DRAFT
MARS-ALE
v1.02 BETA
Quick Start Up Guide

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This MARS-ALE User Guide supersedes all previous edition's of this guide. All previous edition's should be destroyed.

MARS ALE STATION APPROVALS: All U.S. Army MARS members desiring to operate on ALE NETS must get authorization per the guidelines in Chapter 8, Section 8-8 of the US Army MARS NET PLAN. Written permission is required for any MARS station to sound on any Army MARS ALE Network channels. MARS members from other services are required to get authorization from their respective Chiefs, through their SMDs.

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WARNING: Stations that have not received direct authority and direction to do so, should NOT be actively participating in multi-channel Sounding operation on ARMY MARS channels. Contact AAR3BB for information regarding the current status of full Sounding operation for U.S. Army MARS members or the use of single channel Beacon Sounding used by Army MARS NCS stations for NET pre-check-in.

WARNING: The MARS-ALE tool is **NOT** authorized for use on the Amateur Bands.

WARNING: Installing this BETA or any release of MARS-ALE on your PC to an existing directory where you have a MARS-ALE installation WILL wipe out your existing ALE.DAT file! It will NOT harm your LICENSE.DAT file however. You should always keep a backup of your ALE.DAT and license.dat files as they can become corrupted should the program crash at the wrong time when the file is being accessed. In addition a .QRG file should be created when GROUP/Channel settings are changed and to periodically create a file with all recent NET, OWN and OTHER address changes.

WARNING: Beginning with MARS-ALE SE B001A8g4, the tool now supports direct control of certain types of external and internal Automatic Antenna Tuner (ATU) and Antenna Switch make/models where there use is selected by as combination of configuration choices on the MIL-STD-188-141 Options dialog and the Channel Add/Modify dialogs and come into on a channel by channel basis. The operator must take the time to read and understand the documentation associated with these advanced ATU and antenna selection features to properly configure for their stations equipments.

WARNING: The ALE.DAT file structure has changed with the release of this BETA. As such you must first run your existing installation of MARS-ALE and use Fill > DUMP to create a .QRG file with your existing configuration of GROUP/Channels and Addresses which will later be loaded into the new beta release to populate your new ALE.DAT file. You will then need to use the configuration dialogs to make your station specific settings such as radio make/model selected, com port etc.

WARNING: If you use any FULL install of MARS-ALE and select a path different than an existing installed version, it WILL change the path settings for your standard MARS-ALE desktop icons. Thus if you added the installation to a new sub directory, like MARS-ALE_SE, when you click on the ICON, you will fire off that build and NOT the previously installed build. Thus make your own icons to the build(s) that you may want to work with.

NOTE: The difference between MARS-ALE "SE" and MARS-ALE Legacy Edition (LE) is that MARS-ALE LE version has been tailored to use an 8Khz vs. 48Khz sample clock and all MIL-STD-188-110 modem support has been removed as it requires 48Khz. LE 8Khz will now work on systems all the way down to Pentium 133Mhz and Windows 98SE and ISA sound devices. A stand alone machine without a network card or any other non-OS software running, which is dedicated to MARS-ALE will provide the best results.

MARS-ALE DO's and DON'Ts

Do expect to put effort into the MARS-ALE learning curve as this is a sophisticated communications tool.

Do fully read this documentation before attempting to make any use of MARS-ALE.

Do fully read the MARS-ALE "Radio Help User Guide" before attempting to make any use of MARS-ALE.

Do follow all the directions and recommendations of the MARS-ALE documentation.

Don't allow your MARS-ALE license.dat file to get out of your safe keeping.

Don't assume MARS-ALE is "Plug 'n Play" and that if it doesn't work as advertised it must be a problem with the software.

Don't assume MARS-ALE is just another digital mode program and should work with your current radio station because you are using a software application that seems to work correctly.

Don't forget that Automatic Link Establishment and supporting standards and protocols are normally implemented using very expensive radio equipments which require extensive training to master.

Don't assume a channel is unoccupied, MARS-ALE may not determine if the channel is busy with voice or data traffic before it transmits. An operator has no indication if two other stations are currently linked.

Don't assume that all ALE stations are using MARS-ALE, many are using ALE hardware solutions and only support AMD for messaging.

Don't use the MOTD feature is you want to allow your station to accept calls from ALE hardware based user's and AQC-ALE calls.

Don't use MARS-ALE on the U.S. Amateur Bands for anything beyond monitoring.

Don't hesitate to provide the MARS-ALE SDT feedback on the tool and its documentation.

Don't have any screen saver's of system hibernate or resources power down while running MARS-ALE.

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OVERVIEW

This start up document has been updated for the MARS-ALE Standard Edition (SE) and Legacy Edition (LE) v1.02 BETA version build **B001A8g8** and provides a synopsis of information (Software Configuration, TUNE Display Window, Data Protocol and Modes, PC Sound Device, Radio Parameters and more) that will found in the other MARS-ALE documentation in detail regarding the installation, configuration and application of the MARS-ALE tool.

The MARS-ALE v1.02 BETA software provides the following new features which will be described in detail herein:

- Developed new 8Khz sample clock Legacy Edition for slower legacy PC systems
- Alternate Quick Call (AQC) ALE is now enabled for testing having been improved
- FED-STD-1052 ARQ protocol is now enabled for testing having been improved
- Developed Quiet Scanning/Sounding (QS/S) to protect radio relays during Scanning
- Added front panel access to important MIL-STD-188-141 Options parameters (Linked TWX, Sounding, AQC-ALE, AQC-Burst, TWA and SCLC values)
- Added Radio 1 Alternate RTS/DTR port for dedicated PTT and MUTE serial port support
- Added ATU Tune Words to generate an ATU tuning tone using the ALE AFSK modem on any PC sound device in the system used as the ALE modem
- Added ATU Tune Level to control the RF drive when using ATU Tune Words. NOTE: This feature is currently set to a fixed level regardless of the value entered.
- Added option for TX Audio Level setting to control RF power output on a channel by channel basis.
- Added support for the Official MARS Message program, regardless as to where it is installed on your system. Help > MARSMSG will launch that tool so that you can use it to create an EEI or whatever and then paste it into MARS-ALE to send
- Added support for radio CAT ATU and ANT SW support when radio make/models support such capability. The CAT ATU and ANT SW control is provided on Channel by Channel basis.
- Added support for RS-232 based LDG AT200PC external ATU/ANT SW and the ACOM and LDG DTS-x series of external ANT SW devices on a channel by channel basis.

- Added support for RS-232 serial RTS and DTR lines for external ANT SW selection on a channel by channel basis where external interface circuitry is provided in support of antenna switching.

- Added support for CAT Attenuator support for radios which support such on a channel by channel basis.

- Refer the RHUG for all newly added or updated supported transceivers and receivers.

The MARS-ALE v1.02 BETA software provides the following enhanced features which will be described in detail herein:

- Improved FSK/PSK modem core to include better performance under all channel conditions and compensation for sample clock error (very effective for sound devices at 48Khz as the error is a smaller fraction of the sample clock, however at 8khz (LE) symbol lengths are not 8ms long which causes the sync point to walk) and modem resetting and the

- Improved Alternate Quick Call (AQC) ALE

- Improved FED-STD-1052 ARQ

- FFT rounding problem has been solved allowing endless 24/7 operation

- AFSK audio drive is higher during FSK ALE (good news for ICOM transceivers)

- Support for additional make/model radios, Support for hardware handshaking with Kenwood radio models, Support added for Storage/Retrieval/Deletion of the last 100 received AMD messages stored in the ALE.DAT database file

- Tracing functions are now automatically turned off at normal program terminate and LQA becoming unchecked during program use has been fixed

- ATU wave file playing while ALE tones sending has been fixed.

- The problem with the log files not being created/saved on other than drive C: has been fixed.

- The Channels > List which only listed 8 GROUPS now lists all 16 GROUPS

- At program start the OWN/SELF database and the current GROUP and all its Channels are displayed, which is in response to helping the operator know what OWN/SELF Addresses are being used and what channels are in the currently active GROUP at a glance

- Improved QS/S in for a number of radios and fixed a few general bugs.

- Fixed all problems with LQA based Individual Calls while Scanning/Sounding.

- Improved DTM ARQ and DBM ARQ by fixing problems with state machine timing.

If you only read and follow the directions outlined within this document, you should be able to start using MARS-ALE immediately after installing the software and placing your license.dat file into the same directory you installed ALE.EXE and after entering all the needed setup parameters. However, reading the MARS-ALE "User Manual" and "Radio Help Operator Guide" is highly recommended for a complete understanding of the tool. Provided as a separate document with this BETA release is an updated "Appendix A" from the "Radio Help Operator Guide" which details all radio make/models supported by this BETA.

This guide is designed for the first time user of MARS-ALE, regardless of whether they have any PC sound device (sound card) digital mode experience or not. Those with PC sound device digital mode experience must **NOT** make any assumptions that their existing PC to radio interfacing and sound levels as configured for the digital modes that they have previously used will work as is with MARS-ALE. It is **STRONGLY** recommended that all directions as to how to configure such parameters for MARS-ALE be followed to obtain the best results as MARS-ALE is not just another sound card digital mode program.

For information as to how the tool is actually used for sending and receiving messages, please refer to the MARS-ALE "User Guide". For information on the details of Radio Control and Radio interfacing to the PC sound device, please see the MARS-ALE "Radio Help Operator Guide". For more in depth technical back ground on ALE and the MARS-ALE please refer to the DRAFT "MARS-ALE Technical Reference Manual" which is not distributed with the tool but is available for download from the support web sites.

ALE FREQUENCY SELECTION

> The following is directly quoted from "HF-ALE MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES FOR THE HIGH FREQUENCY AUTOMATIC LINK ESTABLISHMENT (HF-ALE) RADIOS, FM 6-02.74, MCRP 3-40.3E, NTTP 6-02.6, AFTTP(I) 3-2.48, COMDTINST M2000.7, SEPTEMBER 2003" page 21.
>
> 3. Frequency Selection
>
> a. For ALE to function properly, frequency selection is important. When selecting frequencies to use in a network, take into consideration the times of operation and distances to be communicated, power level used, type of antenna(s) used and so forth.
>
> b. When using the above parameters, a good propagation program should also be used to determine which frequencies will propagate. Appendix H lists some of the available propagation software programs and contact information.
>
> c. Consulting with the frequency manager early on in this process may save you a lot of work, since the manager may already have lists of approved frequencies that can be used for particular functions in given areas.

ALE OPERATIONAL LIMITATIONS

> The following is directly quoted from "HF-ALE MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES FOR THE HIGH FREQUENCY AUTOMATIC

LINK ESTABLISHMENT (HF-ALE) RADIOS, FM 6-02.74, MCRP 3-40.3E, NTTP 6-02.6, AFTTP(I) 3-2.48, COMDTINST M2000.7, SEPTEMBER 2003" page 21.

"4. Limitations

a. ALE is a tool that automates HF linking and frequency selection. It does not replace a properly trained HF operator. Knowledge of the specific radio equipment being used, propagation, antennas, and so forth is still essential to use ALE effectively.

b. ALE will not improve propagation. If poor propagating frequencies are used, ALE will not make them work better. ALE only works as well as the frequencies you put into it; therefore, proper frequency management is essential.

c. ALE makes the linking process more automatic, allowing a novice HF user to use the radio effectively. However, ALE in some cases takes more time than it takes two highly trained HF operators to establish a link.

d. ALE determines only the best channel to pass traffic and tries to establish a link between radios. The ALE function, in itself, does not provide data capability other than a simple automatic message display (AMD) in the ALE header signal or other equipment specific features.

e. Depending on the specific equipment used, ALE may not determine if the channel is busy with voice or data traffic before it transmits. An operator has no indication if two other stations are currently linked."

REFERENCES

MARS-ALE SE v1.01 User Manual, 10 October 2005

MARS-ALE SE v1.02, Radio Operators Help Guide Appendix A, 23 March 2006

MARS-ALE Application Note, Training and Operation of the LDG Electronics AT-200PC for use with MARS-ALE, Version 1.01, 24 March 2006

MARS-ALE Application Note, RS-232 Computer Control Interface for LDG Electronics DTS-4/DTS-6 Desktop Coaxial Switches, Version 1.01, 23 February 2006

ARMY MARS NET PLAN, 1 DECEMBER 2005

U.S. ARMY MARS DIGITAL OPERATIONS AND TRAINING GUIDE, SEPTEMBER 2005

FED-STD-1045A, 18 OCTOBER 1993

MIL-STD-188-141A and Appendix A

MIL-STD-188-141B Appendix A, AQC-ALE, 31 AUGUST 2001

MIL-STD-188-110A

FED-STD-1052 Appendix B, Data Link Protocol

HF-ALE MULTI-SERVICE TACTICS, TECHNIQUES, AND PROCEDURES FOR THE HIGH FREQUENCYAUTOMATIC LINK ESTABLISHMENT (HF-ALE) RADIOS FM 6-02.74, MCRP 3-40.3E, NTTP 6-02.6, AFTTP(I) 3-2.48, COMDTINST M2000.7

FTSC Test Plan for Interoperability and Performance of HF ALE Radios

NIST Special Database 17, NIST Automatic Link Establishment (ALE) Tones per FED-STD-1045A and 1046/1

NIST Special Database 21, NIST Automatic Link Establishment (ALE) Degraded Tones Per Fed-STD-1045

JITC MIL-STD-188-141B CONFORMANCE TEST PROCEDURES, November 2003

JITC MIL-STD-188-110B CONFORMANCE TEST PROCEDURES, July 2004

NOTE: Most of the above references can be found in many places on the internet, most can be found at www.n2ckh.com/MARS_ALE_FORUM

INSTALLING THE BETA SOFTWARE

The process for installation of the BETA can be one of two methods detailed below, do NOT just drop the BETA version into your pre-existing MARS-ALE directory as the BETA release has a new ALE.DAT file structure, thus your pre-existing ALE.DAT file will be considered corrupt and will be over written if present by the BETA version when started.

METHOD 1.

NOTE: If you have NOT previously installed a earlier version of v1.02 Beta, then you MUST run the existing version of MARS-ALE v1.01 before installing the BETA version if you are going to use this method.

If you have never installed MARS-ALE in the past or you prefer to automate the process, make a full installation of MARS-ALE SE v1.01 to a directory specific for use with this beta and then copy all of the files distributed with the beta to the same sub directory.

Next, if you have previously installed MARS-ALE, run that version of the tool and check that you have the proper Army ALE channels configured with respect to the 1 December 2005 Net Plan ALE channel changes and use Fill > Dump to create a .QRG file with your GROUP/Channel information and Addresses. Then exit the program and start the BETA following the directions herein to include importing the .QRG file just created and making the needed changes to your configuration settings and exit the program normally to save the changes to the tools ALE.DAT database file.

Otherwise using the provided MARS_SHARES.QRG supplied with the beta, make sure to edit all instances of the OWN example Address to read your primary ALE Address follow the directions herein to include importing the MARS_SHARES.QRG file making the needed changes to your configuration settings and exit the program normally to save the changes to the tools ALE.DAT database file.

METHOD 2.

The second option is to manually create a new subdirectory for the beta and copy over all of your existing files from your installed version of MARS-ALE. Then copy all of the files distributed with the beta to the same sub directory.

Next, if you have previously installed MARS-ALE, run that version of the tool from its sub directory and check that you have the proper Army ALE channels configured with respect to the 1 December 2005 Net Plan ALE channel changes and use Fill > Dump to create a .QRG file with your GROUP/Channel information and Addresses. Then exit the program and start the BETA following the directions herein to include importing the .QRG file just created and making the needed changes to your configuration settings and exit the program normally to save the changes to the tools ALE.DAT database file.

Otherwise using the provided MARS_SHARES.QRG supplied with the beta, make sure to edit all instances of the OWN example Address to read your primary ALE Address and follow the directions herein to include importing the MARS_SHARES.QRG file making the

needed changes to your configuration settings and exit the program normally to save the changes to the tools ALE.DAT database file.

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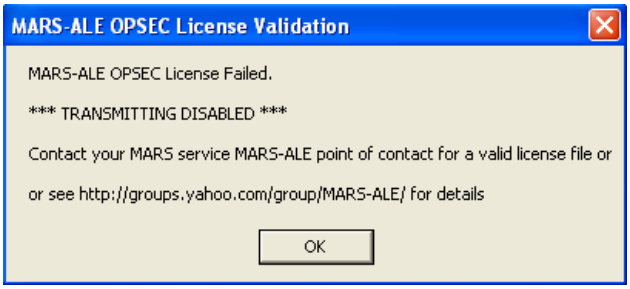
STARTING THE PROGRAM

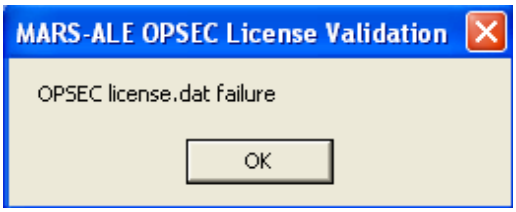
NOTE: The BETA release has a new ALE.DAT file structure, thus your pre-existing ALE.DAT file will be considered corrupt and over written if present by the BETA version when started.

NOTE: Under new updates of Windows 2000 Professional and Windows XP the following screen may be displayed when starting MARS-ALE, just click "unblock".

A license file (license.dat) is required for MARS-ALE to enable transmitting. If the license file is missing or corrupt the message below is displayed when the program starts as well as the message "**`MARS-ALE OPSEC License is missing or corrupt. Transmitting is disabled`**" in the engineering data window. To enable transmitting you are required you to make sure a valid license.dat file is installed where the application (ALE_SE102B.EXE or ALE_LE102B.EXE) is located.

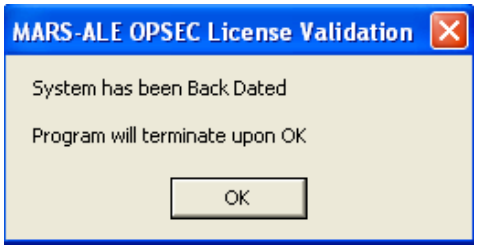


Without a valid license.dat the tool may be used for monitoring with the exception that it will not print or respond to any calls made to any of the OWN Addresses entered into the system and that it will always respond to any requests to establish a link with the message "**`MARS-ALE OPSEC License Validation Failed`**" in the engineering data window and the message box seen below which will require the operator to always click "OK" to continue with use of the tool.



If a valid license.dat file is found at program start, the licensee information contained within the license file shall be displayed within the engineering data window and the tool will immediately be available for two way communications assuming it has been properly configured.

Lastly, as this is a beta release of the tool and carries with it an expiration date, any use of the tool where the PC system date has been set back, will result in an OPSEC Back Dated violation and the tool will immediately terminate upon clicking "OK".



