Ameritech

AM-TR-OAT-000065

Ameritech Message Signal Interface (AMSI) and Ameritech Message Signal Interface - Expansion (AMSI-E)

Interface Between Customer Premises Equipment and Ameritech Central Offices to Support the Ameritech Message Signal Interface (AMSI) and the Ameritech Message Signal Interface-Expansion (AMSI-E)

To:	All Interested Parties
Priority:	N/A
Effective Date:	N/A
Issue Date:	Issue #1, July 31, 1990
Expires On:	N/A
Training Time:	N/A
Related Documents:	N/A
Canceled Documents:	N/A
Issuing Department:	N/A
Distribution:	NA
Business Unit:	N/A

Table of Contents

TECHNICAL REFERENCE NOTICE

This Technical Reference is published by Ameritech to provide a technical description of the Interface Between Customer Premises Equipment and Ameritech Central Offices to Support the Ameritech Message Signal Interface (AMSI) and the Ameritech Message Signal Interface-Expansion (AMSI-E).

Ameritech reserves the right to revise this document for any reason including, but not limited to, conformity with standards promulgated by various agencies, utilization of advances in the state of the technical arts, or the reflection of changes in the design of any equipment, techniques or procedures described or referred to herein.

AMERITECH MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO THE SUFFICIENCY, ACCURACY, OR UTILITY OF ANY INFORMATION OR OPINION CONTAINED HEREIN. AMERITECH EXPRESSLY ADVISES THAT ANY USE OF OR RELIANCE UPON THIS TECHNICAL REFERENCE IS AT THE RISK OF THE USER AND THAT AMERITECH SHALL NOT BE LIABLE FOR ANY DAMAGE OR INJURY INCURRED BY ANY PERSON ARISING OUT OF THE SUFFICIENCY, ACCURACY, OR UTILITY OF ANY INFORMATION OR OPINION CONTAINED HEREIN.

This document is not to be construed as a suggestion to any manufacturer to modify or change any of its products, nor does this document represent any commitment by Ameritech or any Ameritech operating company (AOC) to purchase any product, whether or not it provides the described characteristics.

Ameritech does not recommend products, and nothing contained herein is intended as a recommendation of any product to anyone.

Nothing contained herein shall be construed as conferring by implication, estoppel, or otherwise any license or right under any patent, whether or not the use of any information herein necessarily employs an invention of any existing or later issued patent.

Ameritech reserves the right not to offer any or all of these services and to withdraw any or all of them at any future time.

For further information, contact:

Information Manager, Ameritech Services, 3040 West Salt Creek Lane, Floor 3, Arlington Heights, IL 60005

1.   General Description

The intent of this document is to describe the interfaces utilized by the Ameritech Message Signal Interface (AMSI) and the Ameritech Message Signal Interface - Expansion (AMSI-E) services.

The AMSI interface was previously known as the Simplified Message Desk Interface (SMDI) service. the AMSI and the AMSI-E services are used to provide identification of the called number for both message desks and for Voice Message Providers (VMP). It is anticipated that the AMSI and AMSI-E interfaces will primarily be utilized by VMPs however; these interfaces could be utilized by business customers to support their own voice messaging needs. Collectively the message desk and VMP equipment will be referred to as Customer Premises Equipment (CPE).

These interfaces can be provided by 1AESS^{TM}, 5ESS^{TM} and DMS 100 Central Offices (CO). Except where identified, the AMSI and AMSI-E interfaces are identical to Telcordia's (formally Bellcore's) Technical Reference TR-TSY-00283 - "Interface Between Customer Premises Equipment: Simplified Message Desk and Switching System: 1A ESS^{TM}" document.

The new AMSI-E interface is similar to the existing AMSI interface except that it will provide wither 7 digit or 10 digit called number identification.

1.1.   Ameritech Message Signal Interface (AMSI)

The AMSI feature provides the 7 digit directory number of the voice messaging subscriber on calls forwarded by the Call Forward Busy Line (CFBL) and the Call Forward Don't Answer (CFDA) features to the message desk or VMP. A detailed description of the functionality of Call Forward Busy Line (CFBL) and Call Forward Don't Answer (CFDA) can be found in TR-TSY-000522 ("Call Forwarding Variable," Bell Communications Research, TR-TSY-000522). The directory number of the originating station, if that station is collocated within the same CO, as well as the reason why the call is being forwarded will also be transmitted to the CPE over a data link (for the business customer) or a Dedicated Network Access Link (DNAL) for the VMP. For the purpose of this document this interface will be referred to as a DNAL. The CPE may then correlate the data with the actual incoming call.

