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Introduction

What the system does...

WinLink is a contraction of *APLink for Windows*.   It is based on the earlier MS-DOS program AmTOR/Packet Link (APLink)[WINLINK].

WinLink adds to APLink the capability of using other modern HF digital modes.   Currently supported are CLOVER and PacTOR in addition to AmTOR.   In addition, several different modes and multiple ports of the same mode are possible simultaneously.

APLink Background

The AmTOR/Packet Link (APLink) is a software system that runs under MS-DOS 3.x or higher on an IBM-XT or compatible computer.   It runs an AmTOR MBO and a Packet BBS concurrently using a common set of message files.   (For whatever reason, the AmTOR community refers to these things as mailboxes [MBO] and the Packet community as bulletin board systems [BBS].   In this document MBO will refer to the AmTOR side and BBS to the Packet side of the system.)

Both sides of the system conform as closely as possible to the conventions that have evolved for the use of Packet BBSs.   There are differences necessitated by the nature and constraints of the AmTOR mode.   Although improvements in AmTOR controllers have greatly reduced the incidence of errors AmTOR is still subject to occasional transmission errors.   For this reason, as well as the fact that AmTOR does not automatically identify a sending station, the MBO requires positive identification during login.   The MBO will also request confirmation of the addressee when entering messages into the system (unless the user has selected 'EXPERT' mode).

In the past AmTOR has had the restriction of a limited character set because of its historical base from the Baudot teletype 5 level code.   This has been eliminated for stations using the latest APLink or PAMS software with up-to-date AmTOR controllers.   The full ASCII printing character set is now available.

Why use AmTOR at all, given its limitations?   AmTOR will work under difficult radio conditions that would pack in an HF Packet link (pardon the pun).   The author of this system has lived on a sailboat and maintained communications with friends and family via ham radio.   AmTOR worked reliably for that purpose, day in and day out, while running with low power, long hauls, and abominable radio conditions. Only CW could improve on its record for reliability.

The APLink MBO provides all of the features that any MBO in use today would normally supply.   The BBS is a subset of what Packet operators who use typical VHF Packet systems are used to.   It is not intended that this system be used as your local, full service, Packet BBS although it could be in a pinch.

No provision is made for handling anything but ASCII text files in regular message format.   There are no W, D, or U commands in the system.

Character Sets

APLink now supports a new feature which, at the sysop's option, may be disabled.   As a default, APLink now sends the full range of ASCII printing characters including all upper and lower case alpha characters and all ASCII punctuation.

To disable this feature set LOWERCASE=0 in the APLINK.CNF file.

> **NOTE:**   This feature will work with any AEA PK-232 controller, any AEA AMT-1 controller with a version 07A ROM or later, any AMT-3 controller with a version 8.0 ROM or later, and any HAL PCI-3000 with version 1.7C ROM or later..   (If you need a new AMT-1 or PCI-3000 ROM contact Jim, KE5HE @ KE5HE.TX.USA.)

The addition of lower case is achieved by transmitting a case 'toggle' or shift character, a Baudot blank, whenever the text changes between upper and lower case.   (The Baudot blank is the Baudot character with all bits set to 0 - not to be confused with the Baudot space.) The beginning of any transmission is always assumed to be in upper case.   Any Baudot figures character always shifts the alpha case back to upper.

Since the Baudot blank character is ignored by virtually all receiving devices this mode is 'backwards' compatible with your existing user's system.   A user not equipped with a system that interprets the Baudot blank continues to see all upper case characters.

The technique used for transmitting the extended punctuation characters is to send an 'escape' code (again, a Baudot blank) ahead of a Baudot figures character to 'reassign' it to an alternate value.   For example, to send a colon in the Baudot code the system transmits a 'Figs-C'.   This may be one or two characters depending on whether the controller is already in 'Figs' case.   To send a semicolon, which is an ASCII character but not a Baudot character, the system precedes the 'Figs-C' with the Baudot blank. This does not interfere with the upper/lower case alpha toggle since any figures character resets the system to upper case alpha.

A copy of the Escape Table is included for those that are curious about the exact characters used.

This method of transmitting upper and lower case was originated by Peter, G3PLX.   It is used in the 'PLX' AmTOR mailboxes that he has written.

> **WARNING:** - The latest versions of the AEA PK-232 also implement upper and lower case using a different technique.   Your users must not use that mode or the upper and lower cases will become confused and/or stray graphics characters may appear in their text. Tell your PK-232 users to set the parameter 'CODE 0' in their controllers.

Escape Table

Here is the 'escape' table used for the extended characters:

	No Null Escape	With Null Escape
FigsA:	- Dash	_ Underscore
FigsB:	? Query	
FigsC:	: Colon	; Semicolon
FigsD:	<Reserved for WRU>	
FigsE:	3	
FigsF:	% Percent	` Reverse Apostrophe
FigsG:	@ At Symbol	} Closing Brace
FigsH:	# Hash Mark	{ Opening Brace
FigsI:	8	
FigsJ:	* Asterisk	
FigsK:	(Open Parens	[Open Square Bracket
FigsL:	) Close Parens	] Close Square Bracket
FigsM:	. Period	> Close Angle Bracket
FigsN:	, Comma	< Open Angle Bracket
FigsO:	9	~ Tilde
FigsP:	0	
FigsQ:	1	! Exclamation Point
FigsR:	4	$ Dollar Sign
FigsS:	' Apostrophe	" Quotation Marks
FigsT:	5	
FigsU:	7	@ And Symbol
FigsV:	= Equal		Vertical Bar
FigsW:	2	
FigsX:	/ Slash Mark	\ Reverse Slash Mark
FigsY:	6	^ Caret
FigsZ:	+ Plus	

The Configuration File - WINLINK.INI

A configuration file will be created (if it does not already exist in your system) when you run WLSETUP.EXE.   You will be prompted for your basic station data.   Packet auto forward data however is not automatically configured and you will need to do that with Windows NotePad.   If you allowed WLSETUP.EXE to create a WinLink program group for you only need to click on the Configuration icon to bring up the file.