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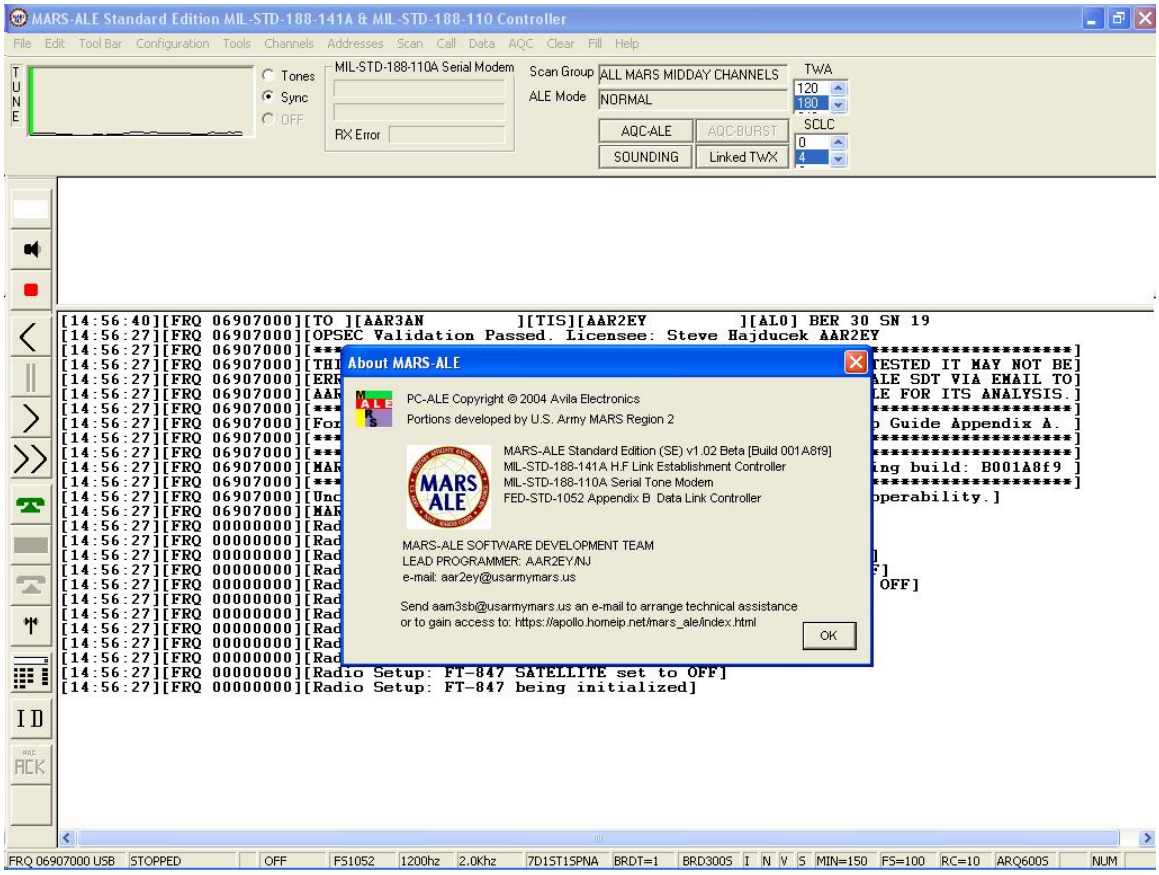
MARS-ALE CONFIGURATION

The following descriptions, screen captures and configuration charts provide all the needed information to configure the MARS-ALE tool and its parameters for proper operation. It also describes changes to menus and screens in the Beta version from the previous release. For full details on all program menus see the MARS-ALE "User Guide" which has not been updated for the BETA tool features. For details on radio and sound device interfacing see the MARS-ALE "Radio Help Operators Guide".

NOTE: Any item that is grayed out all the time, is currently under development and/or not approved for use and thus not available at this time. Some items are periodically grayed out do to operational considerations on certain pull down menus and dialogs as will be detailed in the documentation provided with the tool.



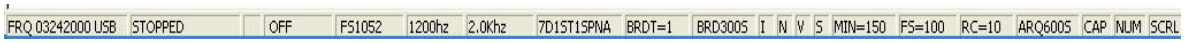
STATUS BAR

The status bar as seen below from the bottom of the main program window, provides a number of systems parameters. Under the new 8Khz LE the MIL-STD-118-110 parameters are not displayed as such support does not exist.

This capability will be expanded in the future to allow for user selected views of the current data so that only items desired are displayed and support for additional configuration parameters. At

present it always provides the current Channel/Frequency & Mode, Operating Status and RX/TX state in the first three blocks followed by the parameters of both the MIL-STD-188-110 and FS-1052 Appendix B menus and the status of the Caps Lock, Num Lock and Scroll Lock keys in the last three blocks.

Box 1 2 3 4 5 6 7 8 9 10 11..14 15 16 17 18 19..21



With respect to the current status bar as depicted in the above image, the breakdown for the coded information display is for the boxes from left to right as follows:

Box… DESCRIPTION……..

1. Channel/Mode information, always displayed, can be frequency or channel number as selected on the MIL-STD-188-141 menu using checking "Freq Display" for full frequency information.
2. Scan/Link Status etc., numerous messages are displayed. No changes made here.
3. RX or TX after first use. No changes made here.
4. MIL-STD-188-110 modem status OFF/LINKED/ALWAYS
5. MIL-STD-188-110 modem mode: AYSNC, FS1052 etc.
6. MIL-STD-188-110 modem PSK carrier frequency in Hertz (Hz).
7. MIL-STD-188-110 modem Bandwidth (BW) in Kilohertz (Khz).
8. MIL-STD-188-110 modem parameters: Data Bits, Start Bits, Stop Bits, Parity: None/Even/Odd, Alphabet ASCII/Baudot

NOTE: At present these parameters are hard coded in the tool.

9. FS-1052 Options Menu: BRD Transmissions: BRDT = 1..50
10. FS-1052 Options Menu: BRD Data Rate and Interleave: DLP75S to DLP4800
11. Immediate Mode: "I" will be displayed if checked, otherwise left blank.
12. Negotiate Always: "N" will be displayed if checked, otherwise left blank.
13. ARQ Mode: F = FIXED, V = VARIABLE, C = CIRCUIT
14. ARQ Interleaver: S for SHORT or L for LONG

NOTE: This selection determines the starting ARQ Data Rate and Interleaver regardless as to what has been selected from the MIL-STD-188-110 menu, at present the Data Rate is always 600BPS. This difference between these two menus needs to be addressed as the tool should be starting at the Data Rate and that is selected from the MIL-STD-188-110 menu.

15. Minimum ARQ Data Rate: MIN=xxxx where 75..2400
16. ARQ Frame Size: FS= 56..1023
17. ARQ Retry Count: RC= 1..100
18. ARQ Data Rate/Interleaver from MIL-STD-188-110 menu: ARQxxxL or ARQxxxS

NOTE: Regardless as to what is selected, 600S or 600L is always used as the starting combination as predicated by the Interleaver selection from the FS-1052 Options Menu at present.

19..21 The last three status bar boxes are the standard keyboard CAPS (CAP), NumLock (NUM) and Scroll Lock (SCRL) key indicators.

The tool provides the standard Windows top level menu structure for access to all setup/operational menus.

For the purpose of setting the primary configuration parameters, as detailed in the configuration charts to follow, the “Configuration”, “Tools”, Channels” and “Addresses” menus shall be utilized.

The “Fill” menu selection is utilized to load GROUPS/Channels from an existing .QRG file, as well as to add OWN, OTHER and NET addresses. This can done from a .QRG that is user exported to restore a system configuration or from a distribution .QRG from a third party such as the supplied MARS_SHARES.QRG example file (where you MUST edit your OWN address with NOTEPAD.EXE before using) provided with the distribution of the BETA tool.

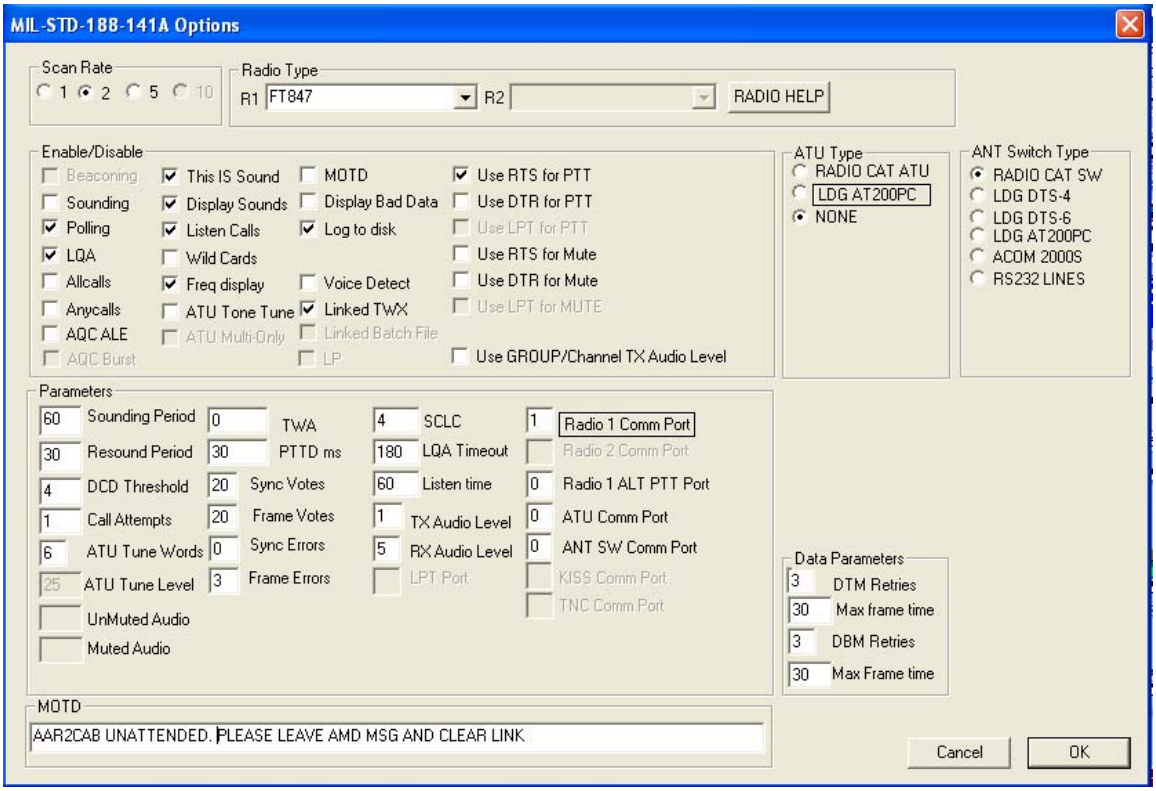
All item added from an imported .QRG file and all changes to configuration made manually are saved to the tools ALE.DAT database file which is automatically created if missing or corrupt with default settings for most parameters, however many parameters must still be user entered. The only time all changes to data affecting the ALE.DAT file are written is when the tool is normally terminated. Changes made by loading a .QRG will NOT be made until normal program termination. Changes made while using the MIL-STD-188-141 or MIL-STD-188-10 Options dialog are made when OK is selected on the respective dialog.

MIL-STD-188-141A Options Menu

The "MIL-STD-188-141A Options" menu, selected under "Configuration", as seen in the following screen capture, has the bulk of the parameters that are required at initial setup. However some of these parameters require revisiting periodically during operational use of the tool, e.g. Scan Rate for Scanning and SCLC predicated on calling a station on frequency or Scanning/Sounding through the frequency as two examples.

As this menu is where the "Radio Type" and its com port are selected, there is also a hot link to the "Radio Help Operator Guide" (another Adobe .PDF file) which provides full details on radio related matters, "Appendix A" provides a full listing of all supported radios and which selections support various make/models that are not specifically listed on the "Radio Type" pull down menu.

No parameters selected on this dialog are changed until the used selects "OK"



NOTE: Changing the Radio Comm Port does not require restarting the program, however it is recommended. Selecting a Comm Port that does not exist will immediately alert the user of the error. Both physical and virtual Comm Ports are supported, however any port must be active when selected else the tool will not allow it to be specified for use.

MARS-ALE SE **Configuration Parameters** **Updated 03-15-06**		
POC: AAR2EY/NJ e-mail aar2ey@usarmymars.us **NOTE:** The parameters contained herein are the same as found in the stand alone "Configuration Parameters" document of the same date of release.		
Parameter	**Value**	**Parameter Description, Comments and Notes**
Configuration MIL-STD-188-141 Options:		**Main Menu, select Configuration, click on "MIL-STD-188-141A Options"**
Scan Rate	2	A setting of 2 ch/sec is pretty much the standard used and all radios operating at 4800 baud or better should support it. Don't use 5 ch/sec unless the radio operates at 9600 baud and above. **NOTE:** AQC-ALE scan rate is fixed at 5 ch/sec. as defined in MIL-STD-188-141B Appendix A.
Radio Type	NONE	1. Select **NONE** for single channel use of a radio that is either not capable or currently attached to the PC for control. Either RTS or DTR must be used for PTT when NONE is selected. **NOTE:** With radio type "**NONE**" is selected, DTR is NOT held High for D.C. power on the DTR line. 2. For a radio under PC control, select your radio make/model directly, if not listed, refer to "Appendix A" of the "Radio Help Operator Guide" for a compatible selection for your make model radio. If none, contact the SDT with your radio info. 3. For a radio under PC control either check RTS or DTR for PTT with an external interface or uncheck both RTS and DTR for or CAT PTT. RTS cannot be used for PTT when handshaking is utilized. **NOTE:** Selecting DTR for PTT drops the DTR line and removes it as a source of D.C. power for external level converters.
Enable/Disable:		
Beaconing	Unchecked	**PLANNED** When checked, Beacon Sounding will be enabled which supports a tactical single channel Sounding system for automated AMD/MOTD exchange with TWX handshake and "Terminate when complete". The Sounding and ReSounding period will be fixed at 5 minutes. There will be no CAT radio Frequency

		and Mode commands sent to the radio, but CAT PTT and all else will work., TWX is checked, TWA is set to 30 seconds, MOTD is checked. The NCS or Guard Channel station will also check Sounding and enter an MOTD message if they want to make their presence on the channel known, if not Sounding can be left unchecked. The Calling stations looking to send messages to the NCS or Guard Channel station will have a GROUP with the specified number of channels to equate to link attempts and will initiate an Individual Call to the target station while Scanning using TIS.
Sounding	Unchecked	Only check when you want your station to actually TRANSMIT during Scanning. **NOTE:** There is also a new control on the front panel of the tool that will toggle this setting, which upon normal program shut will cause the setting to change as well. **NOTE:** Contact AAR3BB for information regarding the current status of ARMY MARS ALE Channels Sounding approval.
Polling	Unchecked	If a station has not been heard for a period of time the software will actively try to exchange LQA information. It is better not to enable this as it causes congestion and has not been fully tested.
LQA	Checked	Should be checked forr Scanning, must be checked for Sounding, also see Polling above.
Allcalls	Unchecked	Allows the reception of All Calls. **NOTE:** Many ALE networks ban the use of Allcalls. An “Allcall” is a general broadcast that does not request responses and does not designate any specific address. **NOTE:** Also, if when Scanning your station is NOT always capable of transmitting on all Channels being monitored, this should not be used.
Anycalls	Checked	Allows the reception of Any Calls. **NOTE:** Many ALE networks ban the use of Anycalls. An "Anycall" is a general broadcast that requests responses without designating any specific addressee(s). **NOTE:** Also, if when Scanning your station is NOT always capable of transmitting on all Channels being monitored, this should not be used.
AQC	Unchecked	Alternate Quick Call (AQC) ALE is derived from the MIL-STD-188-141B, Appendix A standard. When checked, your station will make AQC calls when initiating any ALE call, including Sounding.

		All stations that are capable of AQC operation are always able to receive and ALE or AQC-ALE call. **NOTE:** There is also a new control on the front panel of the tool that will toggle this setting, which upon normal program shut will cause the setting to change as well. **NOTE:** AQC must **NEVER** be checked when Sounding on the current MARS ALE networks. **NOTE:** The ALE Mode indicator which reads NEITHER when the program starts, will display ALTERNATE when an AQC call is heard or an AQC LINK is established, baseline ALE calls will result in NORMAL. **NOTE:** Receiving stations are always ready to detect either an ALE or AQC-ALE call. **NOTE: Only** 6 character addresses or less can be used AQC-ALE for both the transmit and receive Address. The software traps for this situation and will alert the operator if the OWN for the current channel is greater than 6 characters.
AQC Burst	Unchecked	**PLANNED** Sends a PSK burst signal using the settings selected from the MIL-STD-188-110 Options menu. The standard only supports the 1800hz PSK carrier and 2400bps symbol rate for a full 300-3300hz total bandwidth. **NOTE:** There is also a new control on the front panel of the tool that will toggle this setting, which upon normal program shut will cause the setting to change as well. **NOTE:** Disabled at present in all versions of MARS-ALE.
Use Group TX Audio Level	Unchecked	Checked when it is desired to use the “TX Audio Level” setting for each GROUP/Channel rather than the master “TX Audio Level” value to allow for a constant RF output on all Channels.
This IS Sound	Checked	Checked when Sounding operation is desired if a pause for a response is desired. It causes the transmitted frames to be terminated in “THIS IS” (TIS) when Sounding. After a sounding the controller listens on the channel before returning to Scanning when operating in this mode. When not checked, it causes the transmitted frames to be terminated in a “That Was” (TWS) and the tool does not pause to listen for any calls while actively Sounding to allow for all queued channels to be Sounded on schedule.

Display Sounds	Checked	When checked, causes the display of received sounds on the operator console. It must be checked if you want sounding transmissions to be displayed. Even with this disabled the controller is saving the information away for later use.
Listen Calls	Checked	Listen to calls between other stations. If this is not checked the controller will immediately return to scanning after an ALE transmission pauses scanning. NOTE: See "THIS IS SOUND" above when in Sounding.
Wild Cards	Unchecked	Allows reception of calls using wild card addresses. A caller may use the Wildcard character ("?") to address multiple stations with a single wildcard address. Responses to a call containing an address with wildcard characters are generated in pseudorandom slots to avoid collisions. **NOTE:** On outgoing calls only one character in a wild card address is accepted at the moment.
Freq display	Checked	This option when enabled will display the full frequency and mode on the lower left corner of the screen rather than just the channel number and operating mode. **NOTE:** Still displayed but of no interest to stations that are not under computer control.
LP	Unchecked	NOT IMPLEMNTED. Linking Protection provides AL1/AL2 linking protection. **NOTE:** Disabled at present in all versions of MARS-ALE.
MOTD	Unchecked	Message of the Day (MOTD). If used, it should only be enabled when your station is unattended but available for a connection in either Single Channel or Scanning/Sounding operation. When a call is received if this option is enabled an AMD message will be sent in response to a LINK. You can use it to inform callers of the status of the station, such as: * UNATTENDED OPERATION * AAR2CAB, CAMP EVANS, WALL, N.J. U.S. ARMY MARS * LEAVE AMD MSG **NOTE:** Linked TWX must also be checked. **NOTE:** MOTD is NOT compatible with most ALE hardware based controllers and radios. **NOTE:** MOTD is NOT compatible for AQC-ALE.
Display Bad Data	Unchecked	When enabled this displays frames whose CRCs are incorrect. This was designed to be used for receiving unacknowledged data frames during either DTM or DBM messaging.
Voice Detect	Unchecked	The purpose is to detect if there is voice activity on

		the channel and if so inhibit transmission. Best to use during unattended Sounding operation.
ATU Tune Tone	Unchecked	Provides a 1Khz Tone transmission using the atu_tune.wav wave file for ATU tuning with any system PC sound device. Its up to the user to adjust the wave file for on-the-air duration time and drive level. **NOTE:** When checked, enables this mode and disables the ATU Tune Words method. **NOTE:** This method only works with a sound device set as the system default sound device.
Linked TWX	Checked	Linked TWX (Three Way eXchange) **MUST** be checked for AMD (except for AQC-ALE), MOTD, DTM ARQ, DBM ARQ and DBM FTP to trigger the full initial handshake acknowledge (ACK/NAK) response. If unchecked AMD, MOTD, DTM ARQ and DBM ARQ won't trigger a response. All stations should have the same setting. Linked TWX must be checked for ALL MARS-ALE to MARS-ALE operation with the above modes, but it may not work with all hardware controllers. From testing to date, it has worked with most but not all ALE hardware based systems as many do not have support for Orderwire Handshake. **NOTE:** There is also a new control on the front panel of the tool that will toggle this setting, which upon normal program shut will cause the setting to change as well. **NOTE:** Linked TWX must **NOT** be checked for AQC-ALE AMD or any use of DTM BRD or DBM BRD for any communications. **NOTE:** There is some ambiguity in the MIL-STD over this point, consequently some commercial controllers do and some do not provide handshakes on AMD messages.
Voice ID	Unchecked	At present this can be used for transmitting a 1Khz for ATU Tuning. This will ONLY work with the DEFAULT sound device, if you are using another sound device for the ALE modem that is not selected as the default sound device, this feature will NOT work. Within MARS-ALE there is Voice ID Button Bar button and Tools Menu selection for manual use. In addition the Voice ID check box enables the Voice ID during times of initial LINKING and Sounding. However it also does so during Individual Clear and may do so at other times not yet determined as well.

