RECOMMENDATION ITU-R M.825-1

CHARACTERISTICS OF A TRANSPONDER SYSTEM USING DIGITAL SELECTIVE CALLING TECHNIQUES FOR USE WITH VESSEL TRAFFIC SERVICES AND SHIP-TO-SHIP IDENTIFICATION

(Question ITU-R 28/8)

(1992-1995)

Summary

Several Administrations have requirements for a radio transponder system for the purpose of obtaining information on ships entering and sailing within vessel traffic service (VTS) areas. In addition, there is a need for a system to provide ship-to-ship identification.

This Recommendation contains the characteristics of a system which uses digital selective-calling techniques, suitable for both applications. The Recommendation is based upon Recommendation ITU-R M.493 and introduces a new message "category" for messages related to VTSs and ship-to-ship identification. It also describes the format, composition and contents of such messages.

The ITU Radiocommunication Assembly,

considering

a) that the use of a transponder system would expedite the passing of data between a vessel traffic service (VTS) centre and ships in its service area;

b) that several administrations have been developing different systems;

c) that a transponder system should, as far as practicable, make use of existing equipment on board ships;

d) that it is desirable that one transponder system for VTS purposes should fulfil the requirements of all administrations desiring to use it;

e) that the digital selective-calling system having the technical and operational characteristics in accordance with Recommendations ITU-R M.493 and ITU-R M.541 has been recommended for use in the maritime mobile service,

recommends

1 that, where there is a need for a transponder system to be used in conjunction with a vessel traffic service, the system should be designed in accordance with the characteristic given in Annex 1;

2 that in areas where VHF Channel 70 is used for public correspondence calling, Channel 70 should not be used for vessel traffic services and ship-to-ship identification unless experience indicates that sufficient spare capacity is available.

ANNEX 1

Technical characteristics of a transponder system for use on maritime VHF channels for vessel traffic service purposes and ship-to-ship identification

1   General

1.1   The transponder system is a synchronous system using the transmission techniques detailed in the sections of Recommendation ITU-R M.493 describing the implementation of digital selective-calling in the maritime VHF environment.

1.2   In addition to the definitions for the symbols 00 to 127 as defined in Recommendation ITU-R M.493, the symbols No. 00 to 99 can also be used to represent alphanumeric data, as specified in Table 1.

TABLE 1

Symbols used to denote alphanumeric data

Symbol No.	Character	Symbol No.	Character	Symbol No.	Character
00	0	16	F	32	V
01	1	17	G	33	W
02	2	18	H	34	X
03	3	19	I	35	Y
04	4	20	J	36	Z
05	5	21	K	37	.
06	6	22	L	38	,
07	7	23	M	39	–
08	8	24	N	40	/
09	9	25	O	41	Space
10	Not used	26	P		
11	A	27	Q		
12	B	28	R		
13	C	29	S		
14	D	30	T		
15	E	31	U		

1.3   The equipment should automatically code and transmit a response to all calls received which contain the symbol No. 117 (acknowledge RQ) as the "end of sequence" character. The automatic response to calls addressed to a "VTS area" should be transmitted after a random delay distributed over the range of 0 to 20 s providing the signalling channel is clear of other traffic.

