



THE OFFICIAL JOURNAL OF
 THE GIPPSLAND GATE RADIO AND ELECTRONICS CLUB
 OCTOBER 1986

GIPPSLAND GATE RADIO AND ELECTRONICS CLUB

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Club meetings held at the 1st Oakwood Park scout hall in
Heyington Crescent, Noble Park North. Meetings commence on
the Third Friday of each month at 8:00 pm.

Club Station: VK3BJA Located at the scout hall.

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ALL VISITORS WELCOME

PRESIDENTS REPORT - OCTOBER 1986

Greetings readers, apart from the Gippsland trip organised by Dave VK3XMF, October shall be a month of preparation. November shall be a busy month for the GGREC.

Friday, the third of November is the evening of our regular Social night, this will be another pleasant evening at the Wheelers Hill hotel from 7:15 onwards. (excellent counter meals are available) On Saturday morning of the 15th some of our members will be involved with the public display in the Dick Smith store, Springvale to promote radio and electronics. The following Friday, our normal general meeting night will be the occasion for our annual WHITE ELEPHANT SALE, the ultimate opportunity to exchange your junk for somebody elses.

The year will wind up on Saturday the sixth of December for the big event, the Christmas break-up at Albert VK3BQO's residence at 13 Virginia st. Cranbourne. This commences from 2:00 pm for an indefinite period.

Our last social night at the Mongolian restaurant in Frankston proved to be a hit, almost twenty of our group got stuck into this unique cuisine. And liked it.

This will be the last edition of GATEWAY for 1986, note that the first meeting for 1987 will be on the THIRD FRIDAY IN JANUARY. If you have any terrific ideas (or even mediocre ones) for future meeting night activities then bring them out in the open, the worst that could happen is that you be publicly ostracised.

OMEGA VISIT

The trip will start from the service road opposite the Drill Hall (Mel 90 E9) Princes Highway Dandenong, at 9AM Saturday 25 October.

Yes! That's the weekend following this coming GGREC monthly meeting.

We will proceed down the Princes Highway to Traralgon.

Here there will be an opportunity for an early lunch. Having stocked up with the right brand of liquid we head south to Mt Tassie.

This being the site of the URLV repeater, we will see if it is accessible by four wheeled vehicles.

From here we proceed to Bulga National Park, then Terra Valley National Park, to view the rainforests.

Later in the afternoon we will set up camp at the Terra Valley Caravan Park. Then settle in for a BYO barbecue dinner. (Note: If ROB's weather doesn't fall, and is terrible we could camp at Yarran or Fort Albert).

On Sunday, at about 10AM, having packed up, we will drive via WonWoon to the OMEGA site at Derrol. After resounding acclaims, of "wasn't it all worthwhile", we head west along the South Gippsland Hwy.

Four kilometers after Welshpool, a side trip can be made to Forty Beach, where Oil rigs are constructed.

Lunch can be bought in Foster, from where we continue to Koobangara. Here we turn south to Inverloch and the Bass Hwy.

Further on at Dalyston, we head north to Bass Hill, repeater site for IRGG.

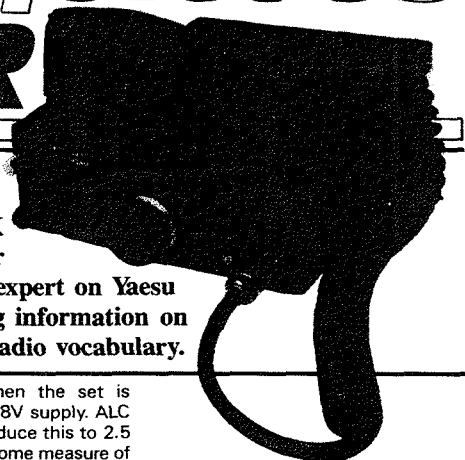
Older Forbes boat on the Bass Hwy is next.