		The idea here is to provide a means of generating just enough RF energy, just long enough, to allow for an external ATU to tune. For example, using an FT-817 and LDG Z11 external auto turner, there is no interface between the two other than RF. In both single channel operation and Sounding it works just fine using a 1 second duration play time and just enough audio level (default file for distribution is 1 second long and -20db) to excite the ATU. Some users may need to use a longer duration and some may need to adjust the file level from –20db. MIL-STD-188-141A/FS-1045A allow for a tuning tone for automatic antenna tuner support and then the and then start of the frame when the power is up. Alternatively, the ALE modem may transmit repeated duplicates of the scanning cycle (set of) first word(s) to be sent (not to be counted in the frame) as the transmitter power rises to full power level and may even use the ALE signal momentarily instead of a tuning tone for the tuner and then start the frame when the power is up. In single channel operation, only when GROUP/Channel has been used to select your Frequency of Operation (Fo) and that Channel has TX rights, you can either click on the Button Bar ID icon or select the “Tools” -> “Voice ID” menu selection. The MARS-ALE software will initiate you configured PTT selection and play the voice_id.wav file to allow your ATU to tune for the duration of the .wav file recording and then set the radio back into receive mode automatically. At this time, ATU tuning with this method is solely predicated on the fact that the ATU is in the circuit and powered on, awaiting RF to perform its tuning. If the ATU requires any additional hardware signaling PC such as a START TUNE logic line, that signal is not available at present. For automatic operation, the Voice ID box must be checked. The only things that are different than in manual operation is that the voice_id.wav file is played prior to each an every ALE transmission. This is fine for full Sounding operation with a properly adjusted 1khz time duration and tone level for minimum RF, it is also fine for a TWS type GlobalAll call. However, it may not work well for other ALE linking and data modes of operation, more testing is needed. The program is written to only send the voice_id.wav file once during a call/link, it will send it each time during sound for the ATU when the Fo is changed. In the future “ATU Tune Tone” will be added, a

		completely separate TUNE selection, which will use the FSK modem for this purpose, thus keeping the voice_id.wav a separate capability. **NOTE:** As the program was originally written and currently exists, it will ONLY play the voice_id.wav file to the sound device that has been selected as the DEFAULT device. Thus if you have selected another sound device for MARS-ALE operation, the playing of this file will NOT go to the radio transmitter.
Log to disk	Checked	When checked, all engineering data in the lower window is saved/appended to the current ***OW****LOG* files and message data in the top window is saved/appended to the current ***DA****LOG* log file in their respective sub directories. Each time the program is run on a new Zulu day, a new file is started for that session until the program is terminated and restarted. Thus if the program is run over a period of days, all data will be contained in one file for those days. The OWLOG files are stored in the sub directory \owlog which must exist under the directory in which ALE.EXE is located. DALOG files is saved under \dalog. If you just install the update, you will need to manually create these subdirectories to use logging. The file extensions for these files has been changed from ".txt" to ".ow" and ".da" respectfully, however the files are still plain ASCII files. The file naming convention for is mmddyyyy.ow where we are creating the file handle based on the current Greenwich Mean Time (Zulu) date. Thus for an OWLOG file started on 10 January 2005 the file would be named 01102005.ow and will remain so until such time the software is restarted. Should the software be restarted a number of times during the same Zulu day, the file is appended to, thus no previously saved data is lost. The convention many change inn the future to yyyymmdd. OWLOG Files – Contain all ALE activity monitored and shown on the screen, so even if you clear the receive screen (first icon on the ALE taskbar) the data isn't lost. DALOG files – All ALE messages (except FTP files) are saved in the dalog (.da) files. So even if you clear the receive screen (first icon on the ALE taskbar) or anything occurs that kills the program the data isn't lost. As both file types are ASCII files, you can read them with any text editor such as Notepad (if it has not grown to large) and print for later analysis if

		required, but only when the file is not in use.
Use RTS for PTT	Checked	This is the Normal selection for PTT for external interfaces when not using CAT PTT. When it and DTR for PTT are **NOT** checked, then CAT PTT is used if the selected radio type supports CAT PTT. **NOTE:** Radios that require RTS/CTS handshaking such as the Ten Tec Pegasus and others, or where a choice is provided and selected such as Kenwood radios, need to use DTR for PTT with external interfaces. **NOTE:** Selecting DTR for PTT drops the DTR line and removes it as a source of D.C. power for external level converters.
Use DTR for PTT	Unchecked	DTR is the alternate selection for PTT for external interfaces. When it and RTS for PTT are **NOT** checked, then CAT PTT is used if the selected radio type supports CAT PTT. **NOTE:** Currently except for radio type "NONE" and any radio using hardware handshaking, the DTR line is held high for the purpose of powering external level converters for PC to radio RS-232 control when NOT checked. If DTR is checked for PTT, then the line is taken low until used for PTT and removes it as a source of D.C. power for external level converters.
Use RTS for Mute	Unchecked	Used for Speaker muting with additional interfacing when not used for PTT. All that applies to RTS for PTT applies to RTS for Mute operation.
Use DTR for Mute	Unchecked	Used for Speaker muting with additional interfacing when not used for PTT. All that applies to DTR for PTT applies to DTR for Mute operation.
Data Parameters:		
DTM Retries	3 Range is 0..30	Determines the number of times the tool will send a DTM message before the link is terminated. A higher setting can and should be used for poor channel conditions.
Max frame time	30	Length in seconds allowed for a DTM frame. This is required because of frequency inaccuracies (and hence timing) in the PC sound device. Range is 10..1800
DBM Retries	3 Range is 0..30	Determines the number of times the tool will send a DBM message before the link is terminated. A higher setting can and should be used for poor channel conditions.
Max frame time	30 Range is 10..1800	Length in seconds allowed for a DBM frame. This is required because of frequency inaccuracies (and hence timing) in the PC sound device.
Parameters:		
Sounding Period	60	The Period in minutes between sounding

	Range is 1..300	transmissions when Sounding is Checked and the tool is actively Scanning. Aside from NCS approved pre-check beaconing (modified form of Sounding), this value should never be less than 60. Some ALE networks prefer 120. NOTE: For information on NCS pre-check in Beaconing please contact: AAV2AS/AAM3SB. For information regarding the current status of Sounding operation please contact: AAR3BB
Resound Period	30 Range is 0..300	Period in minutes after which an attempt will be made to sound on a channel if a scheduled sound failed. Aside from NCS approved pre-check beaconing, this value should never be less than 5.
DCD Threshold	4 Range is 0..20	This determines the DCD detect sensitivity when scanning, a suitable value is between 3 and 5. If it is set too low the controller stops on every channel and if it is set too high is never stops.
Call Attempts	1 Range 1..5	This is the number of times the ALE controller will try all GROUP/Channels for scheduled sounding pass or fail.
ATU Tune Words	0 Range 0..27	When set to 0, ATU Tune Words is off. When set between 1..27 and "ATU Tone Tune" is NOT checked, it is active and will provide a tone to ATU tuning using the ALE AFSK modem using any PC sound device in the system for a duration based on the value entered. However, the entered value is NOT exactly in 1 second increments as its based on the Tribit buffer for an ALE data Word, 1 equals about 33% of 1 second or so, thus a value of 3 is about one second and 27 is about 10 seconds.
ATU Tune Level	0 Range 1..100	Adjusts the drive level for RF output power when ATU Tune Words is being used. When 0 minimum drive based on the setting being used for ALE tones will be generated. **NOTE:** At the moment this is not yet working.
TWA	180 Range 0..1000 Automatically set to 180 if 0 at Scan Start	Timeout Wait for Activity in seconds. If no PTT activity has taken place the LINK will time out. Sets the LINK timeout time period in seconds. Set to zero (0) your LINK will never time out. Set higher for unattended operation, such as 180 (3 minutes) or 300 (6 minutes). If TWA is set to zero (0) and Scanning is started, the system will automatically set it to 180. There is now a new list box control on the front panel of the tool for rapid changes of this parameter with selections of 0, 60, 120, 180, 240 and 200 seconds.
PTTD ms	30-75 typically	Time allowed in milliseconds for the transmitter

	Range: 3..100,000	system to settle after frequency change before keydown and ALE transmissions start. May need to be higher than the default when using a linear amplifier, external ATU or other in-line switching devices, please check your equipment manuals for settling time recommendations. **NOTE:** Higher settings can affect timing and cause failures of DTM and DBM ARQ mode operation and AQC-ALE.
Sync Votes	20 Range 0..30	Maximum number of no unanimous votes allowed when searching for word sync.
Frame Votes	20 Range 0..30	Maximum number of non unanimous votes allowed when receiving a frame.
SCLC	4-16 Range 0..100 Set to 0 for automatic operation based on the number of channels in the current Scan Group in use.	Single Channel Linking Call. This sets the LINK request frame length during ALE calling in seconds for synchronization. When set to 0, the tool automatically calculates the length based on the number of channels in the scan GROUP being used, if that is the same number of channels as the station you are attempting to link with and that station is not being paused during scanning through the channels then automatic will work well most of the time. For single channel operation it can be set to anything, the lower the better, 4 works well. However it needs to be longer when calling a station operating in Scanning/Sounding. 8 works well, however for the best chance of capturing a station that is Scanning/Sounding 12-16 is better. At times 20 or greater may be needed as the station you are attempting to call may be scanning a large group and/or being paused on one or more channels due to activity. There is now a new list box control on the front panel of the tool for rapid changes of this parameter with selections of 0, 4, 8, 12,16 and 20.. **NOTE:** Has no affect on AQC-ALE.
LQA Timeout	180 Range 10..1000	Timeout period in minutes before Link Quality Analysis (LQA) data for any station last heard is considered un-reliable for aging purposed and is reset. If set to 0, system will default to 180.
Sync Errors	0 Range 0..2	Number of errors allowed when hunting for ALE word Sync. Sync errors are returned from the Golay algorithm and can only detect up to 7 errors or correct 3 not both. If you set the threshold to high it

		will Sync on random noise.
Frame Errors	3 Range 0..3	Number of errors allowed when receiving a frame.
TX Audio Level	1..10 typical Range 1..99 Most radios are in the 1-30 range. NOTE: Most ICOM radios require higher drive levels. Please refer to MARS-ALE Radio Help User Guide for full details.	PC Sound Device (Sound Card) drive level output to transmitter from Line-Out or Speaker-Out as labeled. **NOTE:** Audio Isolation transformers MUST be used. **NOTE:** Set radio RF power control for full output and all speech processors, compressor's OFF and mic gain for good ALC range with normal SSB voice transmissions. Then with the PC Sound device control panel Main/Speaker/Playback or whatever the course output level control is called and the MARS-ALE TX audio level (you will see the WAVE control on the sound panel change) control, adjust for about 35% or less of your full SSB RF output power level while checking for NO ALC moment. **NOTE:** RF output power during ALE and MIL-STD-188-110 modem usage must ONLY be controlled by the use of this setting, do NOT use the radio mic gain or radio RF output power gain adjustments. **NOTE:** You MUST use a tool like QuickMix at present to save and refresh the course sound panel volume setting. See MARS-ALE Radio Help User Guide for full details.
RX Audio Level	1..5 typical Range 1..99	PC Sound Device (Sound Card) input level from receiver to sound device Line-In. For course adjustment, with TUNE display in Tones mode, adjust PC sound device RX audio level so that the Purple bar is never more than half way. **NOTE:** Audio Isolation transformers MUST be used. **NOTE:** Normally we do **NOT** use MIC-IN, it should be disabled on sound device control panel. See MARS-ALE Radio Help User Guide for full details.
Radio 1 Comm Port (Radio and RTS/DTR)	1..9	This is the RS-232 Communications port (COM port) assignment for Radio Control and external interface PTT line (RTS/DTR) as well as external Speaker Muting (RTS/DTR) control. **NOTE:** After this has been changed on the MIL-STD-188-141 Options menu, it is necessary to close the program and restart it for the change to take effect.

		NOTE: Most USB port VCP RS-232 devices will likely work at or below 9600 baud. Above 9600 baud may require testing more than one unit before finding one that works well. The SDT has found that the Belkin F5U109 (with the latest drivers) performs 100% up to 57600 baud in actual testing. **NOTE:** See MARS-ALE Radio Help User Guide for full details.
Radio 1 Alt PTT Port Alternate RTS and DTR for PTT/MUTE purposes.	0..9	RS-232 Communications port (COM port) assignment is for Radio1 PTT for an external interface PTT line (RTS/DTR) as well as external Speaker Muting (RTS/DTR) control only at this time. If 0 is entered, then its not enabled and the Radio 1 Comm Port will be used for RTS and DTR purposes, if 1..9 is entered then this port will be used for RTS and DTR purposes.
ATU Comm Port	0..9	RS-232 Communications port (COM port) assignment is for external ATU support when required. If 0 is entered, then it is not enabled. Please refer to the appropriate application note for the given RS-232 ATU hardware details.
ANT SW Comm Port	0..9	RS-232 Communications port (COM port) assignment is for external Antenna Switch support when required. If 0 is entered, then it is not enabled. When "RS232 Lines" are selected as the ANT SW type, RTS is used for ANT port 1 and DTR is used for ANT port 2. Please refer to the appropriate application note for the given ANT SW hardware details.
Listen Time	60 RANGE 1..86400	Listen Time in seconds which determines how long during Scanning/Sounding the receiving station will pause to listen to a channel during an ALE transmission before continuing to scan. Recommend that 400 be used as a minimum to allow stations Scanning at 2 ch/sec to be able to respond to an AQC-ALE linking call.
MOTD	AMD Length Text Message	MOTD stands for Message Of The Day. This is an item that is NOT an ALE standard capability and should be used with caution. It must **NOT** be used for AQC-ALE operation. It will cause an unattended station message to be sent upon an ALE LINKed state if MOTD is checked. An example being: "* UNATTENDED OPERATION * AAR2CAB, CAMP EVANS, WALL, N.J. U.S. ARMY MARS – LEAVE MESSAGE –". **NOTE:** MOTD is NOT defined in MIL-STD-188-141A/FS-1045A as MOTD, however it is permitted by the standards. Some commercial controllers that

		are not capable of handling an AMD during a LINKing call setup (but most commercial controllers should be able to cope with it) will not handle an MOTD either. **NOTE:** It is doubtful that many hardware based stations will be calling MARS-ALE based unattended stations in any great numbers, at least not until we have a MARS-ALE server version, so MOTD use should not be a problem as much as sending an AMD during a LINKing call. **NOTE:** Linked TWX, which should always be checked for MARS use, MUST be checked for MOTD to work properly.
ATU Type		ATU support Channel by Channel when the channel is changed in any manor when, ATU enabled is checked. One selection will always be checked, Radio CAT ATU is the default. If ATU Enabled is checked for a given GROUP/Channel then the toll will look for a proper selection here to provide ATU support.
Radio CAT ATU	Unchecked	Supports control of an internal ATU for those supported CAT transceivers that provide CAT commands for ATU control. No RS-232 port selection for "ATU Comm Port" is required in this instance. **IMPORTANT:** The radio's ATU must be trained on all ALE channels prior to use with MARS-ALE. This simply means that the ATU must be used on each antenna port with each antenna that will be used for all ALE channels to save all the data to its memories for Memory Tuning operation. Should the ATU not have enough memories for all of the ALE channels or no be a memory type ATU, then one of the ATU tune tone methods MUST be enabled. **How it works**: The ATU is enabled if checked for a given channel, else it is turned off. When the radio in Scanning/Sounding, just before it goes into transmit, the ATU is turned on and if required started. For all units it is recommended to make use of one of the two forms of ATU tuning tone generation, for some ATU units few or no memories the tone prior to data being sent will be required to prevent tuning while sending data.
LDG AT200PC	Unchecked	Supports control of the LDG AT200PC external RS-232 interfaced ATU. A proper port selection for "ATU Comm Port" must also be entered for proper operation. The AT200PC is always set to Ant Port 1 at program start should another antenna switching device such as the DTS- series be selected for use in conjunction with the AT200PC in support of more ports. Please refer to the appropriate application

		notes for the hardware details on the AT200PC and DTS-x antenna switches. **IMPORTANT:** The AT200PC must be trained on all ALE channels prior to use with MARS-ALE. This simply means that the AT200PC must be used on each antenna port with each antenna that will be used for all ALE channels to save all the data to its memories for Memory Tuning operation. **How it works**: The ATU is enabled if checked for a given channel else its turned off. When the radio in Scanning/Sounding, just before it goes into transmit, the Fo is sent to the AT200PC just as it is sent to the radio in QS/S. In single channel operation this occurs each time the user manually changes the channel. Thus with the AT200PC trained for all the channels being used for ALE, it will instantly be ready for use. However, as the unit is set for Auto Tuning should the VSWR be higher than the VSWR Threshold Setpoint (fixed at 1.7:1 for now, user selectable in the future) then with RF applied Memory Tuning will take place and proceed to a Full Tune if no data in memory achieves a VSWR less than the selected VSWR threshold. Thus it is recommended to make use of one of the two forms of ATU tuning tone generation to prevent any possible tuning from taking place while sending data. If a Memory Tune takes place and data is found that works the tuning time is less than 0.1 seconds, however, a Full Tune can take 0.5 to 6 seconds. **NOTE:** Clicking on "LED AT200PC" in the future will bring up a full setup and utilities dialog that is TBD.
LDG Z11	Unchecked	TBD. The SDT is developing an RS-232 hardware interface and modification that will require adding a cable and soldering wires to the PCB behind the front panel. The goal is to achieve control of BYPASS, the unit will always be left in "Auto". This is not a memory tuner, but rather a latched last used tuner and one of the ATU tuning tone methods is always be required.
LDG Z100	Unchecked	TBD. The SDT is developing an RS-232 hardware interface to the LDG "Radio Interface" port. The goal is to achieve control of BYPSS, Memory Tune and Full Tune. This is not a memory tuner, however one of the ATU tuning tone methods is always be required. This selection when available should support most of the LDG units that have a "Radio" or "Radio Interface" port.