The information passed over this DNAL will only be passed when the CPE and the voice messaging subscribers are served out of the same CO (Host). The AMSI sections of this technical reference will describe the interface and data protocol used in an intraoffice environment for this service.

This description is based on Ameritech's interpretation of information obtained from switch providers and field data. This DNAL may also be utilized by the CPE to activate the stutter dial tone, more commonly known as the Message Waiting Indicator (MWI).

1.2.   Ameritech Message Signal Interface - Expansion (AMSI-E)

Ameritech Message Signal Interface - Expansion (AMSI-E) is similar to the AMSI service is functionality. The prime difference is that the AMSI-E service will allow a message desk or a VMP to serve any station/subscriber within a Local Area Transport Area (LATA) from one Host central office. The previous statement must be qualified in that the subscriber and VMP must be served from central offices that are connected to the Common Channel Signalling System Number 7 (SS7) network.

The AMSI-E feature provides the 7 or 10 digit directory number (depending on switch type) of the voice messaging subscriber on calls forwarded by the Call Forward Busy Line (CFBL) and Call Forward Don't Answer (CFDA) features to the message desk or VMP. The 1AESS and 5ESS switch types will only support the delivery of 10 digit directory numbers to DMS 100 will support the delivery of either 7 or 10 digit directory numbers to the CPE. A detailed description of the functionality of Call Forward Busy Line (CFBL) and Call Forward Don't Answer (CFDA) can be found in TR-TSY-000522. The VMP has the option of having 7 or 10 digit directory numbers delivered to their CPE. Providing that the originating caller's central office is connected to the SS7 network their, 7 or 10 digit directory number as well as the reason why the call is being forwarded will also be transmitted to the CPE over a data link (for the business customer) or a Dedicated Network Access Link (DNAL) for the VMP. For the purpose of this document this interface will be referred to as a DNAL. The CPE may then correlate the data with the actual incoming call.

Information will only be passed over the DNAL when the CPE and the voice messaging subscribers are connected to the SS7 network. The AMSI-E sections of this technical reference will describe the interface and data protocol used in an interoffice environment for this service. This description is based on Ameritech's interpretation of information obtained from switch providers and field data. This DNAL may also be utilized by the CPE to activate the stutter dial tone, more commonly known as the Message Waiting Indicator (MWI).

2.   Physical Interface

The Ameritech Message Signal Interface and Ameritech Message Signal Interface - Expansion features require the CPE to interface to the DNAL through a customer supplied asynchronous 1200 baud modem. This DNAL consists of a 4-wire 3002 data channel. for the CPE to send the **message waiting indicator (MWI)**, this DNAL will be arranged as full duplex.

An asynchronous serial data transmission protocol is used on the DNAL. Each word of the message consists of a start bit (space), a 7-bit standard ASCII character, an even parity bit, and a stop bit (mark). Start and stop bits have the same duration as data bits. Within each word, the bits are sent in order of increasing significance, where bit 0 is the least significant.

Interconnection to the customers voice stations is via standard outside plant cable, tip and ring connections. Refer to PUB61100 ("Description of the Analog Voiceband Interface Between the Bell System Local Exchange Lines and Terminal Equipment," Bell Communications Research, PUB61100) for details on this type of connection.

Interconnection to the CPE is via standard outside plant cable, tip and ring connections. Refer to PUB41212 or PUB41214 ("Data Sets 202S And 202T Interface Specification, "Bell Communications Research, PUB41212 and "Data Set 212A Interface Specification," Bell Communications Research, PUB41214) for details on this type of connection.

Figure 1 shows typical interconnections needed to implement the AMSI service.