Our arrival at Dandenong is expected at about 5PM Sunday afternoon.

Come along and be Radio Active at OMEGA !

The Ubiquitous FT290R

The Yaesu FT290R is unquestionably the best selling VHF amateur transceiver ever, with in excess of 10000 being sold in the UK alone. Harry Leeming, G3LLL, of Amateur Electronics/Holdings and an acknowledged expert on Yaesu equipment, offers modification and servicing information on the rig that puts 'ubiquitous' into amateur radio vocabulary.



In June 1981, the newly introduced Yaesu FT290R took the UK amateur market by storm. Soon dealers had queues of amateurs on a waiting list with money in their hands ready to go 2m multimode for under £250. Especially now, the FT290 fits the requirements of the not too affluent market very well. In one piece it provides a unit which is suitable for portable, mobile or base station use with CW, FM and SSB operation being provided for. The FT290 is a little large for portable operation and somewhat small for base station use, but it suits most people who want to do a little of everything on the 2m band and have not a £1000+ to spare for three separate rigs.

What's Inside?

The block diagram, Fig. 1, gives a pretty good idea of the circuit arrangement. The receiver section is conventional with a dual gate FET RF stage and first mixer followed by a 10.81MHz first IF. The SSB and CW sections carry on at this frequency as far as the balanced demodulator, whilst FM is dropped to 455kHz by an 'all in one' demodulator chip. AF output to the speaker is about 1 watt, far more than the miniature internal speaker is happy with, but provision is made for the use of an extension speaker — if at all reasonably sensitive this makes 1 watt sound quite loud.

On transmit the SSB and FM signals are developed at 10.81MHz and "squirted" towards the antenna. The PA stage is set up so that without ALC it will deliver 4-5 watts

to the antenna when the set is operating from a 13.8V supply. ALC is then applied to reduce this to 2.5 watts and provides some measure of SWR protection to the PA transistor.

Powering The Rig

Provision is made for operation from eight internal U11/C size batteries or from an external 8.5-15V supply. On FM, the internal batteries can be either rechargeable NiCads or conventional types, but for SSB transmit only NiCads are suitable as the higher internal resistance of carbon/zinc batteries tends to cause unwanted FM and distortion on SSB transmissions.

How To Blow Up . . .

Basically, the FT290R is an extremely reliable unit. However, through dedication, skill and experimentation, our customers have worked out several ways of putting them out of action.

. . . The PA Transistor

The ALC system on the FT290R is designed to hold the power down to 2.5 watts. When correctly set, it will deliver its 2.5 watts at any DC power supply voltage from about 11 to the top limit of 15 volts. If the ALC is incorrectly set, over 5 watts output can be obtained at the 15 volts end of the scale and some people think that they have "peaked up" their rig by misadjusting the ALC pot. You may get away with it for a time, but any attempt to get more than 2.5 watts will make negligible

difference to signal strengths and is likely to result in a £25 bill!

The telescopic antenna on the FT290R can be removed to facilitate the use of a flexy whip or a 'rubber duck'. Once the telescopic antenna has been removed, it is essential that it is refitted and telescoped down into its holder before any attempt is made to transmit on an external antenna. The retracted telescopic whip is part of the PA tuned circuit when using an external antenna, and its omission will reduce output and increase input — and more than likely blow the PA transistor.

. . . The NiCads

The calculator type socket on the back of the FT290R is for connecting an external DC supply lead. There are at least four different sizes of calculator type DC plug which will fit into the hole in the socket but only one size is correct. The plug used must operate a switch to disconnect the internal NiCads as it is inserted *before* the external supply makes contact. Many plugs when half inserted put the NiCads straight across the 12 volts supply and several FT290Rs have been written off simply by using the wrong size of plug.

