Prosigns for Morse code

From Wikipedia, the free encyclopedia

Morse code **prosigns** or **procedural signals** are unique, special, dot/dash sequence symbols (e.g., · — · —) that do not represent written or printed human-language alpha-numeric or punctuation textual characters.[1] Instead, prosigns are unique, special (normally unwritten), stand-alone, dot/dash sequence symbols, that have specific non-language functions, such as: indicating changes of transmission communications protocol status, and indicating (or initiating) textual white space formatting.[2] Although preceding teleprinter (teletypewriter) and computer character set control characters by many decades, these traditional Morse prosigns play a role similar to the role played by the modern (normally unprinted) control characters of teleprinter and computer character set codes such as the: Baudot, Murray, ITA2, ASCII, Unicode and EBCDIC codes.

Morse code prosign symbols have been used by telegraphers (American English), or telegraphists (British English), since the 1860s, predating modern character set code control characters by almost one hundred years. Traditionally, Morse code is sent manually (encoded) by telegraphers using hand-operated telegraph keys, and decoded or copied mentally as the Morse signals are received by ear in real time. Often the mentally received Morse information is manually recorded on paper by pencil or typewriter or typed into an electronic document file using a text editor application. With the advent of inexpensive personal computers special Morse decoding computer applications (Morse code readers) have been developed which can decode and record accurately sent Morse code automatically. With but one exception, namely the Morse symbol for the letter "K" which also serves as a prosign, all of the remaining Morse prosigns constitute unique dot/dash sequence code symbols representing *non-textual* functions that are equal in status but separate from those of the *textual* alpha-numeric and punctuation Morse symbols. Mastery of Morse prosigns is an important part of becoming a fluent telegrapher/telegraphist.

Contents

Prosign symbol representations

Of the several methods used to represent Morse prosign symbols, there are two unique methods and one non-unique method:

1. Unique dot/dash sequences
2. Unique audible sounds
3. Non-unique concatenated character groups.

Prosigns are defined and uniquely represented by their corresponding dot/dash sequences (e.g., · — · —) and their corresponding distinctive sounds, which may be verbalized.

Unique audible sound

As with human spoken languages, skilled audible Morse code telegraphers decode Morse code by the distinctive sounds of its symbols, not by its written or printed representations. Morse code is not only a code of unique dot/dash sequences as often depicted on paper by means of short and long marks (e.g., · — · —) but Morse code is also an audible language wherein the unique audible sounds of the Morse symbols and even combinations of symbols are the main characteristic that enables high-speed real-time decoding by humans listening to the code by ear. The audible sounds of Morse code sent by telegraph keys may be verbalized by humans using "dit" and "dah" sounds for dots and dashes, as for example the well known new paragraph prosign verbalized as "dahdididididah". Usually when verbalizing audible Morse, the

"dah's" are fully pronounced, but the "dits" are foreshortened to "di" except for a final "dit" when the "t" is sounded. Skilled operators never take an intermediate step to convert the memorized sounds first into dots and dashes and then to the final source characters. Instead, skillful high-speed telegraphers decode Morse code symbols mentally from their audible sounds directly into the respective source characters (alpha-numeric and punctuation characters). Just as proficient telegraphers learn to memorize the sounds of the normal alpha-numeric and punctuation Morse code symbols representing textual information, proficient telegraphers also commit to memory the unique audible sounds that represent the unique Morse code prosign symbols. Indeed, the most proficient Morse code operators usually also commit to memory the totally unique Morse sounds of numerous short words and abbreviations as well.

Non-unique concatenated character groups

For strictly illustrative or pedagogical purposes, the unique prosign symbols may be non-uniquely represented in written or printed form by means of alpha-numeric character groups that are specially delineated by annotations as described in a following paragraph. The special delineation is used to indicate that, when transmitted, the delineated characters—which would normally be sent separately—are intended to be run together, or concatenated.

To run together or concatenate the specially delineated characters transmitted in real time, normal Morse code inter-character timing must be violated. When sent during normal Morse keying operations, the characters in the delineated group are not separated from each other by the normal three-dot duration inter-character silent period. Instead a single-dot duration silent period is used between the delineated characters. This abbreviated silent period blends the separate character symbol sounds, and dot/dash sequences, together uniquely creating the corresponding prosign symbol. The strict one-dot duration inter-character spacing ensures that the dot/dash sequence as well as the audible sound of concatenated character groups used to form the unique prosign symbol is essentially and markedly distinct and different from the audible sounds, and dot/dash sequences, of the individual concatenated characters. Prosign symbols in either dot-dash sequence or audible sound form are thus distinct and different from any other of the unique alpha-numeric and punctuation Morse symbols; the single exception being the normal literal character "K", which is also used as a (turn over) prosign.

Delimited concatenated character groups representing prosigns are nothing more than prescriptions for the construction of unique stand alone dot/dash sequence symbols. The concatenated characters used to represent such prosigns are not to be construed as abbreviations. The concatenated character groups are only used for illustrative or pedagogical purposes, and have no intrinsic meaning beyond that of illustrating the prosign construction. The single dot duration silent period between the characters of the grouping blends the normally separate character symbols into a single unique Morse prosign symbol. It should be noted character groupings concatenated to represent unique prosign symbols may not be unique themselves. Prosigns can be represented by several possible concatenated character

groups. Tradition usually dictates a specific character grouping for each prosign; although alternatives to the traditional character groupings which also create the very same unique prosigns may be encountered in some illustrative documents.

Although included in the transmitted Morse symbol data stream during normal sending (keying) operations, during normal receiving operations Morse prosign symbols are never explicitly written or printed on paper or electronically recorded. Instead, during sending operations, Morse code operators include the unique prosign symbols in the transmitted data stream to indicate the (non-typographic) actions the sending operator intends for the receiving operator to take when the prosigns are received.

Concatenated group delineation

The following paragraphs outline two alternative methods of delineating or annotating character groups to indicate their *special* nature in the representation of Morse code prosigns and the fact that they are not to be sent separately but are to be concatenated or run-together when sending.

Illustrative written delineation of (potentially non-unique) character groups concatenated to create unique prosign symbols is effected by specially annotating the otherwise normal-looking character groups. Two common annotations used to delineate concatenated character groups that represent prosigns are: either an overline extended over the character group (e.g., $\overline{\text{AA}}$), or alternatively a set of angle brackets surrounding the character group (e.g., <AA>). We use here as an example the concatenation of two "A" characters to represent the unique dot/dash sequence symbol (· — · —), which can also be uniquely verbalized as the audible sound "didahdidah". This unique prosign represented by two concatenated literal "A" characters indicates the point of initiation of a new line in a text message. It should be noted that, for skilled high-speed telegraphers, it is ultimately the unique audible sound that is the most useful representation of Morse code prosigns.[2]

On most standard computer keyboards, and teleprinters, the simple, single-keystroke angle bracket annotation used to delineate concatenated characters (e.g., <AA>) can be effected easily with fewer keystrokes than the complex sequence of keystroke operations needed to effect the overline notation (e.g., $\overline{\text{AA}}$). Commonly most ordinary keyboard operators cannot effect multiple character over line annotations without the special training and tools available for typographical and/or hypertext *experts*.

