

Mail Tracker

A Graphical Mail Tracking Program

Keith Sproul, WU2Z
Radio Amateur Telecommunications Society

Keith Sproul, WU2Z
698 Magnolia Road
North Brunswick, NJ 08902-2647
AppleLink: Sproul. K
Internet: sproul @sproul.com
Packet: WU2Z@KB2EAR.NJ.USA

ABSTRACT

Packet Mail Forwarding as we know it today works pretty well. [1] The end user enters a message into the system and, other than having to address it correctly, he does not have to do anything else to make it get to its destination. If the message is addressed for some place local, it is handled via VHF only. If it is addressed for someplace far away, it gets routed to the appropriate 'gateway' to get it there. This gateway might be an HF gateway, or a SATELLITE gateway, or a WORM-HOLE, but somehow, the system knows or thinks it knows the best way for a message to get from where it is currently to where it should be. There has been much discussion on routing methods, automatic updating of routing tables, and on the best way to route messages. This can be an extremely volatile topic of discussion and will not be discussed here.

This paper discusses a network utility program called **MAIL TRACKER** that will look at messages and graphically show the route those messages have taken from the point they entered the network to their final destination. This paper will not discuss how to route traffic, only how to evaluate the routings being used.

INTRODUCTION

Mail Tracker is the second program in a series of packet utility programs specifically designed to teach us something about what is going on in our complex hobby. **Packet Tracker**, which was the first program, shows us what is going on in the immediate area on a specific frequency. It 'TRACKS' Packets and displays where they are coming from and where they are going. (See the article on this program elsewhere in these proceedings).

Mail Tracker 'TRACKS' entire Mail Messages, showing where they came from, where they have been and where they ended up. It does this by plotting the route the message took on a map. **Mail Tracker** also keeps limited statistics on several different aspects of message handling. All of this information is done in a graphical environment where a picture is worth a thousand words. In this case, telling someone that a message

routing is bad is wasted breath, but showing them a picture that presents this might actually convince them that there is a problem. **Mail Tracker** runs on a Macintosh computer and since it uses data files as its input, it does not need to be connected to a TNC.

This program allows the user to select messages from the database of messages available and shows the route the message took and the amount of time the message took. The user can select a message and examine it. Once he has displayed a message he can also examine different statistics about the message and statistics about each station that message has passed through.

OBJECTIVES

There has been much discussion and arguing about message routing. There has also been lots of discussions about the content of the R-Colon lines that are added to messages as they pass through the Packet Bulletin Board Systems. In light of these 'discussions' we discussed the feasibility of writing a program to track messages that went across the country. The first obstacle was to determine if you could actually get useful information out of the data contained in the R-Colon headers that get added to the messages. Once this was determined, we had to determine how this information should be presented so that it was easily understood. After writing routines to parse all of the information and put it into databases, we started to display this information on a map. At that time, it became very apparent that this data was indeed useful and could be presented in a way to teach us something.

From this information we actually see the interesting ways that messages bounce around the country. We also can get many statistics on the different Packet BBS's around the country. The other thing that we hope to get out of this is that by showing the actual amount of travel these messages actually do, we might be able to convince some of the people to only send messages where they should be sent and not to send messages to ALLUSA or WW when they should be kept local.

MESSAGE DATA REQUIREMENTS

The data needed by this program is simply a collection of mail messages from any BBS that has the R-Colon data still intact. If the messages have RFC-822 headers, they get displayed also. **Mail Tracker** does NOT provide for reading messages, just for examining the paths and the header information. All data shown in the examples in this paper were messages received at the WU2Y BBS which is fed by KB2EAR.

PROTOCOLS

Mail messages are passed from one Packet BBS to another using the WORLI / WA7MBL [2] protocol. Each BBS that a message passes through adds a line to the top called an R-Colon line. This line has several different variations, two of them are shown below.

```
|----- R:
| |----- Date/Time
| I |----- BBS Call sign
| I |----- Hierarchical address
| |----- Additional Info
| |----- Message BID/MID
|
R:930110/1159E @:WU2Y.NJ.USA [No Brunswick] MPM-V1. 01 $:0022_KB2ICI
```

```
|----- R:
| |----- Date/Time
| |----- Message Number
| |----- BBS Call sign
| |----- Hierarchical address
|
R:930115/1401z 30342@KB1BD.#CNJ.NJ.USA.NA
```

This line of data has several different forms and LOTS AND LOTS of arguments about what should and shouldn't be in it. [3] Another thing that is currently under hot debate is the [HANDLED BY CLOVER] message at the end of some messages. If this really needs to be included (which I don't think it should), it should be in the R-Colon header so that software like this can tell which links are CLOVER, which are HF and what other types of links are being used. It would be interesting and useful to plot the different links in different colors. This paper will not get into these arguments except to say that these R-Colon lines proved to be extremely useful, and the hierarchical addressing supplied in them made a lot of the mapping easier.

Mail Tracker uses the information contained in the R-Colon lines in tracking where the message has been. It keeps track of every BBS seen, how many messages each BBS handles, how many different countries it sees, how many different states, and how many different subareas. It also keeps track of how long a message took between stations, and the overall length of transit time. All of this is done in large database structures.

