

# T8.5.0 SS076 Test Plan

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for testing the STM ATB

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# Contents

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- 1 Preface ..... 4
  - 1.1 References ..... 4
- 2 Analysis of ERA subset 035 v3.2.0 ..... 5
- 3 Relevant ERA subset 076-3 v3.2.0 tests ..... 6
- 4 Test definitions ..... 9
- 5 Traceability .....10
- 6 Annex A - JRU-0 packet contents .....19
  - 6.1.1 Type '0' JRU packet .....19

# 1 Preface

**Text, STMA-62775** - This document describes an integration test plan for STM ATB. The aim is to integrate and test the STM ATB with a simulated ETCS environment at an independent test facility. Specific tests are selected from the subset 076 test suite and enhanced to include STM interactions. Chapter 2 provides an analysis of subset 035 v3.2.0 (Specific Transmission Module FFFIS), which has been used to provide system requirements for the development of the STM ATB. Chapter 3 lists which subset 076 test cases are regarded as relevant for STM ATB. Chapter 4 suggests tests to be executed at the independent test facility, focusing on STM and on National (ATB) behaviour. Chapter 5 lists traceability information.



## 1.1 References

### **Text, STMA-14296 - Reference documents**



All the documents references used in this document can be found in the document  [P6.1](#)

[Bibliography](#) available in the Polarion folder  [Processes](#)

### **Abbreviations, definitions and terminology**

An overview of the abbreviations, definitions and terminology used in this document can be found in document  [P6.2 List of abbreviations, definitions and terms](#) available in the Polarion folder  [Processes](#)

### **Requirement identification**

The STM ATB project makes use of an automated requirement management system. In this system each requirement has been identified as a work item. Each work item has been automatically assigned with a unique ID, with the format "STMA-<number>". As a result requirement ID's are not in logical order. An overview of all the used STMA-numbers is given in document  [P6.3 Requirement Overview](#) available in the Polarion folder  [Processes](#)

2 Analysis of ERA subset 035 v3.2.0

**Text, STMA-72792** - Table **T** **STMA-53099** lists a detailed analysis of the clauses in ERA subset 035. For each clause, it is indicated whether an independent test is relevant. When applicable, the corresponding STM ATB requirement is listed - indicating that the clause is used as an input requirement for the STM ATB development. This also implies that the requirement has been tested in detail, according to the **T8.2.0 STM Integration Test Plan**, by the INT/TST team of the STM ATB project. Some notes for independent testing have been added for each clause.

**Text, STMA-53099** - Table: analysis of clauses in ERA subset 035:  
In the attached file it is shown which of the clauses from subset 035 that are relevant to the STM ATBEG are testable with the test setup described in the test plan.

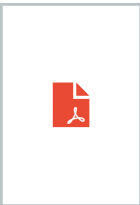


Table 1 Analysis of subset 035 clauses to be tested

### 3 Relevant ERA subset 076-3 v3.2.0 tests

**Text, STMA-53106** - Table **T STMA-53102** lists subset 076-3 tests that already include transitions from various ETCS Levels and ETCS Modes to and from Level NTC (National Train Control) / SN (System National) mode, which is the 'Responsible' state of the STM ATB. These test cases are suitable candidates to add STM interactions.

**Text, STMA-53102** - Subset 076-3 test cases:

Test case	From Level	From Mode	To Level	To Mode
Subset-076-6-3_3060600_02_LNTC_v320	1	SR	NTC	SN
Subset-076-6-3_4060300_07_LNTC_v320	NTC	SN	1	SH
Subset-076-6-3_4080300_11_LNTC_v320	NTC	SB->SN	NTC	SN
Subset-076-6-3_4080300_12_LNTC_v320	N/A	SB	NTC	SB->SN
Subset-076-6-3_4080403_02_LNTC_v320	1	SR	NTC	SN
Subset-076-6-3_4080410_03_LNTC_v320	1	SR	NTC	SN
Subset-076-6-3_4080414_02_LNTC_v320	1	SR	NTC	SN
Subset-076-6-3_4080415_02_LNTC_v320	1	SR	NTC	SN
Subset-076-6-3_4080419_02_LNTC_v320	1	FS	NTC	SN
Subset-076-6-3_4080440_03_LNTC_v320	1	SR	NTC	SN
Subset-076-6-3_5040500_04_LNTC_v320	0	SB	NTC	SB->SN
Subset-076-6-3_5080300_02_LNTC_v320	1	SR	NTC	SR->SN
Subset-076-6-3_5080300_04_LNTC_v320	1	SR	NTC	SN
Subset-076-6-3_5100100_01_LNTC_v320	N/A	SB	NTC	SB->SN
Subset-076-6-3_5100100_03_L3_LNTC_v320	3	FS	NTC	SN
Subset-076-6-3_5100200_04_LNTC_v320	1	FS	NTC	SN
Subset-076-6-3_5100400_02_LNTC_v320	0	UN	NTC	SN
Subset-076-6-3_5100400_03_LNTC_L3_v320	N/A	SB	NTC	SB->SN
Subset-076-6-3_5100400_04_LNTC_v320	0	UN	NTC	SN
Subset-076-6-3_5100400_05_LNTC_v320	N/A	SB	NTC	SB->SN