Sections:

[AUTOFORWARD]
[MESSAGE MANAGER]

WINLINK.INI, [WINLINK] Section

The [WINLINK] block consists of two major sections.   The first five entries specify the directories for the program to use on your hard disk.   The defaults written by WLSETUP.EXE are shown below and are highly recommended.

```
;    Directories:
APDATA=C:\WINLINK\APDATA
BINARY=C:\WINLINK\BIN
LOGS=C:\WINLINK\APDATA
MESSAGES=C:\WINLINK\MESSAGES
OLDDATA=C:\APLINK
```

The other six entries consist of station information and are also written by WLSETUP.EXE.   (I leave the QTH= entry blank to reduce header size.)

```
;    Station Information:
STATION=WA8DRZ
SELCAL=WDRZ
PREFIX=
POSTFIX=6
QTH=
ROUTE=#NOCAL.CA.USA.NA
```

WINLINK.INI, [AUTOFORWARD] Section

The [AUTOFORWARD] block specifies stations you may forward to automatically on Packet (and later on HF ports if automatic HF forwarding becomes legal).   You may specify up to 32 stations.   Each station fills a parameter BBS00 through BBS31 and is in the following format:

`BBSnn=<call>, <port name>, <minutes>`

where <call> is the call of the BBS including the SSID (if there is one), <port name> is the name of the Packet port forwarding is to occur on (not the COM port number but a name assigned to the Windows task, see below), and <minutes> is the number of minutes past the hour that forwarding is to occur on. Use -1 if you don't want hourly forwarding.   You may manually start automatic forwarding anytime but the station must be in this file.

Following the BBSnn... line is the routing information for that station. It consists of text to be transmitted alternating with text to be looked for in response.   The response text can be any string of characters that may be embedded in a response.   Responses that do not contain the looked-for string are ignored.

You may put the BBSnn entries in any order and the entries do not have to be contiguous.   For example you can use BBS07 and BBS03 and without using any others.   The WINLINK.INI file is case insensitive. For example, "CONNECTED"   will match with "connected".

If during the link-up process the system receives a message containing "DISCONNECTED", "FAIL", or other similar text indicating a failed link the process will be aborted immediately.   If the link does not complete in 6 minutes, it will be aborted.

Forwarding Examples

Forwarding Examples

Here are some examples.   This one is for a station that is reached via a direct connection:

```
BBS04=W1ABC-6, VHF, 30

   C W1ABC-6

   4RE-

   END
```

In the above example, we connect with "C W1ABC-6" and look for "4RE-" as an indication of a successful link.   "4RE-" is part of the station's SSID, [4RE-02.12-HMR$], assuming it is a station running an AA4RE BBS.   Using part of the SSID as the final test of a link is a good idea since it absolutely confirms that you are connected to a valid BBS.   (But do not use "[" or "]" in this file.) Following the route you must always include an 'END'.

Here is a more complex example:

```
BBS06=W1ABC, UHF, 45

   C SAT440

   CONNECTED

   C W1ABC-3

   4RE-

   END
```

Here is an example of a connection through TexNet:

```
BBS00=KE5HE, VHF, 10

   C ALAMO

   CMD

   C % HRN @ BRAZOS,0

   OK

   MBO

   W5SMM

   END
```

In this case the final response is my own call since I happen to know that once I am linked to the KE5HE BBS I will get "W5SMM de KE5HE...".

WINLINK.INI, [MESSAGE MANAGER] Section

CONFIGURING THE MESSAGE MANAGER

A separate parameter block has been established in the WINLINK.INI file for the Message Manager. This block begins with "[MESSAGE MANAGER]".

The UPDATE= parameter specifies the hour (nn) that update should occur.

`UPDATE=nn`

The following additional parameters are permitted:

`PENDING=YES`

`PRIVATE=NO`

`NTS=NO`

`BULLETINS=NO`

`HELPS=NO`

The values shown are the defaults.   Each parameter should be either YES or NO.   These values set the initial search parameters for the message list.   None of these parameters need to be entered into the {MESSAGE MANAGER] parameter block if the defaults are acceptable.

Forwarding

Automatic Packet forwarding only occurs if there is traffic to forward.   If you manually forward however, the far station is called even if there is no traffic.   An option to poll a far station for traffic automatically will be added eventually.

WINLINK.INI, [AUTOFORWARD] Section

FORWARD.APS

Idle Tasks

There is no reason to leave the any tasks other than the ports running, but there is no harm either.

The port tasks are completely independent and will function any time they are running.   They access the message and user data files through a common DLL.

The only reason to leave the Message Manager task running is to have the automatic daily update.

The only reason to leave the Event Log task running is to keep message statistics.

Sound

The sysop alarm uses the sound features of Windows.   If you have a sound card then whatever tone sequence is programmed for the "Question" (Control Panel/Sound/Events) will sound when there is a sysop alarm.   If you do not have a sound card only a standard DOS "beep" is heard and you must be right next to the computer to hear it.

MBBIOS

WinLink does not use the Windows-provided communications drivers but the familiar <u>MBBIOS</u> instead. This provides for compatibility with other BBS-related programs that use <u>MBBIOS</u> (or other compatible TSRs such as the G8BPQ switch).   (Getting BPQ to work with Windows is NOT the WinLink author's problem.)

MBBIOS or BPQ should be run as TSRs always <u>before</u> Windows is started.   This is best accomplished by putting the command(s) in the AUTOEXEC.BAT file.

Changing Files

Data that is read in from the [WINLINK] data block in the WINLINK.INI file is only read at the time a given task starts.

All other file data; the [AUTOFORWARD] block, the FORWARD.APS file, the INTRCPT.APS file, and any data updated by the Message Manager and User Manager is immediately current in all tasks.

CRT

WinLink assumes you have at least a VGA with 640 x 400 pixel screen size or better.   A Hercules monochrome card should also work OK, but has not been tested.   An EGA card may give pretty poor results.

FORWARD.APS

The Forwarding File

The method of routing messages for auto forwarding is the same hierarchical routing (H-routing) scheme that is used by the Packet network.

Routing is strictly a function of the station you are linked to and is independent of whether you are linked on HF or Packet.

