

Military Auxiliary Radio System Navy-Marine Corps MARS

MARS Operator Course

3.01.a

06 SEP 2008

Unit Five RADIOTELEPHONE DIGITAL PROCEDURES AND MODES

Contents:

- * Lesson 1 – Radiotelephone
 - * Lesson 2 – Digital Communication Procedures
-

Lesson 1 RADIOTELEPHONE

Note: Paragraph numbering in this lesson does not cross reference to another document.

V-101. Voice Standard Operating Procedures

In 2007 the three MARS services chiefs, Air Force, Army, and Navy-Marine Corps, agreed to establish a set of common, unified voice net procedures to insure that all three services conducted voice nets in the same manner. It was developed by a committee with equal representation from each of the respective services, under the guidance of the three MARS chiefs all working together.

The Voice Operating Procedures is officially titled *U.S. Military Auxiliary Radio System (MARS) Joint Air Force, Army, Navy-Marine Corps Standard Operating Procedure for Calling and Operating a Voice Net.*

“Voice SOP” may be used as the short title. This document was approved by all three

MARS chiefs with a letter of promulgation dated 22 NOV 2007, to become effective 01 JAN 2008. This document supersedes NTP-8 (D), Chapter 7.

Some questions in the review test and final exam will be based on the Voice SOP. Be sure you obtain a copy of this document and study it thoroughly.

V-102. Operating Rules

Adherence to prescribed procedure is mandatory. Unauthorized departures from or variations in prescribed procedure are prohibited. This isn't just being rigid. MARS operates as closely as possible to prescribed US Navy practices. The Voice SOP is based on the Allied Communications Plan (ACP-125). These practices have evolved as the most efficient means based on a great deal of experience under all sorts of conditions and circumstances. To deviate from these procedures will invariably create confusion and reduce both reliability and speed.

Transmissions by radiotelephone shall be as short and concise as practicable consistent with clarity. The use of standard phraseology enhances brevity. It also increases clarity and reduces errors because prescribed practices are what receiving stations know and expect to hear.

Transmissions over radiotelephone should be clear with natural emphasis on each word. In radio transmissions higher pitched voices tend to carry further, but are harder to understand. Deeper voices are much clearer, but do not carry as well. In short, don't try to change your voice to what you think is better. Just speak normally. Operators should speak in natural phrases, not word by word. If technically practicable during transmission the operator shall pause after each natural phrase and interrupt the transmission (un-key the transmitter) momentarily, to allow another station to break in if necessary.

New members especially tend to speak too fast when passing a message. Try this. Mimic writing over the text of the message by hand as you read it. This will help you pace your speaking and reduce the necessity for repetitions.

To avoid interfering with other traffic, an operator shall listen to make certain that a net/frequency is clear before making any transmission. A common problem during check ins is doubling with another station. It is helpful when checking in if you pause and un-key briefly after sending the NCS call sign, just to see if you hear another station also transmitting. This pause is a requirement of the Voice SOP on all voice nets among all three MARS services.

When necessary for a station to initiate test signals for the adjustment of a transmitter before making a call such signals will not continue for more than 10 seconds. Netting is the process by which the NCS transmits a signal so that all stations may tune to his or her frequency. The procedure for netting is laid out in the Voice SOP.

Call signs shall be spoken using the phonetic equivalent except that since all

NMCMARS calls begin "NNN" we simply say, "EN EN EN" then the suffix phonetically, e.g. "EN EN EN ZERO ALPHA SIERRA ALPHA".

Full call signs are always used except when Net Control Station (NCS) has authorized use of abbreviated calls (just the suffix phonetically). Even then, a full call sign is never wrong.

V-103. Use of Operating Signals

Operating Signals ("Q" and "Z") as covered in NTP-8 Annex C are designed for digital keyboard to keyboard nets, not radiotelephone transmissions. In radiotelephone procedure the corresponding proword, or operating information, will normally be spoken in concise plain English phrases. However, the use of operating signals is permissible when they are included in the text of a message being transmitted by radiotelephone. In this instance operating signals are transmitted by using the authorized phonetic equivalents. In other words, "I SPELL" followed by the OPSIG phonetically, as discussed in a previous lesson.