The user can look at any message in the current list and examine many different aspects of that message. The program not only displays the route taken on the map, it also displays the BBS list on the side, showing the exact BBS call sign and hierarchical address used by that BBS. Information about each message gets displayed on the bottom of the screen, The user can also select the different BBS stations and look at some of the statistics about each station.

PROGRAM USAGE

Mail Tracker displays a large window with a map of the US. [Figure 1] In a window at the bottom of the screen is a list of messages. The user can scroll through the list of messages, select one, and double-click on it. The data used by this program is a simple collection of mail messages. Typically, Mail Tracker will handle several hundred messages at once. This really depends on how much memory is available.

MESSAGE INFORMATION

If you double click on a message in the message list, the program displays the route the message took on the map. It also lists the BBS's the message passed through on the right hand side of the map. Some information about the message is displayed at the bottom of the map. If you double click on a BBS in the list on the right hand side of the map, it will highlight that location on the map. There are five different messages displayed in **Figures 2 through 6**.

Each message shows the message information at the top line of the bottom window. Included here are several pieces of information. The top line of Figure 2 is shown below to explain the different parts.

289	Message Number (within Mail Tracker)
WG0I	The person that sent the message
WB0GDB	His BBS
.#STP.MN.USA.NOAB	The Hierarchical address of that BBS
6/07/1993 13:05	The date and time the message was sent
R:20	The number of R-Colon headers seen
L:4	The number of LOOPS seen (See below)
T: 14 9:26	The amount of time needed, Days, Hours:Minutes

289 WG0I @ WB0GDB.#STP.MN.USA.NOAB 6/07/1993 13:05 R:20 L: 4 T: 14 9:26

On the right hand side of the map is the list of Packet BBS's the message traveled through. To follow the message, start at the **BOTTOM** of the list and go up. If you double click on one of these stations, it will highlight that station on the map.

STATION LOCATION

Each station that **Mail Tracker** sees gets assigned a location on the map based on the hierarchical address. The program parses this address and sees what continent, country, state, and sub-area the station is in. It then assigns a location on the map to that station based on this information.

Another way that this could be done, which is planned in future versions of this software, is to go to the call book database from CD-ROM (Buckmaster Publishing) and find the zipcode for that station. Then using another database, look up the coordinates of that zipcode. Obviously, this wouldn't work for the entire world, but would be very accurate for the US. Of course, this also assumes that the call book data is up to date. Due to the size of the map and the 'rough' approximation of the sub-state area designators, the actual accuracy of the map locations are limited.

STATION STATISTICS

After selecting a message, the list of stations that it has traveled through gets displayed in the right-hand list window on the screen. The user can then select any one of these stations and bring up some statistics about that station. [FIGURE 7]. This includes the stations full Hierarchical address, the coordinates on the screen, the number of messages that station TRANSMITTED, and a list of all of the BBS's that it talked to and that talked to it, showing how many messages went each way. Note: This can be misleading because these statistics are ONLY collected on the messages that were received at the station where the data files were collected.

LINK STATISTICS

Mail Tracker also keeps track of how many messages pass through each LINK. A link is defined as going from station A to station B. Going from station B to station A is defined as a separate link. You can get information about the different links from any given station. [Figure 7].

TIME

Mail Tracker also displays the amount of time a message took from start to end. This proved to be interesting information and brought up one minor surprise. There are a surprisingly large number of Packet BBS's that have their time incorrect. This in itself isn't a real problem, but it did prove to make some interesting things happen when examining the times and trying to determine how long messages took to pass through the system. There are many messages that arrive before they are sent out. This problem is inherent to the poor clocks on the older PCs which are quite often used in Packet Bulletin Board Systems.

WHAT IS OPTIMUM ROUTING?

The term OPTIMUM can mean different things. In this case does it mean quickest? the least amount of band-width utilization? the least amount of re-transmissions?, or the shortest number of air-miles traveled? Different people may have different opinions as to which one of these is the most important. You can never say that any one specific consideration is more important than the others all the time, but you can say what is usually more important in some 'normal' situations etc.

In consideration of message handling, most people will probably agree that fastest / shortest amount of time is either at the top or at least close to the top of importance. Using speed as a consideration, which message routes are bad and which are good? This aspect of routing takes a lot of consideration. For example, if a message that originates in Florida, what is the BEST way for it to get to the northeast? The obvious immediate answer would be straight up the eastern coast, probably through Virginia. Unfortunately, this is not the way most messages from Florida get to the northeast. Usually they go west, either to Colorado, Arizona or California, then come back east. Most people's first reaction would be that is ridiculous, however, due to the weird propagation of HF

frequencies, it might be the **QUICKEST** way to get the messages from Florida to the northeast.

ROUTING CONSIDERATIONS

Another thing that has to be considered is what **TYPE** of message you are looking at. If the message was a private message sent to an individual at a specific BBS, it **SHOULD** go the shortest (quickest) route. However, if the message was a **BULLETIN** sent to **ALLUSA**, each station that handles the message asks other BBS's that it talks to if they have seen that **BID** number, if not, they send the message on. Using this type of forwarding, (called **FLOODing**) the messages can and do take very strange routes, bouncing around in non optimum routes. Is this bad? Not really, it just is confusing.

way. If this happens, the message will tend to bounce all over the place. This **BID** changing is something that really has to be addressed because it can cause **LOTS** of

will just point out that this is a problem and can cause significant amounts of unnecessary traffic.

