

Raintree Systems, Inc.



RAINTREE HL7 INTERFACE SPECIFICATION

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07/09/2007	1.1	<ul style="list-style-type: none">• added PV1 segment to ADT^A01 message• added message examples
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01/22/2008	1.4	Added info about ACK messages

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1. General

1.1. Introduction

This document describes the Raintree HL7 Interface based on the IHE Technical Framework.

1.2. HL7 Interface

HL7 is an industry known format used to facilitate the transfer of medical information. “HL7’s mission is to provide standards for the exchange, management and integration of data that support clinical patient care, and the management and delivery of healthcare services by defining the protocol for exchanging clinical data between diverse healthcare information systems.”

This document references the HL 7 Standard version 2.3.1, available at: <http://www.hl7.org>

1.3. IHE Technical Framework

The Integrated Healthcare Enterprise (IHE) framework was created to ease the integration of, and information flow between, various medical information systems, with the ultimate goal of ensuring that all required clinical information is correct and readily available to the relevant users. While HL7 provides the standard for messages, IHE provides the framework for information sharing. While it was originally designed for radiology, it is expanding into other areas as well.

This document references the IHE Technical Framework Year 3, revision 5.5 dated November 20, 2003, available at: <http://www.ihe.net>

1.4. Acknowledgment Messages

Upon receiving an HL7 message, Raintree HL7 Interface validates it and generates an **ACK** message.

- If mapping the message and sending data to Raintree is successful, the **ACK** message has **AA** as the MSA-1 acknowledgment code.
- If mapping the message and sending data to Raintree fails due to error in the message content or format, the **ACK** message has **AE** as the MSA-1 acknowledgment code.

Note that Raintree HL7 Interface currently does not generate **AR** messages.

See *3.1 ACK – Acknowledgment Messages* for more details.

2. Interfaces

The Raintree HL7 interface handles Patient Registration, Procedure Scheduled, Structured Report Export and Charge Posting/Account Management IHE-defined transactions from HIS/RIS and updates the necessary Raintree products accordingly. Below are summarized the supported IHE transactions and their corresponding HL7 messages.

Note that if an HL7 message is received by Raintree, an acknowledgment message is sent back. The MSH-9 field will contain ACK as the message type.

Raintree Interface	IHE Transactions	HL7 Messages
Patient Registration	Patient Registration (#1)	ADT^A01 (admit a patient) ADT^A02 (transfer a patient) ADT^A03 (discharge a patient) ADT^A04 (register a patient) ADT^A05 (pre-admit a patient) ADT^A08 (update patient information) ADT^A11 (cancel admit) ADT^A13 (cancel discharge) ADT^A18 (merge patient information)
Schedule Export	Procedure Scheduled (#4)	ORM^O01 (general order message)
Report Export	Structured Report Export (#28)	ORU^R01 (unsolicited transmission of an observation message)
Billing	Charge Posting (#35)	DFT^P03 (detail financial transaction)
	Account Management (#36)	BAR^P01 (add patient accounts) BAR^P05 (update account) BAR^P06 (end account)

2.1. Patient Registration

2.1.1. Scope

This interface is designed to transfer patient and payor information from one system to another. If the patient does not exist in the destination database, a new patient record will be created. Otherwise, an error message is returned.

Raintree supports both sending and receiving functions.

2.1.2. Actors

The interface is incorporating the following IHE Framework Actors:

- *ADT Patient Registration*
- *Department System Scheduler/Order Filler*

Raintree acts as both *ADT* and *Order Filler* depending on the scenario. *ADT* sends information about a patient transfer and *Order Filler* receives it.

2.1.3. Integration Profile

The Actors are going to participate in the *Scheduled Workflow (SWF)* Integration Profile according to the IHE Technical Framework.

The Scheduled Workflow Integration Profile establishes the continuity and integrity of basic departmental imaging data acquired in an environment where examinations are generally being ordered. It specifies a number of transactions that maintain the consistency of patient and ordering information as well as defining the scheduling and imaging acquisition procedure steps. This profile also makes it possible to determine whether images and other evidence objects associated with a particular performed procedure step have been stored (archived) and are available to enable subsequent workflow steps, such as reporting. It may also provide central coordination of the completion of processing and reporting steps. (IHE TF-I 2.1.1)

2.1.4. Transactions

The following Transactions between Actors are implemented in the interface:

- **Patient Registration** (IHE transaction #1) transmits an **ADT** message.

