

ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-27

FOR

ABORT AND INTERRUPT PROCEDURES

An Extension of the Basic Mode Control Procedures
for Data Communication Systems
According to Standard ECMA-16

April 1971

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BRIEF HISTORY

Technical Committee TC9 of ECMA issued in May 1968 their Standard ECMA-16 for Basic Mode Control Procedures for Data Communication Systems using the ECMA 7 bit Coded Character Set. Further work was undertaken on procedures for abort and interrupt. A proposal by ECMA was filed in June 1970 with ISO/TC97/SC6 and approved by the various delegations.

The present Standard ECMA-27 corresponds to this proposal. It is an extension of the Basic Mode Standard ECMA-16. It defines the procedures by which a Master station or a Slave station could terminate or ask to terminate, respectively, an information Message or Block.

It has been accepted by the General Assembly of ECMA on Dec. 11, 1970.

1. SCOPE

This Standard ECMA-27 is an optional extension of Standard ECMA-16 on Basic Mode Control Procedure for Data Communication Systems.

This means that:

- i) those systems which conform to Standard ECMA-16 do not necessarily have to include the functions described in the present Standard,
- ii) systems implementing the functions described hereafter must comply with the present Standard to conform to Standard ECMA-16 on Basic Mode Control Procedures. The procedures described in this document fall into two categories, namely ABORT and INTERRUPT.

ABORT procedures are always initiated by the Master station wishing

- either to stop transmitting a block of information before its normal end (ETB or ETX) but without returning to control mode or neutral,
- or to stop transmitting at any time during the information transfer phase and then return to control or neutral status.

INTERRUPT procedures are always initiated by the Slave station which desires to stop receiving either instantaneously or within a short period of time.

2. ABORT PROCEDURES

2.1 Block Abort

2.1.1 Description

The Master station decides to terminate an Information Message or Block in an unusual way so that the Slave station rejects this Block. There is no return to control or neutral and the Master station resumes transmission to the same Slave station.

2.1.2 Procedure

When the Master station decides to abort an Information Message or Block, it terminates it immediately with ENQ. The Slave station must reply with NAK which is the only valid acknowledgement in this case. The Master station then resumes trans-

mission beginning with STX (or SOH). If the reply from the Slave station is invalid, or if there is no reply, the normal recovery procedures may apply (see Figure 1).

NOTE 1. As examples, Block abort may be used in the following cases:

- the Master station determines that invalid data has been sent, for example errors are detected at the buffer storage level, or when reading data from their media, or by the source,
- with fixed length blocks when programming or operator errors cause overflows,
- when the Master station determines that the Message being transmitted will not be accepted by the Slave station.

2.2 Station Abort

2.2.1 Description

The Master station decides, either while an Information Message is being sent or between two Blocks of an Information Message, to stop transmitting and return to control or neutral.

This procedure may follow if necessary a "Block abort" as described above in paragraph 2.1.

2.2.2 Procedure

a) While a block is being sent

When the Master station decides to abort transmission, it immediately sends the transmission control character ENQ (DLE ENQ). The Slave station detects this unusual termination with ENQ (instead of ETB or ETX) and then replies with NAK which is the only valid reply in this case. After receiving NAK, the Master station sends EOT and the communication link returns to control mode or neutral.

When there is no answer or an invalid answer, the normal recovery procedures may apply (n retries, time-out) (See Figure 2.a).

b) Between two blocks of information

The Master station terminates the block being transmitted in the usual way. The usual answer of the Slave station is ACK. The Master station then send EOT and the communication link goes

back to control mode or neutral. If the answer is NAK, if there is no answer or an invalid one, the Master station may or may not decide to use the normal recovery procedures (n retries, time-out) before transmitting EOT with the resulting return to control mode or neutral (See Fig. 2.b).

NOTE 2. In switched line applications DLE EOT may be used in place of EOT.

NOTE 3. Examples of use when it is intended to disconnect the line.

Master station abort may be used in the following cases:

- Master station detects its own malfunction, or a malfunction of the transmitting media,
- Master station detects a failure in the Slave station or in the link (persisting NAK, or invalid reply, or absence of reply) or the Master station detects that the Slave station is no longer in a position to receive (indication contained in a prefix to an acknowledgement),
- Master station is notified that the transmission media are urgently required for another purpose.

3. INTERRUPT PROCEDURES

3.1 Block Interrupt

3.1.1 Description

The Slave station, at the end of an Information Message or Block, is no longer in a position to receive and wishes the Master station to cease transmission immediately.