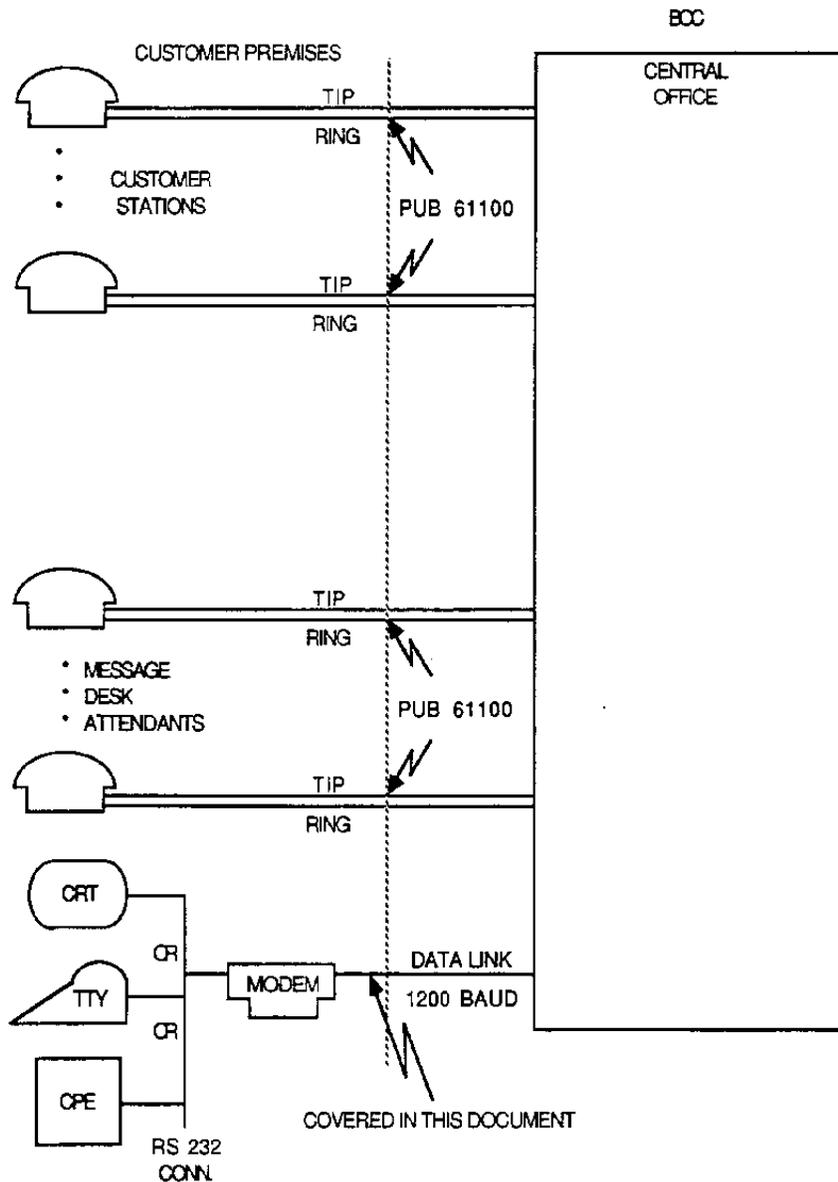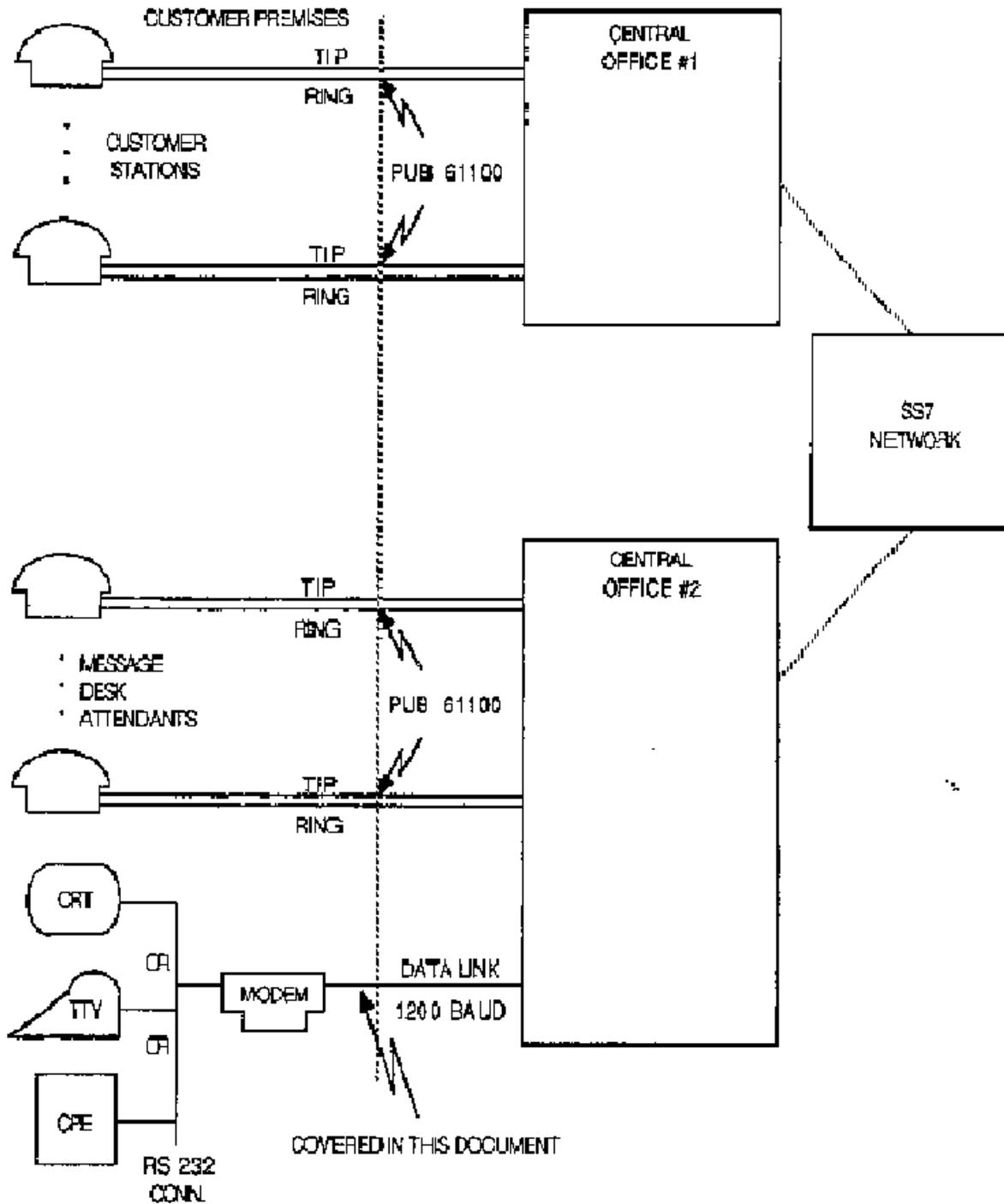**Figure 1.   Typical Ameritech Message Service Interface Arrangement**