You cannot tell if the plug is correct by looking at it, try pushing it in slowly whilst watching the LCD display. If the plug is correct, the display should disappear as it is



inserted about half way. If external 12 volts power is connected to the plug, the display should then reappear when the plug is pushed in further. It is most important that the plug disconnects the NiCads slightly before it connects the external power and *only the correct plug will achieve this*. On the subject of external power the FT290R consumes about 800mA and hence it is essential that the DC lead is fitted with an inline fuse holder with a fuse of not more than 2 amps.

... The Micro Processor

The scan pins on the mic socket end up at the micro processor. Also on the mic socket is a 5 volt supply pin. Try soldering a mic socket whilst it is plugged into the rig or short out the mic connections and you are likely to blow the micro processor. This, of course, applies to most rigs using micros and as these devices are about the size of a ½p. and have 50+ soldered connections, replacement is expensive and a job for the dealer.

Initially Insensitive

Some FT290Rs did initially seem slightly lacking in sensitivity and there was a rush of modifications and pre-amplifiers to hot them up. Later they were really quite sensitive, and the writer is not too keen on adding internal pre-amplifiers or high gain first FETs. In some circumstances extra gain may help, but

when the band is crowded with strong signals, it will only make splatter — due to cross modulation — worse. The writer's feeling is that any extra gain should be switchable so that the "best buy" is a good linear power amplifier with a switchable pre-amp.

If the rig really is deaf, it is possible that the alignment is out, particularly if it started life as a "grey impor" originally trimmed to cover 144-148MHz. Touching up the RF alignment of the FT290R is not too difficult provided you know what you are doing — it is covered in the instruction manual. The following notes are provided for the benefit of those without a load of test gear, assuming that the rig has not previously been attacked by a trimmer twiddler.

The simplest way of checking of frequency is to tune to a reliable frequency standard, such as a beacon, a couple of different repeaters, or an accurate crystal calibrator, in SSB mode and note the dial readings. It is very difficult to judge exact zero beat so try tuning to a low beat note first on USB and then on LSB and take the average. If the display is more than about 0.3kHz out alignment is needed. Find L 3007 (see page 41 of the manual) and turn it very slightly (about ½ turn) until the calibration is correct — you should not have to move the core more than half a turn unless some fault has developed. Use a proper trimming tool — not a screw

driver — to avoid damaging the core. Note that holding the trimming tool near the core will upset the frequency.

Once the calibration is correct on SSB receive, the rig will automatically transmit on frequency on SSB and CW, but may be out on FM transmit. To check this, either borrow an accurate frequency counter, or get a few reports over the air. Only when the SSB side is correct should you start adjusting for the FM transmit by slightly turning L2002 (also shown on page 41 of the manual).

Brightening Up The Audio

When used mobile, the internal speaker tends to rattle if the volume is increased sufficiently to read the more muffled FM signals above road noise. A big increase in volume and clarity can be obtained by carrying out a small modification to the de-emphasis network which may have been optimised for higher pitched Japanese voices. This is shown in Fig. 2. C110 is removed by squeezing it with a pair of long nosed pliers until it shatters and then shaking out all the bits. This really does make for much clearer Rx audio.

Modifications

It must be emphasised that no work using a soldering iron should be carried out unless the rig is completely disconnected from aerial, power, batteries and all other

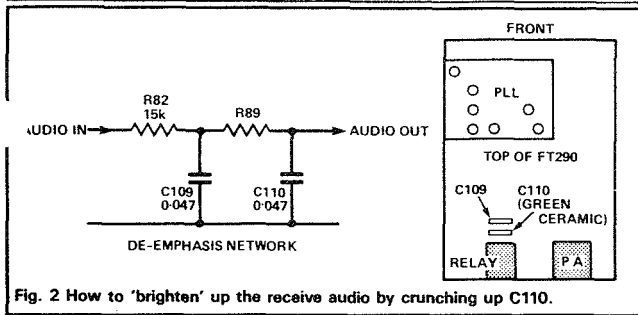


Fig. 2 How to 'brighten' up the receive audio by crunching up C110.

equipment. The soldering iron must be of a low leakage type and should preferably be earthed to the chassis of the FT290R.