3.1.2 Procedure

When the Slave station recognizes to be no longer in a position to receive, it waits for the end of the current Information Message or Block and replies EOT instead of its normal reply. EOT indicates that the last received Block was not accepted and concludes the current transmission. The communication link returns to control or neutral status (see Figure 3).

NOTE 4. The transmission system, may, at any time, be in one of the following states:

- i) Control station is also Master station.
- ii) Control station is also Slave station.

- iii) Control station is neither Master nor Slave but is monitoring only the transmissions of the Master station.
- iv) Control station, being neither Master nor Slave, is monitoring all data exchange within the system.

The Block Interrupt procedure, as described in paragraph 3.1.2 above, can only be used in cases i, ii and iv. As to case iii), the control station is not aware of the EOT sent by the Slave station and there is no way to return to control or neutral status other than through recovery procedures (control station time-out, for instance).

For this reason, the use of Block Interrupt procedure is not recommended for case iii) above. In all cases Block Interrupt is not recommended for frequent utilization, its use should be reserved for emergency situations.

3.2 Station Interrupt

3.2.1 Description

Station Interrupt is the means by which a Slave station can request the Master station to stop transmitting as soon as possible.

3.2.2 Procedure

Station Interrupt is accomplished by the Slave station transmitting as appropriate control sequence (see Note 3) instead of the normal positive acknowledgement. (See Figure 4). This reply has a double meaning:

- i) It includes the acknowledgement which would have been normally sent.
- ii) It means a request from the Slave station to have the current transmission terminated at the earliest possible time (by the Master station sending EOT). However, the Master station may not stop transmitting immediately and may, for instance, continue to transmit so that its buffers are cleared and readily available for further transmissions. The point where the Master station effectively stops is system dependent.

NOTE 5. Example of use

The control station being also the Slave station may want to interrupt so as to be able to urgently poll or select another tributary station.

NOTE 6. The transmission control sequence is not defined at the present time. It should be selected from the following two possibilities:

- i) DLE sequence
- ii) Prefix ACK.

NOTE 7. Recovery procedures. The event of a station Interrupt sequence being garbled by line disturbances should be considered. Particularly, if backward supervision numbering is used, a relation of the station Interrupt sequence with supervisory sequence numbering should be established: this may lead either to use the same numbering scheme for the station Interrupt sequence as for the supervisory sequences, or to impose other rules to preserve the correct information blocks sequencing. For instance, it should not be permitted to continuously send station Interrupt after subsequent blocks.

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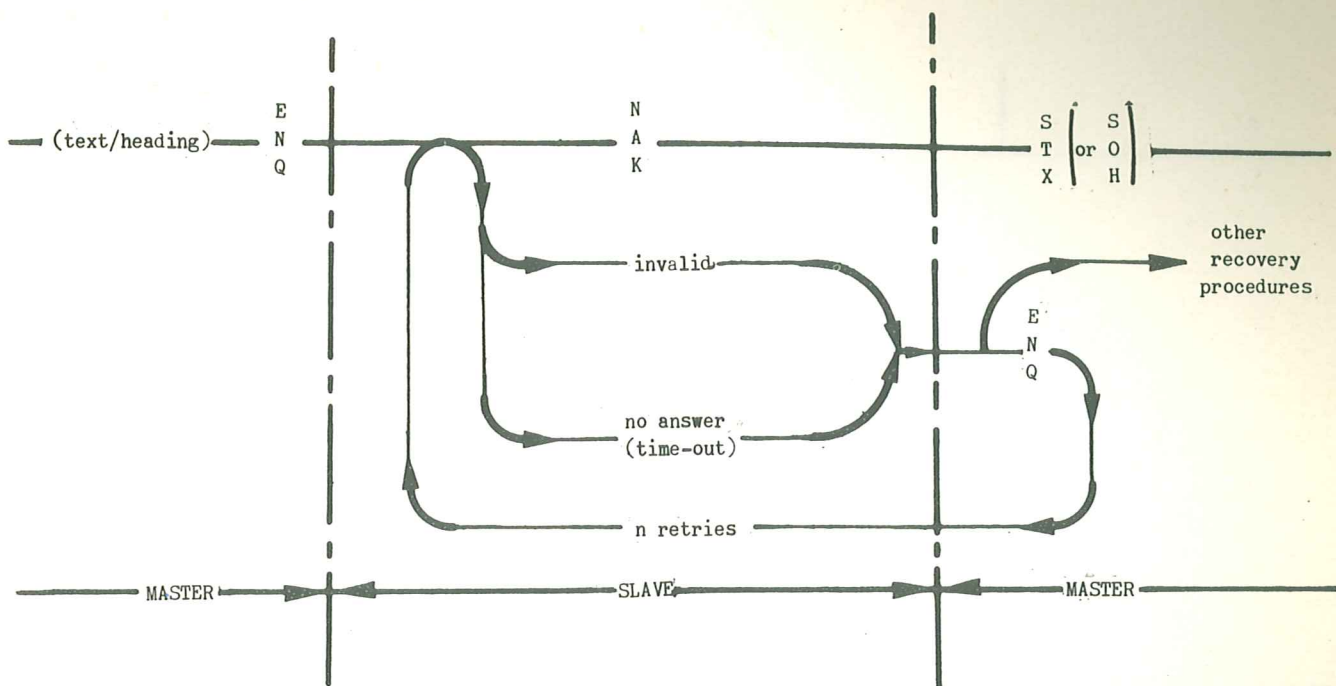


