BS 8521:2009

BSI British Standards

Specification for dual-tone multi-frequency (DTMF) signalling protocol for social alarm systems

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 24, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI and came into effect on 30 April 2009. It was prepared by Subcommittee GW/1/12, *Social alarms*, under the authority of Technical Committee GW/1, *Electronic security systems*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 7369:1991, which is withdrawn.

Information about this document

This is a full revision of BS 7369, and introduces the following principal changes:

- message structure has been extended to reflect the evolution of user requirements, and extended range of alarm generation sources;
- extended definitions of parameters are provided and an error detection checksum has been added to alarm messages;
- a remote parameter programming and enquiry facility has been introduced;
- tone durations and signal timing have been revised.

The aim of this British Standard is to provide a replacement to the BS 7369:1991 social alarm DTMF signalling protocol implementation employed by manufacturers within the social alarm market place to enable a solution toward meeting the requirements of the current market place. BS 8521 is intended to ensure that equipment users can benefit from improved equipment interoperability, irrespective as to the source of their equipment.

BS 8521 is not interoperable with BS 7369:1991.

Compliance with this British Standard does not infer that all the functions listed herein are available within any given item of alarm equipment.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

This British Standard has been prepared in response to requests from purchasers and users of social alarm systems for the establishment of a common signalling protocol to ensure that social alarm systems from different manufacturers exchange essential information and controls in a compatible manner. Essential information and controls include identification of an individual local unit and controller, the nature of any alarm, with the type of trigger initiating this, and the controls necessary to operate any speech link between a local unit and an alarm receiving centre (ARC).

This British Standard specifies requirements for dual tone multi-frequency signalling, for the transfer of messages and commands, this being an acknowledged method for transmitting information over the public switched telephone network once a call has been established between the local unit and controller and the ARC.

1 Scope

This British Standard specifies requirements for the transfer of information and controls within a social alarm system, by means of dual-tone multi-frequency (DTMF) tone signals passing between site control or local equipment and an alarm receiving centre via the public switched telephone network (PSTN) supporting voice traffic conforming to ITU-T Recommendation G.711 [1].

The standard specifies an in-call protocol which supports the 300 ms maximum round trip delay specified in the UK National Transmission Plan [2] for connections over the fixed network.

2 Normative references

BS EN 50134-1, *Alarm systems – Social alarm systems – Part 1: System requirements*

BS EN 50134-3, *Alarm systems – Social alarm systems – Part 3: Local unit and controller*

ES 201 235-1, *Specification of dual tone multi-frequency (DTMF) transmitters and receivers – Part 1: General*

ES 201 235-2, *Access and terminals (AT) – Specification of dual tone multi-frequency (DTMF) transmitters and receivers – Part 2: Transmitters*

ES 201 235-4, *Access and terminals (AT) – Specification of dual tone multi-frequency (DTMF) transmitters and receivers – Part 4: Transmitters and receivers for use in terminal equipment for end-to-end signalling*

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS EN 50134-1 and the following apply.

3.1 clear
termination of audio communication whilst retaining connection to a controller

3.2 clear-down
termination of a PSTN connection between a controller and an ARC

3.3 command
coded instruction

3.4 grouped equipment
local system installation in which multiple local units are connected to a single controller

3.5 listen
speech direction to an ARC from a local unit

3.6 message
coded information sent as data between a local unit and controller and an ARC

3.7 null field
any data element where the data digits are set to value zero (DTMF 0)

3.8 simplex tone controlled speech
voice channel operated by tone commands which determine the direction of speech

3.9 speak
speech direction to a local unit from an ARC

3.10 tones

3.10.1 acknowledge tone
DTMF signal transmitted to confirm receipt of data or a command

3.10.2 data request tone
DTMF signal sent by the receiving equipment to inform the sending equipment that contact has been established

3.10.3 enquiry tone
tone, within the audible frequency range, transmitted prior to the sending of information by local unit and controller to indicate that the call was initiated by electronic means

NOTE This tone serves the purpose of identifying to an uninformed recipient that the call is generated by automated equipment and is not a nuisance caller.

3.10.4 guard tone
DTMF signal transmitted to indicate to equipment that a command follows and to mute the audio channel to and/or from a local unit as appropriate

3.10.5 start tone
DTMF signal transmitted at the commencement of the transmission of data or commands

3.10.6 stop tone
DTMF signal transmitted at the completion of the transmission of data or commands

3.11 VOX
voice operated speech switching

4 Information transfer

4.1 General

Information transfer shall be by means of DTMF tone signals representing digits as specified in ES 201 235-1. Signal output from the DTMF transmitter shall conform to the requirements specified in ES 201 235-2. Determination of the receipt of a valid tone at the receiver shall follow the requirements specified in ES 201 235-4. The tones assigned to social alarm information transfer and command functions and their timing shall be in accordance with Table 1.

The sending of information from automatic equipment shall be preceded by an enquiry tone of (250 ± 50) ms duration, repeated at (2 ± 0.4) s intervals, which shall be ignored for signalling purposes by automatic receiving equipment.

Table 1 **DTMF digit assignments**

Tone (key)	Value	Function/command	Duration of tone transmitted to network [A)]
0	0	Select local unit	(80 ± 5) ms
1	1	Request information on outstanding calls	(80 ± 5) ms
2	2	Manufacturer-specific functions	(80 ± 5) ms
3	3	Speech control functions	(80 ± 5) ms
4	4	Parameter programming	(80 ± 5) ms
5	5	Parameter enquiry	(80 ± 5) ms
6	6	Data mode request	(80 ± 5) ms
7	7	Speak	(80 ± 5) ms
8	8	Listen	(80 ± 5) ms
9	9	Clear (clear speech)	(80 ± 5) ms
*	*	Padding character	(80 ± 5) ms
#	#	End of data (stop)	(80 ± 5) ms
[A]	A	Guard	(250 ± 12.5) ms
A	A	Commencement of data (start)	(80 ± 5) ms
B	B	Acknowledge	(80 ± 5) ms
[B]	B	Data request	(1 000 ± 50) ms
C	C	Enter programming	(80 ± 5) ms
D	D	Clear down	(80 ± 5) ms

[A)] Tone sequences are sent with a (80 ± 5) ms gap between tones.

4.2 Start and stop tones

There shall be an interval of not less than (600 ± 30) ms between the end of the stop tone and the commencement of the start tone of subsequent transmissions from the same source.

4.3 Guard tone

On receipt of a guard tone, the local unit shall mute the audio channel for a period not exceeding 500 ms.

5 Communication

5.1 Session initiation

Following completion of call set-up signalling, the local unit and controller shall send an enquiry tone to the line to indicate that automatic equipment is using the line.