We need to consider the different types of messages and the associated types of forwarding before we actually start to criticize a particular route.

- . **INDIVIDUAL / PRIVATE**

- . **LIMITED AREA**
(**NJNET**, **CABBS**, etc.)

- . **WIDE AREA**
(**ALLUS**, **WW**)

As you think about how these different types of messages should be handled, you will realize that they will indeed get handled differently, even if the BBS's routing tables doesn't special-case them. Typically, messages that are aimed at local distribution do not get forwarded to the HF-gateways, or at least the HF gateway is smart enough to not send it out to its HF partners. Messages aimed at groups, i.e. limited area **OR** wide area will get sent to every BBS that has not seen that particular message. Messages aimed at an individual **SHOULD** only be sent to one other BBS. This BBS would be the BBS next closest to the final destination.

Given the fact that bulletins are usually '**FLOODed**', i.e. sent to every BBS known that hasn't already seen that specific message, you can start to understand the sometimes hap-hazard routing. In this case, it is truly possible for a message that originated in Pennsylvania to make its way to New York by way of the **midwest**. This doesn't seem correct, but it is all done assuming that the **BIDS** have not been changed, and that the stations keep the **BID** list long enough to prevent duplication. That time needs to be at

least two of three months. **Mail Tracker** has shown messages to take in excess of twenty days to travel from beginning to end.

LOOPS

Mail Tracker keeps track of something that I call a LOOP. A loop is when a message leaves from one area, i.e. a state or country, and then re-enters that state or country. In general, LOOPS show either poorly done routing tables, or confusion as to which way the message should be forwarded. When looking at the list of messages, the number labeled L: is the loop count. The higher this number, the poorer the forwarding method.

Theoretically, all loops should be bad, but there are some that are not. The best example of a loop that is good is a messages going from northwest USA such as Washington, Oregon, or Idaho to northeast USA. Usually, these messages go from USA to Canada and back to USA. Mail Tracker sees this as a loop, which indeed it is, but it is actually good, efficient routing.

CONCLUSIONS

In the process of creating the program, there were many hours of discussion as to whether the information could actually be put to good use, and was the program even worth doing. What has come out of these many discussions is that the most good would be to use this program to evaluate routes and to try to find out where the problems exist. Once that has been determined, it will be easier to actually fix them.

Unlike Packet Tracker, Mail Tracker is not a utility for everyone. It is really only usable by people that have access to the data files from a BBS. The information that needs to be shown to the general packet community is to show them the maps this program creates and try to convince them that sending a message to ALLUS really does have a significant impact on the Packet Mail system. These maps should be shown at ham radio clubs. If this happens, we might stop seeing messages that read TO: ALLUS, 50' TOWER, LOCAL PICKUP ONLY!!!! Yes, these types of messages still happen regularly.

REFERENCES

[1] **Judge, Ed**, W5TOO *Packet Radio's Long-Haul Mail System*, C Q Magazine, February, 1990 pp 13-17

[2] **Riley, Brian B**, KA2BQE *Improving the Packet Mail Transfer System*, Proceedings of the 10th Computer Networking Conference, Newington, CT; ARRL, September 1991, pp 130- 136

[3] **Clark, Tom**, W3IWI *Some comments on the "H"ierarchical Continent Address Designator*, Proceedings of the 9th Computer Networking Conference, Newington, CT; ARRL, September 1990, pp 278-279

