

P4dragon ALE User's Manual

Description of special ALE features

Firmware-Version 2.40.00 ALE (08/2021)

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General information

P4dragon 2nd generation (2G) Automatic Link Establishment (ALE)^{1 2} Firmware 2.40 replaces firmware 2.30 as the **P4dragon** operational firmware. The 2.40 Firmware incorporates all PACTOR features, includes bug fixes and, with the exception of Alternate Call ALE, adds new 2G ALE features based on MIL-STD-188-141D, Appendix A requirements tailored to the immediate needs of existing **SCS** PACTOR customers.

This document describes the new **SCS** modem ALE features. For general information on firmware Version 2.40 please read the general Update Information, provided along with this document.

¹ This ALE implementation was enabled by substantial support by Stephen B. Hajducek, AR Callsign: N2CKH, U.S.A. The ALE protocol layers above the physical layer are based on MIL-STD-188-141A firmware originally developed by Charles Brain, AR Callsign: G4GUO, United Kingdom.

² Permanent use of the 2G ALE features requires a FEATURE LICENSE from SCS. There are 100 ALE links available without the ALE feature license, Contact SCS or your SCS dealer for the information needed to acquire a license. Once a license is acquired, use the "FLICENSE" command to add the license to the DR-7x00 modem.

1 Basic Information

1.1 General

Firmware Version 2.40 is the first P4dragon firmware to support 2nd generation ALE features. ALE allows automatic choice of the currently best channel from a set of available HF channels easing operation on an HF network.

All ALE features are implemented by a separate firmware module, which is referred to as the modem **ALE controller**.

The user first defines and then configures the modem with the frequencies that are available to the own network. The modem's ALE controller then scans these frequencies. ALE "soundings"³ are regularly transmitted as beacons, and received "soundings" are continuously evaluated. The soundings contain the calling station's call sign. Through analysis of the bit error rate (BER) and the signal to noise ratio (SNR) of the received sounding, the modem's ALE controller determines channel connection suitability. The result is called "Link Quality Analysis" data, or simply LQA for short; LQA is stored for use when making ALE connections.

If the modem is to establish a connection to a known station, a quality ranking of the available channels is first generated. Based on this ranking, the ALE controller first calls the "other" station on the best available channel. In the case of failure to connect, the ALE Controller continues to try additional configured channels.

1.1 Basic terms in ALE operation

The ALE controller implements a set of ALE specific commands. The commands are found here [COMMANDS](#).

PACTOR supports a maximum of 8-character callsigns. ALE callsigns can in principle be up to 15 characters long. However, for best ALE results **SCS** recommends using 3 or 6-character⁴ call signs for stand-alone ALE or combined ALE/PACTOR operation. In combined ALE/PACTOR operation, if the PACTOR maximum of 8 characters is used, it will result in a 9-character ALE ID due to hidden character appending in accordance with the ALE standard.

The following terms describe components of the ALE configuration.

AMD, Automatic Message Display. An ALE feature that allows the transfer of a message that is up to 90 characters long "AMD messages" between ALE controllers. AMD use is described in the Link establishment and Link Management section.

³ Sounding is the testing of selected channels for quality by providing a very brief identifying transmission that may be used by other stations to evaluate connectivity, availability and to identify working channels for immediate or later use for communications or calling. Soundings are often used to maintain connectivity in digital communications high frequency radio networks.

⁴ 2G ALE system call signs use an ALE address containing the basic 36 alpha-numeric characters; e.g., the 26 alpha characters (A-Z) (only capitals) and the 10 digits (0-9).

LQA, Link Quality Analysis, is a channel figure of merit calculated using BER and SNR data obtained by evaluating received soundings. Based on the LQA data, the ALE controller compiles a channel ranking prior to setting up a connect attempt.

MY is the ALE call sign of your own station.

NET defines special network callsigns that refer to predefined sets of “other” stations as well as one “own” call sign. Predefining such net call sign sets allows fast and time-slotted star-network connections. Network connections are only possible during “ALE only” operations; they are not possible in combination with PACTOR ARQ features.

OTHER stations are call signs of “other” individual (opposed to network) ALE stations known to the ALE controller.

OWN is a set of ALE call signs that can be defined as "my" call sign, see below. Before "my" can be used, at least one “own” call sign must be defined.

SOUNDINGS are periodic “beacon” broadcasts that contain your “my” call sign and allow other stations to assess the current reception quality on a channel.

1.2 Basic ALE operation

The P4dragon ALE controller enables automated ALE participation in a combined ALE/PACTOR connect environment. In addition, manual ALE operation supports AMD short message exchanges. Stand-alone P4dragon ALE operations at this time do not support all of the requirements of MIL-STD-188-141D Appendix A. Currently, the duration of an ALE connection enabled single sideband (SSB) voice operation is limited to the fixed ALE link timeout period; however, the period can be extended through use of the modem “PTT IN” function described below. On ICOM transceivers, the ALE controller polls the external PTT status and thus automatically extends the ALE link timeout if the microphone is used.

If ALE is enabled, standard PACTOR calls are wrapped by the ALE controller. ALE is used as a “frontend” for PACTOR. For example, with ALE enabled, the PACTOR Connect command (e.g., “C TESTXY <CR>”) is first processed by the ALE controller which employs ALE to call and connect to the target channel. If the ALE connect succeeds, then a follow-on PACTOR connect is automatically performed on that channel. Note, the PACTOR connect will not proceed if the ALE connect process fails to complete. Automatic wrapping of PACTOR calls by the ALE controller can be disabled through use of the ALE AUTOALE command.

After finishing the PACTOR connection established during the “AUTO-PACTOR/ALE operation”, the ALE controller sends an “ALE CLEAR” message to the distant station disconnecting the established ALE connection.

As required, the user can perform manual ALE calls to any “other” station or “net” call sign. There are ALE operations commands available that explicitly do not involve PACTOR operation. This allows the modem to be used as a general-purpose ALE controller, even in stand-alone mode without any application software “connected to” the modem. Configured ALE

parameters and the current LQA data can be stored permanently in the modem's non-volatile memory allowing continued ALE LQA operations without having to reconfigure the modem even when power-cycling the modem.

Currently, the **P4**dragon ALE controller focus is to augment and enhance PACTOR operations by relieving the user of the best channel selection task. A full featured stand-alone ALE capability for any application is a future **SCS** development goal.

1.3 Transceiver Remote Control

Unlike stand-alone PACTOR operation, ALE or ALE/PACTOR operation requires the use of Transceiver Remote Control.⁵ Prior to activating ALE scanning, the physical parameters of the "remote control" connection (TRX port) between modem and transceiver must be configured. For ALE operation, this is done using the "trx" command.

Basic transceiver connect information can be found in the **P4**dragon DR-7x00 Installation Guide, Section 6.2.2, Connector Pin Description DR-7800, through Section 7.3, Amplitude Adjustment.

In depth transceiver connect and control information can be found in PTC-IIpro manual sections. This information is common to the PTC-IIpro and the **P4**dragon DR-7x00 modems.

- Section 3.3 Connections to the transceiver
- Section 3.4 Transceiver Remote Control
- Section 13 TRX

Additional firmware update information may be found at the **SCS** download site:

<https://www.p4dragon.com/en/Downloads.html>

Baud Rate vs. Scan Rate

A number of factors affect effective use of the **SCS** DR-7800 modem as an external ("external", not embedded in the transceiver) ALE controller operating the HF SSB transceiver. A core requirement is the use of the fastest data connection between **SCS** modem and the HF transceiver.

Many legacy HF transceivers that do not include higher remote control baud rates, lack TXCO support, are missing a dedicated data port, or have limited SSB filter characteristics, may be less suitable for use with the ALE controller. Channel scanning is a core ALE function. Transceiver characteristics that affect channel scanning are of prime importance to ALE operation.

The minimum transceiver to modem baud rates correlating to standard ALE scan rates in a perfect world are:

⁵ ALE requires the ALE Controller "drive" the radio causing it to scan frequencies and key when required. The Transceiver Remote Control functionality interfaces the controller with the radio providing the access necessary to manage the radio.

- ALE scanning channels at the rate of 1 channel per second (cps) requires 2400 baud minimum.
- ALE scanning channels at the rate of 2 cps requires 4800 baud minimum.
- ALE scanning channels at the rate of 5 cps requires 9600 baud minimum.

HF transceivers use a variety of remote-control protocols where the syntax may be based on commands using ASCII, BCD, HEXADECIMAL or a combination thereof. A result is that the modem to transceiver command process places additional throughput requirements on command channel data throughput – some remote-control protocols require additional data to accomplish functions like channel selection, etc. As a result, it is desirable that the transceiver support at least twice the minimum remote control baud rate for the employed scan rate.

HF Transceiver Spectral Purity Relays

Most HF Transceivers that operate at greater than low power (QRP) use relays for the selection of Spectral Purity Filters rather than PIN diode switching. Depending on the selection of ALE channel frequencies in the active scan group and the spectral filter band edges, the relays could switch with each channel step. However, there are often groups of two channels within a single spectral filter selection at lower HF frequencies. At one channel per second, this represents 86,400 channel steps in a 24-hour period and 432,000 at five channels per second during the same period. This will take a toll on the Spectral Purity relays over time and could lead to power amplifier and filter component damage if there is relay failure.

The more rugged Land Mobile, Marine and Military grade HF transceivers are known to use a better grade of Spectral Purity relays than Amateur Radio grade transceivers. But even those units' relays will prematurely reach end of life with 24/7 ALE scanning. Most HF transceivers that incorporate ALE also make use of relays verses pin diode switching. To avoid early relay failure, the ALE controller sets and holds the relays in bypass during ALE scanning. The relay is energized at transmit putting the spectral filter in place. Unfortunately, it is not a common HF transceiver manufacturer practice to provide remote control bypass commands.

SCS suggests that HF Transceivers for ALE or ALE/PACTOR use be modified so that the Spectral Purity Filter relays are held in bypass during ALE scanning. There are some known HF Transceiver modifications that have been developed and published in the Amateur Radio world. For example:

<http://hflink.com/icom/icm710/>

<http://hflink.com/icom/ic7200/>

<http://hflink.com/icom/ic718/>

1.4 ALE Transmission Audio Level

As all 2nd generation ALE transmissions utilize 8-FSK waveforms, the FSKA parameter also defines ALE waveform transmit levels. FSKA adjustment information can be found in the

P4dragon Installation Guide, Section 7.3, Amplitude Adjustment and in the PTC-IIpro manual, Section 3.3.4, Amplitude Adjustment and Section 6.42, FSKAmpl.

1.5 Extended Transceiver Support

The P4dragon ALE enabled firmware adds additional “TRX Type” command options to the modem. Information about those options follow.

TRX Type Command Changes

HARRIS

Version 2.40 adds the “HARRIS” transceiver type. If Harris is the first parameter, only the Baudrate is accepted as second parameter:

Command is `trx ty h 9600`. Example

```
cmd: trx ty h 9600

Current transceiver settings:
-----
Type: HARRIS RF350
Baudrate: 9600 BD
Interface: V24/RS-232
```

This supports use of the Harris RF-350 transceiver for ALE operations.

Harris RF-350 supports includes a command that allows the definition of an external audio source for ALE transmit audio.

Command is `trx HAudio`, example:

```
cmd: trx ha 2

trx: help ha

HAudio:
0=NULL CATCH, 1=MIC, 2=AUD2, 3=PATCH, 4=OFF
```

The default value is 2 (AUD2).