**Text, STMA-20413 - table;** Packets to be received in messages

Packet	Node	Content
1	all	establish connection, version check
2	STM Controller	node addresses + safety levels
5	STM Controller	current ETCS mode and level.
7	STM Controller	Override status
14	STM Controller	order to change STM state
31	STM Controller	active DMI channel (ActiveDMI)
45	STM Controller	nat.data: new code speeds + validity distance. (not used)
175	STM Controller	V_max, int train cat (R.P.G)
176	STM Controller	brake delay time, traction cut of time, braking%, brake type (pass in P, fr(eight) in P, fr in G
177	STM Controller	M_adhesion, date, time
178	STM Controller	not used, but the reception has to be logged
180	STM Controller	End of specific DE
182	STM Controller	request to sent data for "data view".
184	STM Controller	M-DATAENTRYFLAG = 0: STOP DE/1: START DE
8	Odometer	V_MIN, V_EST, V_MAX, timestamp
9	Odometer	odometer cycle and production times
22	STM Controller	test permission
34	DMI	push or release event for 1 to 5 buttons
40	DMI	ack of text message
139	TIU	direction controller, cab status, traction status
136	BIU	EB availability
143	BIU	delay between sending a brake command at the profibus till the brake is commanded

**Text, STMA-35116 - Note:** STM-20, STM-30, STM-47, and STM-141, are not used by STM ATB.

**Text, STMA-8712 - Messages which may be sent by the STM ATB**

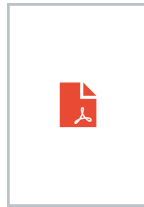
<b>Pac ket</b>	<b>Node</b>	<b>Content</b>
1	all	establish connection, version check
15	all	STM state
13	STM Controller	CO, DE, or CS state request
16	STM Controller	STM max speed (for transition to ATB)
18	STM Controller	trip mode
23	STM Controller	Reply on test permission (STM ATB: no test)
38	DMI	Text message
39	DMI	Delete text message
179	STM Controller	N_ITER = 0; "end of data entry"
181	STM Controller	sent with Q_DATAENTRY = 0
183	STM Controller	N_ITER = 0; "no specific data values"
32	DMI	display buttons
35	DMI	cab signals, witte lamp, ATB state ind
46	DMI	sound commands
128	BIU	EB command
130	TIU	Traction cut off
161	JRU	JRU logging
77	DRU	DRU logging ( <i>packet defined in baseline 2</i> )

**Text, STMA-35117** - Note: STM-6, STM-17, STM-21, STM-43 and STM-129, are not used by STM ATB.




































## 4 Test definitions

**Text, STMA-73153** - This document has been created as the test plan concerning the Subset 076 tests, as described by the ERA. The subset 076 tests have been outsourced to the accredited test lab Multitel. Because the subset 076 tests are not created for the purpose of testing an STM, Multitel has adapted the standard subset 076 tests to show the interaction of the STM with an EVC when making transitions to and from ETCS/ NTC. The following document has been created by Multitel as the testplan for these tests. This plan has been defined as a test Definition and linked to the relevant requirements to be tested from the subset 035 as shown in **T STMA-53099**.



