

THE PHILIPS DC-777

SHORTWAVE LISTENING IN THE CAR IS NOW A REALISTIC CHOICE

Terry Palmersheim and John Grimley

Shortwave radio in the car is not a new concept. Since the end of the second world war, a number of radios have been produced for the European market with shortwave capability. Often such coverage was restricted to the 49 metre band and little else, mainly because Europe used this band (and still does) for short-range broadcasting to its own and to neighboring countries.

In the sixties, John had such a radio in the U.K., a Sony 7F-74DL, a rare model, which consisted of a metal housing case, mounted below the dash, in which was slotted an analog receiver, with all controls on the front face, looking very like a conventional two-knob car radio. It could be removed from the housing and, using its internal batteries and its own antennae, doubled as a portable "transistor", as they were called then. It had long wave, medium wave, VHF (our FM band), and one shortwave band which covered 5 MHz to 18 MHz! Sensitivity tailed off towards the band limits and there was no fine tuning control, either. Needless to say, tuning shortwave stations was an adventure and as the band was tuned, stations would appear at the speaker with a distinct "plop" sound. But, once tuned, the thing delivered very solid-sounding audio into the car.

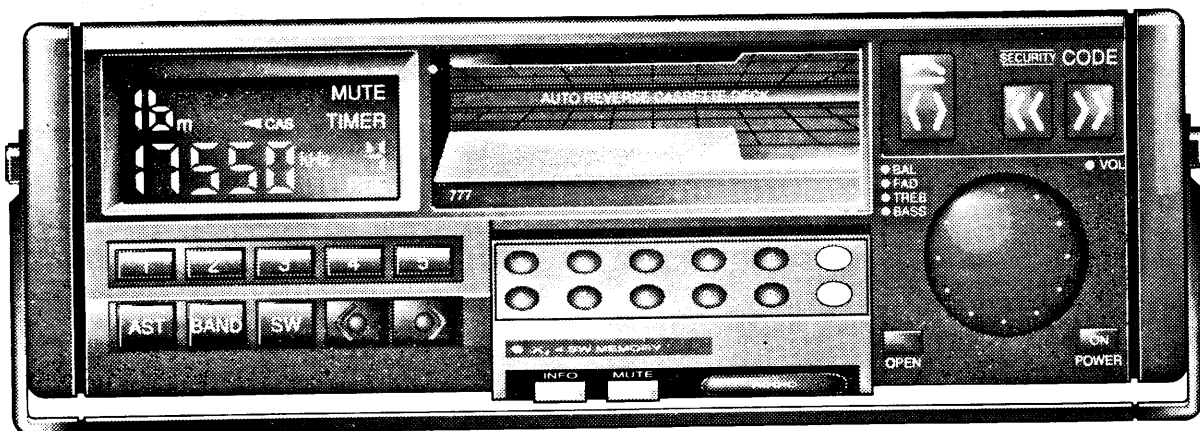
THE DC-777

Add digital tuning, miniaturization and most of the other trappings, improvements and performance of today's typical shortwave portable by Sony or Panasonic; take away the duplicate antennae and the batteries and you'd have something close to the Philips DC-777—the first breakthrough in affordable, credible shortwave radio for the car; certainly, at least, in North America (with apologies to Blaupunkt!).

The fact that the DC-777 is marketed in North America at all started as somewhat of a sideline. It is clearly manufactured for the European market, with its long wave, "medium" wave and "VHF" coverage. The original model had 9 kHz channel spacing on the AM band and the unit had the capability to tune in European FM sub-carriers, which are used there to carry road traffic reports and the like.

VERSION I

The first version available here was publicized by Philips and by other pre-release sources as being the same as the European version. When it hit the streets here, in the Spring of 1990, it had no long wave (just as well), the channel spacing was 10 kHz on AM (just right) and there was no FM subcarrier capability (very little used to date in North America). It was just what was needed. And with a price, including the housing unit, of US\$399 at Universal Shortwave it was steal. All this and an auto-reverse audio cassette deck included as well. John owns version I. Towards the end of 1990 Philips pulled this model from the North American market, replacing it with a second version.



