

BayCom V1.60

The complete guide to Packet Radio
with BayCom Packet Radio

for IBM PC with MS-DOS

**The official manual for the software release V1.60 of
BayCom**

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FOREWORD BY THE AUTHOR OF THE ENGLISH MANUAL

Some of this manual originates from a series of bulletins designed to help newcomers to packet. This manual was written to accommodate the commands and features of the new version V1.60. It is not a straight translation from the German manual. While I have endeavoured to include all the information contained in the German manual, I have also decided to include an extended section on troubleshooting and operating on air. The reason for this is that outside the highly developed packet scene in Germany, many users found that they were left with little assistance in the field with very few experienced individuals around.

With regard to the congested conditions on many packet frequencies around the world, I suggest strongly that - once you have established yourself on packet with BayCom - you have a look at optimizing your setup. Read this manual carefully, as it will explain the necessary details to you.

Apart from giving you more enjoyment by speeding your operation up, optimizing your parameters means that you will also be causing less QRM to others who share the channel with you. So please show some ham spirit. Once you have understood the basic concepts, please help others!

My thanks go to the BayCom team in Germany, especially Johannes DG3RBU who has been very helpful in our efforts to make BayCom available to amateurs in New Zealand and who answered many of my (often stupid) questions. The honour for supplying the software belongs to Flori DL8MBT. Rudi DK5RQ who can sing a song on strange encounters of the BayCom kind at airports, has often shipped hardware out to us in New Zealand without which we wouldn't have been able to get to know the system as well as we do now.

A very special tribute goes to the late Ralph Woodfield ZL1CN, who showed great ham spirit while already terminally ill, and volunteered to check parts of this work (the said series of bulletins) for glitches in spelling and grammar. His son, Murray, who now carries Ralph's call, Michael ZL1UEU and Graham ZL1TOF also deserve a mention here for their role in the Auckland VHF Group's BayCom Project.

Comments are always welcome.

Have fun with BayCom and Packet Radio!

On behalf of the BayCom team and the Auckland VHF Group,

73, Ulrich ZL1DDL

IMPORTANT!!!!!!!



Copyright Note

Due to a number of unfortunate events we are forced to protect the copyright on BayCom software and this manual more strictly than before. As it was never intended to make more money with BayCom than what was necessary to cover the cost of developing hardware and software, and perhaps fundraising for amateur packet radio projects, it should be noted that the developers had the benefit of the amateur community in mind. They did not intend to support businesses with freebies, who, in several cases have illegally supplied the software with modem products.

As it is always regrettable when legal action has to be taken to stop software pirates, we would like to outline our policy once again:

The purchase of BayCom software entitles you to use the software for your own packet operation at your own station. It may only be used for non-commercial purposes in amateur radio. The authors do not accept liability for any loss or damage that may result from the use of BayCom software or hardware. Amateur radio regulations must be adhered to under all circumstances.

The authors also permit you to copy the software privately and hand it on to others, provided that:

- the software is not offered for sale, and is not handed on together with a commercial product, e.g., a modem.
- it must not be mounted on file servers or distributed via the amateur packet network or any other electronic network, or CD's. Anyone violating this rule will be required to pay full royalties for all distributed copies.
- all copies made must be individual copies, multiple copies are not permitted.
- the software is handed on in its original release format, including particular the copyright marks. Individual parameter settings in SCC.INI or the terminal SCC.EXE may be modified.
- the manual must not be copied.

We hope that you will understand that it is not acceptable for us to see other people reap the benefits of our work. It should also be common sense among amateurs to accept that purchases from commercial software pirates are not contributing to the funding of further development of your packet radio network and your packet system.

Apart from BayCom, the following groups are distributing BayCom in their respective countries as a fundraising project for the local packet networks:

Auckland VHF Group in New Zealand

Australian Amateur Packet Radio Association (AAPRA) in Australia

Both will also sell modem hardware. BayCom has licensed commercial software distributors in the following countries:

UK: SISKIN ELECTRONICS
USA: PACCOMM and TIGERTRONICS

It should be noted here that some dubious businesses sell older versions of BayCom software, partly embedded into other software to give them a somewhat professional touch. These versions are **not** supported by BayCom as they are being used without consent. Entering a :ver command at the terminal command prompt should clarify this. Please note that all versions of BayCom in all release languages are covered by the copyright, and that BayCom or its representatives will act accordingly to prevent copyright violations.

☐ the authors and distributors of BayCom wish to state here that only genuine BayCom software and hardware will be supported by them. While we will try to help if problems arise, we would appreciate if dissatisfied users of clone modems and/or alternative software products would refrain from sharing their grief with @WW in packet bulletins entitled "MY BAYCOM DOESN'T WORK!!!". We must also mention here that the quality of our work (which we do in our spare time) is negatively affected by the pressure impatient users put on us.

We presume that most bona fide amateurs will understand this and appreciate the work involved in development and distribution of soft- and hardware. It is you we are doing this for, as the amount of positive feedback proves. Have fun with BayCom!

If there is no BayCom dealer or distributor in your country, and you are interested in becoming one, please contact

Johannes Kneip
Bert-Brecht-Weg 28
30890 Barsinghausen
Germany

Enquiries, especially from clubs that wish to use BayCom as a fundraising project for amateur radio packet development in their country, are always welcome.

PC SYSTEM SPECIFICATIONS

BayCom terminal software requires a fully IBM PC compatible computer. It uses the serial interface in a rather unorthodox way, which requires the interface to be absolutely compatible to the original IBM design. For a list of incompatible machines please see the troubleshooting section (p. 80).

The software will run under MS-DOS 3.0 or higher. We recommend MS-DOS 5 or higher or Novell-DOS 7.0. The multitasking option of the latter is not usable. The same applies to OS/2 and Windows, where BayCom will not work.

The reason for this is that all these multitasking environments run on "virtual machines" that do not offer a direct access to the hardware. Normal serial port applications will run under these circumstances. As mentioned above, BayCom will only work because it is NOT a normal serial port application. We regret if this causes occasional problems, but the BayCom team prefers to offer a system that runs on most machines rather than none at all.

I AM NEW ON PACKET AND WANT TO GET ON AIR A.S.A.P. - WHAT DO I DO?

If you are a complete newcomer, or you just want to get QRV without reading lots of stuff, go straight to the section entitled QUICK START (p. 20). We do, however, suggest that you come back and read the sections on optimizing your system (OPERATIONAL PARAMETERS, p. 55ff) once you are up and running.

WHAT ARE THE NEW FEATURES IN BAYCOM V1.60 COMPARED TO V1.50? - A QUICK OVERVIEW

In most aspects, BayCom V1.60 is very similar to V1.50. The new version features:

- setup program INSTALL.EXE for quick starters (p. 20).
- automatic eavesdropping and recording of 7plus files in a separate subdirectory 7PLUS (parameter 7PSAVE ON, p. 54).
- support for KISS TNC or direct access to a net node in KISS mode (p. 36). NOTE: this results in a slightly different syntax in SCC.INI (MODE command, p. 35), which permits a more flexible hardware parametrization.
- AUTOBIN protocol for automatic binary file transfers, compatible to SP, Turbo Packet etc. (parameter AUTOBIN ON, p. 53).
- optimization in the hardware drivers (especially for the SCC cards), slower computers will now run better.
- RTT round-trip-timer (p. 68).
- L2 requires less memory than in V1.50.
- L2 will now respond on its own to a "//q" command from another station when the terminal is not running.
- more flexible generation of sysop passwords (p. 76).
- improved data security under remote control. All file commands will only work in a subdirectory REMOTE, unless the controlling station has identified itself with a password (p. 75).
- inclusion of external programmes in the RUN subdirectory. These can be started locally or remotely with the RUN command (p. 67).
- all EXE files will now generate a help text when called with "/" as a command line option.
- an arbitrary interrupt vector can be used for the communication between L2.EXE and SCC.EXE. The command line option is /i<vector> where <vector> is a hex number between 40 and FF.

STARTING WITH ADAM AND EVE: WHAT YOU ALWAYS WANTED TO KNOW ABOUT PACKET, BUT WERE AFRAID TO ASK!

Packet Radio communication originated in the US about fifteen years ago. Unlike its predecessor RTTY, packet communication is much more flexible. We will tell you why in a moment. For the time being, let's have a look at the details of the way in which communication is accomplished. Beginners may safely skip this section but should return at some stage in the interest of a smooth traffic on all frequencies.

WHAT IS PACKET ?

With packet you can send messages (electronic mail) to other amateurs, you can read bulletins on bulletin boards (BBS), remote control computers far away - or simply have a typed QSO with a friend. As far as the possibilities are concerned: not even the sky is the limit - some amateur satellites carry packet radio traffic between continents. So even if you don't have an HF station, you can work across borders and continents.

Unlike RTTY, a packet QSO (which is sometimes called "connect", "connection" or "link") is a two-way affair: both the sending and the receiving station are involved in the data transfer process. One can compare it to two people transferring goods (our data) in small parcels, or "packets". Each packet can contain some of the goods transferred. If a single packet gets lost in the mail, it's not a big problem, you simply send it again. Smaller packets - rather "letters" - travel in the opposite direction to confirm reception or request the resending of packets that got lost.

Packet radio uses small data packets which are transmitted in short transmissions. These transmissions are followed by silence to allow the partner station to confirm reception. All this is done automatically for you, and it's called:

AX.25

Packet stations exchange digital data in binary form, that is, they either transmit a one or a zero or don't transmit at all. The one (or zero) is a so-called bit (well most of you would know that anyway, wouldn't you?). The way in which a bit is transmitted depends on the kind of modem that you use.

If you have a standard type 1200 Bd BayCom modem, a "one" bit is transmitted as a single FM tone. A "zero" bit is transmitted as a transition between two tones. You don't really need to know all this, just note that a one is transmitted as "no change" and a zero as "change" on the channel. This is called NRZI which means "No Return to Zero Inverted". There's also NRZ which is used in the fast G3RUH-compatible DF9IC modems but that isn't within the scope of this introduction.

A modem chip listening to a signal coming out of a radio will either hear nothing (radio squelched), noise or QRM, or a packet signal. It will convert this into a string of

bits (a so-called bitstream) at its output. From this bitstream, your BayCom software will have to determine where the actual transmission of meaningful data starts.

The convention says that each packet transmission begins with a flag. That is an 8-bit sequence of pre-defined format: 01111110. Whenever your BayCom system receives a valid packet, it has to start and finish with a flag. Within a packet, flags cannot occur as the convention also says that there must never be more than five 1's in a row. When your BayCom system wants to transmit something that has at least five 1's in a row, it will insert an extra 0 after the fifth 1. This way it is ensured that anything that gives more than five 1's at the receiver is clearly either a flag, noise, or silence. This technique is called "bit stuffing". Its other purpose is to ensure that there is never an endless stream of 1's in a packet, which would make it difficult for the receiver to perform "clock recovery", i.e., to figure out when a bit ends and the next bit starts.

Every flag initializes a new packet. The next flag terminates it. If the bitstream inbetween makes sense to the receiver, it is counted as a valid packet. If not, it will be discarded and the second flag is regarded as the start flag of a packet. The bitstream between two flags can be of zero length, i.e., two flags may be received after another. This is done by BayCom as a preamble before the actual packet transmission, the so-called TXDELAY. The TXDELAY delivers flags to the modem while the transmitter is keyed up rather than the actual packet. It follows later when the transmitter has reached its full output power. While bit errors within the actual packet are prevented in this way, audible flags (which are actually QRM and should be kept to a minimum, see TXDELAY, see p. 56) signal to other stations listening that the frequency is busy and that a packet transmission will follow.

The actual packet (or "frame") contains the intelligence. There are in principle two kinds of packets: supervisory frames (they make sure that the communication runs properly) and info packets (which contain the actual information). Both of them exist in two varieties: numbered and unnumbered. Unnumbered supervisory frames are used to establish and terminate a connection (also called a "link") between two stations. Unnumbered info frames are used to transmit beacons which can be monitored by all stations. Numbered frames occur within an existing connection only.

A packet consists of at least a header, containing at least the call signs of originating station and destination, plus a few bits to identify its species and a CRC checksum of all the data in the packet. The checksum enables the receiver to verify whether the decoded data is correct, or whether something got corrupted on the way.

Info packets also have an info field. It contains the actually transmitted information, chopped into parts of up to 256 bytes. You as the user have little control about how your data is chopped up, but you don't actually need to mess too much with it because the receiver puts it all nicely together again - error free.

Within a connect, all info packets carry two numbers: their own sequence number as well as the sequence number of the next expected info packet of the partner station. This way, the partner station is told whether all of its previous info packets have arrived safely. Info packets are numbered from 0 to 7 and hence if we last received one that had the number 2 and now we're getting number 4 we know that number 3 got lost.

What happens if a packet got lost? Your BayCom system will tell your partner station about it. In the case above, it will recognize that something went lost and will request packet number three by sending a packet that has a REJ3 in it: "I reject what you've sent me, I want number three instead!". This is called a "reject packet". BayCom is actually quite intelligent: it knows that 4 comes after 3 and won't demand a resend of packet number 4 which was received correctly.

What if the packet that got lost was not followed by one that was received correctly? This is, by the way, the more frequently occurring case. Well, our partner station expects us to acknowledge the receipt of the last of its info packets after a while. Your BayCom system will acknowledge incoming packets automatically. An acknowledge packet will be sent which tells our partner station which info packet number we want next. If this acknowledge packet doesn't get through or isn't sent because the info packet didn't arrive in the first place, our partner station will ask ("poll") us, either by resending the last unacknowledged packet ("info poll") or by simply sending a poll packet.

A poll packet is like an acknowledge packet. Both tell the respective partner station what packet number is expected next. In our case, we would be told what info packet number to send next. Our partner station will now expect a packet from us - either an info packet (if we have data ready for transmission) or an acknowledge packet. Both contain the packet number we want to receive from our partner station and hence are capable of clarifying the situation.

Rules determining how two systems talk to each other have a name: they're called a "protocol". The most popular one we use in amateur packet radio is a derivative of the commercial X.25 protocol. It is called AX.25.

A SAMPLE QSO WITH AX.25

This is a simple QSO similar to the ones that may appear on your monitor screen when you connect to another station or when another station has a QSO.

The QSO starts with a transmission (marked by a T at the beginning of the line) of DL8MBT. DL8MBT is calling the BBS DK0MUC in Munich via the digi DB0AAB. The calling code in AX.25 is "SABM". That stands for "set asynchronous balanced mode" and is the politically correct version of "hey, I want to connect to you". The "3" after the "T" is the channel: Flori DL8MBT is using a BayCom USCC card and the QSO is held on the 9600BD channel. After the colon we find the number of flags transmitted before the actual data (the TXDELAY). This is followed by the system time. At the end of the packet is a single bit ("P"), which isn't actually essential, just that it's called different names for every kind of packet. The whole packet looks like this:

```
T3:06 21:18 DL8MBT/DB0AAB>DK0MUC>SABM,P
```

This is answered by the BBS with a "UA" packet which we receive ("R"). "UA" stands for "unnumbered acknowledge". The asterisk indicates that the transmission we hear comes from DB0AAB on DK0MUC's behalf:

```
R3:07 21:19 DK0MUC/DB0AAB*>DL8MBT>UA,F
```

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The unnumbered acknowledge is followed immediately by the first info packet ("I") - of course also via the digi DB0AAB (note that the downlink between DB0AAB and DK0MUC takes place on a different frequency). The first "0" is the number of the packet, the second "0" is the number of the next info packet that the digi DB0AAB expects from DL8MBT. The info field of the packet contains the welcome blurb of DK0MUC, which is typical for a FBB BBS:

```
R3:09 21:19 DK0MUC/DB0AAB*>DL8MBT>I00,C,F0:
[FBB-5.15-AB1FHMR$]
DK0MUC BBS, QTH JN58SD.
Hello Flori, you are now on channel 2.
Here are 4614 active messages, 213441 is last message and
122872 is the last you have listed.
Assigned channels:
Ch. 1 (1240.400) : OE7XCI-3 -
```

The info packet is then acknowledged by DL8MBT. As a matter of fact, it is possible to receive up to seven info packets without acknowledging them (their numbers go from 1 to 7). An acknowledge for a particular info packet is valid for all previous info packets. A packet is acknowledged by telling the partner station which packet number is expected next. Since DL8MBT has just received packet number 0, the next packet should have number 1:

```
T3:06 21:19 DL8MBT/DB0AAB>DK0MUC>RR1,R
```

The "RR" in the acknowledge packet means "received - ready". In plain language this means that DL8MBT is ready to accept more data. If DL8MBT was not ready for new data (e.g., if there was a buffer overflow - it hardly ever happens) it would send "RNR" instead: "received - not ready". This would tell the partner station that the packet has arrived but that DL8MBT is currently unable to accept more data.