Aside: *Readers may note that, when converted to *.pdf format by the Wikipedia "Print/export > download as pdf" converter, the overlines delineating prosign concatenation are eliminated by the *pdf converter, leaving only the alpha characters, which then appear as ordinary, non-delineated text in the resulting pdf document! Additionally, the Wikipedia Wiki markup language removes over-line annotations before presenting the section headings in the Contents table that is automatically generated from article sub-titles by Wikipedia.*

Consequently, it seems that the simplest annotation for indicating prosign character group concatenation that can be applied by keyboard, and that also has the most durable support by text-conversion applications, is the angle bracket annotation (e.g. "<XY>"). However, since this Wikipedia article on prosigns may sometimes be subject to text-conversion applications when downloaded or printed, we have accordingly adopted here the (novel) convention of combining angle bracket annotation together with over-line annotation (e.g., <$\overline{\text{AA}}$>). This novel (combined) delineation convention thus honors both of the commonly encountered styles of annotation for Morse prosign concatenated characters, and ensures that the delineations herein will survive inadvertent text-conversion application actions should readers desire to print or export this Wikipedia article into other applications. It should be noted that, apart from pedagogical and/or tutorial documents, prosigns are almost never committed to print or written form, and so the particular concatenation annotation used in illustrative documents such as this Wikipedia article is not relevant to real time Morse code operations and is really an unimportant typographic detail appearing only within illustrative or pedagogical documents in which prosigns are discussed.

Reiterating preceding discussion; written or printed representations of prosigns and their associated delineation annotations are used strictly for illustrative purposes in tutorial or pedagogical documents. In actual real-time Morse code operations prosigns are never written or printed. Prosigns are an integral part of communications protocol signaling and message formatting and are *recorded* only by the actions taken upon reception; actions taken by receiving operators who recognize and either, act on the explicit change of communications protocol status indicated by the prosign or, act to implement the explicit white space formatting indicated by the prosign, e.g. text formatting actions such as: *new line*, *new paragraph*, or *new message*.

Examples of possible non-unique character groups

As noted in preceding paragraphs, concatenated character groups used to represent prosign symbols are not necessarily unique. The unique prosign symbol represented by <$\overline{\text{AA}}$> could alternatively be represented as <$\overline{\text{EK}}$>, which upon being sent by an operator would produce exactly the same unique dot/dash symbol and unique sound as the group <$\overline{\text{AA}}$>. The grouping <$\overline{\text{AA}}$> being the traditional, and most common, way of writing down or illustrating the formation of this unique prosign. Another example of a prosign character grouping is <$\overline{\text{BT}}$>, which indicates the white space required to begin a new paragraph. This unique *new paragraph* prosign is traditionally, and most commonly, illustrated by the concatenated characters B and T, representing the unique dot/dash sequence (— · · · —) that may also be uniquely verbalized as the sound "dahdididididah". Alternatively, <$\overline{\text{BT}}$> might possibly be represented or illustrated in printed or written form as <$\overline{\text{TV}}$>, <$\overline{\text{NU}}$>, or <$\overline{\text{DA}}$>, all of which have identically the same unique dot/dash sequence and audible sound and verbalization.

The commonly encountered traditional concatenated character group representations presented in this Wikipedia article are not abbreviations nor acronyms and have no intrinsic meanings based upon the constituent characters. The concatenated character groups representing prosigns presented here are simply the result of long traditions of use by the Morse code community; readers should note that alternative concatenated character representations other than the traditional representations may sometimes be encountered. Nevertheless, the dot/dash sequences and audible sounds of these alternative representations are all identical to the traditional representations. Prosigns are unique even though some concatenated character groups representing them may be different.

Morse prosigns and modern keyboard applications

Morse code is over a century old. Fluent Morse code telegraphers still enjoy sending Morse code and the traditional Morse prosigns using manually operated mechanical keys or electronic keyers. Although Morse code is no longer used in commercial practices, the use of hand sent Morse code seems to be growing among amateur radio operators even though Morse proficiency is no longer required to obtain an amateur radio license. As intrepid sailboat sailors, in the modern age of the powerboat, yearn for the heel of sailboats in the wind, there are those who send Morse code by hand in the modern age of the Internet. Nevertheless, some will mix modernity with Morse and choose to send Morse with keyboard operated software applications rather than telegraph keys. The following paragraphs outline several difficulties which may be encountered when using modern computer keyboard operated Morse code applications (apps) with century old Morse code prosigns.

Variable length Morse vs fixed length character code symbols

Created, without benefit of the modern 1950's era information theory concepts of Claude Shannon, by Samuel Morse and Alfred Vail in the 1840s, the bandwidth efficiency of the variable length symbol Morse code, wherein Alfred Vail assigned shorter Morse code symbols to more often used source symbols, is readily understood in terms of Claude Shannon's modern era source coding (or data compression) techniques, e.g. Huffman codes, arithmetic codes, Lempel-Ziv codes. Because of Moore's Law and the extremely low cost of modern digital hardware, extreme variable length character coding efficiency eventually became moot. As bandwidth efficiency became less important with modern communications codes, modern keyboard operated teleprinter and computer character set codes, such as the Baudot, Murray, ITA2, ASCII, Unicode and EBCDIC codes came to use less bandwidth efficient fixed length symbols sent by expensive complex machinery. The older but more efficient Morse code used bandwidth efficient variable length symbols sent by telegraphers using hand operated mechanical telegraph keys. The use of the bandwidth efficient variable length symbols of Morse code easily supported the creation of (normally unwritten) traditional Morse prosigns by operators simply concatenating existing (normally written) Morse symbols. Human operators sending by hand on telegraph keys can readily achieve character concatenation by

simply pausing for only one dot duration between the concatenated characters instead of pausing for the standard three dot durations. Modern fixed length keyboard machine generated control characters and other symbols do not support such concatenations directly, instead usually requiring simultaneous multi-key actions to generate separate fixed length *control character* symbols.

Because of these differences modern keyboard operated computerized Morse applications often do not deal well with traditional Morse prosigns forcing sending operators to send individual separated (non-concatenated) literal characters rather than unique traditional prosign symbols and failing to correctly interpret received traditional prosigns as the communications status change and white space control signals they are intended to indicate.

Control characters, prosigns and function keys

Morse prosigns generated by human hand operated telegraph keys are the bandwidth efficient predecessors of less bandwidth efficient modern keyboard generated control characters. As bandwidth has become less expensive, bandwidth efficient variable length character codes such as Morse code have been replaced by the less bandwidth efficient fixed length character codes found on modern teleprinter and computer keyboards. Modern keyboards have so-called *function keys* that automatically generate the corresponding fixed length alpha-numeric, punctuation, and control character symbols as dictated by their specifically designed character set codes. *Function keys* on modern keyboards generally represent non-written code symbols control characters and include keys with keytops labeled as: Alt, Ctrl, Enter, Line Feed, Newline, Carriage Return, Shift, Tab, F1, F2, F3, etc. Some function keys are simply left unlabeled as is the space bar function key. Actuating many of these control functions may also require simultaneous multi-key actions. Striking keys on modern teleprinter and computer keyboards generates a single fixed length alpha-numeric, punctuation or control character symbol but provides no capability to send run-together (concatenated) variable length symbols corresponding to traditional Morse prosigns. Additionally, many of the built in control characters of the modern character set codes generated by keyboards are unrelated to traditional variable length Morse prosigns. Because of this, Morse operators using modern keyboard operated computer applications often encounter difficulties while attempting to send correctly formed Morse prosign symbols. Receiving Morse operators may also encounter incorrectly formed (non-concatenated) prosign symbols sent by keyboard Morse operators.