SteppIR	Unchecked	TBD. Not an ATU but rather a controller that actually adjusts the length of a SteppIR antenna to resonance. If you are all ready configured with a SteppIR and a supported make/model radio that seems to work with MARS-ALE and you are happy then this selection is not needed. However, using this selection, the SteppIR antenna will be more properly controlled for ALE operations and will work with any radio make/model, not just those directly supported. The PC RS-232 port must be connected to the SteppIR controller "DATA OUT PORT". This is the lower DB9 connector. This port is always active thus allowing control of the antenna by both the computer and radio simultaneously, however that is NOT recommended with MARS-ALE, only the PC should be in control.
NONE	Checked	If no ATU control is desired, NONE should be checked. **NOTE:** Selecting NONE precludes support of other features of some devices, such as ANT SW support for the AT200PC.
ANT SW Type		Antenna switch support is Channel by Channel when the channel is changed and when an Ant Port entry greater than 0 is made on the GROUP/Channels Add/Edit. The Ant Port entry will accept range of 1..10, however not all supported devices provide for 10 antenna ports. It is recommended that if Ant Port is used is should be filled in for all channels such as 1, 1, 2 , 2, 2 , 2 and not 1, 0, 2, 0 , 0, 0 although that would also work when ant 1 is desired for the first two channels and 2 for the last four channels when those channels are being used in the GROUP that they were designated, however if they were reused in other GROUPS (which is not recommend) the 2nd scenario can make a mess of things and you may be using the wrong Ant Port for the ones where 0 is used.
Radio CAT SW	Checked	Supports control of the internal Antenna switches for those supported CAT transceivers that provide CAT commands for control. No selection of "ANT SW Comm Port" is required in this instance. **How it works**: See DTS-4 below. **NOTE**: Some radios offer 2, 3 and 4 ports for TX/RX antenna selection, if number is entered into GROUPS/Channel exceeding the radio capability no

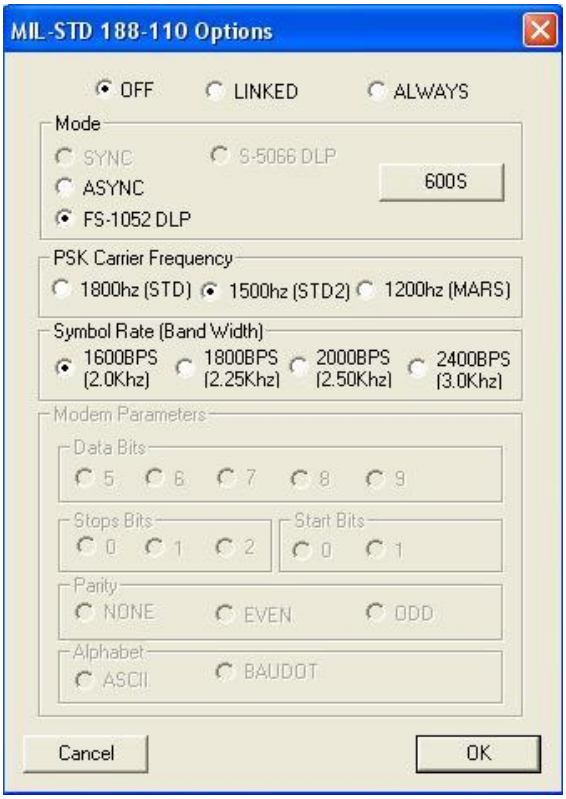
		change will take place and an error message will be printed in the engineering window. **NOTE:** At present the following radios are supported for CAT antenna port: JST145, JST245, R-5000, TS-480, TS-570,TS-870, TS-2000, TS-B2000, IC746, IC746PRO,IC756PRO, IC756PROII, IC756PROIII, IC7400, IC7800, FTdx9000 models. The K505DSP is TBD.
LDG DTS-4	Unchecked	Supports the LDG DTS-4 4-port manual push button/TLL interface antenna selection switch. A user supplied RS-232 to TTL interface is required, details of the designed used by the SDT in development shall be provided. A proper port selection for "ANT SW Comm Port" must also be entered for proper operation. **NOTE:** Support of the DTS-4R in a Y-cable arrangement with the DTS-4 and PC is under development. **How it works:** Each time a channel change is made, the Ant Port number entered will be selected, if 0 or a number in excess of the device capability will result in no change.
LDG DTS-6	Unchecked	Supports the LDG DTS-6 6-port manual push button/TLL interface antenna selection switch. A user supplied RS-232 to TTL interface is required, details of the designed used by the SDT in development shall be provided. A proper port selection for "ANT SW Comm Port" must also be entered for proper operation. **NOTE:** Support of the DTS-6R in a Y-cable arrangement with the DTS-6 and PC is under development. **How it works:** See DTS-4 above.
LDG AT200PC	Unchecked	Supports the LDG AT200PC ATU and its 2 antenna port selections only if the AT200PC is also the selected ATU type. The proper port selection for "ATU Comm Port" must be made. No com port for "ANT SW Comm Port" is required. **How it works**: See DTS-4 above.
ACOM 2000SW	Unchecked	Supports the ACOM2000SW remote antenna switch with its 10 ports. The ANT SW Address must be set to x051h (51 Hex). The proper port selection for "ATN SW Comm Port" must be made.
RS232 LINES	Unchecked	Supports the use of RTS for ANT port 1 and DTR for ATN port 2 via the RS-232 port selected as the "ANT SW Comm Port". This capability in support of user provided interfacing and antenna switching device.

MIL-STD-188-110 Options Menu

The MIL-STD-188-110 Options menu (does not exist in LE) is where the state of the MIL-STD-188-110 for use is chosen as OFF, LINKED or ALWAYS.

It is also where the modem operating modes (FS-1052 DLP and future modes like ASYNC, SYNC and STANAG 5066 DLP) are selected and where the PSK Carrier Frequency, Symbol Rate and ARQ/FTP Data Rates and Interleaver settings are selected.

For the MIL-STD-188-110 native data modes (SYNC and ASYNC and STANAG 5066 when released) the data rate/interleaver settings for these modes will be selected from the FS-1052 Appendix B Options menu as are FS-1052 BRD. The FS-1052 ARQ data rate/interleaver is selected on this menu from the pull-down menu within the "Mode" area the dialog.



The PSK Carrier and Symbol Rate settings apply to all modes used with the MIL-STD-188-110 mode and data rates except 75BPS which uses a spread spectrum technique within a full 3Khz channel. For MARS-to-MARS communications the combination of 1200hz PSK Carrier and 1600BPS Symbol Rate which equates to a 2khz bandwidth for an overall bandwidth of 200-2200hz is the best choice for radios having less than 2.7Khz SSB filters, the next best choice is 1500hz and 1600BPS, the military standard combination of 1800hz carrier and 2400BPS symbol rate for an overall bandwidth of 300-3300hz exceeds the filtering of most Amateur Radio grade radios used by MARS operators. Since MARS-ALE was released in September 2005, the 1200hz PSK carrier selection

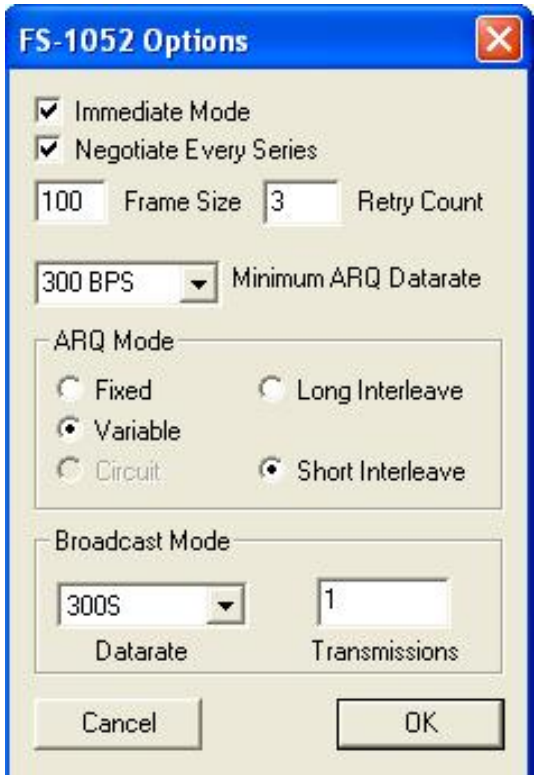
has become the defacto standard for MARS-to-MARS communications using the MIL-STD-188-110 modem as all radio used in MARS operations will support that required bandwidth.

MARS-ALE SE **Configuration Parameters** **Updated 03-15-06**		
POC: AAR2EY/NJ e-mail aar2ey@usarmymars.us **NOTE:** The parameters contained herein are the same as found in the stand alone "Configuration Parameters" document of the same date of release.		
Parameter	**Parameter**	**Parameter**
Configuration MIL-STD-188-110:		**Main Menu, select Configuration, Click on "MIL-STD 188-110 Options"**
OFF	Checked	**OFF** disables MIL-STD-188-110 modem, none of the protocols will be active. OFF, LINKED, ALWAYS are interactive, only one state can be selected at a time. **NOTE:** At this time **OFF** should be the default mode, only enable when use of the MIL-STD-188-110 modem is planned. **NOTE:** OFF can not be the mode in effect when the use of a standard immediate FS-1052 message to establish an ALE LINKed state or a MILS message is desired. **NOTE:** The MIL-STD-188-110 modem is a hog on system resources, for legacy computers under 866MHZ CPU, it will have a dramatic loading affect when not OFF and on such systems it may not be able to decode any transmission being sent, however transmitting will still function, thus FS-1052 BRD can be used to send off a message fast.
LINKED	Unchecked	**LINKED** allows MIL-STD-188-110 modem operation only when LINKed. OFF, LINKED, ALWAYS are interactive, only one state can be selected at a time.
ALWAYS	Unchecked	**ALWAYS** means the MIL-STD-188-110 modem is always operational, even when no ALE link pre-exists. OFF, LINKED, ALWAYS are interactive, only one state can be selected at a time.
ASYNC	Unchecked	NOT AVAILABLE AT PRESENT. Selects MIL-STD-188-110A ASYNC operation. **NOTE:** ASYNC, FS-1052DLP (and future modes like SYNC, 5066) are interactive, only one state can be selected at a time.
FS-1052DLP	Checked	Selects FED-STD-1052 Data Link Protocol (DLP) operation.

		NOTE: ASYNC, FS-1052DLP (and future modes like SYNC, 5066) are interactive, only one state can be selected at a time. BRD and ARQ options are selected from the message dialog when supported.
5066	Unchecked	PLANNED. Selects NATO STANAG 5066 operation.
ARQ/FTP Data Rate Select Button Click/select BPS S/L	600S	This data rate selection pull down menu is for FS-1052 ARQ and FTP mode support only at this time. At first this button is BLANK. When clicked, it provides a pull-down selection of 75-4800 BPS with combinations of SHORT (S) and LING (L) Interleave and NONE for 4800 BPS. **NOTE:** At this time, the first ARQ or FTP transmission will always be at 600BPS, either SHORT or LONG as the Interleave is selected on the FS-1052 Appendix B Options menu. **NOTE:** 75BPS L should be used on the worst channel conditions. 150-300 on poor channels and 300 and above on good channels. **NOTE:** 75BPS selection negates the PSK carrier and Symbol Rate selections from the MIL-STD-188-110 menu and requires a full 3Khz IF BW.
PSK Carrier Frequency	1200hz	Supports the user selection of PSK carrier (which along with PSK carrier determines the BW) of 1200, 1500 and 1800hz. The standard PSK carrier per MIL-STD-188-110 and FS-1052 is 1800hz. For MARS-to-MARS use 1200hz is recommended as Amateur Radio grade transceivers with less than 3Khz BW IF filtering can not handle the 1800hz carrier and Symbol Rate of 2400BPS which extends to 3.3Khz BW at it is to wide, thus the use of 1200hz and 1600BPS for a 2Khz BW covering 200-2200hz total bandwidth is recommended. **NOTE:** The next combination would be 1500hz and 1600BPS for 500-2500hz total bandwidth. **NOTE:** For 1200hz PSK Carrier, only 1600BPS (2.0Khz BW) is supported.
Symbol Rate	1600BPS	Supports the user selection of Symbol Rate (which along with PSK carrier determines the BW) of 2400BPS (3Khz BW) which is the MIL-STD-188-110 and FS-1052 standard symbol rate and 1600 (2Khz BW), 1800 (2.25Khz BW) and 2000BPS (2.5Khz BW). **NOTE:** For 1200hz PSK Carrier, only 1600BPS (2.0Khz BW) is supported.
Modem Parameters	TBD	PLANNED. Supports the user selection of various MIL-STD-188-110 modem parameters which are currently fixed.

MARS-ALE LE/SE
Quick Start Guide
Version 1.02 Beta Released 04-17-06
FS-1052 Appendix B Options Menu

The FS-1052 Appendix B Options menu (does not exist in LE) is where a number of FS-1052 DLP parameters that effect both ARQ and BRD modes are setup as detailed in the chart below.



MARS-ALE SE Configuration Parameters Updated 03-15-06		
POC: AAR2EY/NJ e-mail aar2ey@usarmymars.us **NOTE:** The parameters contained herein are the same as found in the stand alone "Configuration Parameters" document of the same date of release.		
Parameter	**Value**	**Parameter Description, Comments and Notes**
Configuration FS-1052 Options:		**Main Menu, select Configuration, Click on "FS-1052 Appendix B Options"**
Immediate Mode	Checked	Requires FS-1052 to be in LINKED or ALWAYS as selected from the MIL-STD-188-110 menu. Supports starting an FS-1052 session by just entering the message and clicking on OK from the FS-1052 message dialog without first having established an ALE link. When OK is clicked, the tool will automatically make the ALE LINKing call

		to establish the ALE LINK. **NOTE:** The new MARS Immediate Link State (MILS) does not require an actual ALE LINK to be established.
Negotiate Every Series	Checked	During ARQ handshaking FS-1052 DLP will negotiate new data rate and interleave (at present the interleave does not change, more code is needed) based on channel conditions and parameters selected below.
Frame Size	100 Range 56..1023	This is the data packet frame size.
Retry Count	3 Range 1..100	The number of resends upon packet failure. Increase for poor channel conditions. NOTE: Resends start from the beginning of the message, not just the last failed packet.
Minimum ARQ Rate	150 BPS	The slowest data rate in ARQ mode that will be allowed when in Variable ARQ mode. Range is 75..1200 BPS. **NOTE:** 75BPS selection negates the PSK carrier and Symbol Rate selections from the MIL-STD-188-110 menu.
ARQ Mode:		The ARQ protocol was designed to handle and prioritize military messages from multiple sources. Like a gateway between a coastal station and a ship. If a flash message comes through lower priority messages will be suspended and the flash message sent. Then the lower priority messages will resume without needing to resend the whole message from the beginning, that is if you have a priority field in your messages that should determine the DLP message priority.
Fixed	Unchecked	Fixed causes the use of fixed control frame sizes. **NOTE:** Fixed, Variable and Circuit modes are interactive, only one can be active at a time.
Variable	Checked	Variable causes variable control frame sizes. **NOTE:** Fixed, Variable and Circuit modes are interactive, only one can be active at a time.
Circuit	Unchecked	PLANNED. When released, circuit mode will cause the channel to be kept busy with idle null ACK signals sent back and forth to alert everyone the channel is in use. It provides for a link to be established and maintained in the absence of traffic. The ARQ variable-length frame protocol is used along with a technique to maintain the data link connection in the absence of user data between the

		two connected stations until data is ready to send.
Long Interleave	Unchecked	Long interleave is best for poor channel conditions. At present does not work well on a good channel, although it should. **NOTE:** This setting over rides the selection for data rate and interleave for ARQ/FTP operation on the MIL-STD-188-110 menu for the first transmission only by the interleave selected here and at 600BPS data rate.
Short Interleave	Checked	Short interleave is best for good channel conditions. **NOTE:** This setting over rides the selection for data rate and interleave for ARQ/FTP operation on the MIL-STD-188-110 menu for the first transmission only by the interleave selected here and at 600BPS data rate.
Broadcast Mode:		
Data Rate	300S	Combinations of 75-2400 BPS with SHORT or LONG interleave are available. **NOTE:** 75BPS should be used on the worst channel conditions and by those with 3Khz BW. 150-300BPS poor to good channels selecting the most appropriate PSK Carrier and Symbol Rate from the MIL-STD-188-110 menu. **NOTE:** The 75BPS mode is extremely robust as it is implemented using a pseudo RAKE receiver (Spread Spectrum technique using several base band correlators to individually process multipath signal components where the outputs from the different correlators are combined to achieve improved reliability and performance) that constructively adds the multipath components so you get individual symbol diversity on top of the overall diversity of the 75 BPS mode. Also, the PSK Carrier and Symbol rate settings do NOT affect 75BPS operation.
Transmissions	1 Range 1..50	This is the number of times the message will be sent. Setting to greater than 1 is recommended for extremely poor channel conditions.

Sound Card Configure

The "Sound Card Configure" dialog is where the PC Sound Device to be used for the ALE modem is selected along with the "Line-In" audio port. MS-Windows and MARS-ALE can support multiple sound devices and you must select which device you have interfaced as your ALE modem.

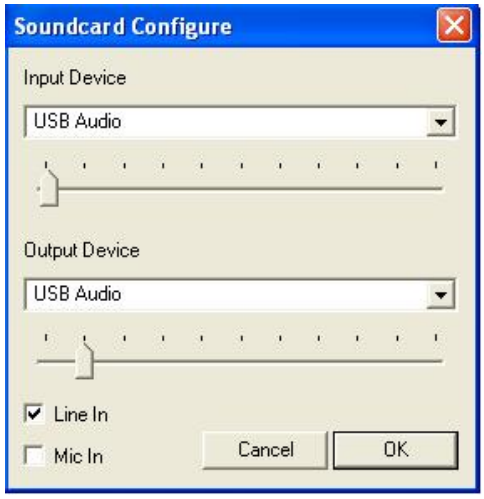
There are many advantages to using a second sound device for your ALE modem as detailed in the "Radio Help Operator Guide", however it must be noted that on some installations predicated on the combination of Windows version in use, sound device hardware and drivers being used, that MARS-ALE may sometimes start with both the Input and Output or just one, selected as "Default Device" rather than the actual name of the sound device you have selected, regardless of whether you only one or not. Thus for best operation, every time you start the tool, this dialog should also should the sound device you have selected by it naming convention.

In addition, due to additional algorithms in new modem core found in the Beta, it supports operation not only on the recommended PCI or external sound devices, such as USB port sound device, it can now also, support most AC'97 based on-the-board sound chip sets as found in laptops and other computers as long as audio isolation transformers are used on both input and output and all other connections between the PC and radio are properly shielded, grounded, isolated and filtered. In addition, the 8Khz LE version will also support ISA sound devices.