Using a text editor (NotePad or the WinLink Editor), create a text file named FORWARD.APS.   Make entries into the file that look something like this (assume you are WA8DRZ for this example and that N6IIU is the Packet BBS you normally forward to):

```
. A line beginning with a period is ignored

. Blank lines are ignored


. The first entry should be your call typically (see below)

WA8DRZ       WA8DRZ
. The second entry should be the Packet BBS you forward to.

N6IIU        N6IIU

VK2AGE       AH6D VK2AGE VK3EHQ

TG9VT        TG9VT

#SOCAL.CA        N0IA

#NOCAL.CA        N6IIU
. This entry routes all NTS traffic with a zip code starting with. 78 to KE5HE

78*     KE5HE
. The next entry would hold all Alaska traffic in the system

AL      WA8DRZ
. The following state code entries are exceptions to the rule that USA traffic goes to N6IIU

HI      AH6D

TX      KE5HE

IL      WA1URA WB7QWG

IN      WA1URA WB7QWG

USA     N6IIU

AUS     AH6D VK2AGE VK3EHQ

EU      TG9VT  ZF1GC

NA      N6IIU

AS      TG9VT ZF1GC

OC      AH6D

SA      TG9VT ZF1GC

AF      TG9VT ZF1GC
```

...and so on.   The first entry on a line is a routing token and the remaining entries on the same line are BBS/MBO stations that messages with those routing tokens may be sent to.   Messages that have nothing in the 'at' field will not move unless there is an exact match to the 'to' field.

You may use a wild card (a '*') on the left hand token.   DO NOT USE WILD CARDS EXCEPT FOR ZIP CODES OR WHERE THE FIRST THREE LETTERS ARE 'NTS'.   Wild cards on anything else will potentially confuse the H-routing scan process.

If you have a token with a leading '#' then the expected following token must be included also (see #NOCAL.CA above).

If you put a call (other than your own and the call of the Packet BBS you forward to) in a routing token field then also put that call in the intercept file with full H-routing so that down stream stations will know how to deal with it.

Put the most specific tokens first, such as call letters, followed by tokens beginning with '#', followed by zip codes (including zip codes with wild cards), followed by state codes, followed by country codes, followed by continental codes.   The scanning process is complicated and the order of entries in FORWARD.APS is very important.   For example, if a message has HI.USA in the 'at' field it will not forward to N6IIU in the above sample file because it will have 'hit' on AH6D first and the system will hold the message for that station.   Put your own call in the first line in both the first and second field to insure that traffic addressed 'at' your station stays there.

Messages that do not match any routing on the list will <u>not</u> move - even on Packet.   Packet is no longer the default if nothing matches.   Make sure that the call of the Packet station you forward to has some broad coverage tokens to pick up the bulk of the traffic that does not otherwise move out on HF.

Messages with your own call in the 'to' field will not move on Packet unless you have selected Forward Own Messages in the Configuration/Preferences box.   Messages with the call of the station that you are linked to in the 'to' field move unconditionally to that station.

Any number of BBS calls can follow the routing token as long as they are separated by one or more spaces and do not exceed a total line length of 80 characters.

If you change FORWARD.APS the system will see a change in the file time stamp and re-load the routing table the next time routing is requested.

HINTS

Do not try to put every possible H-routing token in your FORWARD.APS file.   It is enough to put 'USA' and/or 'NA' for the station(s) that handle most of your U.S. traffic and then just enter the state codes that are exceptions ahead of it.   Use 'EU' for the station(s) that takes your European traffic, etc.   If your FORWARD.APS file is growing large you may not be making the best of it.   Make sure there is at least one entry for each continental code.

The Intercept File, `INTRCPT.APS`

The intercept file provides a very special service.   Each line of the file should contain station's call letters, white space, and an H-route - AND NOTHING ELSE.   Each time a message is received by WinLink the file is searched for a match to the TO field of the incoming message, if nothing is found then an search is made on the first token of the AT field. If the first call on any line matches, then the H-route is placed in the AT field of the message.   Note in the sample provided that the first line of the file reads:

```
W5SMM    WA8DRZ.#NOCAL.CA.USA.NA
```

This means that any message for W5SMM arriving in the system will be forwarded to him at WA8DRZ. (In fact, W5SMM requests that all sysops leave his call in the intercept file as shown.)

Bulletins

Bulletins entered into the system from any HF port or by the Sysop are visible to everyone who uses the system.   Because of the proliferation of bulletins that arrive at any BBS via Packet, bulletins that enter the system from a Packet port will not be visible to HF users unless the Sysop edits the MCB using the Message Manager to change the "Channel" field from Packet to SYSOP.

Bulletins may be entered by any station.   If there is no entry in the 'at' field then the bulletin will remain in the system and will not be forwarded to any other station.   If there is an entry in the 'at' field the bulletin will be forwarded once <u>only</u> to the station indicated by the FORWARD.APS file for that routing. WinLink does not do "flood" forwarding of bulletins.   If the bulletin is forwarded to a Packet BBS however, that BBS may "flood" the bulletin to many stations.

Bulletins entering the system via Packet are deleted after 21 days unless the Sysop changes the channel designator.   All other bulletins are held in the system until deleted by the sysop or the originating station.

AmTOR LogIn

The AMTOR login routines have been completely revised.   When a station links, the system turns the link around and immediately requests an AAB without any banner or other announcement.   If a recognized AAB is received the system goes directly to the opening ID.   The result is a quick and more reliable login.

If an unrecognized AAB is received or 10 seconds pass without the AAB starting then the familiar manual login procedure will begin.

Legal Stuff

Copyright Statements

The code and documentation for the WinLink system is Copyright   1989-1993 by Victor D. Poor, W5SMM.

All Rights Reserved

It may be copied only in its entirety and without modification and distributed freely without charge.   It may be used only for Amateur Radio communications where no charge is made for its use.

The WinLink Reference Help system is Copyright   1993 by Craig McCartney, WA8DRZ.

Installation

Software Setup for WinLink

System requirements

Hardware Required

The equipment required to operate a WinLink system is:
 A Computer System
 At least one of the following:
   An AmTOR code convertor
   A CLOVER Controller
   A Packet TNC
   A PacTOR controller
 Radio systems

Software Required

In addition to the files provided on the WinLink diskette, the following must be provided by the sysop:

Operating System - Any version of DOS that supports Microsoft Windows such as MS-DOS 3.1 or later.

Windows - Version 3.1 or later is required, and should be installed on the system before attempting to install WinLink.   Windows for WorkGroups is also known to work.

Other documentation required

In addition to this document, you made need to refer to the operation and instruction manuals provided with the major items of hardware and software used with APLink.   Such documents include:

Hardware:

the manual for your AmTOR, CLOVER, Packet and PacTOR controllers.

the manual for your HF radio(s)

the manual for your VHF/UHF radio(s)

Software:

DOS manual

Microsoft Windows User's Guide

Computer System

Any PC AT or a close clone.   Although the program will run on a system with a 286 CPU, performance will be slow.   Also, Windows will be limited to Standard mode.   Therefore a   386 or 486 CPU is highly recommended.