File Edit Settings Special Windows

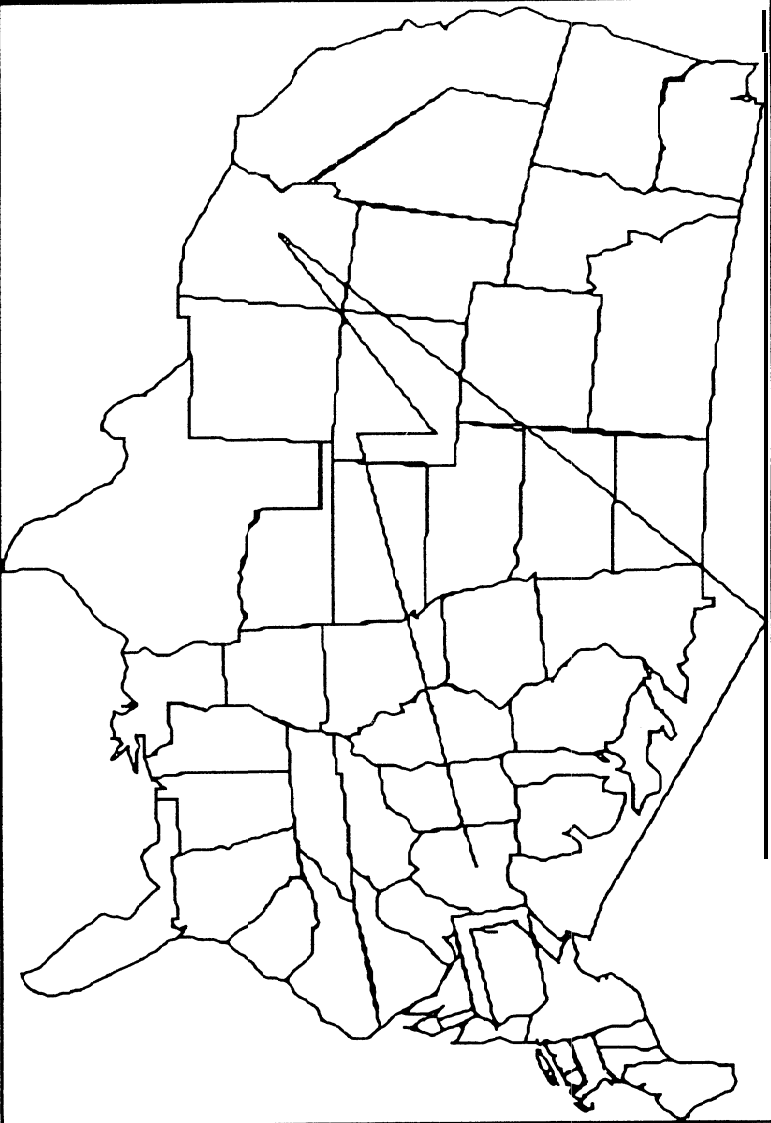
Station Map

19:57:44

	FROM	DATE	TIME	STATUS	TYPE	TIME
1	9Y4DG @ K16QE.#CENCR. CA. USA. NA	6/11/1993	18:54	R: 7	L: 0	T:01 12:43
2	N40HO @ MB50JM.#AGS. GA. USA. NA	6/08/1993	3:07	R: 8	L: 1	T:05 4:31
3	ME6R @ MB6YMH.#SOCA. CA. USA. NA	6/09/1993	20:11	R: 8	L: 1	T:03 11:28
4	N3LEJ @ W3UDX.#MPA. PA. USA. NORH	6/11/1993	7:38	R: 8	L: 1	T:02 0:02
5	K9GMAB @ N9GRH.#NEIL. IL. USA. NA	6/10/1993	12:46	R: 14	L: 0	T:02 18:55
6	KC5ALN @ N4QEP.#ITX. TX. USA. NORH	6/10/1993	14:00	R: 15	L: 0	T:02 17:41
7	KA0GBG @ W0LJF.#NECO. CO. USA. NA	6/11/1993	1:51	R: 12	L: 0	T:02 5:51
8	WAZCNU @ NY2S.#NLI. NY. USA. NA	6/12/1993	1:30	R: 7	L: 0	T:01 6:12
9	KC6OKA @ N6YN.#SOCA. CA. USA. NA	6/09/1993	22:41	R: 8	L: 1	T:03 9:05
10	N8SEF @ N8NNN.#SEHI. HI. USA. NA	6/08/1993	23:08	R: 21	L: 0	T:04 8:40

Figure 1 MAIL TRACKER MESSAGE LIST

Station Map



MUZY. .NJ.
 KB2EAR. .NJ. NA
 LZDXO. #S1PA, PA, NOR1
 KD4CCU. #1MPA, PA, NA
 KR3NP. #S1PA, PA, NOR1
 LQ1XR. #S1PA, PA, NOR1
 KA30EH. #N1MPA, PA, NA
 KA3SFC. #N1MPA, PA, NA
 WROPTV. #MNY, NY, NA
 VE3SNP. #N1AG, ON.
 VE3OV. #SCON, ON, NA
 VE3FJB. #CON, ON, NA
 VE3MHF. #EON, ON, NA
 UE4KU. #PG, NB, NOR1
 KA6HMG. .AZ.
 KTOH. #NECO, CO.
 MORA. #SECO, CO, NA
 N8GTC. #CIN, IN, NOR1
 KC8TM. #CIN, OH, NA
 N8JSF. #LBN, OH, NA
 K8SCH. #CIN, OH, NA

259 N8FJL @ K8SCH, #CIN, OH, USA, NA
 Reply-To: N8FJL, #K8SCH, #CIN, OH, USA, NA
 To: ALL@USBBS
 Subject: NEN 10-10 DX MEMBERS <JUNE>
 Date-String: 930619/0526z
 Date: 06/19/1993 05:26
 Date-Rcvd: 06/21/1993 02:55
 BID: 4008_K8SCH