V-104. Establishing Communications

Before passing message traffic over radiotelephone circuits, contact the other station(s) involved to ascertain that communication is possible. You should be receiving detailed instructions in your on-the-air training on how to do this properly, as well as how to respond to a station calling you.

V-105. Prowords Related to Radio Checks

The prowords listed below are for use when initiating and answering queries concerning signal strength and readability.

RADIO CHECK	What is my signal strength and readability, i.e., how do you hear me? This proword is always a question.
LOUD AND CLEAR	Your signal is loud, clear, and easily readable. If reception is other than loud and clear it must be described using appropriate prowords below. Prowords may be combined such as LOUD DISTORTED
LOUD	Your signal is very strong.
GOOD	Your signal strength is good.
WEAK	Your signal strength is weak.
VERY WEAK	Your signal strength is very weak.
FADING	Your signal strength fades to such an extent that continuous reception cannot be relied upon.
CLEAR	Excellent quality.
READABLE	Quality is satisfactory
UNREADABLE	The quality of your transmission is so bad that cannot read you.
DISTORTED	Having trouble reading you because your signal is distorted.
WITH INTERFERENCE	Trouble reading due to interference.

V-106. Radio Checks, Signal Strength and Readability

A station is understood to have good signal strength and readability unless otherwise notified. Strength of signals and readability need not be exchanged unless one station cannot clearly hear another station, or due to conditions one station suspects there may be difficulty. A station that wishes to inform another of his signal strength and readability will do so by means of a short and concise report of actual reception such as, "Weak, but readable," "Loud, but distorted," "Weak with interference," etc. Reports such as "Five by Five", "S-9", etc., will not be used.

V-107. Preliminary Calls

If conditions appear to be good the sending station will call the station(s) to receive traffic as follows.

NNN0AAA, NNN0BBB, (etc) THIS IS NNN0ZZZ, ONE ROUTINE, OVER

Stations will answer in the order they were called. As long as they receive the sending station clearly the response is:

NNN0ZZZ, THIS IS NNN0AAA, OVER

If a station does not hear the sending station well the station should reply with the appropriate response as listed in V-105, above. For example:

NNN0ZZZ, THIS IS NNN0BBB, WEAK READABLE, OVER

When communication is difficult or when the calling station wishes to ascertain whether the called station is ready to receive, the sending station will request a radio check before transmitting a message. The radio check consists of the sending station first calling the receiving stations(s) and simply saying "RADIO CHECK, OVER". The receiving station(s) will then respond (in the order they were called) using the applicable prowords listed above. If a station does not respond in his or her turn the next station in line will wait 10 seconds then proceed to respond to calling stations. After the remaining stations have responded the calling station will then call the station(s) that did not respond. If still no response the sending station will continue his/her transmission of the message(s), excluding the non-responsive station(s). After completion of the transmission or series of transmissions the sending station will then notify NCS of traffic completion and indicate which station(s) could not be contacted and so are presumed not to have the traffic.

V-108. Transmission of Mixed Groups (Figures, Numbers, etc.)

The correct procedure when transmitting a group of random letters, abbreviations, or words that cannot be pronounced is to precede such groups with the proword "I SPELL". When sending a group of figures, i.e., telephone numbers, zip codes, social security numbers, etc., precede them by saying "FIGURES".

When a group is mixed, that is, it contains both figures and letters, such as PA1E, the first character in the group determines which type it is. If the first character is a letter the group is considered a word. If the first character is a number (1, 2, 3 etc), it is considered figures. Note that if a numeral is spelled out, such as "TWENTY" that is a word. The figures would be "20" This may seem confusing at first, but it will become clear, quite easy, and natural.

