July 1978, p.112).

Exploiting these modes, you can listen to taxis in Tijuana, aircraft in Auckland and communications links in Korea! Amateurs exploit these modes for some excitement on the 50 MHz, 144 MHz and 432 MHz bands.

When the CB boom came along in the early 1970s, many CBers expanded their interest in communications, some discovering VHF-UHF listening and scanners. At the same time there was a general increase in interest in communications and many shortwave listeners, having purchased HF receivers and explored that, sought further afield and discovered scanners.

Interest in the VHF and UHF bands began to rise markedly in Australia in the late 1970s and is currently enjoying something of a boom. Quite a variety of equipment is available and much of it is keenly priced.

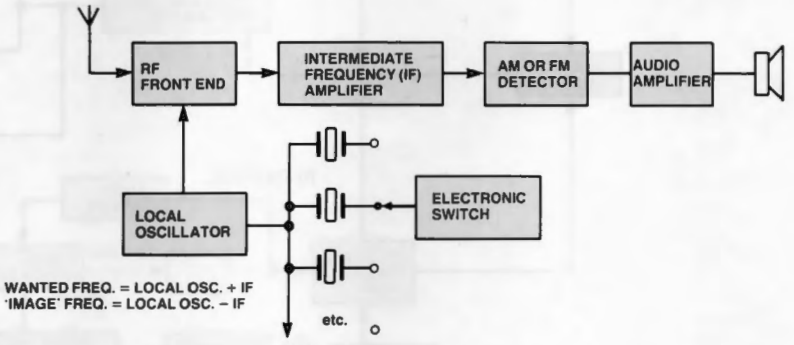


Figure 1. Block diagram of a simple scanner — a straightforward superheterodyne receiver. A suitable IF frequency has to be used so that front end selectivity will reject the 'image' frequency, avoiding possible interference from signals on that frequency. Channels were selected by switching between crystals.

The VHF-UHF spectrum

By convention, the VHF spectrum commences at 30 MHz and runs to 300 MHz. Likewise, the UHF spectrum commences at 300 MHz and runs to 3000 MHz. Each is divided, for purposes of allocating usage, into various segments or bands. For example, 66-88 MHz is 'business radio', 118-136 MHz is the 'aircraft band', 144-148 MHz is the 'two ▷

metre' amateur band, 480-490 MHz is 'electronic news gathering' (you can eavesdrop on the journalists now!), 476-477 MHz is the UHF CB band.

Large chunks of the spectrum are taken up for TV broadcasting and there's the 88-108 MHz broadcast band. Considerable portions are also occupied by the military. Some small segments are set aside for satellites, also; like some weather satellites around 136-140 MHz and the Space Shuttle around 240-250 MHz.

The bands are allocated channel spaces at fixed intervals. The interval between channels is called the channel *spacing*. This varies among different bands, depending on their allocated use, the number of users and the limits of available technology. Channels in the VHF band may be spaced at 12.5 kHz intervals, 25 kHz or 50 kHz, for example. On UHF they may be spaced at 25 kHz, 50 kHz or greater intervals.

As the VHF band is 270 MHz wide, if you wanted to search every 12.5 kHz channel for activity, you'd have to look at some 21 600 channels! Then there's the UHF spectrum. Considering 25 kHz channels, there's over 100 000 in 2700 MHz! However, much of the space is empty. Most of the 'action' is between 400 MHz and 550 MHz.

The Regency 'Touch M400' scanner is a very compact, slick looking unit with a 'touch sensor' keyboard, 30 channel memory (inc. battery backup) and coverage of 66-90 MHz, 144-174 MHz and 440-512 MHz in six bands.

On VHF it steps in 5 kHz increments, 12.5 kHz on UHF giving you around 16 500 channels. Reception is FM only. Normal scan delay is 0.6 seconds, though a two second optional delay is available. The unit may be operated from the mains or 12 Vdc. A 'priority channel' feature is included.

Regency scanners have a reputation for quality, reliability and top performance. Contact **Vicom, 57 City Rd, South Melbourne 3205. (03)62-6931.** Branches in most Australian States and N.Z.

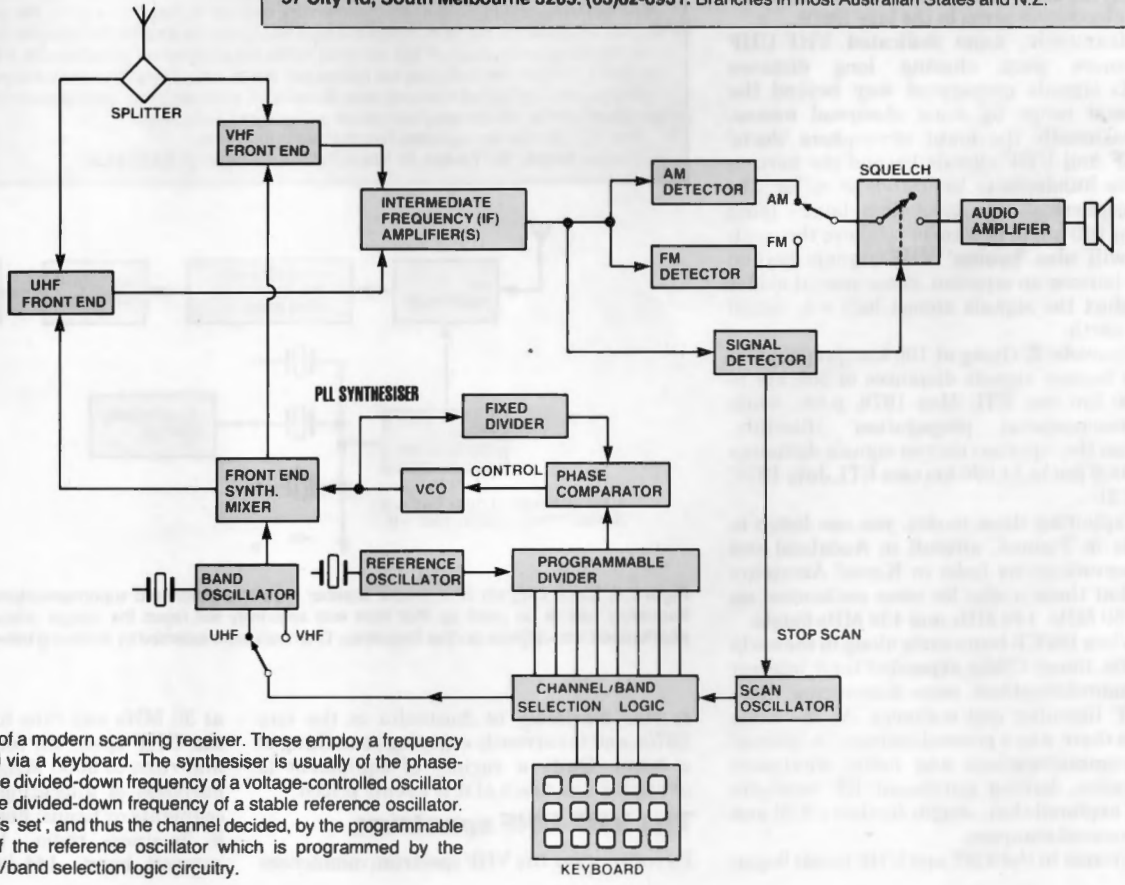


Figure 2. Block diagram of a modern scanning receiver. These employ a frequency synthesiser programmed via a keyboard. The synthesiser is usually of the phase-locked loop type where the divided-down frequency of a voltage-controlled oscillator (VCO) is compared to the divided-down frequency of a stable reference oscillator. The reference frequency is 'set', and thus the channel decided, by the programmable divider on the output of the reference oscillator which is programmed by the keyboard via the channel/band selection logic circuitry.

SCANNING the world beyond shortwaves

Modern equipment

Compared to the receivers of a decade ago, modern scanners have moved from the horse-and-buggy era into the space age!

The first scanners were simple 'superhet' receivers covering maybe a dozen channels over a small sector (several MHz at best) of the VHF spectrum. Figure 1 shows the general arrangement. Mostly, the transmission mode was frequency modulation (FM), so the receivers had FM detectors. Some scanning receivers were put out in the mid-1970s covering just the aircraft band, which employs AM transmission. Figure 1 shows the general block diagram of these early receivers.

The local oscillator was switched between several crystals, using a simple electronic switch and an oscillator to drive the switch so that the receiver scanned the channels. It's cheap, but effective if you only wish to cover limited channels. Modern pocket scanners are like this but are capable of covering a number of bands of interest in the VHF and UHF range.

A modern programmable scanner is a much more complex beast. Figure 2 shows a typical block diagram. The unit will have several 'front ends' and, instead of a switched oscillator, will employ a digitally controlled phase-locked loop (PLL) frequency synthesiser. Many employ a microprocessor to manage the channel selection logic and scanning sequences. Programming is via a calculator-like keyboard.

Two detectors may be incorporated, one for AM transmissions, one for FM. A 'squelch' circuit quietens the audio output when no signal is received on a channel. A signal detector circuit detects the presence of a carrier and will open the squelch and stop the scanning so that you can listen to what's on the channel. Many scanners have a timer so that the scan is only stopped on a channel for a certain short period while a signal is being received before continuing. If you want to listen further, you have to stop the scan there manually.

