D4.1 Interface Requirements Specification (IRS)

for the development of an STM ATB

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CONTENT

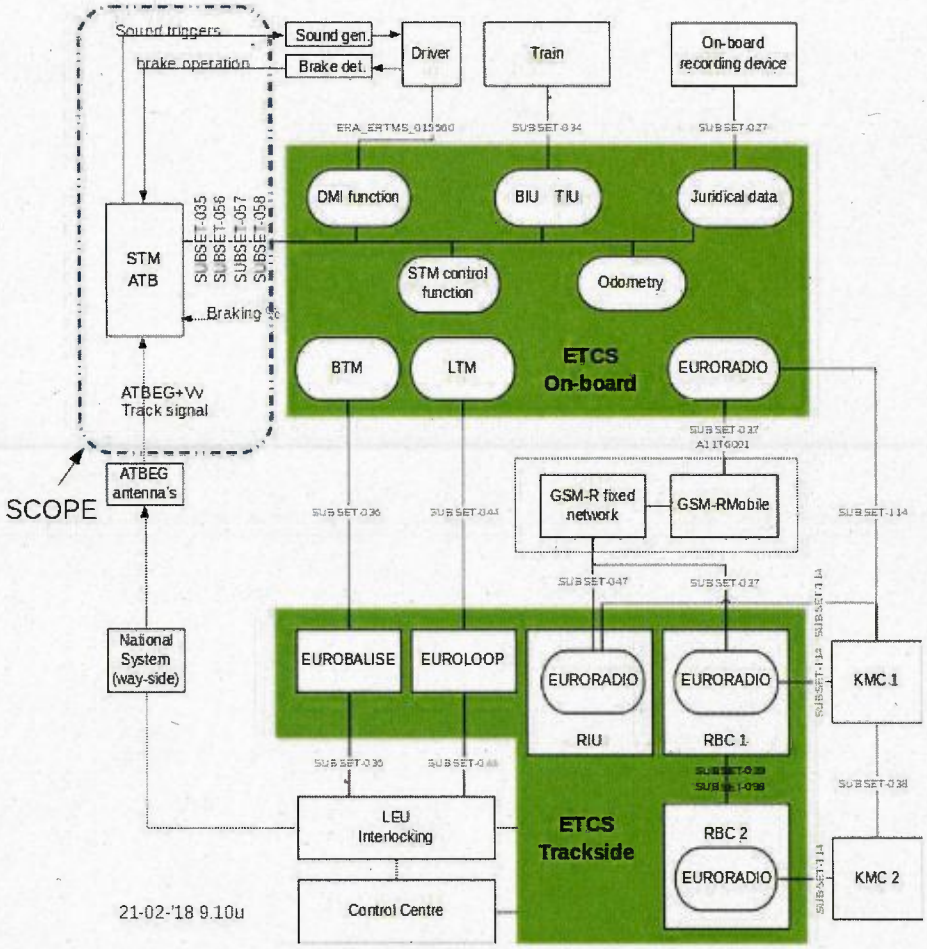
1 Preface

Text, STMA-21193 - In the figure below the STM ATB is shown in the context of the ETCS environment.
The interface between the ETCS on-board and the STM ATB is specified in the ERA subsets 035, 056, 057 and 058, and not an item in this IO specification.
The other interfaces of the STM ATB are:

- Power supply
- The interface to the way-side ATB (EG+Vv) equipment
- Inputs to detect brake operation by the driver
- Outputs to communicate sound information to the driver (time critical information for which ETCS on-board equipment might cause too long delay times).
- Outputs to communicate indicator information (different from cab signals), e.g. for diagnostic purposes.
- A feed-back from the EB command given by the ETCS on-board (not specified in the mentioned ERA subsets

Text, STMA-28791 - Required legal standards and norms applicable to the STM ATB project and product are listed in document D3.0 Legal framework standards and norms