Accordingly, precede each group with the proword "I SPELL" or "FIGURES". For example:

ADCE you transmit,
"I SPELL ALPHA DELTA CHARLIE ECHO"

1D3E you transmit,
"FIGURES ONE DELTA THREE ECHO"

Always pause briefly after each group. If you have more than one random group in a row be sure to repeat the correct proword at the start of each so the receiving station knows they are separate groups. Example,

ADWC BTMS You would transmit,
'I SPELL ALPHA DELTA WISKEY CHARLIE (brief pause) I SPELL BRAVO TANGO MIKE SIERRA"

V-109. Relay

The proword "RELAY" used alone indicates that the station called must relay the message to all addressees. The proword "RELAY" followed by one or more call signs (or addees) indicates the station called is to relay the message to the addee(s) indicated, but is not responsible to deliver or forward to the other addees. It is assumed the message has been delivered by other means. In digital mode each addee to whom it has been delivered by other means is preceded by the opsig ZEN. For example

TO NNN0AAAA
ZEN/ NNN0ABB

In this case BBB has been sent the message by other means. The ZEN opsig is never used or transmitted on voice communications. It is an opsig and not part of the message header per se.

When more than one station is called, the call sign of the station designated to perform the relay will precede the proword "RELAY" In other words, different stations may be given different delivery responsibilities. If no relay instruction is given it is assumed the receiving station need do nothing with regard to forwarding or delivering the message. This should only occur if the receiving station is an addee on the message.

V-110 Correction during Transmission

When the transmitting operator makes an error, the proword "CORRECTION" transmitted followed by the last word, group, proword or phrase correctly transmitted. Transmission then continues.

V-111 Receipt Procedure

Formal acknowledgment that a message was received completely and correctly is employed in station-to-station traffic handling. No message is considered delivered until a receipt is obtained. The basic receipt procedure is for the receiving station to transmit the proword "ROGER" after each message correctly received, and before the next message is sent. General messages (Broadcasts) read over a net for the information of all does not require a receipt unless a station is being designated to relay the

message. Receipt of a general message indicates the member must, if called, be able to read back that message.

V-112 BREAK-IN Procedure

A station having any communication of higher precedence than the transmission in progress may break-in and thus suspend that transmission in the following circumstances:

- FLASH messages are likely never to be handled on MARS circuits.
- IMMEDIATE May break-in at once and pass the message. On a directed net, NCS approval to transmit the message must be obtained. On a free net NCS must first return control to a directed net.
- PRIORITY Same as for immediate except that only long routine messages should be interrupted.

The procedure is precedence spoken three times followed by THIS IS and your call sign. This means "Cease transmitting immediately". Silence will be maintained until the station breaking in has passed the message.

You would never break the net with a Routine message. Wait until a call up, or during a free net, when no other transmission exchanges are in progress, call the NCS and list your traffic.

Stations requiring urgent contact with another station, but not having a formal message to pass, may break-in by transmitting the call sign of the net control station. This would be rare, generally involving an emergency situation of an urgent matter relating to safety of persons or property and being of an eminent nature.

Whether a formal message or an informal comment, the urgency of the content rather than the actual precedence of a message should be the guiding factor in determining whether to break the net or wait for the current transmission series to end. Refer to the Voice SOP for further explanation and details.

The use of BREAK in radiotelephone procedure for the purpose of breaking into a net is not authorized. BREAK is a proword used in MARS only to establish the beginning and end of the text of a message. Some military services use BREAK to separate a transmission with one station and switch to address another, or between topics in a broadcast, such as the Coast Guard's Notice to Mariners broadcasts. This is not used in this way in MARS.

Lesson 2 DIGITAL COMMUNICATION PROCEDURES

800. Introduction

Digital communications procedures are identical to the basic radiotelephone procedures, including prosigns, operating signals, and message format.

E130. MARS Data System (MDS)

as of 01 SEP 2008 the MARS Data System (MDS) is no longer in operation. MARS WinLink (WL2K) is now the system for forwarding record traffic.

WinLink is a system utilizing HF digital communications, computer servers, and high priority level on the internet for forwarding message traffic to any MARS station, Area, Region, or State. It has built in redundancies that virtually assure no down time regardless whether one part of the system goes out of service, or is inaccessible. Although WinLink utilizes the internet, it is not dependent upon it.