Most scanners available actually incorporate two IF amplifiers, not one as shown in Figure 2, the first being at quite a high frequency so that signals are not received on the 'image' of the wanted signal, the second IF being at a lower frequency (generally 10.7 MHz) where it is easier to obtain gain and selectivity.

While scanners may be able to cover from around 11 000 to 33 000 channels, users always have groups of 'favourite' frequencies. Hence, facilities are included to 'memorise' these favourite channels so that the scanner may be set to scan only those or a selected group of them.

Frequency readout is usually via a digital display, giving channel frequency directly in MHz down to 5 kHz. The display in many receivers also doubles as a clock.

Frequency bands covered vary from brand to brand and model to model, but generally, most scanners cover the 65 — 90 MHz band, 140 — 174 MHz and 400 — 512 MHz. Some cover wider ranges than those, some narrower, but that's roughly the spectrum segments covered.

Most scanners are made to operate from both 240 Vac and 12 Vdc. Some operate from 12 Vdc only and a plugpack or other dc supply is necessary for ac mains operation.

All come with some sort of antenna that simply plugs straight in to the antenna socket. While many signals are very strong, better results are gained by using an outside antenna mounted high and clear of buildings or other obstructions. The subject of antennas for scanners warrants a separate article!

Some models only have facilities to store 10 channels, others have 20, 40 or even 70 channel memories. Most models include provision for 'battery backup' for the channel memory so that the programmed-in channels are not lost if the receiver is switched off at any time.

Dick Smith's PRO-40 scanner is a hot selling item, according to their marketing blurb. A 12 Vdc operated unit intended for mobile use, this receiver covers 68-88 MHz, 136-174 and 360-512 MHz. You can store 40 frequencies in its channel memory, which has battery backup.

The keyboard is a 'touch sensor' type, like you see on microwave ovens. The squelch delay holds the receiver on channel for three seconds when a signal is received.

Reception is FM only and you can scan in preset steps of 5 kHz, 10, 12.5 and 25 kHz on VHF or 10 kHz, 12.5 and 25 kHz on UHF. The PRO-40 has a 'priority' channel which is checked every four seconds regardless of what other scanning routine the unit is carrying out.

The PRO-40 seems to perform well from our limited experience of using it, but the keyboard is not as nice as the calculator-type as it s easy to make mistakes. Nonetheless, the PRO-40 is keenly priced and has many desirable features. See your local **Dick Smith store.**

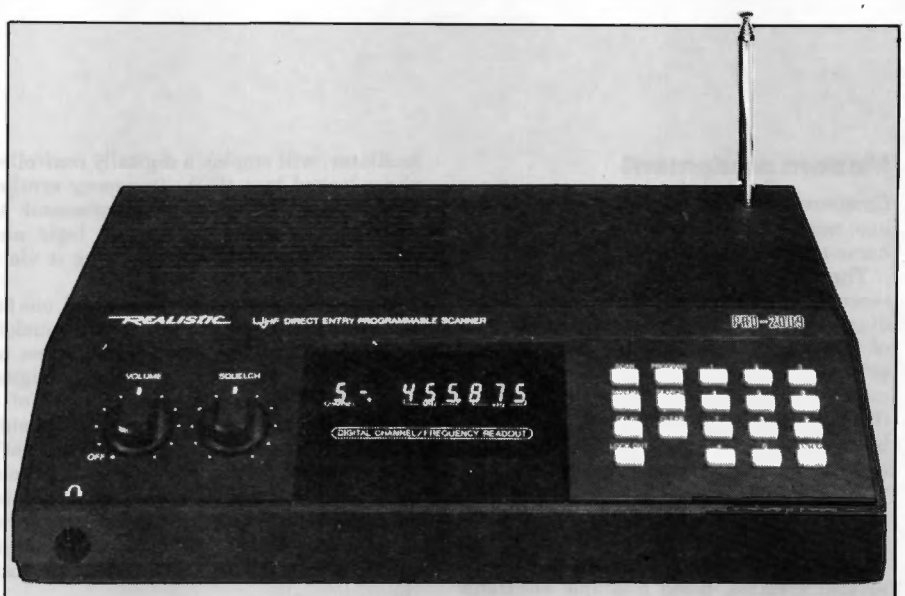
Legalities

Using a scanner *may* be illegal. The Wireless Telegraphy Act of 1905 (as amended) says that you cannot "... erect, maintain or use ..." equipment for transmitting or receiving messages without being duly authorised. With the exception of broadcast receivers (including TV), authorisation is the responsibility of the Department of Communications.

Radio amateurs, under the terms of their certificate of proficiency and licence, *may* have sufficient excuse to own and use a scanner, particularly as most cover at least one amateur band.

There is certainly opposition to scanners being available to 'the general public', particularly amongst police, security services ▷

SCANNING the world beyond shortwaves



Tandy's Realistic model PRO-2009 is a low-priced scanner that features an eight-channel memory and covers 68-88 MHz, 144-174 MHz and 410-512 MHz in six bands.

Control is via the usual keyboard and the channel memory has battery backup. Frequency limits for scanning are entered via the keyboard and reception is FM only. The unit can be powered from the mains or 12 Vdc. See you local **Tandy store** for this and other Realistic scanning receivers.

and certain public service departments. And with good reason. They don't want what were once 'private' and 'secure' communications channels becoming the least bit 'public'.

It is probably less a matter of concern that you might own a scanner but of great concern as to what use you put it to. If you're chasing DX from Darwin and aren't interested in what's being said, OK. But, if you're eavesdropping on the activities of Customs in Cheltenham, with a view to pursuing something nefarious, it's not on.

There seems to be no current provision in the W.T. Act Regulations to permit licencing of scanners. The draft Radio Communications Bill 1983 has this to say:

Receiver not to be operated without receiver licence

36. (1) A person shall not, without reasonable excuse, operate a receiver except in accordance with a receiver licence.

(2) Without limiting the generality of the expression "reasonable excuse" in sub-section (1), it is a reasonable excuse if a person operated a receiver in the honest belief that that operation was reasonably necessary for the purpose of—

(a) securing the safety of a vessel or aircraft that was in danger;

(b) dealing with an emergency involving a serious threat to the environment; or

(c) dealing with an emergency involving risk of death of, or injury to, persons, or risk of loss of, or damage to, property.

Penalty: $2,000.

Receiver licence

37. (1) Upon application in accordance with the appropriate approved form, the Minister may, in his discretion, grant to the applicant a licence in writing to operate specified receivers or receivers included in a specified class of receivers.

The Department of Communications has sought comment on the draft Bill. So, if you have something to say, they'd like to hear it. Send comments to The Secretary, D.O.C., P.O. Box 34, Belconnen 2616. Closing date for comment was 22 April 1983, but as the Government has changed in the meantime, this may have changed. Copies of the Bill can be obtained from Australian Government Publishing Service bookshops.

Few prosecutions have occurred and the court decisions have set no clear precedents.

What's to be heard

Lots and lots of things! Taxis, tow trucks, fire brigades, ambulance services, hospitals, radio telephones, paging equipment, local councils, news services, radio and TV station communications services.real estate agencies, engineering companies, surveyors, aircraft, radio amateurs, CBers, marine craft, satellites, transport companies, oil companies, mining companies, couriers, plumbers, servicemen, Government instrumentalities, beacons, bakeries, garbage disposals, hire cars, church groups, and on, and on . . . et al●

Pocket scanner. Typical of the pocket scanners available is this 'Pocket Scan' receiver from Imark. It provides 10 crystal-controlled channels for FM reception in any of the three bands: 70-90 MHz, 146-174 MHz and 430-520 MHz. It is powered by four AAA dry cells or NiCads. See **Imark, 167 Roden St, West Melbourne 3003. (03)329-5433.**

Scanner antennas

There's an old maxim about antennas that says ". . . the bigger it is and the higher you put it, the better it'll be . . .". And it's correct. But there are a few other considerations when it comes to such a specialised application as scanning. Here's a practical guide on buying, building and erecting an antenna system for your scanner, no matter what your budget.

Roger Harrison

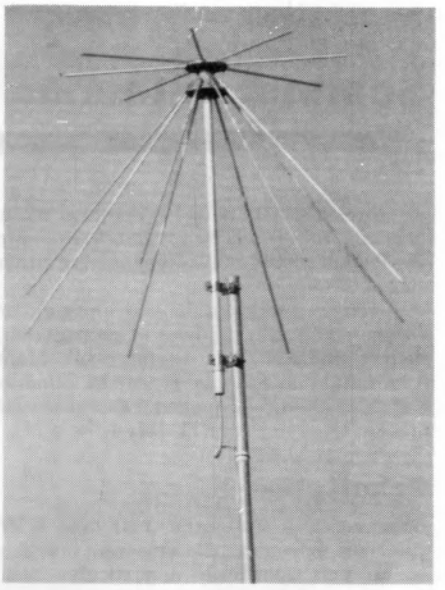


Figure 2. A popular, commercially-made 'discone', the Hoxin GDX-1. (Picture courtesy of G.F.S. Electronic Imports, Melbourne.)