Definition, STMA-4891 - (figure)
STM ATB system scope


Sound triggers
brake operation
Sound gen.
Brake det.
Driver
Train
On-board recording device
ERA_ERTMS_015560
SUBSET-034
SUBSET-027
DMI function
BIU TIU
Juridical data
STM ATB
SUBSET-035
SUBSET-056
SUBSET-057
SUBSET-058
Braking %
STM control function
Odometry
BTM
LTM
ETCS On-board
EURORADIO
ATBEG+Vv Track signal
SUBSET-037 A11T6001
ATBEG antenna's
SCOPE
SUBSET-036
SUBSET-044
GSM-R fixed network
GSM-RMobile
SUBSET-114
SUBSET-047
SUBSET-037
National System (way-side)
EUROBALISE
EUROLOOP
EURORADIO
EURORADIO
KMC 1
RIU
RBC 1
SUBSET-039
SUBSET-098
SUBSET-038
LEU Interlocking
ETCS Trackside
RBC 2
EURORADIO
KMC 2
21-02-'18 9.10u
Control Centre

2 Interfaces

Text, STMA-2186 - Parallel interfaces of the STM ATB are:

- Power supply
- Antenna signals: analogue signals containing the ATBEG+Vv track signal
- Digital input signals to detect if the driver is operating the brakes: "brake handle applied", "brakes sufficiently operated" (BHA and BSO)
- Analogue signal to detect if the driver is operating the brakes: "brake pipe pressure signal".
- Digital outputs for controlling the sound generator.
- A Profibus interface to the ETCS on-board system.

2.1 Power supply

Requirement, STMA-4892 -

The STM ATB shall be available for supply voltages used in existing rolling stock.

Voltages used to power existing ATB on-board systems are 24Vdc (nominal) and 110Vdc (nominal) according to the specification described in [4.5] (environmental specifications). Requirements concerning the power supply are described in the latter document and therefore out of the scope of this IO specification.

2.2 Generic requirements

Requirement, STMA-10763 - All digital inputs shall be implemented as redundant inputs with inverse information. (STMA-10024)

Definition, STMA-10024 - The information given by a digital input with two physical inputs (A and B) is defined as follows:

Value input A	Value input B	Resulting information	Diagnostic information
high	low	True	OK
low	high	False	OK
high	high	False	Fault
low	low	False	Fault

For all inputs shall be configured in a way that "False" is the "safe state"

"high" shall be above 11Vdc

"low" shall be below 9Vdc

9-11Vdc: don't care

Definition, STMA-19190 - The digital inputs are defined as specified in the table below (if the inputs are not connected the input value shall be defined in the same way for all inputs, i.e. all inputs which are not connected shall be either all "high" or all "low")

input	signal	description

DIn_1A	BHA	Brake Handle Applied
DIn_2A	BSO	Brake Sufficiently Operated
DIn_3A	SIA	Spare Input Asserted
DIn_1B	BHN	Brake Handle Not applied
DIn_2B	BSN	Brake Not Sufficiently operated
DIn_3B	SIN	Spare Input Not Asserted

Requirement, STMA-4897 -

A nominal voltage level for digital inputs from 24Vdc to 110Vdc shall be supported (real values 14,4Vdc-154Vdc, i.e. range from 0Vdc to 154Vdc)

Definition, STMA-28699 - The digital outputs are defined as specified in the table below

output	signal	description
DOut_1A	rembel	Acoustic signal, overspeed
DOut_2A	gong	Acoustic signal, cab signal change
DOut_3A	Spare Out	Spare Output
DOut_1B	WhiteLamp	White indicator, brake operated
DOut_2B	RedLamp	Red indicator, brake commanded by ATB
DOut_3B	BlueLamp	Blue indicator, monitoring active

Requirement, STMA-28709 - It shall be possible to connect the "rembel" and "gong" signals to a LogiPlus Railtone (see D4.1.2).

The sound inputs are active high. Logical high for a LogiPlus Railtone can be 24 VDC, 48 VDC, 72 VDC or 110 VDC. The LogiPlus Railtone sound inputs are 5mm Faston connectors with common reference.