Listen On Input

When working through a repeater, it is handy to be able to check if simplex contact is possible by dropping the receive frequency 600kHz. A very simple to carry out modification from the importers, Amateur Electronics of Birmingham, enables this to be done. Referring to Fig. 3, remove the bottom cover and cut the black and white wire on SK1 which is the tenth wire from the left. Remove this wire and insulate it from SK1. Find the green and white wire on SK2 and connect the anode of a diode — either an IS1555 or 1M914 — to it, remembering to sleeve the diode leads to avoid shorting. Connect the cathode of the diode to the red/white wire from SK1 at point X on Fig. 3. Now when pressing the call button, the logic of the rig is 'conned' into believing the rig is in transmit mode and so the receiver falls 600kHz without actually going over to transmit. Remember though, that when you want to send a tone burst now, you must squeeze the PTT at the same time as pressing the call button.

However, for those more adept at wielding the soldering iron, there is a modification to provide both listen on input and auto tone burst facilities. The 'listen on input' is added to the previously redundant 600 position of the selector switch and a one second tone burst is sent whenever the mic is squeezed when switched to repeater mode. (There is no tone burst on simplex). If the tone burst is not required, it can be killed by switching off the noise blanker at the back.

As with the previous modifica-

tion, the listen on input functions by switching the logic to Tx mode when the unit is on receive. The tone burst is made to run continuously on receive by being fed via D2 and R2 from the noise blanker +6.8V supply. When the PTT is pressed the 6.8V supply disappears leaving the tone burst to run for about one second from the charge in C1.

Here are the instructions for fitting this modification which was developed by ourselves (Amateur Electronics/Holdings of Blackburn).

1. Remove top cover.
2. Fit a 100 ohm resistor, R2, to the rear solder pillar and run a new brown wire from the free end of this resistor through any convenient hole to the regulator board on the underside of the chassis. Insulate any bare wires.
3. Cut the green wire from pin 12 and solder to line end of D3. Insulate diode and connections.
4. Cut back insulation on the black/white wire going to pin 11 without cutting wire and solder D3, the new blue wire and the

47k resistor, R1, to the bared wire.

5. Solder the other end of R1 to the HT pillar which has several red wires going to it. Insulate any bare parts and run the new blue wire to regulator board. Re-fit top cover.
6. Remove bottom cover and battery tray.
7. Slide out the regulator board and cut the printed circuit tracks at the two places shown.
8. Solder D1 to the green wire on the mode switch and the green/white wire on the nearby socket. Insulate as before.
9. Solder the new blue wire to the track on the underside of pin 11 on the socket.
10. Solder a 470uF, C1, to the track cut from pins 13 and 12, the negative end goes to an earth point on regulator board.
11. Feed the new brown lead via D2 to the positive end of C1.
12. Check that all diodes are connected the correct way round and that all joints and bare leads are insulated. Re-assemble the bottom cover.

Testing

Listen on input will occur when switched to +600. Tone burst will appear on -600 with "NB" switched on. If tone burst is too long or short in duration, alter value of C1. If tone burst appears on simplex, fit a 2.2k in parallel with C1.

Distortion On SSB Transmit

If the PA transistor is ever replaced, it is essential that it is

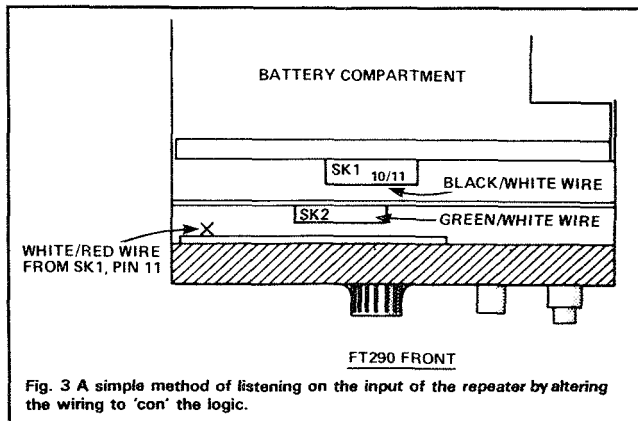


Fig. 3 A simple method of listening on the input of the repeater by altering the wiring to 'con' the logic.