As DL8MBT still hasn't sent anything himself (except overhead packets), DB0AAB still expects packet number 0 from him. The second info packet is not acknowledged immediately, but only after the third info packet has arrived:

```
R3:09 21:19 DK0MUC/DB0AAB*>DL8MBT>I10,C,F0:
Fri 12/08/94 20:59
  via : DB0MWE-0
Ch. 2 (1240.400) : DL8MBT-0 - Fri 12/08/94 21:04
  via : DB0MWE-0 DB0AAB-0
Ch. 9 (1240.400) : DK0MWX-0 - Fri 12/08/94 21:01
  via : DB0MWE-0
R3:07 21:19 DK0MUC/DB0AAB*>DL8MBT>I20,C,F0:
Here are 2 message(s) for you that you have read but not
killed.
Please kill them with KM.
(3) DK0MUC BBS (H for help) >
T3:06 21:19 DL8MBT/DB0AAB>DK0MUC>RR3,R
```

Now that DK0MUC has sent its blurb, it waits for some input from Flori DL8MBT. Flori enters "Im" on the terminal and presses RETURN to send it off. This results in his first info packet, which has the number 0. The "3" tells DB0AAB that DL8MBT still expects an info packet with number 3 - just in case DB0AAB has sent other packets in the meantime that got lost on the way:

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```
T3:06 21:19 DL8MBT/DB0AAB>DK0MUC>I03,C,F0:
lm
```

Let us suppose that for some reason this packet isn't received properly: the frame will be discarded by DB0AAB and no acknowledge packet will be sent. After a while, DL8MBT realizes that the packet may have been lost and sends it again, just slightly altered, as an "info poll":

```
T3:06 21:19 DL8MBT/DB0AAB>DK0MUC>I03,P,F0:
lm
```

This time, the frame gets through to the digi DB0AAB, which acknowledges the packet immediately:

```
R3:09 21:19 DK0MUC/DB0AAB*>DL8MBT>RR1,R
```

Soon after, DK0MUC sends the requested information via the digi. In this case, Flori has requested a listing of all messages to or from him:

```
R3:07 21:19 DK0MUC/DB0AAB*>DL8MBT>I31,C,F0:
Msg#      TSLD  Dim   To      @ BBS      From      Date/Time  Title
(LC-choice: *)
212527 PF      795 DL8MBT@DB0AAB 5B4TX  0809/1053 IN ENGLISH?
152195 PFL    234 DL8MBT@DB0AAB DL2RBI  0226/1028 DB0LNA Link
(3) DK0MUC BBS (H for help) >
T3:06 21:19 DL8MBT/DB0AAB>DK0MUC>RR4,R
```

After acknowledging the info packet, nothing happens for a while, as Flori ponders about what he should do with the two messages he has already read. In the meantime, his station and DB0AAB exchange a pair of poll packets to tell each other that they're still there:

```
R3:09 21:19 DK0MUC/DB0AAB*>DL8MBT>RR1,P
T3:06 21:19 DL8MBT/DB0AAB>DK0MUC>RR4,F
```

A short while later Flori has made up his mind. He does the prudent thing and kills the messages. This is done sending the command "km" from the keyboard in an info packet (which in turn gets acknowledged by DK0MUC):

```
T3:06 21:20 DL8MBT/DB0AAB>DK0MUC>I14,C,F0:
km
R3:01 21:20 DK0MUC/DB0AAB*>DL8MBT>RR2,R
```

Flori then decides to leave the BBS. He does it the proper way - by sending a "b" (bye) command to the BBS and waiting for the BBS to disconnect him:

```
T3:06 21:20 DL8MBT/DB0AAB>DK0MUC>I24,C,F0:
b
R3:01 21:20 DK0MUC/DB0AAB*>DL8MBT>RR3,R
```

DK0MUC confirms the execution of his commands in two info packets:

```
R3:09 21:20 DK0MUC/DB0AAB*>DL8MBT>I43,C,F0:
Message #152195 is killed.
```

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```
Message #212527 is killed.  
(4) DK0MUC BBS (H for help) >  
R3:02 21:20 DK0MUC/DB0AAB*>DL8MBT>I53,C,F0:  
You have been connected 1mn 48s - Computer-time : 2s  
Bye, Flori, and welcome back.  
T3:06 21:20 DL8MBT/DB0AAB>DK0MUC>RR6,R
```

After it has received the acknowledgement from DL8MBT, DB0AAB hands the disconnect request from DK0MUC on to DL8MBT:

```
R3:09 21:21 DK0MUC/DB0AAB*>DL8MBT>DISC,P
```

DL8MBT reacts to the disconnect request by telling DB0AAB via DK0MUC that the station is now in "DM" - disconnect mode:

```
T3:06 21:21 DL8MBT/DB0AAB>DK0MUC>DM,F
```

This concludes the QSO. There is a lot more to AX.25 than this short QSO can demonstrate. However, you will now be able to understand a lot of what is happening on your monitor screen. Note: the above QSO (courtesy DL8MBT) was slightly modified - the original was too "smooth".

MULTI-USER, MULTI-CONNECT OPERATION

Perhaps the most outstanding feature of packet radio: several QSO's by a number of stations can be conducted on a single radio channel at the same time. Interference between stations appears as "collisions" between packets, which leave one or more of the packets in an unreadable state. However, as we have seen above, the QSO can recover from such "accidents" thanks to the AX.25 protocol. All that happens is that the data transfer slows down a bit.

When two stations have more than one QSO on a channel, packets associated with the different QSO's are labelled by a so-called SSID (Secondary Station IDentifier), a number appended to the callsign, e.g., ZL1DDL-1.

BBS, DIGIPEATERS AND NETWORKS

The other outstanding feature of packet radio is that it enables networking in many ways. To communicate with a packet station on the other side of the world, it is no longer required that the other station is on air to receive your message while you transmit it. You just drop it into your local bulletin board system (BBS - see the section BBS OPERATION) which will take care of its delivery to the other station's BBS. The other station can then pick up the message at its convenience. BBS are also sometimes called "mailboxes".

Sometimes you won't be able to connect to your local BBS directly, either because it is out of your radio range or because it has no direct radio port for users like you. In such cases you may have to rely on the services of a "digipeater" (short for "digital repeater", sometimes it's also called a "node" or a "packet switch"). Its outstanding

feature is that it communicates with you and hands on your packets (rather, their contents) to the BBS. It can also hand your packets on to other digipeaters in other parts of the country and to other stations there, so you can have real-time keyboard-to-keyboard QSO's with friends.

Digipeaters come in many shapes and sizes: very simple ones have only a single radio channel, more complex ones can have a duplex access port or two and perhaps several link ports. Access ports (or user ports, as they're also called) Each port runs on a separate radio channel, but packets can travel between the ports - even if the ports operate with different baud rates.

If you're a beginner, you'll probably find this a bit mindboggling, as it is a very complex topic - even some "experts" get things wrong when it comes to digipeating. The real trick is that the transferred information is completely regenerated in an error-free form at each digipeater site. The digipeater can make use of the information contained in the packets to route them to their destination. The network of digipeaters, BBS etc. that can talk to each other is often referred to as the "packet network".

Sometimes you will see a digipeating process at work in your monitor window: whenever you see a packet with three or more callsigns in the header, the middle call sign(s) will be that/those of the digipeater(s) used. Some digipeating processes are not visible from the header.

The whole topic is so complex that all we recommend that you consult a local expert to tell you how best to access the network from your QTH. Better still, experiment and become an expert yourself.

A LITTLE BAYCOM HISTORY

BayCom originates from Regensburg in the German state of Bavaria, where a small team of packet enthusiasts developed a packet network in the late 1980's. This is why BayCom got its name: "Bayern" is the German word for Bavaria.

Packet users all over the world have enjoyed the DIGICOM system, which originated from the same group and is still supported today. The first BayCom projects were in the field of packet networking. In 1990, the desire to have a system for end users which didn't require a huge TNC and power supply led to the development of the legendary BayCom modem for the RS-232 interface.

It has undergone a few changes with time, to optimize signal input from the modem into the computer interface and to optimize current consumption - one of the main reasons why BayCom is so popular: it will run on most computers without an external power supply.

Today, BayCom stands for a range of hard- and software concepts. While the high number of clones (of varying quality) and homebrew modems proves the popularity of the standard RS-232 based modem, other popular choices include the USCC cards, which permit multiport operation at higher baud rates, and the brand-new 9600 Bd modem for the printer port. Some other software developments allow

BayCom hardware to be used with a wide range of other software. Few people outside Germany know that a different form of the BayCom software is used for BBS's and node digipeaters in Germany.

For more information, please contact the BayCom team or one of its distributors.

AN OVERVIEW OF THE BAYCOM SOFTWARE

GENERAL PROPERTIES

- The software consists of a "TNC" and a "Terminal" part. The "TNC" runs in the background as a memory resident routine under DOS, even if other programmes are running simultaneously. Your station can be connected from the outside just like a TNC. Any messages left there are shown to you when you start the terminal program (note: BayCom is neither a PMS nor a BBS system).
- There is an on-screen editor in the terminal program: every program output may be used as input by bringing the cursor into the line and pressing RETURN.
- The screen is split into three windows, similar to SP and other terminal programs. The upper window is for outgoing data and commands, the middle window is for incoming data, and the bottom window is used to monitor the frequency.
- Scroll back is possible in all windows.
- Usual multiconnect properties, incl. file transfer.
- EGA and VGA video modes are fully supported.
- Window contents can be saved when you are quitting and are restored when you re-enter the program.

THE FILES

The software package you bought together with this manual consists of several programmes and data files, which we will introduce here:

- L2.EXE. This is the central program unit of the BayCom system. Its specialty is that it runs as a Terminate-and-Stay-Resident (TSR) routine in memory. This means that, once you've started the program, you will be returned to the DOS prompt. The only indication of L2's presence is a flashing rectangle in the upper right corner of the screen (you can switch this off, if you want, see BLINK). Your computer will now, if modem and radio are connected, behave on air as if it was a standalone TNC (terminal node controller, the thingy you needed to get on packet before BayCom was invented). Other stations can connect to you and leave messages on your screen. You won't be able to see these, though, before you start the terminal program (SCC.EXE). When only L2 is running, and the DOS prompt is on the

screen, you may use the computer for other jobs such as programming, word processing etc. The only restriction is that L2 needs about 90kB of the available memory. This means that other applications will have less memory available. With a standard IBM machine with 640kB DOS memory this means a reduction to 550kB. This may lead to problems with larger applications.

☐ SCC.EXE. This is the terminal, or user interface. After starting it, you will be presented with the usual three-window screen. It enables you to conduct full packet radio operation. The program has an on-screen editor. Please see the documentation in this manual for a full description of the possible commands.

☐ OFF.COM. This little program removes L2.EXE from memory and frees the memory for use by other applications. Having other memory resident (TSR) routines (e.g., Norton Commander) may cause problems as the memory freed by OFF.COM may not be returned to DOS immediately.

☐ SCC.INI. This is a normal ASCII text file. It contains all the default parameters entered by the user and can be edited with a normal text editor (such as, e.g., EDIT under DOS). Some of the parameters are set with INSTALL.EXE but we recommend that you edit the file later to make parameter changes permanent that you entered from the terminal. This is important because you may lose all changes entered from the terminal if the parameter compiler PARA.EXE is called up. This happens automatically whenever L2 deems SCC.PAR to be older than SCC.INI, or when SCC.PAR is damaged. SCC.INI is initially created by INSTALL.EXE.

☐ PARA.EXE. This is the parameter compiler. It takes the parameter data from SCC.INI and converts it into a machine readable form, which is stored in the file SCC.PAR. PARA.EXE can be invoked manually, but is used automatically after each start of L2.EXE if the date stamp on SCC.INI is newer than that of SCC.PAR, or SCC.PAR doesn't exist. When it encounters an illegal parameter, PARA will produce an error message. It will also check whether the specified hardware (COM port or SCC card) exists, if not, COM1 is configured automatically. PARA must also be called if the hardware configuration has been changed (e.g., adding a USCC card) or a new password has been installed. Another application of PARA is the compilation of the help file TERMHELP.SCC.

☐ SCC.PAR. This is the parameter file generated by PARA.EXE. It must not be tampered with manually. If it is missing on your release disk, don't worry, it will be created automatically.

☐ TERMHELP.SCC. This is the help file. It is a text file and contains the help texts you can call up with :HELP from the terminal screen.

☐ SCC.VID. BayCom can save screen contents automatically when you exit the terminal and restore the screen when you return to the program. The screen data is saved in SCC.VID and retrieved when the program is started the next time. SCC.VID is created after the first start of BayCom.

☐ SCC.PWD. Password file for the automatic generation of sysop passwords and the remote login via the //j function. This file must be generated by you, if required.

- ❑ BAYCOM.BAT. A simple batch file that starts L2.EXE, then SCC.EXE, and removes L2 from memory with OFF.COM once you have left the program. It is intended for users who are not interested in memory resident operation of L2.
- ❑ INSTALL.EXE. The installation program. It is self-explanatory.
- ❑ SCC.LOG. All log data from the packet station goes into this file, which is generated by the program if the LOG function is ON.

QUICK START

SETTING IT UP WITHOUT GETTING UPSET... -INSTALLING THE HARDWARE

If you have already installed your modem, or you're just upgrading, skip this section and go straight to the next "INSTALLING THE SOFTWARE".

Install your BayCom modem, or USCC-card, or KISS TNC. We will only describe the installation of a standard modem here, as the other items are usually installed by more experienced users.

Figure out which of your serial ports you wish to use. Default is COM1, but if you are already using a mouse, or a phone/fax modem, it may already be in use. No problem, you may use COM2, COM3, or COM4 as long as you know what the base address and the interrupt (IRQ) of the port are. This will usually be available from your computer's manual or from that of the interface card. Make sure you have them ready when installing the software.


If your modem connector is different from that on your serial port, check whether it is possible to use the connector from an unused serial port instead (desktop machines only). This may save you from having to use an adaptor. When using a prefabricated adaptor you should make sure it is a full adaptor, not just a mouse adaptor which has a few connections missing. If you use cables, use shielded versions and keep them as short as possible. Keeping the aerial away from the modem setup is a good idea, especially if you are using a handheld radio.

The radio should be connected via short, shielded cables. Make sure all connections are wired correctly. Unsquench your radio and set it to a packet frequency. If you can hear strong, clear packet signals, give it a try. If you don't know what the local packet frequencies are, ask someone who knows.

Once you have installed the modem and software, and you can transmit packets, get another receiver to monitor your transmissions. Make sure you set the trimpot of the modem correctly. Otherwise you may be overdeviating which makes your signals difficult to receive. Your signals are best if they sound the same as those of a station whose deviation has been aligned. This should normally be the case with your local BBS.

INSTALLING THE SOFTWARE

Start your computer. Take your BayCom disk and insert it into your computer's disk drive. We will assume that this is drive A:, if not, please change the following instructions accordingly.

 If you are just installing a new version, and you wish to keep your old parameters, follow the instructions here anyway. The INSTALL program will scan your old parameters and ask you whether you wish to keep them.

At your DOS-prompt please enter the following:

If you have a colour display: `a:install`
If you have a monochrome display: `a:install /m`

Everything else will now happen automatically. You will be prompted for an installation mode. If you are an absolute beginner, choose the express option. You will then be prompted for your hardware configuration, which you should have figured out when you installed the modem or SCC card. Make sure you have the base addresses and interrupts ready for the serial port modem (COMBASE, COMINT), or the USCC card (SCCBASE, SCCINT), the 9600Bd parallel port modem (FSKBASE, FSKINT) or the KISS port (KISSBASE , KISSINT), depending on what you want to use. You will also be prompted for your call sign (time to get licensed, hi!), your name and QTH. Note that name and QTH together must not have more than 38 characters.

If you wish to carry out a more detailed parametrization, you can choose the option for a more detailed installation. You may as well edit SCC.INI directly. For those unfamiliar with editors: just run `a:install` again. If the installation program detects BayCom V1.60 on disk, it will ask you whether you wish to change existing parameters. A good way to do things like, e.g., installing different hardware such as SCC cards or the new 9600 Bd modem for the parallel port.

Start BAYCOM.BAT in your BayCom directory. Alternatively, start L2.EXE first, then SCC.EXE. This way you can make use of the memory resident features of L2 after leaving the terminal.

Now you're ready to operate packet. If it doesn't work, don't worry. Go to the section TROUBLESHOOTING (p. 79) and see what you can do.

If there is traffic on the frequency, you should now see packets being decoded and displayed in the bottom window on your screen. Congratulations, half the work is done!

CONNECTING TO ANOTHER STATION

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At this stage it is very advisable to have a packet-literate friend around. He (or she) should be able to tell you what frequencies to find the local packeteers on, and which stations you can connect to. Let us suppose you have been told that there is a station with the call sign ZL1AVQ that you can connect to, and you have been given its frequency. Set your radio to the frequency (with the proper repeater split if it is a duplex station) and start your BayCom program.

In the terminal SCC.EXE, you will see a cursor in the upper window (the **command window** or **TX window**). At the colon command prompt, enter

```
:c zllavq
```

(if you have an SCC card, please see the documentation for the CONNECT command)

to connect to ZL1AVQ. "c" is the abbreviation of the CONNECT command. Accordingly you must use the callsign of other stations that you wish to connect to. Note that it doesn't matter whether you use upper or lower case letters. The colon before the command means that it is a command for your own BayCom system. When you will work your way through packet, you will have to send commands to remote stations such as BBS's. These are **not** preceded by a colon as they go to another station.

Once you have issued the CONNECT command, the call sign (in our example ZL1AVQ) will appear highlighted on the lower status line which separates the middle and the bottom window. The number to the left of the call sign specifies your port number. You can toggle between different ports by pressing the appropriate function key, e.g., F2 to get to port 2, F3 to get to port 3, F1 to get back to port 1 etc. You can have one separate QSO per port. So if you have four ports, you can have up to four simultaneous connects.

Once you have been connected to the other station, a bell will ring (unless you've turned it off, of course). You can now send stuff to the other station. To do so, you must enter the text WITHOUT a colon at the beginning of the line. Whenever you press RETURN, or write across the right margin of the line, the complete line will be sent out. If you are not connected to another station, BayCom ignores any input that is not a command (i.e., preceded by a colon).

ONCE AGAIN: As a general rule, you use commands preceded by a colon whenever you want to give a command to your own system. Whenever the command or text is to be evaluated by a remote system, such as a BBS, the line must NOT start with a colon. A colon at the beginning of the line can be added or removed by pressing the TAB or the ESC key.

For more information on how to use the terminal, please see the section entitled "HOW TO USE THE TERMINAL" (p. 39).

HOW TO USE A BBS: THE FIRST STEPS

Note: COMMANDS MENTIONED IN THIS SECTION ARE NOT TO BE CONFUSED WITH THE BAYCOM TERMINAL COMMANDS OF THE SAME NAME.

How exactly you talk to your local BBS depends on the software it uses. However, there are some commands which are common to almost all types of software. Fortunately they are also the most frequently used ones (if in doubt, ask someone who knows). On your first login you will probably be greeted with all sorts of questions. Never mind, just enter what the BBS asks you for: your name, QTH etc. Don't get fussed about QTH locators. Just enter SOMETHING, you can change it to the proper value later, it's not essential.

One of the other things your BBS may greet you with is the message that there are messages for you. It may even list them for you. So the first thing you may wish to do is read them. This is done with the READ command, which usually abbreviates to a simple R. The listing will tell you what the message number is, and all you need to do is tell the BBS to read the message with the specified number, e.g.,

```
r 2
```

Some BBS (such as FBB, which is the most widespread BBS software in VK and ZL) number all their messages and bulletins with a unique number. Chances are your message number will look rather like 23679 or something pretty high, i.e., you'd need to type `r 23679` instead. BBS's that list your personal messages neatly numbered from 1 to whatever are called "area based". Area based BBS have the advantage that it is easier for you to find what you are looking for if there is a lot of bulletin traffic.

Now that you've read the message, you may wish to reply to it. Most BBS software enables you to send a reply with a special command. On FBB, this is SR followed by the message number of the message you wish to reply to. Be warned that if the message is from overseas, it may be better not to use the reply function but rather send a message to the address of your correspondent. The reason is that forwarding through international gateways sometimes requires makes the reply go back on a slow and unreliable way. Ask your local overseas mail guru for advice.