Training on WL2K is beyond the scope of this training material. Information is readily available on the National MARS web site. However, it is in the secure area, not accessible by members in their Trial Service period. Contact your state director or state training staff for information on getting established on, and using, MARS WinLink.

801. Functions

Carriage Return (CR): used to reset the receiving equipment to the left margin.

Line Feed (LF): used to advance the copy vertically to a new line.

Note that in common computer work the hard return actually combines the ASCII commands of the carriage return and line feed. Although commonly referred to together as a hard return or carriage return they are actually separate functions.

A carriage return alone will only return the printer to the start, or far left margin. A line feed must also be executed in order to drop to the next line of print.

Figures (FIGS): A single FIGS function is used to shift radioteletype (RTTY) and AMTOR from lower case to upper case.

Letters (LTRS): A single LTRS function is used to shift RTTY and AMTOR from upper case to lower case. LTRS functions may be used to correct errors when preparing a tape.

End of Line (EOL): a series of functions used to begin a new line.

In NAVMARCORMARS, the standard EOL sequence is one CR, one LF. Use of a LTRS or FIGS function after the LF is optional. A second CR may be added before the LF if operating in RTTY.

Unshift on Space: Shifts RTTY and AMTOR from upper case to lower case when a space is received. This feature is not used in NAVMARCORMARS and shall be turned off.

802. Character Set

Character sets used for the various transmission systems differ, causing several common punctuation marks to be lost or altered as they are transmitted. In some cases, use of lower case letters may cause translation problems from one system to another. To preserve message accuracy, only the following shall be used when transmitting messages via digital modes:

- capital letters A through Z,
- the numerals 0 through 9,
- and these punctuation marks:
question mark, colon, dash, slant, paren, unparen, comma, apostrophe and period.

All other punctuation marks shall be spelled out, or use the designated abbreviation, in either case surrounded by parentheses.

803. Transmission Characteristics

Navy-Marine Corps MARS continues to use earlier transmission systems such as RTTY and has been adding newer, more effective systems as they develop.

RTTY operates at 100 words per minute (WPM), using five level Murray (Baudot) code at a rate of 74.2 or 75 Baud, with a stop bit length of 1.42 or 1.5 units. Although some teletypewriter (TTY) equipment sends shorter 1.0-unit stop bits (operating at 107 WPM), this mode is not compatible with all receiving devices and is not authorized for NAVMARCORMARS use.

AMTOR is standardized by CCIR Standard 476. NAVMARCORMARS generally follows the Standard except that transmitted polarity is inverted and an optional shift of 200 Hz is permitted.

PACKET is standardized to the AX.25 protocol. NAVMARCORMARS HF Packet transmissions are at 300 Baud.

PACTOR is a protocol developed in Germany that essentially combines AMTOR type transmissions with longer bursts at 100 or 200 baud. PACTOR II, an enhancement of the original PACTOR that uses longer data bursts and more complex modulation of the signal.

CLOVER transmissions consist of four tones with complex modulation. It is transmitted on HF by modulating an SSB transmitter with audio generated by the CLOVER modem. CLOVER has 4 separate channels each with 4 separate tones:

RTTY, AMTOR, Packet and PACTOR transmissions below 30 MHz use frequency-shift keying (FSK) emission. The frequency difference between the two emitted frequencies is normally 170 Hz. Because some commercially available equipment operates at 200 Hz shift (which is mutually compatible with 170 Hz), the 200 Hz shift is optional for NAVMARCORMARS. For RTTY and AMTOR, the lower transmitted frequency is the MARK condition.

807. Long Messages

Up to 100 lines of continuous text may be transmitted in one section. Messages which exceed 100 lines of message text are considered to be long messages. Long messages monopolize circuit time and increase the difficulties in the receiving station getting all the message under poor propagation conditions if transmitted without a break. If you have ever gotten two-thirds of the way through receiving a message to have propagation wipe out your connection, start over, and have the same thing happen again, you will know the value of breaking long messages into sections., Such messages are separated into sections as follows:

Separate the text at the end of a sentence at a convenient point. It is best, when practical, to break the message into approximate equal sections, none to exceed 100 lines MAX.