MOST SCANNERS are supplied with some form of plug-in whip when you purchase them. These, in general, are just a simple telescopic whip with a connector on the end for desk top/mobile scanners, or a 'rubber ducky' type short flexible whip for pocket or handheld scanners. While, in the main, they do work they are inefficient at gathering in the signals you may want to hear. You can be deceived by the apparent strength and clarity of the signals you can hear on your scanner using one of these whips, but there are likely to be myriads more you're missing out on. The one major saving grace of such antennas is *convenience*. You can just plug in your scanner, plug in the whip and be on the air.

You often hear that VHF and UHF signals travel only by 'line of sight' — from the antenna to the horizon; if you can't see the antenna of the station transmitting you can't hear it. To a certain extent this is true, but not strictly so. The 'radio horizon' is actually a little further than the visual horizon — as if the earth were 4/3 the size it is, as a rough rule. However, large landforms — hills, mountains — can get in the way, but also, bending or scattering over the top of these can extend the 'horizon' somewhat. Buildings large and small will reflect VHF and UHF signals, scattering them into places you would not expect to hear them.

As mentioned in my previous article on scanning, the lower atmosphere will occasionally 'duct' VHF and UHF signals way beyond the normal horizon, some hundreds to thousands of miles. Also, the ionosphere — the electrified layers lying from 100 km to 800 km or so above the Earth — will bounce VHF signals beyond the horizon under the right conditions, sometimes half-way round the Earth.

The 'Sporadic E' layer, which forms at about 100 km above the ground at unpredictable times (hence the name) will reflect signals for distances from 500 km out to 2000 km in a single 'hop', very occasionally 3000-4000 km on multiple hops. Sporadic E propagation is most prevalent during the summer months, with a smaller seasonal activity 'peak' during mid-winter.

Around the equinoxes (21 March, 21 September), 'transequatorial propagation' conducts VHF signals across the equator for ▷

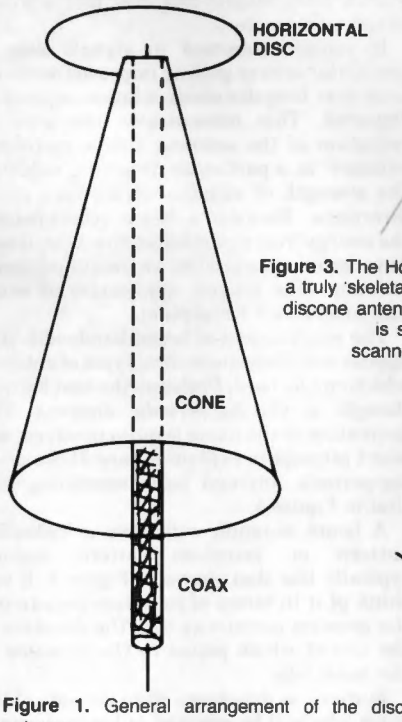


Figure 1. General arrangement of the discone antenna.

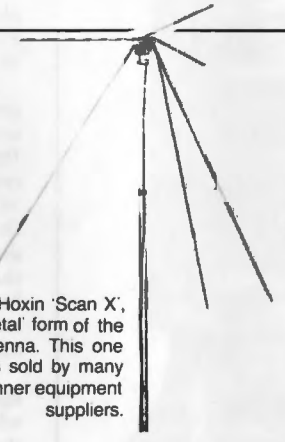


Figure 3. The Hoxin 'Scan X', a truly 'skeletal' form of the discone antenna. This one is sold by many scanner equipment suppliers.

Figure 5. A typical log-periodic beam antenna (horizontally polarised here). All the elements are split in the centre and 'cross-connected' to the next in line.

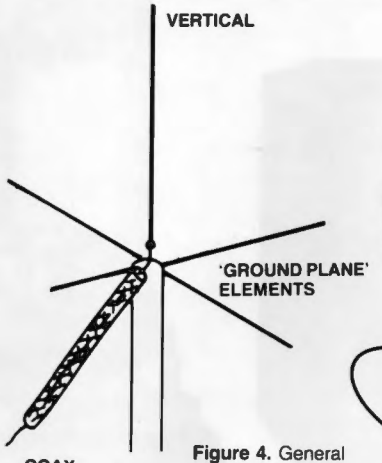


Figure 4. General arrangement of the 'groundplane antenna.

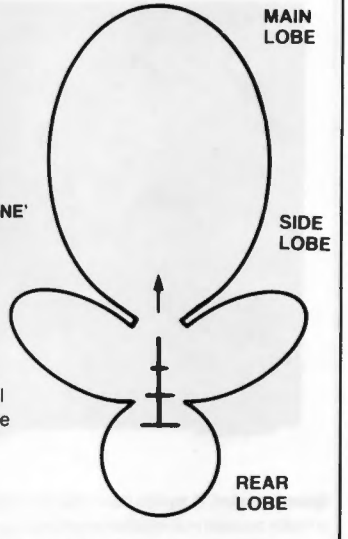


Figure 6. The 'radiation pattern' of a typical beam antenna, showing how the sensitivity varies to signals from different directions. To pick up a signal from a particular direction, the antenna is rotated so that the main lobe points in the desired direction (where the signal will be strongest).

Scanner antennas

distances of 3000 km to 10 000 km or more, bouncing the signals via two dense regions in the F layer (200 — 800 km high) lying either side of the equator.

If you're interested in the unusual, or fascinated by the vagaries of propagation, then a scanner is a useful 'tool'. More information on Sporadic E may be found in ETI, May 1978, p.82, and on transequatorial propagation (TEP) in ETI, July 1978, p.112.

Polarisation

Most services using the VHF and UHF spectrum for communications want coverage in all directions over a particular area, between a base station and a number of mobiles. The simplest antenna type for this application, for both the base and the mobile stations, is a vertical whip. Such an antenna will radiate and receive in all directions in the horizontal plane.

As the current-carrying portion of the antenna is in the vertical plane, by convention the antenna will be vertically polarised because the electric field of the antenna will be vertical. Hence, the majority of signals you hear will be vertically polarised. (Well, not after they have travelled some distance, as atmospheric effects and the effects of multiple reflections confuses the polarisation of the signal so that it will be a combination of vertical and horizontal polarisation — or elliptical.)

Antenna types

For scanning applications, the first major requirements for an antenna are that it be able to receive vertically polarised signals and that it can receive more or less equally from all directions. i.e: have omnidirectional coverage. Now, because scanners cover such a wide frequency range, typically from about 40 MHz to 500 MHz or so, the antenna needs to cover a wide frequency range with more or less equal results anywhere in the range of interest. i.e: it should have a broad bandwidth.

Now that's a pretty tall order for an antenna!

Probably the most well-known, and certainly one of the best suited, types is the *discone*, the general arrangement of which is shown in Figure 1. Quite simply, it consists of a horizontal disc sitting atop a vertical cone. The connection to the elements is via a coaxial cable, the braid (or 'outer') of the cable being connected to the apex of the cone and the inner conductor to the disc, which is insulated from the cone.

The disc and cone elements can be made of solid metal, or in 'skeletal' form from metal rods or tubing. Figure 2 shows one of the popular commercially available types, the GDX-1.

The dimensions of the cone and disc are arranged in a particular way, the length of the cone side being around half a wavelenth at the lowest frequency and the diameter of the disc being 70% of that length. The included angle of the cone is generally 60°.

Some types of discone are really stripped down to the bare essentials, the cone and disc simply consisting of three rods each, spaced 60° apart. This results in less expensive construction and a lower cost antenna. The 'Scan-X' is a widely available model featuring this form of construction (see Figure 3).

A popular form of omnidirectional, vertically polarised antenna is the *groundplane*. This consists of a single vertical element, about a quarterwavelength high, situated at the hub of four horizontal, orthogonally arranged elements, as shown in Figure 4. The four horizontal elements form a 'virtual ground', or groundplane, for the vertical element. A coaxial feedline is used, the outer (braid) connecting to the hub of the groundplane, the inner conductor to the vertical element.

The groundplane however, has a limited bandwidth, generally only +/− 5% of the designed centre frequency. However, with the addition of several shorter vertical elements alongside the original, higher frequency ranges can be covered. Tandy, for example, market such an antenna (cat. no. 20-014, 'VHF Hi/Lo, UHF Hi/Lo Ground Plane Base Antenna'). I'll show you how to build a multi-band groundplane later in the article.