Sending a message or a bulletin is also rather easy with the SEND command, which abbreviates to S. For a message to a station with call sign ZL1DDL for example, you would enter (upper/lower case doesn't matter):

```
s z11ddl
```

if ZL1DDL is active on your local BBS. If not (which is not unlikely), you should tell your BBS where to find him. Within your own country, it will usually be sufficient to add the BBS that ZL1DDL is using. In New Zealand, it will be sufficient to type

```
s z11ddl@z11ab
```

which stands for "ZL1DDL at ZL1AB". In most domestic situations this will be sufficient. If you wish to send mail interstate or overseas, you will have to add the full "hierarchical address" in many cases. Such as

```
s z11ddl@z11ab.#11.nz1.oc
```

If in doubt, it is always best to specify the full hierarchical address - it won't do any harm. As a courtesy, you should always include your full hierarchical address in the body of your messages. Ask your BBS sysop (`s sysop`) what your correct hierarchical address is if you can't figure it out for yourself.

Once you have issued the proper S command, you will be prompted for a message title. Choose a short, meaningful title. Many BBS systems restrict the title to 32 characters or so.

After entering the title, you will be prompted for the message itself. Just type it in. When your finished, press the CTRL key on your keyboard and hold it. Press the Z key. Then release both keys. You now have produced a CTRL-Z character. Send it off to the BBS by hitting the RETURN key. Most BBS's also know another message end marker. Try `***END` or `/EX` at the beginning of a single line - it's mostly intended for people who want to send a pre-typed file rather than type the message online (see p. 51).

If you have problems, please consult your local sysop: `s sysop`

The following commands will work on FBB BBS, if your local BBS is of another type, please consult your sysop about the equivalent commands:

- H this command displays a command summary.
- L this command lists messages or bulletins. Type ?L to get a more precise explanation.
- K erases bulletins you sent or messages from or to you.
- X gives you expert status. This allows you to enter a command before the previous one was executed.
- OP toggles the paging, if you find that your BBS stops every few lines to ask you whether it should continue.
- F gets you into the server menu. This may have useful stuff in it. See the help function for details on what is available on your BBS.
- B quits the BBS in an orderly manner (if you just disconnect, the software won't know whether you have been disconnected by accident or intentionally).

These are only a few examples of possible commands, but they should help you to get started and to find out more for yourself.

OPERATING BAYCOM AND CUSTOMIZING IT TO DO WHAT YOU WANT

By now you should be familiar with simple packet operation. It is now time to explore your system in depth, so that you will be able to get the optimum performance out of

it. As a courtesy to others, you should also aim at optimizing your parameters in order to cause as little unnecessary QRM on the frequency as possible. In the following we will describe the commands and parameters in didactic order, i.e., related commands will be listed together.

Note: only the underlined letters in all commands and parameters need to be spelled out; the other letters can be omitted. The underlined ones are the essential ones. BayCom is not case sensitive, so every command or parameter can be entered in lower case letters.

THE PARAMETER FILE SCC.INI

There are two ways to change parameters in BayCom: either, you enter them from the terminal. Parameters entered in this way will remain valid even after the program is terminated and restarted. They are stored in SCC.PAR, the actual parameter file used by the system. If this file doesn't exist or is out of date, the TNC routine L2 will automatically call the parameter compiler PARA.EXE. PARA scans the parameter text file SCC.INI, takes the parameter values from SCC.INI and stores them in SCC.PAR in a machine readable form.

If parameters in the old SCC.PAR are not identical with those in SCC.INI when PARA is running, the values in SCC.PAR will be overwritten with those from SCC.INI. Hence if you entered a parameter value from the terminal, it will be overwritten by the corresponding value in SCC.INI. If you're unlucky, that value is just the one you wanted to replace.

Therefore, whenever you have changed a parameter value and you want to make this change permanent, you should go and change SCC.INI. When you have done so, the new value will be reloaded each time SCC.INI is recompiled.

To change parameters in SCC.INI, you can either run a:install again. However, only the following parameters can be changed with the installation program:

7PSAVE	ASSIGN (indirectly)	AUTOBIN
BLINK	CBELL	COLOR
COMBASE	COMINT	CRTSAVE
CTEXT	DCALL	DISCTIME
DWAIT	ECHO	FRACK
FSKBASE	FSKINT	GERMAN
INSMODE	IPOLL	KISSBASE
KISSINT	KNAX	L2CTEXT
LINKTIME	LOG	MAXFRAME
MODE	MYCALL	QTEXT
REMOTE	RESPTIME	RETRY
SCCBASE	SCCINT	TINFO
TPORTS	TXDELAY	VGALINES

To change any of the other parameters, you will have to edit SCC.INI. This may, after all, be the more convenient way for you if you are computer literate. Make sure

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that you have a backup file before you start playing with SCC.INI. Enter something like this at your DOS prompt to create a backup file:

```
copy \baycom\scc.ini \baycom\scc.bak
```

If your BayCom files are in a different subdirectory (ask someone who knows about computers if you don't know), you have to change the subdirectory appropriately.

Just in case the worst happens: a:install can create a new file for you, but then of course you are back to basics again... .

Now use a text editor (e.g., EDIT from DOS) to edit the file. If you don't know how, ask someone who knows.

Note that SCC.INI files from old BayCom versions are unsuitable for version V1.60 . However, if you had your old SCC.INI customized, you may wish to print it out and transfer your customized values to the parameters that have remained the same. However, some commands and parameters have changed, so if you can't find them in the new SCC.INI, don't feel tempted to transfer them.

Here's an example for a SCC.INI file:

```
; SCC.INI      BAYCOM V 1.60 INITIALISATION FILE
;
; by Ulrich Guenther ZL1DDL@ZL1AB.#11.NZL.OC   (1-8-94)
;
; on behalf of Florian Radlherr DL8MBT@DB0RGB as a commented
; English translation of his German original
;
;!!!!!! MAKE A BACK-UP COPY OF THIS FILE BEFORE YOU CHANGE ANYTHING  !!!!!
;-----
;
; You should edit this file to customize it for your own station.
; Just follow the instructions below. It's easier than you think.
;
;-----
;
; The construction of this file is relatively tolerant.
; Empty lines and SPACE characters can be inserted anywhere.
; The order in which the COMMANDS appear does not matter.
; You can use UPPER or lower case letters.
; Everything after the semicolon is a comment and is ignored,
; unless it is in a text definition line!
;
; This file is automatically compiled by PARA.EXE when alterations
; have been made to it or SCC.PAR cannot be found, and converted into
; a machine readable format.
;
;-----
;
; INSTALLATION OF SERIAL PORT, KISS PORT, FSK MODEM AND SCC CARD(S)
;-----
;
; Default COM port is COM1. If you want to use COM2, COM3 or COM4
instead
; of COM1, you must know the base address and interrupt of the interface
; card. A few are listed below. Unused interfaces are set to 0.
;
COMBASE $0;      address of serial port for BayCom modem
```

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```
COMINT  0;          interrupt (IRQ) number of the port
;
KISSBASE $0;       address used for serial port with KISS interface
KISSINT  0;       interrupt (IRQ) number of the port
;
; COM addresses : COM1:$3f8 COM2:$2f8 COM3:$3e8 COM4:$2e8
; COM interrupts: COM1:4   COM2:3   COM3:5   COM4:7
; note that some cards are non-standard and may be using different
; address/interrupt combinations. Check your interface manual.
;
; The following two parameters set the base address and interrupt for
; the parallel port 9600Bd G3RUH compatible BayCom FSK modem:
;
FSKBASE $0;       address of parallel port for BayCom 9600Bd FSK modem
FSKINT  0;       interrupt (IRQ) number of the port
;
; Here are the most common address/interrupt combinations for LPT ports
;
;   LPT1: FSKBASE $3bc      FSKINT 7
;   LPT2: FSKBASE $378      FSKINT 5
;   LPT3: FSKBASE $278      FSKINT 7
;
; If you are using an SCC or USCC card, you must also know its base address
; and interrupt. Follow the manual and use the SCCBASE and SCCINT
parameters
; here to install the card.
;
SCCBASE $0;       base address of SCC card
SCCINT  0;       interrupt (IRQ) number of the SCC card
;
; If you use an SCC card, you can still use the serial port modem and/or
; a KISS interface. The parallel port FSK modem will also work.
;-----
;
;           INSTALLATION OF CALL SIGNS
;-----
; MYCALL defines YOUR callsign. Put your personal callsign in as the first
; callsign after MYCALL. This will be used by BayCom as the default
callsign
; for outgoing connects. It will also respond if another station is trying
to
; establish a connect with this callsign. You may wish to add further calls
to
; the list under which the station can be connected FROM the outside. This
could
; be your own callsign followed by an SSID number (e.g. ZL1DDL-10) or the
; callsign of a family member:
;
MYCALL ZL1OM ZL1OM-1 ZL1XYL ZL1XYL-1
;
; up to 4 MYCALLS are allowed.
;
; DCALL determines the callsign under which others can use your station as
a
; level 2 digipeater. Usually, this would be the same as your MYCALL.
;
DCALL  ZL1OM
;
; This is the destination call used by the UI (unnumbered info) frames in
the
; F10 (monitor) screen. Ignore it for the time being if you're a newcomer.
;
CONNECT ID          ; Unproto call ('quasi connect')
;
```

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```
; CNOT are callsigns that your station will IGNORE. These include
meaningless
; default calls as well as pirate calls etc.
;
CNOT    NOCALL WOMBAT PK232 TNC2C; Ignore these calls
;
;
;      INSTALLATION OF PERSONAL TEXTS
;      -----
;
L2CTEXT AWAY, PLEASE LEAVE MESSAGE
; This text is sent when only L2 is running and another station connects to
; your station
;
CTEXT t
; When another station connects to you, the standard text available under
the
; key combination ALT-T will be transmitted.
;
QTEXT q
; When the QUIT command is used, the standard text available under ALT-Q is
; transmitted before the other station is disconnected.
;
; And here are the definitions of the standard texts mentioned above
;
ST T \x \m Hello
ST Q 73 de \m
ST C \x:c zllab
;
; The last standard text connects you to ZL1AB if you press ALT-C from
; the terminal (enter your local BBS or digipeater callsign here instead
; of ZL1AB).
;
;
;-----
--
; If you are an absolute beginner just trying to get on air, finish here.
;-----
--
;
; For other standard texts and the definition of standard text macros
; consult the software manual.
;
;
;      MEMORY MANAGEMENT AND PORT SELECTION
;      -----
;
; Decreasing the number of TPORTS means that there will be more lines
available
; for scrolling back on each remaining port. This number of lines can also
be
; increased by increasing the number of buffers, at the expense of
available
; memory for other applications.
;
TPORTS  5  ; 2-8 number of terminal screens +1 for U/I Monitor
BUFFER  40 ;40-400 AX 25 buffer space in frames
RBUFFER 10 ; 4-20 RX buffer frames X 330 Bytes
MBUFFER  5 ; 2-50 monitor buffer frames X 330 Bytes
;
;      BUFFER > RBUFFER+MBUFFER
;
;
;      TERMINAL SETUP
;      -----
;
SAVEPORTS 5 ;0-8    number of port screen that are saved to disk on exit
```


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```

MCALLS      ; Select CALLS to monitor (default: all calls)
;           ; if MSELECT not 0.
;WRITE 0 MONITOR.SCC; Remove semicolon at beginning of line to get a
;           ; monitor dump file
;
FRACK       40 ;10-200 FRACK timer. start value in 100ms units
RESPTIME    2  ; 1-10 RESPONSE-timer in 100ms units
LINKTIME    120 ; 6-120 inactive-link-test timer in 10sec units
PACLEN      256 ; 1-256 maximum info field length in bytes
RETRY       20 ; 1-100 maximum number of retries before disconnect
IPOLL       80 ; 1-100 maximum info field length for IPOLL
DISCTIME    360 ; 0-600 disconnect if no activity in seconds
;
;
;           LAYER-1 PARAMETERS
;           -----
;
; Each channel is connected to the modem, KISS port or SCC port with
; an ASSIGN command. The first ASSIGN command assigns channel 0, the second
; assigns channel 1, and so on. The MODE command sets the parameters for
; the modem: baud rate, carrier, NRZI/NRZ, clocks.
;
; MODE settings for the BayCom modems (see the manual for details):
;
; RS-232 or SCC card modem with TCM3105 for 1200Bd:
;
; MODE 1200c    with software squelch (software DCD)
; MODE 1200     with hardware squelch (radio squelch or XR2211)
;
; MODE 2400 or MODE 2400c for modified TCM3105 modem for 2400Bd.
;
; RS-232 or SCC card modem with AM7911:
;
; MODE 300     for HF
; MODE 1200    for VHF/UHF
;
; LPT modem for 9600 Bd:
;
; MODE 9600c
;
; 9600Bd DF9IC type modem on SCC card or external:
;
; MODE 9600trz
;
; Note that parameter blocks of non-existent interfaces are ignored.
;
ASSIGN      scc0  ; parameter block for channel 0 of the first SCC card,
;                ; will be ignored if SCCBASE and SCCINT were set to 0.
MODE        1200c ; the MODE command sets baud rate, carrier detect, clocks
and
;                NRZI/NRZ encoding. See above.
DWAIT       30   ; "Channel free" waiting time in 10ms units
TXDELAY     25   ; *=====*
;                *                TXDELAY SETTING                *
;                *                -----                *
;                * TXDELAY is the delay your transmitter needs between *
;                * the time the PTT is activated by the modem and the *
;                * time it can send clean data. Modern rigs can *
;                * usually do with FAR LESS than 25, especially if your*
;                * rig has a separate PTT line (i.e., the PTT is not *
;                * switched via the MIC line). Keep your TXDELAY as *
;                * short as possible. A good way to adjust the TXDELAY *
;                * is described in the manual. You'll save valuable *
;                * airtime for yourself and others. *
;                *=====*

```

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```

MAXFRAME 3      ; Maximum number of outstanding, unacknowledged frames (1-
7)
BEACON      0      ; Beacon in 1s units (0 = Beacon off)
BADRESS     BEACON ZL10M; Beacon Address <destination> <mycall> <digi>
BTEXT       TEST   ; Beacon Text
;
ASSIGN      scc1   ; parameter block for channel 1 of the first SCC card,
;                will be ignored if SCCBASE and SCCINT were set to 0.
MODE        1200c ; the MODE command sets baud rate, carrier detect, clocks
and
;                NRZI/NRZ encoding. See above.
DWAIT       30     ; "Channel free" waiting time in 10ms units
TXDELAY     25     ; *=====*
;                *                TXDELAY SETTING                *
;                *                -----                *
;                * TXDELAY is the delay your transmitter needs between *
;                * the time the PTT is activated by the modem and the *
;                * time it can send clean data. Modern rigs can *
;                * usually do with FAR LESS than 25, especially if your*
;                * rig has a separate PTT line (i.e., the PTT is not *
;                * switched via the MIC line). Keep your TXDELAY as *
;                * short as possible. A good way to adjust the TXDELAY *
;                * is described in the manual. You'll save valuable *
;                * airtime for yourself and others. *
;                *=====*
MAXFRAME 3      ; Maximum number of outstanding, unacknowledged frames (1-
7)
BEACON      0      ; Beacon in 1s units (0 = Beacon off)
BADRESS     BEACON ZL10M; Beacon Address <destination> <mycall> <digi>
BTEXT       TEST   ; Beacon Text
;
ASSIGN      scc2   ; parameter block for channel 2 of the first SCC card,
;                will be ignored if SCCBASE and SCCINT were set to 0.
MODE        9600trz; the MODE command sets baud rate, carrier detect, clocks
and
;                NRZI/NRZ encoding. See above.
DWAIT       8      ; "Channel free" waiting time in 10ms units
TXDELAY     15     ; *=====*
;                *                TXDELAY SETTING                *
;                *                -----                *
;                * TXDELAY is the delay your transmitter needs between *
;                * the time the PTT is activated by the modem and the *
;                * time it can send clean data. Modern rigs can *
;                * usually do with FAR LESS than 25, especially if your*
;                * rig has a separate PTT line (i.e., the PTT is not *
;                * switched via the MIC line). Keep your TXDELAY as *
;                * short as possible. A good way to adjust the TXDELAY *
;                * is described in the manual. You'll save valuable *
;                * airtime for yourself and others. *
;                *=====*
MAXFRAME 3      ; Maximum number of outstanding, unacknowledged frames (1-
7)
BEACON      0      ; Beacon in 1s units (0 = Beacon off)
BADRESS     BEACON ZL10M; Beacon Address <destination> <mycall> <digi>
BTEXT       TEST   ; Beacon Text
;
ASSIGN      scc3   ; parameter block for channel 3 of the first SCC card,
;                will be ignored if SCCBASE and SCCINT were set to 0.
MODE        9600trz; the MODE command sets baud rate, carrier detect, clocks
and
;                NRZI/NRZ encoding. See above.
DWAIT       8      ; "Channel free" waiting time in 10ms units
TXDELAY     15     ; *=====*
;                *                TXDELAY SETTING                *
;                *                -----                *
;                * TXDELAY is the delay your transmitter needs between *