Minimum acceptable memory for Windows Enhanced mode is 2 MB, but at least 4 MB is recommended. More is better.

A hard disk is required.   Windows wants about 10 MB, DOS needs 5 MB and WinLink can take over a MB more so get the largest you can afford (up to about 100 MB).

A separate serial port is required for each external controller.   Each one must have a dedicated IRQ line.   NOTE: The HAL plug in cards do not require serial ports.

Most any video card (display adapter) and monitor are usable, as long as it is supported by Windows. Color is not used in the WinLink screens so a Hercules monochrome card is all that is really needed.

A draft quality printer supported by Windows, connected to a parallel port is optional but highly recommended.

AMTOR Code Converter:

Several models of AmTOR controllers are currently supported by WinLink:

AEA AMT-1   Contains the original G3PLX hardware and software.   Version 07A or higher firmware is required.   Strap the unit for 110 baud on the serial port and connect only TD, RD and ground.   (This unit is no longer in production.)

AEA DSP-1232   AEA states this has the same interface as the PK-232.   Not known to be tested with WinLink.

AEA DSP-2232   AEA states this has the same interface as the PK-232.   Not known to be tested with WinLink.

AEA PKT-232   Version July 1991 or later firmware is required.

AEA PKT-900   AEA states this has the same interface as the PK-232.   Not known to be tested on AmTOR with WinLink.

HAL PCI-3000   This is an internal plug-in card for the PC.   Version 1.7C or higher firmware is required.

Heath HK-232   Heath's clone of the AEA PK-232, no longer in production.   You will probably have to get update firmware from AEA.   Not known to be tested with WinLink.

ICS AMT-3   Version 8.0 or higher firmware is required.   Available in the U.S. through KB1PJ.

CLOVER Controller

One model of <u>CLOVER</u> controller is supported by WinLink:

HAL PCI-4000   This is an internal plug-in card for the PC.   Version ___ or higher firmware is required.

Packet Terminal Node Controller (TNC):

Any <u>Packet</u> TNC that recognizes Control-C to enter command mode, responds to CONOK ON and CONOK OFF, and enters CONVERSE mode automatically on connect should work.   Also, the TNC <u>must</u> toggle pin 8 (CD) on connect.   The following devices are known to have been used successfully with WinLink (there are many others):

AEA PK-87

AEA PK-88

AEA PK-232

AEA PKT-1   (requires <u>minor modification</u>)

TAPR TNC-1 (requires <u>minor modification</u>)

TAPR TNC-2

TNC-1 Modification

As explained below, the TNC-1 needs a modification before it will work with APLink or WinLink. The following note was received from Gordon, VK2AGE:

```
ON THE TNC-2 PIN 8 IS CALLED DCD AND IS A SIGNAL WHICH CHANGES STATE

WITH CONNECT/DISCONNECT.  I ASSUME APLINK USES THIS SIGNAL TO CONTROL

FLOW OF DATA TO TNC AND ENSURE DATA IS NOT DOWNLOADED IN DISCONNECTED

STATE.

PIN 8 ON TNC-1 IS QUITE DIFFERENT.  WHILE  IT IS CALLED DCD BY TAPR IT

DOES NOT CHANGE STATE WITH CONNECT/DISCONNECT.  IN FACT, UNLESS IT IS

INFLUENCED BY A SIGNAL FROM A TERMINAL, IT DOES NOT CHANGE STATE AT ALL

AND IS HELD HIGH BY A PULL-UP RESISTOR.  THERE IS IN FACT NO SIGNAL

AVAILABLE ON THE RS-232 PORT OF A TNC-1 WHICH INDICATES CONNECT/DISCONNECT

HOWEVER, THERE IS A CONNECT/DISCONNECT SIGNAL AVAILABLE ON THE PARALLEL

USER PORT, J1, RIGHT NEXT TO THE RS-232 PORT.  THIS IS PA2 WHICH COMES

OUT ON PIN 16 OF J1.  AS A TEMPORARY MEASURE I HAVE CONNECT TO THIS PIN

USING A FLYING LEAD FROM THE RS-232 CABLE.  I GUESS BY RIGHTS THERE SHOULD

BE SOME BUFFERING IN THERE.  I WILL EVENTUALLY MAKE THIS A PERMANENT

CONNECT BY A LITTLE BIT OF TRACK CUTTING IN THE TNC AND BRING THE SIGNAL

UP ON PIN 8.
```

WA8DRZ notes:

I have modified my AEA PKT-1 (TNC-1 clone) according to the above and in addition added the buffering that Gordon mentions. It turns out that there is one unused section on U__, the 148_ translator IC. Cut the trace going from pin 8 of the RS-232 connector to R__ and U__. Connect pin 16 if J1 (or pin __ of U__) to pin __ of U__. Then connect pin __ of U__ to pin 8 of the RS-232 connector.

As noted, this mod also applies to the AEA PKT-1, the Heath HD-4040 and the TAPR TNC-1.

PacTOR Controller

Several models of PacTOR controllers, all of which have the same basic firmware, are currently supported by WinLink:

AEA DSP-1232   AEA states this has the same interface as the PK-232.   Not known to be tested with WinLink.

AEA DSP-2232   AEA states this has the same interface as the PK-232.   Not known to be tested with WinLink.

AEA PKT-232   Version May 1993 or later firmware is required.

AEA PKT-900   Version March 1993 or later firmware is required.

Radio Systems:

One for each AmTOR, CLOVER, or PacTOR port in use.(typically HF) and one for every VHF or UHF Packet port in use.   The details are up to your imagination.

WinLink is capable of transmitting on one or more radios while receiving on the others so your installation should allow for adequate isolation.

Quick Start Check list

This section assumes that you already have, *fully checked out and operating*, the following equipment:

A computer system with hard drive, monitor, keyboard and serial ports.   Microsoft Windows must be successfully installed and running.   (NOTE: Set the computer's clock to GMT, not your local time.)

An AmTOR, CLOVER or PacTOR HF radio system.

A Packet radio system using a standard TNC

If you do not have *all* of the above fully functioning STOP here and get it all set up and checked out before continuing.

1.   Connect your HF data controller to a COM port on the computer.   The cable for an AMT-1 only requires pins 2, 3 and 7 on the computer end.   The cable for a PK-232 requires pins 1 through 8 and 20.   Others are similar.

2.   Connect your TNC to a COM port on the computer using a cable with pins 1 through 8 and 20.   Make sure the TNC is configured to toggle pin 8 (CD) on connect.