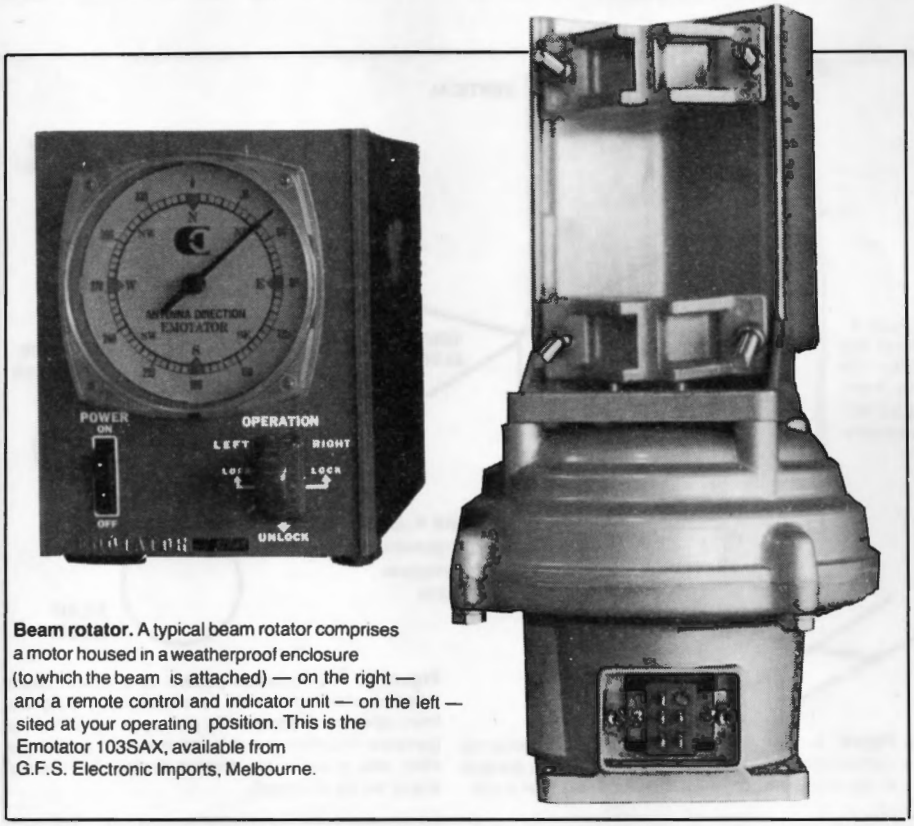
The groundplane may come with a minimum of three horizontal elements, but four is more usual. Sometimes you'll see them with multiple groundplane radials, as the groundplane portion is simply a skeleton version of a solid groundplane just over half a wavelength in diameter.

If you're interested in signals from a particular area or getting improved performance over long distances, a beam antenna is required. This concentrates the area of reception of the antenna over a restricted 'window' in a particular direction, reducing the strength of signals coming from other directions. Because a beam concentratres the energy from a particular direction, it will have 'gain' compared to an omnidirectional antenna. The biggest application of beam antennas is in TV reception.

The requirement of broad bandwidth still applies and there are several types of antenna which can be used. Probably the best known, though, is the *log-periodic* antenna. The derivation of the name is quite involved, so I won't attempt to explain it here. However, a log-periodic antenna looks something like that in Figure 5.

A beam antenna will have a 'radiation pattern' or 'reception pattern' looking typically like that shown in Figure 6. If you think of it in terms of reception sensitivity, the greatest sensitivity is in the direction of the arrow, which points in the direction of the 'main lobe'.

Stations at directions off to the side of the main lobe will be received at lower strength than those toward the front. The directions



Beam rotator. A typical beam rotator comprises a motor housed in a weatherproof enclosure (to which the beam is attached) — on the right — and a remote control and indicator unit — on the left — sited at your operating position. This is the Emotator 103SAX, available from G.F.S. Electronic Imports, Melbourne.

either side of the main lobe peak where the signal strength falls to a half defines the 'beamwidth'. A very large beam, with many elements, may have a beamwidth of 20°, a smaller model, perhaps 80°.

Well to the side of the antenna there may be some minor 'side lobes', with very deep 'nulls' between them and the main lobe. Signals in the direction of the nulls will be severely attenuated.

A further lobe will be found to the rear of the antenna, but sensitivity will be well down compared to the main lobe, as it will be with the side lobes.

Naturally, if the antenna is directional, you'll need to be able to point it in any desired direction, unless you're interested in signals from one general direction only. That's what an antenna rotator is for.

In general, omnidirectional antennas for scanning cost $50 to $100, whereas a beam antenna will cost upwards of $100.

There are many makes and models of antenna rotators on the market, for TV antenna systems and for ham or commercial antenna applications. They cost from around $150 upwards. In general, an antenna rotator will consist of a motor assembly which mounts on a mast and a remote control unit which contains the control switches and a direction indicator. (See Figure 11, later.)

Build your own scanner antenna

For a simple, quick, cheap and effective antenna that will cover a single band of interest, it's hard to beat the 'coax dipole' shown in Figure 7. There is an antenna type known as the *coaxial dipole*, and this is a version constructed on the end of a piece of coaxial cable.

To make it, cut the end of a length of coax square then measure back along the sheath the distance 'A' indicated in the accompanying table. Using a penknife or modellers' scalpel, carefully cut around the cable through the outer sheath, to the braid. Take care not to nick the braid. Slit the sheath from the cut to the end of the cable and remove it, exposing the braid. Starting at the end of the cable, gently push the braid back toward the end of the sheath, bunching it up, then work the braid loose along its length toward the end of the sheath. Carefully undo a little of the braid at the end and roll it back on itself, then roll back the braid, pulling it down over the sheath to form the antenna as illustrated in Figure 7.

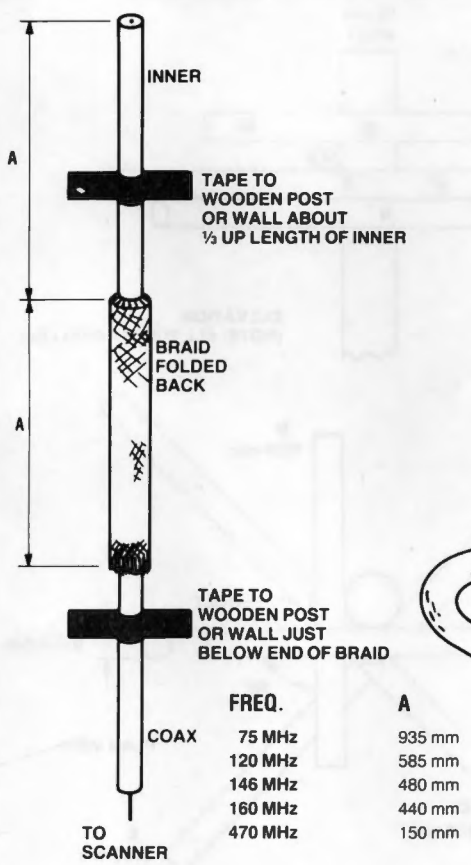
If you're going to mount the antenna outdoors, seal the cable at the turnover of the braid using a silicone compound such as Silastic.

The antenna may be taped high on a wall or taped to a pole mounted outside and as high as you can conveniently get it. Use electrical insulation tape. It doesn't matter too much if the inner droops a bit at the top.

If you're taping it to a wall inside, position the antenna as high as possible; keep it vertical and away from large masses of metal. You could suspend it using nylon fishing line, if you wish.

This 'quickie' antenna will work well over a range of 5% or so either side of the frequencies quoted in the table with Figure 7, and also at three times those frequencies.

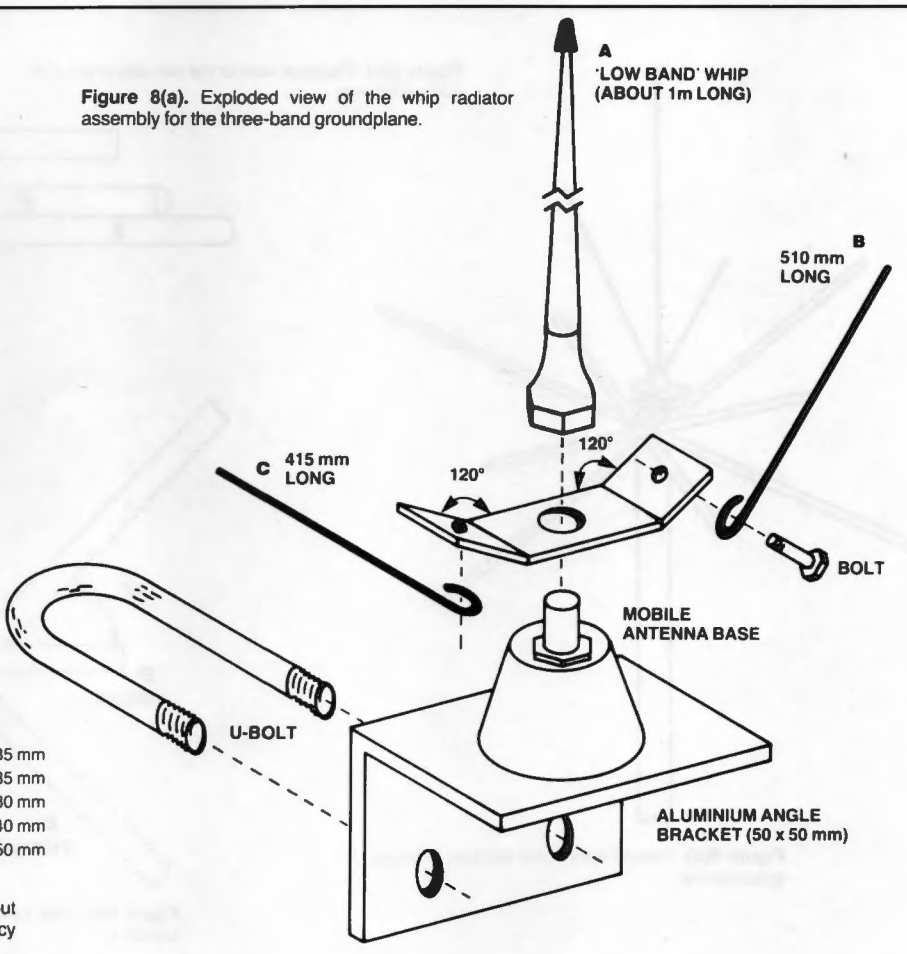
Figure 8 shows the construction details for ▷



FREQ.	A
75 MHz	935 mm
120 MHz	585 mm
146 MHz	480 mm
160 MHz	440 mm
470 MHz	150 mm

Figure 7. The 'quickie' coaxial dipole. It's simple, but only covers one band (and three times that frequency band, but not as well).