This transaction is used by the *ADT Patient Registration* and *Department System Scheduler/Order Filler (DSS/Order Filler)* Actors. *ADT* registers a patient and transfers the patient information to *DSS/Order Filler*.

The *Patient Registration* transaction will transmit an HL7 Patient Administration (ADT) message. An **A01**, **A04** or **A05** event will be used to add a new account that did not exist before. An **A02**, **A03**, **A08**, **A11**, **A13** or **A18** event will be used to update an existing patient account.

2.2. Schedule Export

2.2.1. Scope

This interface is responsible for exporting appointments scheduled in Raintree to the third party application in the form of order messages.

2.2.2. Actors

The interface is incorporating the following IHE Framework Actors:

- *Department System Scheduler/Order Filler*
- *Image Manager*
- *Report Manager*

Raintree acts as *Department System Scheduler/Order Filler*. Depending on the scenario, Raintree sends an order message either to *Image Manager* or *Report Manager*.

2.2.3. Integration Profile

The Actors participate in the *Scheduled Workflow (SWF)* Integration Profile according to the IHE Technical Framework.

The Scheduled Workflow Integration Profile establishes the continuity and integrity of basic departmental imaging data acquired in an environment where examinations are generally being ordered. It specifies a number of transactions that maintain the consistency of patient and ordering information as well as defining the scheduling and imaging acquisition procedure steps. This profile also makes it possible to determine whether images and other evidence objects associated with a particular performed procedure step have been stored (archived) and are available to enable subsequent workflow steps, such as reporting. It may also provide central coordination of the completion of processing and reporting steps. (IHE TF-I 2.1.1)

2.2.4. Transactions

The following Transactions between Actors are implemented in the interface:

- **Procedure Scheduled** (IHE transaction #4) transmits an **ORM** message.

This transaction specifies a message from the *Department System Scheduler/Order Filler* to the *Image Manager* and the *Report Manager* notifying them that a procedure has been scheduled.

The *Department System Scheduler/Order Filler* uses an ORM message with event **O01** to convey necessary procedure and scheduling information.

2.3. Report Export

2.3.1. Scope

This interface is responsible for exporting reports created in the report manager to the report repository.

2.3.2. Actors

The interface is incorporating the following IHE Framework Actors:

- *Report Manager*
- *Enterprise Report Repository*

Raintree acts as the *Enterprise Report Repository* in this framework.

2.3.3. Integration Profile

The Actors are going to participate in the *Simple Image and Numeric Report (SINR)* Integration Profile according to the IHE Technical Framework.

The Simple Image and Numeric Report Integration Profile facilitates the growing use of digital dictation, voice recognition, and specialized reporting packages, by separating the functions of reporting into discrete actors for creation, management, storage and viewing. Separating these functions while defining transactions to exchange the reports between them enables a vendor to include one or more of these functions in an actual system. (IHE TF-I 2.1.7)

2.3.4. Transactions

The following Transactions between Actors are implemented in the interface:

- **Structured Report Export** (IHE transaction #28) transmits an **ORU** message.

This transaction is used by the *Report Manager and Enterprise Report Repository* Actors. A *Report Manager* composes an HL7 Result transaction by mapping from DICOM SR and transmits it to the *Enterprise Report Repository* for storage.

The *Structured Report Export* transaction will transmit HL7 Observation result/unsolicited (ORU) messages using the **R01** event.

2.4. Billing

2.4.1. Scope

The interface is responsible for sending and receiving financial transactions (charges).

2.4.2. Actors

The interface is incorporating the following IHE Framework Actors:

- *ADT Patient Registration*
- *Department System Scheduler/Order Filler*
- *Charge Processor*

Raintree acts as a *Charge Processor* interfacing with other Actors to receive patient and procedure related information required for charge posting.

2.4.3. Integration Profile

The Actors are going to participate in the *Charge Posting (CHG)* Integration Profile according to the IHE Technical Framework.