3.   Turn the power OFF on all your radios.   Turn ON the power to your HF data controller and your TNC.

4.   Install WinLink by inserting the distribution in a drive and running the WLSETUP program from within Windows.   It will create the file and directory system for WinLink

5.   Double click on the Packet icon in Program Manager.   Under the _____/_____ menu selection enter the COM port number that you connected the TNC to.   Make sure the TNC is set for 2400 baud, no parity and 8 bits.   Type the following TNC-2 commands, or their equivalent for your specific TNC, to initialize your TNC for   APLink:

```
ECHO OFF

FLOW OFF

XFLOW ON

XON $11

XOFF $13

START $11

STOP $13

MONITOR OFF

MYCALL <your call>
```

6.   Check out the Packet channel: Turn on your VHF (Packet) radio and connect to a local BBS.   Make sure that the incoming data prints in the upper window of the screen.   The outgoing characters you type will appear in the lower window of the screen.   Press **End** to disconnect when you are finished testing.

7.   Double click on the AmTOR, CLOVER or PacTOR icon in Program Manager, depending on which type of controller you have.   Under the _____/_____ menu selection enter the COM port number that you connected the controller to.   Make the other selections to configure your controller as appropriate.

8.   Check out the HF channel: Turn on your HF radio and tune in an transmission of appropriate mode.   Make sure that the incoming data prints in the upper window of the screen.   Connect to an MBO or BBS.   Press End Link to disconnect when you are finished.

9.   Start the HF MBO system:

10.   Start the Packet BBS system:

Congratulations, you now have your APLink system on the air!   You may want to call up a friend or two

and have them check in to both the MBO and the BBS while you watch the console screen to become familiar with what it looks like during operation.

Hardware Setup for WinLink

The section below assumes that you are starting from scratch and have an entire computer system, AMTOR converter, CLOVER controller, PacTOR controller and Packet TNC and several radio systems to dedicate to WinLink operation.   We presume that everything is still in the boxes, new, and not checked out.   (You must be rich!)

Setting up your computer hardware

Set up your computer and install all option boards, following the instructions supplied by the manufacturer or dealer.   If you are using the HAL internal cards just plug them in, there are no jumpers to worry about.   Connect the monitor, keyboard and mouse.

Format the hard disk (if required) and install the operating system (DOS) according to the instructions that came with it.   Install Microsoft Windows and confirm that it is operating properly

Generally check things out and insure that your computer hardware and operating system software are working properly before attempting to install APLink.

Setting up your HF data converters

Setting up an AMT-1

If an AEA AMT-1 has been located it should be connected to a serial port and hardware configured for 110 baud (See the AMT-1 manual).   All other configuring will be done by WinLink during the AmTOR port startup.   Only the RD and TD signal lines are used between the AMT-1 and the computer.   Flow control is done through use of the status byte from the AMT-1.   The cable between the computer and the AMT-1 can be as simple as one shielded pair, see Appendix F1 for a diagram.

Setting up a PCI-3000

If a HAL PCI-3000 unit is going to be used on an AmTOR port it should be simply plugged into any open 8 (or 16) bit slot in the computer.   All configuring will be done by WinLink at startup.

Setting up a PCI-4000

If a HAL PCI-4000 unit is going to be used on a CLOVER   port it should be simply plugged into any open 8 (or 16) bit slot in the computer.   All configuring will be done by WinLink at startup.

Setting up a PK-232 or PK-900

If an AEA PK-232 or PK-900 Terminal Unit is going to be used on an AmTOR or PacTOR port it should be connected to a COM port and configured for 2400 baud.   All configuring other than baud rate will be done by APLink at startup provided all other initial values are at the default settings.   If in doubt execute the PK-232 RESET command and then set TBAUD to 2400.   The interconnecting cable between the PK-232 and the COM1 serial port should include wires 1 through 8 and 20, see Appendix F2 for a diagram.

Setting up your Packet TNC

Connect your Packet TNC to a serial port.   The TNC can be set up before starting WinLink with a terminal.   The critical parameters in the Packet TNC are:

```
ECHO OFF

FLOW OFF

XFLOW ON

XON $11

XOFF $13

START $11

STOP $13

MONITOR OFF
```

```
        MYCALL <your call>


        Baud rate to the computer: 2400

        Parity: None

        Characters: 8-bits
```

These things are <u>not</u> set by WinLink.   Since it is intended that WinLink work with most any TNC no effort has be made to automatically configure the TNC.   Be sure your TNC is properly configured before trying to run the system on the air.   You may bring up the system and use the keyboard mode of the Packet port to set up the TNC.   Only software flow control is used (both ways) and RS-232 status signals are not used for flow control..   See Appendix F3 for a cable diagram.

Pin 8, CD, is used to signal the connect status of the TNC to WinLink.   Make sure that your TNC toggles this line on connect and disconnect.   For the TNC-1/PKT-1 a minor <u>modification</u> is required for this signal.   For the TNC-2, jumper J1 must be omitted, which is the default setting.   For the AEA PK-87 jumper J __ must be moved from the factory setting to __ to enable this signal.   For the AEA PK-232 set the ____ parameter to ____.   For other TNCs you are on your own.

Setting up your radio systems

The best approach is to use some sort of simple terminal program in the computer to check out each radio system separately prior to attempting operation of the WinLink system.   This way the operation of each radio system can be confirmed.   Make a few HF contacts in each mode you are using and connect to a local BBS or two on Packet.

Now is a good time to contact the local Packet BBS sysop group and make known your intention to join their merry band.   You will need their cooperation from the start to get your messages forwarded into the Packet network.