Figure 2 shows typical interconnections needed to implement the AMSI-E service.

Figure 2. Typical Ameritech Message Service Interface - Expansion Arrangement

3.   Message Protocols

Messages are transmitted over the DNAL to provide the CPE with the following information:

- Called number

- Calling number (if available)

- Message desk terminal number to which the incoming call was delivered

This latter information could be used to route subsequent messages relating to a specific directory number automatically to the same attendant. Furthermore, as an option, the CPE may send requests to activate or deactivate an audible MWI on a specified directory number to the CO.

3.1.   AMSI Messages

3.1.1.   Messages to the CPE

All messages to the CPE start with a carriage return and a line feed sequence. These are followed by the letters **MD**, then a series of seven numeric characters. The first three digits represent the message desk number to which the incoming call is routed. Because the DNAL can be shared between several collocated message desks monitoring the same directory numbers, the message desk numbering plan has to be arbitrarily assigned. This assignment is determined by agreement between the customer providing the service and the Ameritech Operating Company (AOC). valid numbers in this field are 001 to 063. Table 1 illustrates the various message configurations that may be transmitted over the DNAL toward the CPE.

The remaining four digits designate the position number to which the incoming call was delivered. Valid numbers for this field range from 0001 to 2047. However, they are accessed sequentially by the CO starting with 0001 and ending at the highest position number assigned in the customer's group.

The next character is a single letter that identifies the type of forwarding used to transfer the incoming call to the message desk. Valid characters are:

- D - Directly dialed call to the message desk

- A - All calls forwarded to the message desk

- B - Call forwarding busy line

- N - Call forwarding no answer

If the next character received is not a space indicator, the next seven digits represent the called station directory number from which the incoming call was forwarded to the CPE (Type 1). If this data is unavailable, the CO will send all zeros or blanks. This sequence would be the norm for directly dialed calls to the message desk attendant or the VMP.

If a space character is sent, either after the single letter character or after the called number, the next seven digits represent the calling station's number. If the calling number is not available, this field will be all zeros or blanks. The space character will be sent eventually in either case, as it marks the end of the field's length.

A second transmission of carriage return and line feed characters signals the end of the data for that call. However, several extraneous characters, usually deletion characters, may be present between line feed and a Control Y character. These characters should be ignored by the message desk terminal.

A type 2 message would be the message that would be received by the CPE if the directory number of the calling party/subscriber was not connected to the SS7 Network. A Type 3 message is one that the CPE would receive when the subscriber placed a direct call to the VMP.