However, the best choice for a sound device remains one of the various external units such as USB, PC Card, FireWire etc., details can be found in the "Radio Help Operator Guide".

Although the fine tune Volume Levels used for adjusting both RX and TX audio can be adjusted on this dialog with the slider controls, it is recommended that it be done on the MIL-STD-188-141A Options menu until such time as this dialog displays the actual numeric value.

NOTE: The use of QuickMix or other such tool is recommended to save and restore all the PC sound device settings as MARS-ALE at this time only saves and restores the fine control settings and not the course settings.



MARS-ALE SE
Configuration Parameters
Updated 03-15-06

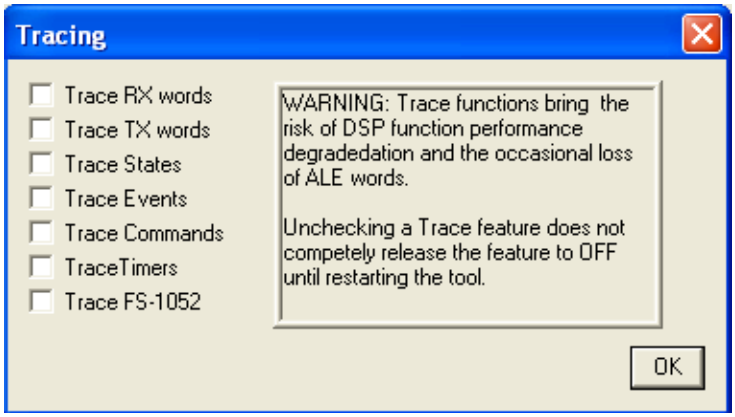
POC: AAR2EY/NJ
e-mail aar2ey@usarmymars.us

NOTE: The parameters contained herein are the same as found in the stand alone "Configuration Parameters" document of the same date of release.

Parameter	Value	Parameter Description, Comments and Notes
`Configuration - Sound Card`		**Main Menu, select > Configuration, Click on "Sound Card"**
		NOTE: All PC sounds MUST be turned OFF if you are using the primary, default Windows sound device for your modem. Sounds that are generated by other programs (none should be running except MARS-ALE) and the Windows Operating System will go to the transmit. These sounds will also mix with ALE transmissions which will cause problems. The best course of action for many reasons is to install a second sound device for MARS-ALE. All stations MUST make sure that under Windows, the "Sounds and Audio Device Properties" have the "Sound Scheme" set to "No Sounds" to prohibit systems sounds from be transmitted.
Input Device	Select the PC sound device to be used for your ALE modem by name.	Use the MIL-STD-188-141A Options panel numeric RX audio entry to set the RX audio level rather than the slider control for precise settings.
Output Device	Select the PC sound device to be used for your ALE modem by name.	Use the MIL-STD-188-141A Options panel numeric TX audio entry to set the TX audio level rather than the slider control for precise settings.
Line In	Checked	Checked (which means your radio audio is connected to the sound card LINE IN input)
Mic In	Unchecked	NOTE: Mute the Mic-In on the Windows Sound Device control panel. **NOTE:** Only use Mic-In if Line-In does not offer enough gain for your radio receiver audio output.

TRACING MENU

The "Tracing" dialog provides engineering tools that are of little interest to the end user of the tool and should be left Unchecked as detailed below due to additional loading of computer resources when enabled. If used, a few as possible should be used at any one time and the program should be restarted immediately after use. All Tracing features will automatically be reset to off upon normal program termination.



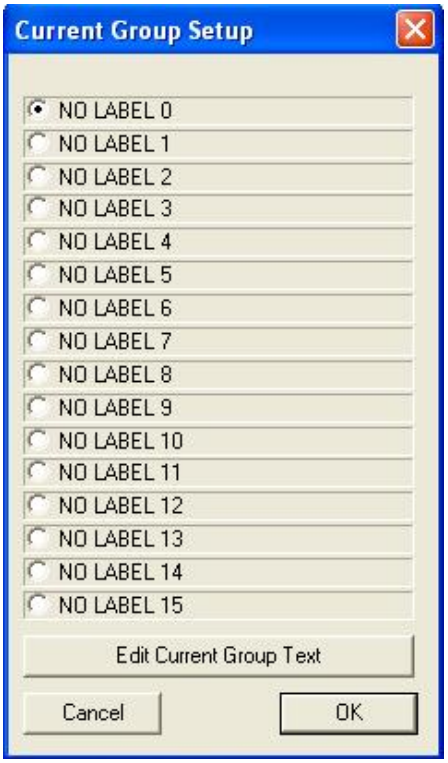
MARS-ALE SE Configuration Parameters Updated 03-15-05		
POC: AAR2EY/NJ e-mail aar2ey@usarmymars.us **NOTE:** The parameters contained herein are the same as found in the stand alone "Configuration Parameters" document of the same date of release.		
Parameter	**Value**	**Parameter Description, Comments and Notes**
Configuration TRACING:		**Main Menu, select Tools, click on "TRACING"**
		NOTE: All TRACING functions should normally be Unchecked. They place a heavy load on processing and produces large quantities of output on both transmit and receive. The use of these functions are known to cause some problems with the DSP functions in the software and occasional cause the loss of ALE words. On computers that are less than 1Ghz CPU and 512MB of RAM and less than Windows XP Home, they will likely cause a program freeze or crash during the reception of data transmissions depending on what combination of trace functions are enabled and how much traffic there is on the channel. **NOTE:** It is recommended that the TRACE functions only be used while monitoring and NOT actively involved in communications unless you

		have been directed by the MARS-ALE Software Development Team to gather certain data during testing. **NOTE:** After any TRACE function has been Checked the tool should be shut down and restarted which will completely kill and reset the TRACE functions to off, just un-checking the features does not completely do so..
Trace RX Words	Unchecked	This option allows the RX Words decoded, it is a good way of seeing commands and start and end of frames and AMD and DTM ASCII messages when receiving. See MIL-STD-188-141A/FS-1045A for details. This is the only TRACE option that user's would find of any use. **NOTE:** RX Words does not display anything with respect to the MIL-STD-188-110 modem.
Trace TX Words	Unchecked	This option allows the TX Words to be broken down and displays the commands being sent and the outgoing address and all parts of the AMD, DTM ASCII message. It will NOT display the DBM outgoing ASCII message. See MIL-STD-188-141A/FS-1045A for details. The information is only of interest to the SDT. **NOTE:** TX Words does not display anything with respect to the MIL-STD-188-110 modem.
Trace States	Unchecked	This option is a window into the tools State Machine as it changes from state to state based on user input and messages being sent and received with commands and data. This option produces very heavy output, especially during Scanning/Sounding operation. The information is only of interest to the SDT.
Trace Events	Unchecked	This option displays all Events. TX Timers, Frame Begins/Ends, Transmissions Complete, etc., it produces very heavy output. The information is only of interest to the SDT. See MIL-STD-188-141A/FS-1045A for details.
Trace Commands	Unchecked	This option allows command strings to be decoded. It is a good way of seeing AMD and DTM ASCII messages when receiving. Displays very little during DBM messages. Also LQA and some other cmds will de displayed. The controller can identify all the 141B command messages but can only decode and display a subset of them, such as TIS and TWS etc. See MIL-STD-188-141A/FS-1045A for details. The information is only of interest to the SDT.
Trace Timers	Unchecked	This option displays the timers such as TWA, TWRT, TWT etc., not of much interest to the user unless directed to provide feedback to the SDT. The information is only of interest to the SDT. See MIL-STD-188-141A/FS-1045A for details.
Trace FS-1052	Unchecked	This option provides heavy data flow during MIL-

		STD-188-110 transmit and receive and a little data during ALE states. The information is only of interest to the SDT.

Current Group Setup

The "Current Group Setup" dialog provides for both the selection of the current default GROUP with associated Channel(s) for use as well as to edit the naming convention of any of the 16 GROUPS using "Edit Current Group Text". The MARS_SHARES.QRG distributed with the software can be loaded as a starting point. It provides for individual ARMY, AIR FORCE and NAVY MARINE CORP. MARS and SHARES groups as well as mixed groups of MARS channels predicated on day/night propagation changes. Stations that are NOT authorized for SHARES operation must not use the SHARES group with anything but RX rights assigned.

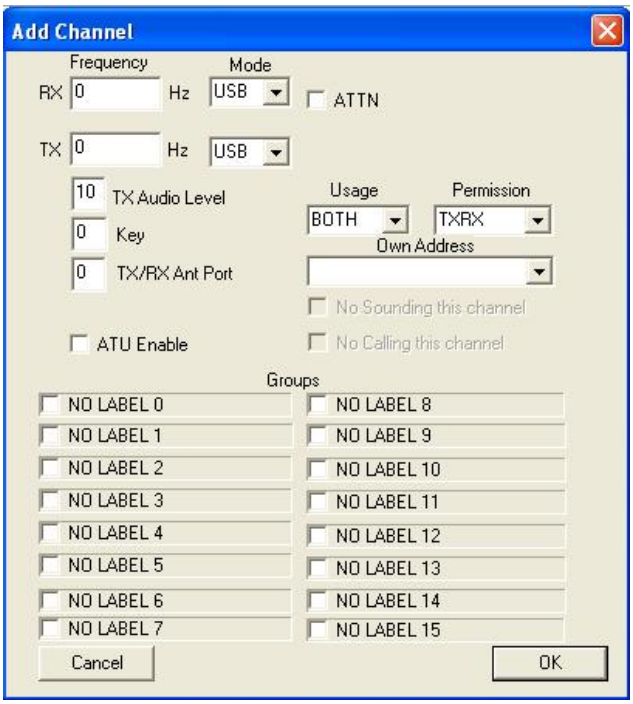


MARS-ALE SE **Configuration Parameters** **Updated 03-15-06**		
POC: AAR2EY/NJ e-mail aar2ey@usarmymars.us **NOTE:** The parameters contained herein are the same as found in the stand alone "Configuration Parameters" document of the same date of release.		
Parameter	**Value**	**Parameter Description, Comments and Notes**
Configuration GROUPS:		**Main Menu, select Channels, click on "GROUPS".**

		NOTE: The fastest way to populate two GROUPS to begin working with the tool is to load the MARS_SHARES.QRG file. **NOTE:** Before loading any .QRG file from a third party, you need to edit it with NOTEPAD so that all instances of OWN is that assigned to your station and then resave the file. If any errors are made in editing the .QRG file the program will display SYNTAX errors when loading the .QRG file. **NOTE:** To load a QRG file, from the Main Menu, select FILL, click on "Load QRG".
Edit GROUP name	Select "NO LABEL 0" or any GROUP of interest to rename and by clicking on that GROUP radio button.	At the bottom of the dialog select "Edit Current Group Text". You will change "NO LABEL 0" in this process. For practice enter "MARS". MARS will now be your PRIMARY scan GROUP. Repeat these steps for each scan GROUP you desire to edit for use. NOTE: If you have the need for more than the GROUPs supported at one time, you can save your GROUPs/Channels to a .QRG file and LOAD in a replacement set and rotate them as needed.

Add Channel

The "Add Channel" dialog (Edit Channel is basically the same) provides access to the selected GROUP to add an additional channel. At this time "Key" are not implemented. At least one GROUP must be selected to add the channel parameters. From 1 to 16 GROUPS may be selected to associate the channel parameters being added.



MARS-ALE SE **Configuration Parameters** **Updated 03-15-06**		
POC: AAR2EY/NJ e-mail aar2ey@usarmymars.us **NOTE:** The parameters contained herein are the same as found in the stand alone "Configuration Parameters" document of the same date of release.		
Parameter	**Value**	**Parameter Description, Comments and Notes**
Add Channel	These are the steps to add a Channel to a GROUP.	**Main Menu, select Channels, click on "Add"**
		NOTE: Each GROUP needs at least one channel. For Scanning/Sounding you need at least two channels. For proper Sounding timing, you need 4 to 6 channels. **NOTE:** No more than 6 channels should be used if its desirable to accept AQC-ALE linking calls when using the 2 ch/sec scan rate. **NOTE:** Whenever the tool is started, the first channel of the selected default GROUP is what your radio under computer control will be set to operate on. **NOTE:** MARS-ALE is Channel rules based. If the channel selected has not been configured for TX or RX/TX, the tool with NOT make your radio transmit. Furthermore, use of the "Manually Controlled Radio Assets" dialog for direct frequency entry will NOT permit transmissions on the selected frequency, you need to use the GROUP/Channel selection interface to make an ALE transmission.
		NOTE: All data should be entered
RX	0000000	RX Operating frequency entered in Hz.
Mode	USB/LSB	Select mode from pull-down.
TX	0000000	TX Operating frequency entered in Hz. If nothing is entered, the RX frequency will automatically be saved as the TX frequency.
Mode	USB/LSB	Select mode from pull-down.
Usage	BOTH	DATA, VOICE or BOTH. If you select Voice, you will not be able to perform Scanning/Sounding or transmit data on the channel.
Permission	TXRX	RX, TX or TXRX. If only RX, you will NOT be able to transmit on the channel.
ATTN	Unchecked	Checked for Attenuator On and Unchecked for OFF. On radios that support ATTN over the CAT

		bus, when implemented it shall control the use of the ATTN on a channel by channel basis.
TX Audio Level Was previously Power (Watts)	0 Range 0..100	Supports TX Audio Level" setting on a channel by channel basis to maintain a constant (or close to it) RF output level across the MF/HF spectrum. The "Use Group TX Audio Level" on the '188-110 dialog under Enable/Disable must be checked, if not, then the "TX Audio Level" value on the '188-110 dialog, which can be considered the master value, will be used for all channels.
Key	0	Encryption Key. NOT IMPLEMENTED
TX/RX Ant Port	0 Range 0..10	Selection of radio antenna port, at first will be where radio supports more than one port via CAT bus. If set to 0, no change will be made, from 1..10 the corresponding port will be selected. Later shall support additional means of antenna selection outside of radio ports via a separate setup facility.
ATU Enable	Unchecked	Enables ATU on a channel by channel basis when checked. The type of ATU support is predicated on selections made from the MIL-STD-188-141 Options dialog.
Own Address	Select from Pull-down	All OWN addresses entered into the system are available. Select the OWN address that you want to associate with this particular channel assignment and GROUP(s) to be used as your OWN Address when initiating an ALE LINK or using the MIL-STD-188-110 message using a protocol that requires an OWN Address. **NOTE:** The OWN Address specified here at present, is your RX OWN Address when using MILS-RX.
Groups	0..15	Check each of the 16 GROUPs that you want the added channel to be active, for instance the "MARS" GROUP and any others.
Edit Channel	These are the steps to edit a Channel in a GROUP.	**Main Menu, select Channels, click on "Modify"**
		NOTE: From the Modify dialog, select the channel, displayed with both overall channel number and frequency parameters. Then follow the directions above for adding a channel beginning with RX.

ALE ADDRESSES

The Primary ALE Address is entered into the OWN ADDRESS database in slot 00 as your primary MARS-ALE Address. It is the Primary ADDRESS that is normally used as your OWN when making ALE Linking Calls and that OTHER stations will see when your station is making an ALE Linking Call or Sounding. However, any OWN address in the database is active to receive a call at, at all times. The software on the calling station side will limit the OWN and OTHER Addressing permitted to only 6 character of less Addresses for AQC-ALE operations

and will advise when an OWN Address for the current GROUP/Channel is not suitable for AQC-ALE operation.

All ALE Addresses should be 6 characters (2 ALE words) or less as such addressing provides the greatest probability of achieving and maintaining an ALE linked state. The use of 6 character Addresing also supports the use of MIL-STD-188-141B Alternate Quick Call ALE (AQC-ALE) which only supports a 6 character (2 word) maximum address. However, for ALE, an address can be as long as 15 characters (5 ALE words), but such an address provides poor results in linking. An Address should always be as short as possible and on even ALE Words (3 characters) if possible. The ALE standard provides automatic stuffing of one or more @ signs on the end of an address that is not an even ALE Word, which the user never sees displayed, but which does make the Address longer and thus less efficient.

Army MARS ALE Primary ADDRESS is your full Army MARS callsign, e.g., for an Army MARS station “AAR2EY” the ALE Primary ADDRESS would be “AAR2EY”. Should your Army MARS callsign exceed 6 characters, it will be truncated in accordance with the 1 DECEMBER 2005 Net Plan, thus AAR2CAB would become AA2CAB.

All Air Force MARS stations use the six characters of their call signs, which are also registered as their ALE call.

Example: AFA1BU SELCAL = "AFA1BU"

Navy-MC MARS has decided to use their full NNN0xxx callsign as their Primary ALE Address. NN0xxx can be used at any time for ALE and must be used for AQC-ALE. For exclusive use in NMCM Net Call (Star Net) operation the last three characters of their MARS call sign may be used as it provides a unique address through out the organization and provides the most benefits with ALE Addressing.

Examples:

PRIMARY	NNN0BCI	=	"NNN0BCI"
AQC-ALE SELCAL	NNN0BCI	=	"NN0BCI"
STAR NET	NNN0BCI	=	"BCI"

Add Addresses

The OWN Address is your MARS callsign and any extension or modification as directed by operational directives for use by stations that will be calling you and for your station to identify with during LINKing and Sounding TIS and TWS transmissions and the sending of all messages.

The OTHER address is the MARS callsign and any extension or modification as directed by operational directives for station that you will be calling.

The TT and TWR parameters on the "Add Other Address" dialog are TT: tune-up time delay of antenna tuner or coupler and TWR: wait for reply time. The default values are acceptable for both ALE and AQC-ALE. However, a TWR increase to 4096 may be preferable for use with stations that are Scanning/Sounding using baseline ALE at 2 ch/sec. to improve linking probability when calling with AQC-ALE. These parameters if not set the same by all stations within a group of stations can cause failures in timing needed for Linking and Messaging, its best for all to use the defaults.

Parameter	Value	Parameter Description, Comments and Notes
Add Addresses	These are the steps to Add an OWN and OTHER Address	**Main Menu, select Addresses**
Click on "Add", "Own"	Enter Address	Insert your Own ALE MARS Address. Your must enter your full Callsign with MARS appended to is as the PRIMARY address, which is address 00. For AQC-ALE the currently active OWN must be 6 characters or less.
Click on "Add", "Other"	Enter Address	Here you enter any legitimate MARS address, Primary or Secondary for stations that you will be calling, must be 6 characters or less for AQC-ALE.

PC SOUNDS AND ALE MODEM

In the "Radio Help Operator Guide" there is a more extensive version of this section with the same title which explores the details of how to check your sound device suitability as an ALE modem.

All PC sounds **MUST** be turned **OFF** if you are using the primary, default Windows sound device for your ALE modem. For those that are using other digital modes and are using a VOX type interface (which is **NOT** allowed with MARS-ALE) this is a critical item to prevent on-the-air transmissions from your station that will cause interference and eventually be tracked back to your station.

If this is not done, all sounds that are generated by other programs (none should be running except MARS-ALE) and the Windows Operating System will go to the transmit. These sounds will also mix with ALE transmissions, which will cause performance problems. The best course

of action for many reasons is to install a second sound device in your PC for all digital modes, including MARS-ALE.