When the ARC detects ringing current, it shall loop the line and shall send a data request tone to the local unit and controller. If no data request tone is detected by the local unit and controller, it shall disconnect from the network.

A received tone shall be interpreted as a data request tone by the local unit and controller only if its duration is not less than 500 ms.

When the local unit and controller detects the data request tone, it shall cease to send the enquiry tone and shall wait until the end of the data request tone; after a delay of (80 $\pm$ 5) ms the local unit and controller shall then send an alarm transmission message to the ARC.

If no acknowledge tone or start of data transmission is received by the ARC within (600 $\pm$ 30) ms of the end of a data request tone, the ARC shall send a further data request tone. This shall be repeated up to four times, after which the ARC shall disconnect from the network if no acknowledge or start of data transmission is received by the ARC within (600 $\pm$ 30) ms of the end of the fourth data request tone.

If an acknowledge tone or start of data transmission is received by the ARC within (600 $\pm$ 30) ms of the end of a data request tone, the ARC shall cease to send the data request tone and shall wait to receive a valid data transmission.

If a valid data transmission is not received by the ARC within 25 s from the end of the transmission of the originating data request tone, it shall disconnect from the network.

If no acknowledge tone is received by the local unit and controller within (600 $\pm$ 30) ms of the end of an alarm transmission message, the local unit and controller shall send a further alarm transmission message. This shall be repeated up to four times, after which the local unit and controller shall disconnect from the network if no acknowledge tone is received by the local unit and controller within (600 $\pm$ 30) ms of the end of the fourth alarm transmission message.

Any redial or reconnection attempts shall be made in accordance with BS EN 50134-3.

5.2 Alarm transmission message format

The message sent by the local unit and controller to the ARC shall consist of the sequence:

A CC TT GGGGGGGG RRRR EEE LL P SS XX #

where:

A and # are the message string start and stop delimiters;

CC is the two-digit system configuration, to indicate the type of equipment (see Table 2);

TT is the two-digit system type assignment, to indicate to the ARC whether the local unit and controller is using the standard protocol or a proprietary variant (see Table 3);

GGGGGGGG is the eight-digit controller identification field, to uniquely define the identity of the specific site/installation;

NOTE 1 This is right-justified, padded with leading zeros (i.e. zero is transmitted as DTMF 0).

RRRR is the four-digit local unit identification field, to uniquely define the identity of the local unit within the installation;

NOTE 2 This is right-justified, padded with leading zeros (i.e. zero is transmitted as DTMF 0).

NOTE 3 In grouped equipment, the controller has the reserved identity of 0000.

NOTE 4 For a combined local unit and controller, the unique identity of that specific unit is given by the combined twelve digits of both the local unit and controller and local unit fields as a single entity. This is right-justified, padded with leading zeros (i.e. zero is transmitted as DTMF 0).

EEE is the three-digit event code, to define the nature of the alarm (see Table 4);

LL is the two-digit location information field, to allow detailed locations of alarm events to be indicated (see Table 5);

P is the single-digit priority field, to indicate that a priority over other alarms has been assigned to this event (see Table 6);

SS is the two-digit status code, to indicate the status of the local unit (see Table 7);

XX is the two-digit checksum (see **5.3**).

NOTE 5 An example of an alarm transmission protocol is shown diagrammatically in Figure 1.

Table 2 **System configuration assignments**

First digit (CC)	System type and local unit status	Second digit	Speech link type
0	Local unit and controller	0	Non-speech
1	Grouped equipment with supervisor off duty	1	VOX
2	Grouped equipment with supervisor on duty	2	Tone controlled switched speech, with guard tone
3	Grouped equipment with supervisor on duty acting as an ARC	3 to 9	Reserved to BSI [A)]
4	ARC		
5 to 9	Reserved to BSI [A)]		

NOTE The type of equipment is described by any combination of the first and second digits, e.g. an ARC operating on tone controlled switched speech with guard tone will have a system configuration of 42.

[A)] System configuration codes that are reserved to BSI might be defined in a future revision of this standard. Where a new code is required, users of this British Standard should propose the new code description to BSI for consideration for future editions.

Table 3 **System type assignments**

System type (TT)	System identity
00	System conforming to the basic protocol with no manufacturer-specific enhancements
01 to 99	Reserved to BSI [A)]

[A)] Users of this British Standard wishing to extend the functionality of the signalling protocol should seek to do so by proposing new commands or codes to BSI for consideration for future editions of this British Standard. A proprietary variant of the protocol should be created only where a proposal for additional functionality cannot be included within the standard protocol.

Table 4 **Event code assignments**

Event code (EEE)	Alarm event/reason	Notes
000	No alarm event/reason information/cancelled	
001 to 009	Undefined/unallocated	Reserved to BSI [A)]
010	Fixed trigger 1	
011	Fixed trigger 2	
012	Pressure mat	
013	Door contact	
014	Passive infra-red (PIR) detector	
015	Boundary breach	
016	Smoke	
017	Fire	
018	Bogus caller trigger	
019	Personal trigger 1	
020	Personal trigger 2	
021	Fall trigger 1	
022	Fall trigger 2	
023	Personal attack 1	
024	Personal attack 2	
025	Panic button	
026	Carbon monoxide gas	
027	Natural gas	
028	Intruder	
029	Automatic person down	
030	Property exit 1	
031	Property exit 2	
032	High temperature	
033	Low temperature	
034	Temperature rate of rise	
035	Medication dispenser	
036	Enuresis	
037	Bed occupancy	
038	Chair occupancy	
039	Property occupancy 1	

Table 4 **Event code assignments** *(continued)*

Event code (EEE)	Alarm event/reason	Notes
040	Property occupancy 2	
041	Bathroom occupancy	
042	Seizure	
043	Inactivity	
044	Environmental monitor	
045	Bed monitor	
046	Chair monitor	
047	Flood	
048	Bath level	
049	Lighting circuit	
050	Heating	
051	Mains power	
052	System power supply	
053	Battery	
054	Duty switch	
055	Door open	
056	Fire door open	
057	System status	
058	Automatic periodic test call	
059	Telephone line 1	
060	Telephone line 2	
061	Radio receiver	
062	IP communication link	
063	Serial data link	
064	System under test	
065 to 089	Undefined/unallocated	Reserved to BSI [A)]
090	Service provider IDs	
091	Service call	
092 to 096	Undefined/unallocated	Reserved to BSI [A)]
097	Acknowledgement message	
098	Presence marking	
099	Service completed	
100 to 199	Undefined/unallocated	Reserved to BSI [A)]
200 to 999	Undefined/unallocated	Available for proprietary use [B)]

NOTE It is not a requirement of this British Standard that all of the identified facilities for providing information are to be incorporated into a social alarm system.