The Charge Posting Integration Profile specifies the exchange of information from the Department System Scheduler/Order Filler actor to the Charge Processor actor regarding charges associated with particular procedures, as well as communication between the ADT/Patient Registration and Charge Processor actors about patient demographics, accounts, insurance, and guarantors. The Charge Posted Transaction contains all of the required procedure data to generate a claim. Currently, these interfaces contain fixed field formatted or HL7-style data. The goal of including this transaction in the IHE Technical Framework is to standardize the Charge Posted Transaction to a Charge Processor, thus reducing system interface installation time between clinical systems and Charge Processors. Additionally, the Charge Posted Transaction reduces the need of the billing system to have knowledge of the radiology internals. The result is that the Charge Processor will receive more complete, timely and accurate data. (IHE TF-I 2.1.9)

2.4.4. Transactions

The following Transactions between Actors are implemented in the interface:

- **Charge Posted** (IHE transaction #35) transmits a **DFT** message.

This transaction is used by the *Department System Scheduler/Order Filler (DSS/Order Filler)* and *Charge Processor* Actors.

- *DSS/Order Filler* collects information relevant to the posting of charges and submits it to the *Charge Processor*.
- *Charge Processor* receives the information from the *DSS/Order Filler*, processes and combines charges in order to issue an insurance claim or patient's billing statement.

Charge Posted transaction will transmit HL7 Detailed Financial Transaction (DFT) messages using the **P03** event.

- **Account Management** (IHE transaction #36) transmits a **BAR** message.

This transaction is used by the *ADT Patient Registration* and *Charge Processor* Actors.

- *ADT Patient Registration* collects information relevant to the account patient and submits it to the *Charge Processor*
- *Charge Processor* receives the information from *Patient Registration*, processes and combines charges in order to issue an insurance claim or patient's billing statement.

Account Management transaction is conducted by the HL7 BAR message. The *ADT* Actor will generate the message whenever a patient is admitted, pre-admitted or registered. The **P01** event will only be used to add a new account that did not exist before, not to update an existing account. The **P05** (update account) event will be used to update an existing account. The **P06** (end account) event will be used to close an account.

3. HL7 Messages

In the **Message Grammar** sections, the following notation is used:

- square braces [] denote that the segment is optional
- curly braces { } denote that the segment may repeat.

3.1. ACK – Acknowledgment Messages

3.1.1. Supported Events

The ACK message is a special acknowledgment message and does not support any events.

3.1.2. Message Grammar

ADT Segment	ADT Message	Chapter in HL7 2.3.1
MSH	Message Header	2
MSA	Message Acknowledgment	3

3.1.3. Message Semantics

Segment	SEQ	Length	HL7 Data Type	HL7 Element Name
MSH	1	1	ST	Field Separator
	2	4	ST	Encoding Characters
	3	180	HD	Sending Application
	4	180	HD	Sending Facility
	5	180	HD	Receiving Application
	6	180	HD	Receiving Facility
	7	26	TS	Date and time of message
	9	7	CM	Message Type
	10	20	ST	Message Control ID
	11	3	PT	Processing ID
	12	8	ID	Version ID
	MSA	1	2	ID
2		20	ST	Message Control ID
6		100	CE	Error code and description*

* The first component of the MSA-6 field is the Raintree internal error code.

3.1.4. Sample Message

Below is a sample ACK^A01 message.

```
MSH|^~\&|Raintree|01|Raintree|01|20070709090424+0300||ACK|EVM^RT4691cfe888a44|P|2.3.1
```

```
MSA|AE|EVM^RT4691cfe888a44|||205:001^Patient number is missing
```

3.2. ADT – Admission, Discharge and Transfer Messages

3.2.1. Supported Events

The ADT message supports the following events:

- **A01** – admit a patient
- **A02** – transfer a patient
- **A03** – discharge a patient
- **A04** – register a patient
- **A05** – pre-admit a patient
- **A08** – update patient information
- **A11** – cancel admit

- A13 – cancel discharge
- A18 – cancel transfer

3.2.2. Message Grammar

ADT Segment	ADT Message	Chapter in HL7 2.3.1
MSH	Message Header	2
PID	Patient Identification	3
PV1	Patient Visit	3
[[DG1]]	Diagnosis	6
GT1	Guarantor	6
[[IN1]]	Insurance	6

3.2.3. Message Semantics

The MSH segment will be constructed as defined in IHE TF-2: 2.4.2 “Message Control”. The field MSH-9 Message Type will have at least two components. In case of A01 event, the first component will have the value “ADT”; the second component will have the value "A01". The third component is optional; however, if present, it will have the value "ADT_A01". For other events, substitute "A01" with the event type.