WinLink Files

The delivery disk contains at least the following files:

```
AMTOR.EXE      The AmTOR port program
CLOVER.EXE     The CLOVER port program
EDITOR.EXE     The WinLink Editor program
EDITOR.HLP     Windows Help file for the Editor
EVTLOG.EXE     The WinLink Event Log program
EVTLOG.HLP     Windows Help file for the Event Log
HELP.AMT       User help file for the AmTOR port
HELP.CLV       User help file for the CLOVER port
HELP.PCT       User help file for the PacTOR port
HELP.PKT       User help file for the Packet port
HF.APA         Default definition file for the AmTOR port
HF.APC         Default definition file for the CLOVER port
HF.APT         Default definition file for the PacTOR port
INFO.AMT       User information file for the AmTOR port
INFO.CLV       User information file for the CLOVER port
INFO.PCT       User information file for the PacTOR port
INFO.PKT       User information file for the Packet port
INSTALL.APS    Documentation for the WinLink setup program
MBBCONFG.EXE   Configuration program for MBBIOS
MBBCONFG.PIF   Windows PIF for MBBCONFG
MBBIOS.COM     Serial port driver
MBBIOS.WRI     Documentation for MBBIOS
MSGMGR.EXE     The WinLink Message Manager program
MSGMGR.HLP     Windows Help file for the Message Manager
OLD2NEW.EXE    Program to convert message and user data from APLink to WinLink
PACKET.EXE     The Packet port program
PACTOR.EXE     The PacTOR port program
PORTS.HLP      Windows Help file for the WinLink ports
README.TXT     The WinLink startup documentation file
USERMGR.EXE    The WinLink User Manager program
USERMGR.HLP    Windows Help file for the User Manager
VHF.APP        Default definition file for the Packet port
WINLINK.INI    The WinLink definition file.
WINLINK.WRI    WinLink documentation notes
WLDLL.DLL      The WinLink Dynamic Link Library
WLDLL.WRI      Documentation for the WinLink Dynamic Link Library
WLQUERY.EXE    11447 09-03-93   1:04p
WLSERVER EXE   16855 09-04-93   3:21p
WLSETUP.EXE    The WinLink setup program
WPP.DLL        Another WinLink Dynamic Link Library
```

PC Setup

The system CONFIG.SYS file should contain the lines:

BUFFERS=10 - Start with this value, adjust later for performance.

FILES=20   - This is a minimum value, more won't hurt.

The system AUTOEXEC.BAT file should contain the lines:

PATH C:\;C:\BIN   - As a minimum

CD \APLINK   - These must be the last 2 lines!

AP   -

Both the system hardware clock and the DOS clock (TIME and DATE command) should be set to Greenwich Mean Time (GMT).   The hardware clock is typically set with a special setup program, then the software clock reads the hardware clock at boot-up time.   Both your local time and GMT are displayed on the APLink console screen.

Directories, Sub-Directories and file locations:

Create a \BIN sub directory for the executable files.   Create an \APLINK sub directory for the APLink working files.   Create an \APLINK\ARCHIVE sub directory for the archived message files.

Either the file AP.AMT or the file AP.232 must be renamed to AP.EXE depending on which type of AMTOR terminal unit you will be using.   This renamed file, the other *.EXE files, and the Norton Editor (renamed E.COM), should all be placed in the \BIN sub directory with \BIN mentioned in your PATH statement as above.

The remaining files should be placed in the sub directory named \APLINK (or whatever) and this must be the current directory when you start the system.   Several other files will be created by the system in this directory when it is first run.

The above is a suggested configuration, others will work.

WinLink creates the following files on first startup:

```
AMTLOG   The AMTOR log file

PKTLOG   The Packet log file

MDIR.M$  The message directory
```

Each active messages is stored in a separate file named with its message number..   They will all be placed in the \WINLINK\MESSAGES sub-directory.   If you delete, rename or edit these files, or if you create other files using this type of name, the program's message directory may become confused and messages could be lost.   Let the program manage these files.

In addition several temporary files are used during the course of the program's operation.   They are deleted when WinLink is finished with them so you should never see them on your disk in the course of normal operation.

Windows Setup

(this section to be added)

WinLink Setup

There are five files you must edit before starting the system the first time.   They are: the configuration file APLINK.CNF, the AMTOR user information file INFO.A$, the Packet user information file INFO.P$, the Packet forwarding route definition file ROUTE.P$ and the user data base USERS.A$.

The initialization   file (WINLINK.INI):

The parameter STATION= declares the call letters of the host station on the AMTOR side (your call letters).   EXT= declares an extension to the call such as a different call area.   Do not include the slash "/" in the extension. For example, f your call is W1ABC/4 set STATION=W1ABC and EXT=4.   (The Packet side was set manually into the TNC in the hardware setup section above which should be smart enough to remember it.)

Set the STASEL=sss parameter to your four letter AMTOR selcal.   It is the selcal that users will use to link with this APLink system.   Normally it is the first letter followed by the last three letters of your callsign.   For example the selcal used by WA8DRZ is WDRZ and the selcal used by KS5V is KKSV. (Stations whose call signs start with numbers typically replace the leading number with an arbitrary letter.   For example 9M2CR uses the selcal NMCR and 5W1GZ uses TWGZ.)

The TUPDATE=nn parameter declares the hour (two digits only) that system update will occur automatically each day.   If set to 999 update will only occur manually.

The information files (INFO.*)

Sample files are provided on the disk and shown in Appendix B.   You may edit these and put most anything you like in them, APLink transmits the entire file when a user types the "I" command. Remember to limit them to a reasonable length, especially the one for the AMTOR channel.

The user database (USERS.APS)

Type "USERS" from a DOS command prompt to invoke the database editor.   You must add your own call and selcal so that messages may be left for you on the MBO.   You might also want to pre-register some other users.   See section 5e for a complete description of the USERS editor and database.

WinLink startup

To start the system the first time, keep your transmitters turned off but your AMT-1 (or PK-232)   and your TNC turned on, make your new \APLINK directory current, and type "AP".   The system will go through its initialization procedure and when it is ready for service will display the console screen with the copyright notice in the upper window.

Press the PgDn key on the number pad and type the following commands to enter the tutorial bulletin files:

```
SB AMTOR HELP1 (return)
SB AMTOR HELP2 (return)
  etc. through HELP9
SB AMTOR NEWFEAT(return)
```

To see if it all worked type:

```
LB(return)
```

and you should get the message list with the bulletins showing.   If uncertain about this procedure read KEYBOARD OPERATION and SYSOP COMMANDS sections first.

This completes the installation.   You should be up and running.

WinLink check-out

Checking out the AmTOR channel

Press the **PgUp** key to enter the AMTOR mode.   Turn on your HF (AMTOR) radio and try receiving some data from a TOR station.   Tune in an FEC transmission.   If no FEC transmission can be found, Press **F3/F6** and tune in an ARQ transmission.   In either case make sure that the incoming data prints in the upper window of the screen.

Now try a link with another station.   Press **F9/F4** and enter the callsign and selcal of a station you can connect to.   See Appendix D for a list of APLink stations worldwide.   Press **F9/F6** to start the link.   The outgoing characters you type will appear in the lower window of the screen.   The large **+** key will send the +? to turn the link over.   Press **End** to kill the link when you are finished testing.

