

# ASTM E1394 Message Parsing

## DRAFT

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This project demonstrates generically reading and creating ASTM E1394 messages.

In 2015 I started working with vendors and customers to help them interface to my company's new instrument. The message format was ASTM E1394 (ASTM). I started to wonder how LIS and middleware vendors were able to adapt to connecting with so many instruments where each instrument manufacturer developed their own message format based on the ASTM E1394 standard.

I had already seen some code that reads and writes ASTM messages, both on the web and proprietary. And I always thought that they were error prone to use and overly complex. I started wondering how reading, writing, and processing ASTM messaging could be generalized so that one could adapt to all the variations that I've seen. I also wondered how to make it less error prone.

I played around mentally going through different ideas for a while until I realized that an ASTM record is in essence a recursive data structure, one recursion per separator. ASTM records have 3 separators; Field, Repeat-Field, and Components. Because it only has 3 delimiters, it is limited to only 3 levels of recursion. Note, HL7 2.x (Pipehat) has 4 separators and 4 levels of recursion. This code also supports HL7 2.x messages.

The following output is from a program that was developed to explore two ideas; generically reading and writing ASTM messages, and using bi-directional maps to map database orders, patients, and results to create and read ASTM messages. The program supports round-tripping, such that the extracted content from one message can be used to recreate the equivalent original message. This program also works with HL7 Version 2.5 message files.

Input message:

```
H|\^&|||OCD^VISION^5.10.0.46252^JNumber|||||P|LIS2-A|20240307151237
P|1|PID123456|NID123456^MID123456^OID123456|Brown^Bobby^B|White|1965010203
0400|U|||||||||||||||||
O|1|SID101||ABO-
D|N|20240307151207|||||||CENTBLOOD|||||||20240307151237|||F||||
O|1|SID101||ABScr|N|20240307151207|||||||CENTBLOOD|||||||20240307151237||
|F||||
L||
```

Parse message into record Position:Value pairs:

```
Delimiters:|\^&
H.1:H
H.5:OCD^VISION^5.10.0.46252^JNumber
H.5.1.1:OCD
H.5.1.2:VISION
H.5.1.3:5.10.0.46252
H.5.1.4:JNumber
H.12:P
H.13:LIS2-A
H.14:20240307151237
P.1:P
P.2:1
P.3:PID123456
P.5:NID123456^MID123456^OID123456
P.5.1.1:NID123456
P.5.1.2:MID123456
P.5.1.3:OID123456
P.6:Brown^Bobby^B
P.6.1.1:Brown
P.6.1.2:Bobby
P.6.1.3:B
P.7:White
P.8:19650102030400
P.9:U
O.1:O
O.2:1
O.3:SID101
O.5:ABO-D
O.6:N
O.7:20240307151207
O.16:CENTBLOOD
O.23:20240307151237
O.26:F
O.1:O
O.2:1
```

O.3:SID101  
O.5:ABScr  
O.6:N  
O.7:20240307151207  
O.16:CENBLOOD  
O.23:20240307151237  
O.26:F  
L.1:L

Extract message content into Key:Value pairs:

Delimiters:|\^&  
H-RecordType:H  
H-SenderName:OCD^VISION^5.10.0.46252^JNumber  
H-Company:OCD  
H-InstrumentModel:VISION  
H-Version:5.10.0.46252  
H-InstrumentID:JNumber  
H-ProcessingID:P  
H-VeresionNumber:LIS2-A  
H-TimeStamp:20240307151237  
P-RecordType:P  
P-SeqNumber:1  
P-PatientID:PID123456  
P-PatientID3:NID123456^MID123456^OID123456  
P-PatientName:Brown^Bobby^B  
P-PatientNameLast:Brown  
P-PatientNameFirst:Bobby  
P-PatientNameMiddle:B  
P-MothersMaiden:White  
P-BirthDate:19650102030400  
P-Sex:U  
O-RecordType:O  
O-SeqNumber:1  
O-SampleIDs:SID101  
O-Profiles:ABO-D  
O-Priority:N  
O-RequestedTimeStamp:20240307151207  
O-SampleTypes:CENBLOOD  
O-ReportedTime:20240307151237  
O-ReportType:F  
O-RecordType:O  
O-SeqNumber:1  
O-SampleIDs:SID101

```
O-Profiles:ABScr
O-Priority:N
O-RequestedTimeStamp:20240307151207
O-SampleTypes:CENTBLOOD
O-ReportedTime:20240307151237
O-ReportType:F
L-RecordType:L
```

Recreate the message by first converting Key:Value pairs into record Position:Value pairs:

```
Delimiters:|\^&
H.1:H
H.5:OCD^VISION^5.10.0.46252^JNumber
H.5.1.1:OCD
H.5.1.2:VISION
H.5.1.3:5.10.0.46252
H.5.1.4:JNumber
H.12:P
H.13:LIS2-A
H.14:20240307151237
P.1:P
P.2:1
P.3:PID123456
P.5:NID123456^MID123456^OID123456
P.6:Brown^Bobby^B
P.6.1.1:Brown
P.6.1.2:Bobby
P.6.1.3:B
P.7:White
P.8:19650102030400
P.9:U
O.1:O
O.2:1
O.3:SID101
O.5:ABO-D
O.6:N
O.7:20240307151207
O.16:CENTBLOOD
O.23:20240307151237
O.26:F
O.1:O
O.2:1
O.3:SID101
O.5:ABScr
O.6:N
```

O.7:20240307151207  
O.16:CENTBLOOD  
O.23:20240307151237  
O.26:F  
L.1:L

Export Position/Value pairs into an ASTM message:

```
H|\^&|||OCD^VISION^5.10.0.46252^JNumber|||||P|LIS2-A|20240307151237  
P|1|PID123456||NID123456^MID123456^OID123456|Brown^Bobby^B|White|1965010203  
0400|U  
O|1|SID101||ABO-  
D|N|20240307151207|||||||CENTBLOOD|||||||20240307151237|||F  
O|1|SID101||ABScr|N|20240307151207|||||||CENTBLOOD|||||||20240307151237||  
|F  
L
```