Requirement, STMA-10764 - Analogue inputs used for detection of brake operation or determination of configuration shall be implemented a set of two inputs. In case of a brake operation it will be two signals from different sensors, with complimentary information. In case of the configuration it will be redundant information.

Requirement, STMA-10765 - If redundant inputs provide conflicting information then the STM ATB shall take measures to ensure safety

2.3 ATB antennas

Requirement, STMA-14774 -

The STM ATB shall provide four antenna inputs, two (one left and one right) per cabin (CAB-A and CAB-B).

Requirement, STMA-14775 -

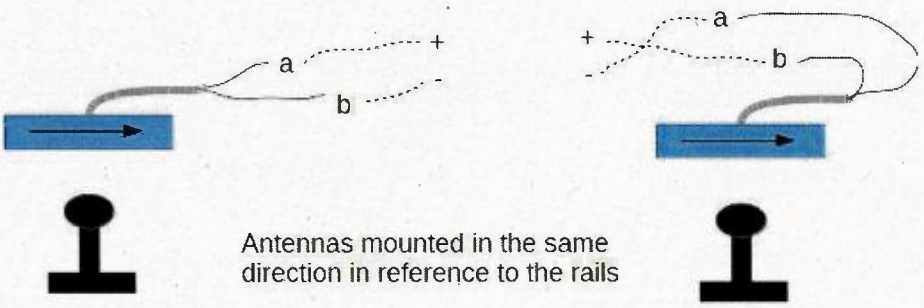
The ATB coil signals corresponding to CAB-A shall be connected to Ain-1 (right coil in the forward direction related to CAB-A) and Ain-6 (left coil in the forward direction related to CAB-A), and

the ATB coil signals corresponding to CAB-B shall be connected to Ain-2 (left coil in the forward direction related to

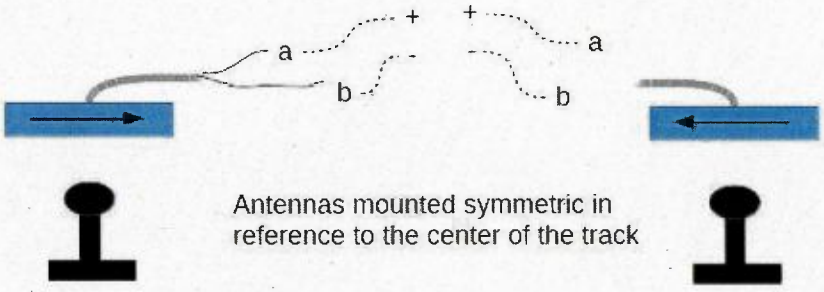
CAB-B) and Ain-5 (right coil in the forward direction related to CAB-B),
where CAB-A and CAB-B are defined as the indicated by the ETCS on-board (in packet STM-139, see ss058). (For the complete pinning, see ! STMA-8241).

Requirement, STMA-14776 - Orientation of the antenna's and connection of the wiring (! STMA-14777)
If the antenna's are mounted symmetric in reference to the center of the track then the wires of the left and right antenna shall be connected equally to the + and - input at the connector (! STMA-8241 and ! STMA-8276)
If the connections are mounted in the same direction in reference to the concerning rail then the wires of the left and right antenna shall be connected inverse to the + and - input at the connector (! STMA-8241 and ! STMA-8276)

Definition, STMA-14777 - Figure: possible orientations and connection schemes of the antenna's corresponding to one cabin.



Antennas mounted in the same direction in reference to the rails



Antennas mounted symmetric in reference to the center of the track

Requirement, STMA-4894 -
The STM ATB shall be compatible with all ATBEG antenna's used in existing rolling stock without configuration of the unit. Type dependent (i.e. not per unit) configuration at the rolling stock side may be required.
The interface of between the ATB way-side and the ATB on-board equipment is described in [1.1] ("ATBEG+Vv system concept"). In currently used ATBEG on-board equipment five different antenna types are used to "pick-up" the electro magnetic ATBEG signal and translate it into a voltage:

- ATBEG phase3 antenna: old antenna type used in ICM, SGM and a part of the DE6400 fleet
- The standard Alstom antenna: used for bogie mounting in trains equipped with an ATB on-board systems

supplied by Alstom.