**Test Definition, STMA-73155** - Test plan for subset 076 tests.

5 Traceability




Requirement	Test Definitions
 STMA-4237	 STMA-73155
 STMA-4238	 STMA-73155
 STMA-4239	 STMA-73155
 STMA-4240	 STMA-73155
 STMA-4243	
 STMA-4246	 STMA-73155
 STMA-4251	 STMA-73155
 STMA-4253	 STMA-73155
 STMA-15646	
 STMA-4268	
 STMA-4269	
 STMA-4270	
 STMA-4271	
 STMA-4272	
 STMA-4273	
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 STMA-4281	
 STMA-4283	
 STMA-4286	
 STMA-4289	 STMA-73155

 STMA-63573	 STMA-73155
 STMA-4292	 STMA-73155
 STMA-4293	
 STMA-4296	
 STMA-4297	
 STMA-4300	
 STMA-4301	
 STMA-4304	 STMA-73155
 STMA-4307	
 STMA-4308	 STMA-73155
 STMA-4310	 STMA-73155
 STMA-4312	 STMA-73155
 STMA-4313	 STMA-73155
 STMA-4315	
 STMA-4316	
 STMA-4317	
 STMA-4318	
 STMA-4319	
 STMA-4322	 STMA-73155
 STMA-4323	
 STMA-4325	 STMA-73155
 STMA-4327	
 STMA-4328	
 STMA-4336	 STMA-73155
 STMA-4337	 STMA-73155
 STMA-4339	 STMA-73155

 STMA-4340	 STMA-73155
 STMA-4341	 STMA-73155
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 STMA-4359	 STMA-73155
 STMA-4360	 STMA-73155
 STMA-4361	 STMA-73155
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 STMA-4630	
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 STMA-4633	
 STMA-4638	 STMA-73155
 STMA-4639	
 STMA-4640	 STMA-73155
 STMA-4641	 STMA-73155
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 STMA-4674	 STMA-73155
 STMA-4675	 STMA-73155
 STMA-4679	
 STMA-4680	
 STMA-4681	
 STMA-4682	
 STMA-4684	
 STMA-4685	
 STMA-4686	
 STMA-4687	
 STMA-4694	
 STMA-4695	 STMA-73155
 STMA-4698	
 STMA-4701	
 STMA-4702	
 STMA-4703	
 STMA-4704	

## 6 Annex A - JRU-0 packet contents

### 6.1.1 Type '0' JRU packet

**Text, STMA-59039** - Table: M\_DATA(k) part of the Type '0' JRU packet. NID\_PACKET=161, N\_LITER=37.

Byte index	Variable	Description	Unit	Size in bytes
0	TYPE	Type '0' packet	0	1
1	YEAR	Year since 2000	0-99	1
2	MONTH	Month	1-12	1
3	DAY	Day	1-31	1
4	HOUR	Hour	0-23	1
5	MINUTES	Minutes	0-59	1
6	SECONDS	Seconds	0-59	1
7	FILLER	Filler to align 32 following bits values	0	1
8	DATE_AND_TIME	Timestamp	ms	4 (uint32)
12	LOCAL_REFERENCE_TIME	Local reference time	ms	4 (uint32)
16	D_STS	Distance to signal-at-danger	m	4
20	DRIVER_OPERATES_BRAKES	Driver acts adequately	0 / 1=true	1
21	DIGITAL_INPUTS	Six digital input value bits	0-63	1
22	GUARDED_SPEEDS	Six VcodeX values	km/h	6
28	SELECTED_CABIN	Active cabin selected by ETCS	enum	1
29	MOVING_DIRECTION	Moving direction of the train	enum	1
30	STM_STATE	The state of the STM state machine	enum	1
31	STMATB_STATE	The state of the STMATB state machine	enum	1
32	ATBEG_STATE	The state of the STM EG state machine	enum	1
33	ATBVV_STATE	The state of the STM Vv state machine	enum	1

34	ATBEG_CODE	The last received ATB EG CodeX	enum	1
35	ATBVV_SIGNAL	The last received ATB Vv Signal	enum	1
36	EB_COMMAND	Status of the EB command	0 / 1=true	1

Text, STMA-59036 - Table: DIGITAL\_INPUTS reported in Type '0' JRU packet

Bit	Input	Signal	0	1
0	Input 1A (DIN1)	Brake Handle Applied (non-inverted)	false	true
1	Input 2A (DIN2)	Brakes Sufficiently Operated (non-inverted)	false	true
2	Input 3A (DIN3)	Spare (non-inverted)	false	true
3	Input 1B (DIN4)	Brake Handle Applied (inverted)	true	false
4	Input 2B (DIN5)	Brakes Sufficiently Operated (inverted)	true	false
5	Input 3B (DIN6)	Spare (inverted)	true	false
6	Reserved			
7	Reserved			