VERSION II

Terry owns version II. It is essentially the same as the European model. The mounting housing is no longer supplied by Philips and Universal accordingly dropped their price by twenty bucks. Very fair. Because of fairly wide selectivity and single kiloHertz tuning increments, 9 kHz channel spacing is not really a problem. Memories can hold frequencies to an accuracy of 1 kHz, too. (Thoughtfully, Philips designers have provided 10 memories each for AM and FM and 20, in 4 banks of 5, for shortwave.)

ENTER VERSION III

In response to a letter by Harold Sellers of the ODXA, requesting literature on the product, Mrs. Imme Glomb (Philips Car Stereo International, Box 1440, D-6330 Wetzlar 1, Germany) writes, "We would like to inform you that a DC-777 specifically designed for US reception circumstances will be available from July 1991 onwards." On that basis, version three should be available in North America by the time this article is published and, hopefully, Philips will have got it right this time.

APPROACH

Installation of the radio will be discussed first, since most will be user-installed. Discussion will then centre on the important features and aspects of the receiver, followed by an evaluation of its performance.

Much of the text reflects the authors' common viewpoint and experience, but individual preferences and experiences are also included, where appropriate. The intention is to provide a balanced perspective for those who are considering shortwave radio for the car.

INSTALLATION

The DC-777 is no more difficult to install than other modern digital auto receivers. Note that there are two power leads; one from the ignition switch and one connected directly to the battery, used to maintain memory, time and security system data. As the DC-777 is a standard DIN-sized deck, installation in many North American cars which do not conform to DIN may pose problems and may entail the purchase of an aftermarket mounting bracket. European and Oriental cars usually conform to this DIN standard.

All of the necessary electrical connectors are supplied with the radio, with most having about six inches of wire attached. The power and ground leads are, necessarily, longer. Two four-wire and two two-wire terminal blocks are supplied, with screw type fasteners. They are not required but their use eliminates soldering. All speaker leads (two or four speaker system) are of the two-wire variety, plus and minus, and do not use a common ground. It is recommended that the existing connecting block(s) on the car's speaker leads not be removed and that, if necessary, an adapter be inserted between them and the DC-777's connector block. This makes it very easy to reconnect the original radio if the car is to be sold.

The DC-777 is protected by a 7.5 amp blade type fuse, mounted in the connector block, instead of the usual in-line fuse found on many other auto receivers. All plugs and sockets are keyed to ensure correct connection. The antenna connector is a standard Motorola fitting. There are two other sockets on the connector block. These are not referred to in the manual. Only the wiring labels suggest their intended use. One is labelled 'remote control' and is used to operate a remote antenna motor and the other provides line level outputs (e.g. to an external amp and/or equalizer).

If the car does not have a standard DIN aperture, Radio Shack and some automotive stores market conversion kits; but they do not, of necessity, cover all makes of North American cars. You may need to resort to some minor surgery on the dash board, as John did, or incur the expense of a professional installation job.

Note that the radio's pull-out handle may be mounted to be recessed over either the top or the bottom front edges of the radio. Be sure to mount it along the top edge; mounting along the bottom can impede the operation of some of the controls on the lower front face.

SCAN TUNING

There are five memory presets each for LW, MW and FM. Twenty memories are available on SW. These are accessed through a row of five buttons under the digital display. The display indicates which memory is being used. There are, in fact, ten memories each for MW and FM. The extra five per band are accessed via the 'AST' button. AST stands for Auto Store and functions only on MW and FM. Pressing this button causes the DC-777 to mute and search the selected band. AST flashes and, if there are sufficient stations of reasonable signal strength, the radio loads into memory the strongest five stations found during the search. These five are now accessible through the memory

buttons. Pressing the 'Band' button returns normal MW and FM memory operation. The AST thus effectively provides a memory expansion and is especially useful for those who travel widely by car, in areas where the local stations may not be known.