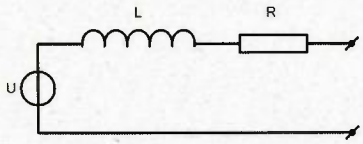
- The Alstom V-antenna: used for body mounting in trains equipped with an ATB on-board systems supplied by Alstom (Thalys and ICE)
- Antenna type PW170-0: used for bogie mounting in trains equipped with Bombardier ATB on-board systems.
- Antenna type PW225-30: used for body mounting in trains equipped with Bombardier ATB on-board systems.

Equivalent (Thevenin) scheme's for the antenna plus coupling to the rail as a function of the current floating through the rail and peak currents to be taken into account are available below.

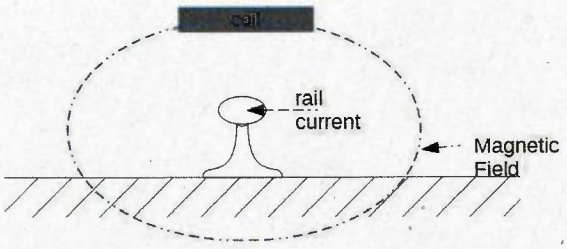
Definition, STMA-7001 - Specification of ATBEG antenna's in use, including coupling.

Antenna type	self inductance L in H	resistance R in ohm	output voltage U / rail current (mV/A @75Hz)	output voltage U / dI/dt (mV/(kA/s))
Alstom bar	1.4	45	21.3	31
Alstom V	1.4	44	4.7	6
PW170-0	4.7	270	22.3	33
PW225-30	4.55	270	14.0	21
fase 3	10.85	250	123	185

(currents and voltages in RMS values, preliminary values based on field measurements)



Thevenin equivalent scheme of the ATBEG antenna's with U, L and R as defined in the table above.



EM coupling of an antenna with the rail current.

Text, STMA-21195 -

Rail current peaks to be taken into account

Short circuits in the infrastructure can cause high current peaks depending on the self inductance between the short circuit and the sub station, and depending on the capability of switching the current off:

Requirement, STMA-7002 - The following two short circuit currents have to be taken into account, i.e. the input

circuits shall not be damaged in case of a rail current as defined below, independent of the type of antenna used:

- A current raising with a time constant tau = 5ms, initial di/dt: 20MA/s, end value: 100kA
  cut-off after 15ms, with a dI/dt = -40MA/s.
- A current raising with a time constant tau = 25ms, initial di/dt: 2MA/s, end value: 50kA
  cut-off after 50ms, with a dI/dt = -6MA/s.

Definition, STMA-7003 -

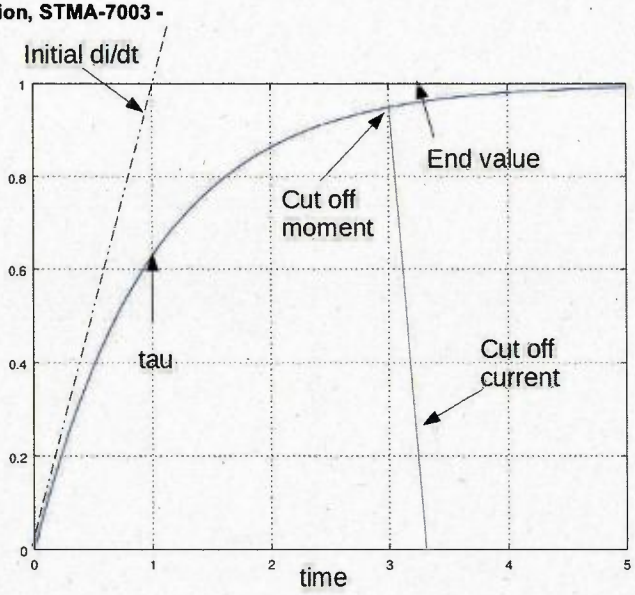


figure 4

Rail current pulses to be taken into account (values given in requirement STMA-7002)

Text, STMA-7000 - Saturation of ATBEG antenna's

In case of saturation of the ATBEG antenna's a "rail current peak" will not lead to a peak in the antenna voltage. Therefore the need for input protection of the STM ATB antenna inputs could be limited if ATBEG antenna's saturate. Below it is calculated at which rail current level the ATB phase 3 antenna saturates (B=2T). This antenna type will saturate at app. the same rail current level as the PW-170. However due to the higher voltage (U) in relation to the antenna impedance is more critical for the phase 3 antenna.