Segment	SEQ	Length	HL7 Data Type	HL7 Element Name
PID	3	11	CX	Patient Identifier List
	5	48	XPN	Patient Name
	7	26	TS	Date/Time of Birth
	8	1	IS	Sex
	11	106	XAD	Patient Address
	13	40	XTN	Phone Number – Home
	14	40	XTN	Phone Number – Business
	16	80	CE	Marital Status
	19	16	ST	SSN Number – Patient
	20	25	DLN	Driver’s License Number – Patient
PV1	2	1	IS	Patient Class
	3	80	PL	Assigned Patient Location
	7	60	XCN	Attending Doctor
	8	60	XCN	Referring Doctor
DG1	1	4	SI	Set ID - DG1
	3	60	CE	Diagnosis Code - DG1
	4	40	ST	Diagnosis Description
	5	26	TS	Diagnosis Date/Time
	16	60	XCN	Diagnosing Clinician
GT1	3	48	XPN	Guarantor Name
	5	106	XAD	Guarantor Address
	6	40	XTN	Guarantor Ph Num-Home
	8	26	TS	Guarantor Date/Time Of Birth
	9	1	IS	Guarantor Sex
	11	80	CE	Guarantor Relationship
	13	8	DT	Guarantor Date – Begin
	14	8	DT	Guarantor Date – End
16	130	XPN	Guarantor Employer Name	

Segment	SEQ	Length	HL7 Data Type	HL7 Element Name
	17	106	XAD	Guarantor Employer Address
	18	40	XTN	Guarantor Employer Phone Number
	19	20	CX	Guarantor Employee ID Number
	20	2	IS	Guarantor Employment Status
IN1	1	4	SI	Set ID - IN1
	2	60	CE	Insurance Plan ID
	3	59	CX	Insurance Company ID
	4	130	XON	Insurance Company Name
	5	106	XAD	Insurance Company Address
	6	48	XPN	Insurance Co Contact Person
	7	40	XTN	Insurance Co Phone Number
	8	12	ST	Group Number
	12	8	DT	Plan Effective Date
	13	8	DT	Plan Expiration Date
	16	48	XPN	Name Of Insured
	17	1	CE	Insured's Relationship To Patient
	18	26	TS	Insured's Date Of Birth
	19	106	XAD	Insured's Address
	36	15	ST	Policy Number
	37	12	CP	Policy Deductible
43	1	IS	Insured's Sex	

3.2.4. Sample Message

Below is a sample ADT^A01 message.

```
MSH|^~\&|Raintree|Raintree|VendorX|VendorX|20070709090424+0300||ADT^A01|RT4691cfe888a44|P|2.3
```

```
PID|1||00600004249||Smith^John^W^Mr||19420920|M|||825 GREEN RD^^POMONA^CA^91767|| (901)391-7713|||M|||111-22-3333
```

```
PV1|1||^L^B^Long Beach|||AB^Anderson^Bill
```

```
IN1|1|A_00000|10004|Geico Insurance|PO BOX 671|(411)271-6811|||20060810||PI|SMITH^JOHN|1|420920|825 GREEN RD^^POMONA^CA^91767|||111-22-3333|||M|||WY019VW1234
```

```
IN1|2|P_00000|00003|/ Patient billed after insurance pays|||19800101||SP|SMITH^JOHN|1|420920|825 E GREEN RD^^POMONA^CA^91767|||M|||ER019MA1234
```

3.3. ORM –order messages

3.3.1. Supported Events

The ORM message supports the following events:

- **O01** – general order message

3.3.2. Message Grammar

ORM Segment	ORM Message	Chapter in HL7 2.3.1
MSH	Message Header	2
PID	Patient Identification	3
PV1	Patient Visit	3
ORC	Common Order	7
OBR	Order Detail	7

3.3.3. Message Semantics

The MSH segment will be constructed as defined in IHE TF-2: 2.4.2 “Message Control”. The field MSH-9 Message Type will have at least two components. In case of O01 event, the first component will have the value “ORM”; the second component will have the value "O01". The third component is optional; however, if present, it will have the value "ORM_O01".