An example of the difficulties encountered by Morse operators using keyboards rather than telegraph keys to send Morse prosigns is the use of the keyboard key labelled either "Enter" or "Newline". Depending upon the application, striking the "Enter" or "Newline" key produces the same result as the older Carriage return, Line Feed (CR-LF) key sequence which typists execute manually on teleprinter or typewriter keyboards. The common multiple key (CR-LF) manipulations used with teleprinters and typewriters has the same effect on printed text formatting as the traditional Morse *new line* <$\overline{\text{AA}}$> prosign symbol sequence (· — · —). Unfortunately most computerized Morse applications do not generate the Morse prosign

<AA> when the "Enter"" or "Newline" key is struck, and most current Morse computer applications do not respond to the Morse <AA> prosign by generating a Newline. The same is true for many of the other Morse prosign symbols such as the *new paragraph* prosign <BT> and the *new page* or *message separator* prosign <AR>. Corresponding single keys for most traditional Morse prosigns are not found on modern computer and teleprinter keyboards. Operators who choose to use most keyboard operated computerized Morse software applications should realize that keying characters in sequence does not concatenate them. For example, keying the character B followed by the character T will not generate the traditional Morse prosign <BT>. As noted in following paragraphs explaining the Table of Morse prosigns, to alleviate some of these difficulties certain keyboard operated computerized Morse applications and products using single-line displays have *hijacked* a couple of mathematical symbol keys on modern keyboards (e.g. "+" and "=") which are used to represent two of the traditional Morse prosigns in those particular application devices.

Prosigns not well supported by *apps*

Modern computer keyboard operated Morse software applications (apps) often exhibit limitations and omissions with implementations of traditional variable length Morse prosigns using the fixed length symbols, and the associated lack of bandwidth efficiency, of modern computer character codes. Hence, operators sending Morse using modern keyboard controlled software apps rather than hand operated telegraph keys may often be unable to create, or properly decode into appropriate actions, the traditional bandwidth efficient Morse prosigns.

Keyboard Morse operators may *work around* limitations and difficulties of software apps by connecting a standard telegraph key into the keying line beside the computer keyboard application interface and intervene during keyboard sending by manually operating the standard telegraph key to transmit traditional prosigns. This kind of *workaround* however defeats the convenience of using a modern keyboard for sending Morse code.

In fairness, none of these problems actually prevents the development of Morse software applications capable of handling all of the traditional Morse prosigns. It seems that Morse software application developers have concentrated mainly on implementing the encoding and decoding of alpha-numeric characters and punctuation marks to support plain language prose, while ignoring the application of traditional Morse prosign symbols to white space page formatting and transmission status control. It is certainly entirely possible for application developers to utilize one or more of the anonymously named function keys (e.g. those labeled: "F1", "F2", etc.) on modern keyboards to actuate traditional Morse prosigns under keyboard and software program control. However, likely because of the limited commercial market for Morse code application programs, and a deficiency in Morse code domain knowledge on the part of many software developers, software applications that handle Morse prosigns well do not seem to be widely available.

Because of these difficulties, Morse operators who choose to use keyboard operated Morse code software apps (or similar microcontroller based devices) may find themselves unable to correctly send properly formed traditional Morse code prosigns and on reception they may hear improperly formed (non-concatenated) prosigns sent by keyboard Morse operators. Users who intend to acquire keyboard operated computerized Morse software applications should first determine if those applications handle traditional Morse prosigns in a manner appropriate to their needs.

Fluent high speed Morse code telegraphers enjoy sending Morse code and traditional Morse prosigns using manually operated mechanical telegraph keys or electronic keyers. Aspiring high speed fluent Morse operators must not only master standard Morse alpha-numeric and punctuation symbols but must also master the use of traditional Morse prosigns as described in the following Table and explanatory paragraphs.

Table of Morse prosigns and useful Morse code abbreviations

The following Table lists twelve unique Morse prosigns and two useful Morse code abbreviations, ordered alphabetically. Although each stand-alone prosign symbol dot/dash sequence is unique, the delimited character groups listed in the first column of the Table are only the most common concatenated character group representations for these unique prosigns. In fact, different groups of concatenated characters may represent the same unique prosign. Apart from the two Morse code abbreviations BK and CL listed at the end of the Table, the delimited concatenated characters in the first Table column are generally not abbreviations, and have no intrinsic meaning; they are shown strictly for illustrative and alphabetic indexing purposes. When forming prosigns by telegraph key, the delimited group characters are separated by only one-dot duration, not the normal Morse three-dot duration inter-character spacing. The dot/dash sequences shown in the second column titled *Code Symbol* comprise the *unique dot/dash sequence definition of each prosign*. Apart from the two Morse code abbreviations BK and CL—which are not complete, stand-alone symbols, but are composed of their separate, non-concatenated constituent character symbols—the Morse prosign symbols have their own complete, stand-alone unique *sound* that is distinctly different from the sounds of all other Morse characters and symbols. In order to handle Morse prosigns at high speed, the unique symbol *sounds*, illustrated in the Table column labeled *Verbalization*, must be memorized. The single exception to the uniqueness of prosign symbols is the alphabetic character "K", which is used both as an alphabetic character symbol and alternatively as a prosign symbol. The *normal* alphabetic character "K" is interpreted as a prosign, and not an alphabetic character, only when sent alone at the end of a transmission. In practice, the two useful Morse code abbreviations BK and CL exhibited in the Table may be occasionally encountered as concatenated characters. Normally, however, the two acronyms

BK and CL are sent and decoded as Morse code abbreviations, represented by their separate alphabetic characters and sounds, rather than concatenated as strict, complete, stand-alone, unique prosign symbols having unique symbol sounds.

Table of Morse Code Prosigns and Useful Morse Code Abbreviations [1]

Prosign	Code Symbol	Meaning	Comments	Memory Aid	Verbalization
<$\overline{\text{AA}}$>	·– ·–	New Line (space down one line)	Typewritten as Carriage Return, Line Feed (CR-LF).	"**A**dd **A** line"	"didahdidah"
<$\overline{\text{AR}}$>	·– ·– ·	New Page (space down several lines)	Message separator. Single-line display may use printed "+".	"**A**ll **R**endered"	"didahdidahdit"
<$\overline{\text{AS}}$>	·– · · ·	Wait	Respond with: <$\overline{\text{SN}}$>, or characters "R" (Roger) or "C" (Confirm).	"Wait **A** **S**ec"	"didahdididit"
<$\overline{\text{BT}}$>	– · · ·–	New Paragraph (space down two lines)	Typewritten CR-LF-LF. Single-line display may use printed "=".	"**B**egin **T**wo"	"dahdididididah"
<$\overline{\text{CT}}$>	– ·– ·–	Attention	Sometimes written as <$\overline{\text{KA}}$>. Commencing important transmission.	"**C**opy **T**his"	"dahdidahdidah"
<$\overline{\text{HH}}$>	· · · · · · · ·	Error (Sometimes "????" is used.)	Sometimes written <$\overline{\text{EEEEEEEE}}$>. Always followed by correct text.	"**E**rror"	"dididididididididit"
K	– ·–	Invitation for any station to transmit	Lone alphabetic character "K" at the end of a transmission.	"O**K**, go ahead"	"dahdidah"
<$\overline{\text{KN}}$>	– ·–– ·				"dahdidahdahdit"