B_{iron} = Constant * I_{rail}

I_{rail} = Amplitude * cos(ω*t)

=> $|U| = \left| d/dt \int\int_A B_{iron} dA \right| = A_{iron}$ * Constant * N * Amplitude * ω

Phase 3 antenna characteristics:

- N = 5000 windings
- A_{iron} = 0,05*0,05 = 2,5*10^-3 m^2

Measurements were done at 75Hz (ω=471), result:

- Amplitude (of the current): 4700mA * √2
- resulting voltage |U| = 580mV * √2

=> $N*A_{iron}*\omega*Constant = 580/4700$

=> constant ≈ 2,1*10^-5 T/A

Assuming $B_{saturation}$ = 2T: => $I_{rail,saturation} = 2/(2,1*10^{-5}) \approx 100kA$

Therefore:

Requirement, STMA-7005 - Saturation shall not be taken into account to reduce the input transients as described above.

2.4 Brake application detection

Text, STMA-21187 - Inputs to detect brake operation by the driver

For currently in use ATB systems different ways are used to detect if the driver is operating the brake at a pre defined level:

- If trains have a brake handle with a direct relation between brake handle position and brake power requested by the driver a contact at a specific position of the brake handle is used. (BHA: "brake handle applied")
- If trains have a "pulse controlled" braking system, i.e. brake power is requested by short operation of the brake handle to lower the brake pipe pressure, then braking may be detected by
  - a contact switching if the brake pipe undershoots a predefined pressure (BSO: "brake operated sufficiently")
  - measuring the brake pipe pressure
  - a contact at the brake handle to detect initial operation by the driver in combination with a contact switching if the brake pipe undershoots a predefined pressure or a measurement of the brake pipe pressure

All inputs are diverse redundant, thus two digital inputs for BHA and BSO or redundant pressure measurement.

The voltage level for the digital inputs can vary from 24Vdc to 110Vdc (according to EN50155).
The current level for the analogue inputs is 4-20mA

The above leads to the following requirement:

Requirement, STMA-4896 -

The STM ATB shall be equipped with the following inputs to detect if the driver is operating the brake:

- An input "brake handle applied" (BHA), operating at the brake handle
- An input "brake operated sufficiently (BSO), operating at the brake pipe pressure or another control signal with a constant relation with the requested brake power.

- A redundant analogue input for a brake pipe pressure (or other analogue signal with a constant relation with the requested brake power) (P_brake),.

Definition, STMA-4898 -

The current level for the analogue inputs for pressure measurement shall be 4-20mA (resolution 0,01mA, 1,6mA/bar), @ =< 200 ohm

5,6mA shall be 1 bar = environmental pressure,

13,6mA shall be 6 bar (= 5 bar + environmental pressure

below 4,6 bar: brake applied

above 4,6 bar: brake not applied

below 3,6mA: failure or not connected

above 21mA: failure

2.5 <Intentionally deleted>

2.6 Configuration inputs

Requirement, STMA-6923 -

21a/21b:

The STM ATB shall be equipped with two analogue inputs to configure the braking percentage. Those analogue inputs are supplied via a resistor.

Range: 0 braking% to 200 braking%

Accuracy: +/- 10 braking%

Not connected (i.e. no configuration information available) shall be detectable (i.e. must be distinguished from valid values)

Relation between resistor values and braking percentage to be decided during implementation.