Advanced KENWOOD

The TRX KType command is extended to range 0...2. Parameter value 2 supports the **TK- 90** radio. TRX TYpe must be set to “K 9600 A V” for that transceiver.

MICOM

Version 2.40 adds the “MICOM” transceiver type. If Micom is the first parameter, only the Baudrate is accepted as second parameter:

```
cmd: trx ty M 9600

Current transceiver settings:
-----
Type: MICOM
Baudrate: 9600 BD
Interface: V24/RS-232
```

This supports the use of the **Micom-2E** transceivers for ALE operations.

Rohde & Schwarz (R&S)

Version 2.40 provides the additional “R&S” transceiver type. If R&S is the first parameter, only the Baudrate is accepted as second parameter:

```
cmd: trx ty R 9600

Current transceiver settings:
-----
Type: R&S
Baudrate: 9600 BD
Interface: V24/RS-232
```

The **TRX RType** command allows the user to discriminate between **XK-2000/2100** series and model **XK-852**.

```
0: XK-2000/2100
1: XK-852
```

The default TRX RType setting is 0 (XK-2000).

ADVANCED ICOM

The Version 2.40 firmware introduces the following command.

TRX IType

The command supports additional ICOM transceivers and functions. Key is ICOM IC-F8101 support and support for the AATU feature.

The following IType values correspond to these transceivers:

```
0: standard, no AATU support
1: IC-F8101 – AATU not yet supported
2: IC-7200
```


3: IC-7700

4: IC-7300 – enables Quiet Scan / Sounding, QS/S, using SPLIT mode⁶

An example that configures the modem to support the IC-7200 transceiver.:

```
trx it 2<C R>
```

Notes.

1. IC-7200. The ALE firmware sets the mode (USB/LSB) per channel on IC-7200 transceivers, as defined in the channel list. In addition, the transceiver is set to "Data" and "Wide" filter every time a new frequency is selected by the ALE controller. It is up to the operator to correctly configure the IC-7200 wide filter bandwidth settings.
2. IC-7700. Mode as well as "Data" and "Fill" are automatically set ONCE when starting or restarting ALE operations. IC-7700 channel-based mode selection is not possible because switching the mode takes too long in the firmware of that radio which negatively impacts ALE scanning dwell time.
3. All ICOM transceivers. The modem polls transceiver PTT state every second when the ALE state is "LINKED." This resets the TWA timer to its initial value avoiding premature ALE link disconnect due to TWA timeout.

ADVANCED YAESU

The TRX YType command defines the Yaesu transceiver sub-type. The command is extended to range 0..10; where parameter value 10 supports the **VX-1700** radio. TRX YType must be set to "Y 4800 A V" for that transceiver. Follows is a summary of the available Yaesu transceiver sub-types.

0= FT-890, 1= FT-990/1000, 2= FT-1000 MP, 3= FT-100, 4= FT-920, 5= FT-847, 6= FT-817/FT-857/FT-897, 7 = FT-950, 8 = FT-2000, 9 = FT-9000, 10 = VX-1700, 11 = FT-991(A)

The TRX KType command is extended to range 0..3 where parameter value 3 supports the **FT-991(A)** radio, truncated Kenwood RC protocol, extended to 11 digits. TRX YType must be set to "K 9600 A V" for that transceiver. Select Baudrate according to transceiver configuration.

Operations Tip: Once the modem is configured use the SAP command to permanently store the TRX IT values.

⁶ ICOM Type 4 (IT 4) is also applicable for QS/S operation on the IC-7610 transceiver and possibly also for other new ICOM transceivers.

1.6 “PTT IN” Function Used to Extend ALE link Period, Non-PACTOR ALE Links

After establishing a manual ALE link (the controller is not in the Auto-ALE / PACTOR mode), the ALE link will disconnect after the period of time defined as “TWA timeout” and the ALE scanner will resume channel scanning. In the 2.40 firmware, TWA timeout defaults to 6 minutes but can be adjusted with the ALE TWA command.

In addition, the timeout period can be extended by pulling the "PTT IN" signal on the 15-pin remote-control socket of DR-7800 modems to ground. Pulling pin 11 ("PTT IN") to GROUND causes the TWA timer to be held at its starting value or, if already running, resets the TWA timer. The TWA timer will be held at its starting value until pin 11 is “released”.

Usually, pin 11 should be connected to an open collector device resembling the “external PTT” signal from the HF transceiver. For example, pulling PTT IN low allows ALE connection initiated SSB voice calls to exceed the 6-minute duration default TWA timeout value.

All other functions of the modem firmware related to “PTT IN” are permanently disabled in the ALE firmware.

Notes.

1. “PTT IN” is not available on the DR-7400 modem.
2. All ICOM transceivers. The ALE firmware polls the transceiver PTT state every second when an ICOM transceiver is in use. If PTT and ALE link are active, then TWA timeout is reset every second.

1.7 Setting the Modem Clock

At modem start-up, unless connected to a source of external time and data, the user should use the TIME and DATE commands to configure the modem. ALE generates significant information that should be referenced to current time and date.

There are two possible ways to obtain external time data:

- If a valid signal is available at the NMEA port (e.g., from a GPS device), the modem clock is automatically set by adopting the NMEA time. This is the preferred option. NMEA time always overrides all other time sources in the ALE firmware, including manually set time.
- Reference the DR-7800, if the Network Option is installed, the modem tries to get accurate time information from network time protocol (NTP) servers. The network option embedded web server supports user NTP server selection.

If GPS and NTP time sources are not available, and automated time setting is required, a DS3231 Real Time Clock (RTC) board can be installed in the modem. Once the DS3231 RTC source is installed, time information is immediately available after power-cycling the modem. Contact **SCS** direct for information on how to implement a DS3231 RTC in the **P4**dragon modem.

Use the UTCOFFSET command to define a time offset between NMEA/NTP UTC and time shown by the modem.

1.8 Adjusting the Receive Audio Level

The DR-7x00 modems support a very dynamic input audio range. The DR-7800 audio input level can vary 0...8000 mV while the DR-7400 supports a range that can vary from 0..4000 mV. However, while the modems support a wide input audio range, they also have an optimum input audio range that provides best performance.

DR-7800. The DR-7800's target input audio level is 50..8,000 mV. Using the OLED display, the DR-7800 notifies if the input is below 50 mV or above 8,000 mV. Specifically, when the input is between 50 mV and 8,000 mV the modem displays an asterisk ("*") on the right side of the display. The modem replaces the asterisk with "!" if the input falls below 50 mV for 3 or more seconds. Finally, the modem replaces the asterisk with "!" if the input exceeds 8,000 mV for over 3 seconds. Note, 9,000 mV peak-to-peak is the maximum allowed input; higher input signals are internally clipped; high inputs will not cause damage as the inputs are protected by transient suppressors that block high voltage.

DR-7400. The DR-7400's target input audio level is 50..4,000 mV. The DR-7400 does not provide a visual input signal level display. Note, 4,500 mV peak-to-peak is the DR-7400's maximum allowed input; higher input signals are internally clipped; high inputs will not cause damage as the inputs are protected by transient suppressors that block high voltage.

Note. The DR-7x00 modems will operate down to 0..10 mV audio input without performance loss. However, very low signal inputs increase the risk of decreased SNR due to spurious signals that are introduced via the audio path. The decreased SNR could negatively impact modem performance.

1.9 Modem Diagnostic Information

The P4dragon modem maintains a system log that documents a wide range of information. This information includes modem health information, operational events, interface use, and more. The log information is critical to effective troubleshooting and issue remediation should the modem have function issues, the PACTOR or ALE firmware seem to have problems, and more. When communicating with SCS to identify a modem issue the user should access, download, and submit the log with the trouble report. The log is accessed with the p4config.exe application.

Where to find p4config.exe? It is available on the SCS download page. Using your web browser, access <https://www.p4dragon.com/en/Downloads.html>

Once downloaded and installed, start the p4config.exe program then select

P4config version 1.1.0.0:

- con modem this connects to the modem
- modem tools open modem tools dropdown menu

- download modem log file accesses the modem and reads the log contents
- save log file you will be prompted to select where to save the log

P4config version 1.0.0.0 / 1.0.0.2:

- con modem this connects to the modem
- PARAMETERS select the information we want
- read modem log accesses the modem and reads the log contents
- save log file you will be prompted to select where to save the log

Finally, when you email **SCS** your trouble note, attach the saved log file as part of the provided information.

1.10 Bluetooth Port.

Note. Not all DR-7800 modems have Bluetooth installed. If necessary, Bluetooth capability can be added to the DR-7800 modem. Contact **SCS** for additional information.

Since the Bluetooth port is an integral part of the ALE STATPORT command, Bluetooth port configuration port should be carried out with great care. When MS Windows creates and configures the Bluetooth device, it creates at least two COM ports. The following steps will lead to the display of MS Windows 10 Bluetooth settings

Access Windows Settings

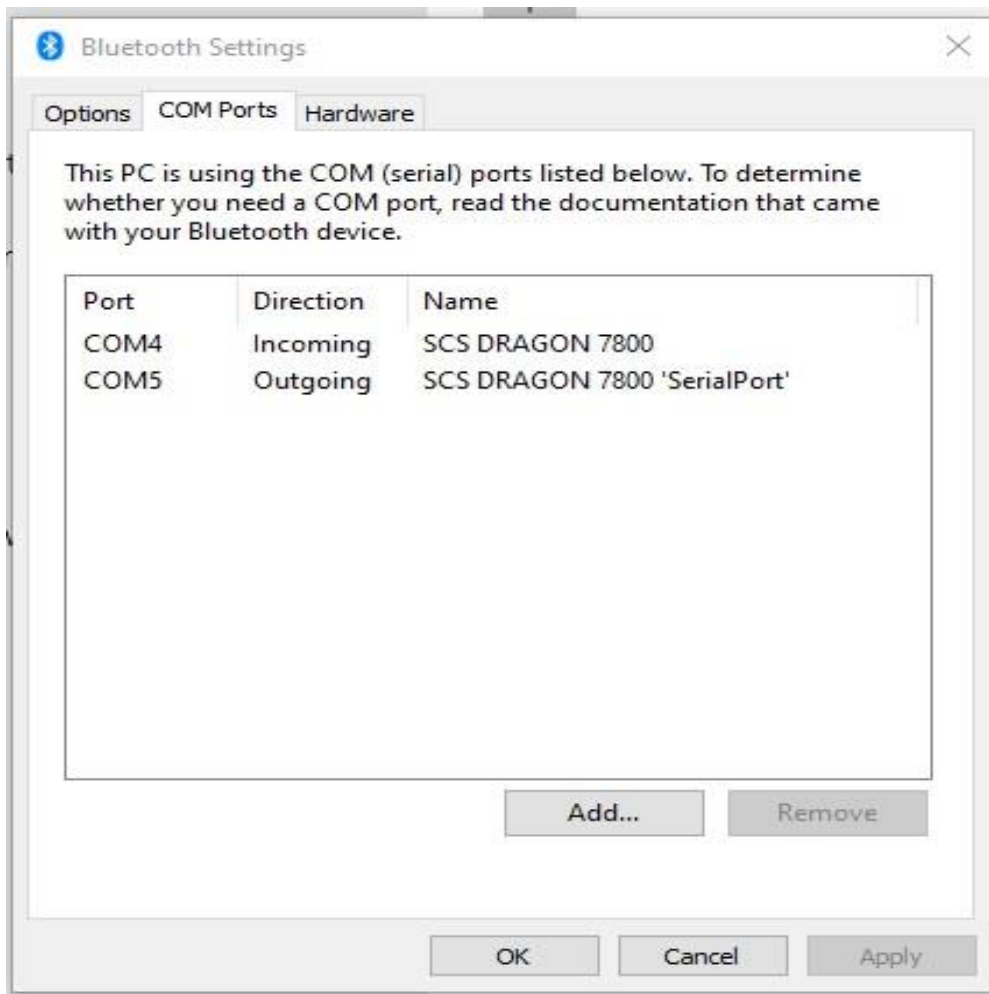
Select Devices

Select Bluetooth & other devices

Select your installed Bluetooth device

Looking at the following graphic or the same on your system, only the “Outgoing” port communicates with the modem. Your software, such as ALE Chat or other terminal program, etc., should point to the “Outgoing” Bluetooth port.