		Invitation for named station to transmit	Go ahead, specific named station.	"O**K**, **N**amed"	
<$\overline{\text{NJ}}$>	– · · – – –	Shift to Wabun code	Shift from Morse code to Wabun code Kana characters.	"**N**ext **J**apanese"	"dahdididahdahdah"
<$\overline{\text{SK}}$>	· · · – · –	End of contact	Sometimes written as <$\overline{\text{VA}}$>.	"**S**ilencing **K**ey"	"dididididahdidah"
<$\overline{\text{SN}}$>	· · · – ·	Understood	Often written <$\overline{\text{VE}}$>. Alternatively shift from Wabun to Morse code.	"**S**ho' '**N**uff"	"dididididahdit"
<$\overline{\text{SOS}}$>	· · · – – – · · ·	International distress signal	Signals imminent danger to life or property. (listen)	"**S**ave **O**ur **S**ouls"	"dididididahdahdahdididit"
Acronym	**Symbols**	**Abbreviation Meaning**	**Abbreviations are sent with normal inter-character spacing**	**Memory Aid**	**Verbalization**
BK	– · · · – · –	Break (Morse abbreviation)	Abbreviation for "back-to you".	"**B**rea**K**"	"dahdididit dahdidah"
CL	– · – · · – · ·	Closing (Morse abbreviation)	Abbreviation for "closing station".	"**CL**osing"	"dahdidahdit didahdidit"

Attention prosigns: <$\overline{\text{CT}}$> and <$\overline{\text{SOS}}$>

In Morse code, the so-called *attention* prosigns are used to *attract the attention* of all stations that may be monitoring or listening to a communications channel.

The ***attention*** **prosign <CT>** is used when a transmitting station wants all monitoring stations to *be alert* and to *listen carefully* for an imminent important message or transmission. Upon hearing <CT>, receiving stations should be prepared to *copy down* or *record* everything that follows. <CT> may be interpreted in English as, *"Copy This"*.

The ***distress*** **prosign <SOS>** is the International Morse code distress signal to be used ONLY in EMERGENCY situations to draw immediate *attention* and to *request immediate help either to save lives or to protect the imminent destruction of significant property*. <SOS> may be interpreted in English as *"Save Our Souls"*.

Beginning early in the 20th century (Radio Act of 1912), the radio frequency of 500 kiloHertz (500 kHz) was an international calling and distress frequency for Morse code maritime communication. Prior to the adoption of the distress prosign SOS as an International Morse distress signal in the early 1900s, the Marconi Company used the signal CQD as a Morse distress signal. The distress signal CQD was not a prosign per se; rather, it was a special Marconi code signal comprising the separate, non-concatenated characters C, Q and D. The use of CQD was phased out in favor of SOS around the time of the RMS Titanic sea disaster, and now for over one hundred years, the Morse prosign SOS has been used under several issues of the *Safety of Life at Sea* or SOLAS Convention regulations as a world-wide International Morse code *distress signal*. Under pain of criminal offense for misuse, the transmission of the SOS prosign is *only* permitted to attract attention when life or property is endangered. In this regard, the Morse code SOS prosign has the same significance as the Mayday distress signal used with voice communications by radio.

White space prosigns: <AA>, <BT> and <AR>

With ***formal written Morse messages*** *white line spaces* are the *line spaces* appearing on a page delineating either: a *new line*, a *new paragraph*, or a *new page* (or *message separation*). Unlike in informal Morse conversation, with *formal written message* procedures, the three Morse prosigns <AA>, <BT> and <AR> are used on transmission to indicate the presence of, and on reception to initiate the creation of, *white space* formatting of the written or printed text on the page or video screen where the message is displayed, or in the computer text file to which the message is saved.

With ***informal Morse conversations***, which are often carried out mentally rather than formally written, the *new paragraph* <BT> prosign is typically only used to provide operators with brief pauses for gathering their thoughts, and to perhaps jot down short notes. Such informal Morse conversations are often referred to as *copying code in the head*.

Although the *message separator* prosign <AR> is quite often used informally by amateur radio operators, its use is unwarranted in casual, informal Morse conversations. The message separator prosign <AR> is superfluous to informal Morse conversations unless the information being transmitted actually requires explicit inter-message separation to enhance understanding and message handling.

When used correctly by telegraphers, the three *white space* prosigns: <AA>, <BT> and <AR>, enable the creation of *highly human-legible* documents.

The formal use of these three prosigns in creating *white space* document legibility is detailed as follows:

1. ***New line*** **prosign <AA>** indicates a *new line* (space down one line).
2. ***New paragraph*** **prosign <BT>** indicates a *new paragraph* (space down two lines).
3. ***New page*** **prosign <AR>** indicates a *new page* or a *new message* or *message separator*.

Historically, formal Morse code record traffic messages (e.g., telegrams or radiograms) were typewritten by professional telegraphers using typewriters. Messages were typewritten onto long paper rolls, or alternatively on fan-folded, often page-serrated, paper stacks. These paper rolls or stacks were fed through the typewriter in lieu of continually inserting separate sheets into the typewriter to accommodate each message. Multiple sequential messages were often sent by *traffic handlers* during long traffic transmission sessions sometimes lasting hours during a traffic handling work shift or radio watch period. Efficient work flow demanded a formal physical separation of individual messages during long traffic handling sessions. This formal physical message separation was indicated by the <AR> prosign. Upon reception of the *message separator* prosign receiving operators create sufficient *white space* on the paper to allow the physical tearing of messages apart (usually at the paper stack serrations) for actual physical delivery to third parties. Historically, the *message separator* prosign <AR> indicating *end of message* was used to initiate the creation of this inter-message *white space* on the page or paper rolls (space down several lines or space down to make a *new page*). Using fan-fold paper roll feed telegraphers often turn up a completely *new page* for each message. Some kinds of teleprinter (teletype) and computer printer documentation refer to this form of white space page creation as a *Form Feed* (FF) or *Page Break*. Actually, the terms "Page Break" and "Form Feed" only came into use with the advent of modern teleprinter machines which gradually replaced manual handwritten or typewritten Morse code operations and eventually came to be the dominant form of handling *telegraph* traffic, e.g. Telex and TWX systems. Today, when typing or writing on individual message forms, such as the ARRL Radiogram form, amateur radio operators often tear a new blank message form from a pad of blank forms upon hearing the <AR> prosign.

In summary, the prosign <AR> may thus be interpreted as a *message separator* between messages, or as the *end of message* marker on a per-message basis, or as a *Page break* or *Form Feed* when copying Morse messages on equipment with form-feed capability. If a

message is actually the final message in a sequential group of messages, each separated by <AR>, the final message-separator prosign is usually followed by a single letter "N", signifying *no more*, e.g. the final message in a sequence of messages is usually followed by the Morse symbol sequence <AR> N.