```

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```

;          * the time the PTT is activated by the modem and the *
;          * time it can send clean data. Modern rigs can      *
;          * usually do with FAR LESS than 25, especially if your*
;          * rig has a separate PTT line (i.e., the PTT is not  *
;          * switched via the MIC line). Keep your TXDELAY as   *
;          * short as possible. A good way to adjust the TXDELAY *
;          * is described in the manual. You'll save valuable  *
;          * airtime for yourself and others.                  *
;          *=====*
MAXFRAME  3      ; Maximum number of outstanding, unacknowledged frames (1-
7)
BEACON    0      ; Beacon in 1s units (0 = Beacon off)
BADRESS  BEACON ZL10M; Beacon Address <destination> <mycall> <digi>
BTEXT    TEST   ; Beacon Text
;
;
ASSIGN    RS232  ; parameter block for RS-232 modem, will be ignored
;              if COMBASE and COMINT were set to 0.
MODE     1200c  ; see the manual for the MODE command. It sets the baud
;              rate, DCD, duplex status, RX clock and also NRZI/NRZ if
;              required.
DWAIT    30     ; "Channel free" waiting time in 10ms units
TXDELAY  25     ; *-----*
;              *              TXDELAY SETTING              *
;              *              -----*
;              *
;              * TXDELAY is the delay your transmitter needs between *
;              * the time the PTT is activated by the modem and the *
;              * time it can send clean data. Modern rigs can      *
;              * usually do with far less than 25, especially if your*
;              * rig has a separate PTT line (i.e., the PTT is not  *
;              * switched via the MIC line). Keep your TXDELAY as   *
;              * short as possible. A good way to adjust the TXDELAY *
;              * is described in the manual. You'll save valuable  *
;              * airtime for yourself and others.                  *
;              *-----*
MAXFRAME  3      ; Maximum number of outstanding, unacknowledged frames (1-
7)
BEACON    0      ; Beacon in 1s units (0 = Beacon off)
BADRESS  BEACON ZL10M; Beacon Address <destination> <mycall> <digi>
BTEXT    TEST   ; Beacon Text
;
ASSIGN    fsk    ; parameter block for 9600 Bd FSK modem on LPT port. The
;              parameter block will be ignored if FSKBASE=$0 and
;              FSKINT=0.
MODE     9600c  ; see the manual for the MODE command. It sets the baud
;              rate, DCD, duplex status, RX clock and also NRZI/NRZ if
;              required.
DWAIT    8      ; "Channel free" waiting time in 10ms units
TXDELAY  20     ; *-----*
;              *              TXDELAY SETTING              *
;              *              -----*
;              *
;              * Like on other channels, keep it as short as      *
;              * possible: on 9600 Bd, the relative delay will be  *
;              * even worse than on 1200 Bd.                      *
;              *-----*
MAXFRAME  3      ; Maximum number of outstanding, unacknowledged frames (1-
7)
BEACON    0      ; Beacon in 1s units (0 = Beacon off)
BADRESS  BEACON ZL10M; Beacon Address <destination> <mycall> <digi>
BTEXT    TEST   ; Beacon Text
;
ASSIGN    KISS   ; parameter block for KISS interface, will be ignored
;              if KISSBASE and KISSINT were set to 0.
MODE     9600   ; see the manual for the MODE command. It sets the baud
;              rate.
;

```

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```

MAXFRAME 3      ; Maximum number of outstanding, unacknowledged frames (1-
7)
BEACON      0      ; Beacon in 1s units (0 = Beacon off)
BADRESS     BEACON ZL10M; Beacon Address <destination> <mycall> <digi>
BTEXT       TEST   ; Beacon Text
;
;          SCREEN SETUP
;          -----
;
COLOR       ON    ;ON/OFF OFF: monochrome attributes. ON: coloured display
;                    Laptops with LCD should have COLOR OFF to get good
;                    contrast.
VGALINES    ON    ;ON/OFF ON: display with 43/50 lines if an EGA or VGA card
;                    is present. Turn it OFF if you find that the
characters
;                    are too small for you.
D1LINES     5     ; 2-20 length of TX/input screen in lines
D2LINES     20    ; 4-23 beginning of monitor screen in lines
VCOLUMNS   80    ;40-132 number columns, usually 80
VLINES      25    ; 25-75 number of lines on screen (these parameters are
ignored
;                    if VGALINES is ON).
;
;          SCREEN COLOURS
;          -----
;
;          Background & foreground colours in hexadecimal
;
;          MONOCHROME
;
CSELECT     0      ; attributes for mono (MDA, Hercules, Laptop LCD)
;
SATTRIB     0 02 ; TX window
SATTRIB     1 47 ; Upper Status Line (USL)
SATTRIB     2 c7 ; STOP indicator in USL (SHIFT-TAB or "-")
SATTRIB     3 07 ; RX window
SATTRIB     4 47 ; Lower Status Line - connected call and port number
SATTRIB     5 40 ; Lower Status line - not selected or connected ports
SATTRIB     6 57 ; Lower Status Line - selected port
SATTRIB     7 03 ; Monitor: address field (header)
SATTRIB     8 02 ; Monitor: info field
SATTRIB     9 17 ; Text of help screen
SATTRIB    10 1e ; Highlights on help screen
SATTRIB    11 5e ; Selected highlight on help screen
SATTRIB    12 04 ; CTRL characters (must be different from SATTRIB 0,3,7,8)
;
;          COLOUR
;
CSELECT     13     ; Attributes for colour (CGA, EGA, VGA)
;
SATTRIB     0 02 ; TX window
SATTRIB     1 47 ; Upper Status Line (USL)
SATTRIB     2 c7 ; STOP indicator in USL (SHIFT-TAB or "-")
SATTRIB     3 07 ; RX window
SATTRIB     4 47 ; Lower Status Line - connected call and port number
SATTRIB     5 40 ; Lower Status line - not selected or connected ports
SATTRIB     6 57 ; Lower Status Line - selected port
SATTRIB     7 03 ; Monitor: address field (header)
SATTRIB     8 02 ; Monitor: info field
SATTRIB     9 17 ; Text of help screen
SATTRIB    10 1e ; Highlights on help screen
SATTRIB    11 5e ; Selected highlight on help screen
SATTRIB    12 04 ; CTRL characters (must be different from SATTRIB 0,3,7,8)
;
;          ^ Foreground(Characters)
;          ^ Background

```



```
;
; Values of colour attributes
;
; 0 = Black           8 = Dark Grey
; 1 = Blue           9 = Light Blue
; 2 = Green          A = Light Green
; 3 = Cyan           B = Light Cyan
; 4 = Red            C = Light Red
; 5 = Magenta        D = Light Magenta
; 6 = Brown          E = Yellow
; 7 = White          F = Light White
;
; The values 8-F work only in the foreground
; As background colours they cause the colours 0-7 to flash
```

Note that the file above has been edited and may not be exactly the one that you find on your disk.

As you can see, most of the file explains itself. If you're not satisfied with the short descriptions given and want a more detailed explanation: why not look it up in this manual?

If the parameter compiler PARA.EXE generates error messages after you have changed SCC.INI, you should check the following:

- have you mistyped a command, or deleted a semicolon by mistake?
- have you set one of the parameters to an illegal value?

When errors occur, they are corrected in most cases by replacing invalid parameters with proper values, so you won't usually have to expect a computer crash.

HOW TO CONFIGURE HARDWARE: THE :MODE COMMAND

The mode command replaces several commands from version V1.50 (HBAUD, CARRIER, HENNING). It is more flexible and hopefully easier to understand.

Its first argument is the modem channel, then the baud rate (the channel parameter should be left away in SCC.INI). This corresponds to the previous command HBAUD. The options follow immediately after the baud rate (no blanks) and tell the software how to talk to the interface:

Options:

- t** TX clock is taken from the modem (otherwise an internal TX clock is used)
- r** RX clock is taken from the modem (otherwise the RX clock is recovered internally)
- z** NRZ instead of NRZI coding (the usual mode is NRZI, NRZ is used in DF91C modem only). The options **trz** can only be set for an SCC card.
- d** Full duplex (KISS mode: TNC is set to duplex). This option works for SCC cards / KISS port only.

c Software DCD.

Examples:

```
mode 0 1200c    1200 Bd modem on RS-232, carrier detect by software (e.g., our
                    TCM3105 modem)
mode 1 300      300 Bd modem, carrier detect by modem DCD line (e.g.,
our            AM7911 HF modem)
mode 2 9600dc   G3RUH modem, clock and DCD not available.
mode 3 9600trz  DF9IC modem
mode 3 9600tr   DK7WJ modem
```

The CARRIER command from previous versions can be converted as follows:

0 -> **c** 1 -> nothing 2 -> **tc** 3 -> **td**

The option **c** permits a software DCD for each channel. DCD stands for Data Carrier Detect. XT users who so far had to rely on a hardware squelch can now also use the software squelch, the bug in V1.50 has been ironed out in V1.60. When data is being received, the own transmitter must remain silent. This is why a fast and efficient carrier detection is necessary.

ATTENTION: after MODE has been changed, you will need to transmit at least one packet before the new setting takes effect.

A few words about the software DCD for the RS-232 modem:

Since version V1.50 it is possible to replace a slow squelch in your radio with a software carrier detect. The radio could then be left unsquelched. This allows a minimum TXDELAY setting at your partner station.

However, if the received signal is noisy, the software DCD will not perform as well as a fast squelch on the radio, or a PLL-DCD with an XR2211. Hence, the software DCD should only be used when the radio squelch is really a bit slow or the signals are very strong and clear.

The software carrier detect works as follows:

With the help of NRZI coding and bit stuffing, it is possible to deduce whether the incoming signal is data or just noise. This is revealed by the number of "one" bits received. A variable X is changed according to the following criteria to determine whether the channel is busy:

- more than 6 bits: bitstream definitely invalid or frame corrupted:
-> X=0, DCD switches to "channel free".
- exactly six "one" bits: a flag, the start/stop byte of a packet frame and TXDELAY character. If such a character is received, X is increased by 5.
- less than six "one" bits: possibly valid data. X is increased by 1.

- $X \geq 10$ means "channel busy", $X < 10$ means "channel free"

About the baud rate: if you are using a modem on the RS-232 port, only the baud rates 300 Bd and 1200 Bd are valid options. The standard TCM3105 modem cannot be used for 300 Bd, so you will require an AM7911 modem for HF operation.

When using a plug-in card, you can change the baud rate on its channels in even fractions of 38400 Bd, which means the baud rate can be set almost continuously.

WORKING IN KISS MODE

Version V1.60 has now an option that allows you to use a serial port in KISS mode. KISS mode is a slightly altered version of the AX.25 protocol that runs via serial interfaces and is very widespread. However, we should say here that this is less a useful alternative for the "average user". Rather, it is an option which may be useful in a few special cases:

- you may have the strong desire to use BayCom with a TNC or other non-BayCom hardware. You may now do so in KISS mode.
- connection to an existing net node. If the terminal is to be used together with, e.g., an RMNC/FlexNet node, it is sensible to do this in KISS mode to keep the hardware requirements low.
- local area networking. As KISS mode will run in parallel to the SCC card or the RS-232 modem, it is possible to establish a KISS link to another PC. You can then use the digipeat function to get on air through the other PC.

The KISS mode is subject to the following restrictions:

- if a TNC is connected, it will only turn on KISS mode automatically if WA8DED firmware is used. If other systems are used, you will have to put the TNC into KISS mode manually or with a special program BEFORE BayCom is started. When BayCom is terminated, the KISS TNC will not be reset to terminal mode automatically.
- parameters are only sent to the TNC during startup. A later change of, e.g., TXDELAY will have no effect until L2 is started the next time.

These restrictions may be regarded as a nuisance, but we would like to stress again that this option is for insiders rather than for the average user. Due to the missing link between modem and software, its radio properties are not the best, either.

To activate KISS mode, you will need to set the parameters KISSBASE and KISSINT in SCC.INI. You will also need to set the parameters for the KISS port that are in the ASSIGN KISS block in SCC.INI.

BEFORE WE START...

A BRIEF REMARK ON OUR NOTATION:

Whenever we have mentioned a command for the first time, we have used the following notation: the command is spelled out in its full form, but the letters that are essential are underlined. Example:

```
:XCONNECT ZL1DDL ZL1AVQ
```

may be abbreviated to

```
:XC ZL1DDL ZL1AVQ
```

Please note that, in general, only commands may be abbreviated, not their arguments. An exception is when a channel number is required and you are only using a single modem (as most users probably will). In this case, the channel number is obvious to the program and may be omitted.

BayCom is generally not case sensitive. We have put a remark wherever there is a difference between lower and upper case.

HOW TO START AND TERMINATE THE BAYCOM PROGRAMS

Once installed, you can run BayCom either via BAYCOM.BAT, if you don't want to make use of the memory resident properties of L2.EXE. This option is desirable especially for people who prefer having the full power of their computer at their disposal rather than being QRV for other people. Just type:

```
baycom
```

at your DOS prompt. Of course, your computer must know where to find the files, so make sure that the BayCom directory is in your path, or that you have set your working directory to the BayCom directory with CD. If you want to enable other stations to connect to you while you are doing other things on your computer, you should start the TNC routine of BayCom, L2.EXE, by typing

```
l2
```

at your DOS prompt. You may then run other applications on your computer. When you wish to check on the terminal, just start the terminal program SCC.EXE by entering

```
scc
```

at the DOS prompt and the terminal will show you the data that has arrived in your absence. You may leave the terminal at any time with the key combination ALT-X. If

you have not used BAYCOM.BAT to start the program, you may wish to remove L2 from memory. Just type OFF. The little utility program OFF.COM that comes with BayCom will then chase L2 out of its memory hideaway. Starting SCC as

```
SCC -C
```

clears the terminal screen when the terminal is started.

All commands above presume that you have your working directory set to the BayCom directory, or that the BayCom directory is part of your DOS path. Ask someone who knows about DOS if you are not sure.

A word of warning about memory resident operation of L2: some other applications may not be compatible with L2. If it doesn't work, check for other TSR routines such as funny mouse drivers, menu programs etc. Some applications started after L2 will not recognize its presence and just take its memory away. A good example for such a ruthless program is MS Windows, so don't try to use Windows after starting L2 if a smooth operation of L2 is important to you... .

You may leave SCC.EXE at any time with ALT-X or with the **:SYSTEM** command.

HOW TO USE THE TERMINAL

There are three screen parts in each screen: the command window at the top, the receive window in the middle, and the bottom monitor section. The lines separating the windows are called status lines. You can shift the upper one with CTRL-HOME and CTRL-END, and the lower one with CTRL-PAGEUP and CTRL-PAGEDOWN. If you have a mouse, you can use it to move the status lines as well as for placing the cursor into any of the three windows.

Incidentally, you can easily jump between the different windows with F9 or the "-" key on the numeric keypad. Within a window, you can scroll up or down using the arrow keys or the "page up/down" keys. The middle window shows everything that you have received on this port. Note that if you jump into the receive or the monitor window with F9 (or "-"), you can only scroll within the display that was on the screen before you pressed F9 (or "-"). To view lines that were received afterwards you will need to leave the window again.

Hint: you may find it more convenient to jump between the windows by pressing ALT and 1,2 or 3 respectively - instead of using F9 or "-".

If you decide to halt the display scrolling away too fast but you don't want to jump between ports, you can do so either with the SHIFT and TAB keys, or by pressing the "+" key on the numeric keypad. This way your cursor remains in the command window so you can enter commands etc. While the output is halted, the QRV/SEND/RECV indicator in the upper status line will flash.

If you put :ECHO ON, it will also echo your own lines as you type them in. ECHO 2 will cause an echo only after a > sent by a digi or a BBS, but only if you use this

command in SCC.INI. If characters are echoed, they will have the same colour as in the transmit window. This way you can get a nice contrast between the incoming data and the stuff you typed yourself. Note that ECHO has also another function under remote operation.

No matter which window you're in: if you type ENTER while the cursor is in a line, this line will be sent out during a connect or interpreted as a command if preceded by a colon. This feature is called "on-screen editor".

The bottom screen part monitors the frequency. Usually, it should show all packets that were heard on the frequency (or frequencies, if you have more than one channel available, e.g., with a SCC card). Consult the section on monitor commands on how to customize your monitor (p. 69).

You can have more than one QSO at a time. The line separating the middle and the bottom screen parts shows numbers from 1 to a maximum of 8. The highlighted screen (or port, as it is also called) is the one you're in. You can change the total number of ports (screens) by changing the TPORTS parameter in SCC.INI. Use the corresponding function key F# to get to screen #, i.e., F1 to get to screen 1, F2 to get to screen 2 etc. F10 will get you to the full-size monitor screen. This one looks like the others, but has no middle receive window. You can connect to other stations from any of the normal screens (ports).

On the monitor screen, however, the packets will be sent out UNPROTO, that is without serial numbers. This is done by simply typing a line and pressing ENTER. The line is then sent out as an UNPROTO packet. In the header, the first MYCALL is used as sender, and the last connected call as the destination call sign. The destination call sign can be changed by using the :CONNECT command. The call sign following the command is then taken as the UNPROTO destination, but it is not actually connected. The reception of your UNPROTO packet will then prompt a "DM" (disconnect mode) packet from the destination station, provided it's still around.

UNPROTO packets are actually quite helpful as you can test your system without actually connecting to anyone and without having to bother too much about your system sending extra packets that you don't want or need. UNPROTO packets are single transmissions at your convenience. They can be used to measure things like the SWR on your feedline (in combination with a very long TXDELAY), or you can simply check whether and how well you are heard by another station. See the section on TXDELAY for a method to align your TXDELAY yourself with the aid of UNPROTO test packets.

HOW TO READ THE STATUS LINES

THE UPPER STATUS LINE:

```
QRV ZL1DDL-1> Link Setup mem=038 ln=203 n2=20 o=0 fr=80 k=0 16:34 2 IU
1 2 3 4 5 6 7 8 9 10 11 12
```

- 1) **QRV** : system receives, but does not hear a signal (channel free)
RECV: system receives a packet signal

SEND: system transmits a packet signal

If this indicator is flashing, the output of received data has been halted by pressing "+" on the numeric keypad or by pressing SHIFT-TAB. It will also flash if the cursor is in the receive or monitor window.

- 2) The call currently used on this port (including SSID).
- 3) Current link status, with the following possibilities:

Disconnected	Not connected...
Link Setup	A CONNECT command has been issued and is executed, but the connect is not yet established.
Disc Request	a connection is about to be severed. DISC packets are being sent.
Info Transfer	means: everything is fine, if data is queued for transmission, it is transferred.
Frame Reject	a serious protocol violation has occurred and leads to an immediate disconnect. This is quite a rare occurrence. It tends to occur when two stations with the same call are on the frequency.
WAIT ACK	poll packet sent.
Reject Sent	an info packet with the wrong number has arrived, correct number requested in a reject packet.

- 4) **mem** is the number of free buffers in the system.
- 5) **In** shows the number of lines in the receive window that you can scroll back.
- 6) **n2** is the current state of the RETRY counter. If this goes towards zero, the connect is in danger of breaking down.
- 7) **o** is the number of outstanding packets, i.e., info packets that were sent but have not yet been acknowledged by the partner station.
- 8) **fr** is the current FRACK time for this connect. This is the time your station will wait for an acknowledge packet before re-sending the packet or polling the partner station. FRACK will adapt itself, except when the selected baud rate is 300 Bd, as the automatic adaption does not work very well on HF. If a DAMA master is recognized, the **fr** display is replaced by **DAMA**.
- 9) **k** is the channel number on which the port sends its data. If you use an RS-232 modem, this will always be zero. It is only relevant when you are using an SCC card.
- 10) The current time from DOS.
- 11) The current port (screen) number.

- 12) **I** stands for insert mode, **R** for overwrite mode. You can toggle this with the INSERT key. **U** indicates the umlaut display. If the program receives IBM umlauts (those funny German characters with the dots on top...) the **U** will flash and the user can switch to sending IBM umlauts by pressing ALT-U (which then corresponds to GERMAN OFF).

THE LOWER STATUS LINE

The lower status line contains a listing of all ports and the calls connected or being connected on the respective ports. If you are connected to a digi and you are connecting onwards, the "*** connected to..." message is evaluated and the call in the lower status line is replaced accordingly. The same applies to possible "*** reconnected to..." messages.

You can determine the total number of ports (screens) in SCC.INI with the TPORTS parameter. The maximum number of ports is 8.

When sending or receiving a file, the current status in bytes sent or received is displayed at the right end of the lower status line.

If the information doesn't appear as expected, check the SATTRIB settings in SCC.INI - white characters on a white background lack contrast... .