Figure 8(a). Exploded view of the whip radiator assembly for the three-band groundplane.



a multi-band groundplane for base station or mobile use. The principal element is a commercially available 'low band' VHF mobile whip about one metre long. This mounts to a standard VHF antenna base mounted on a piece of aluminium angle bracket. A small piece of aluminium plate about 20 mm wide by 40 mm long is drilled and bent as shown in Figure 8a. This holds the two side antennas, B and C, at an acute angle to the main whip (about 30). These can be fashioned out of heavy gauge (e.g: 16g or 18g) bare copper or steel wire. Each has a small loop at the end so that it can be bolted to the bracket secured under the low band whip.

A dual groundplane system is used for base station applications. These are fashioned out of 9 mm (3/8 inch) aluminium tube bolted to a 50 mm (or larger) diameter aluminium mast which can be as long as you please. Figures 8b and 8c show the dimensions and general construction, 8d shows the completed antenna.

The angle bracket holding the vertical element is secured to the mast just above the groundplane elements using a U-bolt.

Attach a length of coax to the antenna base, seal it with a silicone compound such as Silastic and you're ready to go on the air!

For mobile operation, dispense with the groundplane elements and mount the angle bracket to a roof-rack bar using two small U-bolts positioned vertically, side by side. Alternatively, if you have a VHF mobile antenna base already mounted on your vehicle, the three elements could be mounted to it in the same fashion as shown in Figure 8a.

This antenna will cover channels within quite a few MHz of 70 MHz, 140 MHz and 170 MHz — which covers some of the more popular bands. It will also work on the UHF band, but perhaps not as well as a good UHF antenna.

Erections

"The higher you put it, the better it'll be . . .", says the old maxim, but there's no need to go to extremes. Really good results can be obtained simply mounting the antenna on the roof of your house. A 30 metre high tower is hardly in keeping with the cost of your scanner!

No matter what sort of antenna you're using, mount it in a conveniently high position and as clear of nearby objects or structures as you can. If you're mounting it somewhere on your house, then simple, low cost TV antenna type fittings can be used, as illustrated in Figures 9 and 10.

When contemplating where to mount the antenna, you'll need to keep in mind that the shorter the run of coax feedline you can get, the better off you'll be. Any sort of feedline has losses — that is, it will attenuate the incoming signals to some extent, and the loss increases with increasing frequency. Thus, the shorter the length of feedline, the less the loss incurred.

The sort of feedline commonly used is known as 'RG58' or 'RG58C/U'. Buy a good quality make — it will have less loss than that made for CB applications. RG58 is about 6.5 mm in diameter and has a loss of around 16 dB per 100 metres at 100 MHz, 24 dB/100 m at 200 MHz.

However, the larger diameter coax cables have lower loss figures. These are generally 10 mm in diameter and two common types

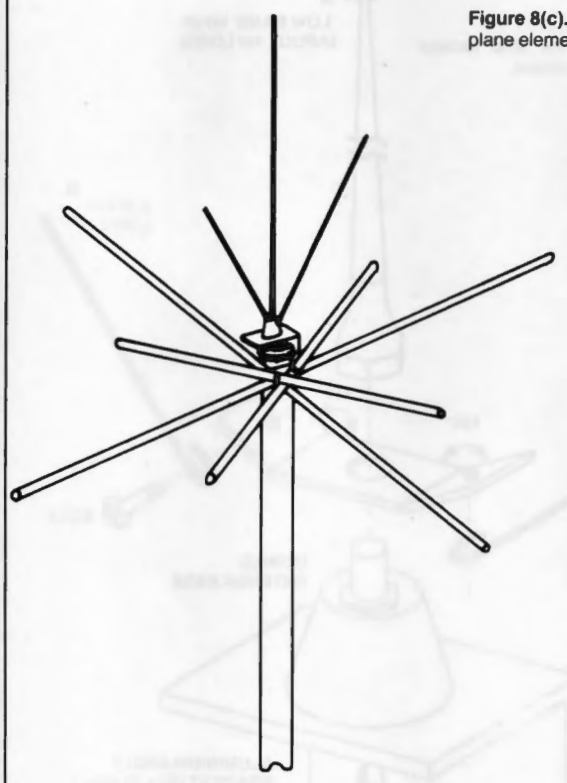
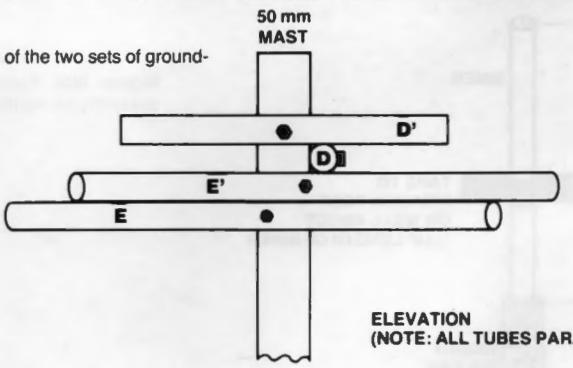


Figure 8(d). Overall view of the finished three-band groundplane.

Figure 8(c). Elevation view of the two sets of groundplane elements.



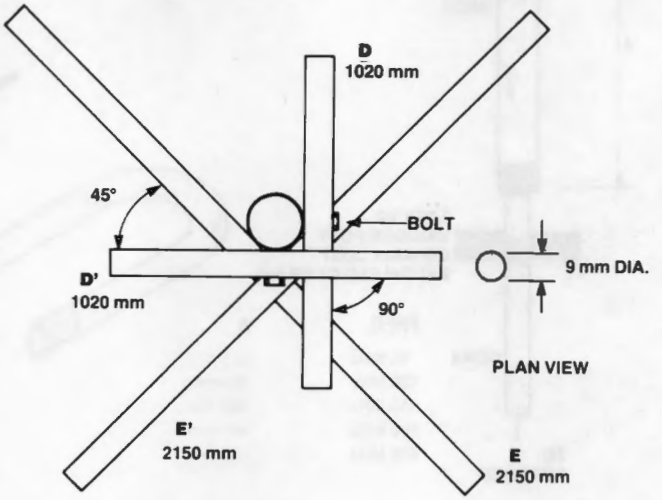


Figure 8(b). Plan view of the two sets of groundplane elements.

are RG8 and RG213 (sometimes with the /U or C/U suffix). These have losses of around 6 dB/100 m at 100 MHz, 9 dB/100 m at 200 MHz. As you can appreciate, despite the extra cost, the larger diameter coax is a better proposition when long feedline runs are involved.

If you intend using a beam antenna, the mounting configuration shown in Figure 11 is recommended. The mast can be mounted using the techniques shows in Figures 9 and 10, but make sure the total mast length is no longer than about three metres, otherwise it may not take the wind loading that the beam antenna will exert on it.

When mounting a beam antenna, ensure that it can rotate freely and that the beam is mounted to the mast at the point of balance. The short section of mast between the beam and the rotator must not be metal, otherwise it will interfere with the operation of the beam. It should be at least as long as the longest element, or slightly longer. You can use ABS pipe, as suggested, or a wooden mast here (suitably treated against the effects of the weather. i.e: paint it with an exterior epoxy lacquer, such as Estapol).

The feedline should have enough slack in it so that it is not strained by the operation of the rotator, yet not too much that it flaps violently in the wind, which will prematurely wear it. Tape it securely to the mast sections above and below the rotator.

Well, that concludes this short guide to scanner antennas; good listening! ●

Another rotator. This beam rotator is a 'medium duty' type, by Alinco, model EMR-400. It is available from Imark Pty Ltd, Melbourne.

Some references

Here are a few books which contain useful further reading on the general subject of antennas. They are not listed in any preference order.

The ARRL Antenna Book, *The American Radio Relay League, 1982.*

Vertical Antenna Handbook, Capt. Paul H. Lee, USNR, K6TS, *Cowan Publishing Corporation, 1974.*

The Radio Amateur's VHF Manual, *The American Radio Relay League, 1982.*

VHF-UHF Manual, Fourth Edition, *G.R. Jessop, G6JP, RSGB Publications, 1983.* ●

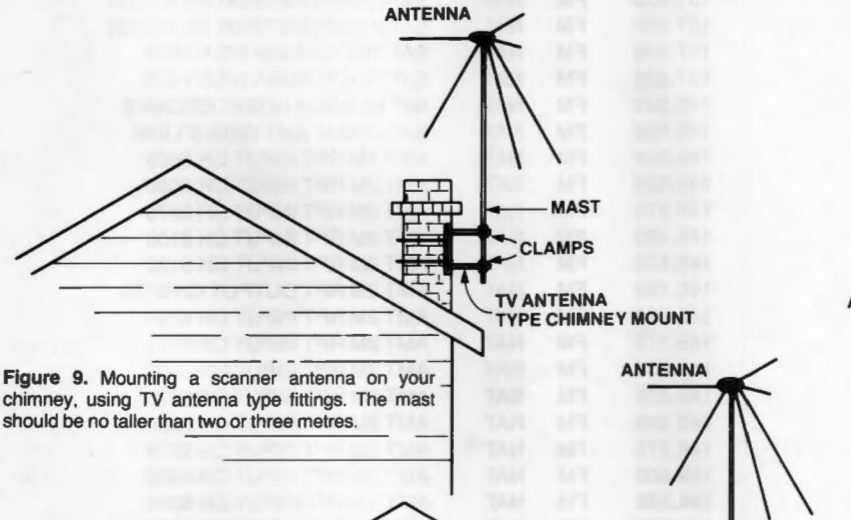


Figure 9. Mounting a scanner antenna on your chimney, using TV antenna type fittings. The mast should be no taller than two or three metres.