Set your HF radio to the frequency you are going to use for the AMTOR MBO.   Press **PgUp** to enter the AMTOR mode and then **F3/F4** to activate the MBO.   Make sure the top status line says "AMTOR:MBO/SBY...".   Press F3/F4 again if it doesn't.

Checking out the Packet channel:

Turn on your VHF (Packet) radio and connect to a local BBS.   Make sure that the incoming data prints in the center window of the screen.   The outgoing characters you type will appear in the lower window of the screen.   Press **End** to disconnect when you are finished testing.

Set your VHF radio to the frequency you are going to use for the Packet BBS.   Press **->** to enter the Packet mode and then **F3/F4** to activate the BBS.   Make sure that the center status line on the screen says "PACKET:BBS/SBY...".   Press F3/F4 again if it doesn't.

Updating from APLink

If you are already running an version of APLink then follow this short check list for bringing up WinLink.

_   1. Copy AP.*, USERS.EXE, and USRCNV.EXE to your \BIN directory.

_   2. Rename either AP.AMT or AP.232 to AP.EXE depending on which AMTOR converter you are using.   You may delete the other (unused) file.

_   3. Make \APLink your working directory.

_   4. If you were running version 3.3x or older Run USRCNV.EXE (Type: USERCNV) to convert your USERS.ID file to the USERS.A$ file.   If you were running version 3.4x or 3.5 skip this step.

_   5. Run AP.EXE (Type: AP).

_   6. Update the HELP messages.

_   7. Add as a bulletin the file NEWFEAT.

_   8. You will want to delete SYSMSG.A$ after a week or two.

WLSETUP

(this section to be provided)

Glossary of Terms

A

AAB
ADRS
AEA
AF
AFSK
AmTOR
APLink
ARQ
ARRL
ASCII
At
automatic forwarding
AX.25

B

baud
Baudot
BBS
BID
bit rate
blank
Bulletin
Busy

C

case
Cancel
Canceled
CIS
CLOVER
COM port
Compuserve
CW

D

E

escape
event log

F

FCC
firmware

Automatic Answer Back, a method where one station can ask the other station in a link to transmit its call sign or other identification.

American Digital Radio Society, their telephone BBS at 1-212-698-2102 is a source of WinLInk test program code.

Advanced Electronic Applications, Inc.
PO Box C2160
2006 - 196th Street SW
Lynwood, WA   98036

A manufacturer of TNCs and data controllers.

Audio Frequency waves, audible to the human ear.   Most people's hearing is less that the range of 3 to 30,000 Hertz.

Audio Frequency Shift Keying, commonly, any method that involves putting AF tones into the microphone input of a voice radio.   Technically only used on the VHF bands, normally with FM radios.   Puting audio tones into the mike input of a SSB radio produces FSK.

Amateur **T**elex **O**ver **R**adio, an adaptation of the commercial Telex Over Radio (TOR) ARQ system for amateur radio, pioneered by G3PLX.

X

AmTOR Packet Link, a software program for MS-DOS computers that links <u>AmTOR</u> stations on <u>HF</u> with the <u>Packet</u> network.

Automatic ReQuest for repeat.   A general term for an error correcting system that uses a method of requesting a repeated data transmission when errors are detected.

American Radio Relay League
225 Main Street
Newington, CT   06111

The largest North American organization of radio amateurs.

American Standard Code for Information Interchange, a standardized method of encoding upper/lower case letters, numerals and puncuation into seven data bits (eight if parity checking is used).

The field in a message listing that contains the address (and <u>H-route</u>) of the <u>home BBS</u> of the recipient.

Forwarding during which the selection of messages to send to the next station down the line is made without intervention of the operator.   The are two types: 1) fully automatic, where the connection is also made automatically (not yet legal in the US on <u>HF</u>) and 2) semi-automatic, where the initial link is established by an operator present to avoid interference on the <u>HF</u> bands.

Amateur X.25 protocol as standardized by the <u>ARRL</u>.   It is used in amateur packet radio communications.

The number of bits per second in a modulated data stream.

A method of encoding uppercase letters, numerals and some puncuation into five data bits. It uses a shift method to encode more than the 32 characters that five bits would otherwise allow.

Bulletin Board System, a store and forward system for message traffic.   Typically supports private messages (can only be read by sender and recipient) as well as bulletins (traffic that anyone can read).

Bulletin **ID**entifier, a unique string used to identify a <u>bulletin</u> and (hopefully) prevent duplication in the network.

The number of bits per second in a binary data stream.

A Baudot code character that contains all zero bits, called NUL in ASCII.   Do not confuse with the space character.

A type of message meant for more than one recipient.   Usually readable by anyone.

The status indication of a port when the port is in use.

A means of expanding the character set of a code by using a shift character to re-define all the other characters.   The well-known example is the Baudot teleprinter code with a Letters and Figures case.

A user command that removes a message from the system.   Similar to the Kill command in typical packet BBS software.

The status of a message that has been canceled.   It no longer appears in any message listings and is removed at the next update.

An acronym for Compuserve Information Service.

A new HF digital mode, developed by HAL Communications in conjunction with W7GHM.

–

A serial port on a PC, used to connect WinLink with data controllers.

Compuserve, a worldwide time-sharing service with effecient electronic mail connections. The HamNet forum is a source of APLink software.

Continuous Wave transmissions, usually refers to On Off Keying using the International Morse Code.

A symbol used to change the meaning of symbols that follow.

An automatically generated text file that records all the events concern that took place.

Federal Communications Commission
225 M Street
Washington, DC.

The regulatory agency that licenses amateur radio operators in the United States of America.

Code and data contained in integerated circuit chips (often PROMs).

Frequency Modulation, a scheme where the modulating voltage changes the frequency of the carrier.

The status of a message that has been either read by the recipient or forwarded toward the recipient's home BBS.

Moving traffic from one store and forward BBS to another, in an effort to get each message to its destination.

The field in a message listing that contains the call sign of the sender of the message.

Frequency Shift Keying, a method of binary data transmission where the two states are represented by different frequencies of the carrier signal.

J. Peter Martinez, known as the "father of AmTOR" for his work in adapting the commercial TOR system to Amateur use.

The author of popular node switch software that expands on NetROM functionality.

L. L. Grace Communications Products, Inc.
41 Acadia Drive
Voorhees, NJ   08043

A manufacturer of TNCs and data controllers.