Philips mentions that 'Search' tuning (up and down arrow buttons) is accomplished at three different sensitivity levels (LW, MW and FM only). The DC-777 searches for high signal strength stations first. If none are found, the receiver increases its sensitivity and tries again. And so on. On SW, searching is done only within the pre-programmed SW broadcast bands (but direct access tuning will reach frequencies outside these bands). It mutes during the search process on all bands. The search function is a useful aid to finding stations whilst driving.

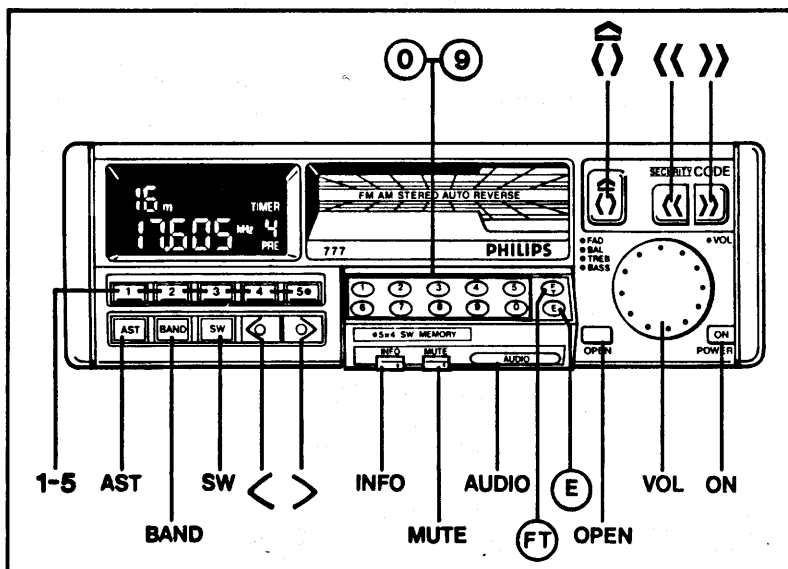
The manual tuning mode is accessed by holding down both the up and down slew buttons together, until a chirp sound is heard. (This chirp is heard when many controls are operated and is useful feedback that the control has functioned, without having to take one's eyes off the road to check it. But the sound is too loud, compared with the audio volume.) The tuning speed in this mode is rather rapid and frequency overshoot is quite likely, especially on MW. Philips did not provide a tuning knob; manual tuning is performed by holding down either the up or the down slew buttons. The radio mutes on LW, MW and FM while manually tuning. This is unfortunate and should be changed. Fortunately, it does not mute when tuning SW frequencies, which assists station location and identification.

The DC-777 has a remarkable knack, while auto-searching or in manual tuning mode, of distinguishing between bona fide signals and interference. Also, it stops right on the correct frequency, even if the signal is very strong. For example, the BBC WS on 6175 kHz will not fool it into thinking it is on 6174 kHz. All this suggests that it is programmed to detect carriers, rather than skirts. What's more, such tuning is done in no more than 1 kHz increments, since split channel stations are also found, e.g. WYFR on 17612 kHz will not escape the scan.

Changing bands, except for SW, is achieved by pressing the 'Band' button. The minor annoyance here is that it is necessary to carousel through each band (LW, MW and FM) to reach the desired band. Press only the 'SW' button to enter the SW bands. The frequency displayed will be that of the currently active memory number, not the previously active SW frequency. This can be irritating at times.

MEMORY TUNING

The twenty memories allocated to SW are accessed in an intriguing way. The first four presets each cover a bank of five memories; these are recalled by hitting the fifth memory button (which does not act as a memory on SW) to carousel through the five frequencies stored. For example, Terry's preset 1 holds 5975, 6060, 6160, 7355 and 7520 kHz. Each time the fifth button is hit a chirp is heard and it proceeds to the next stored frequency. Only one direction is used; to move from 6060 to 5975 requires 4 hits of button five. This is a little cumbersome, but is nonetheless an efficient way of getting twenty memories into five buttons. In theory, presumably, the number of memories per button could be increased. However, for SW listening in the car, twenty memories seems to be quite adequate.