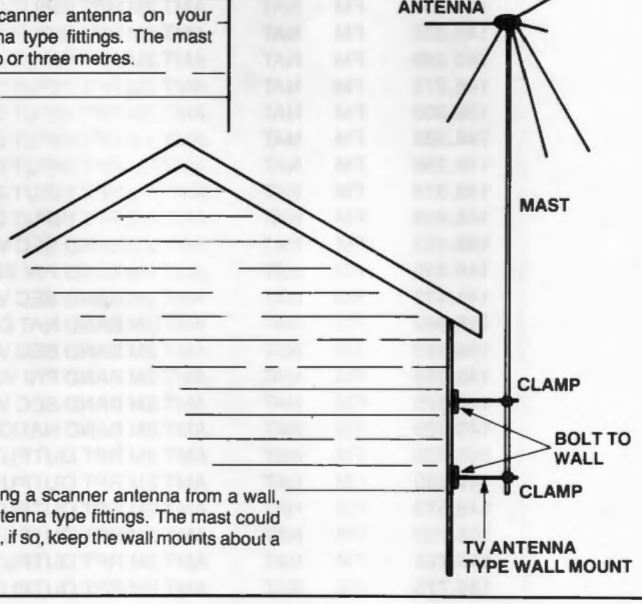


Figure 10. Mounting a scanner antenna from a wall, again using TV antenna type fittings. The mast could be up to 4m tall but, if so, keep the wall mounts about a metre apart.

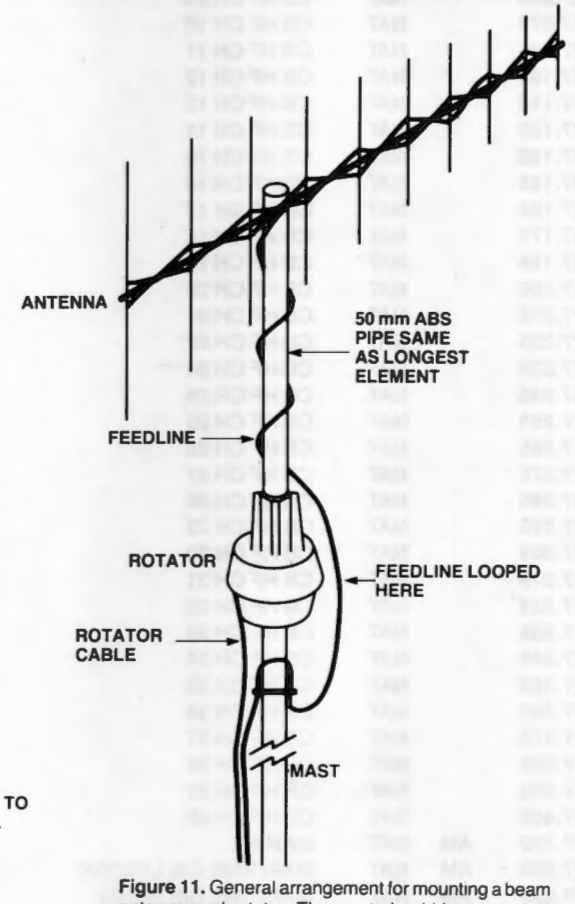


Figure 11. General arrangement for mounting a beam antenna and rotator. The mast should be supported no further than 1½m below the rotator.

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Mechanically rugged the SX-200 uses high quality double-side Epoxy-Glass printed circuit boards throughout. Some of its other outstanding features include 3 MODE SQUELCH circuitry which allows the lockout of spurious and carrier only signals, extremely low spurious count, AM and FM detection on all bands, FINE TUNING control for off channel stations, 240 VAC or 12 Volt DC operation, Accurate QUARTZ CLOCK, Squelch operated OUTPUT for switching a tape recorder etc, 16 memory channels, MEMORY BACKUP, which lasts up to two years, high SENSITIVITY and SIGNAL-TO-NOISE ratio on all bands, CRYSTAL FILTER for excellent SELECTIVITY and easy serviceability due to component layout as well as a 90 day warranty
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Bearcat slashes the price of scanning

Rig Round-Up

The Bearcat 200FB offers a great deal to the fledgling scanning enthusiast for $349. Here's a quick review of this recently released rig.

Available through Dick Smith stores, the 200 FB Bearcat features a 16-channel memory (with battery back-up), auto or manual search over three bands (66-88 MHz, 138-174, 407-512 MHz), direct channel access, automatic channel lockout and priority functions plus patented selective scan delay so you don't miss the replay on two-way conversations.

The rig can be operated direct from the vehicle battery, or from the mains using a commonly available plugpack. It comes complete with its own telescopic antenna, which suits desk-top operation of the unit, and an external antenna socket so you can really 'pull in' those signals from an outside antenna.

We jumped at the opportunity to review one of these rigs and here's what we found.

The Bearcat 200FB is a compact plastic-cased rig, measuring just 235 mm wide by 220 mm deep by 70 mm high. A 'porch' at the front contains the controls and a sloping panel from the top to the porch contains the 9-digit fluorescent display.

The volume and squelch knobs at the left are well-designed, just right for thumb-and-forefinger operation. The programming keyboard occupies most of the right hand side of the porch. It employs sensor-touch operation and the loudspeaker 'bips' when you press the keys.

Internally, it appears a well-constructed unit, all the electronics being on a single printed circuit board.

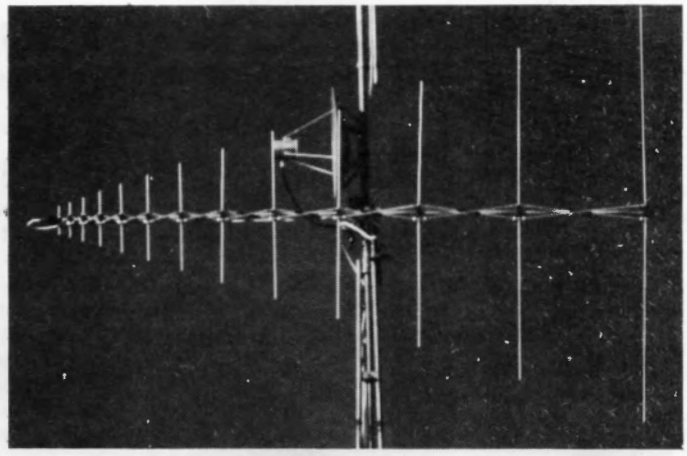
On the air, the unit proved to be very sensitive, easily pulling in signals from base stations 50 km away on just its own telescopic whip. Programming it is a breeze.

The handbook that comes with it is clearly written, well set out and easy to use.

The display is a little hard to see with light directly falling on it, but if you locate the unit away from direct light, there's no problem. In any case, the same goes for many other scanners we've seen.

The handbook warns of 'birdies' — spurious signals, generated within the receiver, and conveniently lists them, thus enabling you to avoid them. We had a look at them and looked up our frequency table and think they should not be troublesome.

Basically, the Bearcat 200FB is a delight to use, offers many useful features and is worthy of serious consideration if you're looking for a scanner and don't want to pay 'big bucks'.



High gain directional antennas

GFS Electronic Imports of Mitcham, Victoria, has available two high gain broadband directional antennas designed for use in a wide variety of VHF/UHF applications.

Particularly suited for scanning receiver use, both models provide excellent performance in fringe areas when compared with a standard discone (such as the Scan-X).

Known as the LOG-S and the LOG-SP, the new antennas are of the log periodic type. The Model LOG-S has nine elements with a claimed gain of 9½ (9 dBi) and a bandwidth from 100 to 520 MHz. Boom length is 1.02 metres.

The LOG-SP has a bandwidth from 65 to 520 MHz, comprises 13 elements and features a claimed gain of 10½ (11.5 dBi). Its boom length is just over 3 m.

Both antennas are also quite suited to transmission applications over their designed bandwidth. Maximum input power handling is given as 200 watts.

The LOG-S and LOG-SP are both available exclusively through GFS Electronic Imports or any of their agents. Price of the LOG-S is $89 plus $10 freight, and the LOG-SP is $125 plus $10 freight.

For further information, contact **GFS Electronic Imports, 15 McKeon Rd, Mitcham Vic. 3132. (03)873-3939.**

Dream machine

This rig must surely rate as every scanning enthusiast's 'dream machine'. It's just about got everything that opens and shuts.