A collection of <u>token</u>s appended to a BBS call sign designed to assist in the forwarding process.

HAL Communications Corp.
Box 365
Urbana, IL   61801

A manufacturer of RTTY terminal units and AmTOR, CLOVER and RTTY data controllers.
Currently the sole source of CLOVER controllers.

A computer and the associated physical equipment directly involved in the performance of communications or data-processing functions.

A line of text added at the beginning of a message by each intermediate forwarding station. It contains time, date message number and call sign at a minimum.

A method of adding forwarding tokens to a call sign in increasing geographic coverage area.   ...for instance, state, then country, then continent.

A special type of message, similar to a bulletin, meant for on-line user reference.

High Frequency radio, generally 3 to 30 megahertz

The status of a mesage that has been flagged by the <u>sysop</u> to not be available until it is reviewed or some other action is taken.

The amateur radio bulletin board system at which a particular user regularly checks for traffic.   The system will forward all of his traffic to this BBS.

ICS
England

A manufacturer of AmTOR controllers.

INT 14   The software interrupt in a PC that accesses the serial communication ports.   Both MBBIOS and the G8BPQ switch replace it with their own code.

The action of adding, or changing, the <u>home BBS</u> and <u>H-route</u> information for a message addressed to a specific station.

The overlapping of individual data bits, often caused by multiple propagation paths.   It is caused by using too short of a symbol rate for the medium.

Kantronics
1202 E. 23rd St.
Lawrence, KS   66046

A manufacturer of TNCs and data controllers.

Keyboard Send Receive, a mode of a WinLink port that allows the sysop to manually chat with a user.

The connection between two stations using error correcting data codes.

Automatically generated text files that record all characters sent and received on each port in use.

The first action a user station takes when linked to WinLink.   His call is recorded in the log.

MailBOx, a term historically used for <u>RTTY</u> and <u>AmTOR</u> Bulletin Board Systems.

MailBox BIOS, a replacement for the INT 14 serial port PC BIOS routines, written by Roy Englehausen, AA4RE

The Message Control Block contains all the data relating to a particular message except the textual elements

MFJ Enterprises
Box 494
Mississippi State, MS   39762

A manufacturer of Packet TNCs and data controllers.

Microsoft Corporation
One Microsoft Way
Redmond, WA   98052

A supplier of PC programs and operating systems.

Message IDentification, a unique string used to identify a message and (hopefully) prevent duplication in the network

A communication transmitted by spoken or written words, signals, or other means from one person or group to another.

A WinLInk program that allows the <u>sysop</u> to examine every message in the system and to optionally change some parameters.

Level 4 networking protocol developed by Mike Busch, W6IXU and Ronald E. Raikes, WA8DED.

Signifies the end of a message.   Used in AmTOR and RTTY.

National Traffic System, a relay system in the US for formal third party message traffic. Traditionally CW, more and more use is being made of digital modes.

On Off Keying, a method of binary data transmission where the two states are represented by the presence or absence of a carrier signal.

PacComm Packet Radio Systems, Inc.
4413 N. Hesperides St.
Tampa, FL   33614

A manufacturer of Packet and PacTOR controllers.

Amateur digital communications using the <u>AX.25</u> protocol.   Works best on <u>VHF</u> and <u>UHF</u> circuits.

A newer HF digital mode that combines features of Packet and AmTOR developed by Dr. Tom Rink, DL2FAK and the WAA Group.

A method of error detection using an additional (eighth) bit append to the seven bit <u>ASCII</u> code, for instance.

Packet Bulletin Board System

The status of a message that is awaiting forwarding, or reading.

A WinLInk program that allows connection to a ham radio network.   Currently supported are AmTOR, CLOVER, Packet and PacTOR ports.

A type of message meant for one recipient.

I have no traffic for you (at this time).

I have *n* messages for you.   Normally sent as QTC 2, for example.

1. The use of electromagnetic waves in the approximate frequency range from 10 kilocycles/second to 300,000 megacycles/second to transmit or receive electric signals without wires connecting the points of transmission and reception.   2.   a. The equipment used to transmit radio signals; transmitter. b. The equipment used to receive radio signals; receiver. c. A complex of equipment capable of both transmitting and receiving radio signals.

The status of a message that has been detected as a possible duplicate and is awaiting action by the sysop.

Radio Teletype, sending teletype messages over radio circuits.

System IDentification.   An identifier for BBS software used in forwarding.   It announces the capabilities and features of a particular system.   Used by WinLink on all port types except AmTOR.

S__ I__ Telex Over Radio, one commercial name for <u>TOR</u>.

Written or printed data, such as programs, routines, and symbolic languages, essential to the operation of computers.

Single SideBand, a radio mode wherein the carrier and one sideband resulting from amplitude modulation are suppressed, leaving only the other sideband to be transmited. Injecting AFSK tones into the mike input of a SSB transmitter produces FSK.

The status of a message that has been marked by the sysop to prevent the software from doing anything with that message.

The time that an encoded signal remains in one state before switchng to another. Generally limited to greater than 5 millisecond on HF radio paths.

SYStem OPerator, the individual responsible for operation and maintenance of a WinLink station.   Usually the station licensee.

Tuscon Amateur Packet Radio
PO Box 12925
Tuscon, AZ   85732

A non-profit, volunteer, organization that was responsible for the design of the first amateur packet TNC.   A source of APLink software on diskette.

A level 4 networking protocol, used mainly in Texas and Oklahoma

Terminal Node Controller, a term generally applied to a Packet controller that connects a PC (or terminal) to a radio.

The field in a mesasge list that contains the call sign of the intended recipeint of the message.

An individaul element of a parsed string, eg, separated by periods in an H-routing address.

Telex Over Radio, the generic commercial system developed to sent 5 unit Telex messages to ships at sea.

One or more messages of the same type or destination.

Ultra High Frequency radio, generally 300 megahertz to 3 gigahertz.

An action taken, usually once a day, by the WinLink <u>Message Manager</u> to "clean house". Old mesasges are removed from the system, etc.

A WinLink program that allows the sysop to display a list of all users registered with the system.

Very High Frequency radio, generally 30 to 300 megahertz.

Victor D. Poor, author of APLink and WinLink

Raymond C. Petit, original developer of <u>CLOVER</u>.

Windows version of APLink.

Who aRe yoU ?, the interrogation character used to trigger an automatic ID response in an automatic answerback system.

A pro-sign used in RTTY and AmTOR to signify the start of a message.