Note. Your port number will most likely be different than the one in the graphic. View your MS Windows Bluetooth settings to determine the port number.



2 ALE Commands in Terminal Mode HERE

2.1 General

ALE commands are accessible via the modem's command interpreter; commands are entered at the displayed "cmd:" prompt. While there isn't a specific ALE submenu, all ALE commands *must be prefixed* with "ALE". For example, the ALE "MODE 1" command is entered as "cmd: ALE MODE 1".

Configuration of ALE parameters is mainly performed using Terminal Mode control prior to switching to Hostmode. Some key parameters, like the CHannel properties, can only be accessed from Terminal mode. Usually, the basic ALE configuration is done via Terminal mode.

The P4dragon ALE firmware implements the following commands.

Basic ALE Commands

AUTOALE	GROUP	MCPT	SCPT
BELL	HELP	MODE	SILENT
CHannel	LBT	RESTART	SOUND
DWELL	LQAA	SCAN	TWA

Commands to Define ALE Calling

ALLCALL	MY	OTHER
ANYCALL	NET	OWN

ALE Link Establishment and ALE Link Management Commands

CALL	KILL	POLLCALL
CLEAR	POLL	SOUNDNOW

Commands for Queries on Messages, Link Status and Parameters

AMD	LINKED	OPTIONS	STATUS
FLICENSE	LQA	STATPORT	VERSION

Management of the Non-Volatile Parameter Memory

CAP	LAP	SAP
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2.2 Description of ALE Terminal Mode Commands

Basic ALE Configuration Commands

cmd: ALE AUTOALE

Value range: 0, 1

Default: 1

Example: ALE AUTOALE 1<Enter>

Enables (1) or disables (0) the modem's automatic "ALE frontend" when starting PACTOR calls ("connections") while the ALE Controller is running (ALE MODE 1).

If enabled, all commands that trigger a "MASTER" PACTOR call -- i.e., sending out "CONNECT FRAMES" -- will automatically be preceded by an ALE call. Only if the ALE call is successful is the follow-up PACTOR call made.

If disabled, normal PACTOR calls can be initiated by using the PACTOR "Connect" commands in terminal mode as well as Hostmode.

Important: As a mandatory constraint condition for normal PACTOR calls while the ALE controller is active, the **ALE SCAN** parameter MUST be set to "0", i.e., the ALE scanner must be switched off. Otherwise, an attempt to establish a direct PACTOR connection while the ALE scanner is running will be rejected with an error message.

Make sure that the transceiver is set to the correct operating frequency before starting a PACTOR when not using the automatic ALE frontend.

cmd: ALE BELLS

Value range: 0, 1

Default: 1

Example: ALE BELLS 1<Enter>

Enables (1) or disables (0) the modem's internal buzzer on ALE Link establishment. If enabled, a short "beep" is emitted when an ALE Link is established.

cmd: ALE Channel

Value range: Channel number 0...9 and corresponding options

Default: -

Examples:

```
ALE CH 0 14200000
ALE CH 1 14300000 14350000 USB
ALE CH 2 14400000 14400000 USB USB 1 0 0 0 0 0
ALE CH 10 3633000 3630000 USB USB 1 0 0 0 0 0 0
ALE CH 2 3
```

The ALE CHannel command allows defining up to 100 ALE channels (ID 0...99). Each channel has its unique channel number (called ID) and, as a minimum requirement, needs an “RX frequency”. The RX frequency serves as both RX and TX frequency. In firmware version 2.40 the TX frequency is ignored.

Optional parameters are

Transmit-Frequency, Receive-Mode, Transmit-Mode, Groups-Flags, USE, Power, TR, RX- and TX-Antenna, Antenna Tuner, Self-Address Index and Keys for Link Protection.

All parameters can be set at once using a single multi-argument command line.

If the RX frequency is defined as “-“, the corresponding channel will be erased.

If the RX frequency is defined as “--“, all channels from the given channel number to the last channel (ID 99) are erased.

If the RX frequency is less than 100 (range 0..99), it is automatically treated as a **channel number** if the connected transceiver supports a channel mode; for example, when using MICOM transceivers. When the RX frequency is a channel number, instead of sending a “send RX frequency” remote control command to the transceiver, the modem sends a “recall channel” command. Mixed frequency/channel operation is allowed but not supported by all transceiver types; see the manual of utilized HF transceivers for more information. The modem’s “recall channel” command includes the TX frequency and mode.

Parameter order [possible parameter values in square brackets]:

1. **CHANNEL-ID** [0 ... 99]
2. **RX-FREQUENCY** [receive frequency as integer value in Hertz]
3. **TX-FREQUENCY** [transmit frequency as integer value in Hertz]
4. **RX-MODE** [USB or LSB, default USB]
5. **TX-MODE** [USB or LSB, default USB]

6. **GROUPS-FLAGS** [0...255, default: 1]
7. **TR** [0, default 0, not used yet]
8. **SELF-ADDRESS INDEX** [0...19, default: 0]
9. **RX-ANTENNA** [0...9, default: 0, not considered yet]
10. **TX-ANTENNA** [0...9, default: 0]
11. **AATU** [0 or 1, default: 0, not supported yet.]
12. **POWER** [0...3, 4 different power levels, default: 0, not used yet]
13. **USE** [0, 1 or 2, default: 0, not considered by ALE scanner yet]
14. **KEYS** [0, 0, not used yet]

CHannel parameter details.

GROUPS-FLAGS:

The GROUPS-FLAGS value allows defining up to 8 channel groups (group index 0...7). Each bit of the GROUPS-FLAGS parameter corresponds to one channel group and “flags” that group. Each of the 100 physical channels can be assigned to one or more of these 8 possible channel groups (bits / flags) by setting the corresponding bit in the channel groups parameter.

If physical channel 0 should be a “member” of channel groups 0 and 7, bit 0 and bit 7 of the groups parameter must be set to 1 (resulting in a group value of 129 decimal).

Using the ALE GROUPS parameter (see below), you can define which physical channels should be included in the current ALE scan process. A channel is included in the ALE process only if that physical channel belongs to a currently selected ALE GROUP parameter.

If, for example, the ALE GROUPS parameter is set to 129, but the channel GROUPS-FLAGS parameter of a certain channel is set to 1, this channel is still included to the scanning process because the channel also belongs to the group defined by bit 0 (group 00000001 binary).

The simplest configuration is to always work with only a single channel group, namely the channel group 00000001 binary (1 decimal). This group is assigned to each physical channel by default.

SELF-ADDRESS-INDEX:

The SELF-ADDRESS-INDEX defines the OWN/SELF callsign of a physical channel. It is the index into the OWN address table as defined by the ALE OWN command, see below.

Usually index 0, which is the first address in the OWN table, is used as channel OWN/SELF callsign.

This address is used as identifier for soundings transmitted on that channel.

RX-ANTENNA: (not yet supported)

Defines which RX-Antenna will be used on the selected channel. Not yet supported.

TX-ANTENNA: (not yet supported)

Defines which TX-Antenna will be used on the selected channel.

Note: The ANTENNA commands require that the HF Transceiver implement antenna port remote control.

AATU: (not yet supported)

0: ANTENNA TUNER DISABLE

1: ANTENNA TUNER ENABLE

Notes:

1. Requires that HF Transceiver provide remote control support of an internal or external automatic antenna tuner unit (AATU).
2. A fast, memory based AATU is recommended.
3. The AATU must be in bypass during ALE scanning, regardless of being under direct remote control or being a stand-alone AATU.

USE:

Defines use of channel once ALE connected. "USE"s are VOICE, DATA or BOTH MODES operation on ALE.

Currently, the ALE scanner ignores the USE parameter.

Some CHannel **parameters can be set or modified separately** by using a non-numerical second argument to the ALE CH command. Examples follow.

ALE CH ID A set the AATU parameter.
Example: ALE CH 0 A 1

ALE CH ID G set the groups parameter.
Example: ALE CH 0 G 1

ALE CH ID K set the keys parameter.
Example: ALE CH 0 K 0

ALE CH ID M set the Mode parameters for receive and transmit operation.
Example: ALE CH 0 M USB. (RX and TX mode are only the same if using this command.)

ALE CH ID S set the attached transceiver to a certain channel. Example:
ALE CH 0 S Sets the transceiver frequency (RX and TX) to RX frequency of channel 0.

Important: The “ALE CH ID S” command stops the ALE SCANNER. The ALE SCANNER must be manually restarted by the “SCAN 1” command in order to resume scanning!

ALE Channel invoked without an argument displays the complete channel list.

Example ALE CH<Enter> generates a list similar to the following.

```
Cmd: ale channel
ID RX FREQ      MODE TX FREQ      MODE T/R GRPS  SND  SELF      RXA TXA ATU  PWR  USE  KEYS
-----
00 3600000 Hz USB 3600000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
01 3603000 Hz USB 3603000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
02 3606000 Hz USB 3606000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
03 3612000 Hz USB 3612000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
04 3615000 Hz USB 3615000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
05 3619000 Hz USB 3619000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
06 3621000 Hz USB 3621000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
07 3624000 Hz USB 3624000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
08 3627000 Hz USB 3627000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
09 3630000 Hz USB 3630000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
```

Note, the SND field in the above list shows the time in minutes until the next sounding transmission will take place on that channel.

Use the channel ID as the single agreement to list information from a single channel. An example follows.

```
cmd: ale ch 3
ID RX FREQ      MODE TX FREQ      MODE T/R GRPS  SND  SELF      RXA TXA ATU  PWR  USE  KEYS
-----
03 3612000 Hz USB 3612000 Hz USB T/R 0001 000 DL6MAA 000 000 000 000 B 0000
```

cmd: ALE DWELL

Value range: 100, 125, 200, 500, 750, 1000, 2000 [ms dwell time]

Default: 200

The ALE DWELL setting represents the time the ALE controller pauses at each selected channel. The channel scan rate in channels per second is determined by [1,000 ms / DWELL time]. For example, a 2,000 ms DWELL time results in a 0.5 channel per second scan rate.

Conversely, DWELL is the period the modem pauses to listen for a signal on the selected channel when scanning.

Example DWELL times and resultant ALE Channel Scan Rates follow.