Early telegraphers apparently saw the need for, and created, only the three *white space* prosigns <AA>, <BT> and <AR> described previously. On the other hand, modern computer character set codes and keyboards contain even more white space control characters, such as the *space bar*, the *Tab* key and the so-called *Form Feed* key. The *space bar* on modern keyboards creates the standard fixed space between words, and generates the most widely used teleprinter and computer keyboard white space control character symbol, sometimes known as the *blank character*. Since traditional Morse code symbols are of variable *width*, there can be no Morse prosign equivalent to the fixed-length white space blank character symbol created by the space bar. Traditional telegraphers create *space bar white space blank characters* between words by simply pausing for the minimum number of prescribed dot durations (normally seven) required for Morse code inter-word spacing. Although there is no Morse code equivalent for the *Tab* function key of modern keyboards, the Morse prosign AR may be considered equivalent to the *Form Feed* key on some keyboards.

The unwritten Morse code *white space* prosigns <AA>, <BT> and <AR> enable the creation of *highly human-legible* documents by enabling the visual-arts use of *white space* to enhance human document reading, and predates the use of the somewhat arcane in-line printed mathematical symbols implemented by some microcomputer-based single- and dual-line display Morse encoder/decoder products as described in the following section.

Math symbols used to generate <BT> and <AR>

Single-line or double-line electronic display systems simply cannot display normal page-oriented *white space* line space formatting, since it is impossible to *space down page* on a single-line or double line display to create *white line spaces*.

Accordingly, in order to accommodate single- or double-line displays, keyboard-operated Morse encoding and decoding systems utilizing single-line or double-line displays, in order to initiate or render the corresponding prosigns, sometimes generate or render the corresponding prosigns <BT> and <AR> using the keyboard mathematical *equal* and *plus* symbols "=" and "+" found on the top row of keys on modern computer keyboards . The "=" and "+" math symbols are usually located on one key , close to the numeral keys, near the right end of the *top row* of modern computer keyboards. When so utilized by single- or double-line display devices, the two white space prosigns <BT> and <AR> are initiated or rendered using the two math symbols as follows:

1. **Mathematical "=" symbol or key used to render or generate the *new paragraph* prosign <BT>** and,

2. **Mathematical "+" symbol or key used to render or generate the *new page* prosign <AR>** .

Apparently the representation of the (normally unwritten) *new paragraph* <BT> and *message separator* <AR> prosigns by means of the seldom-used mathematical "=" and "+" keyboard symbols and keys initially appeared with the advent of keyboard-operated, microprocessor-based electronic Morse code encoder/decoder devices utilizing single-line or double-line displays. Examples of such devices are the MFJ Enterprises models MFJ-461 and MFJ-462B microprocessor-based Morse code reader products.

Since traditional *white space* formatting of pages according to the received (unwritten) prosigns creates more *human-legible documents* than computer-based methods that utilize in-line insertion of printed mathematical symbols (=, +), Morse code software application developers would be wise to include a user-selectable option to use either: the traditional *highly legible white space* formatting or, at the user's discretion, the arcane computer-oriented *in-line* printed mathematical (=, +) symbols.

Turn over prosigns: K, <KN>, <SK> and abbreviations: BK and CL

Turning over a communications channel is the change in communications protocol transmission status that occurs when a transmitting station *turns over* or releases transmitting control of a communications channel to another station.

The ***general turn over*** **prosign K** symbol, although not unique to prosigns, is traditional, and is also identical to the alphabetic character symbol for the letter "K". The symbol for the alphabetic character K is interpreted as a prosign only when sent alone, at the end of a transmission. This symbol (verbalized as "dahdidah") is the only prosign symbol that is identical to another Morse symbol, namely the normal written-text alphabetic character "K". When sent alone at the end of a transmission, the alphabetic character symbol for the letter "K" is taken as a prosign to indicate a *general channel turn over* or change in communications protocol status. When sent as a prosign at the end of a transmission, the dot/dash symbol for the letter K literally means "*ok, go ahead anyone*" or "*ok, over to anyone*".

The ***specific turn over*** **prosign <KN>** composed of the run-together or concatenated letters K and N indicates a *specified* channel *turn over* or change in communications protocol status literally meaning "*go ahead only*" or "*over to you only*" when the sending operator wishes to specify a reply *only* from the current receiving station, and specifically does not wish replies from any other stations.

The ***end of contact*** **turn-over prosign <SK>** is usually sent in lieu of the prosign K or the prosign <KN> at the very end of the last transmission from the transmitting station, to indicate the termination or end of a particular contact (conversation) between two stations, thus turning the communications channel over to other users. The <SK> prosign may be interpreted in

English as, this station will be "*silencing key*". Often when terminating a contact with the <$\overline{\text{SK}}$> prosign, a transmitting station may continue listening on the communications channel for calls from other stations.

The ***back-to-you*** **turn over Morse code abbreviation BK** is actually an abbreviation for the word "break", comprising the sequential alphabetic letters B and K, which are not run together, and is sometimes used within a Morse conversation or contact between two stations as a *turn over abbreviation* to indicate that the sending station is turning over the communications channel to the specific receiving station without taking the time to transmit the identity of either the sending or receiving station. Generally, fluent high-speed Morse operators tend not to use the BK abbreviation for channel turnovers, instead using the *full break-in* or *QSK operation* interrupt technique for turn-overs as outlined in a following paragraph.

The ***closing station*** **turn over Morse code abbreviation CL** is actually an abbreviation for the word "closing", comprising the sequential alphabetical letters C and L, which are not run together, and is sometimes sent by operators as their last signal before closing their station by finally quitting the communications channel, and turning off their receivers. For example, when terminating a contact and closing their station, a transmitting station will often end the last transmission with the sequence $\overline{\text{SK}}$ CL, which can be interpreted in English as, "*silencing key and closing*".

As with all Morse code prosigns, in practice none of these *turn over* abbreviations and prosigns are ever written or printed by receiving operators.

Full break-in turn over*, also known as QSK operation*,[3] is the fastest and most efficient Morse code turn over technique. *QSK operation* is a technique wherein each station is equipped with the radio transceiver hardware technology necessary to enable listening between transmitted dots and dashes. This so-called *QSK* hardware technology creates the opportunity for a receiving station to quickly *interrupt* a sending station in mid-transmission. Station operators equipped for *full break-in* operation usually send the Q code signal *QSK* during the first transmission of a Morse conversation to inform the receiving operator that the transmitting operator can *listen between dots and dashes*. When equipped for *full break-in* (so-called QSK operation) stations can easily *interrupt* each other's transmissions by momentarily pressing their telegraph key while the other station is still transmitting. At this point, the interrupted station pauses and transmits a single prosign K indicating that the channel has been turned over, and pauses again to listen for what the interrupting station sends next. Using hardware-enabled full break-in interrupt technology (QSK) together with the single Morse prosign K enables fast and fluid two-way telegraphy communications similar to normal human face-to-face voice conversations.