HOW TO CONNECT FROM THE TERMINAL

:MYCALL AND :DCALL

MYCALL should be set in SCC.INI, but you may also change it from the terminal - with the disadvantages already mentioned. Normally you will have set your call sign during the installation procedures, but if your call sign changes or you bought your station from a previous user, then you may wish to change it manually.

MYCALL defines up to four callsigns that the program will recognize as the station call if it is connected by another station. Only the first MYCALL is used on outgoing connects. If you want to connect to the same station twice at the same time, you will notice that BayCom automatically appends your MYCALL with an SSID (secondary station identifier).

Example: You are a licensed family. The father's call (who we suppose is the primary user) is ZL1OM, his xyl is ZL1XYL and the kids are ZL1GAL and ZL1GUY. You should be using the following MYCALL list in SCC.INI:

```
mycall zl1om zl1xyl zl1gal zl1guy
```

If an outside station wishes to connect to any of these call signs, your station will accept the connect request.

If you change MYCALL during a connect from the terminal, the running connect will be handled under the old call sign, only new connects will carry the new MYCALL.

DCALL is the callsign under which the station will act as a digipeater. Usually this will be the same as MYCALL but you can use a different one instead if the need arises, e.g., if you host the local club station on your system at home... .

:CONNECT AND :XCONNECT

The CONNECT command will always take the first call sign from the MYCALL list. Its syntax is as follows:

```
:c <destination call sign> [<channel>] [<digi1> <digi2> ...]
```

Examples:

```
:c z11ab 0           connects you with ZL1AB on channel 0
:c z11ab             is the same if you have a modem on the RS-232 port
:c z11ab a           A is equivalent to 0 as a channel number
:c z11ab z11avq     connects to ZL1AB via the digipeater ZL1AVQ
```

The channel number may be omitted if there is only a single modem or KISS port installed, in this case BayCom will default to channel 0. If there are several channels (channel numbers run from 0...7 or A...H instead), BayCom will take the channel for the connect from the MHEARD list. That is, provided no channel has been assigned with to the call sign with the LINK command. Note also that there is no need to type a "via" between the destination and the digipeater callsigns, although you won't get an error message if you do. Up to eight digipeaters are allowed.

Once you have issued the CONNECT command to your BayCom system, you will see the destination callsign in the field right next to the port number in the lower status line. This doesn't mean that you are actually connected. The upper status line will say "link setup" until you are connected. When the connect is established, a bell will ring (provided you haven't turned it off). Only then you will be able to send data to the other station.

Just in case you mistyped your connect command: just correct the wrong line and enter it again - as long as the link isn't set up, a disconnect request will be sent to the wrong call sign and a link setup to the correct call will be attempted. The CONNECT command without any arguments causes a connect to the station that was connected last time - provided you haven't left the program since the last connect. If it is the first connect after you started the program, CONNECT without arguments will try to connect to the UNPROTO call.

Similar to CONNECT is XCONNECT. It allows you (or, rather, someone else who is using your station) to connect under another call sign than the first call on the MYCALL list, without having to mess around with MYCALL.

This can be of real help. Imagine that your station is also used by a family member with a different call sign. Of course you could change MYCALL each time the other operator uses the station and change it back afterwards. Common sense and Murphy's Law tell us that this is almost unworkable. XConnect allows you to change

the call for one QSO only. So if your wife is ZL1XYL, and you're ZL1OM, and you're the main user, you would have your SCC.INI set as:

```
mycall z11om z11xyl ...
```

ZL1OM is used first, but the station will answer incoming calls for ZL1XYL as well.

If your wife is keen on using the station (let's say she wants to connect to ZL1AB) she must type:

```
:xc z11xyl z11ab
```

followed by any calls of digipeaters she wants to use. Apart from the extraordinary station call before the destination call, the syntax is exactly the same as that of the CONNECT command.

:DISCONNECT OR :QUIT?

The command

```
:d
```

disconnects the partner station. For this purpose, disconnect requests are transmitted and the connection is only terminated when an appropriate packet (UA or DM) is received from the partner station. Issuing the command twice will prompt a unilateral disconnect and your station will not wait for a response from the partner station.

```
:d all
```

disconnects on all ports. This is useful if you are in a hurry.

If you are in a connect that you would like to terminate, but you can see that there is still data waiting to be transmitted (i.e., it hasn't been shown on the monitor screen), you might like to use the

```
:q
```

command instead. However, the QUIT command is most useful in conjunction with a remote logout under remote control. Whenever a connect is terminated with QUIT, the pre-defined QUITTEXT is transmitted before the connect is severed. If the data cannot be transferred and the quit timer (see TQUIT) expires, the connect is terminated anyway.

:KANAL

In English this means "channel" and is used to assign a particular hardware (radio) channel to the current port. This is useful if you have a USCC card and you want to test a particular channel from the monitor screen (F10).

:LINK

LINK assigns a fixed channel to a callsign. The syntax is

```
:link <call> <channel>
```

Normally you won't need the LINK command. However, if you operate with more than one channel (e.g., if you have a USCC card), and you omit the channel specifier in the CONNECT command, the system will check the MHEARD list for the channel that the callsign was last heard on. If a LINK channel has been assigned to this callsign, the connect will always go through the LINK channel, unless a different channel is specified in the CONNECT command.

:CNOT

This command precedes a list of callsigns that your station should ignore. Usually you would include the dummy default callsigns such a NOCALL, TNC2, WOMBAT, PK232 or whatever is en vogue in your part of the woods when it comes to new TNC's etc.

However, if you have a pirate in the vicinity or there is some other reason to exclude a particular station from connecting to you, you may also include this callsign in the list. Your station will show packets from the CNOT call signs on the monitor, but will not react to them on air.

THE HELP SYSTEM

THE HELP FILE TERMHELP.SCC

BayCom has a growing helpfile. This means that the BayCom team welcomes additions to the file and will include them in their official releases. Please do NOT send them whole helpfiles over packet just because you have added a few lines. However, you're quite welcome to tamper with your own file...

Please send your add-ons to

```
z11ddl@z11ab.#11.nz1.oc
```

or to

```
ulrich@tcode.auckland.ac.nz
```

if you have e-mail.

HOW DO I GET :HELP?

```
:h
```

will display help on HELP.

```
:h index
```

shows the keywords for which a help text is available. Move the cursor to the highlighted item that you want to select and press RETURN.

If you need help on a particular subject, type

```
:h <subject>
```

Example:

```
:h txdelay
```

gives you the help text on TXDELAY. If you have received a text and you would like help to a particular word in the text, just move the cursor onto the word and press CTRL-F1. You may also use the mouse by clicking on the highlighted fields in the help text. If you click the mouse outside the pop-up help window, the help window will be closed. With ALT-F1 you can recall the help text that was displayed last.

Within the HELP window, the cursor keys can be used to select a highlighted topic. If you press RETURN, the help text for the highlighted topic is displayed. You can view help texts that go over several pages by turning the pages with the PgUp/PgDn keys. You can return to the previous help window with "Z". "H" gets you to the menu. With "E" or ESC, you can close the help window.

HOW TO EDIT THE HELPFILE

The helpfile TERMHELP.SCC can be changed, provided you observe the basic rules. It starts with a keyword list, the so-called index. The index contains the keywords which are marked with a double backslash \\ in the actual help text.

Do not edit the index! It is created automatically.

A cross reference is marked with ^ before and after the word, e.g., ^BAYCOM^. Make sure that there is a keyword for every cross reference.

A line in the help text must not be longer than 69 characters. In each text for a keyword entry, you should leave lines 1, 18, 19, 36, 37, 54 and so on blank. This guarantees that help texts over several pages are shown correctly.

Make sure that there are enough dummy lines (*****) between the index and the help text. Add more dummy lines if necessary - otherwise the first lines of help text will be overwritten!

HOW TO COMPILE THE HELPFILE AFTER EDITING

That's simple. Just use

para -h

from DOS. PARA.EXE will now recompile the helpfile and put a new index in. Your helpfile is now ready for use. If error messages appear, check for missing cross references, missing blank lines, and lines that are too long. If your compilation is ok, your new help file is ready for use.

MODIFICATIONS TO THE TERMINAL

(skip this if you're new to BayCom)

If you find that the dimensions of the screens are unsuitable for you, it is best to go and change the relevant parameters in SCC.INI. You can also change them in the program. But remember, all such changes will get lost after you change SCC.INI the next time.

You can play with some of the following values in SCC.INI to make your terminal do what you want:

BUFFER: must be followed by a number and determines how many 340 byte blocks (buffers) will be available to L2. This in turn determines how many lines you can scroll back, how much data can be buffered by L2 while it is running without the terminal. The trade-off of a high number of buffers is that you will have less memory available under DOS while L2.EXE is running. If you don't intend using DOS while using BayCom you may find it more convenient to have a higher number of buffers. The total number of buffers must be greater or equal than the sum of buffers reserved with TBUFFER, MBUFFER and RBUFFER.

TBUFFER: dummy command due to compatibility to older versions.

RBUFFER: this is the number of BUFFERS used PER PORT for reception. The ports are the windows that you can select with the function keys F1 to F... . TPORTS tells you how many ports you have. If you have, e.g., TPORTS 5, you will have one monitor screen and four normal ports, i.e., the function keys from F1 to F4 switch between the ports. The more RBUFFER and the fewer ports you have, the more lines you can scroll back.

MBUFFER: determines the number of BUFFERS used for the monitor, the more you have, the further you'll be able to scroll back.

Note that buffers are used dynamically under BayCom. The buffers are also used for tasks like log book writing etc. Note also that the buffers are only returned to DOS properly after OFF.COM was used to remove L2 - if L2 was the only resident program. Some other programs, if run in parallel, may prevent the memory from being freed until they themselves are terminated. This is due to a shortcoming of DOS, not of BayCom.

Always make sure you have enough buffers.

TPORTS: as mentioned before, this is the number of port windows your terminal will provide. It is also the maximum number of connects you can have at any time, as you need one port for each connect. Having less TPORTS allows more memory to be used for scrolling back on the receive window. In most cases, you will be perfectly happy with no more than three such ports. However, some people like downloading files from BBS's by the megabyte and think that it is better to have several connects at a time to speed things up. This is usually an unfounded belief, as several connects will not increase the available airtime... They will however increase the overhead, and lower the throughput... .

D1LINES: is the number of lines in the top part of the screen, i.e., tells you in which line the upper status line is located.

D2LINES: is the line number for the lower status line.

Obviously these two parameters can be used to determine the size of the screen parts.

COLOR: this can be either ON or OFF. Set it to OFF if you have a monochrome screen or LCD display but otherwise a VGA graphics card (laptops). This parameter is ignored if the program detects a monochrome video card.

VGALINES: ON or OFF. Leave ON unless you have problems reading small characters. This parameter is also ignored if the program detects a monochrome video card.

VCOLUMNS, VLINES: determines column and line number on your screen. This is for extreme cases only. These commands are ignored if VGALINES is ON.

WWRAP: for people like you and me who like typing without looking where they go with their line, wwrap is the position of the automatic word wrap. 80 is the usual value here.

SAVEPORTS: is the number of ports for which SCC.EXE will save the screen when you leave the program. If you're working from floppy and you're usually in a rush, set this parameter to 0.

CRTSAVE: if you hate screensavers (as I do), you can put this one to 0. Otherwise it is the time in minutes between the last activity and the activation of the screensaver. N.B.: you don't need a screensaver on LCD displays...

INSMODE: another case for fundamentalists: put it ON if you prefer to have characters INSERTED in a line, put it OFF if you'd like new characters entered from the keyboard to overwrite the old ones. If you're not happy with your default choice, you can always toggle this while you're in the terminal, using the INS key.

DOSCLEAR: if ON, you'll lose your DOS screen when running BayCom. DOSCLEAR OFF will save it and restore it after you terminate BayCom.

MHEADER: ON puts a line feed between the AX.25 packet header and the info field on the monitor screen. MHEADER OFF puts both in the same line.

MOUSE: ON will look for a mouse driver. Set to OFF if you have no mouse or if the mouse causes trouble (some old machines don't like the interrupt vector). Sometimes serial mouse drivers want to use the same COM port as BayCom. MOUSE won't help you there, but you **MUST** disable the mouse driver to use BayCom.

SATTRIB: people suffering from colourblindness will love the possibilities this command offers: it determines the colours used. The syntax is

sa <area> <backgr.><foregr.>

<backgr.> and <foregr.> are 1 digit hex numbers for the back- and foreground colours. The hex numbers are:

0 black	1 blue	2 green	3 cyan
4 red	5 magenta	6 brown	7 white
8 dark gray	9 light blue	A light green	B light cyan
C light red	D light magenta	E yellow	F bright white

8...F are foreground colours only. In the background they are the same as 0...7 and cause the area to flash.

The areas are numbered from 0 to 12. See for yourself.

Attributes changed with SATTRIB from the terminal will not change immediately on the screen (except for the status lines). Only new data on the screen will appear in the new colours.

Some of the above parameters can also be changed from the terminal. However, a change in the terminal may have no effect until L2 is started again.

ADVANCED OPERATING TRICKS ON THE TERMINAL

By now, you will have learned how to connect and disconnect with BayCom. You would also know how to customize its appearance to suit your needs. This chapter is about a few extra features you can employ to make better use of your terminal during operation.

PRINTING INCOMING DATA WITH :WRITE PRN

This is quite simple. Enter

```
:w prn
```

to start the printout, and

```
:w off
```

to stop it. Note that you cannot print out and write incoming data to a file on disk at the same time. Solution: write the data to disk and then print it out under DOS with :OSHELL (p. 66).

FILE TRANSFERS AND FILE VIEWING AND EDITING

TEXT FILES: :READ AND :WRITE

The next thing that should give you some more command over the program are the READ and WRITE commands. They allow you to write incoming text data to disk, or simply read a text file on disk out to the station you're connected to, e.g. a BBS. The syntax is quite easy:

```
:w [\<path>\]<filename>
```

and

```
:r [\<path>\]<filename>
```

Let's suppose you want to dump an incoming bulletin or message from the BBS to disk. Open a file with

```
:w [\<path>\]<filename>
```

All the incoming data will now be written to that file. Don't forget to close the file after you have finished. Unclosed files can accumulate megabytes of junk on your harddrive, so make sure you only leave them open if you intend to.

As far as WRITE goes, it should be noted that only ONE FILE AT A TIME can be opened on each port. This includes the dumpfiles in SCC.INI and the printer output file PRN. So if you want to print something but keep it on disk as well, write it to disk first, then print it, e.g. under :OSHELL (see p. 66).

The other common situation is that you have prepared a message or bulletin on an editor and saved it as a textfile on disk. If you want to upload it to your local BBS, you connect to the BBS. Then, you issue the SEND command to the BBS, enter the title. When you're prompted to enter the message, simply type

```
:r [\<path>\]<filename>
```

and things should go smoothly. After the file is through, it will automatically be closed and all you have to do is add your CTRL-Z to it.

There's a little trick here: sometimes files are longer than the transmit buffer. So BayCom will first fill the whole buffer with the start of the file. As more data is sent out successfully, it refills the buffer. As it stands, your keyboard has priority in the refilling process. So if you're trying to upload a long file to the BBS, it will only partly fit into the buffers. Then you enter CTRL-Z manually. This will be the next thing to go into the buffer.

The result of this is that it is sent out BEFORE the rest of the file. So you're terminating the file prematurely. As you can bet, the rest of the file will follow, but the BBS now expects commands. Most files don't make much sense to it so you're likely to end up with a string of error messages.

If this happens: DISCONNECT, using the :D command IMMEDIATELY. Otherwise the rest of your QSO is going to be de-facto-QRM, depending on how long the rest of the file was. To get around this effect, increase the TBUFFER parameter. This will decrease the amount of memory available for OShell operations, but if TBUFFER is high enough, it will definitely solve the problem, as the whole file should now fit into the buffers.

The ELEGANT way around all this is of course to include a file end marker (depending on the BBS, this could be *****END** or **/EX**) in the text file. If you have expert status on your BBS, it won't usually mind if you include the SEND command and the message title in the file as well. In this case, all you have to do is connect to the BBS and enter

```
:r [\<path>\]<filename>
```

If no path is given, both READ and WRITE will use the current directory. So if you get an error message, checking the path is a good idea... .

BINARY FILES: :RPRG, :WPRG and :AUTOBIN

These are the binary transfer commands for BayCom. Unfortunately, the YAPP protocol, proved to be incompatible with the internal structure of the BayCom software so that it could not be included in the release of V1.60, despite the desperate efforts of DL8MBT. One way around this - if you really need YAPP - is to use some other software that interfaces to BayCom hardware and permits YAPP transfers. Examples include TFPCX with various terminal programs, but also BAYAPP and other utilities that have appeared on the scene. We would like to stress

BayCom Terminal Software V1.60 for IBM-compatible PC

here that none of these programmes are available from BayCom distributors unless stated otherwise, so please don't ask.

However, BayCom V1.60 includes a binary transfer protocol which is quite widespread in Germany. It is called AUTOBIN. If your partner station does not have the AUTOBIN protocol, you may wish to try it manually if there is some natural intelligence on the other side, and the station is a BayCom one:

To use RPRG and WPRG without AUTOBIN (e.g., if your partner station runs an old version of BayCom prior to V1.60), it is a good idea to establish two connects to the partner station (or one connect and a voice/phone link). Let us call one of those connects the data channel and the other one (or the phone link) the communications channel. You use the latter to communicate with the operator of your partner station. Let us assume that you want to send a binary file to the other station.

Set

```
:au off
```

on your machine. When you're ready, get the other station to enter

```
:wp [\<path>\]<filename>
```

on their system on the port of the data channel. They should then tell you (on the communications channel, NOT the one with :WPrG) that they are ready to receive the data.

Now you enter

```
:rp [\<path>\]<filename>
```

on your machine on the data channel screen. Observe the file as it is transferred. You will be able to notice when the transfer is complete. That is when all data has appeared on your screen and has been sent out in packets. Watch the "o" counter for unacknowledged packets in the upper status line. When it goes to zero, the file has been transferred.

Your partner station is NOT in a position to notice when the whole file has arrived, so you could tell the station over the communications channel that you're finished. The other station must then enter

```
:wp off
```

This completes the data transfer. Sounds complicated ? It is if you're doing it for the first time. But you get used to it. There is also a way of remote controlling the far end station (provided you have access privilege to the command). During the data transfer the remote control is blocked. Only a RETURN character followed by //WPRG OFF at the beginning of the new line will work (note: you must type WPRG, WP alone won't work. It will corrupt your file, though, if the data transfer wasn't finished). Just as with READ and CTRL-Z you should be careful not to enter //WPRG OFF too early.