[A)] Event codes that are undefined/unallocated and reserved to BSI might be defined in a future revision of this standard. Where a new event code is required, users of this British Standard should propose the new event description to BSI for consideration for future editions.

[B)] Event codes that are undefined/unallocated and available for proprietary use may be used as required, but users of this British Standard are encouraged to advise BSI of such uses in order that they can be considered for future editions.

Table 5 **Location code assignments**

Location code (LL)	Default meaning	Location code (LL)	Default meaning
00 (Default)	No location information	30	Back door (main)
01	Local unit	31	Back door (other)
02	Hallway (downstairs)	32	Garage (main)
03	Hallway (upstairs)	33	Garage (other)
04	Stairs (main)	34	Workshop
05	Stairs (other)	35	Laundry (main)
06	Landing	36	Laundry (other)
07	Bedroom 1 (master)	37	Office (main)
08	Bedroom 2	38	Study/office (other)
09	Bedroom 3 (other)	39	Games room
10	Bedroom 4 (guest)	40	Common room (main)
11	Living room (main)	41	Common room (other)
12	Living room (second)	42	Lift (main)
13	Living area (other)	43	Lift (second)
14	Dining room (main)	44	Lift (other)
15	Dining room (second)	45	Front gate
16	Dining area (other)	46	Rear gate
17	Bathroom (main)	47	Outbuilding (main)
18	Bathroom (second)	48	Shed
19	WC/toilet (upstairs)	49	Outbuilding/shed (other)
20	WC/toilet (downstairs)	50	Garden (front)
21	WC/toilet (other)	51	Garden (rear)
22	Kitchen (main)	52	Garden (other)
23	Kitchen (second)	53	Basement/cellar
24	Kitchen area (other)	54	Ground floor
25	Utility room (main)	55	Bin store
26	Utility room (other)	56	Boiler room
27	Entrance/lobby	57	Attic
28	Front door (main)	58 to 79	Reserved to BSI [A)]
29	Front door (other)	80 to 99	Available for proprietary use [B)]

[A)] Location codes that are undefined/unallocated and reserved to BSI might be defined in a future revision of this standard. Where a new location code is required, users of this British Standard should propose the new location description to BSI for consideration for future editions.

[B)] Location codes that are available for proprietary use may be used as required, but users of this British Standard are encouraged to advise BSI of such uses in order that they can be considered for future editions.

Table 6 **Priority code assignments**

Priority code (P)	Meaning
0	Lowest priority (default status)
1	
2	
3	
4	Increasing priority
5	
6	
7	
8	
9	Highest priority

Table 7 **Status code assignments**

Status code (SS)	Meaning
00	Normal default
01	Privacy switch operated
02	Non-speech manually operated
03	Non-speech automatically operated
04	In service (fault rectified) [A)]
05	Fault status (alarm active) [A)]
06	Fault status (alarm not active) [A)]
07	Low battery status set [B)]
08	Busy
09	Out of service
10 to 79	Reserved to BSI [C)]
80 to 99	Available for proprietary use [D)]

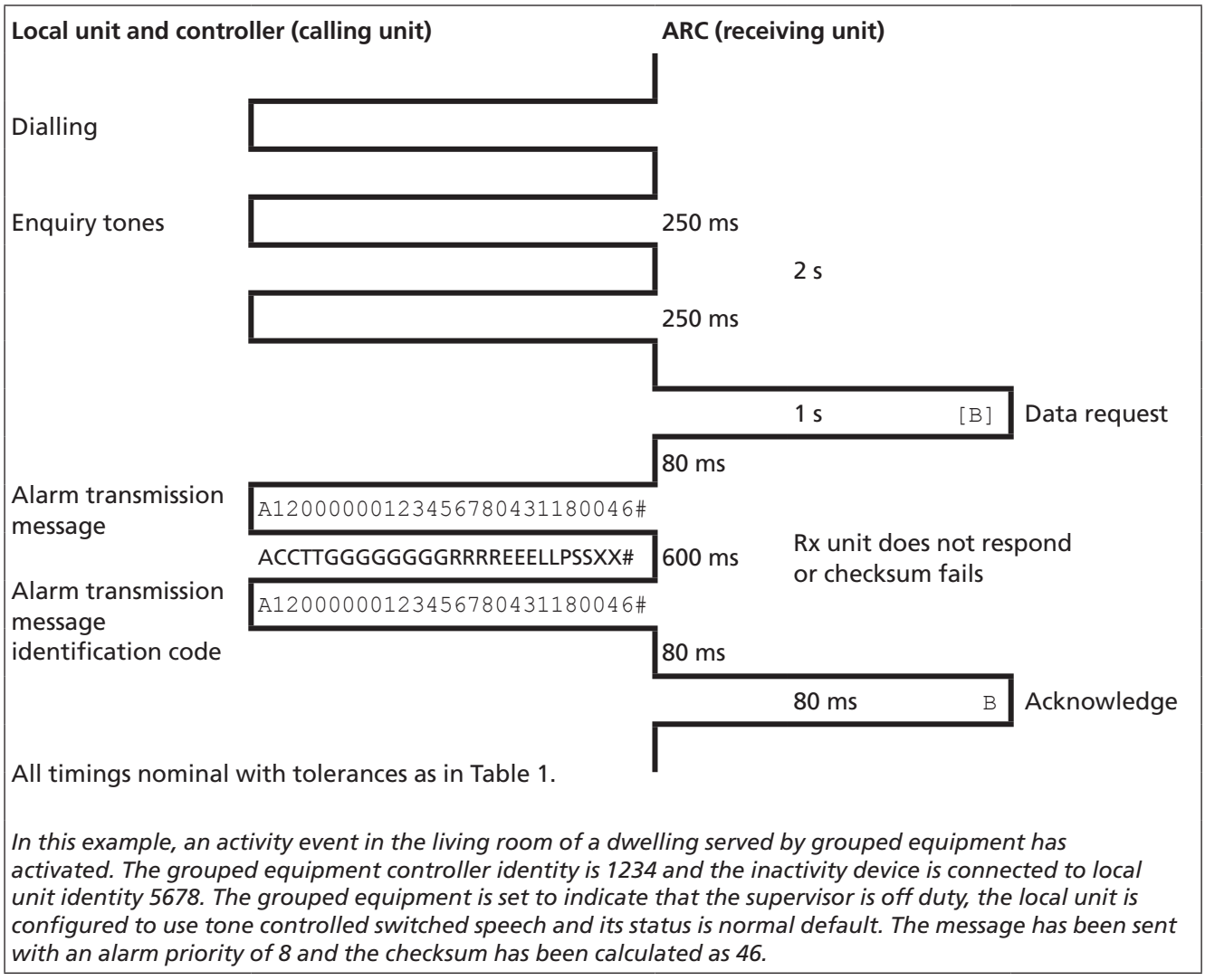
A) Can be used to indicate that a fault state is present/rectified with the device or alarm identified by the primary alarm event code (Table 4). This may be associated with an alarm event or used in a supervisory capacity.