Fig. 1 Block Abort

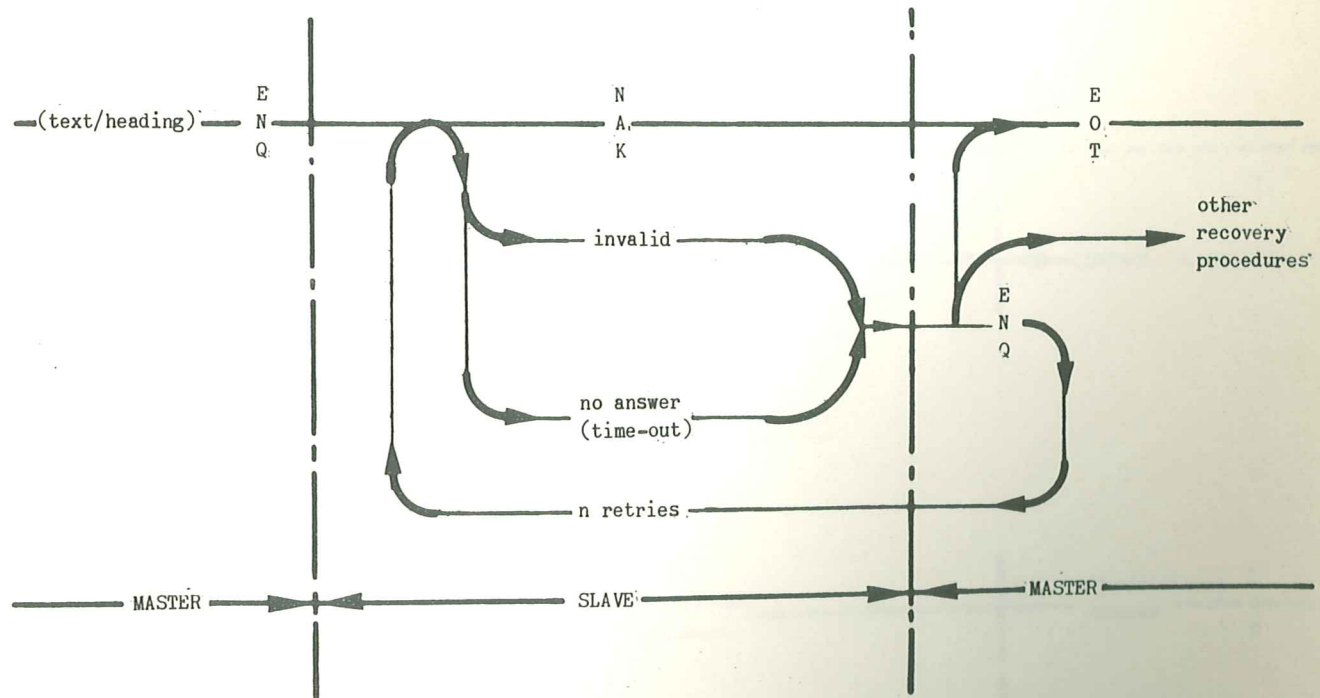


Fig. 2.a Station Abort (While a block is being sent)