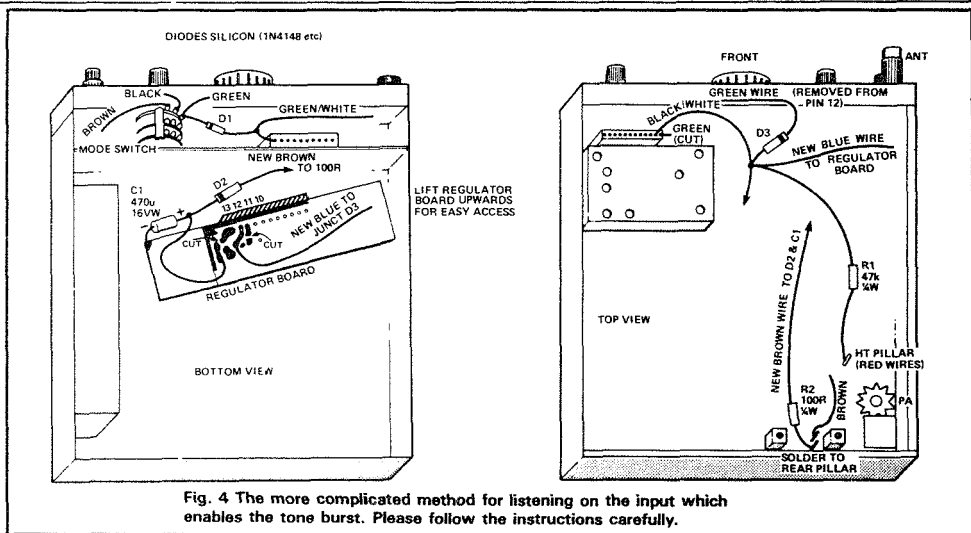


Fig. 4 The more complicated method for listening on the input which enables the tone burst. Please follow the instructions carefully.

correctly biased. A transistor at the end of the gain specification can be under or over biased if it is just swapped. To check, monitor the whole rig's HT current with it set at SSB, transmitting into a dummy load and feeding the rig from a 13.8 volts supply. Check on a sensitive power meter that there is no output, ie ensure that the carrier is correctly balanced, and that no sound is being picked up by the microphone.

Now short circuit the base of the PA transistor, Q2022, to chassis and the total HT current should fall by between 10-15mA. If it does not fall by this amount alter the value of R71 until it does. R71 is a fixed resistor in early FT290Rs and — whilst not shown in manual — is a variable pot in later FT290Rs adjacent to the PA transistor. The small diode, D23, is incorporated to prevent thermal run away and must be installed so that it is in thermal contact with the PA transistor using silicon grease whenever it is replaced.

Replacing The Pilot Lamp

The pilot lamp is probably the worst feature on the FT290R and whilst it does not burn out very often, it is a "pig" to replace. If you are used to electronic service work, allow 2-3 hours. If not, forget it and dangle a well insulated bulb between the display and the meter. Incidentally, a good insurance

against lamp burn out is to dim it by connecting a series resistor of about 47 ohms.

If you do decide to replace the bulb, I am afraid I cannot give you a blow by blow description of its replacement, but for guidance, start by removing the regulator board and then work forward removing the other two boards by unscrewing them from their mounting pillars. Do not dismantle the LCD display but slide out and unsolder the old lamp and slide in a new one. The real art is to do the job without wires dropping off or becoming trapped under mountings and short circuited when re-assembling.