B) Can be used to indicate that a low battery state is present with the (radio) device or alarm identified by the primary alarm event code (Table 4). This may be associated with an alarm event or used in a supervisory capacity.

C) Status codes that are undefined/unallocated and reserved to BSI might be defined in a future revision of this standard. Where a status event code is required, users of this British Standard should propose the new status description to BSI for consideration for future editions.

D) Status codes that are available for proprietary use may be used as required, but users of this British Standard are encouraged to advise BSI of such uses in order that they can be considered for future editions.

Figure 1 **Diagrammatic representation of an example of an alarm transmission protocol**



In this example, an activity event in the living room of a dwelling served by grouped equipment has activated. The grouped equipment controller identity is 1234 and the inactivity device is connected to local unit identity 5678. The grouped equipment is set to indicate that the supervisor is off duty, the local unit is configured to use tone controlled switched speech and its status is normal default. The message has been sent with an alarm priority of 8 and the checksum has been calculated as 46.

5.3 Checksum algorithm

5.3.1 Calculation of the checksum

The checksum shall be calculated using Modulo 100 arithmetic by adding the values of all the command string characters specified in Table 8, between but not including the delimiters.

NOTE DTMF "A","B", "C", "D" and "#" are not legitimate characters within a data field response, but take the values indicated in Table 8 for the purposes of calculating the checksum. If such characters appear within the data field aspects of a command/data string format, such a string should be rejected. However, if they are found present and are part of a corrupt string, a value within the checksum algorithm to allow it to be calculated (and thereafter rejected) is prudent.

The value of decimal zero within the two-digit checksum shall be transmitted as DTMF 0.

5.3.2 Verification of the checksum

The ARC shall calculate the checksum for the received string and compare the calculated value with the received value. The ARC shall acknowledge the transmission only if the two values agree.

Table 8 **Values of DTMF tones for checksum calculation purposes**

Digit	Checksum value
1 to 9	Numerical value of digit
0	10
*	11
#	12
A	13
B	14
C	15
D	0

EXAMPLE An example of a checksum calculation is as follows:

a) alarm string data 01 03 00008765 4321 054 31 6 03;

b) gives an initial total of 142;

c) Modulo 100 = 1 remainder 42;

d) checksum = 42;

e) the resulting transmitted alarm string is formatted as follows:

A 01 03 00008765 4321 054 31 6 03 42 #

where A and # are the message string start and stop delimiters.

6 Speech path and system control commands

6.1 General

Only equipment configured as or acting as an ARC shall be able to generate commands.

On receipt of a command, the local unit and controller shall respond by sending either an acknowledge tone or a data sequence, depending on the command, to the ARC not less than (80 ± 5) ms after cessation of the command.

If no acknowledge tone or start tone for a data sequence is received by the ARC within (600 ± 30) ms of cessation of the command, the ARC shall repeat the command, including any guard tone, to a maximum of four attempts.

If no acknowledge tone or start tone for a data sequence has been received by the ARC after four attempts, the ARC shall issue a "null" command (see **6.5**).

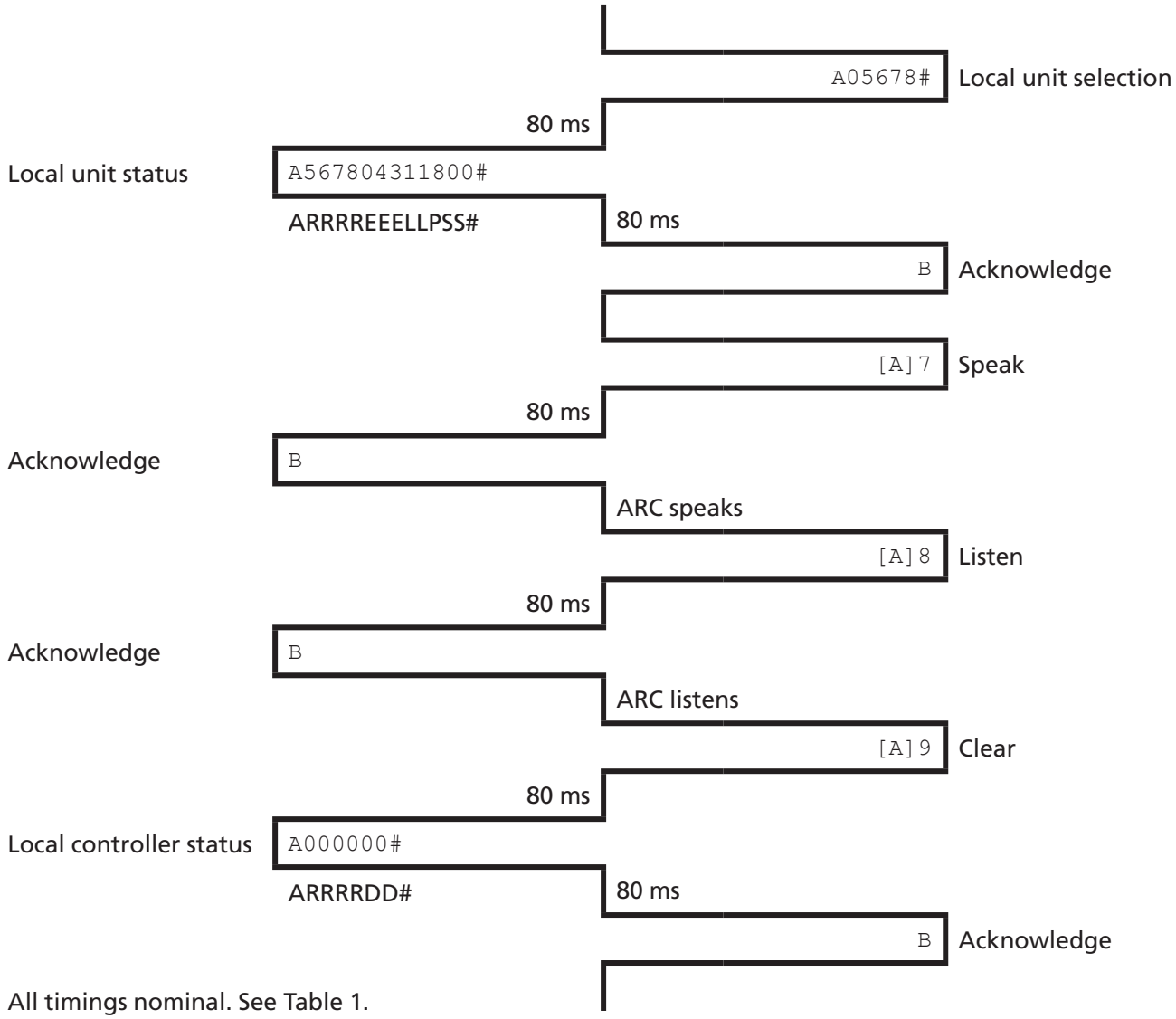
Where a data sequence response is sent by the local unit and controller, the ARC shall respond with an acknowledge tone after not less than (80 ± 5) ms of cessation of the end-of-data digit.