2.7 DMI

Text, STMA-21185 - Outputs to communicate sound information

Currently in use ATB on-board systems use specific devices in the cabin to generate sounds in the cabin. The profibus communication is not used because it leads to delays in the starting moment of the sounds which are time critical (the profibus may be used if it can be proven that the ETCS on-board system communicates fast enough).

The devices in the cabin can be controlled with three 24Vdc or 110Vdc digital signals (bel and gong) according to EN50155.

The above leads to the following requirement:

Requirement, STMA-4901 -

The STM ATB shall be equipped with two digital outputs compatible with the interfaces as described in [D4.1.2 Logiplus and phase 3 sound generator interface specification].

3 Communication with the ETCS on-board

Requirement, STMA-6787 -
The STM ATB shall be equipped with a PROFIBUS connection according to "CENELEC EN 50170-2 (1996)"

Requirement, STMA-2177 - Interfacing between the STM ATB and the ETCS on-board system shall comply with ERA requirements

- STMA-10814 - D4.7.4 Specific Transmission Module (SS035 v3.2.0)
- STMA-11331 - D4.7.2 STM FFFIS Safe Time Layer (SS056 v3.0.0)
- STMA-11326 - D4.7.1 STM FFFIS Safe Link Layer (SS057 v3.1.0)
- STMA-10810 - D4.7.3 STM FFFIS Application Layer (SS058 v3.2.0)
- STMA-7262 - D4.7.5 Performance requirements (SS059 v3.1.0)

3.1 DMI

Text, STMA-21186 - The STM ATB has to exchange data with the ETCS on-board in order to comply with the requirements defined in the document mentioned above. For this purpose information packets for exchanging data are defined in STMA-10810 - D4.7.3 STM FFFIS Application Layer (SS058 v3.2.0). The DMI communication will be based on a "customizable DMI" according to STMA-10814 - D4.7.4 Specific Transmission Module (SS035 v3.2.0), paragraph 13.5.

In this paragraph the "Recapping Table with configuration data for customisable DMI" (ss035, 13.5.1.2) is defined specifically for the STM ATB (STMA-8277). Together with the above mentioned documents this table completes the DMI specification.

Requirement, STMA-7011 - The STM ATB shall send information to the DMI (via the ETCS on-board) using definitions specified in a DMI configuration table (STMA-8277) defining, (a.o.) indicator IDs, button IDs, sound IDs, Icon IDs and position IDs.

Text, STMA-21190 - According to the size and positions:

- the minimum size is (wxh) 12x15mm
- A screen must be 10" (480x640 pixels) diagonal: 800 pixel pixels = 10" = 25,5cm
  => 1 pixel = 0,32mm
- Minimum size: 38x48 (used: 40x50)
- Width area: 272, 6 lamps 240, so 16 additional at each side:
- Position lamp 1: (71,366), soft key(71,351) 71 = 55+16 margin
- ATB status indicator (140,275), softkey (140,260), size: 36x108

For the different indicators fixed positions shall be used, i.e.:

- The "indicator_ID" as sent by the STM will always be equal to the "indicator position_ID"

- The "button_ID" as sent by the STM will always be equal to the "button position_ID"

Definition, STMA-8277 -

DMI configuration table according to STMA-4671.

Description	**Values**									
NID_STM of the STM	1 (= ATB)									
Number of Indicators	9 6 speed indicators, 1 white lamp, 1 red lamp, 1 blue lamp									
	Lamp1	Lamp2	Lamp3	Lamp4	Lamp5	Lamp6	White Lamp	Red Lamp	Blue Lamp	
Indicator id (i)	1	2	3	4	5	6	7	8	9	
font size (i)	40	40	40	40	40	40	-	30	30	
Horizontal text alignment (i)	center	center	center	center	center	center	center	center	center	
Vertical text alignment (i)	center	center	center	center	center	center	center	center	center	
Number of Indicator positions	9									
	Lamp1	Lamp2	Lamp3	Lamp4	Lamp5	Lamp6	White Lamp	Red Lamp	Blue Lamp	
Indicator position id (i)	1	2	3	4	5	6	7	8	9	
X Offset of the upper left corner (i)										
Y Offset of the upper left corner (i)										
Horizontal size (i)										
Vertical size (i)										
Number of Buttons	5									
	Release	Attention	BD	Test	Override					
Button id (i)	*11*	*12*	*13*	*14*	15					
Font size (i)	30	30	30	30	30					
Horizontal text alignment (i)	center	center	center	center	center					