2 Technical format of a transmission sequence

2.1 The technical format of a transmission sequence is identical to that described in Recommendation ITU-R M.493. The construction of the transmission format is given in Table 2.
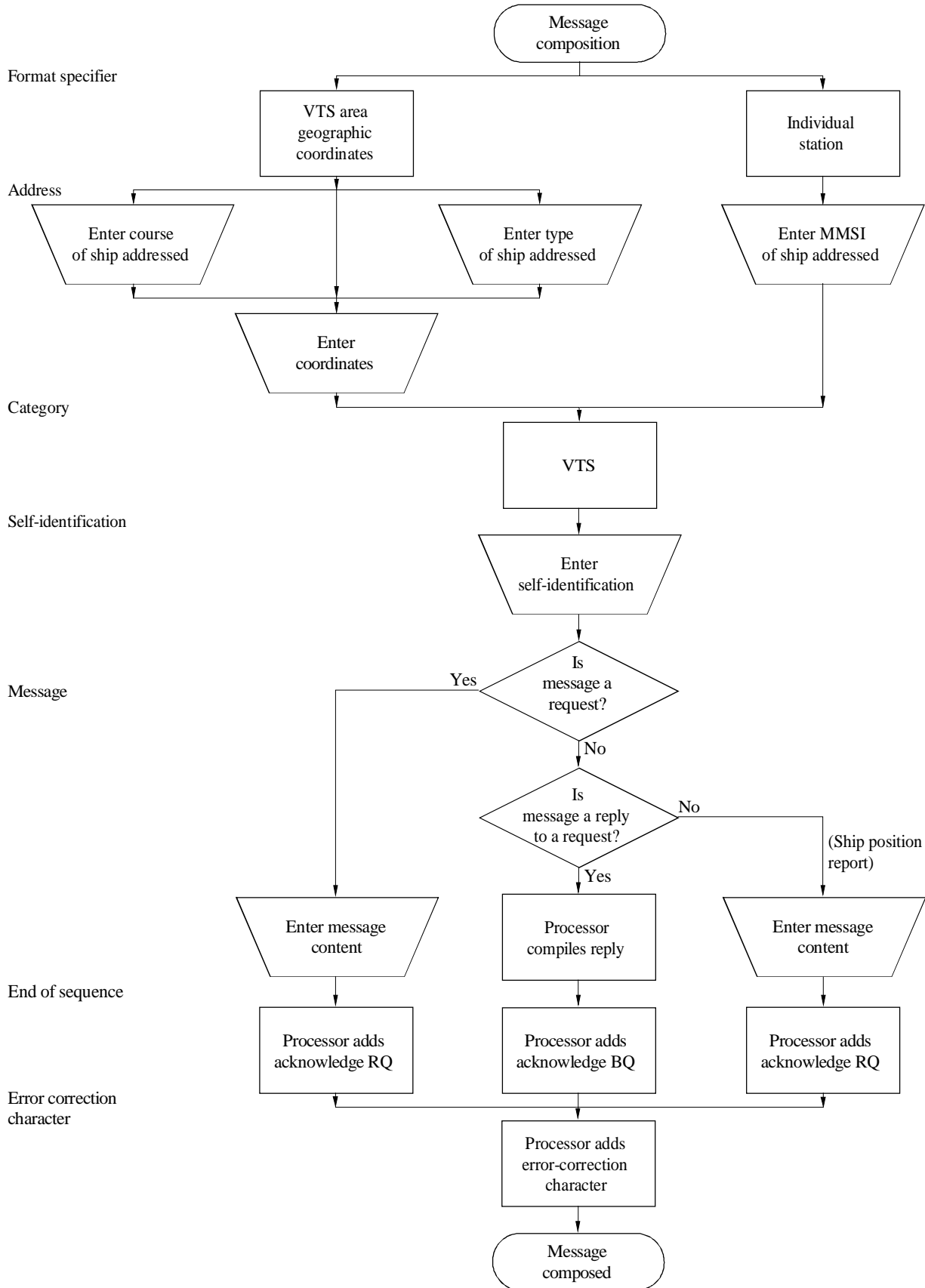
TABLE 2

Format of a transmission sequence

Dot pattern	
DX	
	RX7
DX	
	RX6
DX	
	RX5
DX	
	RX4
DX	
	RX3
DX	
	RX2
A	
	RX1
A	
	RX0
B_1	
	A
B_n	
	A
C	
	B_1
D_1	
	B_n
D_n	
	C
E_1	
	D_1
E_n	
	D_n
F	
	E_1
G	
	E_n
F	
	F
F	
	G

RX/DX : phasing sequence
A: format specifier
B_1-B_n: address
C: category
D_1-D_n: self-identification
E_1-E_n: message
F: end of sequence
G: error-check character

2.2 A flow-chart illustrating the message composition is shown in Fig. 1.

FIGURE 1

Message composition flow chart

Format specifier

Address

Category

Self-identification

Message

End of sequence

Error correction
character

Message composition

VTS area geographic coordinates

Individual station

Enter course of ship addressed

Enter type of ship addressed

Enter MMSI of ship addressed

Enter coordinates

VTS

Enter self-identification

Is message a request?

Yes

No

Is message a reply to a request?