NOTE An example of a local unit and speech communication protocol is shown in Figure 2.

6.2 Speak ([A]7) and Listen ([A]8)

On receipt of the "speak" or "listen" command, the local unit and controller shall respond by sending the acknowledge tone to the ARC.

Figure 2 **Diagrammatic representation of an example of local unit and speech communication**



In this example, a normal alarm occurs, the calling unit is local unit and controller and the receiving unit is an ARC. The ARC selects the local unit in alarm (5678), the local unit and controller confirms connection to the local unit and the details of the alarm. The ARC toggles the speech direction. The ARC clears contact with the local unit reverting to the local unit and controller (without disconnecting the line). The local unit and controller confirms the status. There are no outstanding alarms.

6.3 Clear ([A]9)

On receipt of the "clear" command, the local unit and controller shall maintain the connection with the ARC and shall send a status and a data field to the ARC in the following format:

A 0000 DD #

where:

A and # are the message string start and stop delimiters;

0000 indicates connection to the local unit and controller;

DD is the two-digit pending calls field, which indicates the number of pending calls/outstanding alarms (in decimal) at the local unit and controller.

6.4 Clear down ([A]D)

On receipt of the "clear down" command, the local unit and controller shall respond by sending the acknowledge tone and disconnect from the telephone line.

NOTE It is advisable for grouped equipment that a "clear" command precedes a "clear down" command so the presence of outstanding calls is indicated, otherwise a complete new communications session will need to be established to service outstanding alarms.

6.5 Null command (keep alive) ([A] #)

NOTE This command serves as a "keep alive" indicating that the channel with the ARC is still active.

When contact between an ARC and local unit and controller is established and no control activity is taking place, a "null" command shall be sent from the ARC to the local unit and controller at intervals of not more than 1 min, commencing from receipt of the acknowledge tone associated with the previous command sent by the ARC.

If no acknowledge tone is received by the ARC within (600 $\pm$ 30) ms of cessation of the "null" command, the ARC shall repeat the command to a maximum of four attempts.

If either the local unit and controller or the ARC fails to detect the "null" command or acknowledge tone after an elapsed time of 130 s, it shall clear down and disconnect from the telephone line.

6.6 Selection of a local unit in grouped equipment

*NOTE The fields in each string are defined in **5.2**.*

The local unit selection command sent by the ARC to the local unit and controller shall be in the following format:

A 0 RRRR #

The local unit and controller shall respond to the local unit selection command by sending a data sequence representing the status of the local unit and any pending alarm event as appropriate. This data sequence shall be in the following format:

A RRRR EEE LL P SS #

6.7 Request for information on outstanding calls

*NOTE The fields in each string are defined in **5.2**.*

The command sent by the ARC to the local unit and controller requesting details of pending calls shall be in the following format:

A 1 NNNN #

If NNNN = 0000, then details of the next highest priority call at the local unit and controller shall be sent. If NNNN = 9999, then details of all pending calls shall be sent.

Upon receipt of the "outstanding call request" command, the local unit and controller shall respond by sending a data sequence representing the status of each alarm event as appropriate. This data sequence shall be in the format:

A RRRR EEE LL P SS #

If the "next call on the list" command was sent (NNNN = 0000) then only a single response shall be sent by the local unit and controller.

If the "all pending calls" command was sent (NNNN = 9999) then the local unit and controller shall respond by sending a response for each pending call, and shall notify the ARC when data on all calls has been sent by sending a data sequence comprising null fields:

A 0000 000 00 0 00 #

The ARC shall acknowledge each pending call data response in turn.

6.8 Speech control functions

The commands sent to the local unit and controller by the ARC to control secondary speech functions, such as volume or extension speaker selection, shall be in the following format:

A 3 N #

where N is the speech function (see Table 9).

An acknowledge tone shall be transmitted by the local unit and controller to confirm receipt.

Table 9 **Speech control function assignments**

Digit	Function
0	Reset to default setting [A)]
1	Volume level 1 (quiet preset)
2	Volume level 2 (normal preset)
3	Volume level 3 (loud preset)
4	Volume up
5	Volume down
6	Select speaker 1
7	Select speaker 2
8	Switch to VOX mode
9	Switch to simplex tone controlled (listen) mode

[A)] As defined by the equipment manufacturer.

6.9 Equipment control functions

The commands sent to the local unit and controller by the ARC to effect specific functions shall be in the following format:

A 2 TT NN #

where:

TT is the system type assignment (see Table 3);

NN is the two-digit control code (see Table 10).

The local unit and controller shall respond by returning the data sequence in the following format:

A TT NN #

where:

TT is the system type assignment (see Table 3);

NN is the two-digit control code (see Table 10).

NOTE If NN is returned as 00, this indicates that either an incorrect system type or an unallocated or unsupported control code has been requested and that the control action will not be performed.

On receipt of the returned data sequence, the ARC shall respond by sending an acknowledge tone.

Table 10 **Equipment control codes**

Control code (NN)	Meaning/action	Notes
00	For system use (see Note to **6.9**)	
01	Activate door lock release 1	
02	Activate door lock release 2	
03	Activate key safe lock release	
04	Unlock all (fire/evacuation state)	
05	Undefined/unallocated	Reserved to BSI [A]
06	Activate general purpose relay 1	
07	De-activate general purpose relay 1	
08	Activate general purpose relay 2	
09	De-activate general purpose relay 2	
10	Switch controller to local	
11	Switch controller to ARC	
12	Switch controller to personal recipient	
13	Inactivity/habit monitoring enabled	
14	Inactivity/habit monitoring disabled	
15	Intruder (away) mode enabled	
16	Intruder (away) mode disabled	
17	Low temperature/hypothermia reporting on	
18	Low temperature/hypothermia reporting off	
19	Temperature reporting delay (day/short)	
20	Temperature reporting delay (night/extended)	
21	Change time at controller +1 hour	
22	Change time at controller –1 hour	
23	Reset monitor status	
24	Request inactivity/monitor status	
25	Request system test call	
26 to 29	Undefined/unallocated	Reserved to BSI [A]
30	Suspend local unit	
31	Reinstate local unit	
32	Exit programming mode	
33 to 79	Undefined/unallocated	Reserved to BSI [A]
80 to 99	Undefined/unallocated	Available for proprietary use [B]

[A] Equipment control codes that are undefined/unallocated and reserved to BSI might be defined in a future revision of this standard. Where a new equipment control code is required, users of this British Standard should propose the new event description to BSI for consideration for future editions.