Miscellaneous prosigns: <$\overline{\text{AS}}$>, <$\overline{\text{SN}}$> and <$\overline{\text{NJ}}$>

The ***wait*** **prosign <$\overline{\text{AS}}$>** is used by a transmitting station to request that receiving stations *wait* for further instructions from the transmitting operator. Often the prosign <$\overline{\text{AS}}$> may be immediately followed by a numeric character such as <$\overline{\text{AS}}$> 1 or <$\overline{\text{AS}}$> 3 to indicate the approximate number of minutes (here, one or three minutes) that the sending operator wishes the receiving operator to wait. The *wait* prosign is often used by Morse code *amateur radio net control operators* when acknowledging specific stations checking into a Morse code network. Normally the receiving station being asked to wait will immediately respond to an <$\overline{\text{AS}}$> request by sending the single *understood* prosign <$\overline{\text{SN}}$>.

The ***understood*** **prosign <$\overline{\text{SN}}$>** is intended to be used by receiving operators to respond to requests from a transmitting operator. For example, a transmitting operator may request the receiver to *wait* for three minutes by sending <$\overline{\text{AS}}$> 3 and the receiving operator would respond immediately with the single prosign <$\overline{\text{SN}}$>. In practice however many Morse code operators will more commonly acknowledge requests with a single ordinary alphabetic character "R", which is a short form of the voice response "Roger" or "Received" or with the single alphabetic character "C" which is a Morse code short form for "Confirmed" or "yes". (Note that the letter "C" sounds like the Spanish word "si" for "yes".)

The ***next Japanese*** **prosign <$\overline{\text{NJ}}$>**, when sent by a Morse code operator indicates to the receiving operator that the sending operator will be immediately *shifting* the communications protocol from International Morse code symbols to *Japanese* Wabun code Kana symbols and to interpret all of the symbols that follow as Wabun code symbols and not Morse code symbols. The symbol <$\overline{\text{NJ}}$> may thus be interpreted in English as *"Next Japanese"*. Prosign <$\overline{\text{NJ}}$> may alternatively be shown as <$\overline{\text{DO}}$>.

The **prosign <$\overline{\text{SN}}$>** appears in both Morse code where it means *understood* and in the Wabun code where it means *shift to Morse code*. When sent by a Japanese Wabun code operator, <$\overline{\text{SN}}$> is a prosign symbol in the Japanese Wabun code that indicates to the receiving operator that the sending operator will be immediately shifting the communications protocol status from the Japanese Wabun code Kana character symbols to International Morse code encoding and to interpret all the symbols that follow as International Morse code and not the Japanese Wabun code Kana symbols.

The ***Wabun code*** is a special form of dot/dash symbol code created by the *Japanese*, which encodes the Japanese *Kana* (*Hiragana* or *Katakana*) characters. The two prosigns <$\overline{\text{SN}}$> and <$\overline{\text{NJ}}$> (the latter often written as <$\overline{\text{DO}}$>) are used to signal a communications protocol status change (shift) from the Japanese Wabun code to Morse code and vice versa. Note that the *Kana* characters are a modern phonetic form of writing Japanese language and are completely different from the thousands of ideographic *Kanji* characters used in formal oriental (Chinese, Japanese, and Korean) writing or calligraphy.

Error prosign: <$\overline{\text{HH}}$>

The ***error*** **prosign symbol <$\overline{\text{HH}}$>**[4] indicates a previously sent *error* and consists of a series of eight concatenated dots[5] or run-together alphabetic letter "E" symbols. This *error* prosign symbol indicates an accidental error in transmission that, once sent, has been almost immediately recognized by the sending operator. When the *error prosign* <$\overline{\text{HH}}$> is sent it is immediately followed by the corrected information text, usually resending the entire current word. When formally writing or typing a message, the receiving operator then deletes (or crosses out) the erroneous text and replaces it with the corrected text.

For illustrative or instructive purposes this symbol may be written or shown as eight run-together "E" letters with overline as <$\overline{\text{EEEEEEEE}}$>, or as the shorter delimited form <$\overline{\text{HH}}$>. This <$\overline{\text{HH}}$> error prosign is never written down by receiving operators; it signals an upcoming correction to the previously transmitted message text, i.e. a change in communications protocol status.

Other non-prosign techniques are sometimes informally used to indicate such accidental errors in transmission. Some operators indicate errors by sending a few sequential question marks (e.g. ????), a sequence which would not often normally appear in regular written text messages. The sequence of four or more question punctuation marks is then followed by the correct text. Alternatively some operators indicate an accidental sending error by transmitting a few well spaced-out dots, the unusual "broken" rhythm indicating that an error was accidentally sent and then followed by the correct text.

In formal message traffic handling there are a further set of detailed procedures and abbreviations for locating errors and *getting fills* (making corrections) within formal messages which, for those interested, are fully described in the message handling documentation found in the ARRL Radiogram ARRL National Traffic System (NTS) practices and procedures documentation. This documentation is available in print or on line from the American Radio Relay League (ARRL).

Casual use of prosigns

Unlike formal written record message handling or participation in either Morse code tests or Morse code high speed copying contests, casual conversations or contacts between amateur radio operators do not require memorizing all of the prosigns or attaining great skill in use of all of the twelve prosigns and two abbreviations in the preceding Table. This is because, with most casual amateur radio contacts, the full text of conversations is usually never written down or recorded. Instead operators casually copy Morse signals mentally while jotting down only a few important facts such as names and locations, etc. With such casual contacts, there is no need for white space formatting prosigns, or initiating specific message handling communications protocol changes.

Of the twelve prosigns listed in the preceding Table, **only three** namely: K (When used alone at the end of a transmission.), <BT> and <HH> are **absolutely necessary** for use in casual Morse code conversations or contacts. These three absolutely essential prosigns are: K used to turn transmission control over to other parties, <BT> used to provide pauses between thoughts and <HH> the error prosign used to correct errors made by transmitting operators.

With a little more experience the use of the two prosigns <KN> and <SK> and the use of the two abbreviations (acronyms) BK and CL can be entertained. Finally, in case a life-threatening emergency is ever encountered during Morse operations, the sound of the <SOS> prosign should be memorized.

Thus, for most casual amateur Morse code operation **only six of the twelve prosigns need be learned**, namely: K, <BT>, <HH>, <KN>, <SK>, and <SOS> together with the two commonly encountered Morse abbreviations BK and CL.

The remaining six prosigns of the preceding Table, namely: <AA>, <AR>, <AS>, <CT>, <NJ> and <SN> can be safely left to professional and commercial operators or hard core amateur radio traffic handlers for use when *handling* formal written record radiogram messages.

Example conversation

Sensible and efficient informal Morse code conversations between operators involves more than simply knowing the alpha-numeric and punctuation characters. Skilled casual operators must eventually know and be able to respond to at least the six common Morse code prosign symbols detailed in the preceding section.

In addition to Morse code characters and prosign symbols there are also internationally agreed communications protocols or patterns of communication, international Morse code abbreviations, and established codes such as the: ACP-131 brevity codes: the Q code, Z code, RST code and commonly encountered numbers from older telegraph era codes such as the Phillips Code to assist with efficient and quick Morse code conversations.