No

Yes

(Ship position report)

Enter message content

Processor compiles reply

Enter message content

Processor adds acknowledge RQ

Processor adds acknowledge BQ

Processor adds acknowledge RQ

Processor adds error-correction character

Message composed

D01

3 Dot pattern and phasing sequence

3.1 The dot pattern and phasing sequence used are formatted as described in Recommendation ITU-R M.493 for operation in the maritime VHF service.

4 Format specifier

4.1 The format specifier signals are transmitted per definition in Recommendation ITU-R M.493. The new format specifier (symbol No. 103) is utilized for all VTS DSC operations. The format specifiers relevant to VTS DSC operation are:

4.1.1 symbol No. 103 for a selective call to a group of ships in a specified VTS area;

4.1.2 symbol No. 120 for a selective call to a particular individual station.

5 Addresses

5.1 For a selective call directed to an individual station, the maritime mobile service identity (MMSI) of the station is inserted in the address field following the methodology as described in Recommendation ITU-R M.493.

5.2 For a selective call directed to ships in a specified VTS area, a numerical geographic coordinated address consisting of 22 digits (i.e., 11 characters) is constructed. When all ships in the area are addressed, the coordinates shall follow immediately after the symbol No. 103. However, two characters indicating the course of the ships addressed or one character indicating that ships of a certain type are being addressed may optionally be inserted between the format symbol and the coordinates.

5.2.1 Ships on a certain course

When it is required to address a ship in the defined area which is steering a particular course, the two characters (four digits) to be inserted between the format symbol and the coordinates shall be constructed as follows:

– the first digit shall be the digit "4" to indicate that a course follows;

– the second, third and fourth digits shall indicate the designated true course in degrees (from 000 to 359). All leading zeros must be used to "fill" the field;

– for example, when addressing ships on a course of 040° true, the two characters inserted between the format specifier and the geographical address would be "40" and "40". If the course was 205° true, the two characters would be "42" and "05";

– shipborne equipment should be considered "addressed" when the ship's heading differs by 2° or less from the course given in the DSC call.

5.2.2 Ships of a certain type

When it is required to address all ships of a certain type in the defined area, the single character (two digits) to be inserted between the format symbol and the geographic coordinates shall be the appropriate symbol derived from Table 3. The first digit shall be either "5", "6", "7", "8" or "9" as defined in the table.

TABLE 3

**Symbols to indicate the type of ship and for the address
of calls to groups of ships in VTS areas**

Symbols to be used by ships to report their type and in the ADDRESS of calls directed to a group of ships in a VTS area	
Symbol No.	Special craft
50	Pilot boats
51	Search and rescue vessels
52	Tugs
53	Port tenders
54	Vessels with anti-pollution facilities or equipment
55	Law enforcement vessels
56	*spare – for assignment to local vessels*
57	*spare – for assignment to local vessels*
58	Medical transports (as defined in 1949 Geneva Conventions and additional Protocols)
59	*spare – for assignment to other special vessels*

Other ships	
First digit	Second digit
6 – Passenger ship(s)	0 – All ships of this type
7 – Cargo ship(s)	1 – Carrying DG, HS or MP IMO hazard or pollutant category A
8 – Tanker(s)	2 – Carrying DG, HS or MP IMO hazard or pollutant category B
9 – Other types of ships	3 – Carrying DG, HS or MP IMO hazard or pollutant category C
	4 – Carrying DG, HS or MP IMO hazard or pollutant category D
	5 – Not under command
	6 – Restricted by her ability to manœuvre
	7 – Constrained by her draught
	8 – *Spare*
	9 – No additional information

DG: dangerous goods
HS: harmful substances
MP: marine pollutants

NOTE 1 – The symbol should be constructed by selecting the appropriate first and second digits. For example, a message addressed to "all tankers" would use symbol No. 80 while an identification report from a passenger ship containing no additional information would use symbol No. 69.

For example, calls addressed to all pilot boats in a geographical area would insert the character "50" between the format specifier and geographical address. Calls addressed to all tanker type ships constrained by draught would use the character "87".