If your partner station is AUTOBIN compatible (such as SP), the whole procedure becomes HEAPS easier. Make sure that :au on and open a file on your side with

```
:wp [\<path>\]<filename>
```

Then send a remote command

```
//rp [\<path>\]<filename>
```

to your partner station. Everything else should happen automatically. Note that if your partner station runs BayCom V1.60, you will need a proper password to access files from directories other than the REMOTE subdirectory of the BAYCOM directory at this station. You can get around this if the RPRG command is entered manually at the remote station by the operator rather than send as a remote control command.

RECORDING 7PLUS FILES WITH :7PSAVE

This parameter can be set to be either ON or OFF. If you set

```
:7 on
```

incoming 7PLUS files will be written into the 7PLUS subdirectory of the BayCom directory under their correct 7plus names. For example, a file named "picture.p01" will be saved as \BAYCOM\7PLUS\PICTURE.P01. However, you will have to decode it yourself with 7PLUS, which is not part of the BayCom software package. 7PLUS is widely available - just ask in the local ham community or your local BBS sysop.

:EDIT

BayCom has a little on-screen editor built in. Don't use it unless you have to, as it is a very primitive one. You start it with

```
:e [\<path>\]<filename>
```

Note that you can not go back in the file to lines that you have previously written. It's just like in a packet connect, with the difference that your data goes into a file rather than to another packet station. End the editing process with

```
:e off
```

or

```
:w off
```

:VIEW

```
:v [\<path>\]<filename>
```

Puts a file in the receive window for viewing purposes. It is not transmitted.

:CAT AND :DIR

The DIR command works like the same command under DOS. Example:

```
:dir \baycom
```

will display the contents of the BAYCOM subdirectory in the receive window. For historical reasons, you may use CAT instead of DIR, with the same syntax.

OPERATIONAL PARAMETERS

Most mistakes are made in this area, as it is complicated, and even a lot of sysops find it hard to come to grips with it. Wrongly set operational parameters can make life pretty hard for you and others.

Not to mention those who deliberately set their parameters in such a way that they're getting "priority" on the channel. Most node digipeater programs allow for a recognition of the latter species and disconnect them. However, those unfair practices are rather widespread, so be aware. If you catch one of the guys, tell them. If they're defiant, tell the local digi/BBS sysops. If they happen to be the local sysops... . Hard cases can be excluded from the services of a digi or BBS. However, don't be too aggressive in the first case. The "offender" may be unaware of the problem. I myself transmitted with a far too long TXDELAY for a while due to a misunderstanding on the way the local packet system was set up.

All parameters discussed here can be changed from within the terminal. Once you have set them to a final value, note it down and change them in SCC.INI accordingly.

HOW TO SET AND ALTER BAYCOM PARAMETERS

Before we start playing with our parameters, we should make sure we know how to change them, and where it is most appropriate to do so. As mentioned before, there are two ways to change a parameter:

- 1) Change the parameter file SCC.INI BEFORE you start the program. For some parameters you can do this by running the INSTALL program, some can only be set by editing SCC.INI. When you start the program, it will compare the DOS date stamp on SCC.INI with the compiled parameter file. If the compiled file is older, it will conclude that the parameters have been changed. In this case, PARA.EXE is run automatically and ALL parameters are set to the values given in SCC.INI. Some parameters can ONLY be set this way (COMBASE, COMINT, SCCBASE, SCCINT, MOUSE, DOSCLEAR, INSMODE etc.).
- 2) Just change the parameter from the terminal. This is easy. Just type a colon at the beginning of the line, then the parameter name (or its short form), a space and then the new value for the parameter. Now press ENTER. BayCom will confirm the change by showing you the old parameter value. Example:

```
:t 15 (sets the TXDELAY to 150 ms)
```

Such a change will only last until SCC.INI is changed the next time. The values in SCC.INI will then replace the ones entered in the program.

As a general rule: for experimenting with a parameter it is best to change it from the program. When you have established the optimum value for the parameter, quit the program and change it in SCC.INI to this value. You can also force a recompilation of SCC.INI (for example after tampering with the system time), by calling PARA.EXE.

If you have more than one hardware channel installed (e.g., an SCC card), you will always have to specify the channel number as well as the new value (except in SCC.INI, where the sequence of the parameter blocks determines the channel number). Example:

```
:t 2 15
```

sets the TXDELAY on channel 2 to 150 ms. For simplicity, we have left the channel specifiers away in the following parameter descriptions.

PHYSICAL PARAMETERS

:TXDELAY

This is a very important parameter. It determines the delay between the time when the PTT line is triggered and the time when the first data is sent out by the modem. The most important reason for the TXDELAY is the time that your transceiver needs to get on air. In most cases, a modern transceiver will do with a TXDELAY of under 24, many will work down to a TXDELAY of under 10. All those values are in 10 ms steps, so a TXDELAY of 20 corresponds to 200 ms. As a general rule, crystal controlled transceivers require less TXDELAY than synthesized ones. On voice or 1200 Bd that doesn't matter too much. On 9600 Bd, the key-up time required by your transceiver is a major factor slowing your traffic down.

Another useful application of TXDELAY is provision for additional delays caused by the key-up process of a radio's squelch, repeater, data repeater or the Auckland X-Link. In this case, you will need a couple of milliseconds more to trigger them. The X-Link requires even more TXDELAY, as it doesn't listen all the time. Try a TXDELAY of 100, it's a bit of a gamble! Most modern node digipeater systems feature state machine digital squelches or software DCD, so you won't need to allow any extra TXDELAY for those systems. If you're working on a digipeater or direct BBS frequency, you should keep your TXDELAY **AS SHORT AS POSSIBLE**.

Setting the TXDELAY in the terminal requires the specification of a channel number if you're using more than one channel:

```
:t <channel> <10-ms-value>
```

Example:

:t 2 12

sets the TXDELAY on channel 2 to 120 ms.

GETTING YOUR TXDELAY RIGHT ON A DIRECT FREQUENCY

Obviously, transmitting something without actually transmitting data is not only useless, but actually causes problems. This something is called flags and whoever can hear them, will not transmit. Whoever can't, might transmit - and get his packet corrupted by your flags - you naughty boy! Hence, the general channel capacity will go down as less airtime is available, which on top is filled up by retries due to collisions.

Getting the TXDELAY right isn't very difficult. We will describe a few methods here. As a general rule: have a look at your transceiver. Does it have a separate PTT line (you might have come across it when assembling the modem-to-radio cable)? If so, your required TXDELAY will quite likely be below 15, especially if your radio is a more recent

model. But even older rigs won't need a long TXDELAY. We know of an FT221 user who runs a TXDELAY of 5. If your PTT is switched via the microphone line (which is the case with a lot of handheld rigs), you will need to allow some extra time. But even here, you will probably be able to settle for something below 20. This is to give you a feeling for the right amount of TXDELAY.

Here's a few methods you might want to try: if you have another receiver that allows you to monitor your own signal, try the following:

Go to an unused frequency, and switch to the monitor screen in the terminal with F10. Select a high TXDELAY, e.g. 300. Now press RETURN and listen. Your station will send an UNPROTO packet which you can see on the screen. You should hear a rough continuous tone lasting for about three seconds. Then there'll be a very brief chirp. The TXDELAY flags are the tone, and only the chirp is the real data. The chirp is all you need, but you need it completely.

Now decrease your TXDELAY to 200, 100, 50, 40 and so on. You'll get a good feeling for the TXDELAY flags. Eventually, you'll be able to hear them on other stations too. The timing is right if you can just about hear that there are flags in the signal. Now return to one of the terminal screens and connect to somebody. It is a fairy tale that some TNC's need a "decent" TXDELAY to receive you. All they may need is a little bit to trigger their DCD. Usually a few milliseconds will do fine. BayCom can do without any TXDELAY from other stations (see 2.1.3). It is even possible that you may be able to reduce your TXDELAY even further, but keep in mind that your transceiver may need a "safety margin" due to thermal effects.

Another method is to use a partner station that may be unmanned. Your local digi or BBS will do fine if you catch them at a time when there is no-one else on their frequency. If your local hangabout is too busy, ask a friend whose station is within range of yours to go to an unused frequency and follow him there. Let us presume that his call sign is ZL1UEU.

Now go to the monitor screen with F10 and enter

```
:c z11ueu
```

Each time you press RETURN after this you will see an UNPROTO packet being transmitted by your station addressed to ZL1UEU. If ZL1UEU can hear you, the station will reply with a packet ending with "DM,F". This means that ZL1UEU got the packet OK and undamaged.

Try this about ten times. If you get a "DM,F" back at least nine out of ten times, your link is OK. Now decrease your TXDELAY and repeat the exercise. As long as your link is OK you should decrease your TXDELAY further. When you hit a value that is too low, the percentage of UNPROTO packets heard correctly by ZL1UEU will decrease as your transmitter key-up delay munches the first few bits away. Set your TXDELAY to the last value where you had proper responses, perhaps ten or twenty milliseconds higher to allow for thermal effects and slow squelches.

The third method requires a partner station running BayCom, but not necessarily an unused frequency. If you watch your own monitor screen, you will notice that packets start with either R or T. The packets starting with an R are the ones that were received, the others were transmitted by your station. The R of the received packets may be followed by a channel number (if you have more than one channel installed, e.g., with an SCC card). Then there's a colon, and the number following the colon is the one of interest to us: it's the number of TXDELAY flags heard on reception (the same number on the transmitted packets is the number of flags transmitted by your station as TXDELAY, but of course you can't say how many of them are audible on the frequency...).

Ask your partner station to monitor your packets. Is the number of flags fairly stable? If not, what is the minimum number of flags heard? From this you can calculate the amount of time by which you may safely reduce your TXDELAY.

Each flag is eight bits long, and there are 1200 bits per second. The number of TXDELAY units (one unit = 10 ms) you can take off your present TXDELAY is given by:

$$\text{units} = (\text{minimum number of flags heard}) * 2 / 3$$

So if the monitor shows at least 30 flags, you may safely take about 20 units off your TXDELAY.

If you find that your connects don't go as well as before, it might be due to a slow squelch on the other side (although most modern systems will run unsquelched). In this case add some TXDELAY (about two units, not more!) to make your connects run satisfactorily. If they still don't the problem lies somewhere else. With your monitor, you might even be able to assist others in adjusting their TXDELAY.

Most modern digipeaters will ignore you or throw you off if your TXDELAY is too long. But even if you're not using one, please keep your TXDELAY as low as possible. Other users will be grateful, and your connects will go faster too.

:TAIL

This is the opposite parameter to TXDELAY. TAIL is not normally included in your SCC.INI, but you can include it or change it from the terminal. TAIL determines for how long the PTT remains keyed after the last data bit has left the RS232 for the RS232 modem.

Normally, TAIL should be 1 or 2. For AM7911 or 7910 modems, a TAIL value of 3 is recommended as the modem chip can be a bit slow.

PROTOCOL PARAMETERS

The protocol, called AX.25, is a description of the way that we "behave" when we're on air. It regulates when and how we transmit, and how we react to certain situations that arise.

Unfortunately, these parameters cannot be explained as easily as the physical ones. The reason for this is that the appropriate parameter setting may depend on the traffic situation on the channel or on the parameters that the connect partner is using. I will try to explain the parameters and the effects that can occur when they are changed. I will also give a few recommended values. However, it must be stressed that the only way to find the best parameters is to use common sense. Again, the best parameters are always those that observe "fair play".

:DWAIT

DWAIT tells L2 how long the radio channel has to be free before it is allowed to go on air. DWAIT is in 10ms steps, and the actual time L2 chooses is somewhere randomly between zero and twice the DWAIT value. This way, it avoids collisions with other users on the channel. Example:

```
:dw 40
```

Some people think that they get more done if they choose a short DWAIT. This is not true. In fact, a short DWAIT increases the probability of a collision occurring. This way, you'll have to send your packets over and over again and you will cause a lot of dismay in the local ham community. In fact, a long DWAIT can have its benefits. A short DWAIT is not recommendable unless you're using an exclusive frequency in a direct QSO with a friend.

Another point in the DWAIT game is the transmit/receive switching time of your QSO partner station. So if you've just received a packet you'll need to wait until the other station goes on receive - no problem if your DWAIT is long enough. In such cases: be smart and put your DWAIT up - NOT your TXDELAY. Get in through the back door and avoid the big rush at the front entrance... .

For Bloke Average User, a DWAIT between 10 and 30, depending on the channel congestion, is a fair value for a 1200Bd channel. Don't get caught with a shorter one! In most cases there is no need for a change in DWAIT from the value set in your SCC.INI during the installation process. However, if the going gets tough, don't hesitate to try a DWAIT of 60 or more.

After some discussion, we decided to recommend a DWAIT of 8 as appropriate for 9600Bd channels in the countries that the English version will be distributed in. Note that this is a temporary recommendation and reflects the fact that most 9600Bd channels outside Germany have a rather low user density. It has to be expected that this will change rapidly in years to come. Therefore, we recommend that you increase your DWAIT as the channel congestion increases on 9600Bd. As an example: Flori DL8MBT runs with DWAIT 50 on a 9600Bd channel near Munich, Germany. This may sound like a lot but it reflects the fact that 9600Bd is becoming increasingly popular in Germany. As most users have 9600Bd radios not too different from the ones used for 1200Bd, switching times stay the same. Under no circumstances should you simply "scale" parameters from 1200Bd.

:PACLEN

PacLen stands for PACKet LENgth and can be anything up to 255. The reason for the existence of this parameter: the shorter a packet on a busy channel, the greater its chance of getting through without a collision. On a clear channel, you can set it to the maximum value, which will maximize the data throughput. Some older TNC's can't swallow big packets either, such as TheNet or NETROM digipeaters which require shorter packets, as they need the rest of the packet length for their internal communication.

On a reasonably clear radio channel, or a duplex digipeater access, you can usually set

```
:p 256
```

If you are working on a simplex radio channel and there are a lot of stations that you cannot hear (symptom in the monitor window: packets going TO stations whose reply packets do not appear), you may wish to decrease PACLEN. Example:

```
:p 80
```

Don't be shy to go even lower if you see that your packets get repeated over and over again. In most cases, PACLEN is most important when you are transferring files. If you are typing a message on the keyboard, for example, the maximum number of characters in each packet is 80, as each line will be sent in an individual packet.

This parameter is best handled flexibly, INSTALL doesn't know it, and you should change it from the terminal to suit the channel conditions.

:MAXFRAME

MAXFRAME sets the number of info packets (i.e., those with some information content) that are sent out in one go before waiting for an acknowledge packet from the partner station. MAXFRAME can have any value between 1 and 7. A small MAXFRAME means that there are more acknowledge packets from the partner station. A high MAXFRAME can thus save acknowledge packets, as the partner station will acknowledge only the last one it received, implying that it got the previous ones too.

On a clear channel with low risk of a packet loss, this will speed up the data transfer. However, if anybody else is around, a high MAXFRAME becomes a nuisance for everyone. Imagine a file transfer with MAXFRAME 7, where all packets are full length: one such transmission takes about 12 seconds. Usually, there will be other stations around which will not hear from their QSO partner during this long transmission. Guess what they will do after you've finished? They'll all test their link with poll packets. That may already take up more airtime than the extra acknowledge packets from your partner station would have taken. So it slows everybody down.

If the chances of losing a packet are high (they are always high as soon as there are other QSO's on the channel), you may lose one of the first few out of your seven packets. Then you may have to repeat all the rest. That doesn't save much airtime either.

Even on duplex digipeater accesses or a data repeater (where there are no additional problems such as hidden stations), a MAXFRAME 3 is the most you should have, as stations can still collide. This happens when a station reckons that the channel is clear while another one has just triggered the PTT but isn't audible yet. You see, life isn't easy for little packets!

You should only increase MAXFRAME **temporarily** if you have to transfer long files on an exclusive frequency. It is a good idea to decrease it when the channel gets busy. As soon as you see that you have difficulties getting packets across, put

:ma 1

:FRACK

FRACK is the start value for a timer. This timer polls the QSO partner (or repeats the packet) if the partner station has not acknowledged your packet within the FRACK time. FRACK is in 100 ms steps, and recommended values are between 40 and 60. It is an uncritical parameter as the actual FRACK time is adapted automatically during a QSO. You can monitor this in the terminal: the upper status line shows the current value as, e.g., fr=20.

If the baud rate on the channel is set to 300Bd, FRACK will not adapt itself automatically as this algorithm has proved to be unreliable under the shaky conditions of HF packet.

:RESPTIME

This parameter is almost unnecessary. It sets the time after which incoming packets are acknowledged. It has to be different from 0, but should be less than the other station's FRACK (some other systems don't adapt their FRACK). Otherwise you'll provoke unnecessary polls or repeats.

If there is a lot of data flow in both directions, a RESPTIME greater than or equal to DWAIT can save you a few acknowledge packets, as all info packets carry the information that an acknowledge packet does.

:IPOLL

IPOLL tells L2 up to which packet length it should repeat a data packet that has not been acknowledged by the partner station instead of polling the partner ("info poll").

IPOLL is an invention which - strictly speaking - violates the AX.25 protocol! Under AX.25, an unacknowledged data packet provokes a poll packet. Once the poll packet is acknowledged, the original info packet is sent out again.

However, the protocol is tolerant enough. If we re-send the original info packet instead of the poll packet, it will be just fine. This way, we can save a pair of short poll packets - provided the second transmission of the original data packet gets through.

If it doesn't, we might want to send another one. If nothing gets through, we've transmitted a lot more stuff and taken a lot more airtime than a few short poll packets would have done. Also, short poll packets have a greater probability of getting through on a busy channel.

Again, we see that this parameter has two sides to it. The optimum value depends on the individual situation and involves more statistics than we would seriously want to involve ourselves in. The BayCom team reckons that the statistical optimum between overhead and useless transmissions is at about IPOLL 80. This is also the default value in SCC.INI.

:RETRY

This is a very important parameter. It tells our station how much patience it should have when talking to others. RETRY determines the number of attempts that we will make to get a packet acknowledged before we give up in frustration and disconnect. Example:

```
:ret 30
```

sets your RETRY counter to 30. Each time that a packet remains unanswered, the RETRY counter is decreased by one and the packet is repeated or a poll packet is sent out. If it remains unanswered, the procedure is repeated. When the counter reaches 0, the connect is deemed to be broken down and a DISC packet will be sent. When an answer is received before the counter has reached 0, the counter will be reset to its original value (30 in the example above).

In general, increasing your RETRY will have no adverse effects other than during link setup or disconnect, where we might try to send packets to a station that can't hear us. This way, we'd produce QRM. In most cases, however, this is the station that everybody else wants to connect to as well (i.e., the local digi or BBS). If this station is gone, it is obviously not too relevant whether there is a little QRM on its access frequency or not...