6/19/1993 5:26 R:21 L:2 T:02 16:29

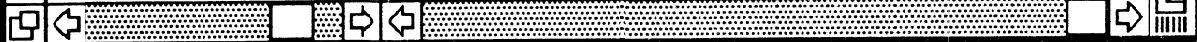


Figure 2 MAIL TRACKER MAIL PATH

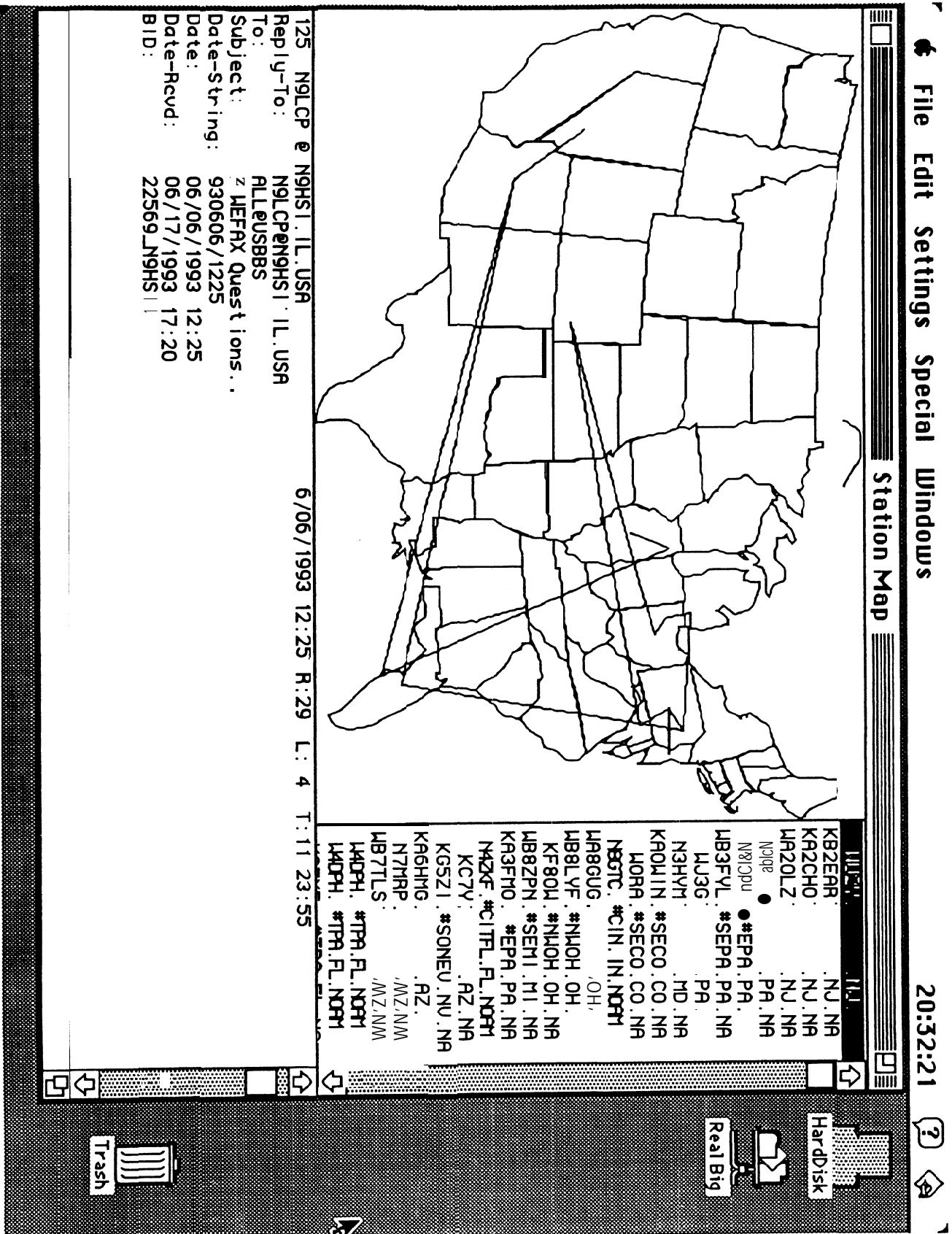
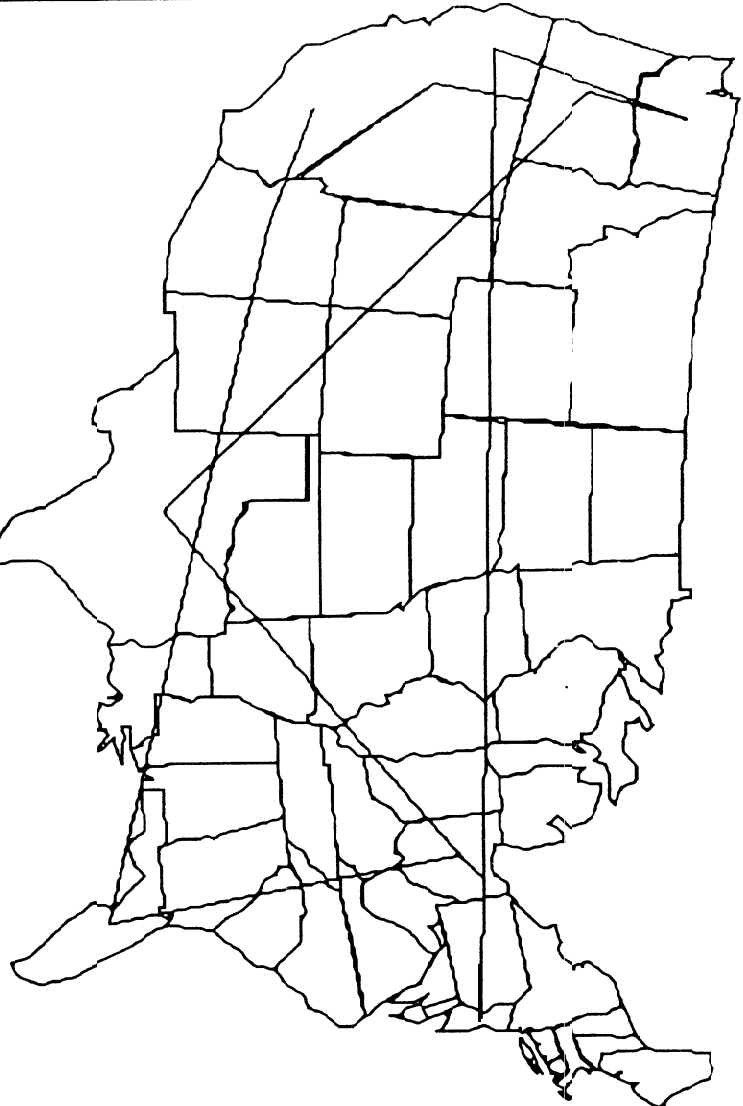