Intermittent Rx Or Tx?

If when you go over to transmit the relay clicks but the red light sometimes does not come on, or conversely two or three stabs at the PTT are required before the Rx comes to life, suspect the relay contacts. To clean, remove the plastic cover and whilst rapidly pushing the PTT squirt some *non oily* cleaning fluid in. I must emphasise that cleaner with lubricant must not be used neither must carbon tet otherwise you will have to replace the entire relay.

Synthesiser Whine

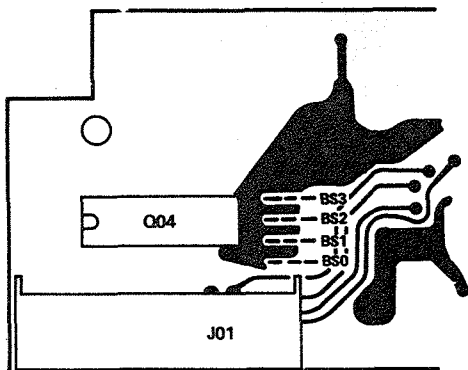
Some early production models of the FT290R had a rather high level

of whine. This can sometimes be reduced by re-tuning the PLL which is explained on page 36, paragraph 2 of the manual. Set the rig at 145MHz and try adjusting TC 3001 for the highest and lowest voltages that can be obtained. Then set it at half way between these extremes — this might not be the 3.5 volts stated. Another dodge is to monitor the whine on a separate receiver and move the wiring harnesses around for minimum noise. The real cure on early production FT290Rs, if you are up some delicate work with a soldering iron, is to locate LO6 in the synthesiser and wire a 15pF capacitor in parallel with it. This can usually be tacked between the hot ends of C24 and C25 which will be found at the rear of the IC in the synthesiser unit.

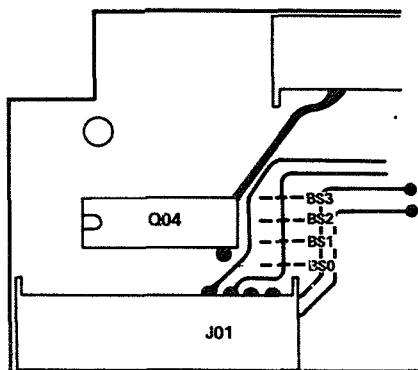
Burnt Out Battery Holders

If, due to a short circuit, a faulty calculator socket or a wrongly fitting plug, the NiCads become hot, the holders will melt. These items are fixed into the metal tray with double sided Sellotape and are easy to replace as two exact replacements can be obtained from RS Components Ltd, stock no 488-214. After replacing these items do check, as explained previously, that the plug and socket are functioning correctly before putting the rig back into operation.

	Type A	Type B	Type C	Type D	Type E	Type F
BAND (MHz)	144.0-147.9999	144.0-145.9999	144.0-147.9999	144.0-147.9999	144.0-147.9999	144.0-145.9999
PRESET (MHz)	147.0	145.0	145.0	145.0	147.0	145.0
CH STEP (Hz)	5k/10k	12.5k/25k	12.5k/25k	5k/10k	5k/10k	10k/20k
BS 0	X	O	X	X	X	X
BS 1	O	X	X	O	O	X
BS 2	O	X	X	X	O	O
BS 3	O	O	O	O	O	O