[B] Equipment control codes that are undefined/unallocated and available for proprietary use may be used as required, but users of this British Standard are encouraged to advise BSI of such uses in order that they can be considered for future editions.

7 Programming

7.1 General

The command for entry into the programming mode shall be in the following format:

A C FFFF #

where:

A and # are the message string start and stop delimiters;

C is the "enter programming" command (see Table 1);

FFFF is a four-digit security code, to prevent unauthorized access to the programming facility of the local unit and controller.

The default security code for all equipment shall be a null field (0000), unless or until such time as a specific security code is assigned to a particular piece of equipment in place of the default.

If the security code is accepted, the local unit and controller shall respond with an acknowledge tone and the equipment shall be placed in programming mode.

If the command is rejected, either because the security code is incorrect, the remote programming is not supported, or the local unit and controller is not in programming mode, the local unit and controller shall respond with a data response in the format A 0000 #. This shall be acknowledged in turn with an acknowledge tone by the ARC.

The command for exit from the programming mode shall be in the following format:

A 2 TT NN #

where:

TT is the system type assignment (see Table 3);

NN = 32 (see Table 10).

The local unit and controller shall respond by returning the data sequence in the following format:

A TT NN #

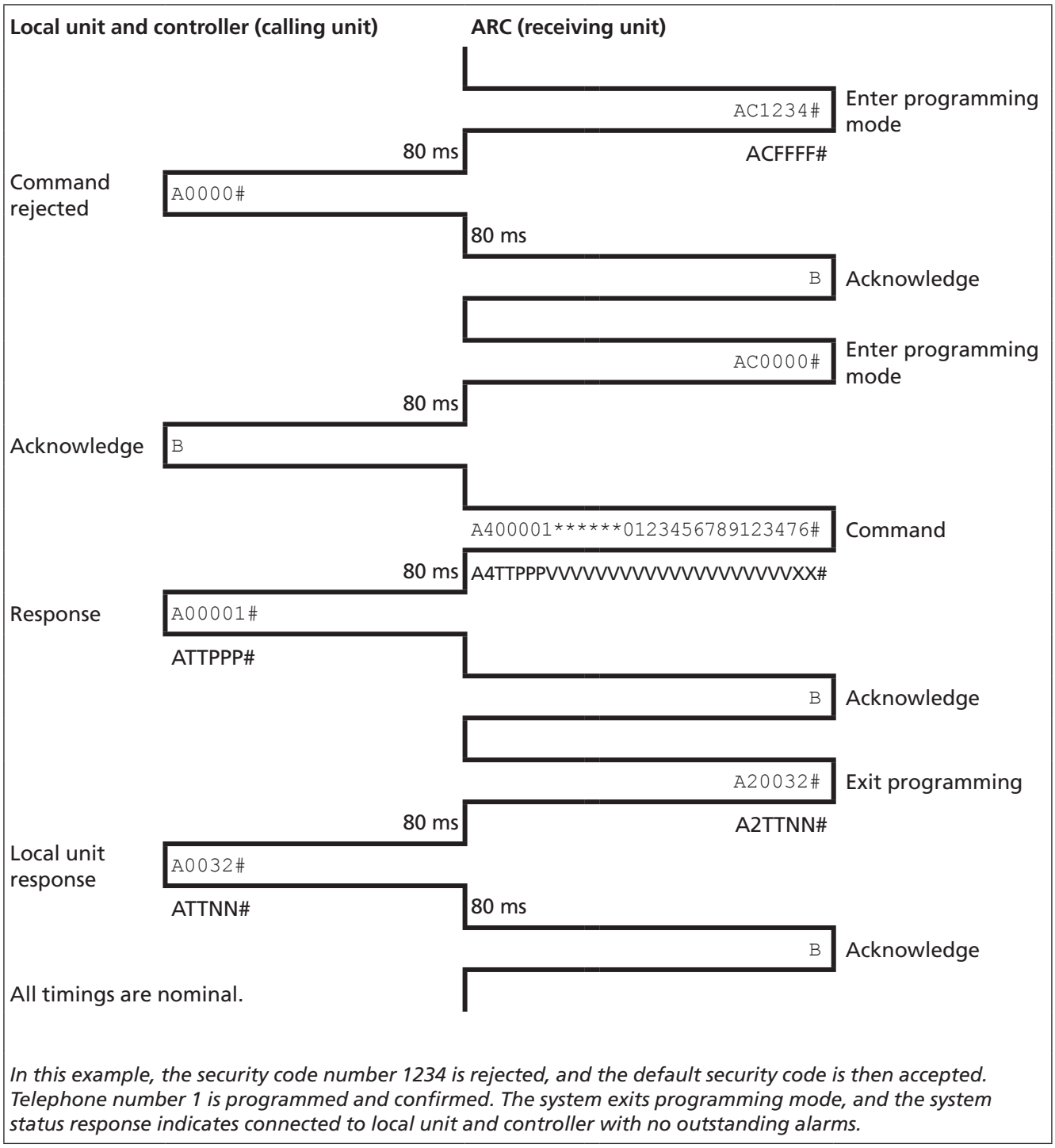
where:

TT is the system type assignment (see Table 3);

NN = 32 (see Table 10).

NOTE An example of programming is shown diagrammatically in Figure 3.

Figure 3 **Diagrammatic representation of an example of programming**



In this example, the security code number 1234 is rejected, and the default security code is then accepted. Telephone number 1 is programmed and confirmed. The system exits programming mode, and the system status response indicates connected to local unit and controller with no outstanding alarms.

7.2 Parameter programming

7.2.1 Parameters shall be programmed using the following command:

A 4 TT PPP VVVVVVVVVVVVVVVVVVVV XX #

where:

A and # are the message string start and stop delimiters;

4 is the parameter programming command (see Table 1);

TT is the system type assignment (see Table 3);

PPP is the parameter number (see Table 11);

VV…V is the parameter data, 20 digits, right-justified, with padding characters (DTMF *) to the left;

XX is the checksum (see **5.3**).