Figure 3 MAIL TRACKER MAIL PATH

Station Map



LUZY NJ
 KBZEAR NJ
 NOARY #NOCAL. CA. NA
 N6QTY #NOCAL. CA. NA
 N6IYA #NOCAL. CA. NA
 WRTSUN IA. NA
 W0RL OR. NA
 L500 #CENTX. TX. NA
 W88MIQ #CIN. OH. NA
 W88MIQ #CIN. OH. NA
 W18UNI #SEOH. OH. NA
 W8811 #NEOH. OH. NA
 N8JNR #NEOH. OH. NA
 N8KGN OH. MA
 M2ZF #CITFL. FL. NA
 KC7Y AZ. NA
 AA6QN #SOCA. CA. NA
 KC6NZN #SOCA. CA. NA
 KC6LHA #SOCA. CA. NA
 KB6JES #SOCA. CA. NA
 K6VE #SOCA. CA. NA
 W86VMH #SOCA. CA. NA

172 ME6A 9 W86VMH #SOCA. CA. USA. NA
 Reply-To: ME6A@W86VMH.#SOCA. CA. USA. NA
 To: ALLEUSBBS
 Subject: WANTED: TEN-TEC OMNI VI
 Date-String: 930615/ 1856
 Date: 06/15/1993 18:56
 Date-Rcvd: 06/19/1993 02:44
 BID: 34523_W86VMH