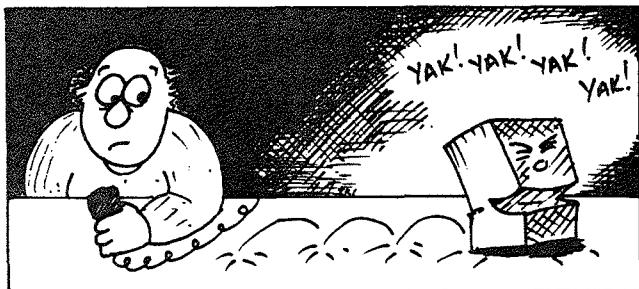


PB-2236C VIEWED FROM COMPONENT SIDE



PB2236-2236B VIEWED FROM COMPONENT SIDE

Fig. 5 How to modify your transceiver to operate within the frequency range and channel spacings which vary round the world. Determine which type your rig presently is and which you would like to change it to. Then install 'jumpers' in the positions marked with a "O" in the table on the component side of the board. Type A transceivers can have their range extended to 143.5-148.49MHz by removing BS0.



Receiver Distorted On Some FM Stations

First check that the synthesiser is on frequency and then using the clarifier, carefully tune either side of a few stations. Note that the audio should be of good quality for about 2-3kHz either side of the point where the maximum S meter reading is obtained. If it is not, locate T1013, shown on page 40 of the manual, and adjust it so that the best quality falls symmetrically around the point where the highest S meter reading is obtained.

Chatter From Speaker When Transmitting

The audio output IC is muted by a voltage when transmitting to prevent "monkey chatter" in the background. In some FT290Rs, this mute voltage is sufficient to kill the speaker when operating from internal batteries but allows it to come back to life if the rig is run from a supply of more than about 13 volts. The cure is to locate the mute resistor R2076 which is 15k ohms and replace it with one of 10k ohms.

Using With A Linear

The matching Yaesu linear is switched by a DC voltage which appears on the antenna socket when in the transmit mode so there is no problem with the Tx/Rx relay clicking in and out when on SSB. When using an RF switched linear, this can become annoying and you may wish to "hard wire" it. If your linear has a PTT socket, this can be wired to the socket marked "stand by" on the side of the FT290R. If this is done with a linear such as the Microwave Modules MML 144/30LS, the clicking relay annoyance will be avoided.

Different Versions

Different FT290Rs are made for sale in different countries. Apart from the tone burst, these versions are identical except for the placement of the links on the micro processor. Fig. 5 shows how these may be altered to give different frequency coverage and this may be handy if you are going abroad, or wish to use the rig with a transverter needing extended coverage.

Setting a data record

Users can buy information-packed compact discs the way they buy recorded music

An adaptation of the hi-fi compact disc technology promises cheaper Third World access to the growing mine of valuable information held in computer databases.

The number of databases has grown from a few dozen to more than 3,000 in 10 years, but most Third World countries have yet to reap any benefits. George Thompson, director of the UN's Accis organisation, which helps coordinate information systems, points out that most of these countries lack direct links to databases, and are dependent on access through phone and telex networks – a costly form of retrieval. Developing countries also lack sufficient skilled operatives to use databases effectively.

Yet they badly need databases such as Agris, a comprehensive international information system for agricultural science and technology run by the UN Food and Agriculture Organisation, or the World

Health Organisation's Inmard, which monitors adverse reactions associated with drug use.

The advent of CD-ROMs means customers can buy information-packed discs in the same way that they buy pre-recorded music. The compact disc is 12cm in diameter and can hold up to 540 megabytes of digital information, equivalent to more than 100,000 written pages.

The information is on a thin metallic substrate sandwiched in transparent protective material. The disc is durable and unaffected by small particles of dust or surface scratches. The CD-ROM is scanned by a laser disc reader costing US\$250-500, and the data fed into a microcomputer. With this technology, says Thompson, the owner of a disc may use it as long and as often as needed, with no telecommunications charge for linkage to a database. CD-ROMs will never completely replace local or remote access to data bases, and are unsuitable for short-lived information, such as financial data and news which are regularly updated. However, they are ideal for access to information of record such as that provided by the UN databases.

Ideally, subscribers to a database would be posted a CD-ROM containing all the information held. At present it is impractical to offer updates more frequently than once a quarter, because of the time it takes to produce the discs. But as CD-ROMs

become more popular, more regular updates will be available.