SUMMARY OF CONTROLS	
1-5	Preset buttons (button 5 acts as a preset location switch on SW)
AST	Auto-Store button (FM & MW only)
BAND	Waveband selector (FM, LW, MW)
SW	Shortwave band selector
<	Search/manual tuning downwards button
>	Search/manual tuning upwards button
INFO	INFO button for traffic information
MUTE	Mute button for muting the radio/cassette player (apart from traffic information if INFO is activated)
AUDIO	Audio mode (Fader/Balance/Treble/Bass) selector
OPEN*	Door open button
VOL	Volume control; also to adjust the Fader, Balance, Treble & Bass
ON	On/off switch
⏏	Eject cassette/Reverse tape direction button
<< >>	Fast wind buttons
*Press OPEN button to access the following controls on the keyboard:	
0-9	Digit buttons—for direct entry of frequency, time and Security Code. Buttons 1-3 are also used for timer.
FT	Frequency/Time selector
E	Enter button

DIRECT ENTRY TUNING

The addition of a numerical keypad in a car radio, for direct frequency entry, is perhaps unique to the DC-777. Icom's IC-R100 and Kenwood's RZ-1 also use keypads but neither is considered to be a de facto car radio. The DC-777 is definitely a car radio. It looks, acts and behaves as one and Philips is certainly marketing it as such. The IC-100 and the RZ-1 are mobile scanners. Also, both can be used outside of an automobile. It is an understatement to say that the addition of a keypad to a SW car radio is a good idea. It is almost a must for successfully accessing shortwave frequencies that are not preset in memories. Imagine tuning SW using only slewing buttons in a moving car!

The DC-777 keypad is accessed by pressing a small button marked 'Open'; the keypad hinges outwards to a 45 degree angle and has two rows of six buttons. 1 - 5 plus 'FT' (for time set) on top and 6 - 0 with 'E' (for enter) along the bottom. The buttons are small with a rubber-like feel and take some getting used to. When first installed, the buttons required some pressure to function. They have loosened up somewhat over time. They chirp when hit.

The Philips designers have done their software homework on this receiver. There are no decimal points or leading zeros to enter. When the first digit is entered the radio mutes and the digit appears in the frequency display. Entering 1-5-4-2-5 and 'E' produces Radio Moscow, booming in at 2000 UTC. The software could be a little more intelligent; if a SW frequency is entered while in the FM mode, for example, the radio beeps and the entry is rejected. On the FM band a trailing 0 or a 5 is required to complete the entry—for example, 93.3 MHz must be entered 9-3-3-0. Presumably this is necessary in some parts of the world.

Once familiar with the various tuning methods, moving around in the spectrum is fast and easy. In respect of this area, and others, it is highly recommended that the manual be read very carefully, and more than once, in order to get the most out of the DC-777. This is particularly true of users who may not be familiar with digital radio or scanner-type operations. Generally, the owner's manual and the installation instructions are well written (in ten languages, but not in Japanese!), including useful graphics, but some useful features are either glossed over or omitted completely.

AUDIO

The DC-777 will deliver 20 watts per channel into two speakers or 7 watts per channel into four speakers. Including a separate on/off button (usually the on-off switch of a car radio is integrated into the volume control knob), there are only four controls affecting audio functions—the main rotary control knob, an oblong button marked 'Audio' and another marked 'Mute'. Mute can be activated in all modes, including tape cassette, whereupon 'Mute' is indicated on the display panel. The rotary knob has detents and controls volume as its default setting. Pressing the 'Audio' button lets you carousel through the other audio functions of Fade, Balance, Treble and Bass, again using the rotary knob to adjust these functions. Fade does not operate and shows 'Off' if only two speakers are used.