3.1.2.   Messages From the CPE

With the optional MWI capability, two messages may be sent to the CO by the message desk attendant or VMP. The first message activates the MWI feature on a specified directory number. The second message deactivates the feature. Table 2 lists the valid combinations of messages accepted at the CO. the CO does not acknowledge receipt of these messages unless it encounters a problem when attempting to execute the CPE request.

Two types of failure messages (invalid and blocked) may be expected at the message desk. The invalid message results from an attempt to activate or deactivate MWI on a directory number not assigned the feature. The message can also be produced when a directory number is transmitted with either too many or too few digits. The blocked message indicates that the CO was momentarily unable to execute the message desk request. The message desk attendant or VMP should recheck the data and then try the transmission again.

3.1.3.   Other Considerations

The CO does not expect an acknowledgment signal from the message desk. When the DNAL is idle, there may be extraneous characters present on the DNAL. These characters should be ignored. In addition, seemingly valid messages, not in the prescribed format, may be present on the DNAL. As with extraneous characters, these messages should be ignored. Only messages that adhere to the formats specified herein should be acted on.

Figure 3. Table 1. Ameritech Message Signal Interface (Toward CPE)

Type 1 (maximum length message)

    cr
      LFMDgggmmmmaxxxxxx yyyyyyyb

Message includes calling as well as called station
identification. Valid except when a = D.

    cr
      LF [Control Y]*

Type 2

    cr
      LFMDgggmmmmaxxxxxxb

No calling station identification

    cr
      LF [Control Y]

Type 3

    cr
      LFMDgggmmmmabyyyyyyyb

Direct call, not forwarded (a = D)

    cr
      LF [Control Y]

cr = carriage return
LF = line feed
ggg = message desk number (001-063)   a = D-Direct call
mmmm = message desk terminal (0001-2047)   a = A-Forward all calls
xxxxxx = *Forwarding from* station number   a = B-Forward busy calls
yyyyyyy = *Calling station* number   a = N-Forward D/A calls
b = Blank space

*   [Control Y] or end of medium is sent by the CO to end the message. There may be
    extraneous characters, usually deletion characters, sent between the final carriage
    return – line feed sequence and the [Control Y]; these should be ignored.

Figure 4. Table 2. Ameritech Message Signal Interface* (From CPE)

```
Type 1 (Activates indicator service to station)
            OP:MWI xxxxxxx![Control D]


Type 2 (Deactivates indicator service to station)
      RMV:MWI xxxxxxx![Control D]

      Acknowledgements from CO; no acknowledgement is given
      for a successful activation/deactivation of MWI on a line.

      The following format will be used for negative
      acknowledgements:

      cr                          cr
         LFMWIxxxxxxx AAA  LF [][][ControlY]


AAA = INV for invalid station number
AAA = BLK for temporarily blocked activity
[Control D] = end of transmission
[] = deletion character (ASCII value FF)
xxxxxxx = station number
LF = line feed
CR = carriage return


* Available only when MWI option is provided
```

3.2.   Ameritech Message Signal Interface - Expansion

3.2.1.   Message to the CPE

All messages to the CPE start with a carriage return and a line feed sequence. These are followed by the letters**MD**, then a series of seven numeric characters. The first three digits represent the message desk number to which the incoming call is routed. Because the DNAL can be shared between several collocated message desks monitoring the same directory numbers, the message desk numbering plan has to be arbitrarily assigned. This assignment is determined by agreement between the customer providing the service and the AOC. Valid numbers in this field are 001 to 063. Table 3 illustrates the various message configurations that may be transmitted over the DNAL toward the CPE.

The remaining four digits designate the position number to which the incoming call was delivered. Valid numbers for this field range from 0001 to 2047. However, they are accessed sequentially by the CO starting with 0001 and ending at the highest position number assigned in the customer's group.

The next character is a single letter that identifies the type of forwarding used to transfer the incoming call to the message desk or VMP. Valid characters are:

- D-Directly dialed call to the message desk

- A-All calls forwarded to the message desk

- B-Call forwarding busy line

- N-Call forwarding no answer

If the next character received is not a space indicator, the next seven or ten digits (To identify the differences between the AMSI and AMSI-E interfaces, Tables 3 & 4 will only depict the 10 digit DN option) represent the called station directory number from which the incoming call was forwarded to the CPE (Type 1). If this data is unavailable, the CO will send all zeros or blanks. This sequence would be the norm for directly dialed calls to the message desk attendant or the VMP.