At present, few expandable databases will fit on a single disc. Companies offering database services have to solve this problem before the idea can be put into practice. A possible solution would be to divide the database into chronological historical portions, with only the latest data reissued on new discs. Alternatively, providers could offer subsets of the complete on-line database service, although these may be of less value than a comprehensive service.

Unlike other kinds of electronic publisher, CD-ROM equipment manufacturers have agreed on a standard physical format for the compact disc. A decision on a common software format is expected soon.

■ Databases are already becoming available on CD-ROM. At the international online information meeting in London last December, the FAO database, Aquatic Sciences and Fisheries Abstracts, was exhibited as a prototype CD-ROM by Cambridge Scientific Abstracts of Washington DC. Oxford University, UK, is working on a CD-ROM version of its famous dictionary. More recently, the Commonwealth Agricultural Bureau announced it was using compact discs to store information on topics ranging from foot and mouth disease to crop breeding.
Ian Harper

Dial information

IVORY COAST's Famtel, Africa's first telematic network, allows computers to interrogate one or more databases from a terminal connected to the phone network. Four databases are accessible from 38 access points. According to the Rome-based Inter-governmental Bureau for Informatics, several hundred terminals and two or three other bases will be operating by the end of the year.

Power revival

A BATTERY additive developed by the Omega manufacturing division in Hong Kong services old acid batteries by dissolving the power-sapping sulphate which builds up on the plates. Omega 908 Battery Revive is claimed to restore disused batteries with one application.

Cheap lines

NIPPON Telegraph and Telephone Corporation of Japan has developed a new method of making fibre optics for telephone cabling at a tenth of the present cost.

Double action

A SOLAR-POWERED pump which also purifies water is being produced by Solpak, a British-based company.

The submersible or surface-mounted pump is powered by a conventional photovoltaic generator, with the water being passed through sand and charcoal filters.

Playing doctor

Microcomputers will be as familiar as charts and clipboards to the doctors who will soon be coming out of US medical schools, where first-year students can use desk-top terminals to learn about diagnosis and treatment programmes.

At the George Washington University School of Medicine and Health Sciences in Washington DC, a student interested in stomach ailments can touch a word on the screen and choose a video simulation of a middle-aged male patient being admitted to an emergency room with severe diarrhoea and nausea.

A laser video disc, interacting with a programme stored on floppy disc, produces on the screen a full-colour emergency room scene in

Space in a briefcase

HANS CHRISTIAN Haugli, a technologist at the International Satellite Organisation in London, has developed a portable satellite system which will receive or transmit written text almost anywhere provided there is an unimpeded view of a satellite, even through a window. The battery-driven system fits into a briefcase and weighs 11kg.

Distant voice

A UK-BASED company has designed a rugged new 20kW broadcasting system which it claims is ideal for remote locations. The system detects any failure of one of its two 10kW transmitters and routes the other one to the antenna, reducing off-air time to a minimum.

Character sketch

A COMPUTER system that can read handwritten Chinese with 95 per cent accuracy has been devised at Harbin Engineering University. The system reads characters from a special pen-and-pad set and displays them in standard characters on a monitor from where they can be edited on the pad without a keyboard. Its inventors, who say the system can read 3,755 commonly used characters, have also developed a computer system to read Chinese characters sent by facsimile transmission.

miniature, complete with sound. A digital clock in one corner of the monitor counts away the minutes as the student, touching the available choices on the screen, decides whether to examine the patient, order tests, prescribe medication or proceed in some other way.

"The first-year students love to see how long it takes them to kill a patient," a teacher says.

"They can use the computer to deal with emergency situations, kill somebody by accident, figure out what they did wrong and never even come into contact with or endanger a real patient."

Tomorrow's doctors in the US should be equipped to use microcomputers for everything from keeping records to diagnosis and treatment, proponents of computer-aided medicine say.

AN