The main control knob uses a photo-encoder circuit, similar to that used by tuning knobs on some digital portable radios. It is not linear in response and careful adjustment is required to obtain the desired settings.

All audio settings, except volume, can be pre-programmed independently for each band, including the presets for that band. This gives needed flexibility, because of the differing audio characteristics of each band; but distinct settings for each preset would have been a welcome addition.

At switch-on, the volume level is always at a relatively low, preset level, regardless of the volume setting when the radio was last switched off. This is also a useful feature, avoiding that blast of sound from having the audio up too high the night before!

Terry's DC-777 is installed in a 1980 Pontiac Phoenix hatchback and John's is in a 1984 Chevrolet Caprice Classic, both with originally fitted speakers and speaker wires. Audio power is more than enough and the sound is quite clean, particularly on FM. But for those who insist on entertaining their fellow road users, as well as themselves, while driving and listening, an additional amp and matching speakers will be needed!

MW AND FM PERFORMANCE

Both Medium Wave (AM) and VHF (FM) sensitivity and overall quality are at least on a par with other car radios experienced. As with SW, much depends on the antenna used; FM performance on fringe signals is much improved by using both a horizontally mounted windshield antenna and an external vertical. The ability to be able to tune between the AM band channels allows local, boomy signals to be tailored to a more pleasing audio tone by detuning a couple of kiloHertz. This feature is also available on FM and allows clearer reception of weak signals which are adjacent to strong signals. For example, at John's location, 93.1 has a strong signal and 92.9 is weak. By tuning to 92.85 the strong signal is avoided and the weak signal is heard in the clear.

As a testament to the AM section's performance, Terry, located in Washington State, has heard HLAZ from South Korea on 1566 kHz using 250 kw with very good signals in the early morning hours, around 1230 UTC.

SIGNAL PROCESSING

The DC-777 has its own way of dealing with what it perceives as weak FM signals; it automatically switches from stereo to mono. This can have a disconcerting affect while driving; multipath reception of strong signals will also produce the same effect. It is rather annoying at first, but it does solve what has been an inherent problem with FM reception while on the move, especially in built up areas, where multipath is more likely. 'Picket fence' noise is eliminated with this feature. The ability to switch this control in or out, according to taste, would have been desirable.

Universal Radio's 91-02 catalogue provides more insight, on page 12: Philips has designed several FM signal processing circuits into the DC-777: SDS/SDR (signal dependent stereo/response), MDS/MDR (multipath dependent stereo/response) and IAC (interference absorption circuitry). None of these features is mentioned in the manual.

PANEL ILLUMINATION

Panel lighting is good but could be improved. At night, most controls are lit and visible, as is the keypad, when opened. Buttons not illuminated are AST, BAND, SW, INFO, MUTE and ON. Based on ergonomics, Philips would do well to consider lighting for the ON, BAND and SW buttons.

The main display panel is very informative compared with other car radio displays, and use is made of colour—orange, yellow and green—to distinguish different pieces of information, both by day and by night. It is easily read, except in direct sunlight.

TIMERS

Another feature is the incorporation of three separate switch-on timers. They are activated via the keypad's 'FT' button and are easily programmed. Philips has chosen to adopt the twenty-four hour format for their clock and timers, so UTC can be properly used for shortwave listening. All that is required for the DC-777 to turn itself on at the programmed time is that the 'On' button be depressed. It will automatically switch to the desired frequency at the programmed time. It even controls the cassette deck! This is a welcome feature on a car radio capable of shortwave reception.

SECURITY

The DC-777 has its own security system, the principles of which are now beginning to appear in conventional car radios in North America. Each radio has its own 4 digit security code. When the permanent 12 volt supply from the battery is disconnected (e.g. by a thief removing the radio), it will not function again unless and until the security code is re-entered properly via the keypad. Small window stickers are provided which advise the prospective thief of this. Whether or not this is an effective deterrent is debatable. The thief may have a useless radio, but the owner is still minus one radio. And the chances of the culprit returning the thing when it is discovered that it will not work seem rather slim.