In the following example an informal casual Morse code conversation between stations with the call signs X1AA and X2BB is depicted.[6] In the following conversational example the mathematical symbol "=" representing the prosign <BT> is shown written in-line as might occur if a single-line display automated software application were encoding and/or decoding the Morse code. The prosign symbol <BT> is actually sent (verbally this prosign is rendered as "dahdididididah") along with the other Morse code information bearing characters but these prosigns are not normally written down by the receiving operator. If writing while copying the signal the receiving operator merely skips down a line or two upon hearing the <BT> prosign creating the appropriate *white space*.

Often, with short informal casual Morse code conversations, as depicted in the following example, operators 'copy' mentally in their heads without formally writing or typing anything. With mental copy the presence of the <$\overline{\text{BT}}$> prosigns, indicated by the "=" signs in the following example are used to simply provide the receiving operator with a short mental pause to digest what was just sent, and perhaps to jot down a short note about it, instead of being used to trigger *white space* in a written record.

In the following example X1AA and X2BB are representative amateur radio call signs identifying each of the stations which are parties to the Morse code conversation or contact. The actual information transmitted between the two stations is shown in **bold face type** after the colons behind the call signs. Normally the prosign symbols are never actually written down or printed as shown here in the bold print in the following illustration of a Morse conversation. The remaining (non bold) text throughout the following example comprises only explanatory comments.

X1AA: **CQ CQ CQ DE X1AA X1AA K**

> Calling anyone (CQ), this is (DE) X1AA, over, go ahead anyone (K)

X2BB: **X1AA DE X2BB X2BB <$\overline{\text{KN}}$>**

> Calling X1AA, this is X2BB, back-to-you only. (<$\overline{\text{KN}}$> means you are inviting *only* the named party to reply)

X1AA: **X2BB DE X1AA = GA DR OM UR RST 599 HR = QTH TIMBUKTU = OP IS JOHN = HW? X2BB DE X1AA <$\overline{\text{KN}}$>**

> We note here again, the "=" signs represent the <$\overline{\text{BT}}$> prosigns as e.g. in single-line display computerized Morse readers.
> Good afternoon dear old man you are RST 599 here
> (Note - RST 599 means... Very readable (5), very strong signal (9), very good tone (9))
> I'm located in Timbuktu (QTH)
> The operator is John
> How do you copy? Go ahead only X2BB.

X2BB: **X1AA DE X2BB = TNX FB RPRT DR OM JOHN UR 558 = QTH HIMALAYA = NAME IS YETI = X1AA DE X2BB K**

> Thanks for the fine business report dear old man John. I read you 558.
> (RST 558 means - Very readable (5), adequate, low-strength signal (5), good tone (8))
> I am in the Himalayas (QTH)
> My name is Yeti, go ahead anyone (K).
> (Note sending K alone as a prosign without the run together N invites other callers to break in).

X1AA: **X2BB DE X1AA = OK TNX QSO DR YETI = 73 ES HPE CUAGN X2BB DE X1AA K**

> Okay, thanks (for this) conversation QSO) dear Yeti
> Best regards (73) Phillips Code and hope to see you again. Go ahead anyone.

X2BB: **X1AA DE X2BB = R TU CUAGN 73 X1AA DE X2BB <$\overline{\text{SK}}$>**

> Roger (R) thank you see you again best regards (73). Signing off (*silencing key*) .(<$\overline{\text{SK}}$>)

X1AA: **E E**

> Often, a couple of dits might end an amateur radio Morse conversation or *contact*. This traditional Morse code idiom resembles the archaic English "pip pip".

This example conversation, with channel turn overs initiated only by transmitting stations sending the K or the <$\overline{\text{KN}}$> prosigns between transmissions, wherein the receiving station waits for the turn over prosign before beginning a transmission, is slow, awkward, and somewhat stilted when compared to normal two-way voice conversations wherein the parties can actually interrupt each other during speech.

Prosign use with QSK (full break-in)

Full break-in or **QSK operation** is a hardware supported *turn over* technique that, by enabling the ability to interrupt senders, encourages less stilted Morse conversations than illustrated in the preceding example. By allowing interruptions, QSK operation facilitates a style of communications protocol similar to normal human voice conversation.

This *QSK operation (full break-in)* consists of a technology and protocol wherein each station is equipped with the hardware capability of *listening between dots and dashes* thus enabling *interruptions* by the other party similar to human voice conversations. If both parties are equipped with fast transmit/receive (T/R) radio frequency switching hardware to allow *full break-in* interrupted operation, stations may break into (interrupt) another's transmission at any time by momentarily pressing their telegraph key during the transmission. Upon hearing (receiving) the *break-in* signal from the receiving station between the transmitting (sending) station's own signals the interrupted station simply stops sending and transmits a single K prosign indicating that the listening station can *go ahead* and then listens for the interrupting party to make their respective transmission.

Using *full break-in high speed transmit/receive switching technology (QSK)* to enable stations to interrupt each other when used together with the turn over prosign K creates a communications channel turn over protocol that facilitates a smooth, fluid style of Morse code conversation that is as efficient as human voice communications. Unfortunately not all radio

transceiver equipment provides the high speed hardware transmit/receive (T/R) radio frequency switching support necessary for *QSK full break-in* operation. Generally full break-in capability is only available on more expensive radio transceivers. Radiotelegraphers who aspire to this QSK mode of Morse conversation must ensure that the radio equipment they acquire or construct includes the hardware ability for T/R switching fast enough to allow *listening between the dots and dashes*.

Formal use of prosigns

Traffic handlers are Morse code operators who: **originate, send, receive, relay, record and deliver** – or *handle* — so-called *formal* recorded text messages for relay and ultimate delivery to **third parties**. Morse record traffic handlers may be radio amateurs[3] or paid professionals such as ship's radio operators or military radio operators who send or relay radiograms on behalf of third parties. Regulations often require that a record of third party traffic be retained by the sending and relaying stations for a reasonable period, hence such *formal* third party messages are often called *record traffic*. These formal records of third party traffic radiograms are usually hand written, or typewritten, either on paper or typewritten into a word processing file so that a more or less permanent record of the radiogram is available to be kept on file for future reference in case authorities wish to review the record traffic for their legal requlating purposes.

In North America (United States and Canada) amateur radio operators (*hams*) are permitted to handle such third-party record traffic as a nonprofit public service. Such traffic handling on behalf of third parties by amateurs is actually forbidden by law or regulation in much of the rest of the world outside of the Americas where most message relay service has been reserved for government authorized monopoly licensed corporations or governmental agencies such as local PTT authorities (postal, telegraph and telephone service). The United States national ham radio organization known as the American Radio Relay League (ARRL), and its Canadian counterpart, Radio Amateurs of Canada (RAC), publish manuals that standardize traffic handling procedures for such third party record communications. These manuals may be downloaded from links at the ARRL Internet Web site under the subject National Traffic System or *NTS*. The word *Relay* in the name of the ARRL is a relic of the original organizational purpose (third party message relay) of the American Radio Relay League.

When Morse code record traffic handlers receive a formal record message for relay or for ultimate delivery to a third party they do not write or type prosigns explicitly, instead they take the page and text formatting or transmission communications protocol actions indicated by the Morse prosigns to format the recorded message on the page, text file, or video screen. For example, when hearing the *attention* prosign <$\overline{\text{CT}}$> ("Copy This") the operator who, until hearing the <$\overline{\text{CT}}$> prosign, is merely listening without writing or typing, will begin writing or typing all that comes after the <$\overline{\text{CT}}$> prosign, immediately expecting a text message header to follow.