Prior to the text and following the security classification, insert the plain language: "SECTION ONE OF....." This can go at the end of the SUBJ line, if there is one.

Each additional section is preceded by an identical message heading and date-time-group, but contains a different station serial number.

The final transmission section is identified "FINAL SECTION OF....."

C203. PROSIGN AND PROWORD LIST

The following authorized list of prosigns and prowords will be used as prescribed The list starts on a new page so you can remove or print it and have at your station for reference.

<u>PROSIGN</u>	<u>MEANING</u>	<u>PROWORD</u>
AA	Unknown Station	UNKNOWN STATION
AA	All After	ALL AFTER
AB	All Before	ALL BEFORE
AR	End of Transmission	OUT
	no response is expected.	
AS	I must pause for a few seconds	WAIT
AS AR	I must pause for more than a few seconds. Will call you back	WAIT OUT
B	More to Follow	MORE TO FOLLOW
BT	Break. (Start or end of message text)	BREAK
C	Correct	CORRECT
DE	From (station transmitting)	THIS IS
(none)	The following is the time, or date-time-group of this message	TIME
EEEEEEEE	Error	CORRECTION
EEEEEEEE AR	This message is in error	OUT

Disregard this Transmission

F	Do not answer	DO NOT ANSWER
FM	Originator of message	FROM
G	Repeat this entire transmission back to me.	READ BACK
(none)	The following is my response to your instructions to read back	I READ BACK
GR (XXX)	Group Count. Replace "XXX" with the count number	GROUP (XXX)
GRNC	The groups in this message have not been counted.	GROUP NO COUNT
HM HM HM ZUG HM HM HM	Emergency silence sign Resume normal transmissions (See NTP-8 Annex C, para C203 for important details on Silence)	SILENCE SILENCE SILENCE SILENCE LIFTED
IMI	Repeat last transmission, or identified portion of transmission	SAY AGAIN
IMI	I am repeating transmission or portion indicated.	I SAY AGAIN
IMI is NOT to be used to add emphasis to a statement. Use RPT/REPEAT instead.		
(none)	next word group I transmit is Spelled phonetically	I SPELL
QSZ	Communication is difficult. Transmit each phrase or each group twice. This PROWORD may be used as an order, a request, or as Information (sender's intent).	WORDS TWICE
INFO	The address designations immediately following are addressed for information, not action.	INFO
INT	Interrogative - used to change a PROWORD/PROSIGN from a statement to a question.	INTERROGATIVE
J	Verify with originator and repeat.	VERIFY
K	Go ahead; or this is the end of my transmission. A response is necessary.	OVER
(none)	Message requiring recording (writing down) follows	MESSAGE FOLLOWS
(none)	Numerals or Numbers group follows (see also Roman Figures)	FIGURES

(any mixed group of letters and figures is considered a WORD if it starts with a letter and FIGURES if it starts with a number. AB9C is a word group. 4DEU is a figures group.

O	Immediate precedence	IMMEDIATE
P	Priority precedence	PRIORITY
R	I have received your last transmission satisfactorily.	ROGER
R	Routine precedence	ROUTINE
RPT	to repeat, intentionally say the same thing twice as part of the message. Not the same as IMI or SAY AGAIN.	REPEAT
T	Transmit this message to all addrees, or addrees immediately following.	RELAY
TO	Action addressee(s)	TO
WILCO	I have received your transmission, understand it, and will comply.	WILCO
(In the military only the unit commanding officer is authorized to use WILCO. In MARS, only the station owner or ART/SAT captain is authorized to use it.)		
WA	Word after	WORD AFTER
WB	Word before	WORD BEFORE
XMT	Addrees that follow are in collective call sign group, but are exempt.	EXEMPT
Z	Flash precedence	FLASH

End of Unit 5, proceed to Unit Six

You may start the review test at any time.