2000	ms	at .5	ch/sec.	(SCS SLOW SCAN)
1000	ms	at 1	ch/sec.	(MIL-STD)
750	ms	at 1.5	ch/sec.	(MIL-STD 3G ASYNC/2G ACTIVE)
500	ms	at 2	ch/sec.	(MIL-STD)
200	ms	at 5	ch/sec.	(MIL-STD)
125	ms	at 8	ch/sec.	(SCS FAST SCAN) Not yet supported, 200 ms used instead.
100	ms	at 10	ch/sec.	(SCS ULTRA FAST SCAN) Not yet supported, 200 ms used instead)

Example: ALE DWELL 200<Enter>

Allows setting the ALE scan dwell time. Short dwell times result in faster scanning. However, the transceiver must support the switching required to implement the higher channel per second scan rate. Short dwell times limit the valid receive window time per visited channel. This becomes a transceiver characteristic challenge at less than 150 ms per channel dwell time.

cmd: ALE GROUP

Value range: 0...255

Default: 1

Example: ALE GROUP 1<Enter>

Allows to define the current channel group that is used for scanning, see ALE Channel command for details.

Caution. Entering GROUP parameter “0” disables ALE scanning!

cmd: ALE HELP

Prints a list of available ALE commands.

Value range: None

Default:

Example: ALE HELP<Enter>

```
cmd: ale help
```

```
MAIN ALE COMMANDS:
```

```
-----
```

```
ALE MODE 0/1 [main switch for ALE controller, 0 = ALE OFF, 1 = ALE and ALT/PT active]
```

```
ALE CALL <callsign> [<callsign> must be a member of OTHER list]
```


ALE CLEAR <callsign>
ALE KILL

ALE OTHER + <callsign>
ALE OWN <X> <callsign> [MY <callsign> must be a member of OWN list]

ALE Channel <X> <frequency> [<X> = index in channel list, <frequency> in Hertz]
ALE CH <X> G <y> [sets channel GROUPS flags, <X> = channel index, <Y> = GROUPS flags]
ALE GROUPS <X> [<X> = global GROUPS flags, selecting the channel groups for scanning]

ALE SCAN 0/1 [main switch for the ALE scanner, 1 = scanning enabled]
ALE SOUND 0/1 [main switch for automatic ALE SOUNDING, 1 = automatic sounding enabled]
ALE SOUNDNOW <X> [X = index in channel list, start TWA SOUNDING on channel <X>]

ALE SAP [Save complete ALE database to the non-volatile modem memory, Save ALL Parameters]

FOR MORE DETAILS PLEASE READ THE ALE MANUAL, ADDITIONAL ALE COMMANDS ARE:

ALLCALLS, AMD, ANYCALLS, BELLS, CAP, DWELL, LAP, LBT, LQA, LQAA, LINKED, MCPT, NET, OP-
TIONS, POLL, POLLCALL, SCPT, TWA, SILENT, STATPORT, STATUS

cmd:

cmd: ALE LBT

LBT is Listen Before Transmit.

Value range: 0..10

Default: 1

- 0: LBT OFF
- 1: Insensitive setting.
- 2: More sensitive setting
- 3: Even more sensitive setting
- 4: Most sensitive setting.
- 5...10: Reserved

Example: ALE LBT 3<Enter>

Listen Before Transmit supports transmission collision avoidance. If the LBT value is greater than 0, the ALE controller listens for receive signals on the active channel before starting a Call or sending a Sounding.

If the channel is “busy”, the ALE controller continues to watch the channel for up to 5 additional seconds until it skips the Call or Sounding on that channel.

cmd: ALE LQAA

Value range: 0...3

Default: 3

- 0: No Averaging
- 1: (Previous LQA + new LQA) / 2

- 2: $((3 * \text{previous LQA}) + \text{new LQA}) / 4$
- 3: $((7 * \text{previous LQA}) + \text{new LQA}) / 8$

Example: ALE LQAA 3<Enter>

The best Link Quality Analysis (LQA) measurements come from active LQA polling, where LQA Averaging level 3 is the best combination.

LQA Averaging reduces the possibility of a single bad LQA reading destroying an otherwise good LQA cell. The LQA Averaging parameter specifies the averaging algorithm used to update the LQA tables with new measurement values.

If enabled, the LQA average is only used if the newly measured value for the given channel is worse than the existing value in the LQA memory cell. Specifically, consistent with the selected parameter, an average of the previous value and the newly measured value will be performed and the LQA cell will be updated.

LQA memory cells are automatically overwritten if the newly measured value is better than the old value.

If LQA Averaging is not enabled, then even though the newly measured value is poor in comparison, it will be saved to the LQA cell.

To ensure consistent ALE operations results, all stations in an ALE network should use the same LQA averaging configuration.

cmd: ALE MCPT

MCPT is Multi-Channel Preamble Time.

Value range: 0..100 [seconds]

Default: 0

0: (AUTO) causes use of MIL-STD signaling calculations based on the number of scan channels

1..100: fixed preamble length in seconds.

Example: ALE MCPT 7

Defines the preamble length of all ALE transmissions to be detected by a scanning distant ALE system. A natural MCPT length is “dwell time” multiplied with the number of channels plus some extra time.

Regardless of 6 or 60 or all 100 channels in a scan group, a linking call or sounding while scanning on any channel takes 7 seconds with MCPT set to 7.

Notes:

1. At an MCPT of 7 for 6 channels a TWS Sounding with the overhead of changing channels takes 1 minute overall.
2. MIL-STD ALE preamble signaling ranges from 1 to 79 seconds depending on the call
3. type, number of channels and ALE ID (callsign) when talking a maximum of 100 channels being supported and up to a 15 characters ALE ID.
4. All stations need to be using the same Preamble Time method where if AUTO is not being used, the same MCPT value.
5. MARS users: In addition, if AUTO is not being used and 10 channels or greater are being used, the scan rate needs to be increased from 2 ch/sec to 5 ch/sec to compensate for the low MARS specified MCPT value.

cmd: ALE MODE

Value range: 0...1

Default: 0

Example: ALE MODE 1<Enter>

This command is available in the cmd: menu. It allows the user to enable or disable the ALE controller.

- 0: ALE controller is switched off. All ALE functions are disabled. The modem works like a non-ALE modem.
- 1: ALE controller is enabled.

Notes:

1. **Important.** ALE parameters. e.g., ALE channels, ALE “other” calls, ALE “my” calls etc., must be configured prior to switching the ALE MODE to 1 (“ON”). Failure to configure the basic ALE controller settings will prevent the modem from starting PACTOR connections because no valid channel can be found.
2. If ALE is not configured properly or does not allow useful operation, switch the ALE MODE back to 0 in order to return to standard PACTOR modem properties.
3. Recommend setting ALE MODE to “0” prior to configuring the ALE parameters during the ALE setup procedure performed by application (GUI) software.

cmd: ALE RESTART

Value range: -

Default: -

Example: ALE RESTART<Enter>

Resets all ALE parameters to factory settings and clears all LQA data. The permanent parameters set in the non-volatile memory are not cleared.

Use the ALE CAP command if it is necessary to mark the non-volatile memory ALE parameter block invalid. The ALE CAP command causes next modem power-cycling or ALE LAP command to load default factory values into the modem ALE parameters.

cmd: ALE SCAN

Value range: 0, 1

Default: 0

Example: ALE SCAN 1<Enter>

Allows user to enable (1) or disable (0) own ALE scanning. Scanning must be enabled in order to allow the ALE controller to evaluate the channel qualities between own and distant location. Scanning is a critical part of the ALE system and should usually be enabled.

cmd: ALE SCPT

SCPT is Single-Channel Preamble Time

Value range: 0..100 [seconds]

Default: 0

Defines the preamble length of all ALE Calls that are started while the ALE scanner is switched off.

0: (AUTO) causes use of MIL-STD signaling calculations based on the number of scan channels

1...100: fixed preamble length in seconds.

Example: ALE SCPT 7

Note: MIL-STD ALE preamble signaling ranges from 1 to 79 seconds depending on the call type, number of channels and ALE ID (callsign) when talking a maximum of 100 channels being supported and up to a 15 characters ALE ID.

cmd: ALE SILENT

Value range: 0, 1

Default: 0

Example: ALE SILENT 1<Enter>

Allows enable (1) or disable (0) of own ALE **SILENT MODE**. When SILENT is enabled, the ALE controller ignores all call types looking to establish an ALE linked state, even those that do not require a response, such as Global All Call (not supported yet).

Do not enable SILENT MODE if normal ALE participation is desired.

cmd: ALE SOUND

Value range: 0, 1 or 5...180 in order to define sounding period in minutes.

Default: 0 (default period: 60 minutes)

Example: ALE SOUND 1<Enter>

Allows user to enable (1) or disable (0) own ALE sounding. Sounding must be enabled in order to allow distant ALE controllers continuously to evaluate the channel qualities between own and distant locations. Sounding is a critical part of the ALE system and is usually enabled.

If the argument value is in the range of 5..180, that value is used for defining the ALE sounding period. ALE is automatically switched on if a valid new period is defined.

cmd: ALE TWA

TWA is Time Without Activity, “Inactivity” timeout of ALE links.

Value range: 1...60 [minutes]

Default: 6

Defines the time an ALE link remains active without detecting any PTT activity PTT by the local user.

Example: ALE TWA 10

Note: The TWA time should not be set to high values without reason. High TWA values may cause prolonged scanning gaps in the case where the ALE controller misses a CLEAR command or other faults that leave a connection active although it should have been disconnected.

Defining ALE Callsigns

cmd: ALE ALLCALLs

Value range: 0, 1

Default: 1

Example: ALE ALLCALL 1<Enter>

Enables (1) or disables (0) ALE ALLCALL reception.

cmd: ALE ANYCALLs

Value range: 0, 1

Default: 1

Example: ALE ANYCALL 1<Enter>

Enables (1) or disables (0) ALE ANYCALL reception.

cmd: ALE MY

Value range: CALLSIGN [1...15 characters, preferred 3 or 6 characters] from the set of capital [A..Z] and digits [0..9]

Default: none

Example: ALE MY DL6MAA <Enter>

This command selects one entry of the OWN list (see ALE OWN command) as the global ALE "MYCALL" or "SELF-ID".

At least one entry must have been defined in the OWN list before the ALE MY command can be used.

cmd: ALE NET

Value range: NETCALL OTHERCALL1 OTHERCALL2 OTHERCALL3 ...
[all calls signs [1...15 characters, preferred 3 or 6 characters] from the set of capital [A..Z] and digits [0..9]]

Default: none

Example: ALE NET NET1 DH7RG DL3FCJ DL6MAA DL2FAK DL1ZAM <Enter>

Note: NET1 is an arbitrary network call sign that can be defined by the user.

This command supports defining up to 20 ALE networks. Basically, an ALE network is defined by assigning its network call sign. A network call sign corresponds to a group of predefined “other “call signs and optionally to one “own/self” call sign as “members” of the network.

A member callsign “@@@” or “-“ defines a free entry (free time slot, see below).

A network can consist of up to 10 members.

ALE networks use time-slotted link arbitration in order to avoid collisions on the HF channel. The time slot assigned to each member callsign thus is of very high importance and must be known to all network members.

If a network callsign is used to establish an ALE link, the ALE controller tries to establish a STAR NETWORK link to ALL members of the network simultaneously. For this, all members must follow some common rules, mainly the assigned TIME SLOT must be known to all members of a net.