Text, STMA-59037 - Table: SELECTED\_CABIN reported in Type '0' JRU packet

Value	Meaning
0x00	Cabin A
0x15	Cabin B
0x2A	No cabin active
0x3F	Unknown

Text, STMA-59034 - Table: MOVING\_DIRECTION reported in Type '0' JRU packet

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Value	Meaning
0x00	No movement
0x15	Forward (relative to selected cabin)
0x2A	Reverse (relative to selected cabin)
0x3F	Unknown

**Text, STMA-59035** - Table: STM\_STATE reported in Type '0' JRU packet

Value	ETCS state	Internal state
0xBB	PO	PO
0xCC		PO connected
0x11		CO requested from PO
0x00	CO	CO
0x33		CS requested from CO
0x22	CS	CS
0xAA	HS	HS
0x44	DA	DA
0x55		DA trip
0x66		DA trip and conditional CS requested
0x77	FA	FA
0x88		FA end
0x99		FA post
0xDD		Unknown

**Text, STMA-59041** - Table: STMATB\_STATE reported in Type '0' JRU packet

Value	STM ATB state	Description
0x00	Inactive	The ATB function is disabled.

0x15	Preparing	The ATB function is processing measured national lineside information, but it is not informing the Driver on the DMI and it is not commanding the EB on the BIU.
0x2A	Responsible	The ATB EG function is supervising the train speed and the ATB Vv function is supervising the distance to a signal-at-danger.
0x3F	Unknown	Internal error.

**Text, STMA-59040** - Table: ATBEG\_STATE reported in Type '0' JRU packet

Value	ATBEG state	Description
0x00	Attention	Attention button (ID=12) has been pressed. It is expected that the train will enter an ATB EG area.
0x24	Intervention	The EB is being commanded by ATB EG. After the train has come to a full stop, the Driver shall have to use the Release button (ID=11) to reset the national trip procedure.
0x49	Braking	The Driver must apply the service brakes, because the CodeX has just changed to a more restrictive code and the train speed is now higher than VcodeX.
0x6D	No ATBEG area	ATB EG is responsible, but the train is in an area where there is no ATB EG infrastructure available. The Driver has disabled the ATB EG function by pressing the BD button (ID=13).  <i>Note: this situation no longer exists in The Netherlands, but the law still requires this function.</i>
0x92	Constant	The VcodeX is constant. It is being guarded by the ATB EG function.
0xB6	Off	The ATB EG function is not active.
0xDB	Entering ATBEG area	The train is entering the ATB EG area. The Driver must acknowledge this by pressing the Attention button.
0xFF	Unknown	Internal error.

**Text, STMA-59044** - Table: ATBVV\_STATE state reported in Type '0' JRU packet

Value	ATBVv state	Description
0x00	Brake Curve Monitoring	The ATB Vv function knows the distance to the next signal-at-danger and it is actively monitoring the braking curve.
0x24	Overridden	The Driver has activate the override procedure. The train can pass a signal-at-danger.
0x49	Intervention before SAD	The ATB Vv function has tripped before the signal-at-danger has been passed.
0x6D	Intervention after SAD	The ATB Vv function has tripped after the signal-at-danger has been passed.
0x92	Monitoring	The ATB Vv function is hunting for lineside signals indicating the distance to the next signal-at-danger.
0xB6	Wait for monitoring	Monitoring will start again after a specific distance has been travelled.
0xDB	Off	The ATB Vv function is not active.
0xFF	Unknown	Internal error.

**Text, STMA-59045** - Table: ATBEG\_CODE reported in Type '0' JRU packet

Value	CodeX	Description
0x00	noCode	40 km/h
0x11	Reserved	
0x22	220	60 km/h
0x33	180	80 km/h
0x44	147	80 km/h (not used in practise)
0x55	120	130 km/h
0x66	96	140 km/h
0x77	75	Leaving ATB EG area
0x88	Reserved	
0x99	Unknown	Internal error.

**Text, STMA-59042** - Table: ATBVV\_SIGAL reported in Type '0' JRU packet

Value	Signal	Description
0x00	Unknown	Internal error.
0x24	30 m	The train passes a beacon at 30 m before a signal-at-danger.
0x49	None	No beacon detected.
0x6D	120 m	The train passes a beacon at 120 m before a signal-at-danger.
0x92	Release	The signal is no longer at danger.
0xDB	3 m	The train passes a beacon at 3 m before a signal-at-danger.