6/15/1993 18:56 R:22 L: 1 T:04 2:48

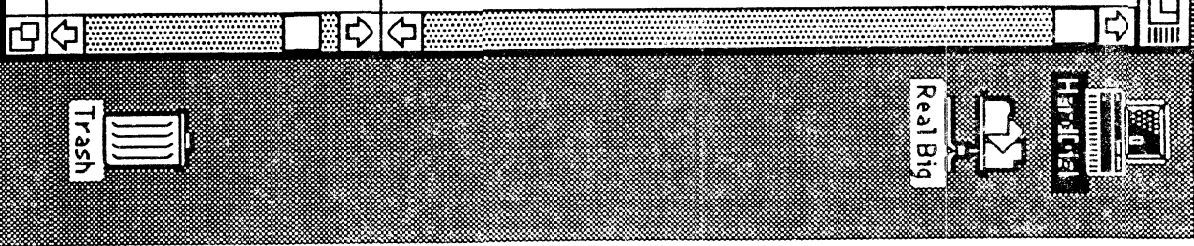


Figure 4 MAIL_TRACKER MAIL PATH

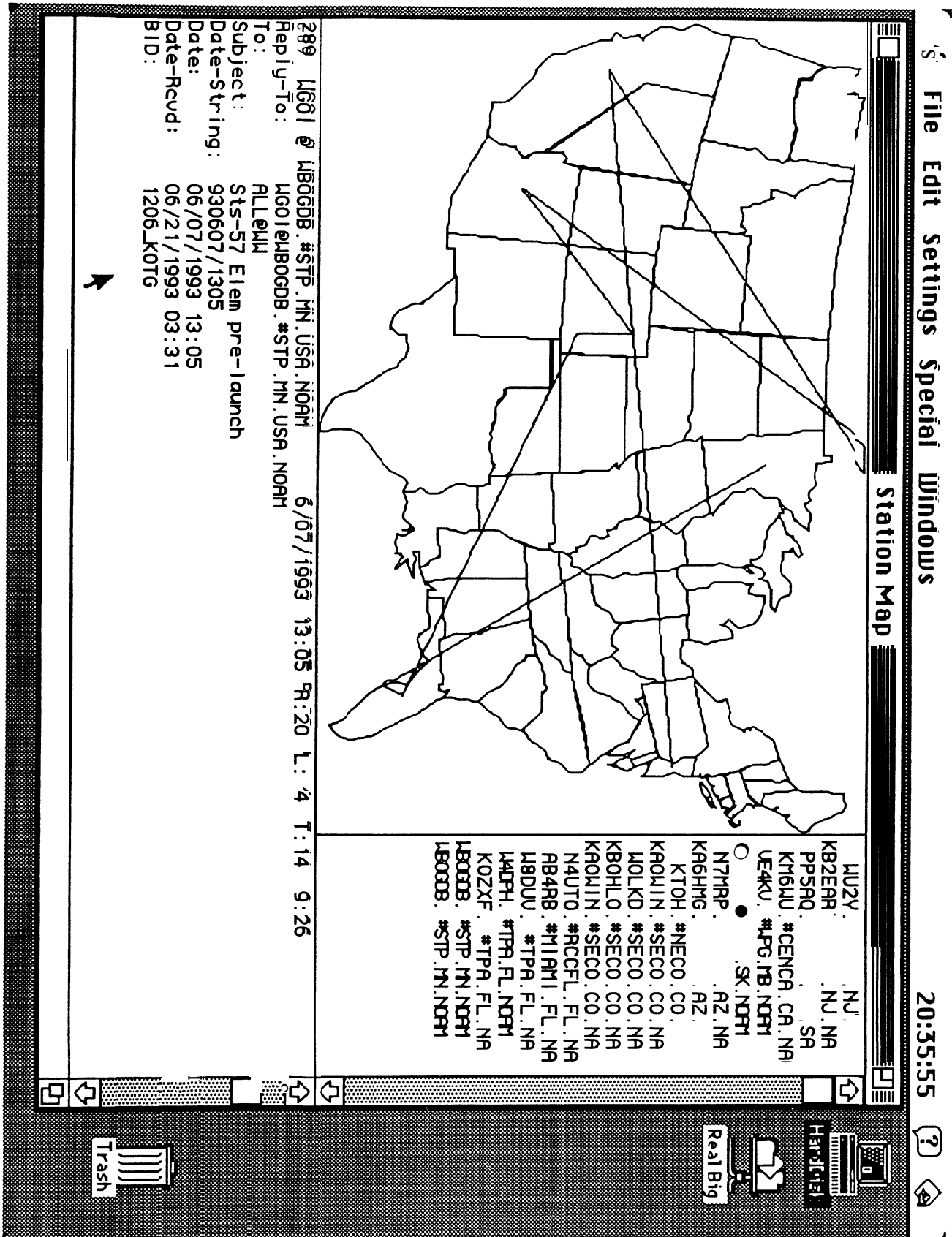


Figure 5 MAIL TRACKER MAIL-PATH