Note: All network members should use the identical ALE NET command for defining a common network as the POSITION of a call sign in the row of callsigns defines the TIME SLOT assigned to that callsign. There are 11 time slots.

The ALE NET command without parameter shows the entire list of ALE network callsigns:

```
cmd: ALE NET
NET1      .....
.....
.....
.....
```

If an existing network callsign is used as argument, the members / corresponding slots are listed:

```
cmd: ale net net1
NET      : NET1
Slot 0   : .....
Slot 1   : DL3FCJ
Slot 2   : DL2FAK
Slot 3   : DL1ZAM
Slot 4   : DL6MAA
Slot 5   : .....
Slot 6   : .....
Slot 7   : .....
Slot 8   : .....
Slot 9   : .....
Slot 10  : .....
Self    : DL6MAA
```

Slot 0 usually is not assigned to a call sign but is used as extra delay during network arbitration.

A network call sign can be deleted / removed from the ALE controller data base if “-” is appended as a member callsign.

Example: ALE NET NET1 – <Enter>

The above example will delete the network “NET1”, if existing.

cmd: ALE OTHER

Value range: +/- CALLSIGN [1...15 characters, preferred 3 or 6 characters] from the set of capital [A...Z] and digits [0..9] [optional WRT] [optional TT]

Default: none

Maximum number of OTHER call signs is 100.

Examples:

```
ALE OTHER + DL6MAA <Enter>
ALE OTHER + DL0WAA 2000 3000<Enter>
ALE OTHER - DL6MAA <Enter>
```

This command allows adding STATIC⁷ “other” known call signs to the ALE controller by using a “+” as first argument followed by the corresponding callsign.

Optionally, the ALE OTHER command can be used to set the Wait Response Time (WRT) and Tune Timer (TT) for ever “other” call sign. Using the OTHER command to set WRT and TT overrides the default WRT and TT settings of 1045 ms (WRT) and 914 ms (TT). The parameter range for both WRT and TT is 10..20,000 ms. Entering a value of 0 (zero) uses the default value. The ALE controller will silently use (e.g., no error message generated) the default WRT and/or TT values if an incorrect value is entered.

The sum of TT and WRT defines the waiting time before switching to the next channel during call attempts.

This command also supports erasing “other” call sign list entries by using a “-” as the first argument followed by the corresponding call sign.

Entering the ALE OTHER command without an argument will display the entire OTHER list. For example:

```
.
cmd: ale other
```

⁷ STATIC means that these “other” callsigns were not added automatically to the “other” list by the ALE controller during LQA processing of received soundings but defined by the user. “other” callsigns only added by the ALE controller are “DYNAMIC” and will be automatically purged from the list again after a certain timeout has elapsed.

```
cmd: ale other
```

```
S: DH3RN          S: DH7RG          S: DL3FCJ          S: DL2FAK  
S: DL1ZAM        D: DLOWAA
```

Prefix “S:” indicates a “static” other call, prefix “D:” indicates a “dynamic” other call.

“Dynamic” means that the other call sign was not defined through the user interface but added to the list automatically after receiving soundings from that call sign.

Up to 100 “other” call signs are possible. In case of table overflow, the oldest DYNAMIC entries are overwritten first.

If a valid / existing “other” callsign is appended to the ALE OTHER command, the current channel ranking for that “other” callsign is output: Example:

```
cmd: ale other dl6maa  
Channel Ranking  
1 83, 0 0, 2 0, 3 0, 4 0, 5 0, 6 0, 7 0, 8 0, 9 0
```

First, the channel number appears (highest rank, e.g., best channel first) followed by the channel quality metric (0...100, 100 is “best” channel), delimited by a comma. The ranking information is limited to a maximum of 10 channels.

cmd: ALE OWN

Value range: ID [0...19] CALLSIGN [1...15 characters, preferred 3 or 6 characters] from the set of capital [A..Z] and digits [0..9] or “-“

Default: none

Maximum number of OWN call signs is 20 (index ID: 0...19).

Examples:

```
ALE OWN 0 DL6MAA <Enter>  
ALE OWN 1 DLOWAA <Enter>
```

This command allows defining the list of “own” call signs that are known to the ALE controller. One of these call signs can be selected as current “my” callsign (see below) or chosen as OWN/SELF address of a physical channel (see ALE CH command).

Up to 20 call signs (index 0...19) can be defined.

An OWN callsign can be erased by using the “-“ sign instead of a call sign. For example, to clear the OWN call sign at list index 0, enter the following command.

```
ALE OWN 0 - <Enter>
```

If “-“ is used instead of “-“, all OWN callsigns from the given number to the last possible location are erased.

Invoking the ALE OWN command without any argument displays the entire OWN list:

```
cmd: ale own
[00] DL6MAA          [01] DL0WAA
[02] .....         [03] .....
[04] .....         [05] .....
[06] .....         [07] .....
[08] .....         [09] .....
[10] .....         [11] .....
[12] .....         [13] .....
[14] .....         [15] .....
[16] .....         [17] .....
[18] .....         [19] .....
```

ALE Link Establishment and ALE Link Management Commands

cmd: ALE CALL

Value range:

CALLSIGN0 CALLSIGN1 .. CALLSIGN19 ...[X] {optional AMD message}

CALLSIGN0...CALLSIGN19 :

Single ALE “other” call sign for “individual call” or single ALE “net” call sign for network call or up to 20 different ALE “other” call sign for ALE group calls.

[X]: Optional channel number for ALE ALLCALL or ANYCALL - only valid in case of “@@?” (“anycall”) and “@?@” (“allcall”) as a single call sign.

Default: none

Examples:

```
ALE CALL DL6MAA <Enter>
ALE CALL DL6MAA {This is a test AMD message for the distant ALE controller!} <Enter>
ALE CALL @@? 3
ALE CALL @?@ 3 {AMD as an ALLCALL}
```

Initiates an ALE “individual” or “network” call or “group” call or “allcall” or “anycall”..

The call sign appended to the ALE CALL command must be a valid “other” or “net” call sign or “@@?” or “@?@”, i.e., it must be known to the ALE controller. Otherwise, the CALL attempt will be rejected by the ALE controller.

An optional AMD message can be appended to the call sign field, separated by at least one space, and delimited by parentheses {}. An AMD is generally not transferred in the ANYCALL case.

The ALE CALL command can be used to send additional AMD messages to stations that are currently linked. All parameter fields, including the call sign(s), must still be passed to the modem - but there will not appear a new “LINKED” message although the ALE three-way handshake will be almost identical to the unconnected case during the continued AMD exchange.

cmd: ALE CLEAR

Value range: optional CALLSIGN

Default: no parameter

Examples:

```
ALE CLEAR<Enter>
ALE CLEAR DL6MAA <Enter>
```

ALE CLEAR with no parameter will try to bring down any existing link.

ALE CLEAR with parameter clears/disconnects an existing INDIVIDUAL or NETWORK or ALLCALL or ANYCALL ALE link associated with that call. For ALLCALLS the CALLSIGN field must be “@?@”.

cmd: ALE KILL

Value range: none

Default: none

Example: ALE KILL <Enter>

Clears/disconnects all existing INDIVIDUAL or NETWORK ALE links and also aborts all ongoing ALE link attempts.

cmd: ALE POLL

Value range: CALLSIGN [X] where [X] is an optional channel number.

Default: none

Example: ALE POLL DL6MAA <Enter>

Initiates an individual LQA poll procedure, i.e., an ALE LQA poll call performed on all ALE groups active channels starting from the highest channel ID. The call sign appended to the ALE CALL command must be a valid “other” call sign known to the ALE controller. Otherwise, the POLL attempt will be rejected by the ALE controller.

A channel number can be appended as second parameter. In this case, the poll is only performed on the identified channel if it is valid, otherwise the command is rejected.

The preamble length of the polling attempt is defined by the MCPT parameter.

Note: ALLCALLS, ANYCALLS and “Group calls” are not supported.

cmd: ALE POLLCALL

Value range: CALLSIGN [X] where [X] is an optional channel number.

Default: none

Example: ALE POLLCALL DL6MAA <Enter>

Starts an LQA poll procedure causing an ALE LQA poll call to be performed on all ALE groups active channels starting from the highest channel ID.

The call sign appended to the ALE CALL command must be a valid “other” call sign known to the ALE controller. An unknown call will cause the POLL attempt to be rejected.

A channel number can be appended as second parameter. In this case the poll is only performed on the identified channel if it is valid, otherwise the command is rejected. The subsequent call will always be performed as a normal call based on the channel LQA information. It is not limited to a single channel even if a channel number is given.

The preamble length of the polling attempt is defined by the MCPT parameter.

In contrast to the ALE POLL command, the ALE POLLCALL command starts a regular ALE CALL to CALLSIGN as soon as the LQA polling sequence has been finished.

Note: ALLCALLS, ANYCALLS and “Group calls” are not supported.

cmd: ALE SOUNDNOW

Value range: 0..99

Default: none

Example: ALE SOUNDNOW 5

Using the ALE MY call sign, initiates a THAT WAS sounding on one of the defined channels.

If ALE SOUNDNOW is entered without appended parameter, soundings on all valid channels will be triggered, beginning from the highest channel.

Notes:

1. ALE SOUNDNOW will also initiate a sounding if ALE SCAN and ALE SOUND are both set to 0. ALE SOUND 0/1 only refers to AUTOMATIC soundings.
2. If ALE SCAN is set to 0, automatic sounding is limited to the current channel.

Commands for Queries on Messages, Link Status and Parameters

cmd: ALE AMD

Value range: none

Default: none

Example: ALE AMD<Enter>

Lists latest 10 receive AMD messages, example:

```
cmd: ale amd
```

```
*** ALE: [AMD MESSAGE] RECEIVED, [CHAN 1 ] 00:01:23 2000-01-01 FROM:
DL1WAA
THIS IS AN EXAMPLE AMD MESSAGE!
*** ALE: [AMD MESSAGE] RECEIVED, [CHAN 1 ] 00:04:37 2000-01-01 FROM:
DL1WAA
THIS IS A SECOND AMD MESSAGE...
```

If an ALE link exists, the ALE AMD command supports sending additional messages to that linked station. The AMD part must be delimited by parentheses { }.

Example: ALE AMD DL6MAA {THIS IS PART OF AN AMD CONVERSATION WHILE LINKED...}

cmd: FLICENSE

Permanent use of the DR-7x00 2G ALE features requires acquisition and installation of an ALE Feature License. Once acquired, the FLICENSE command is used to pass the license data to the modem.

There are 100 ALE links available without the ALE license.

Please contact SCS or your SCS dealer for details on how to acquire the license.

All feature licenses are based on the modem serial number.

The FLICENSE command allows to enter and show licensed items.

Entering the FLICENSE command with the modem serial number and license code appended as parameters causes the license information to be stored in the permanent modem memory.

FLICENSE typical use:

```
cmd: flicense
```

```
FLICENSE: 0100001417160605 EABATCGUOOLHCBFACCD5
```


LICENSED FEATURES:

-
- BASIC 2G ALE option
 - SCSchat_ALE support
 - SCSmail_ALE support
 - AES-256 option

See *document-is-under-development* for additional FLICENSE details.

cmd: ALE LINKED

Value range: none

Default: none

Example: ALE LINKED <Enter>

Lists all callsigns that are currently linked:

```
cmd: ale linked
*** ALE: CURRENTLY LINKED WITH:
DL6MAA
```

cmd: ALE LQA

Value range: optional OTHER call sign

Default: none

Lists the LQA data collected for and from all other stations and channels. A valid other call sign without LQA data will not be listed.