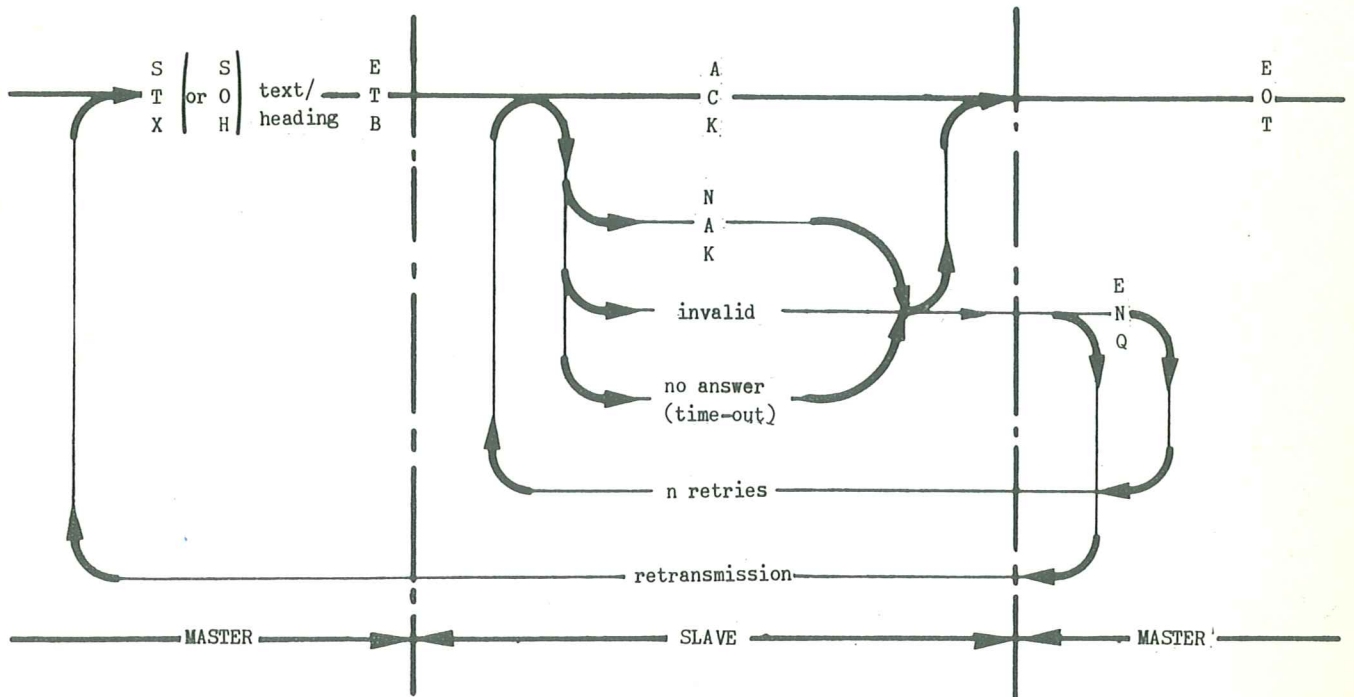


Fig. 2.b Station Abort (between two information blocks)

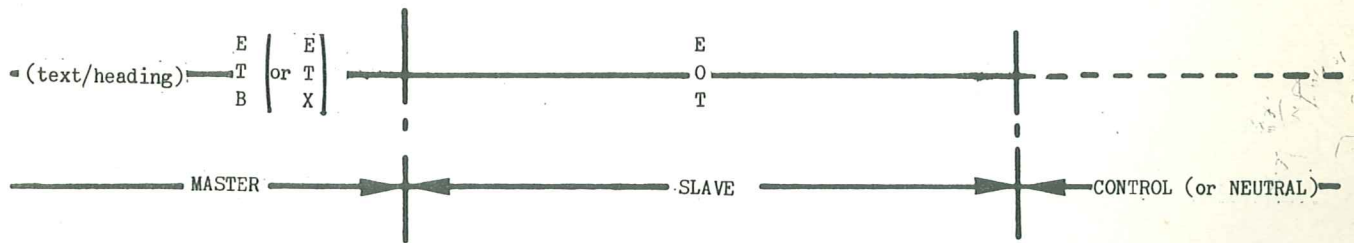


Fig. 3 Block Interrupt

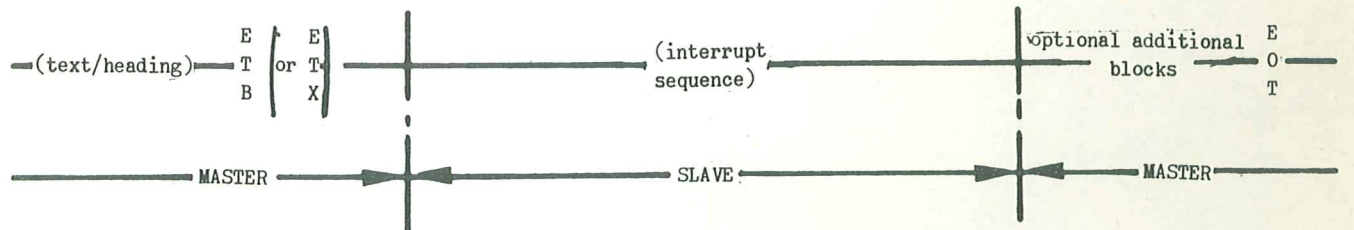


Fig. 4 Station Interrupt