All stations **MUST** make sure that under Windows, the "Sounds and Audio Device Properties" have the "Sound Scheme" set to "No Sounds" to prohibit systems sounds from be transmitted. The only exception to this is when a second sound device is being used for MARS-ALE and is NOT selected as the default sound device.

PC Sound Device Sample Rate -

The highest frequency which can be captured in digital form is half the sample rate: thus with a 44.1Khz samples per second sample rate, you can cannot convert more than 22.05 Khz audio signal. However, there are significant effects at lower frequencies, so it is desirable to work at a higher sampling rate when practical. Most audio recording is done at 48Khz and professional mixing is often done at 96Khz. The MARS-ALE software is using a 48Khz sample rate or rather 48000 samples per second for MARS-ALE SE and 8Khz sample rate or rather 8000 samples per second for MARS-ALE LE in the new BETA tools.

PC Sound Device Sample Rate Error -

Although the new modem in the BETA now has algorithms that compensate for sample clock errors, it is still recommended that you test your sound device to determine how close to being within 10Hz of being on frequency for both transmit and receive by using the popular MMSSTV software procedure commonly used in the Amateur Radio and MARS communities in conjunction with the Time and Standards signals transmitted on WWV.

The sound device clock for the sample rate needs to be as close as possible to being on frequency. Some Amateur Radio digital mode programs provide a method of entering a correction factor when the sound device clock is in error. See the "Radio Help Operator Guide" for details on how to determine if your PC sound device is suitable for MARS-ALE.

SETTING UP TX AUDIO

The TX Audio is setup using the ALE AFSK modem. Testing performed by the SDT and core ALE Test Team has determined that the QOR achieved with absolutely NO amount of ALC and less than 35% of your SSB voice RF on the AFSK modes has been significant in reducing distortion and thus improving performance.

NOTE: The MIL-STD-188-110 PSK modem requires very linear audio drive, the tool provides a PSK TX audio drive that is about -6db down from the AFSK modem for the same TX audio level setting, thus your RF power output should be about half of the FSK when transmitting with the PSK modem. It is imperative that they be NO ALC at all with the PSK modem.

To setup the TX audio using the ALE AFSK modem, first adjust your SSB transmitter with any SSB RF Power Control to 100% and your MIC gain for good ALC range (any speech processor or speech compressor MUST be OFF) with your voice peaks or a two-tone test is you have such.

Next, starting with your MARS-ALE TX audio level set at say 40, and any external adjustment such as in an external interface such as the RigBlaster set wide open, enable and adjust the

volume levels on your PC sound device Windows Playback Volume Control panel main control sometimes called Playback, Master, Primary Volume or other things, this is the course control, the WAVE volume control is fine control, its adjusted by the MARS-ALE TX audio level, set the course control to about 50%.

Then on the MIL-STD-188-141 Options menu, set SCLC to about 20 for this process, next while making a LINKing call, note your transmitter ALC, if it's not moving at all, you can bring up the course control until you just see ALC move, then back off for no ALC. Then you can take a look at your RF output power, it should be about 30-35% of your full output power. **NEVER** exceed these levels. You may need to interactively work with the course and fine audio levels, you may even need to use the external adjust potentiometer should you have one to get things just right as some PC sound device drivers have poor linearity. When complete, at any time should you need to reduce your RF power, you MUST do so with the TX audio level adjustment within MARS-ALE and **NOT** the radio mic gain or RF power control.

You must also use QuickMix or the like to save the course Playback PC sound device setting for TX audio and reset it prior to use of the tool as MARS-ALE does not do so at present. Power levels of 10-20 watts work very well with these modes. Also, for the new comer's, you MUST only use the Left Channel of stereo audio via wiring or mono settings and you MUST use audio isolation transformers for both input and output and your MUST use Line in and Line/Speaker Out.

SETTING UP RX AUDIO

The RX audio is also first setup using the ALE AFSK modem. You need to set your radio audio level (if not a fixed port) to a level that is comfortable listening and NEVER, NEVER, NEVER change it! If you can't abide by this then you need to use a fixed audio level port on your radio. Some radios with fixed output on dedicated ports have been found to have way too MUCH output, you may need to either open the radio and adjust or put in a potentiometer or other means to attenuate the receiver audio to the PC sound device if this is so.

On the Windows Sound Device Recording Panel, you need to select Line In, the MARS-ALE tool when selected for this should make this happen for you, some drivers under some OS's are problematic and you may need to it from the control panel. You will need to manually use the balance control to select the Left Stereo Channel of audio or Center of Balance, all the way to the Right Channel kills the Left Channel. From within the program you need to bring up the RX audio level until you are able to reliably make a NORMAL ALE Link with one of the 24/7 stations on the ALE channels. Then you need to work with another station and make sure that you can reliably and consistently receive AMD messages and then DTM BRD and ARQ, don't worry about DBM, that one will work as soon as you can make a link happen.

When you have the RX audio level setup for this level of performance on good channels, you then, at present, need to increase the RX audio level by about a factor of 2x to 3x for the PSK modem to work consistently well. When you are always seeing the full FS-1052 BRD status messages and RX error being displayed, as well as printing the messages on good channel conditions, then you have got it setup.

TUNE WINDOW

The "TUNE" window mode of "Sync" should always be used when actually attempting to establish an ALE link or to send/receive data with MARS-ALE when using less than a 866Mhz PC. Also, under the MIL-STD-188-110 Options menu, keep "OFF/LINKED/ALWAYS" set to "OFF". The reason being that both the Tones display and serial modem loads the CUP/OS and testing has shown much better ALE performance in the above configurations. For systems with less than 866Mhz CPU, after you have established a link, and desire to work with the FS-1052 DLP, simply enable it and proceed. This procedure does prohibit using the initiation of and FS-1052 MSG to make the ALE LINKing call.

NOTE: Under MARS-ALE the modes "OFF", "LINKED" and "ALWAYS" exist regarding the MIL-STD-188-110 serial modem menu. OFF means that the MIL-STD-118-110 modem code is OFF. LINKED means that the modem code is active and looking for serial modem signals when LINKED. The ALWAYS means that the modem is always looking or serial modem signals even when NOT in a LINKED state. If you want to be able to initiate a LINK, send an FS-1052DLP message and CLEAR the link in one shot by just going to DATA and selecting FS-1052 MSG when NOT linked and selecting the ADDRESS of the receiving station, then you MUST be in ALWAYS mode. LINKED mode will only allow FS-1052 MSG when LINKED. Also, the "Terminate when done" for an FS-1052 message has now been coded, checking this item will cause the LINK to be cleared after the message has been sent, successfully or not.

NOTE: The new MARS Immediate Link Step (MILS) allows for the immediate LINK state to be established without an actual ALE or AQC-ALE LINKing call for the purpose of sending an FS-1052 message, upon completion of the message being sent, whether or not you have checked "Terminate when done", the LINK will automatically be cleared.

The TUNE display, when in "Tones" mode, accounts for about a 10% or greater degradation in the performance of the tool with respect to the use of the "Sync" mode of TUNE window display. This is attributed to the overhead in processing data and updating the TUNE display window to provide the user interface a near-real time activity display. This is very noticeable on legacy computer systems below 866Mhz.

NOTE: It is also known that RS-232 and PS/1 based mice, as they generate a hardware interrupt are also a noticeable problem on marginal CPU based systems. It is highly recommended that a USB port mouse be used on all systems.

The "Sync" display has been improved in the latest version of the tool. In addition, the SDT is developing a less processing intensive display of some type that will provide the needed parametric data. There are also plans to provide a "TUNE" mode of "OFF" as a user selection, as going from "Tones" to "Sync" provides a huge improvement, "OFF" will provide an additional improvement.

As ALE is a channel based operation, where all stations MUST be on the exact same frequency and there is NOT use made of any tuning of frequency, there is no need for any type of tuning display in that regard. The displays do however yield parametric data that the operator can interpret which does assist in the diagnosis of station problems and channels conditions as well as

when to kill a link or long message or file transfer as an experience user we know its not happening.

HOW SYNC WORKS

The MARS-ALE modem must addresses two very difficult problems with respect to SYNC:

- Tracking Symbol SYNC
- Synching in a Multi-path environment

Hunting for preamble Sync is the most CPU intensive part of the modem processing and the tool is simultaneously decoding both ALE, AQC-ALE (and MIL-STD-188-110 signals if enabled). If we loose SYNC when we have moved one symbol, it then takes 250 symbols to regain SYNC, there are 147 symbols in an ALE word, thus we need 1.5 ALE words to re-SYNC.

In the previous modem, when hunting for SYNC, with each sample the modem was looking for the tone with the greatest magnitude and added a fraction of that to the sum of all previous (decayed) magnitudes for that symbol position. That was stored in a 64 position buffer. The SYNC point was considered as the position with the greatest magnitude. There are a number of problems with this.

1. Multi-path degrade the SYNC point

2. Timing is required for the Attack/Decay constants to allow fast SYNC acquisition and slow SYNC decay so that SYNC it does NOT drop out on fades.

3. The ALE tones don't necessarily change on each symbol so you cannot be guaranteed to get 8 ms pulses.

4. If the TX/RX sample clocks are not the same, the symbol positions will drift. You may have to add/remove bits from the bit stream to maintain symbol alignment.

The BETA program contains a new modem core with a new bit SYNC routine that copes with PC sound devices that have slightly off frequency sample clocks when using the MFSK ALE waveform. It parallel decodes the ALE symbol in 4 positions 0, 16, 32, 48 samples into the symbol. When it finds SYNC it chooses the SYNC position that has the biggest magnitude as the real SYNC. The main thought behind this is simply adding or subtracting one sample to the sample block size to get the sync to move.

The sync errors are actually the Golay error correction level. The more errors you can detect the fewer errors you can correct and the more errors you can correct the fewer errors you can detect. So the lower the error correction level the more likely it is to detect errors. The maximum number of errors Golay can fix is 3 hence the 0 - 2 in setup. For Sync its best to set it to 0 for fix no errors but detect 7. The number of errors you can detect is 2X + 1 the number of errors you can correct. So a 24,12 Golay code can detect 7 errors or correct 3 errors.

The GREEN maker of the new SYNC display does not seem to move much is because the SYNC routine is aggressively trying to keep it stationary with the hump in the middle. With the previous modem the left side of the display was always at a fixed point in the SYNC buffer (the start). So different SYNC points would have the peak at different places. With the new modem the display

is locked to the sync position so the hump should always be in the middle and not move if the feedback loop in the SYNC routine is functioning correctly as will be seen in image captures herein.

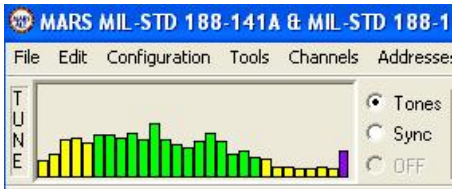
FFT Reset:

With the previous modem there was an FFT rounding error that would cause the modem to lock up and cease working after many hours or days of operation, the slower the CPU speed the sooner this would occur. This is no longer the case, the program will no run for as long as the Windows OS remains stable.

To cure this problem an FFT Reset routine as been incorporated into the new modem that periodically resets the sliding FFT algorithm which is called when: we scan to a new channel; when ALE word SYNC is lost; every 60 minutes if not in Word SYNC hunting.

TUNE Window "Tones" mode -

During ALE reception, the TUNE "Tone" display provides a visual indication of the audio spectrum passband where the 8-ary ALE tones will alternate between GREEN/YELLOW and RED as SYNC is achieved (discussed in more detail later in this section and the "Sync" section) and data is being demodulated. During MIL-STD-188-110 modem operation this display has no meaning other than showing the deviation from center frequency of the serial waveform.

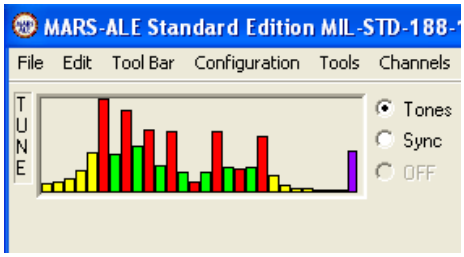


The "Tones" mode also provides feedback regarding your receive audio level indicator being fed to the PC device (a.k.a. sound card) modem via the last vertical (Purple) bar, which will indicate audio level from the receiver at all times. This audio level indicator should be about one quarter to one third of the height of the window as seen above when the ALE 8-ary tones are being received during ALE linking and messaging.

The audio level indicator bar will be higher at times during channel activity than for a relatively quiet frequency with low noise levels. Tuned to WWV during the 1Khz tone, the audio level indicator bar it should go to about one half vertical height. During MIL-STD-188-141A/FS-1045 reception, it should go to about half height and no more that three quarters of the height maximum. For MARS-ALE the typical receive audio level setting on the "Configuration Options" menu is less than 10 for most make/model radios, however ICOM radios will require about 50 or more.

A number of things can be observed when using the "Tones" TUNE mode, with experience the user can actually see these details noted below of the ALE waveform in the display and the characteristics the radio IF BW filter skirts on the tones can also be seen in the amplitude of the tones.

The ALE waveform is designed to pass through the audio passband of conventional SSB 3khz channel bandwidth radio equipment. The waveform is an 8-ary frequency shift keying (FSK) modulation with eight orthogonal tones. Each tone is 8 milliseconds in duration (period) and ranges in frequency from 750 Hz to 2500 Hz with 250 Hz separation between adjacent tones. Each tone represents three bits of data, resulting in an over-the-air data rate of 375 bits per second (b/s) or 125 tones (symbols) per second (a.k.a. 125 BAUD).

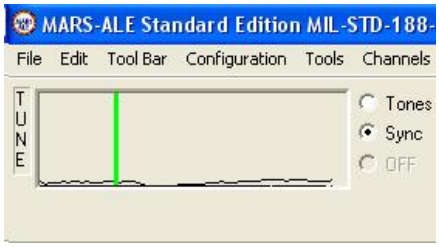


A review of the Tune display reveals that there are 27 vertical bars. The 6th one in the audio spectrum represents the beginning the ALE 8-ary at 750hz and then every other one is another tone in the 8-ary which consists of 8 tones stepped at 250hz., the discrete tones being 750, 1000 1250, 1500, 1750, 2000, 2250 and 2500hz. The first bar in the display is at 125hz and each bar is a step of 125hz in frequency, ranging from 125hz to 3275hz for the last bar. Thus the seven frequency marks for the bars between the 8-ary tones are at: 875, 1125, 1375, 1625, 1875, 2125 and 2375hz.

The 8-ary tones are represented by the first GREEN bar for 750hz, alternating every other GREEN bar in 250hz steps to 2500hz. Thus the bars in between are NOT part of the 8-ary signaling tones and thus during ALE linking etc. do NOT turn from GREEN to RED, only the 8-ary tones go to RED when SYNC is achieved and held as data is being decoded.

During data reception the amplitude of the 750hz (first GREEN bar) and the 2500hz (last GREEN bar) is not totally comparable for passband as these are SYNC levels of the data bits (bits in an ALE word being received) and not signal audio amplitude being displayed. Also, the lower tones representing data bits will be used more than the higher tones in that regard. When looking at the display and monitoring noise or other signals, it is the length of dwell time at a particular tone in a time domain that is causing a pip to display in the frequency spectrum, however, amplitude does factor in as the overall amplitude of the display decreases as the input level from the receiver is decreased.

TUNE Window "Sync" Mode -



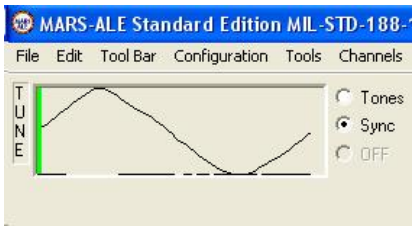
The "Sync" mode displays a "Sync" waveform that is representative of the preamble code reception of a short sequence of symbols at the beginning of a coded sequence used to achieve synchronization. This sounds simple, however the truth is that it is not, those interested can read about it in more detail in FS-1045A, Section 5. "Detailed Requirements", refer to: http://www.its.bldrdoc.gov/fs-1045a/45-detr.htm. During MIL-STD-188-110 modem operation this display has no meaning as its basically noise to the algorithms.

The TUNE window in "Sync" mode provides feedback on the incoming signals "Sync" lock status which provides an experienced ALE operator with a visual indication of the current channel conditions an the likelihood of achieving and maintaining a LINK, however MARS-ALE v1.02 Beta is using a new modem core with a new SYNC display appearance, it now uses the color scheme of the TONES window as well.

When the TUNE window is in "Sync" mode, as seen above, that GREEN vertical line will moving about slightly to random noise and non-ALE signals much slower than in the past with the BLACK horizontal line jumping about quite a bit with channel noise and voice signals of all types unless there is some FALSING on digital signals.

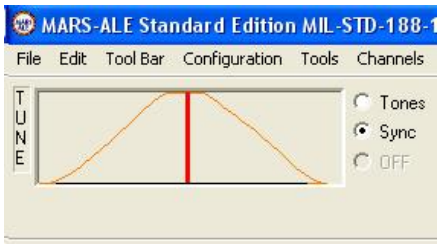
During all this time the amplitude of the Sync wave form shape will mostly be near the bottom of the window, but not the flat line of the past, it may at times take on the shape of a sine wave with a large pulse of noise while remaining BLACK and the vertical SYNC marker line will remain GREEN when its just noise, it may be at the far left or just about anywhere within the window. At times that horizontal line will be moving about like a grain a grass in heavy wind producing all types of interesting, but meaningless wave shapes.

If a true ALE signal is heard, but it is very weak, the GREEN vertical line may jump from one location to another and even turn RED now and then and the BLACK line may start to steadily take shape and rise but not change color to ORANGE. You may also see the change to a RED marker line and ORANGE sync waveform start and then change right back to GREEN marker and BLACK sync pulse.



As a true ALE signal is detected with decent signal strength as indicated by the height of the SYNC pulse waveform, the program will start to SYNC, the BACLK SYNC pulse waveform line will start to rise and change color to ORANGE and shape to that of a sine wave and the vertical SYNC marker line will change to RED as the black line changes to ORANGE and the RED SYNC line will stabilize near the center of the peaking signal pulse as the SYNC pulses build as seen below.

Then as SYNC lock is achieved the waveform changes to a full peak filling the screen as seen below.



The more stable the SYNC, the more stationary vertical SYNC mark indicator is while remaining RED, if the SYNC is poor it will flash between RED and GREEN and the SYNC line may flash between ORANGE and BLACK and the SYNC pulse shape may also fall apart.

There may be some amount of jittering about the top of the window indicates one or more problems with achieving and maintaining SYNC that the modems algorithms are compensating for, this includes sample close error, weak signals, very strong signals, fading signals, multi-pathing signals and severe amounts of QSB, noise, static crashes and various types of interference. The new modem, even under the worst of conditions will usually continue to hold SYNC lock unless the channel conditions offer no hope of supporting the ALE protocol. Then either a channel change is in order or the use of AQC-ALE can be made, which provides for improved protocol parameters between it and baseline ALE will allow for use under worst channels conditions. With baseline ALE the receiver has to work out what state it is in from its internal state tables. With AQC-ALE the link state can be had from looking at the received frame. Thus SYNC for linking and messaging is much improved with AQC-ALE.