If a specific “other” call sign is appended to the ALE QQA command, for example “ALE LQA DL6MAA”, a call sign specific LQA report is listed. This report is generated even if the call sign has no LQA data.

```
cmd: ale lqa dl1waa
```

```
DL6MAA CH 0:
```

```
-----
          BER      SINAD      AGE
OWN       ?        ?        ??:?:?:??
OTHER     ?        ?        ??:?:?:??
-----
```

```
DL6MAA CH 1:
```

```
-----
```

	BER	SINAD	AGE
OWN	0	29	00:00:04
OTHER	0	30	00:00:04

DL6MAA CH 2:

	BER	SINAD	AGE
OWN	?	?	?:?:??
OTHER	?	?	?:?:??

Notes

1. "OWN" line shows all data reported from "other" station for own signal.
2. "OTHER" - line shows the values detected by own ALE controller for "other" callsign. It is the report for the other station.
3. A "?" field means that no data is available yet for that field.

cmd: ALE OPTIONS

Value range: none

Default: none

Example: ALE OPTIONS <Enter>

Returns a summary of current ALE controller parameters. This command supports ALE troubleshooting. Some listed parameters are internal to the controller and cannot be altered by the user.

cmd: ale options

```
ALE PARAMETER SUMMARY :  
=====
```

```
CURRENT GROUP 1 (HEX)  
SCAN RATE      5c/s  INACT (TWA)    6 m  PTTD PERIOD    20 ms  
SOUND EVERY    60 m  RESOUND AFTER  4 m  LQA TIMEOUT    180 m  
SCANNING       E      SOUNDING       E      VOICE DETECT   D  
LQA            D      POLLING        D      ALLCALLS      D  
ANYCALLS      D      THIS IS        D      LP            D
```

cmd: ALE STATPORTs

CAUTION: Exercise care when using the STATPORT command. Incorrect use can block access to the modem Bluetooth and Ethernet configuration ports.

Use the USB interface to access the modem and correct a STATPORT value that incorrectly blocks Bluetooth and/or Ethernet port access.

The STATPORTs value always resets to 0 when the modem is power-cycled.

Application software using STATPORTs must always set the appropriate/desired parameter value prior to starting operation.

Note: With firmware version 2.40, the TCP/IP port is not blocked when defined as a STATPORT port instead it behaves like the USB port providing continual modem access.

Value range: 0..7

Default: 0

Example: ALE STATPORTs <Enter>

Defines modem interfaces⁸, called ports, where ALE status for external software is generated. The STATPORT value is a bit field. Each Bit of the STATPORT parameter value represents a port. Set bits OR together selecting 1 or more ports.

Bit 0 = Main USB port
Bit 1 = Bluetooth (if available)
Bit 2 = TCP/IP (if available)

Example:

```
cmd: ale statport

*** ALE: STATUS PORTS: 6
```

This means that bit 1 and bit 2 are set, so Bluetooth as well as TCP/IP are used for special ALE status information.

Notes:

1. If a port is used as an ALE status port, it is no longer available to support standard input or output; e.g., it is no longer available to configure the modem. Only special ALE status information is available on that port - except for the main USB port. On firmware version 2.40 especially the Bluetooth port must be configured with care.
2. IF the STATPORT value is 2, 3, 6, or 7, the Bluetooth port is no longer available for updates.
3. Bluetooth Info. When "ALE STATPORT" is set to the value 2, the Bluetooth port ONLY provides sounding status messages (receive only); an example follows.

```
[11:31:18][FRQ 03606000][SND][           ][TWS][DL6MAA    ][AL0] BER 30 SN 27
[11:31:41][FRQ 03606000][SND][           ][TWS][DL6MAA    ][AL0] BER 30 SN 26
```

Important: If the Bluetooth port is to be used normally again, the ALE STATPORT parameter must be reset to 0 or 1 again via USB or Network port.

The Bluetooth behavior also applies to Hostmode operations.

4. With firmware version 2.40, the TCP/IP port is not blocked when defined as a STATPORT port instead it behaves like the USB port providing continual modem access.

The following special status strings are defined:

1. Sounding information

⁸ The physical interfaces, e.g., USB Port, Bluetooth, and Ethernet Network, are referred to as ports. The ALE controller continually generates ALE status information. Using STATPORT and the bits that refer to the port, causes the controller to route that status information to the selected port(s) for use by external programs.

Example:

```
[11:30:36][FRQ 04765000][SND][          ][TWS][DL6MAA    ][AL0] BER 30 SN 20
```

Note: Internally the DR-7X00 modems uses “native” BER values, lower numbers mean less actual bit errors. However, if ALE STATPORT is greater than 0, the modem switches to PC-ALE/MARS-ALE compatible LQA reports based on the sounding data received in the terminal mode. In this case, the ALE controller calculates:

```
BER_STATPORT = 30 - BER;
```

```
IF (BER_STATPORT < 0)  
    BER_STATPORT = 0;
```

cmd: ALE STATUS

Value range: none

Default: none

Example: ALE STATUS <Enter>

Returns the current state of the ALE controller including current AUTO-PACTOR/ALE state (wrapping of PACTOR connections by the ALE controller).

Example: cmd: ale status

The example returns the following.

```
*** ALE: STATUS:  
ALE: 1  
AUTOPT: 0  
TWA-TIMER: 0 s
```

The following ALE states are defined:

```
0: SCANNING_STOPPED  
1: SCANNING  
2: PAUSE_SCAN_TO_LISTEN_FOR_CALL  
3: LISTEN_FOR_ACTIVITY_BEFORE_CALL  
4: INDIVIDUAL_WAIT_COMPLETION_OF_RESPONSE  
5: INDIVIDUAL_WAIT_COMPLETION_OF_CALL  
6: INDIVIDUAL_WAIT_COMPLETION_OF_ACKNOWLEDGEMENT  
7: INDIVIDUAL_WAIT_ACKNOWLEDGEMENT  
8: INDIVIDUAL_WAIT_RESPONSE  
9: LINKED_IDLE  
10: INDIVIDUAL_LINKED_WAIT_COMPLETION_OF_INITIAL_FRAME  
11: INDIVIDUAL_LINKED_WAIT_COMPLETION_OF_ACKNOWLEDGEMENT
```

```

12:  INDIVIDUAL_LINKED_WAIT_COMPLETION_OF_RESPONSE
13:  INDIVIDUAL_LINKED_WAIT_ACKNOWLEDGEMENT
14:  INDIVIDUAL_LINKED_WAIT_RESPONSE
15:  LINKED_BRINGING_DOWN_LINK
16:  NET_WAIT_COMPLETION_OF_RESPONSE
17:  NET_WAIT_COMPLETION_OF_CALL
18:  NET_WAIT_COMPLETION_OF_ACKNOWLEDGEMENT
19:  NET_WAIT_ACKNOWLEDGEMENT
20:  NET_WAIT_RESPONSE
21:  NET_LINKED_WAIT_COMPLETION_OF_INITIAL_FRAME
22:  NET_LINKED_WAIT_COMPLETION_OF_ACKNOWLEDGEMENT
23:  NET_LINKED_WAIT_COMPLETION_OF_RESPONSE
24:  NET_LINKED_WAIT_ACKNOWLEDGEMENT
25:  NET_LINKED_WAIT_RESPONSE
26:  LISTEN_BEFORE_THIS_WAS_SOUND
27:  LISTEN_BEFORE_THIS_IS_SOUND
28:  THIS_WAS_SOUND_IN_PROGRESS
29:  THIS_IS_SOUND_IN_PROGRESS

```

A non-zero AUTOPT state indicates an ongoing PACTOR connection triggered by the ALE controller.

The TWA-TIMER shows the time in seconds until an existing ALE link is automatically disconnected (timeout). This value is reset to the value set with "ALE TWA" when a new ALE link is set up or by external PTT activity on the transceiver assuming the activity can be detected by the modem.

cmd: Version ##⁹

Version command examples.

```

cmd: Version ##
#0:H#1:2.30.154_ale#2:1.20#3:N#4:5A0A#5:V#6:A>79E2

```

```

cmd: Version ##
#0:H#1:2.30.154_ale#2:1.20#3:N#4:5A0A#5:V#6:I>0000

```

See footnote (¹⁰)for version command information.

The P4dragon ALE Firmware uses field #6 of the "Version ##" parameters. If permanent ALE setup data from the Flash ROM (ALE SAP) is available, an "A" is displayed in field # 6, otherwise "I" for "invalid" is shown. This allows the user to determine whether or not the modem supports ALE or if the modem can be used in the standalone-mode. If Flash ROM setup data is not available, ALE SAP has never been executed or

⁹

¹⁰ Version command detail can be found in the PTC-IIpro manual, Section 6.107, Version. Firmware background is found in the PTC-IIpro manual, Section 5, PTC-Firmware.

the data is corrupt, the modem cannot be used as a standalone ALE Controller. Using ALE SAP to save an ALE parameter set to Flash ROM will correct the problem.

In addition to the “A” and “I” flag, the field number also contains a 4-digit hexadecimal hash value. The hash is calculated over the entire Flash ROM ALE data block and is separated by an “>” character.

The hash value can only be altered by using ALE SAP. Thus, the hash can be utilized by application software to decide if the modem still works with the latest setup saved using ALE SAP. This requires that ALE SAP be performed after any external application software ALE parameter change has occurred. Consistent ALE SAP use keeps the application software stored ALE parameters and the ALE parameters used by the modem synchronized. Since the modem is also designed for standalone operation, this synchronization between application software and modem is essential.

Full erasure and reset of all ALE data should be avoided, if possible. The modem still collects LQA data during standalone operation. Collected LQA data must not be cleared as the application software is started.

The external application software standard start-up procedure is as follows.

Part I.

- a. Send VER ## to the modem.
- b. Compare #6 hash value to the value that was stored after last ALE SAP command.
- c. If both hash values match, do nothing, else do a complete re-initialization of the modem and set all parameters.

Part II – reinitialization if required.

- a.. Send ALE RESTART command to modem.
- b. Send all ALE parameters to the modem -- define channels, own calls, other calls, etc., through use of associated terminal mode commands.
- c. Send ALE SAP to the modem. This will make the parameters permanent and recalculate the hash value.
- d. Send VER ##, to the modem and store returned hash value. That hash is the value that must be compared in Part I.b above, during future software start-ups,

Management of the Non-volatile Parameter Memory

cmd: ALE CAP

Value range: none

Default: none

Example: ALE CAP <Enter>

Marks the non-volatile memory ALE parameter block invalid.

Causes next modem power-cycling or next ALE LAP command to load default factory values into the modem ALE parameters, including “other” callsigns and all LQA information.

Note: The ALE CAP command does not change the standard SAP parameters (“PACTOR parameters”).

cmd: ALE LAP

Value range: none

Default: none

Example: ALE LAP <Enter>

Restores all ALE data from the non-volatile memory. This command automatically executes when the modem is power-cycled. If a valid ALE parameter block is available in the non-volatile memory, i.e., the CRC “checksum” is OK, the modem always restores its ALE parameters from that data block during modem initialization.

Notes.