5.2.3 **The numerical geographic coordinate address**

The numerical geographic coordinate address shall be constructed as follows:

– the designated geographical area will be a rectangle in Mercator projection;

– the upper left hand (i.e., North-West) corner of the rectangle is the reference point for the area;

5.2.3.1 the first digit indicates the azimuth sector in which the reference point is located, as follows:

– quadrant NE is indicated by the digit "0";

– quadrant NW is indicated by the digit "1";

– quadrant SE is indicated by the digit "2";

– quadrant SW is indicated by the digit "3";

5.2.3.2 the second to the seventh digits indicate the latitude of the reference point in tens and units of degrees and tens, units, tenths and hundredths of minutes;

5.2.3.3 the eighth to the fourteenth digits indicate the longitude of the reference point in hundreds, tens and units of degrees and tens, units, tenths and hundredths of minutes;

5.2.3.4 the fifteenth to the eighteenth digits indicate the vertical (i.e., North to South) side of the rectangle in tens, units, tenths and hundredths of minutes;

5.2.3.5 the nineteenth to the twenty second digits indicate the horizontal (i.e. West to East) side of the rectangle in tens, units, tenths and hundredths of minutes;

5.2.4 for example, the characters necessary to compose the geographical address defining an area with a reference point of 27° 40.30′ N and 082° 57.80′ W, a vertical side of 06.00′ and a horizontal side of 17.0′ would be:

"12" "74" "03" "00" "82" "57" "80" "06" "00" "17" "00".

6 Category

6.1 The category information indicates a safety call related to VTS operation. Symbol No. 103 is used to indicate this purpose. This category definition is an addition to Recommendation ITU-R M.493.

7 Self-identification

7.1 The maritime mobile service identity (MMSI) assigned to the calling station, coded as indicated in Recommendation ITU-R M.493, is used for self-identification.

8 Messages

8.1 The message included in a transmission sequence will comprise one or more, up to a maximum of 4, of the symbols given in Table 4. Certain symbols from Table 4 are followed by an appropriate symbol or symbols, from 00 to 99, constructed as follows.

TABLE 4

Symbols for message contents of VTS DSC calls

Symbol No.	Message
100	My position is .... at time.... (followed by twelve or thirteen symbols)
101	Switch to VHC channel .... for subsequent VTS DSC communications (followed by one symbol)
102	Report your position now and at intervals of ... minutes (followed by one symbol)
103	Report your position
104	Spare
105	Ship is leaving berth or anchorage or entering the VTS
106	Report next port of call
107	Ship is berthing, anchoring or leaving the VTS
108	Report length of ship
109	Report course of ship
110	Message acknowledged
111	Report ship's name/identification
112	Acknowledge message
113	Report your destination information (followed by one symbol)
114	My destination information is .... (followed by two to thirteen symbols)
115	Ship's name/identification is .... (followed by several symbols)
116	Report speed of ship
117	*Not to be used*
118	Report draught of ship
119	Course of ship is .... degrees (followed by two symbols)
120	Speed of ship is .... knots (followed by two symbols)
121	Next port of call is .... followed by two symbols
122	*Not to be used*
123	Draught of ship is .... metres and decimetres (followed by two symbols)
124	Length of ship is .... metres (followed by two symbols)
125	*Not to be used*
126	No information
127	*Not to be used*

8.1.1   symbol No. 100 should be followed by twelve or thirteen symbols as follows:

8.1.1.1   the first digit indicates the azimuth sector in which the position is located, as follows:

–   quadrant NE is indicated by the digit "0";

–   quadrant NW is indicated by the digit "1";

–   quadrant SE is indicated by the digit "2";

–   quadrant SW is indicated by the digit "3";

8.1.1.2   the second to the ninth digits indicate the latitude of the ship in tens and units of degrees and tens, units, tenths, hundredths, thousandths and ten thousandths of minutes;

8.1.1.3   the tenth to the eighteenth digits indicate the longitude of the ship in hundreds, tens and units of degrees and tens, units, tenths, hundredths, thousandths and ten thousandths of minutes;

8.1.1.4   the nineteenth to the twenty fourth digits indicate the time at which the position was determined in hours, minutes and seconds (UTC), using the 24 h notation;

8.1.1.5   the optional twenty fifth and twenty sixth digits indicate the type of ship and certain additional information derived from Table 3;