The security code system did not function correctly in Version I, one reason why Version II was introduced so quickly. If you purchase Version I (there should be very few on the market now), it is recommended that the security system not be activated in the first place, whereupon it will not fail. In any event, the car's door locks (and trunk) provide the best deterrent.

ANTENNA EXPERIENCES

Terry had replaced his original windshield antenna with a Radio Shack 31" cowl mounted antenna (catalogue #12-1322) to improve reception of MW stereo on his previous radio. The DC-777 exhibited quite a bit of ignition noise with this antenna. Expect some ignition noise when listening to weaker SW stations (see below). Terry installed RJ-14 resistor spark plugs, by Champion, and noise suppressor type spark plug wires at his next tune-up. A Harada model ST-19 replaced the Radio Shack antenna at the same time. This antenna is a 45" three section whip with a base loaded 'booster coil', cost US\$13.00. EUREKA! Shortwave reception became better than was ever imagined in the car, with no ignition noise apparent.

As mentioned above, John has kept the windscreen antenna and combined it with a mag-mount whip. This provides at least adequate signal levels on all bands, but engine noise (airborne, via the antenna, not via the 12 volt supply) can still be a problem on weaker SW signals.

It should be stated clearly that practicalities dictate that shortwave radio in a moving car is very much a question of Shortwave Listening, rather than DXing. Therefore these noise problems tend to limit themselves, because it

is the higher strength SW signals that are most often tuned in and listened to.

To help in minimizing noise pick-up at the antenna, it cannot be emphasized enough that a good ground connection be installed, and maintained, between the underside base of the antenna and the metal body of the car. Use a short, braided grounding strap to optimize the shielding properties of the coax line. This is not always possible with a mag-mount, however. Use a silicone-based caulking compound to keep out air and water at all exposed points, to avoid poor contacts due to future corrosion; also ensure first rate electrical contacts in all areas, to avoid disconnection due to vibration.

AUTO NOISE

The DC-777 has excellent DC filtering and provides a virtually noiseless DC current to the radio, which itself is well shielded. Any auto noise experienced will be airborne RF noise, picked up by the antenna and/or the lead-in. It may be radiated by the offending component, by connecting wires or by the whole car chassis and body metal—perhaps by all of the above. It may come from sources beyond the car.

Terry and John have compared notes concerning listening experiences. Antenna type and location are critical for both optimizing signal pickup and minimizing RF noise interference. Our own experience, and that of others, suggests that expensive antennas with their own pre-amps may prove to be a costly mistake, rather like active antennas in a downtown environment. Try to eliminate the source of noise rather than to excessively boost the signal input.

The other major variable is the car itself. RF noise generation varies from model to model and even from car to car of the same model. At the risk of generalizing, it seems that Japanese cars fare better in this area, and they also use that DIN size aperture a lot more than North American cars.

Guy Atkins has a DC-777, installed in his Laser XE Turbo. The car's three on-board computers issue a fair amount of RF noise, especially on the 90, 75, 60 and 41 meter bands. Guy believes that most of the noise comes from the interconnect wires, rather than the components themselves. His experimentation with noise suppressors (e.g. LC filters, coaxial feedthrough capacitors and ferrite beads) yielded no perceptible improvement. His present setup uses a Radio Shack 102" CB antenna, cut down to 72" for aesthetics and manageability. Guy says this works well.

Before embarking into SW for the car, use your portable SW receiver and its whip antenna to assess RF noise coming from your car. Try different parts of the car, including under the hood, at different frequencies. Compare the results with other cars.

It's worth repeating that, in its intended mobile environment, the DC-777 is not a DXing machine. Even if it was, the vulnerability of your insurance premiums, and possibly your life, should preclude any temptation to dial-twiddle whilst driving! Eyes on the road and hands on the wheel, please!