If a space character is sent, either after the single letter character or after the called number, the next ten digits represent the calling station's directory number. If the calling number is not available, this field will be all zeros or blanks. the space character will be sent eventually in either case, as it marks the end of the field's length.

A second transmission of carriage return and line feed characters signals the end of the data for that call. However, several extraneous characters, usually deletion characters, may be present between line feed and a Control Y character. These characters should be ignored by the message desk terminal or VMP.

A Type 2 message would be the message that would be received by the CPE if the directory number of the calling party/subscriber was not resident in the same CO. A Type 3 message is one that the CPE would receive when the subscriber placed a direct call to the VMP.

3.2.2.   *Messages From the CPE*

With the optional MWI capability, two messages may be sent to the CO by the message desk attendant or VMP. The first message activates the MWI feature on a specified directory number. The second message deactivates the feature. Table 4 lists the valid combinations of messages accepted at the CO. The CO does not acknowledge receipt of these messages unless it encounters a problem when attempting to execute the CPE/VMP request.

Two types of failure messages (invalid and blocked) may be expected at the message desk. The invalid message results from an attempt to activate or deactivate MWI on a directory num-

ber not assigned the feature. The message can also be produced when a directory number is transmitted with either too many or too few digits. The blocked message indicates that the CO was momentarily unable to execute the message desk/VMP request. The message desk attendant or VMP should recheck the data and then try the transmission again.

3.2.3.   Other Considerations

The CO does not expect an acknowledgment signal from the message desk. When the DNAL is idle, there may be extraneous characters present on the DNAL. These characters should be ignored. In addition, seemingly valid messages, not in the prescribed format, may be present on the DNAL. As with extraneous characters, these messages should be ignored. Only messages that adhere to the formats specified herein should be acted on.

Figure 5. Table 3. Ameritech Message Signal Interface - Expanded (Toward CPE)

Type 1 (maximum length message)

    cr
     LFMDgggmmmmaxxxxxxxxxbyyyyyyyyyyb

Message includes calling as well as called station
identification. Valid except when a = D.

    cr
     LF [Control Y]*

Type 2

    cr
     LFMDgggmmmmaxxxxxxxxxb

No calling station identification

    cr
     LF [Control Y]

Type 3

    cr
     LFMDgggmmmma yyyyyyyyyyb

Direct call, not forwarded (a = D)

    cr
     LF [Control Y]

cr = carriage return
LF = line feed
ggg = message desk number (001-063)   a = D-Direct call
mmmm = message desk terminal (0001-2047)   a = A-Forward all calls
xxxxxxxxx = *Forwarding from* station number   a = B-Forward busy calls
yyyyyyyyyy = *Calling station* number   a = N-Forward D/A calls
b = Blank space

* [Control Y] or end of medium is sent by the CO to end the message. There may be
   extraneous characters, usually deletion characters, sent between the final carriage
   return – line feed sequence and the [Control Y]; these should be ignored.

Figure 6. Table 4. Ameritech Message Signal Interface - Expanded* (From CPE)

```
Type 1 (Activates indicator service to station)
            OP:MWI xxxxxxxxx![Control D]


Type 2 (Deactivates indicator service to station)
        RMV:MWI xxxxxxxxx![Control D]

        Acknowledgements from CO; no acknowledgement is given
        for a successful activation/deactivation of MWI on a line.

        The following format will be used for negative
        acknowledgements:

        cr                         cr
            LFMWIxxxxxxxxx AAA   LF [][][ControlY]


AAA = INV for invalid station number
AAA = BLK for temporarily blocked activity
[Control D] = end of transmission
[] = deletion character (ASCII value FF)
xxxxxxxxx = station number
LF = line feed
CR = carriage return


* Available only when MWI option is provided
```

4.   References

1.   "Call Forwarding Variable," Bell Communications Research, TR-TSY-000522.

2.   "Description of the Analog Voiceband Interface Between the Bell System Local Exchange Lines and Terminal Equipment," Bell Communications Research, PUB 61100.

3.   "Data Sets 202S And 202T Interface Specifications," Bell Communications Research, PUB41212 and "Data set 212A Interface Specification," Bell Communications Research, PUB41214.

   NOTE: (Reference 1, 2, & 3) - These documents may be ordered from Bell communications research, Information Operations Center, 60 New England Avenue, Piscataway, NJ 08854-4196, (201) 981-5600