7.2.2 If all of the following conditions are met:

- the remote local unit and controller has already entered programming mode; and
- the TT system type assignment field is correct, namely 00 for equipment conforming to the standard protocol or the correct system type code where the local unit and controller utilizes a proprietary variant of the protocol; and
- the programming parameter number specified is supported, and
- the checksum is correct;

then the command shall be acknowledged with a data response string in the format:

A TT PPP #

7.2.3 If any of the conditions are not met then the local unit and controller shall respond to the command in the format:

A TT 000 #

NOTE This indicates that the parameter programming command was received correctly but cannot be complied with.

The site's data sequence shall be acknowledged in turn with an acknowledge tone (B) by the ARC.

7.3 Parameter remote enquiry

NOTE Parameter remote enquiry is only available once entry to programming mode using the correct security code has been successfully achieved.

7.3.1 Remote enquiry of parameters shall be carried out using the following command.

A 5 TT PPP #

where:

A and # are the message string start and stop delimiters;

5 is the parameter remote enquiry command (see Table 1);

TT is the system type assignment (see Table 3);

PPP is the parameter number (see Table 11).

Table 11 **Parameter programming/enquiry fields**

Parameter code (PPP)	Meaning	Notes
000	Not available	
001	Telephone number 1 (ARC)	
002	Telephone number 2 (ARC)	
003	Telephone number 3 (ARC)	
004	Telephone number 4 (ARC)	
005	Telephone number 5 (personal recipient)	
006	Telephone number 6 (personal recipient)	
007	Telephone number 7 (personal recipient)	
008	Telephone number 8 (personal recipient)	
009	Telephone dial sequence [nnnnnnnn where n is the number in the sequence; default = numbers dialled in sequence order from 1 to 8]	
010	Redial attempts [nn = 00 to 99]	Applies to all numbers equally
011	Pre-alarm condition [nn = 00 to 99 (seconds)]	
012	Unit/scheme ID no. 1	
013	Unit/scheme ID no. 2	
014	User fast dial telephone number 1	
015	User fast dial telephone number 2	
016	User fast dial telephone number 3	
017	User fast dial telephone number 4	
018	Programming mode security code [nnnn = four-digit code]	
019	Loudspeaker OFF [nn = 00] or ON [nn = 01]	
020	Default speech type setting – VOX or simplex (VOX [nn = 00]/Simplex [nn = 01])	
021	Auto answer setting: OFF [nn = 00] or ON [nn = 01]	
022	Intruder alarm entry/exit delay [nn = 00 to 99]	
023	Reassurance tone: OFF [nn = 00] or ON [nn = 01]	
024	Dial mode: DTMF [nn = 00] or LD [nn = 01]	
025	Set real time clock [n….n = YYYYMMDDHHmm]	
026	Telephone line disconnect warning: OFF [nn = 00] or ON [nn = 01]	
027	Mains power fail warning: OFF [nn = 00] or ON [nn = 01]	
028	Periodic test call: no. of days [nn = 01 to 99], Disabled [nn = 00]	
029	Away mode: OFF [nn = 00] or ON [nn = 01]	
030	System type (nn = see Table 3)	
031	Equipment-specific identifier	
032 to 899	Undefined/unallocated	Reserved to BSI [A)]
900 to 999	Undefined/unallocated	Available for proprietary use [B)]

[A)] Parameter codes that are undefined/unallocated and reserved to BSI might be defined in a future revision of this standard. Where a parameter event code is required, users of this British Standard should propose the new event description to BSI for consideration for future editions.

[B)] Parameter codes that are undefined/unallocated and available for proprietary use may be used as required, but users of this British Standard are encouraged to advise BSI of such uses in order that they can be considered for future editions.

7.3.2 If all of the following conditions are met:

- the remote local unit and controller has already entered programming mode; and
- the system type assignment field is correct, namely 00 for equipment conforming to the standard protocol or the correct system type code where the local unit and controller utilizes a proprietary variant of the protocol; and
- the programming parameter enquiry number specified is supported; and
- the information requested is available;

then the command shall be acknowledged with a data string in the format:

A TT PPP VVVVVVVVVVVVVVVVVVV XX #

where the fields are as defined in **7.2.1**.

The "acknowledge data" response shall be acknowledged in turn by the ARC only when all of the following conditions are met:

- it is correctly formatted; and
- the system type assignment field is correct, namely equal to that which was transmitted; and
- the correct parameter number is returned; and
- the checksum returned is deemed correct.

7.3.3 If the remote local unit and controller is unable to fulfil the "parameter enquiry" command, it shall respond to the command in the format:

A TT 000 #

NOTE This indicates that the "parameter enquiry" command was received and understood but cannot be complied with.

This shall be acknowledged in turn with an acknowledge tone from the ARC, if correctly received.

8 Remote access to local unit and controller (incoming calls)

8.1 ARC contact initiation with controller

NOTE 1 This subclause describes communication initiated by an ARC with a controller serving multiple local units.

To initiate contact with the remote controller, after the basic line connection has been established, the local unit and controller shall issue a data request tone. The ARC shall then respond with an identification data string in the format of an alarm string.

The message sent by the calling unit to the receiving unit shall consist of the sequence:

A CC TT HHHHHHHHHHHH EEE LL P SS XX #

where:

HHHHHHHHHHHH is the identification of the ARC (user-defined);