However, for a direct link setup, the SABM transmission is only repeated RETRY/4 times. If you're going VIA a digi, twice the RETRY value is used, as your station cannot know how many intermediate digipeater hops there may be in a network and what the round-trip time would be. The same applies to disconnects.

So you would probably find that a high RETRY is good for busy channels on direct frequencies, while a low RETRY is good for clear channels - you won't need to try ten times to find out that the only station you can hear has gone, especially when it's been 5 and 9 the day before.

As a general rule, it is unwanted to have a high number of retry events on the channel (i.e., information that get sent more than once and hence needs extra channel time). However this is not related to your RETRY parameter.

Some people seem to believe that a very low RETRY value is needed to keep the frequency clean. This is because they confuse the RETRY parameter with the actual retry events on air. Don't let them tell you that you should have a low RETRY parameter. This is a recipe for unwanted disconnects.

For example, imagine your RETRY parameter is set to 40. If you are working on a clean channel with nobody else around, chances are you won't need a single retry (i.e., send the same packet twice or poll the partner station). In this case, a RETRY of 10 would also be sufficient.

Now imagine a second case: you operate on a busy channel with lots of stations. You are trying to send a message. You have already sent most of your message. Then you get disconnected because the channel got a bit congested during the connect and your RETRY was set to 10. With a RETRY of 20 you could have saved the situation at the expense of sending a few extra packets.

Note that in a situation where you can get disconnected with a RETRY of 10, you may find it rather easy to reconnect to the partner station. If you now try to send your whole message again, you will eventually cause more QRM than if you had sent a few extra packets when the connect got weak.

In another situation you might be trying to get a long packet through a busy simplex channel. The chances for a long packet to get through without damage are a lot lower than those of a short poll packet. The likely scenario is that your station's first attempt at sending the packet will be unsuccessful. It will then send a poll packet, which will get through to the partner station and which will get acknowledged. The RETRY counter will only be decreased by one, and is brought back to its original value as soon as the answer to the poll packet from the partner station is received. Then, your station will attempt to send the long info packet again, perhaps also without success, and the whole process is repeated. Even with a low RETRY counter, a long packet may get transmitted many times more than the maximum value of the RETRY counter.

Don't get involved in speculations about other bad, "overdeviating" stations being the ones throwing you out. Overdeviating stations are a nuisance (they waste channel time), but with proper parameters on both sides (you and your partner station) they cannot kill your connect. Besides, most overdeviating stations are unaware of this. Perhaps telling them politely is better than telling them off?

TIMEOUT TIMERS

There seems to be some confusion about the timers that BayCom operates with. Four of them are for timeout purposes.

:DISCTIME

Imagine you're in a direct connect with a friend and you get a phone call. You forget about the QSO, so does your friend. Your connect becomes inactive, no data is transferred. Nevertheless, your systems keep on playing, exchanging poll packets from time to time to find out whether the other station is still there. Nobody would want that to go on forever.

DISCTIME is the time in 10 sec steps after which your station will send a disconnect request to your partner. The allowed values are between 0 and 600, i.e., between zero and 6000 seconds. Example:

```
:disct 360
```

disconnects an inactive link after one hour.

Be aware that e.g. when you're downloading data from a BBS via a bad link, no data packet might come through for some time and all you get might be poll packets. In such a case, a too low DISCTIME can cause you problems. A too long DISCTIME might cause unnecessary QRM from unattended QSO's.

I suggest the right DISCTIME is the time that you are prepared to wait for the next data packet from the BBS, or the time that you want a connect to stay alive while you're on the phone/toilet/holiday... .

:TQUIT

What happens when you've got data to send (i.e., there is still some data in your transmit buffers), but you can't get it across due to a bad link ? Well, you may wish to just go away and let the system disconnect after it has finished the transfer.

To do so, you simply enter the command :QUIT in the command screen. BayCom will then send the rest of the data out and disconnect you afterwards. But what happens if the program can't get the data across due to a bad link, or because the other station has gone off air without explicitly disconnecting? You have entrusted your valuable data to the program, and now it cannot deliver.

Surely, you must know what to do. With TQUIT, you can give BayCom a time in 10 sec steps. If it cannot get a packet across during this time, it will disconnect, regardless of whether it has any data left to transmit or not.

BayCom recommend TQUIT 30, i.e. 300 seconds. Example:

```
:tq 30
```

:LINKTIME

This timer tests your connection with the other side. When the connection is inactive (i.e., no data is transferred), LINKTIME is decremented and when it has expired, a poll packet is sent to test the link. If the poll packet isn't acknowledged, another poll packet is sent. If there is no acknowledge after a number of poll packets specified by RETRY, we send a disconnect request.

If we are successful, LINKTIME is restored and the process repeats itself until data is transferred again. While data transfer is going on, the transfer itself ensures that the link is ok, and no extra testing is required. Example:

```
:linkt 30
```

:DAMA

Contrary to common belief, DAMA isn't a funny South American animal, but a digipeater access protocol proposed for amateur radio by DK4EG and implemented in some TheNetNode digis by DL8ZAW. Its principle is that the "DAMA master" (the digi) calls up the users one-by-one and that users refrain from transmitting unless asked to do so. This way, digipeater accesses can handle high numbers of users reliably and with a minimum of collisions (I've seen sixteen stations simultaneously on DB0II just today, almost impossible without DAMA). The BayCom software recognizes DAMA masters automatically. If no DAMA master is identified, BayCom will automatically switch to conventional channel access. The DAMA parameter tells the program how long it is supposed to wait for a DAMA master. 12 seems to be a good value. If the program recognizes a DAMA master, the FRACK indicator in the upper status line is replaced with "DAMA".

OTHER PARAMETERS AND COMMANDS

:TINFO

This one makes the "packing" of packets more efficient. It tells the system how many 100 milliseconds it has to wait for late data coming in before sending the whole stuff out. With TINFO 4, you will avoid a sequence of RETURN's entered on the keyboard getting one packet each. You can use anything between 0 and 100 for this parameter.

:XMITOK

Can be 1 or 0. XMITOK 0 means the station won't transmit. Good way to stop the kids from transmitting garbage. XMITOK 1 is the default setting and as you would have guessed - it allows transmitting.

:GERMAN

No, this doesn't mean that the program messages will come in German. GERMAN ON/OFF switches between the character sets used. GERMAN ON will use the German DIN character set whereas GERMAN OFF will use the standard IBM

characters. This has some consequences as to how umlauts are displayed, which is a big problem for German packeteers since there is no norm on this. Since this command also has implications for the READ and WRITE commands, I strongly recommend that users in an English-speaking environment leave German OFF.

:USERS AND :CSTATUS

These commands display a list of stations currently connected. Don't confuse CSTATUS and the CSELECT switch in SCC.INI.

:CD

Works the same way as the DOS command of the same name: it changes the current working directory. Whatever your current working directory, the BayCom system files will still be searched for in the BayCom directory.

:OSHELL

Can be used without argument to shell out temporarily to DOS. However, you must keep in mind that the memory available will be much less than normal. To return to the terminal, enter

```
exit
```

at the DOS prompt. If OSHELL is used with an argument, the argument is executed as a DOS command. Example:

```
:o print scc.ini
```

will print SCC.INI under DOS - provided the BAYCOM directory is your working directory. If you use DR-DOS instead of MS-DOS, the OSHELL command is likely to cause you trouble. OSHELL will also not work under 4DOS, but there is a remedy: try starting SCC.EXE in the following way:

```
scc /m
```

This should minimize the memory requirements so that the 4DOS command interpreter has some space to run in. Of course this means that you have less memory for BayCom, so you can't scroll back quite as much as before.

If you are running your system without a harddisk, make sure that the system disk is in the floppy drive, as OSHELL will look for the DOS command interpreter file COMMAND.COM.

OSHELL can do some damage if it is made remote controllable, we recommend that it is left OFF the RCMD list. Use RUN instead and give users appropriate DOS batch files to play with.

:RUN

This command operates like OSHELL, but it will only run programs that it can find in the RUN subdirectory of the BayCom directory. This way, it can be included in the RCMD list for remote control as it is difficult to cause any damage with it. The possibilities of this command to do useful jobs are unlimited.

:CLEAR

```
:cl          Clears the receive window.
:cl 1        Clears the transmit window.
:cl 2        Clears the receive window.
:cl 3        Clears the monitor window.
:cl 123      Clears all three windows.
```

In addition, you may clear all three windows when the program is started by starting SCC.EXE with the command line option -C :

```
scc -C
```

THE :COMMAND COMMAND

This command determines whether a colon is generated automatically in a new line after a command has been issued (:com on) or not (:com off).

:RTT

This command invokes a round-trip-timer. It requires a partner station that understands the //e command (the remote command that prompts the other station to return all data that you send to you). Entering

```
:rtt
```

during a connect sends the current system time to the partner station. The round trip time is calculated from the difference between that time and the time when the packet is returned.

:CWID

According to all we know, the authorities in the UK have abandoned the requirement to transmit a CW identification on packet. Hence the CWID parameter has been dropped.

If you nevertheless need it, let us know.

:LOG AND :EXITLOG

Keep it OFF, unless radio regulations in your country require you to have one. If it's ON, you will get a nice little logfile, which over the years will grow into a nasty big one. With EXITLOG ON, people who still need a log and still don't have a hard drive, can have the log written to a floppy when they exit the program.

:KNAX, :CBELL AND :BLINK

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KNAX is German for "click" and if you set it to OFF it will switch off the click that is produced by incoming packets.

```
:cb off
```

does the same for the funny noise that the program makes whenever you connect or disconnect, or when a CTRL-G character is received.

```
:bl 0
```

gets rid of the litte rectangle in the upper right corner of the screen. Especially useful at the workplace, when BayCom is running in the background and the boss isn't supposed to see... .

```
:bl 1
```

will put it back on. With

```
:bl 2
```

you will get a flashing rectangle whenever new data has arrived. This command used to run from SCC.INI only but is now available on the terminal as well.

The BayCom team advises you to observe Murphy's law on PC bells and beepers:

The PC bell in an office will always be loud enough to alert the boss two offices down the corridor. At home, it will never be loud enough to alert you to the connect by a long awaited station.

:VERSION

The VERSION command displays the current software version number. It works on previous BayCom versions as well and is a splendid way to check other people's products that come along as "the latest software", are wrapped in a nice batch file that rings all sorts of bells and whistles, and then turns out to be an old version of BayCom...

We may add that none of this stuff is distributed with the consent of the BayCom team.

MONITOR COMMANDS

The BayCom monitor is a pretty nice thing to have. To put things straight, we're talking about the screen that you get into with F10 as well as the little bottom window in each of the QSO ports. It's the same as far as the monitoring function goes - just that the F10 one is a lot bigger.

The command window on the big monitor screen will work similar to the ones on the other ports. If you use the CONNECT command, the destination address for UNPROTO packets is changed. Note that the monitor is the only port from which you can send UNPROTO packets. They come handy as test packets. Any text sent from the monitor window goes into the info field of the UNPROTO packets. They are sent whenever a line of text input from the keyboard is completed, either by pressing RETURN or writing past the end of the line - just like in normal QSO.

To customize the monitor to your personal needs, you can use the following commands:

:MONITOR

This command tells the system which hardware channels it is supposed to monitor. For your RS232 modem MONITOR 0 is enough as this is all there is to monitor. The other channels require you to have an SCC multichannel card or an additional LPT modem or KISS port. However, listing non-existent channels won't do any harm. If the monitor annoys you for any reason, put it to an unused channel, e.g., :mo 1.

:MCALLS

This command must be followed by a list of callsigns. They tell the systems which calls are included in the monitoring process - but not in which way! This is done by MSELECT:

:MSELECT

MSELECT is followed by a number, and you have the following options:

- 0 Default, all received frames are shown. The MCALLS list has no effect whatsoever.
- 1 QSO mode. Frames are only shown if they contain two of the calls from the MCALLS list. This means that both QSO partners must be on that list.
- 2 FROM mode. Only frames that originate FROM a call on the MCALLS list are shown.
- 3 TO mode. Only packets TO the stations on the MCalls list are shown.

Adding 10 works as a kind of inverter:

- 10 Nothing is shown.
- 11 QSO's between stations on the MCALLS list are ignored by the monitor.
- 12 Packets from stations on the MCALLS list are ignored by the monitor.
- 13 Packets to the stations on the MCALLS list are ignored.

Unless you specify an SSID in MCALLS, MSELECT applies to all SSID's.

:MHEARD

This command shows all stations heard within the last few minutes.

Examples:

```
:mh          shows all calls heard on channel 0 during the last 60 minutes
:mh *        shows all calls heard on channel 0 during the last 120 minutes
:mh #        shows the calls heard within the last 15 minutes including their path
:mh <call>   shows path, SSID's and time elapsed since <call> was last heard.
              You may also specify parts of a call: :mh z11 for example will list
              all stations with a ZL1 call that were heard within the last 60 minutes.
:mh P2 *     shows all stations heard on channel 2 within the last 120 minutes

:mh 04:15    shows all stations heard within the last four hours and fifteen
              minutes. Note: the time format is always HH:MM and is always
              relative to the current time, never absolute.
```

STANDARD TEXTS

In version V1.50 this seemed to be a source of constant agony for a lot of users in the English-speaking world. The reason for this is that it is true that you "only need to set a few parameters" to get on air, but that a lot of people seem to be so happy to be on air that they completely forget about the rest.

This is especially so if you got your packet system from someone else. Would you like to be caught with somebody else's connect text?

That's why it is so very important that you have your texts right. Put them in SCC.INI if you haven't gone through the installation routine with a fresh copy of software. The important standard texts are:

:L2CTEXT

If only L2.EXE is running, but not SCC.EXE, this is the connect text which your station will send to a QSO partner who has just connected. It should contain something like a welcome and tell the station that your terminal is off. Chances are that they'll get the message and disconnect.

L2CTEXT must not be longer than one line. It will not be broadcast when SCC.EXE (the terminal) is running.

:CTEXT

This is only one letter, which refers to the letter under which the standard text macro is defined. We will soon discuss how to define such a macro. Usually the letter **t** is used here. You can then get the CTEXT in the terminal by pressing ALT-T. It is sent out automatically by your station whenever somebody connects to you while the

terminal is running. You would only use it manually (with ALT-T, that is) when you want to introduce yourself quickly to someone you connected from your station.

:QTEXT

This is the same thing as CTEXT, but will be sent out whenever a station sends you a remote //quit or when you terminate a QSO with :QUIT from the terminal. It is also a single letter (Q) which refers to the standard text stored under that letter.

CALLSIGN DEPENDENT GREETING TEXTS (:ANSWER)

You can greet special friends of yours with a special message. It must be stored in a file named after the callsign and with the extension .CTX, such as VK2GWL.CTX . It will then be sent out AFTER the normal connect text. You can put those files EITHER in the

BayCom directory, OR create a subdirectory of the BayCom directory called ANSWER. BayCom will scan either, but not both, so don't put files under the BayCom directory when there is an ANSWER one.

To activate the answer function, put

```
:an on
```

The ANSWER function will only work when the terminal SCC.EXE is running.

INFO.SCC (:INFO)

This textfile should contain information about your station. This file is sent out to anyone who uses the remote //Info command. You can read it yourself with :i.

A file like this written by someone else a long time ago can cause you some trouble. Somebody might connect to you, and issue a //i command.

Now let's suppose your name is Peter and you live in Sydney. Wouldn't it be a bit embarrassing to see yourself introduced as "This is Bruce in Hopeless Creek, and I have a 286 machine of the rotten kind..." ? This is why you should edit this file NOW and put your own stuff in, if you bought your software from a friend who was selling his BayCom system.

STANDARD TEXT MACROS: :ST AND :LIST

A standard text (or keyboard) macro is called up by pressing both the ALT key and a letter or function key at the same time.

The syntax in SCC.INI is also quite easy: first, put ST for standard text, then a space and the letter you want to associate with the standard text. The letter must be followed immediately by a digit starting at 0 and going up to 9, which denotes the line number of

the following text. An example for the connect text on the letter T could be:

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```
st t0 \xHello and welcome to Ulrich ZL1DDL's BayCom terminal\r
st t1 \x Feel free to use the following remote commands:\r
st t2 \x          CStatus Info MHeard Users Quit\r
```

The \x clears the line in the terminal before it puts the macro in, \r puts an additional return in (there is one after each line). The received connect text would look like this:

```
Hello and welcome to Ulrich ZL1DDL's BayCom terminal

  Feel free to use the following remote commands:

          CStatus Info MHeard Users Quit Version
```

There are a few more backslash (\) commands you can use:

\a	inserts the time since the connect was established
\c	inserts the other station's callsign
\d	inserts the date
\i	suppresses the RETURN at the end of the line
\k	inserts the screen number
\l	inserts login time
\m	inserts your own callsign
\r	inserts a RETURN (see above)
\t	inserts the current time
\v	inserts software version
\w<call>	stops the text until a connect to <call> is established, this can be useful when connecting to a digipeater and then further on
\x	erases the line where the cursor stands (this avoids transmitting garbage that may have been there)
\z	inserts a CTRL-Z

You could also include a READ command with a reference to a text file in a standard text. This way you can get around the ten line limit.

The function keys are denoted as numbers 0 (F10) to 9 (F9). Example:

```
st 00 \x:monitor
st 01 \x:mcalls
st 02 \x:mselect
```

displays the monitor settings under the combination ALT-F10.

Note that you can also enter standard texts from the terminal, with the disadvantages we have mentioned before. Use

```
:l
```

to list the existing standard texts. They already come in a very useful format, all lines start with the command :ST . So if you only want to change a standard text, all you need to do is to change the line on the screen and hit RETURN while the cursor is in the line.

If you want to enter a new standard text from the terminal, you must type

```
:st <text>
```

manually. Using the LIST command followed by a letter, such as

```
:l a
```

will display the standard text stored under the the key combination of ALT and the letter (here ALT-A).

Be careful when implementing standard texts for keys that already have a function assigned to them when pressed together with the ALT key, such as ALT-X, ALT-U or ALT-F1. These functions will be overwritten if a macro is assigned to these keys.

Besides: if you reckon that the ALT and SHIFT keys on your keyboard are too close for comfort, why not try and replace ALT-X by

```
st x \x:system\i
```

This way you will have to confirm the ALT-X operation by pressing RETURN, an accidental termination of the program is practically impossible.

BEACON OPERATION

Beacons should only be used either if you're testing (even then you can usually avoid it) or if you run something like a private gateway or single frequency digipeater station. The mere presence of your station on the band is NOT a valid cause for having one. In all other cases, keep the frequency clear. If you feel that there is a need for you to have a beacon, you must know how to use the three commands associated with it. If you got the program privately, make sure that the person you got the program from hasn't left you with an unwanted beacon.

:BEACON

This command tells L2 when to transmit a beacon frame. BEACON must be followed by a number, which is the time in seconds between two beacon transmissions. E.g., BEACON 3600 will cause a transmission every hour. Don't expect to see one immediately after you've entered the command. If your station has more than one channel, you should specify the channel number after the BEACON command, e.g.,