8.1.2   symbol No. 101 should be followed by one symbol indicating the VHF channel number on which all subsequent VTS DSC communications will take place. For example, to instruct a station to use VHF channel 66 for all future VTS communication, the character "66" would follow symbol No. 101;

8.1.3   symbol No. 102 should be followed by one symbol indicating the number of minutes between reports by the ship. The symbol No. 00 when transmitted as the number of minutes between reports is used to indicate that no further position reports should be sent at pre-set intervals of time. Automatic reporting of position shall cease if either the message symbol No. 102 followed by symbol No. 00 is received or 5 consecutive automatic reports of position were not acknowledged by the originator of the request;

8.1.4   symbol No. 113 should be followed by a single data symbol indicating the type of destination information to return to the VTS centre. If the data symbol is a "00", then the current destination information should be reported. If the data symbol is a "01", then the next destination waypoint information should be reported to the calling station;

8.1.5   symbol No. 114 is followed by two to thirteen symbols, depending upon the destination waypoint information available to report. Desired destination information consists of the destination reported (current or next), the coordinates of the destination, the estimated time of arrival and a numeric designator indicating the position in the transited route. The first symbol following the command is the destination type. This value repeats the "00" or "01" sent in the request for information (refer to § 8.1.4). Latitude and longitude destination position data immediately follow the command symbol. The transmitted data consist of nine symbols formatted as described in § 8.1.1.1 to 8.1.1.3. If no position data are available, then no other data are considered available and the single "126" symbol is transmitted in response to the information inquiry with no other data. The route position indicator follows and is a single symbol, 00-99. A "126" should be transmitted if no data are available for this field. The estimated time of arrival completes the data and consists of two symbols indicating the elapsed time in hours and minutes necessary to reach the destination considering the current situation. Maximum reportable time is 99 h, 59 min. If this datum is not available, two No. 126 symbols are transmitted as the time data;

8.1.6   symbol No. 115 should be followed by symbols from Table 1 which spell the name/identification of the ship. The field shall not exceed twenty total symbols. For example, to transmit the name "sea escape" to the VTS centre, the characters following symbol No. 115 would be:

<div align="center">"29" "15" "11" "41" "15" "29" "13" "11" "26" "15";</div>

8.1.7   symbol No. 119 should be followed by two symbols indicating the true course of the ship. "0" digits should be added before the course when necessary to complete the two symbols. For example, to report a course of 275° true, the two characters "02" and "75" would follow symbol No. 119;

8.1.8   symbol No. 120 should be followed by two symbols (four digits) indicating the speed in knots. The speed is reported in hundred, tens, units and tenths of units with any position where no data is available filled with a zero. For example, to report a speed of 12.2 knots, the characters "01" and "22" would follow symbol No. 120;

8.1.9   symbol No. 121 should be followed by symbols from Table 1 which spell out the name or the next port of call of the ship. The field shall not exceed twenty total symbols;

8.1.10   symbol No. 123 should be followed by two symbols indicating the actual draught of the ship in metres and decimetres. The first symbol indicating hundreds and tens of metres, the second symbol units of metres and decimetres. For example, to report a ship's draught of 6.4 m, the two characters "00" and "64" would follow symbol No. 123;

8.1.11   symbol No. 124 should be followed by two symbols indicating the length of the ship in metres. Where necessary, "0" digits should be added before the length of the ship to complete the two symbols. For example, to report a ship's length of 264 m, the characters "02" and "64" would follow symbol No. 124 in the transmission sequence;

8.1.12   in all instances where, in response to a request for information, there is no information available the appropriate message symbol should be followed by the single symbol No. 126 (no information).

9   End of sequence

9.1   The end of sequence signal is transmitted three times in the DX and once in the RX position as described in Recommendation ITU-R M.493. For VTS operation, the following two symbols from Recommendation ITU-R M.493 are used:

–   symbol No. 117 is used for transmission sequences requiring an automatic response (acknowledge RQ);

–   symbol No. 122 is used to answer a transmission sequence requiring an automatic response (acknowledgement BQ).

10   Error-check character

10.1   The error-check character is the final character transmitted and serves to check the entire sequence for the presence of errors which went undetected by the ten-unit error detecting code and time diversity employed. The checksum is calculated and included in the transmission sequence as specified in Recommendation ITU-R M.493.

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