- 1. ALE LAP will not load parameters from the non-volatile memory if firmware version tag of the permanently stored ALE parameter block and version number of current firmware do not match!**
- 2. A firmware update invalidates the non-volatile ALE parameter block.** Execute at least one ALE SAP command after updating the modem firmware and reconfiguring the ALE parameters

cmd: ALE SAP

Value range: none

Default: none

Example: ALE SAP <Enter>

ALE SAP saves all ALE parameters, including all “other” call signs and LQA data, to the P4dragon non-volatile memory. The ALE data block is completely separate from the usual SAP parameters (see normal cmd: SAP command). Nevertheless, executing ALE SAP automatically triggers a standard SAP command resulting in all standard, non-ALE, parameters being stored in the EEPROM as the ALE parameters are stored.

The execution of the ALE SAP, including the automatically triggered standard SAP, command may take a few seconds.

Example: cmd: ale SAP

*** ALE: PARAMETERS SAVED to PERMANENT DATA BASE

2.3 Summary of ALE (Link) Status Messages in Terminal Mode

During ALE operation in Terminal Mode, the modem outputs some messages that may be watched/parsed by attached software:

```
*** ALE: CALL FAILED AT
*** ALE: DIRECT PACTOR CALL NOT WHILE SCANNING - FAILED
*** ALE: CALLING ON CHANNEL:
*** ALE: CLEARED WITH
*** ALE: LINKED WITH
*** ALE: POLLED WITH
*** ALE: RESPONSE FROM
*** ALE: UNKNOWN OTHER
*** ALE: UNKNOWN OWN ADDRESS
*** ALE: UNKNOWN NET
*** ALE: ONLY ONE OWN ADDRESS ALLOWED
*** ALE: DYNAMIC ADDRESS NOT ALLOWED
*** ALE: NOT WHILE CONNECTED
*** ALE: NOT WHILE SCANNING
*** ALE: COMMAND REJECTED, PLEASE TERMINATE PACTOR FIRST!
*** ALE: CALL IN PROGRESS ON CHANNEL AT
*** ALE: SCANNING RESUMED AT
*** ALE: SCANNING STOPPED
*** ALE: NOT ENOUGH PARAMETERS
*** ALE: MY ADDRESS NOT SET
*** ALE: MY ADDRESS:
*** ALE: SORRY NOT IMPLEMENTED YET
*** ALE: HANDSHAKE FAILED
*** ALE: [TWS SOUND] RECEIVED: ON BER SINAD
*** ALE: [TIS SOUND] RECEIVED: ON BER SINAD
*** ALE: [AMD] RECEIVED, CHAN FROM:
```

2.4 Example configuration / example list of commands sent to the modem during initial ALE setup:

```
; switching off ALE controller for sure first

ale mode 0

; configure the TRX hardware interface

trx ty i 19200 116

; define ALE physical channels

ale ch 0 14100000
ale ch 1 14200000
ale ch 2 14300000
ale ch 3 14400000
ale ch 4 14500000
ale ch 5 14600000
ale ch 6 14700000
ale ch 7 14800000
ale ch 8 14900000
ale ch 9 14000000
ale ch 10 14050000

; define set of ALE OWN callsigns

ale own 0 dl6maa
ale own 1 dl0waa

; define ALE MY callsign

ale my dl6maa

; add static ALE OTHER callsigns

ale other + dh7rg
ale other + dl1waa
ale other + dl3fcj
ale other + dl2fak
ale other + dl1zam

; define a star network "net1"

ale net net1 dl3fcj dl2fak dl1zam dl6maa

; switch on sounding as well as scanning

ale sound 1
ale scan 1
```

```
; switch on the ALE controller
```

```
ale mode 1
```

```
; define PACTOR "MYCALL"
```

```
my dl6maa
```

```
; set transmit level (FSKA level also defines output power  
of ALE soundings.
```

```
pska 400
```

```
fska 400
```

3 ALE under Hostmode Control

3.1 General

Virtual Hostmode¹¹ Channel 247 is reserved for ALE messages/data from the modem. All ALE “Link Status” information is also output on that channel. All messages on this channel are output in a simple **JSON format**.¹² Each JSON message starts with a curly bracket and ends with a curly bracket. The messages can be composed of several host mode packets.

All information that a connected application software needs is automatically made available as JSON messages during operation and can be queried with G-Poll. For example, if the ALE controller receives a new sounding of an “other” call sign, this information, including BER and SNR, is accessible as a JSON message. A new channel ranking is also created for this “other” callsign and output immediately, so that the operating software is always up to date when tracking the JSON messages.

Two JSON message examples follow.

```
{  
"TYPE": "SOUNDING",  
"CALL": "DL0WAA",  
"STATUS": "TWS",  
"CH": 8,  
"FREQUENCY": 14900000,  
"BER": "0",  
"SNR": "30.0",  
"TIME": "10:00:46 2020-31-12"  
}
```

```
{  
"TYPE": "RANKING",  
"CALL": "DL0WAA",  
"R 1": "5 100",  
"R 2": "8 100",  
"R 3": "2 97",  
"R 4": "0 94",  
"R 5": "7 0",  
"R 6": "6 0",  
"R 7": "4 0",  
"R 8": "3 0",  
"R 9": "1 0",  
"R 10": "10 0",  
"TIME": "10:00:46 2020-31-12"  
}
```

¹¹ See SCS PTC-IIpro manual, Section 5.14, The Hostmode, and Section 10, Hostmode, for information on SCS modem Hostmode use and operations.

¹² See https://www.w3schools.com/js/js_json_syntax.asp for JSON syntax information.

All JSON entries are generally quoted. The parameter descriptor appears first followed by a colon, then the actual parameter value is output. The time format is HH:MM:SS, the date format is -JJJJ-MM-DD. Details on possible JSON messages are discussed below.

Note, for discussion, the **amber lines** in the following text correspond to Terminal Mode equivalents of the Hostmode JSON messages.

The amber data is for information only.

3.2 Description of ALE Hostmode Commands

%AC

ALE Call command.

Value range: CALLSIGN {optional AMD message}

Default: none

Examples:

```
%AC DL6MAA
```

```
%AC DL6MAA {This is a test AMD message for the distant ALE controller!}
```

Initiates an Individual or Network or ALLCALL or ANYCALL call. The call sign appended to the ALE CALL command must be a valid “other” or “net” call sign or “@@?” for “anycall” or “@?@” for “allcalls”, i.e. must be known to the ALE controller. Otherwise, the CALL attempt will be rejected by the ALE controller.

An optional AMD message for the distant ALE controller can be appended to the call sign field, separated by at least one space, in parentheses {}. An AMD is generally not transferred in the case of ANYCALLS.

If an ALE link already exists, the %AC command allows to sending (follow-up) messages to the distant station (“other” callsign) that is linked. The AMD part must be delimited by parentheses.

Example:

```
%AC DL6MAA {THIS IS PART OF AN AMD CONVERSATION WHILE LINKED...}
```

Note: “Group calls” are not supported yet.

The command will trigger some JSON messages, the most important are:

```
*** ALE: CALLING ON CHANNEL:
{
```

```
"TYPE": "STATUS",
"STATUS": "*** ALE: CALLING ON CHANNEL:",
"CH": 10,
"FREQUENCY": 3600500,
"TIME": "10:00:46 2020-31-12"
}
```

*** ALE: LINKED WITH

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: LINKED WITH:",
"CALL": "DL6MAA",
"TIME": "10:00:46 2020-31-12"
}
```

*** ALE: CALL FAILED AT

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: CALL FAILED",
"TIME": "10:00:46 2020-31-12"
}
```

%AD

ALE Disconnect command.

Value range: CALLSIGN

Default: none

Example:

```
%AD DL6MAA
```

Clears/disconnects an existing INDIVIDUAL or NETWORK ALE link.

Note: "Group calls" are not supported yet.

The command will trigger some JSON messages, the most important are:

*** ALE: CLEARED WITH

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: CLEARED WITH:",
"CALL": "DL6MAA",
"TIME": "10:00:46 2020-31-12"
}
```

%AJ

ALE JSON command.

Value range: 0..2

Default: 2

Example:

%AJ 1

Sets the virtual Hostmode channel where ALE JSON messages are sent to the application software. After starting the Hostmode, the %AJ parameter is always automatically set to 2, i.e., the JSON messages appear on the PACTOR channel (see PTCHn command in general modem description, channel 4 per default).

The following parameter / channel assignments are possible:

%AJ value	JSON channel
0	NONE, no JSON messages
1	247, special ALE channel
2	PACTOR channel

%AK

ALE Kill command.

Value range: none

Default: none

Example:

%AK

Clears/disconnects all existing INDIVIDUAL or NETWORK ALE links and aborts all ongoing ALE link attempts.

%AL

ALE Linked command.

Value range: none

Default: none

Example:

%AL

Lists all call signs that are currently linked. A JSON message in the following format is generated:

```
{
  "TYPE": "STATUS",
  "STATUS": "LINKED",
  "CALL": "DL1WAA"
}
```

%AM

ALE Message command.

Value range: CALLSIGN {AMD message...}

Default: none

Example:

```
%AM<Enter>
```

Lists the latest 10 received messages (currently only AMD). Up to 10 JSON messages in the following format are generated:

```
{
  "TYPE": "MESSAGE",
  "CALL": "DL6MAA",
  "STATUS": "AMD",
  "CH": "",
  "TIME": "00:01:16 2020-12-31",
  "MSG": "THIS IS A TEST AMD MESSAGE!"
}
```

If an ALE link exists, the %AM command allows sending messages to that distant station (e.g., "other" callsign) that is linked. Only a single call sign is allowed for that operation on Hostmode, "Groups" are not supported yet. The AMD part must be delimited by parentheses {}.

Example:

```
%AM DL6MAA {THIS IS PART OF AN AMD CONVERSATION WHILE LINKED...}
```

%AP

ALE POLLCALL command.

Value range: CALLSIGN

Default: none

Examples:

`%AP DL6MAA`

Note: ALLCALLS, ANYCALLS and “Group calls” are not supported.

Initiates an individual LQA poll procedure – an ALE LQA poll call is performed on all active channels that are available for the ALE GROUPS setting starting from the highest channel ID.

The callsign appended to the %AP command must be a valid “other” callsign known to the ALE controller or the POLL attempt will be rejected.

The preamble length of the polling attempt is defined by the MCPT parameter.

In contrast to the %AQ command, the %AP command initiates a regular ALE CALL to CALLSIGN as soon as the LQA polling sequence completes.

The command will trigger some JSON messages, the most important are:

***** ALE: POLLING ON CHANNEL:**

```
{
  "TYPE": "STATUS",
  "STATUS": "*** ALE: POLLING ON CHANNEL:",
  "CH": 10,
  "TIME": "10:00:46 2020-31-12"
}
```

%AQ

ALE POLL “Q”uery command.

Value range: CALLSIGN

Default: none

Examples:

`%AQ DL6MAA`

Note: ALLCALLS, ANYCALLS and “Group calls” are not supported.

Initiates an individual ALE LQA poll call that is performed on all active channels currently available for the current ALE GROUPS setting, starting from the highest channel ID.

The callsign appended to the %AP command must be a valid “other” callsign known to the ALE controller or the POLL attempt will be rejected.

The preamble length of the polling attempt is defined by the MCPT parameter.

The command will trigger some JSON messages, the most important are:

```
*** ALE: POLLING ON CHANNEL:
```

```
{  
  "TYPE": "STATUS",  
  "STATUS": "*** ALE: POLLING ON CHANNEL:",  
  "CH": 10,  
  "TIME": "10:00:46 2020-31-12"  
}
```

%AS

ALE Status command.

Value range: none

Default: none

Example:

```
%AS<Enter>
```

Lists the ALE controller main ALE link state and the ALE AUTO-PACTOR state. JSON messages in the following format are generated:

```
{  
  "TYPE": "STATUS",  
  "STATUS": "STATES",  
  "ALE": 1,  
  "AUTOPT": 0,  
  "MODE": 1,  
  "SCAN": 1,  
  "SOUND": 1  
}
```

The “ALE” and “AUTOPT” values are discussed in the Terminal Mode “ALE STATUS” above.

This JSON message will be automatically generated if the ALE MODE parameter is changed by pressing the sensor button on the DR-7800 modem. This allows Hostmode application software to keep track of external ALE MODE changes.

%AO

ALE OTHER command.

Value range: CALLSIGN

Default: none

Example:

```
%AO<Enter>
```

If no argument is appended, the entire current “other” list is output as a JSON message in the following format:

```
{  
"TYPE": "OTHER",  
"O 0": "DH7RG",  
"O 1": "DL1WAA",  
"O 2": "DL3FCJ",  
"O 3": "DL2FAK",  
"O 4": "DL1ZAM"  
}
```

The %AO command allows to append a valid (existing and known) “other” call and then returns the current channel ranking for that “other” callsign.