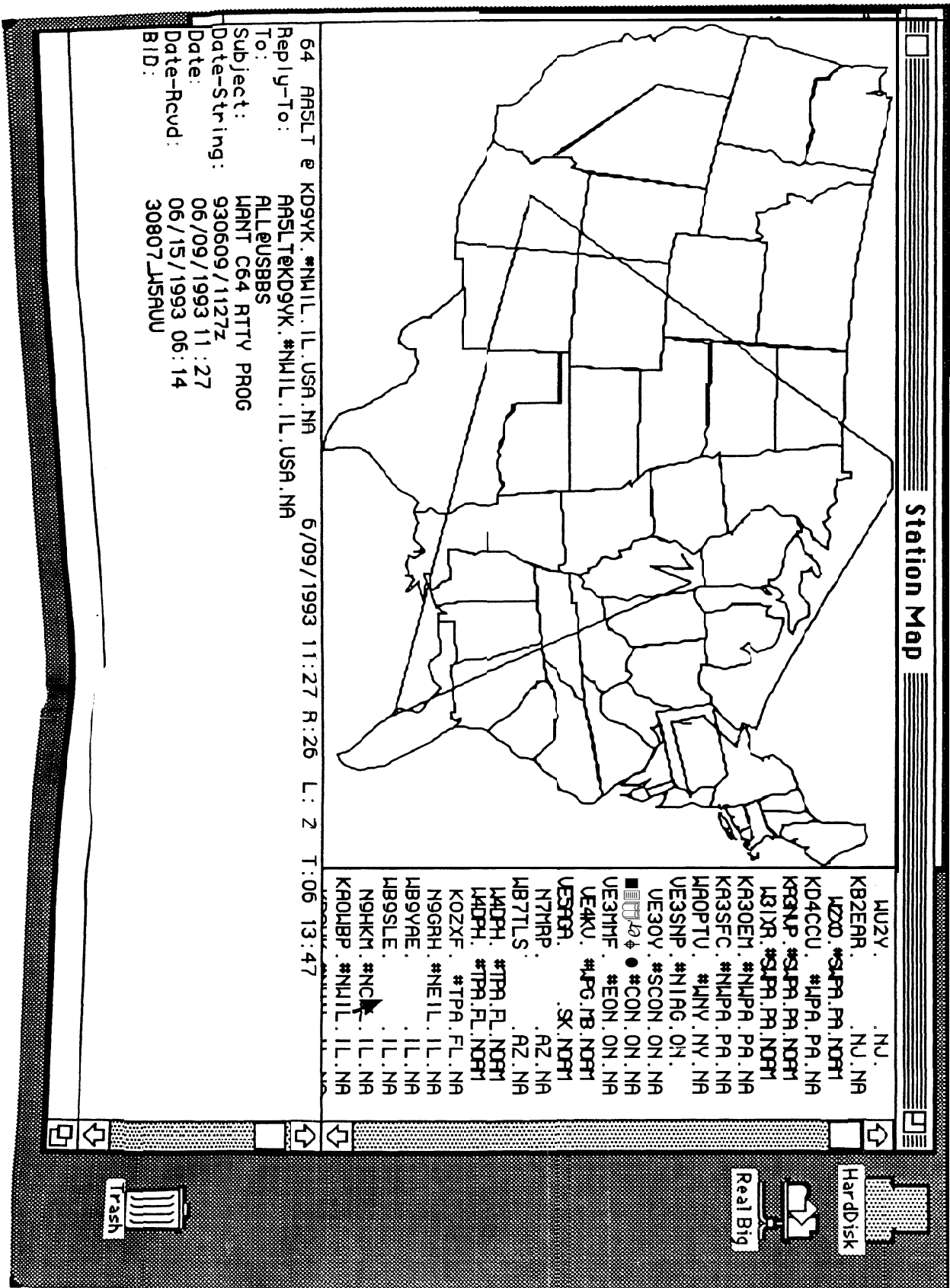


Figure 6 MAIL TRACKER MAIL PATH

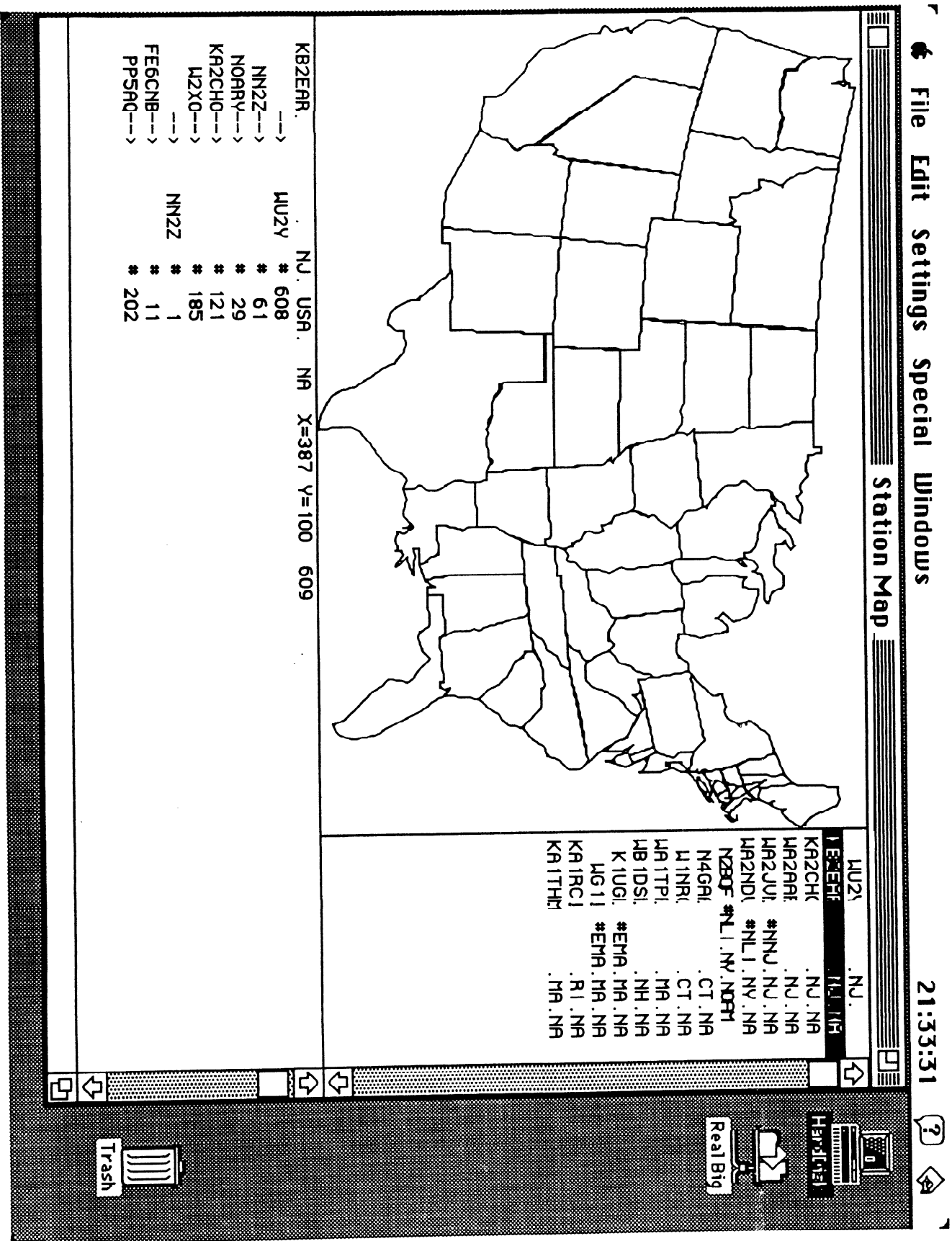


Figure 7 MAIL TRACKER STATION INFORMATION