Segment	SEQ	Length	HL7 Data Type	HL7 Element Name
PID	3	11	CX	Patient Identifier List
	5	48	XPN	Patient Name
	7	26	TS	Date/Time of Birth
	8	1	IS	Sex
	11	106	XAD	Patient Address
	13	40	XTN	Phone Number - Home
	14	40	XTN	Phone Number - Business
	19	16	ST	SSN Number – Patient
PV1	2	1	IS	Patient Class
	3	80	PL	Assigned Patient Location
	7	60	XCN	Attending Doctor
	8	60	XCN	Referring Doctor
ORC	1	2	ID	Order Control
OBR	1	4	SI	Set ID
	2	22	EI	Placer Order Number
	4	200	CE	Universal Service ID
	7	26	TS	Observation Date/Time
	27	200	TQ	Quantity/Timing (see note)
	28	150	XCN	Result Copies To
	39	200	CE	Collector’s Comment

Note: Value “S” in OBR:27.6 indicates STAT appointment.

3.3.4. Sample Message

Below is a sample ORM^O01 message.

MSH | ^~\&|Raintree|Raintree|VendorX|VendorX|20070712144832+0300||**ORM^O01**|RT46961510cc2b9|P|2.3

PID |1||0000002||Test^Alex||19180303||||6343 Main St^^Portsmouth^NH^00212

PV1 |1|O|RAIN||||GO

ORC |NW

OBR |1|Y801B8W7BLE||OV^Office Visit|||200707120830

3.4. ORU – ancillary data reporting

3.4.1. Supported Events

The ORU message supports the following events:

- **R01** – unsolicited transmission of an observation message

3.4.2. Message Grammar

ORU Segment	ORU Message	Chapter in HL7 2.3.1
MSH	Message Header	2
PID	Patient Identification	3
[PV1]	Patient Visit	3
OBR	Order Detail	7
{OBX}	Observation Results	7
[[NTE]]	Notes and Comments	7

3.4.3. Message Semantics

The MSH segment will be constructed as defined in IHE TF-2: 2.4.2 “Message Control”. The field MSH-9 Message Type will have at least two components. In case of R01 event, the first component will have the value “ORU”; the second component will have the value "R01". The third component is optional; however, if present, it will have the value "ORU_R01".

Segment	SEQ	Length	HL7 Data Type	HL7 Element Name
PID	3	11	CX	Patient Identifier List
	5	48	XPN	Patient Name
PV1	2	1	IS	Patient Class
	19	20	CX	Visit Number
	51	1	IS	Visit Indicator
OBR	1	4	SI	Set ID
	2	22	EI	Placer Order Number
	3	22	EI	Filler Order Number
	4	200	CE	Universal Service ID
	7	26	TS	Observation Date/Time
	25	1	ID	Result Status
OBX	1	4	SI	Set ID
	2	3	ID	Value Type
	3	80	CE	Observation Identifier
	4	20	ST	Observation Sub-ID
	5	255	ST	Observation Value
	11	1	ID	Observe Result Status
NTE	1	4	SI	Set ID
	2	1	ST	Source of Comment
	3	255	IS	Comment/Result

3.4.4. Sample Message

Below is a sample ORU^R01 message.

MSH|^~\&|Raintree|Raintree|VendorX|VendorX|20070712160409+0300||ORU^R01|RT469626c915bb9|P|2.3

PID|1||0000002||Test^Alex|||||6343 Main St^^Portsmouth^NH^00212

OBR|1||7201B8WHMBE|A01^Sample Procedure|||200707121604|||||||||||||||||New

OBX|1||||Line1

OBX|2||||Line2

3.5. DFT – financial management

3.5.1. Supported Events

The DFT message supports the following events:

- P03 – detail financial transaction

3.5.2. Message Grammar

DFT Segment	DFT Message	Chapter in HL7 2.3.1
MSH	Message Header	2
PID	Patient Identification	3
[PV1]	Patient Visit	3 (see note)
{FT1}	Financial Transaction	6

Note: PV1 is required if use of *PV1-19 Visit Number* is required per the applicable regional or national appendices to the IHE Technical framework.

3.5.3. Message Semantics

The MSH segment will be constructed as defined in IHE TF-2: 2.4.2 “Message Control”. The field MSH-9 Message Type will have at least two components. In case of P03 event, the first component will have the value “DFT”; the second component will have the value "P03". The third component is optional; however, if present, it will have the value "DFT_P03".