When hearing <BT> ("Begin Two lines") within a message, the traffic handler creates *white space* by beginning a new paragraph on the page (e.g. spaces down two lines). When hearing the prosign <AA> within a message, the traffic handler spaces down one line on the page (i.e., starts a new line, say for each line of a street or postal address). Upon hearing the prosign <AR> the operator stops writing down or recording the current message text and prepares a new page (or a new message blank from a pad of ARRL Radiogram blanks) or just spaces down several lines to a new part of the page in preparation to copy a subsequent message.

Example formal message

The following two paragraphs delineated as Part A and Part B illustrate an example of a typical record traffic message, sent in the ARRL Radiogram format.[7] The first Part A illustrates the Morse code data stream as heard by the operator, which explicitly includes all prosigns that are included in the data stream along with the record text. The second Part B illustrates the message (record) as actually recorded by an operator writing or typing the message on paper or into an electronic text file in response to the transmitted Morse code data stream. The second Part B paragraph illustrates the appropriate *white spaces* created by the receiving operator in response to the *white space*, *attention* and *message separator* prosigns sent by the transmitting operator.

Part A: --- Morse code message data stream as actually transmitted, including prosigns. ---

<CT> NR 2 R HXE VE9ZK 10 OTTAWA 1800 12-23-14 <BT> JOE JACKSON <AA> 123 HENRY ST <AA> INDIA, FL 32900 <BT> WILL MEET YOU AT STATION 1500 HRS X BEST REGARDS <BT> PETE <AR>

Part B: --- Formal message as recorded (typewritten) on paper with *white space* text formatting rendered in accordance with the received prosigns. ---

```
NR 2 R HXE VE9ZK 10 OTTAWA 1800 12-23-14

JOE JACKSON
123 HENRY ST
INDIA, FL 32900

WILL MEET YOU AT STATION 1500 HRS X BEST REGARDS

PETE
```

The two layouts of the same message as exhibited in the preceding paragraphs illustrates: In Part A - the continuous data stream of Morse code symbols as received in real time and, In Part B - the *white space* formatted text message as recorded in more human legible form on the: page, text file, or electronic display where the permanent record of the message will be stored for future use.

Note in Part A that the sending operator precedes the message text with the "Attention, Copy This" prosign <CT>. The receiving operator does not write or type this "attention" prosign, instead the receiving operator prepares to write or type all that follows taking appropriate action on reception of any subsequent prosigns.

The first line in this formal message is the so-called *header* and contains somewhat arcane details of ARRL Radiograms that are only of interest to record traffic handling experts. The address lines illustrated below the header line are separated by two lines from the header as indicated by a new paragraph <BT> symbol prosign. Each line of the address information is separated from the others by a one line space indicated by the new line <AA> prosign symbols. The address is then separated from the main text of the message by a two line space new paragraph symbol <BT>. Finally the signature line "PETE" is separated from the main body of the text by two lines indicated by another <BT> prosign.

Comparing the two message layouts illustrated under the preceding Part A and Part B paragraphs, readers will note that the *protocol change* prosigns <CT> and <AR> in the Morse code data stream of Part A indicate only changes in transmission protocol status and so do not explicitly appear in the part B recorded message layout. The leading prosign <CT>, usually interpreted as "Copy This", alerts the operator to pay *attention* and to begin writing or recording a new message text. The message separator prosign <AR> sent at the end of the message is interpreted as "End of Message" or "New Page", and alerts the operator to stop writing or typing message text and to prepare a new page or a new place on the page (by creating enough *white space separation*) for the next message.

Readers may note the traditional ARRL Radiogram style use of an "X" character in the main text of the formal message to indicate a so-called *full stop* which is equivalent to the *period* punctuation mark. Traditionally, standard punctuation mark characters such as: commas, periods and question marks are not used in Morse traffic handling, instead such punctuation marks are simply spelled out as words to ensure accuracy under noisy communications conditions. Sometimes the *period* or *full stop* may be sent as the spelled out word *STOP* rather than the letter "X". It is also traditional in Morse code record traffic to spell out the word *QUERY* in place of the punctuation mark symbol "?".

Prosign use with QSK (full break-in)

Normally highly skilled Morse traffic handlers operate using *full break-in* or *QSK operation* and so the operators sending the radio telegram messages as presented in the preceding Part A and Part B paragraphs are actually listening for possible interruptions from the receiving station as they are sending their own signals. The receiving operators may then interrupt the sending operator at any time during sending of the telegram message by hitting their telegraph key momentarily allowing them to immediately correct errors or obtain 'fills' for parts of the message they may have missed. Further details of traditional efficient Morse code record

traffic ARRL Radiogram handling procedures and practices may be found in the ARRL National Traffic System (NTS) documentation which is available in print or on line from the American Radio Relay League or ARRL.

Prowords

In voice communications use there are certain spoken words designated as *procedure words* or *Prowords* several of which are equivalent to the much older Morse code prosigns. For example, the *proword* "OVER" is equivalent to the Morse *prosign* "K". For further information on *prowords* see the corresponding Wikipedia article on Prowords.

See also

- 500 kHz
- ACP-131
- Amateur radio
- Amateur radio net
- American Radio Relay League
- ARRL
- ARRL Radiogram
- ASCII
- Baudot code
- Brevity code
- Carriage return
- Character set
- concatenated
- Control character
- Continuous wave
- CQD
- CW
- CW Operators
- Distress signal
- Enter key
- EBCDIC
- Form Feed
- High-speed telegraphy
- ITA2
- Line feed
- List of telegraphists
- Mayday

- Theodore Roosevelt McElroy
- Morse code abbreviations
- Morse code
- Murray code
- National Traffic System
- Newline
- Page break
- Phillips Code
- Proword
- Procedure word
- Q code
- QSK operation (full break-in)
- Radio Act of 1912
- Radiotelegraphy
- Radiogram (message)
- RMS Titanic
- RST code
- SOS
- Space bar
- Telegraphists/Telegraphers
- Telegraph key
- Telegraphy
- Teleprinter
- Telex
- UNICODE
- Whitespace character
- White space
- Wireless telegraphy
- Z code

References

1. ARRL Inc. (8 October 2012). *ARRL Operating Manual* (10 ed.). ARRL. ISBN 978-0872595965.
2. http://www.arrl.org/files/file/Public%20Service/MPG304A.pdf
3. http://www.arrl.org/files/file/NTS_MPG2014.pdf
4. ARRL FSD-218 (http://www.arrl.org/files/file/Public%20Service/fsd218.pdf)
5. ITU-R M.1677-1 recommendation (http://www.itu.int/dms_pubrec/itu-r/rec/m/R-REC-M.1677-1-200910-I!!PDF-E.pdf)
6. Field, Don (2010). *The Amateur Radio Operating Manual*. Potters Bar: Radio Society of Great Britain. p. 92. ISBN 1-905086-00-8.
7. http://www.arrl.org/files/file/Public%20Service/RADIOGRAM-2011.pdf

Categories: Morse code | Brevity codes