The J.I.L. SX-400 scanning receiver offers continuous coverage from 26 MHz to 520 MHz in 12 bands. AM and FM detection, two scan rates (4 & 8 ch/sec), 20 memory channels and an IEEE standard interface buss.

An optional-extra converter can extend this coverage to 800 MHz in 480 channels and an extra 12 spot frequencies can be received up to 3.7 GHz! A demodulator for multiplex transmission is also available.

Definitely for the scanner who must hear everything! Further details available from the Australian agents, **GFS Electronic Imports, 15 McKeon Rd, Mitcham Vic. 3132. (03)873-3939.**

Rig Round-Up

Auto-AM operation for the SX-200 scanner

A simple, low cost modification kit profides automatic AM operation for the popular J.I.L. SX-200 scanner on the VHF aircraft and 27 MHz bands.

The kit comprises a small printed circuit board, an IC, two resistors, wire and instructions. Assembly, installation and wiring up are a breeze, following the clear step-by-step instructions.

Known as the "A4-AM Kit", it is sold by the SX-200 importers, GFS Electronic Imports. When installed, operation is quite simple. With the AM/FM switch in the FM position, the SX-200 will operate in the FM reception mode on all bands except for the 27 MHz marine and CB channels and the 108-140 MHz VHF band, for which it will automatically operate in the AM mode.

The A4-AM kit costs $32 and is obtainable from **GFS Electronic Imports, 15 McKeon Rd, Mitcham Vic. 3132. (3)873-3939.**

Antenna rotator from Imark

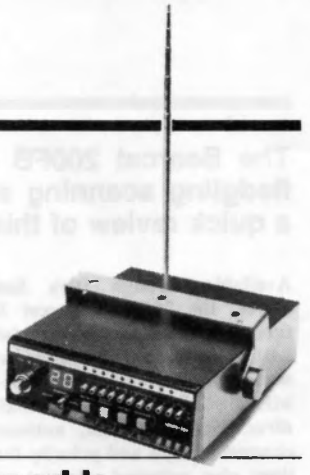
The Alinco EMR-400 medium duty antenna rotator, available from Imark Pty Ltd, is designed for light to medium duty operation and is ideal for VHF and UHF antennas.

It is sturdily constructed with Melamin-coated diecast aluminium and is waterproof. Noise and wear is reduced by the use of tempered low speed gears and Duracon moulded high speed gears. A total of 94 ball bearings are used to distribute the load evenly and to ensure smooth operation and longevity.

Rotation of 360°, +5°-0°, is provided, limited by a mechanical stopper. The two-piece adjustable clamp permits perfect centering and both pieces are grooved to ensure maximum mast grip. All stainless steel screws are used to prevent rust.

The control box provides the 24 Vac power source for the rotator and has a large, easy to read lighted azimuth meter which is calibrated in degrees either side of North. Left or right rotation is controlled by the 'easy action' paddle switch. Rotation time is 60 seconds for 360°.

Further details are available from **Imark Pty Ltd, 167 Roden Street, West Melbourne Vic. 3003. (03)329-5433.**



Imark's mobile scanner

The Tri-Star Compu-20D scanner is different from most in that it is specifically designed to be mounted in a vehicle for mobile use. Available from Imark, it operates on the vehicle's 12 Vdc supply and is compact enough to be conveniently mounted in almost any vehicle.

While a telescopic antenna is supplied, the receiver is fitted with a Motorola-type connector on the rear to accept the normal car-type antenna lead.

The unit features a programmable PLL-type double-conversion FM receiver which covers both the VHF high and low bands, from 70.010 MHz to 84.410 MHz and from 156.010 MHz to 170.410 MHz, in 15 kHz steps. Any 20 frequencies of the 1920 frequencies within these ranges can be programmed.

The receiver is solid state for low battery consumption and uses one crystal filter and two ceramic filters to ensure excellent sensitivity and selectivity. Back-up batteries are included to provide memory keep alive of the programmed frequencies even if the power is removed.

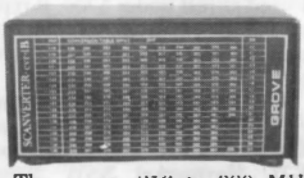
Manual channel change and automatic scanning function, as well as a channel bypass feature, are standard equipment. A green LED display is used for channel number indication. Other features include adjustable squelch control and scanning delay function.

Further details are available from **Imark, 167 Roden Street, West Melbourne Vic. 3003. (03)329-5433.**

Accessories for SX-200 scanner

GFS Electronics has available a range of accessories to suit their JIL SX-200 Scanning receiver.

The first, known as the Model CVR-1B Scanverter, allows the SX-200 to cover 216 to 380 MHz. It simply plugs in series with the external antenna lead and gives the SX-200 full frequency coverage from 26 MHz to 514 MHz with no gaps except for the 88 to 108 MHz FM Broadcast band.



The range 216 to 380 MHz encompasses frequencies used by the Space Shuttle crew for direct communication to tracking stations.

The Model CVR-2 Globscan shortwave converter turns the SX-200 into a broadcast and shortwave receiver. It provides coverage from 550 kHz to 26 MHz enabling the user to receive all normal broadcast stations as well as thousands of overseas signals from shortwave stations.

Like the CVR-1B it simply plugs in series with the external antenna lead of the SX-200.

Priced at $199 and $189 respectively the CVR-1B and CVR-2 turn the SX-200 into a full coverage programmable receiver from 550 kHz through to 514 MHz with the exception of 88 to 108 MHz.

Also available, and designed to increase the JIL SX-200's facilities, are two user-assembled and installed kits.

The A4-AM kit allows the SX-200 to automatically select the AM mode whenever it receives an Airband or 27 MHz Marine/CB frequency. The facility is also manually overideable so that the FM mode can be used in either of these bands, if required.

The EXP-32 memory expander kit provides the SX-200 with an additional 16 memory channels. With this kit installed a total of 32 memories are available and may be selected in two separate banks of 16 or the entire 32.

Prices are $32 and $53 for the A4-AM and EXP-32 respectively. For full details of all four products contact **GFS Electronic Imports, 15 McKeon Road, Mitcham Vic. 3132. (03)873-3939.**

Low cost, 10 channel desk-top scanner from Dick Smith

Dick Smith Electronics has released an inexpensive desk-top scanner. The Bearcat 150FB is a 10 channel crystal-less programmable scanner covering a large part of the UHF and VHF spectrum.

The frequency ranges covered are: • UHF from 406-490 MHz (includes the full amateur 70 centimetre band) • 66-98 MHz (includes Australian VHF low band allocation) • 144-174 MHz (includes amateur two metre band and VHF high band).

With the Bearcat 150FB you don't need crystals. You can program the frequencies into it and change them anytime and program different frequencies, as you prefer.

Features include a smooth, touch-sensitive keyboard (no knobs and switches), 8-digit fluorescent display to show the frequency programmed for each channel and special scan function and command confirmation.

The receiver sensitivity is specified as 0.5 uV on VHF, 0.8 uV on UHF. It will scan the programmed channels at 16 channels/second and it has a two second selective delay. The unit is powered from 240 Vac and is supplied with a telescopic antenna. an external antenna socket is provided.

The Bearcat 150FB is listed in Dick's catalogue as No. D-2800 and costs only $275 **from any Dick Smith Electronics store.**

Mobile scanner by Kraco

The Kraco Pro 20 MKii scanner is different from most in that it is specifically designed to be mounted in a vehicle for mobile use. It operates on the vehicle 12 Vdc supply and is compact enough to be conveniently mounted in almost any vehicle.

While a telescopic antenna is supplied the receiver is fitted with a Motorola-type connector on the rear to accept the normal car-type antenna lead.

The unit features a programmable PLL-type double conversion FM receiver which covers both the VHF Hi and Lo bands, from 70.010 MHz to 84.410 MHz and 156.010 MHz to 170.410 MHz, in 15 kHz steps. Any twenty frequencies of the 1920 frequencies within these ranges can be programmed without the need to purchase even one crystal.

The receiver is solid state for low battery consumption and uses one crystal filter and two ceramic filters to ensure excellent sensitivity and selectivity. Back-up batteries are included to provide memory 'keep alive' of the programmed frequencies even if the dc power is removed.

Programming of the required frequencies is easy and can be performed simply 'in situ' by setting the programme switches according to the frequency selection chart supplied.

Manual channel change and automatic scanning function as well as a channel bypass feature are standard equipment. A green LED display, which is more visible in bright sunlight, is used for channel number indication. Other features include adjustable squelch control and scanning delay function.

Further details are available from **Imark Pty Ltd, 167 Roden Street, West Melbourne Vic. 3003. (03)329-5433.**

Rig Round-Up

VHF/UHF Receiver features continuous coverage over 25-550 MHz

Featuring three reception modes and continuous coverage from 25 MHz, the AR-2001 communications receiver available from Emona Electronics is a combination programmable receiver and scanner that takes up where the usual 'communications' receivers leave off.

The three reception modes are: narrowband FM (NBFM) of ±7.5 kHz deviation, wideband FM (WBFM) of ±50 kHz deviation, and AM for modulation bandwidths to 50 kHz.