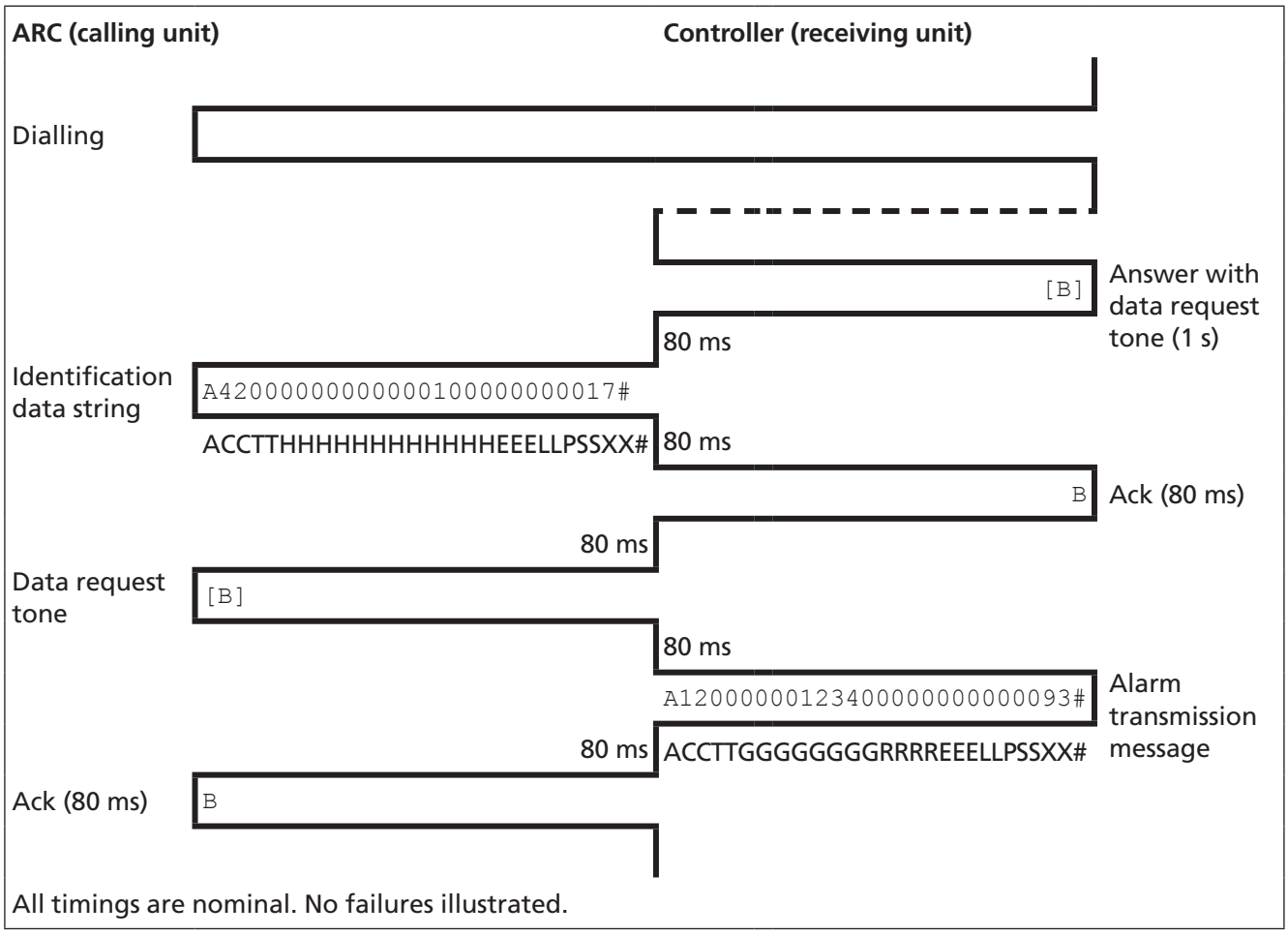
all other fields are as defined in **5.2**.

The ARC shall send a data request tone after the controller has acknowledged the alarm message sent to it. The controller shall then send its alarm message to the ARC.

NOTE 2 This exchange of identification strings confirms the nature of both pieces of equipment, the system configurations, the system type assignments and if applicable the nature of any (or the highest priority) alarm(s) that might be outstanding on the remote system at that time. In effect the double exchange of identification strings between local unit and controller and ARC transfers control of the communications link back to the ARC once both ends have established a legitimate connection.

NOTE 3 An example of ARC contact initiation with the controller is shown diagrammatically in Figure 4.

Figure 4 **ARC initiated communications sequence with controller**



8.2 ARC contact initiation with local unit and controller

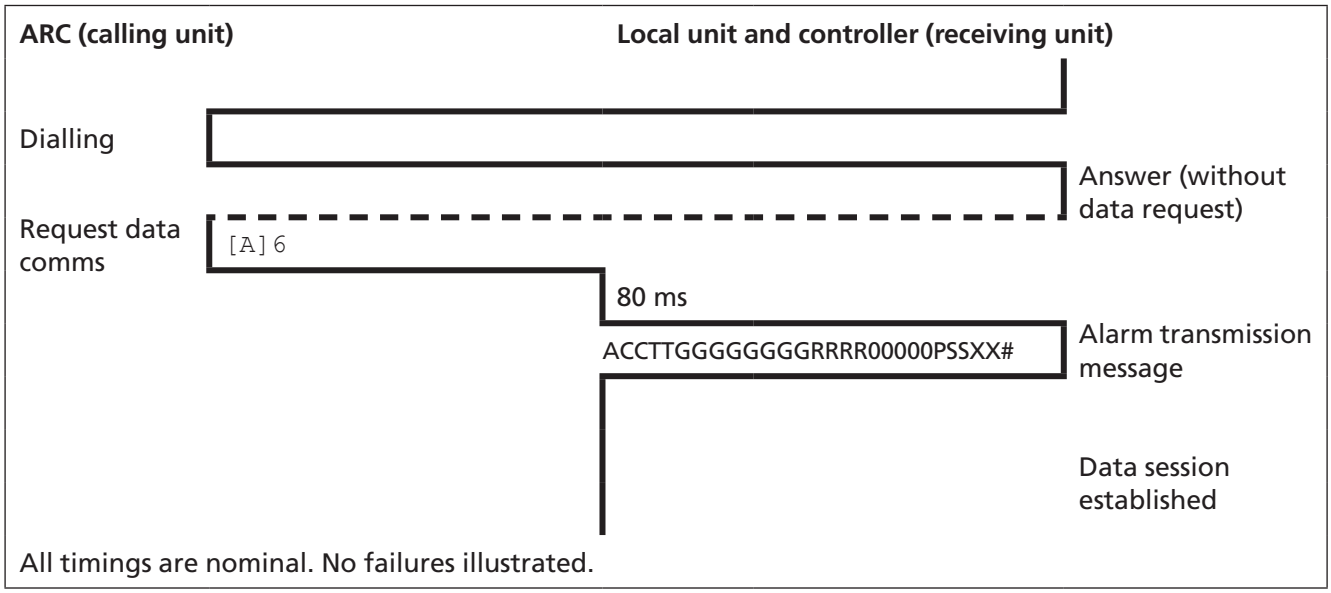
NOTE 1 This subclause describes communication initiated by an ARC with a combined local unit and controller. It is presumed that the local unit and controller will not be configured for auto-answer and that authentication will take place by voice communication using standard telephony.

To move into a data session, the ARC shall transmit the "request data communications" command ([A]6).

The local unit and controller shall respond with the alarm transmission message sequence given in **5.2**, with EEE set to 000 and LL set to 00.

NOTE 2 An example of ARC contact initiation with the local unit and controller is shown diagrammatically in Figure 5.

Figure 5 **ARC initiated communications sequence with local unit and controller**



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[1)] Available for download at www.nicc.org.uk/nicc-public/Public/interconnectstandards/info/nd1701_2006_03.pdf.

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