Segment	SEQ	Length	HL7 Data Type	HL7 Element Name
PID	3	11	CX	Patient Identifier List
	5	48	XPN	Patient Name
PV1	Not implemented			
FT1	1	4	SI	Set ID – FT1
	4	26	TS	Transaction Date
	5	26	TS	Transaction Posting Date
	6	8	IS	Transaction Type
	7	80	CE	Transaction Code
	10	6	NM	Transaction Quantity
	11	12	CP	Transaction Amount - Extended
	14	60	CE	Insurance Plan ID
	16	80	PL	Assigned Patient Location
	19	60	CE	Diagnosis Code - FT1
	20	120	XCN	Performed By Code
21	120	XCN	Ordered By Code	

3.5.4. Sample Message

Below is a sample DFT^P03 message.

```
MSH|^~\&|Raintree|Raintree|VendorX|VendorX|20070712174007+0300||DFT^P03|RT46963d4724c76|P|2.3
```

```
PID|1||0000002||Test^Alex
```

```
FT1|1|||20070508|20070508|CG|99215|||1|121.00|||10001||RAIN|||002.0|GO|00001
```

3.6. BAR – financial management

3.6.1. Supported Events

The BAR message supports the following events:

- **P01** – add patient accounts
- **P05** – update account
- **P06** – end account

3.6.2. Message Grammar

BAR Segment	BAR Message	Chapter in HL7 2.3.1
MSH	Message Header	2
PID	Patient Identification	3
[[DG1]]	Diagnosis	6
GT1	Guarantor	6
[[IN1]]	Insurance	6

3.6.3. Message Semantics

The MSH segment will be constructed as defined in IHE TF-2: 2.4.2 “Message Control”. The field MSH-9 Message Type will have at least two components. In case of P01 event, the first component will have the value “BAR”; the second component will have the value "P01". The third component is optional; however, if present, it will have the value "BAR_P01". For other events, substitute "P01" with the event type.

Segment	SEQ	Length	HL7 Data Type	HL7 Element Name
PID	3	20	CX	Patient Identifier List
	5	48	XPN	Patient Name
	7	26	TS	Date/Time of Birth
	8	1	IS	Sex
	11	106	XAD	Patient Address
	13	40	XTN	Phone Number - Home
	14	40	XTN	Phone Number - Business
	16	80	CE	Marital Status
	19	16	ST	SSN Number - Patient
	20	25	DLN	Driver's License Number - Patient
DG1	1	4	SI	Set ID - DG1
	3	60	CE	Diagnosis Code - DG1
	5	26	TS	Diagnosis Date/Time
	16	60	XCN	Diagnosing Clinician

Segment	SEQ	Length	HL7 Data Type	HL7 Element Name
GT1	3	48	XPN	Guarantor Name
	5	106	XAD	Guarantor Address
	6	40	XTN	Guarantor Ph Num-Home
	8	26	TS	Guarantor Date/Time Of Birth
	9	1	IS	Guarantor Sex
	11	80	CE	Guarantor Relationship
	13	8	DT	Guarantor Date - Begin
	14	8	DT	Guarantor Date - End
	16	130	XPN	Guarantor Employer Name
	17	106	XAD	Guarantor Employer Address
	18	40	XTN	Guarantor Employer Phone Number
	19	20	CX	Guarantor Employee ID Number
	20	2	IS	Guarantor Employment Status
IN1	1	4	SI	Set ID - IN1
	2	60	CE	Insurance Plan ID
	3	59	CX	Insurance Company ID
	4	130	XON	Insurance Company Name
	5	106	XAD	Insurance Company Address
	6	48	XPN	Insurance Co Contact Person
	7	40	XTN	Insurance Co Phone Number
	8	12	ST	Group Number
	12	8	DT	Plan Effective Date
	13	8	DT	Plan Expiration Date
	16	48	XPN	Name Of Insured
	17	80	CE	Insured's Relationship To Patient
	18	26	TS	Insured's Date Of Birth
	19	106	XAD	Insured's Address
	36	15	ST	Policy Number
	37	12	CP	Policy Deductible
	43	1	IS	Insured's Sex