The AR-2001 covers from 25 MHz to 550 MHz in 5 kHz, 12.5 kHz or 25 kHz steps. Twenty memory channels can be programmed and scanned at will or you can scan across selected bands by programming the upper and lower limit frequencies. Scanning rate is given as five channels per second.

The unit is powered from a 12 Vdc source, either battery or mains plugpack. The display is a liquid crystal type that shows reception mode, channel number and frequency. The receiver is a triple-conversion type with a crystal-controlled frequency-synthesised local oscillator.

Performance specifications are quite good, sensitivity being given as 0.3 μV for 12 dB SINAD on NFM, 1 μV for 12 dB SINAD on WFM and 0.5 μV for 12 dB SINAD on AM. The squelch threshold is quoted as 0.2 μV on AM and on NFM, 2.5 μV on WFM.

The AR-2001 measures a compact 138 mm wide x 80 mm high x 200 mm deep overall and has the front panel angled upwards making it suitable for either under-dash or benchtop mounting. An internal speaker is included. Audio output is given as one watt.

We had the AR-2001 for a brief review at ETI and found it a very good performer indeed. Sensitivity proved excellent and we found few troublesome spurious responses. It sure pulls-in the signals and the audio sounds clean.

Programming it is quite easy and the sensor-touch elastomeric keyboard has a positive feel. Priced at just under $700, it represents good value for money, especially considering the continuous coverage it offers.

For complete details on the AR-2001, contact **Emona Electronics Pty Ltd, P.O. Box K21, Haymarket NSW 2000. (02)211-0531.**

The scanner's manual

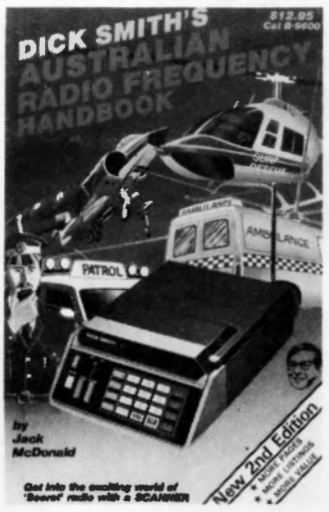
Dick Smith's Australian Radio Frequency Handbook, 2nd Edition, must surely be the 'text' every scanner should have.

Written by scanner 'expert', Jack McDonald, this 170-page-plus book contains a wealth of information on scanning, including a detailed table of frequencies and services you'll find on the VHF and UHF bands.

There are 15 short chapters at the start of the book that explain, in simple language, all the basics you need to know to get into scanning.

The book shows you how to build yourself a simple antenna, how to install a scanner in a car and how to interpret the various codes you hear used on the air.

The book costs $12.95 and is listed as catalogue No. B-9600. Enquire at any Dick Smith store or **Dick Smith Electronics, P.O. Box 321, North Ryde NSW 2113.**



RF Spectrum usage chart published by D.O.C.

The Department of Communications has produced a colour-coded chart showing complete use of the radio frequency spectrum in Australia.

The chart reflects information set out in the *Australian Table of Frequency Allocations* publication, which in turn is based on the International Telecommunication Union (ITU) Radio Regulations.

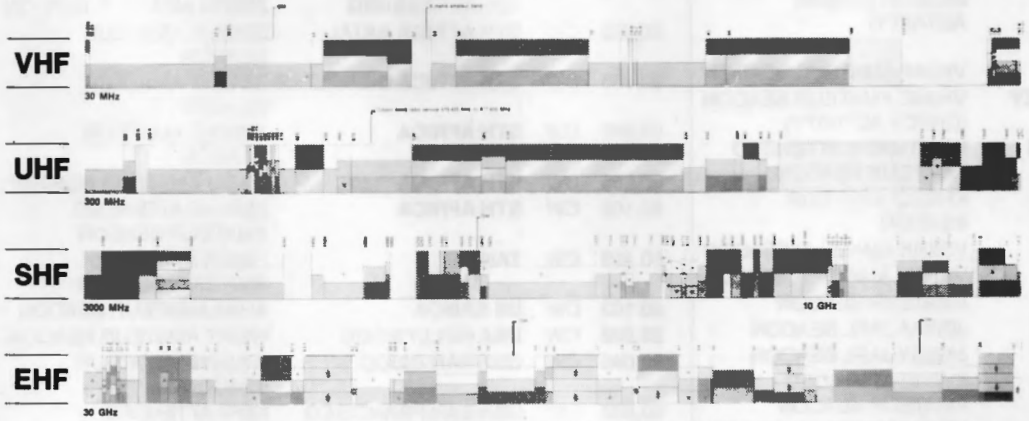
"The new chart provides a quick and easy-to-read guide to Australia's increasingly congested frequency spectrum," a spokesman for the Department said.

"Over the last decade the demand placed on the frequency spectrum has meant that new areas have had to be utilised, such as Ultra High Frequency (UHF) for television. The guide shows the full range of frequency bands from Very Low Frequency (VLF) to Extremely High Frequency (EHF).

"Each of these bands is divided into sub-bands which are used by particular services such as land-mobile radio, broadcasting, aeronautical, maritime or space services. The spectrum used by different services is shown in the chart by different colours.

"All those using the radio frequency spectrum, from broadcasting stations to amateurs, will find the chart a very useful reference guide."

The chart is available from **Australian Government Publishing Service** outlets in all the capital cities for $3.



A section of the chart showing the Australian Table of Frequency Allocations.

Pocket scanner

GFS Electronic Imports has released its new, fully programmable miniature pocket scanning receiver, the Microcomm Model SX-150.

The SX-150 incorporates many unique features, according to GFS. Amongst these are its ability to cover over 45 000 frequencies within the range 30-88, 138-176 and 380 to 514 MHz. It also has a total of 160 memory channels. The first 40 of these are normally used to manually store frequencies while the additional 120 are used by the SX-150 to automatically memorize frequencies it has located signals on while in search mode. These top 120 channels can also be manually programmed.

Other features include a priority channel, programmable 0.1 or 2 second scan/search delay, 16 channels/second scan/search speed, LCD display, clock, as well as 'rubber duck' antenna using a BNC Connector.

The SX-150 is supplied with rechargeable NiCad batteries and battery charger. Dimensions are only 175 (H) x 74 (W) x 42 (D) mm and the price $449 plus $10 p&p.

For further information contact the Australian distributors, **GFS Electronic Imports, 17 McKeon Road, Mitcham Vic. 3132. (03)873-3777.**

J.I.L. INTRODUCES PROFESSIONAL ULTRA-SUPER MULTIBAND RADIO/COMPUTERIZED PROGRAMMABLE SCANNER

UNINTERRUPTED FREQUENCY COVERAGE 150 KHz—3.7 GHz WITH RF CONVERTER

SX-400 SERIES

SCANNING MONITOR RECEIVER

New JIL SX-400 synthesized scanner designed expressly for commercial/professional monitor users that demand features not found in ordinary equipment...

OPTIONALLY EQUIPPED RF CONVERTER/COVERAGE 150 KHz-26 MHz AND 520 MHz—3.7 GHz

- CHANNEL SPACE SELECT SWITCHES (12 SWs. 26 MHz—520 MHz)
- MOMENTARY RECALL OF ANY MEMORY CHANNEL, CONVENIENT 2-WAY SCANNING
- QUICK SEARCH WITH PRIORITY CHANNEL
- CONTINUOUS 26—520 MHz GENERAL-COVERAGE, WIDER COVERAGE (150 KHz—3.7 GHz) WITH RF CONVERTER (OPTIONAL)
- WITH DATA INTERFACE (OPTIONAL), COMPUTER CONTROLLED • MEMORY CHANNEL EXPANSION, • 20 CH HIGH-SPEED REPROGRAMMING • RECORDING OF REQUENCY, VOICE AND TIME • AND ALL FUNCTIONS REMOTE CONTROLLABLE
- BUILT-IN ANL (AUTOMATIC NOISE LIMITER) EFFECTIVELY SUPPRESSES AM-PULSE-TYPE NOISE
- HI-FI RECEPTION OF FM/TV BROADCASTS BY NARROW/WIDE SWITCHING OF FM IF FILTER BANDWIDTH
- CONTINUOUS SEEKING WITHOUT INTERRUPTIONS BY BIRDIES
- STOP MODE CHANGE SWITCH ENABLES SCANNING AND SEEKING FOR MODULATED SIGNALS
- AC ADAPTOR (OPTIONAL)

SPECIFICATIONS (SX-400)

- **Frequency Range:** 26-520 MHz
- **Channel Space:** VHF 5 KHz or 6.25 KHz, UHF 10 KHz or 12.5 KHz
- **Sensitivity:** VHF FM 0.5μV 12dB S/N, AM 1.0μV 10dB S/N
  UHF FM 0.5μV 12dB S/N, AM 2.0μV 10dB S/N
- **Selectivity:** FM 60dB at ±15 KHz, AM 60dB at ±10 KHz
- **Memory Channels:** 20 channels
- **Dimensions:** 300(W)×90(H)×210(D)mm
- **Weight:** 3.5 Kgs

VIC. Vicom International Pty. Ltd.
P.O. Box 366, South Melbourne, 3205
Telephone: 62 6931 Telex AA36935

NSW. Vicom International Pty. Ltd.
118 Alfred Street, Milsons Point, 2061
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