```
:BE 3 900
```

:BADRESS

BADRESS specifies the beacon address field, that is the beacon's destination, the origin and the digipeaters used. Examples:

```
:ba 0 id zllavq
```

will cause a beacon on channel 0 (usually the RS232 modem) to ID from ZL1AVQ. No digi is used. If you need to use a digi, type

```
:ba 0 z11ab z11ddl z11avq
```

will cause a beacon to ZL1AB from ZL1DDL using ZL1AVQ as a digi. As the beacon is an UNPROTO frame (i.e. an unnumbered packet), it will provoke a DM packet from ZL1AB as an answer, provided the link via the digi works. (Aucklanders: remember that all call signs are purely coincidental!)

Note that the spelling of the command is not a typographical error, there is only one "D" in it!

:BTEXT

```
:bt <channel> <text>
```

This is the beacon text. Keep it short.

REMOTE CONTROL

A lot about the remote control features of BayCom has been in the BBS's in recent times. The reason for this was the silliness of some users who allowed ALL commands to be remote controllable. This allowed some shady characters to activate remote control functions in a rather destructive way. They sent bulletins that contained remote commands which caused havoc on the harddrive. Are you a possible victim?

Enter `:rc` at the terminal. If the answer is `*`, you are. Read on to find out how do solve the problem.

:REMOTE

This can be either ON or OFF. If it's ON (as it should be), only those commands listed behind RCMD can be used. Use OFF only if you're a really nasty person..

:RCMD

This lists the commands available under remote control. You can use the short form of the commands, as you only have one line available for it. The original SCC.INI in BayCom comes with

```
rcmd cstatus info mheard quit rtt write wprg read rprg dir
```

and nothing else.

If you have `rc *` in it, your program will accept ALL commands remotely. This is HIGHLY DANGEROUS, all of the BBS "viruses" use this way to damage your disk! So think twice what commands can do before you allow others to use them.

To prevent major damage in any case, remote commands relating to files will only work in a subdirectory of the BAYCOM directory called REMOTE.

Now about the nicer sides of remote control. As mentioned above, you can use all commands listed after RCMD from a remote station. All you need to do is to send a double slash // before the command name. For example, if you don't have a second receiver, get a friend who can monitor your signal to help you. You could add TXDELAY to the commands after RCMD and he could change your TXDELAY from his station!

PASSWORD ACCESS

This is something that has changed somewhat in version V1.60. The machine that you wish to control remotely needs a text file named SCC.PWD in its BAYCOM directory. It must contain one line of random text (80 characters, no RETURN), such as:

```
HKLDElpi gfd rOLheeoP: "/_97fLHDESk; ,mfeweik95fda6rtuYRS; 0FD0ydsdgEfgDgsfj1Djfkguqw
```

Let us suppose the call sign of this station is ZL1UEU. If the station it is to be controlled by remotely is also a BayCom machine, install the same file in its directory, just the way you installed it at ZL1UEU. If there is already a password file, e.g.,

```
Afji86&kmd$HG=nhT, dcn3, Opfabtdb4bcyfg59nsbct9q\ !l%n&U$narqz3s3kcywfgbUYYQD76:o] *
```

edit it and append it with z11ueu: in a new line following the existing password line and put the password for ZL1UEU in the next line. The file should now look like this:

```
Afji86&kmd$HG=nhT, dcn3, Opfabtdb4bcyfg59nsbct9q\ !l%n&U$narqz3s3kcywfgbUYYQD76:o] *  
z11ueu:  
HKLDElpi gfd rOLheeoP: "/_97fLHDESk; ,mfeweik95fda6rtuYRS; 0FD0ydsdgEfgDgsfj1Djfkguqw
```

Before the passwords become valid, you must run PARA.EXE on both machines.

Now run BayCom on the controlling station and connect to ZL1UEU. Send a //j (lower case letter!) to ZL1UEU and see what happens: ZL1UEU will send you five numbers between 1 and 80, e.g, these:

```
15 27 32 34 60
```

The terminal will now look up the letters in these positions in your local SCC.PWD and send them back to ZL1UEU

```
hLk, d
```

ZL1UEU will check these characters against its own file and give you access to ALL commands if they are found to be correct.

BayCom Terminal Software V1.60 for IBM-compatible PC

If you are not using BayCom at the controlling station, you must search for the appropriate letters yourself and send them out by hand.

The successful login is not acknowledged by the remote station other than with the fact that you can now operate ALL commands.

A password file can include as many passwords as you like. The first line which is not preceded by a call sign is used as the password for the station itself. If a call sign is followed by an asterisk:

```
Afji86&kmd$HG=nhT,dcn3,Opfabtdb4bcyfg59nsbct9q\!l%n&U$narqz3s3kcywfgbUYYQD76:o]*
zllueu*:
HKLDELpigfdrOLheeoP:"/_97fLHDESk;,mfeweik95fda6rtuYRS;0FD0ydsdgEfgDgsfj1Djfkguqw
```

it means that the password reply isn't given in plain text, but is embedded in a random string of incorrect character sequences. This makes it almost impossible for an eavesdropper to guess the correct password.

BayCom V1.60 can also generate sysop passwords for RMNC/FlexNet. For this purpose, you enter the digipeater callsign with the colon in SCC.PWD, and put the secret number in the next line instead of the 80-character password:

```
zllavq:
76523
```

If you now connect to the RMNC, you can send `sy` (lower case!) and everything else should go automatically. If you do not intend to use the automatic function, enter `Sy` (upper case).

WHAT ARE A L L COMMANDS ?

ALL commands in the above text means practically anything except the HELP command. The CONNECT and XCONNECT commands are also remote controllable. However, all commands will react as if they had been issued from the terminal. And if you issue a CONNECT or XCONNECT command on a port that is already connected (which is the prerequisite for any remote control, hi), you will achieve exactly the same as if you issued it from the keyboard at the remote machine: nothing.

REMOTE ECHO

If used by a remote station, `//e` (only this spelling will work!) causes all data to be returned to the sending station. This can be useful for measuring the packet round-trip time, especially in connection with the RTT command.

MAKING A CABLE FOR THE BAYCOM RS-232 MODEM

If you have built your own modem or the connector on the one you purchased does not fit the one of the serial port on your computer, you may wish to make your own cable. We advise to use shielded cable and to keep it short.

BayCom Terminal Software V1.60 for IBM-compatible PC

Here are the connections:

RS-232	25-PIN	9-PIN	Usage under BayCom
DTR	20	4	TX data +/- 10V
RTS	4	7	PTT, active high, -10V=RX, +10V=TX
CTS	5	8	RX data
GND	7	5	Ground

TROUBLESHOOTING

GENERAL

PROBLEM	SOLUTION
DOS tells me that it does not know BAYCOM, L2, or SCC	Change to the BayCom directory or include BayCom in your path. See your DOS manual or ask someone who knows.
My radio locks up in transmit although the program says "QRV"	Try to remove the aerial further from the radio - some handhelds like to feed RF back into the RS-232 interface.
Computer crashes after starting L2, or the rectangle doesn't appear	See under SCC-card or RS-232 modems. Another possible cause are other memory resident programs such as menus or mouse drivers that are incompatible with L2. Try to remove them (usually in CONFIG.SYS or AUTOEXEC.BAT) and try again. If this is the problem, get another mouse driver or menu program. There are plenty of them.
I'm using Windows, OS/2 or some other multitasking operating system. BayCom won't run.	Forget it.
I can't receive	Is L2 running? Check for the flashing rectangle. If this is not the cause, see hardware section for details.
L2 works, but the SCC terminal screen won't appear.	Wrong video adapter in SCC.INI?
Colours look faint on my LCD screen	Set COLOR OFF in SCC.INI.
I have changed a parameter but the program behaves just as before.	Some parameters are only loaded during initialization. Terminate the program (including L2) and start again.
The program behaves funny, all the settings are different from what I entered at the terminal.	Didn't we tell you to put all important changes into SCC.INI???
My bell sounds funny	Did you play with the clock speed of your computer (TURBO button?)
I have used the same SCC.INI	AAAARRRRRGGGGHHH!!!!!!

in V1.40, V1.50 and now it won't run properly.

Rumours have it that there are computers that the BayCom RS-232 modem simply won't work with. These rumours are absolutely true! Here's a shortlist:

- NEC Multispeed
- Atari Portfolio (hopeless case)
- some Sharp laptops
- Bondwell B200 under DR-DOS
- some IBM PS2 notebooks

BayCom should run without difficulties on all desktop machines as long as the interface card isn't too exotic. If your interface card doesn't do it (some are non-standard and hence won't receive) just try a grotty old one with an 8250 chip on it. It might just work and comes cheaper by the dozen. If it still doesn't work after a dozen (nar, we don't mean two sixpacks here, folks), the problem is likely to be somewhere else.

BayCom will also run on almost all laptops and notebooks. As we are not endorsing any particular brand here, we will not publish a list. If in doubt, try it out.

HARDWARE TROUBLESHOOTING

A second packet station nearby, an oscilloscope and a modem/cable set that is known to work (work together, too) is helpful. Some OM's also reckoned that a sixpack solved the problem. Others swear it was a cup of tea. Whatever, if you can't dig up an oscilloscope, don't worry. You can get far without it.

RS-232 MODEM

Common causes for trouble if nothing works:

- wrong interface set in SCC.INI, incorrect interrupt, address etc.
- cabling wrong or back-to-front (popular down under, hi)
- mouse adaptor used for 25-to-9 pin connectors. Mouse adaptors frequently lack certain essential connections because the mice don't need them.
- insufficient supply voltage. Check with voltmeter across zener diode. If it is around 0V something else must be wrong. If it's just below the required 4.5 V or something, a boost with a 9V block battery might help.
- is the radio turned on?

Modem transmits but does not receive

- does the indicator in the upper status line go from QRV to RECV when you choose the default setting MODE 0 1200c (squelch open)? If so, you receive. Check whether you get a proper signal into the modem: >100 mV at pin 4 of the TCM3105. The signal might be noisy. Keep cables short. Can you hear packets

on the frequency. Existing packets are much easier to decode than imagined ones.

If you have an oscilloscope and nothing else helps, check your incoming signal from the radio. When packets are being received, you should see tones of 1200Hz and 2200Hz. These must have roughly the same amplitude. If not, insert an RC low pass/high pass filter to achieve this.

- if the indicator does not move, check your cabling and if nothing else helps, try another interface or interface card.

Modem receives but doesn't transmit

- check the PTT line with long test packets. Does the PTT transistor switch properly? If so, check the PTT current of your radio by connecting an ammeter between the PTT line and ground. If it is over 100 mA, replace the final transistor in the modem with a model that gives you a higher current.

Modem transmits but there is no modulation

- check the signal path through the modem and the cabling.
- check the setting of the modulation trimpot

SCC AND USCC CARDS

No packets are decoded:

- is the right channel on the MONITOR list?
- check whether you have parametrized the modem correctly with the MODE command. Have you confused SCC channels?

Other problems:

- check the jumpers. Loopback, address, interrupt.
- have you chosen the right parameters for the modem with the MODE command?

THE BAYCOM HARDWARE RANGE

THE RS-232 MODEM

This is the BayCom classic. It is available as a kitset and also as a built-up version from most BayCom distributors, some of whom have developed their own versions to suit local requirements. Many amateurs have built their own modems. The main characteristic of the modem is its price-performance ratio for the end user which is probably unsurpassed in its category. It operates out of the RS-232 port and does not usually need an external power supply.

THE RS-232 MINIMODEM

Honey, they shrunk the modem! The classic BayCom modem for the RS-232 port is also available as a miniature version, where the whole modem fits into the case of a 9-pin or 25-pin sub-D connector. The 9-pin version, the most popular model, is the ideal packet solution for the travelling ham who wants to be QRV on packet with a handheld and a laptop.

THE AM7911 MODEM

This is the modem for people who wish to use BayCom on HF. Just like the standard BayCom modem, it plugs into the RS-232 port. The AM7911 modem chip features a choice between 300 and 1200Bd operation and a DCD circuit. Due to the high current consumption of the AM7911 chip, an external power supply is required.

THE 4-CHANNEL USCC CARD

This plug-in card is suitable for any IBM-compatible machine that has slots for standard plug-in cards. It is intended for the advanced user and for small digipeater and BBS applications. It offers four SCC channels. The first channel has a standard TCM3105 modem on board, which can be used for 1200Bd, but with some modification will also run 2400Bd. The second channel is connected to an on-board AM7911 modem for 300 or 1200Bd operation. The third channel can be connected to an external modem, while the fourth channel is the icing on the cake: it is connected to a DF9IC modem, which is G3RUH compatible and can be configured for baud rates between 4800 and 38400Bd. A full kitset comes for about the price of a standard 1200Bd TNC with no extras.

THE 2-CHANNEL 9K6-USCC CARD

This card is intended for the advanced user who wants to be QRV on 9600Bd. The card has an on-board DF9IC modem which controls a on-board 2W 70cm FSK transceiver. All you need to get on air is a coax cable and an aerial. All this comes for about the price of a handheld 70cm transceiver.

THE 9600Bd MODEM FOR THE PARALLEL PORT

The release of this modem is planned for October 1994. The manufacturing prototypes are running well and everyone is waiting for the necessary chips to arrive. The modem will provide a cheap alternative to the USCC cards for users who wish to operate 9600Bd on a portable basis or who don't need more than one channel and can supply their own radio. The modem is on a 10cm x 10cm PCB.

WHAT ELSE ?

That's up to you. Questions to Ulrich ZL1DDL@ZL1AB.#11.NZL.OC if you really can't get any further with this manual.

Have fun with BayCom !

73 de Ulrich ZL1DDL

 Literature: BayCom Terminalprogramm V1.60 fuer den PC ohne TNC
 DL8MBT und DG3RBU
 June 1994

COMMAND SUMMARY

NOTE: ONLY THE UNDERLINED LETTER OF A COMMAND ARE ESSENTIAL, THE OTHERS MAY BE OMITTED. THE COMMAND OPTIONS/ARGUMENTS GIVEN ARE THE SIMPLEST ONES POSSIBLE. FOR DETAILS PLEASE REFER TO THE PAGE NUMBER GIVEN.

<u>7</u>PSAVE ON/OFF	save &PLUS files automatically	54
<u>A</u>NSWER ON/OFF	send personalized connect texts	72
<u>A</u>UTOBIN ON/OFF	automatic binary file transfer	53
<u>B</u>ADRESS <call>	set beacon address	74
<u>B</u>EACON <number>	set time interval between beacons	74
<u>B</u>LINK 0/1/2	flashing L2 rectangle on/off/new data	68
<u>B</u>TEXT <text>	set beacon text	75
<u>C</u>AT <filespecs>	display directory (same as DIR)	55
<u>C</u>BELL ON/OFF	connect/disconnect/CTRL-G bell	68
<u>C</u>D <directory>	change working directory in DOS	66
<u>C</u>LEAR [<number>]	clear screen [window <number>]	67
<u>C</u>NOT <calls>	ban <calls> from connecting	45
<u>C</u>OMMAND ON/OFF	automatic colon generation	68
<u>C</u>ONNECT <call> [<digi>]	set up connection to <call>	43
<u>C</u>RTSAVE <time (min)>	screensaver after <time> (0=OFF)	49
<u>C</u>STATUS	show users (same as USERS)	66
<u>C</u>TEXT	set standard text macro as connect text	71
<u>D</u>AMA <time (s)>	DAMA timeout	65
<u>D</u>CALL <call>	set digipeater call	42
<u>D</u>IR <filespecs>	display directory (same as CAT)	55
<u>D</u>ISCONNECT	disconnect on current port	44
<u>D</u>ISCONNECT ALL	disconnect on all ports	44
<u>D</u>ISCTIME <time (10s)>	inactive link timeout	64
<u>D</u>WAIT <time (10ms)>	mean "channel free" waiting time	59
<u>E</u>CHO ON/OFF/2	echo own input in RX window	40
<u>E</u>DIT <filename>	simple keyboard editor	54
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<u>I</u>NFO	read info file INFO.SCC	72
<u>I</u>POLL <number>	maximum packet length for info poll	62
<u>K</u>ANAL <number>	assigns hardware channel to port	45
<u>K</u>NAX ON/OFF	"incoming data" click	68

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<u>LINK</u> <call> <channel>	connect <call> only on <channel>	45
<u>LINKTIME</u> <time (10s)>	inactive link test interval	65
<u>LIST</u>	list standard texts	72
<u>LOG ON/OFF</u>	write log file SCC.LOG	68
<u>MAXFRAME</u> <number>	maximum number of info frames	61
<u>MCALLS</u> <calls>	calls monitored (or not)	70
<u>MHEARD</u> <option>	show calls heard	70
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<u>OSHELL</u>	shell out to DOS	66
<u>OSHELL</u> <DOS-command>	execute DOS-command	66
<u>PACLEN</u> <number>	maximum length of info packets	60
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<u>RCMD</u> <commands>	list of remote controllable commands	75
<u>READ</u> <filename>	send text file from disk	51
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<u>TQUIT</u> <time (10s)>	disc. after QUIT with incomplete QSO	65
<u>TXDELAY</u> <time (10ms)>	transmitter key-up delay	56
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<u>VERSION</u>	show start-up message and version no.	69
<u>VIEW</u> <filename>	view file on screen	55
<u>WPRG</u> <filename>	write incoming data to binary file	53
<u>WRITE</u> <filename>	write incoming data to text file	51
<u>XCONNECT</u> <mycall> <call> [<digi>]	connect using other call than MYCALL	43
<u>XMITOK</u> <channel> 0/1	deactivate/activate TX on <channel>	66

KEY SUMMARY

F1 -F8	select ports (depending on number)
F9 or "-"	jump between TX-, RX and monitor windows
F10	select monitor port
ESC or TAB	toggle colon at beginning of line
"+" or SHIFT-TAB	halts output on current port
CTRL-RETURN	moves to next line without evaluating current line
PgUp	scroll one page up
PgDn	scroll one page down
CTRL-PgUp	increase size of monitor window
CTRL-PgDn	decrease size of monitor window
CTRL-HOME	decrease size of TX window
CTRL-END	increase size of TX window
ALT-X	exit SCC.EXE
ALT-1	puts cursor into TX window
ALT-2	puts cursor into RX window
ALT-3	puts cursor into monitor window
ALT-U	toggles umlaut display
ALT-F1	returns to last help text
ALT-<letter>	displays standard text macro
INSERT	toggles insert/overwrite mode
CTRL-<cursor left/right>	move to next word

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