SHORTWAVE LISTENING

What shortwave broadcasters do we listen to on the DC-777? John listens to the BBC World Service mainly, out of personal choice. Fortunately they beam transmissions to North America during both of the East Coast rush hour periods, usually with more than one acceptable signal at those times. Typically, Radio Australia and TWR in the morning and Radio Netherlands, Ecos del Torbes, WCBS, Deutsche Welle, etc. in the evenings; with WCSN, Radio Sweden and even All India Radio in between. One set of John's memories carry WWV and CHU for accurate time checks and current propagation reports. Sadly, the memories which contain Radio Canada International frequencies have received little use since March of 1991....

Driving to work around 1430 UTC, Terry has no problems hearing R. Australia on 6060 and 9580 kHz. The BBC rolls in on 9740 and 11750 kHz. Terry has had good reception of R. Thailand on 9655 kHz. Letting the DC-777 search through the 60 metre band nets many Chinese regionals and it will lock onto RTM Kuching on 4950 kHz, with its English programming. It finds Taiwan's BCC station on 6087 kHz and WYFR on 17612 kHz.

CKZU from Vancouver on 6160 kHz. can be heard all day and, on occasion, CKFX 6080 and CFVP 6030 have been heard.

Travelling from work, Terry also tunes in the BBC, on 9590, 9915 or 15260 kHz. Lunchtime driving on the west coast yields R. Moscow on 15425 and 17605 kHz and the VOA transmits good signals for the DC-777 on 17800 and 21485 kHz. Radio Netherlands, from Bonaire, on 21685 provides an early version of Media Network, on Thursdays, during the 2030 - 2125 period, which Terry hears quite well in the car on the North West Coast.

The DC-777 is a single conversion receiver and the occasional image has been noted—an example is R Moscow appearing on 5100 kHz, being 900 kHz away from 6000 kHz; the DC-777 uses a 450 kHz intermediate frequency. Images are hard to find in this model, but experimentation with a longwire antenna produced, perhaps not surprisingly, MW images and excessive overloading. If DXing is desired at a static location, limit the longwire to no more than 25 metres.

By way of comparison to existing equipment, John considers the front end of the DC-777 to be close to or

on a par with the paperback-size portables from Panasonic and Sony, using their telescopic whips (but the Philips has no SSB capabilities). Because of the power output and the car's own speakers the audio quality is considerably better than any small shortwave portable can deliver and most table tops too. One of the big pluses of the DC-777 is its sound quality on shortwave. Terry compares it favourably with his Grundig Satellit 500, when the car engine is turned off.

In terms of comparison with alternative methods of listening to shortwave in the car, there's no contest. The DC-777 far outperforms any SW converter and is much more convenient to operate and provides the audio power and dynamic range necessary in the car that, say, a portable radio strapped against the car window just cannot deliver. True, there is no headphone socket on the DC-777. But it is neither desirable, nor necessary to listen on headphones.

Philips' choice of bandwidth, 6 kHz, proves to be a good compromise between the fidelity that it produces and the avoidance of splatter from adjacent channels. The DC-777's audio controls and 1 kHz tuning increments are often enough to get rid of all but the most stubborn hets and whistles. The AGC is very well adjusted; signal fading is conspicuous by its absence in the DC-777.

CONCLUSION

On long, non-routine drives, as well as during the daily commute, the variety afforded by international shortwave broadcasters seems to make the journey pass more quickly and enjoyably, compared with home-spun, ho-hum radio. And somehow, being cooped up in that metal shell on wheels doesn't seem such a bad thing after all. In fact, we confess we quite look forward to getting behind the wheel these days.

The DC-777 is the first and, so far, the only radio that has successfully brought acceptable shortwave listening into the car in North America. It has certainly exceeded our expectations of such a radio in such an environment. For a price tag that can be less than US\$400, Philips are to be congratulated on their thoughtful design of a product that fills a need that has existed for many years. And they've done it in a professional way and at a price that represents excellent value. Neither of us would now relish being without a DC-777 in the car.

Until now, there have been two main categories of shortwave radios—portables and table tops. Now we can add a third.