```
{  
"TYPE": "RANKING",  
"CALL": "DL1WAA",  
"1": "1 83",  
"2": "0 0",  
"3": "2 0",  
"4": "3 0",  
"5": "4 0",  
"6": "5 0",  
"7": "6 0",  
"8": "7 0",  
"9": "8 0",  
"10": "9 0",  
"TIME": "00:05:11 2000-01-01"  
}
```

Ranking is limited to a maximum of 10 channels. First the “rank” is output, followed by the standard “colon” limiter. Then the channel number for that rank is output as well as the channel quality metric (range: 0...100, 100 is “best” channel).

3.3 Summary of JSON ALE Link Status Messages in Hostmode

Note, for discussion, the **amber lines** in the following text correspond to Terminal Mode equivalents of the Hostmode JSON messages.

The amber data is for information only.

```
*** ALE: CALL FAILED AT
```

```
{  
  "TYPE": "STATUS",  
  "STATUS": "*** ALE: CALL FAILED",  
  "TIME": "10:00:46 2020-31-12",  
}
```

```
*** ALE: DIRECT PACTOR CALL NOT WHILE SCANNING - FAILED
```

```
{  
  "TYPE": "STATUS",  
  "STATUS": "*** ALE: DIRECT PACTOR CALL NOT WHILE SCANNING  
- FAILED",  
  "TIME": "10:00:46 2020-31-12",  
}
```

```
*** ALE: CALLING ON CHANNEL:
```

```
{  
  "TYPE": "STATUS",  
  "STATUS": "*** ALE: CALLING ON CHANNEL:",  
  "CH": 10,  
  "FREQUENCY": 3600500,  
  "TIME": "10:00:46 2020-31-12"  
}
```

```
*** ALE: CLEARED WITH
```

```
{  
  "TYPE": "STATUS",  
  "STATUS": "*** ALE: CLEARED WITH:",  
  "CALL": "DL6MAA",  
  "TIME": "10:00:46 2020-31-12"  
}
```

```
*** ALE: LINKED WITH
```

```
{  
  "TYPE": "STATUS",  
  "STATUS": "*** ALE: LINKED WITH:",  
  "CALL": "DL6MAA",  
  "TIME": "10:00:46 2020-31-12"  
}
```

```
*** ALE: POLLED WITH
```

```
{
```

```
"TYPE": "STATUS",
"STATUS": "*** ALE: POLLED WITH:",
"CALL": "DL6MAA",
"TIME": "10:00:46 2020-31-12"
}
```

*** ALE: RESPONSE FROM

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: RESPONSE FROM:",
"CALL": "DL6MAA",
"TIME": "10:00:46 2020-31-12"
}
```

*** ALE: UNKNOWN OTHER

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: UNKNOWN OTHER ADDRESS:",
"CALL": "DL6MAA"
}
```

*** ALE: UNKNOWN OWN ADDRESS

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: UNKNOWN OWN ADDRESS:",
"CALL": "DL6MAA"
}
```

*** ALE: UNKNOWN NET

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: UNKNOWN NET ADDRESS:",
"CALL": "DL6MAA"
}
```

*** ALE: ONLY ONE OWN ADDRESS ALLOWED

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: ONLY ONE OWN ADDRESS ALLOWED:",
"CALL": "DL6MAA"
}
```

*** ALE: DYNAMIC ADDRESS NOT ALLOWED

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: DYNAMIC ADDRESS NOT ALLOWED:",
"CALL": "DL6MAA"
}
```

*** ALE: NOT WHILE CONNECTED

```
{
```

```
"TYPE": "STATUS",
"STATUS": "*** ALE: NOT WHILE CONNECTED"
}
```

```
*** ALE: NOT WHILE SCANNING
```

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: NOT WHILE SCANNING"
}
```

```
*** ALE: CALL IN PROGRESS ON CHANNEL AT
```

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: CALL IN PROGRESS ON CHANNEL",
"CH": 8,
"TIME": "10:00:46 2020-31-12"
}
```

```
*** ALE: SCANNING RESUMED AT
```

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: SCANNING RESUMED",
"TIME": "10:00:46 2020-31-12",
}
```

```
*** ALE: SCANNING STOPPED
```

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: SCANNING STOPPED",
"TIME": "10:00:46 2020-31-12"
}
```

```
*** ALE: NOT ENOUGH PARAMETERS
```

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: NOT ENOUGH PARAMETERS"
}
```

```
*** ALE: COMMAND REJECTED, PLEASE TERMINATE PACTOR FIRST!
```

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: COMMAND REJECTED, PLEASE TERMINATE
PACTOR FIRST!"
}
```

```
*** ALE: MY ADDRESS NOT SET
```

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: MY ADDRESS NOT SET"
}
```

```

*** ALE: MY ADDRESS:
{
"TYPE": "STATUS",
"STATUS": "*** ALE: MY ADDRESS:",
"CALL": "DL6MAA"
}

*** ALE: SORRY NOT IMPLEMENTED YET
{
"TYPE": "STATUS",
"STATUS": "*** ALE: SORRY NOT IMPLEMENTED YET"
}

*** ALE: HANDSHAKE FAILED
{
"TYPE": "STATUS",
"STATUS": "*** ALE: HANDSHAKE FAILED",
"TIME": "10:00:46 2020-31-12"
}

*** ALE: [TWS SOUND] RECEIVED: ON BER SINAD
{
"TYPE": "SOUNDING",
"CALL": "DL0WAA",
"STATUS": "TWS",
"CH": 8,
"FREQUENCY": 14900000,
"BER": "0",
"SNR": "30.0",
"TIME": "10:00:46 2020-31-12"
}

{
"TYPE": "RANKING",
"CALL": "DL0WAA",
"R 1": "5 100",
"R 2": "8 100",
"R 3": "2 97",
"R 4": "0 94",
"R 5": "7 0",
"R 6": "6 0",
"R 7": "4 0",
"R 8": "3 0",
"R 9": "1 0",
"R 10": "10 0",
"TIME": "10:00:46 2020-31-12"
}

*** ALE: [TIS SOUND] RECEIVED: ON BER SINAD
{
"TYPE": "SOUNDING",

```



```
"CALL": "DL0WAA",
"STATUS": "TIS",
"CH": 7,
"FREQUENCY": 14800000,
"BER": "0",
"SNR": "28.0",
"TIME": "10:00:46 2020-31-12"
}
```

```
{
"TYPE": "RANKING",
"CALL": "DL0WAA",
"R 1": "2 100",
"R 2": "4 100",
"R 3": "5 100",
"R 4": "9 97",
"R 5": "10 97",
"R 6": "3 95",
"R 7": "1 94",
"R 8": "7 94",
"R 9": "8 91",
"R 10": "6 0",
"TIME": "10:00:46 2020-31-12"
}
```

*** ALE: [AMD] RECEIVED, CHAN FROM:

```
{
"TYPE": "MESSAGE",
"CALL": "DL1WAA",
"STATUS": "AMD",
"CH": 2,
"TIME": "10:00:46 2020-31-12",
"MSG": "THIS IS AN AMD MESSAGE!"
}
```

*** ALE: [TWS SOUND] TRANSMITTED: ON

```
{
"TYPE": "SOUNDING",
"CALL": "DL0WAA",
"STATUS": "TWS",
"CH": 8,
"FREQUENCY": 14900000,
"TIME": "10:00:46 2020-31-12"
}
```

*** ALE: [TIS SOUND] TRANSMITTED: ON

```
{
"TYPE": "SOUNDING",
"CALL": "DL0WAA",
"STATUS": "TIS",
"CH": 8,
```

```
"FREQUENCY": 14900000,  
"TIME": "10:00:46 2020-31-12"  
}
```

4 AUTO-PACTOR/ALE Operation

IMPORTANT: Immediately after setting the ALE MODE parameter to 1, the standard PACTOR “Connect” command, and the Hostmode “C” command, are controlled by the ALE controller.

The Terminal Mode “Connect” command as well as the Hostmode “C” command allow appending an AMD text message to the callsign field. The AMD message must be separated by a space character and framed by parentheses {}.

All ALE parameters should be configured before setting the ALE MODE parameter to 1. Failure to configure ALE parameters before setting ALE MODE 1 could result in aborted PACTOR Connect commands because of ALE link failures.

Example, on Hostmode. Note the JSON messaging that documents the process.

Remarks are in blue

C DL6MAA {This is an AMD message...}

-- Original, standard PACTOR “C” command on Hostmode.

-- Now the ALE controller takes over the “C” command and first tries to establish an ALE link on channel 0:

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: CALLING ON CHANNEL:",
"CH": 0,
"FREQUENCY": 3600500,
"TIME": "00:01:00 2000-01-01"
}
```

-- As no ALE answer was received on channel 0, the ALE controller switches to the next channel:

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: CALLING ON CHANNEL:",
"CH": 1,
"FREQUENCY": 3603000,
"TIME": "00:01:16 2000-01-01"
}
```

-- ALE link is established!

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: LINKED WITH:",
"CALL": "DL6WAA",
"TIME": "00:01:34 2000-01-01"
}
```

-- As soon as the ALE link has been established, the PACTOR call is started.

-- The PACTOR call is acknowledged immediately by the called station and a PACTOR link is established.

(4) CONNECTED to DL6MAA

-- PACTOR data exchanged.

---[SCSchat 1.3.0.14]---[00000000]---

-- Finally, the user can invoke a standard PACTOR disconnect command in order to finish the PACTOR connection consistent with a normal PACTOR connections.

(4) DISCONNECTED fm DL6MAA

-- The ALE controller again takes over control and killing existing ALE link. After ALE link termination, standard ALE scanning resumes automatically.

```
{
"TYPE": "STATUS",
"STATUS": "*** ALE: CLEARED WITH:",
"CALL": "DL6MAA",
"TIME": "00:02:01 2000-01-01"
}
```

SCS

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