Lastly, at times when attempting to establish an ALE LINKed state or between handshakes with messages, the yellow envelope may be gray rather yellow as seen below.

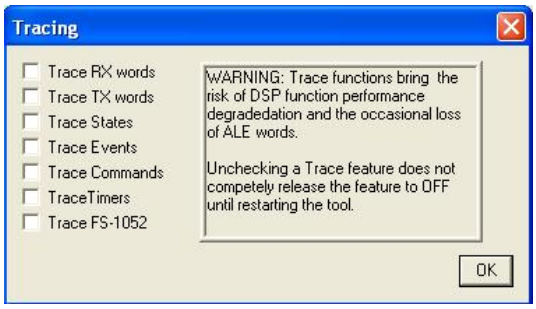
This will often happen when the signal is too strong or too weak or during multi-pathing channel conditions or when a very strong signal comes along within your passband or just adjacent. When this happens during linking or messaging you may see a delay with the new modem in the BETA and then it will go Yellow as seen below.

However it may remain gray, in which case you will need to select Tools > Reset Modem as seen below to manually reset the modem.

TRACING DETAILS

With respect to MARS-ALE (its different under PC-ALE and not recommended for use at all), on the main menu under tools, exists the selection of "Tracing". This feature provides seven check boxes to enable/disable the display of data related to Received (RX) Words, Transmitted (TX) Words, program States, program Events, program Commands, program Timers and FS-1052 parameters. These are basically Engineering tools. The operator normally does not need to have them on, at most the "Trace RX Words" would be of additional benefit to the operator.

If you are one of the program developer's and or know all there is to know about the details as specified in MIL-STD-188-141A/FS-1045A and MIL-STD-188-110A/FS-1052 then perhaps you may understand all the data that can be displayed. However, even the SDT at this juncture is NOT even fluent in the language of Tracing.



Using all but "Trace FS-1052", the following data was captured on the receiving end of the an Individual Call being made from by a calling station via two radios on dummy loads. See if you understand what it all means, can you tell where it starts and were it ends and all that took place ?

```
Event = EV_RX_FRAME_END
State = SCANNING STOPPED
[RESUME SCAN]
Event = EV_RX_FRAME_END
```

```
[END OF FRAME]
[TWS AAR2EYMARS]
[RX][CH 15][START OF NORMAL FRAME]
State = PAUSE SCAN TO LISTEN FOR CALL AFTER WORD SYNC
Event = EV_RX_FRAME_BEGIN
Event = EV_AQC_FRAME_END
State = SCANNING STOPPED
[RESUME SCAN]
Event = EV_AQC_FRAME_END
[RPT 908DFA ]
[RPT F1195E ]
[TO  AAR]
[TO  AAR]
[TO  AAR]
[RX][CH 15][START OF NORMAL FRAME]
State = PAUSE SCAN TO LISTEN FOR CALL AFTER WORD SYNC
Event = EV_RX_FRAME_BEGIN
Event = EV_AQC_FRAME_END
State = SCANNING STOPPED
[RESUME SCAN]
Event = EV_AQC_FRAME_END
[TO  AAR]
[TO  AAR]
[RX][CH 15][START OF NORMAL FRAME]
State = PAUSE SCAN TO LISTEN FOR CALL AFTER WORD SYNC
Event = EV_RX_FRAME_BEGIN
Event = EV_AQC_FRAME_END
State = SCANNING STOPPED
[RESUME SCAN]
Event = EV_AQC_FRAME_END
[TO  AAR]
[TO  AAR]
[TO  AAR]
[RX][CH 15][START OF NORMAL FRAME]
State = PAUSE SCAN TO LISTEN FOR CALL AFTER WORD SYNC
Event = EV_RX_FRAME_BEGIN
[23:49:38][FRQ xxxxxxxx][AMD][AAR2EYMARS     ][DE AAR2EY BT SITREP PSE
BT AR ]
```

The answer to the above question is likely “NO”, which is why not having all those Trace features enabled is no great loss to you. However, NOT having them enabled is a BIG benefit as they do degrade the performance of the program at present.

It is recommended that all Tracing be **“UNCHECKED”** except when just monitoring, if you are looking to LINK and exchanged data with the least amount of impact to the process, do NOT having any Tracing checked. It you want to observe the operation of the tool while monitoring other stations or if you are just being experimental and you want observe what takes place while performing casual LINKING and data exchange and understand that the tools performance with be degraded that check the Trace feature you feel that you need.

MARS-ALE LE/SE
Quick Start Guide
Version 1.02 Beta Released 04-17-06
DATA MODES

Below are the combinations of supported data protocol modes within MARS-ALE and their current status.

Automatic Message Display (AMD) - This message protocol is mandatory for all ALE controllers. **NOTE:** The confirmation handshake, referred to in MARS-ALE as "Linked TWX", often referred in the ALE hardware world as "Orderwire Handshake" is not supported by all hardware controllers or is often not enabled for more efficient usage of on-the-air channel time. In MARS-ALE the last 100 received AMD messages are available for review and will be over written in FIFO order and can optionally be deleted with user confirmation from the Data > AMD MSG menu selection.

AMD - Orderwire Message

- Limited to 90 characters.
- LINKED TWX on the MIL-STD-188-141A Options menu must be checked on both stations for the receiving station to send and the transmitting station to respond to a confirmation handshake for ALE. **NOTE:** AQC-ALE AMD does not support the Orderwire Handshake, AMD at Individual Call or Individual Clear. Also many older hardware ALE controllers do not support these uses of AMD either.

MOTD - Message Of The Day ("Out Of Office" response)

- Sent after a LINKed state to the calling station if enabled on the receiving station.
- Best use is for announcing the current status of the station being called such as when in unattended operation. **NOTE:** Not part of the ALE standard, must always be OFF for AQC-ALE use, also, many older hardware ALE controllers can not handle MOTD.

NOTE: For ALE, the DTM, DBM and FS-1052 as well as the FTP modes if selected without first having an ALE LINK established, have the ability to establish the LINK and then send the message and then automatically CLEAR the LINK. For FS-1052 Immediate Mode must be selected on from the FS-1052 Options menu and ALWAYS must be checked on the MIL-STD-188-110 menu. As AQC-ALE does not support this, these features are grayed out.

Data Terminal Message (DTM) – This is an optional message protocol that most ALE hardware systems do not provide as standard. DTM messages can be up to **32KB** in size.

DTM BRD

- LINKED TWX is **NOT** to be used, when it is checked on the sending station end, it will signal a handshake failure as the receiving station does NOT send a confirmation handshake.

DTM BRD "Terminate when done"

- Clears the LINK when done, the sending station will get an additional set of messages similar to the following:

```
[22:59:54][FRQ xxxxxxxx][CLEARED ][AAR2EY          ]
[22:59:48][FRQ xxxxxxxx][MSG SENT][AAR2EY          ]
```

DTM ARQ

- LINKED TWX is **REQUIRED** checked at both sending and receiving stations. During the sending of the message, depending on the size, the system may exchange multiple ACK/NAK sequences prior to completion. The receiving station will see even short messages of a few lines display piece by piece on their terminal.

DTM ARQ "Terminate when done"

- Fails. Until further notice do not bother to use this option.

Data Block Message (DBM) - This is an optional message protocol that most ALE hardware systems do not provide as standard. DBM messages can be up to **32KB** in size.

DBM ARQ

- This protocol will send a short message of EEI length usually in one piece, however longer messages will display piece by piece depending on the size, the system may exchange multiple ACK/NAK sequences prior to completion.. This protocols has a musical quality to it toward the end, the sending station will get a confirmation message similar to:

```
[00:31:33][FRQ xxxxxxxx][MSG SENT][AAR2EY         ]
```

DBM ARQ with "Terminate when done" checked:

- Does NOT clear the link when done. Sending station will see a message similar to:

```
[00:50:58][FRQ xxxxxxxx][MSG SENT][AAR2EY          ]
```

DBM BRD

- Broadcasts the message, no automatic feedback regarding success.
- LINKED TWX is **NOT** to be checked. If you have it checked you will receive a HANDSHAKE FAILED indication for the number of retries you have set and you will always get a MSG SENT indication as seen below:

```
[00:43:05][FRQ xxxxxxxx][MSG SENT][AAR2EY          ]
[00:43:05] * HANDSHAKE FAILED
[00:42:54] * HANDSHAKE FAILED
```

DBM BRD when "Terminate when done" checked:

- FAILS. Does not clear the receiving station, only the sending station. The Message or may not get through, you will receive HANDSHAKE FAILED indication for the number of retries you have set and you will always get a MSG SENT indication as seen below:

```
[00:57:04][FRQ xxxxxxxx][CLEARED ][AAR2EY          ]
[00:56:58][FRQ xxxxxxxx][MSG SENT][AAR2EY          ]
[00:56:58] * HANDSHAKE FAILED
[00:56:47] * HANDSHAKE FAILED
```

File Transfer Protocol (FTP) - This capability is only for use between stations using MARS-ALE. It is not to the RFC-959 File Transfer Protocol standard specified in MIL-STD-188-141B Appendix E.

DBM FTP -

- LINKED TWX is **REQUIRED** checked at both sending and receiving stations.
- This is not the fastest way to send a file with the tool. It will support sending a binary file or ASCII file. It is best to only send small files. I would not send anything larger than 10Kb at present. The maximum FTP file size as coded is 500KB.
- The receiving station will find the file, it successful, in their \DOWNLOAD directory with ALE.EXE is located. The sending and receiving station may get a lot of messages during this one.
- You may get HANSHAKE FAILED you may and recover a number of times depending on retries. When completed successfully the sending station will get a message similar to:

```
[01:13:47][FRQ xxxxxxxx][LINKED  ][AAR2EY         ]
[01:13:45][REMOTE][TRANSFER] OK download\ALE_Icon1.jpg
[01:13:32][FRQ 05711000][@ Good Msg]
[01:13:32][FRQ 05711000][@ DB_NORMAL_ALE]
[01:13:32][FRQ 05711000][@ dtm_crc_word]
```

FS-1052 FTP -

- This is the fastest way to send a file with the tool. It will support sending a binary file or ASCII file. It is best to only send small files no larger than 10Kb at this time. The maximum FTP file is 500Kb as coded.
- At this time, after each FS-1052 FTP message the transmitting station needs to break the link, then reestablish the link to send the next message.
- The receiving station will find the file, if successful, in their \DOWNLOAD directory where the MARS-ALE executable (.EXE) file is located. The sending and receiving station may get a lot of messages during this one.
- When completed successfully the sending station will get a message similar to:

```
[02:39:50][FRQ xxxxxxxx][CLEARED ][AAR2EY         ]
[02:38:14][REMOTE][TRANSFER] OK \temp_dnload\ALE_Icon1.jpg
[02:39:44][FS-1052 Message Confirm ID 0 AAR2EY    ]
[01:47:41][LOCAL][SENDING] D:\temp_dnload\ALE_Icon1.jpg
```

FED-STD-1052 Protocols - Messages under MARS-ALE FS-1052 can be up to 32KB in size and “Terminate when done” works will clear the ALE link when the message has been sent.

FS-1052 BRD with and without “Terminate when done” works.

Broadcast (BRD) will send the message for as many re-transmissions are selected under the FS-1052 DLP Appendix B Options menu, the default being 1. There is no handshake with BRD.

FS-1052 ARQ with and without “Terminate when done” works.

In ARQ mode the message is sent once and the speed can be locked or allow to change with channels conditions in an async manor. The number or re-transmissions for errors are selected under the FS-1052 DLP Appendix B Options menu. There is no handshake with BRD.

MIL-STD-188-110 MARS Immediate Link State (MILS) -

The MARS-ALE tool beginning with B007A8 has the ability to make use of the MIL-STD-188-110 PSK modem by creating an artificial LINKed state and using any protocol and mode supported by the MIL-STD-188-110 modem.

FS-1052 DLP MILS Operation -

A. When you have an ALE (or AQC-ALE LINK) established, MILS is disabled.

B. When you do NOT have a ALE LINK established MILS is an option.

C. The RX station simply clicks DATA > FS-1052 > MILS-RX and they are ready to receive. You no longer need to select the address of the station that will be sending the message, just as you do NOT in ALE.

D. The TX station simply clicks DATA > FS-1052 >, types/pastes the message and selects ARQ or BRD (default) and clicks on MILS-TX

E. When the message has been sent, successfully or NOT, the TX station will send the ALE CLEAR to break the link. The ALE CLEAR has been improved and works much better. However, should it fail, the RX station should hit their AXE to CLEAR. If you don't, you will still be in MILS-RX and LINKed to the station that sent you the message as your system now knows who that station is from Addressing. You will NOT be able to send anything until you clear the link.

RADIO ADJUSTMENTS

During Single Channel operation, the experienced operator can make certain radio receiver adjustments to improve operation.

When poor channel conditions exist, such as high noise levels, static crashes and weak signals that causes problems during a LINKing attempt where NORMAL-ALE fails to link (use of AQC-ALE can also be made to overcome such channel conditions) the operator(s) can often compensate for the poor channel conditions with radio receiver and transmitter adjustments.

WEAK SIGNALS -

When weak signals that causes TUNE “Sync” pulse waveform vertical line to go from GREEN to RED to GREEN and jump about, the receiving station can request that the sending station increase RF output power, this is actually supported in MIL-STD-188-141B as an ALE command in support of an ALE hardware radio capability to reduce power during linking automatically, but is not implemented in MARS-ALE.

STRONG SIGNALS -

When strong signals causes TUNE GREEN “Sync” pulse waveform vertical line to go from GREEN to RED to GREEN and jump about, the receiving station can request that the sending station decrease RF output power, this is actually supported in MIL-STD-188-141B as an ALE command in support of an ALE hardware radio capability to reduce power during linking automatically, but is not implemented in MARS-ALE.

HIGH NOISE LEVELS, STATIC CRASHES AND MULTIPATH -

Fast AGC is required for AQC-ALE and recommended for ALE, but it may not always the best setting. AGC reduces the overall gain of our receiver, usually in the IF stages, but sometimes also in front-end RF stages. The methods used for AGC gain reduction almost always reduce the usable dynamic range. If a high noise level hangs your S-meter at S-9, half of your receiver's dynamic range is no longer available. If we attenuate the input so that the noise barely activates the AGC, we have nearly all the dynamic range available to handle various signals. When poor channel conditions exist, such as high noise levels, static crashes that causes TUNE “Sync” pulse vertical line to change back and forth rapidly from RED to GREEN the receiving station can try to adjust their AGC setting from the normal FAST AGC to SLOW or MEDIUM AGC, if needed, even AGC OFF may be tried for ALE, however for AQC-ALE it must always be set to FAST AGC.

There is another problem with the effect of noise on AGC. AGC reduces the average signal level with its relatively long recovery time, but AGC detectors have a fast attack which responds to peaks. Noise has a disproportionate effect on AGC, since noise has very high peak levels with low average power. As a result, it takes less noise power to activate the AGC than signal power. When noise is reduced ahead of the AGC detector (using your attenuator), the signal-to-noise improvement is larger than the amount of the attenuation. A more down-to-earth way to put this is-if you can add enough attenuation to limit the noise level to S-1 or S-2, you will hear many more signals that were previously inaudible because the noise was keeping the AGC

unnecessarily high. For example, tune in a channel between 2 and 5Mhz and listen for poor channel conditions, now add the 30 dB or more of attenuation to get the S-meter down to the low end of its range. You will almost certainly discover that your receiver works a lot better than you expected. Although the receiver RF Attenuator can be utilized, most radios do not provide a sufficient range of attenuation steps alone to be the answer.

However, most newer radios provide better way to derive improved dynamic range from a reduced noise floor level, which will make the difference between success or failure. The receiving station can make use of their IPO/AIP/PREAMP or RF gain settings depending on the make/model radio being utilized. Depending on your radio, if you have IPO (Yaesu - Intercept Point Optimization) or AIP (Kenwood - Advanced Intercept Point) or RF PREAMP choices on ICOM radios or whatever your make/model calls the ability to provide an improved dynamic range (also reduces adjacent signal interference should that be a factor) from a reduced noise floor by decreased RF gain at the first receive RF amplifier, use it, as you can increase the dynamic by 100db or more on some receivers.

Another method that works well, if your radio has no fixed selection is to adjust your RF gain to reduce the noise floor, but unless your RF gain has an on/off and most don't, its a lot of knob twisting when stations are coming in at various signal strengths.

ACCELERATOR KEYS AND FRONT PANEL CONTROLS

As covered elsewhere, the tool provides the standard Windows top level menu structure for access to all setup/operational menus, ALT-letter accelerator keys are provided for each selection, hold down the ALT key and the letter for each selection will be exposed, such as ALT-C for the Channels menu. In addition the following accelerator key combinations have been added to speed certain functions that are even quicker with a key combination than a mouse:

ALT-Z - In the spirit of the Z Signal "ZAT", opens the "Send AMD Message" dialog where if you are already linked, you can send an AMD and if you are not yet linked and are in baseline (NORMAL) ALE, you can initiate a LINKing call with an AMD message.

CTRL-B - Opens the "Send DBM Message" dialog where if you are already linked, you can send an AMD and if you are not yet linked and are in baseline (NORMAL) ALE, you can initiate a LINKing call with an AMD message.

CTRL-F - Opens the "File Transfer" dialog where if you are already linked, you can send a file using FS-1052 FTP or DBM FTP and if you are not yet linked and are in baseline (NORMAL) ALE, you can initiate a LINKing call with an AMD message.

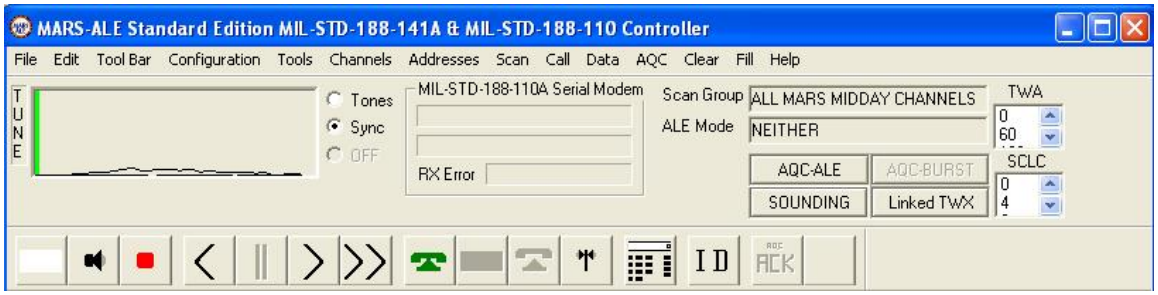
CTRL-I – When a linked state exists, opens the Individual Clear dialog.

CTRL-L - Lists up to the last 100 AMD messages received.

CTRL-M - Opens the "MSTD-188-110 Message" dialog where if you are already linked, you can send a FS-1052 message and if you are not yet linked and are in baseline (NORMAL) ALE, you can initiate a LINKing call with an AMD message. Optionally you can utilize the MILS capability. NOTE: Not applicable to MARS-ALE Legacy Edition.

CTRL-Q – When an AQC-ALE link has been established, opens the Quick AMD Dictionary dialog to send a QAMD message.

CTRL-T - Opens the "Send DTM Message" dialog where if you are already linked, you can send an AMD and if you are not yet linked and are in baseline (NORMAL) ALE, you can initiate a LINKing call with an AMD message.



The front panel as detailed elsewhere proves main menu, the TUNE window, MIL-STD-188-110 status window, Scan Group and ALE mode windows and new in the BETA are front panel controls for changing some parameters on the fly that are found on the MIL-STD-188-141 Options menu.

The name entered for the currently selected Scan GROUP will always be displayed in the “Scan Group” window. The current ALE mode will always be displayed in the “ALE Mode” window, where “NEITHER” indicates that since the tool has been started it has not heard any ALE and has not been used to make any ALE call, thus it is not committed to either mode. NORMAL indicates that the tool is in baseline ALE mode from either an intercept of an ALE transmission, or having made and ALE call. ALTERNATE indicates that the tool is in AQC-ALE mode from either an intercept of an ALE transmission, or having made and ALE call.

The four push button controls below the “ALE Mode” window are toggles for AQC, AQC-BURST, SOUNDING and Linked TWX enabled/disabled status. When a push button is pressed, the state will toggle and a message will appear in the lower Engineering window that announces the change of the state for the particular parameter. In the future, the state of the push buttons being depressed will indicate that the parameters is Enabled, at present there is no correlation.

The two list box controls provide for the selection of values for TWA and SCLC, a mouse double click of the left mouse button will cause the selection of the highlighted parameter and a message in the lower engineering window indicating the change has taken place.

The Icon Tool Bar as seen above resides just above the two messaging windows, from left to right icons are:

Clear Screen - [White Square icon]: Clears all text from both the Message window and Monitor windows.

Toggle Receiver Muting - [Black Speaker icon]: Mutes receiver audio as operator has configured.

Push-To-Talk - [Red Square icon]: Immediately toggles Radio PTT line as operator has configuredfor PTT.

Step Back a Channel - [Less Than symbol]: Causes the controller to reset the radio frequency and move to the most previous channel in the currently selected GROUP. (not used for single channel operation).

Pause Scan - [Double Vertical Bars]: Causes SCANNING or SOUNDING to Pause (not used forsingle channel operation).

Step Forward a Channel - [Greater Than symbol]: Causes the controller to reset the radio frequency and move to the next channel in the currently selected GROUP (not used for single channel operation).

Resume Scan - [Double Greater Than symbols]: Causes SCANNING or SOUNDING to Resume.

Individual Call - [Telephone On Hook icon]: Initiates an Individual call.
Send AMD - [Envelope Icon]: When LINKED with a YELLOW Envelope icon, initiates sending an AMD message.

Individual Clear - [Telephone OFF Hook icon]: When LINKED, clears the LINK.
Kill Current Link or Outgoing Call - [Black Axe icon]: When LINKED, KILLS the LINK.

Manually Control Radio Assets - [Keypad icon]: Initiates the "Manually Control Radio Assets" operator interface panel. (not used for single channel operation).

Manual Voice ID - [ID icon]: Initiates the sending of the voice_id.wav file by placing the radio into PTT for as long as it requires to the play the voice_id.wav file. If the voice_id.wav is NOT present, it will simply cause the radio to toggle PTT. NOTE: Do NOT click the ID icon unless you desire to make an on-the-air transmission of the contents of the voice_id.wav file.

The Icon Tool Bar can be un-docked, allowed to free float or snapped to the sides or bottom of the window as well as the top or hidden altogether. To undock the tool bar you need to double click or click and drag the tool bar between, above or below the icons, the area to the far right where there are no icons will not allow this.

When un-docked and free floating, the tool bar will have a blue top border and a Red X

Close button. When free floating, either on or off the tool, using the main menu "Tool Bar" selection and "Dock Home", will return the Icon Tool Bar to its normal position.

When the tool bar has been snapped (docked) to another area of the screen, "Dock Home" has no effect. Should the tool bar be closed, "Dock Home" has no effect and the toolbar shall not be accessible again during the current session.

The big advantage of having the Icon Tool Bar dockable is that more vertical space is provided for the display of Messages and Engineering information. This is especially true when the tool bar is away from the tool area altogether.

NOTE: When floating it will stay on top unless moved off.

QUIET SCANNING/SOUNDING

Most Amateur Radio grade transceivers and many Commercial and even some Military make/models use Band Pass Filters (BPF) to meet spectral purity which are either switched with diodes or relays. With ALE operations employing Scanning/Sounding those relays will take one heck of a beating in a relatively short period of time.

Quiet Scanning/Sounding (QS/S) is a method used by MARS-ALE only during Scanning/Sounding operation and only with radios that support it to keep those relays from energizing and de-energizing for the switching in and out of the BPF needed for a new frequency range each time the MARS-ALE controller changes the RX frequency, they will then only do so when the TX frequency is changed. QS/S either uses a pre-existing control code is sent to the radio to bypass BPF relays (such as the Harris RF-350/RT-1446 series) or a transceiver is placed into SLPIT VFO operation with “VFO A” being used for the RX frequency and “VFO B” being used for TX frequency.

The TX frequency is sent to the transceivers TX VFO just before TX during Sounding or any type of Call or other transmission under computer control for the given GROUP/Channel selected. That frequency change will only cause the BPF relays to work if the frequency is different from the last TX frequency sent to the transceiver.

In addition, it is planned that for those radios which support computer control of the internal antenna tuner (ATU), that when the program has been coded to support the addition of ATU information on the GROUP/Channel setup dialog, that the program will also manage the state for the ATU so that it is only engaged when the TX is called.

Most modern Amateur Grade radios use mechanical relays for BPF switching (some use expensive linear or less expensive non-linear semi-conductors, which can cause distortion if the best devices are not used, which are costly) as these less expensive mechanical relay prevent 2nd order distortion at the primary stage of signal processing, most manufacturers use relays. However, when the radio is subjected to rapid frequency changes that exceed the current BPF range, the relays switch this switching is audible. The use of these types of radios with an ALE controller (hardware or software) can make these relays sound a bit like a machine gun cycling. In addition, the extra amount of relay activation decreases the
overall life of the relays.

However, as these BPF are used for filtering transmitted signals, they are engaged on the transmit VFO of most radios that offer split frequency operation, thus, if we operate the radio in SPLIT MODE, the BPF relays for most make/model radios will not come into play during Scanning/Sounding. If split mode is selected, then during Scanning and Sounding these BPF relays are not energized until the radio in Sounding goes into transmit mode, thus the noise is reduced and the wear and tear on the life of the relays is minimized.

The SDT has found that the QS/S approach works perfectly on many of the newer radios, however it does not work on all radios, examples being the Ten Tec radios, the ICOM Marine Grade radios and most Yaesu radios fail to comply, many of the Commercial radios tested also fail to comply. The ICOM IC-7800 partially supports QS/S in that the BPF relays work for QS/S by there are front end mixer relays still be switched with relays. When you start software, it announces if the radio selected for use complies for QS/S at program. A comprehensive list of radios know to comply is provided in Appendix A of the Radio User Help Guide.

Another issue is where QS/S would work, but we have not found any such radios where it is needed yet, is where SPLIT MODE cannot be enabled automatically, thus the user would NEED to enable split mode manually. For these radios, the software will send the frequency and mode information to both VFO A and B even if SPLIT MODE is not enabled, in such cases it's in the user's hands to enable SPLIT mode for Scanning.

Also, if the radio has an ATU and it is engaged, it will still be playing while Scanning and Sounding, some will only do so at TX, but most internal ones will do so during RX, some are only in line in the TX, but some are in line during both RX and TX. It is planned to code to only enable the ATU just prior to TX for those radios that support bus control of the internal ATU, not all do and some may be to slow to be ready, experimentation is still required in this area.

The approach taken to make QS/S work via SPLIT VFO is:

1. At startup, the radio is placed into normal VFO operation, whenever Scanning/Sounding operation is started, SPLIT VFO mode operation is invoked. "VFO A" is the RX VFO and "VFO B" is the TX VFO. When Scanning/Sounding operation is terminated, normal VFO operation is automatically resumed.

2. During Scanning/Sounding and any frequency selection for most radios, the RX frequency is written to the radio "A VFO" along with the mode.

3. When it comes time to transmit the radios frequency is written to the radio "B VFO" along with the mode if the TX frequency is not the same as last used.

4. When Scanning/Sounding is terminated, so is SLIT VFO operation.

A simple test to determine if a radio will work with QS/S or not is to turn your internal ATU OFF and RIT/XIT OFF, using 'VFO A' change frequency on your radio using what ever means desired, until your hear the BFO relays come into play. Then back up in frequency and you will hear the relay's again, then enabled "SPLIT VFO" and once again tune through the frequency cross over point that the BPF relays previously activated, if nothing is hear, your radio is QS/S qualified, if its not listed as such in Appendix A herein, please send a message to the SDT so that it can be added to the QS/S routines and list. Like wise, if you radio is on the list, but does not work, please inform the SDT so that it can be removed.

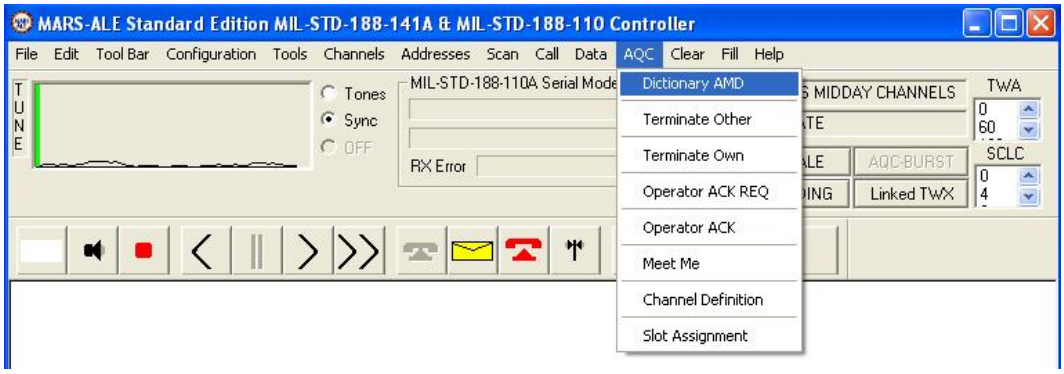
ALTERNATE QUICK CALL (AQC) ALE

MARS-ALE v1.02 Beta now provides for support of Alternate Quick Call ALE (AQC-ALE) which is an optional form of ALE detailed in MIL-STD-188-141B, Appendix A. AQC-ALE provides a link establishment technique that requires significantly less time to link than the baseline ALE system and is significantly better at establishing and maintaining a link on under poor channel conditions.

This is accomplished by some additional technology and trading-off some of the lesser used functions of the baseline ALE system for a faster linking process. The primary focus of AQC-ALE is to establish a link between two or more stations as rapidly as possible. Once linked, information can be exchanged in the most efficient manner as is common between stations. AQC-ALE is basically a tactical tool, in that although it supports Scanning/Sounding and most things that baseline (a.k.a. NORMAL ALE) supports, AQC-ALE is usually used in small tactical network operations rather than fixed point 24/7 ALE Network operations.

MARS-ALE is always listening for the baseline ALE call and shall automatically respond and operate in that mode or AQC-ALE when called. However, to initiate an AQC-ALE contact, the operator must select AQC from the MIL-STD-188-141 Options menu by checking AQC. This selection is NEVER to be checked when Sounding on standard ALE networks at this time.

AQC-ALE allows for a maximum of a 6 character (2 ALE word) address for both the OWN, OTHER and NET address and MARS-ALE has been written to fully trap for any addressing in excess of 6 characters. In addition, AQC-ALE does NOT support AMD, DTM or DBM during link set up, or an AMD at link clear or an MOTD or initiating an AQC-ALE link by use of a MIL-STD-188-110 modem associated link request. MARS-ALE has been written to exclude these types of messages when initiating or clearing an AQC-ALE link, however it is up to the user NOT to use MOTD when using AQC-ALE.



It is permitted to make an AQC-ALE linking call to any AQC-ALE station that supports AQC-ALE, be that a MARS-ALE based or hardware (very few are active within MARS at this time) based AQC-ALE station that is Scanning/Sounding, as AQC-ALE stations can always receive and reply to either a baseline ALE or AQC-ALE call.

However, AQC-ALE has a very fast calling handshake and all parties must be using FAST AGC and the Scanning/Sounding station MUST be operating at a 5 ch/sec scan

rate for best results. A 2 ch/sec scan rate will work depending on the number of channels in the Scan Group and timing considerations as to when the calling station starts transmitting and when the Scanning station comes to that channel next, a 1 ch/sec. scan rate will not work reliably. An AQC-ALE call will reliably capture a station Scanning that is using a 6 channel or less Scan Group at a 2 ch/sec. scan rate and has "Listen Calls" checked and "Listen Time" set to 400.

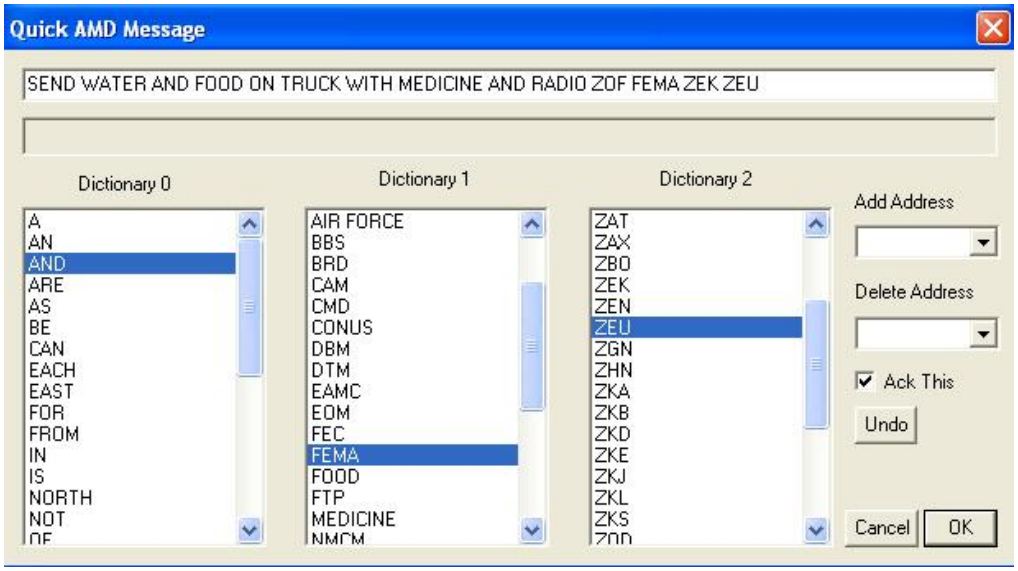
Quick AMD Dictionary

AQC-ALE offers additional tactical features not found in baseline ALE, such as Quick AMD Dictionary operation.

QAMD works from three dictionaries in a code book fashion where no actual text of the message is being sent out over the air. It is a table lookup value in the code book which are the dictionaries. There is no data encryption going on here. Using a combination of a fixed dictionary for most commonly needed words and mission specific expressions in the additional two dictionaries, which can be changed to fit the scenario of the Exercise or non-Exercise

AMD Dictionary is a quick mouse double click system of selecting words and phrases to create an AMD when using AQC-ALE. The operator can not enter any words on the fly, the word or phrase must pre-exist in the dictionaries. In the example below, the message "SEND WATER AND FOOD ON TRUCK WITH MEDICINE AND RADIO ZOF FEMA ZEK ZEU" was created pretty fast and when sent would be pretty secure.

.



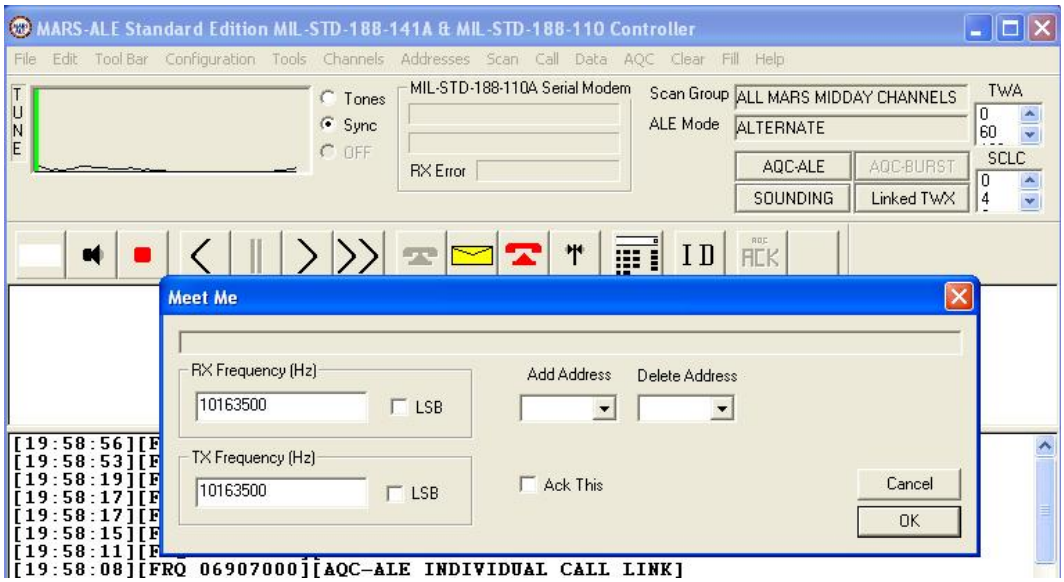
If all the users are not using the same dictionaries then the receiving station will not print the proper message, thus if a MARS member or third party does not have or is not using the proper Dictionary files they will not be able to intercept the message in whole. All users must be using the same set of Dictionaries, it's a tactical thing.. If you do not have the proper set of dictionary files you will still print words, just the wrong words, of if you have no dictionary files installed or too few words in your dictionary then you will just print the place holder index location such as {1,96} for should have been a word at that

location in your dictionary, which is the place holder of the word in the dictionary that is missing in your dictionary.

For testing the Dictionary capability, the BETA has provided a sample integral Dictionary (DICT0) which is the same for all users and two sample external Dictionaries (DICT1 and DICT2) which must all always named the same. These files in content and format are subject to change, they are only for testing at this time. You will note that Q and Z signals are used in the sample DICT 2. These dictionaries can hold 32 words each up to 10 characters long as the tool is currently coded. The number of entries can not be changed, so 32 entries by 3 dictionaries yields a total of 96 selections. However, the number of characters per selection for longer phrases can be changes.

AQC-ALE MEET ME

AQC-ALE provides the "Meet Me" dialog for rapid frequency changes that can steer an entire net on the fly, the "Meet Me" Orderwire command capability.



The "Meet Me" capability requires that all stations in the link be under computer control and all are using the exact same GROUP/Channels configuration, then the NCS or any station can steer the group (or individual station) to a new channel instantly without the need for a voice announcement or even an AMD message.

The process simply requires entering the RX and TX frequency in Hz (channel based pull down from current GROUP is planned) and checking LSB if required and clicking OK, then an Ordewire message is sent and all the stations will QSY to the new frequency/mode pair if entered correctly and if existing in the current GROUP of all linked stations. Optionally stations may be added or deleted from the linked stations and an acknowledgement (Ack This) may be requested.