Vertical text alignment (i)	center	center	center	center	center					
Number of Button positions	5									
	Release	Attention	BD	Test	Override					
Button position id	11	12	13	14	15					
X Offset of the upper left corner (i)	-									
Y Offset of the upper left corner (i)										
Horizontal size (i)										
Vertical size (i)										
Linked soft key	Next to H2	Next to H3	Next to H4	Below F8	Below F9	Below F10				
Number of Icons	15									
Icon id (i)	1	2	3	4	5	6	7	8	9	10
Icon (i) (.bmp)	Yellow_off	Yellow_on	Green_off	Green_on	red_on	Red_off	Blue_on	Blue_off	white_on	white_off
Display text upon icon	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Icon id (i)	11	12	13	14	15					
Icon (i) (.bmp)	release_ button	attention_ button	BD_ button	Test_ button	Override button					
Display text upon icon	yes	yes	yes	yes	yes					
ETCS speed and distance supervision	Yes, display the speed dial (no supervision information)									
ETCS speed dial range	180km/h									
Slow flashing frequency for Buttons and Indicators	1/3Hz									
Fast flashing frequency for	1Hz									

Buttons and Indicators										
Flashing style	Whole frame									
Number of Sounds	5									
	Sound id (i)	sound (i) (.wav)	type							
gong	1	Gong.wav	One-stroke							
BD-signal	2	BD-signal.wav	One-stroke							
losbel	3	Losbel.wav	One-stroke							
bel	4	Bel.wav	continuous							
Bel-damping	5	Bel-damping.wav	One-stroke							
Number of moved areas of the ETCS layout	0									

Note 1: This table is supplied by the rolling stock owner to specify the STM-ATB DMI-layout. For the current DMI configuration the table is used from document: "ATB Layout voor NS materieel v2.0".

Note 2: ETCS speed and distance supervision is not required but the speed dial shall be displayed for presenting the current train speed.

4 Connector specifications

Text, STMA-21191 - Below the details of the connectors used are specified

Requirement, STMA-29032 - All connectors shall be front mounted.

4.1 Digital I/O connector

Definition, STMA-8323 - (table)
For the power supply and digital I/O signals a front connector type DIN41612-F-48P is defined.
DIO Front connector

Pin	I/O	Pin name	Description
2d		*PE*	Shield
4d	I	*DIn_1B*	Digital input
6d		*DIn_B-PWR*	External power supply for input circuit
8d		*PE*	
10d	O	*DOut_1B*	Digital output
12d		*DOut_B-GND*	Digital out ground

14d		*PE*	
16d	I	*Supply +*	Power input
18d	I	*Supply -*	Power input
20d		*PE*	
22d	I	*DIn_1A*	Digital input
24d		*DIn_A-PWR*	External power supply for input circuit
26d		*PE*	
28d	O	*DOut_1A*	Digital output
30d		*DOut_A-GND*	Digital out ground
32d		*PE*	
2b		*PE*	
4b	I	*DIn_2B*	Digital input
6b		*DIn_B-GND*	Digital in ground
8b		*PE*	
10b	O	*DOut_2B*	Digital output
12b		*DOut_B-GND*	Digital out ground
14b		*PE*	
16b	I	*Supply +*	Power positive input
18b	I	*Supply -*	Power negative/return input
20b		*PE*	
22b	I	*DIn_2A*	Digital input
24b		*DIn_A-GND*	Digital in ground
26b		*PE*	
28b	O	*DOut_2A*	Digital output
30b		*DOut_A-GND*	Digital out ground
32b		*PE*	
2z		*PE*	

4z	I	*DIn_3B*	Digital input
6z		*Di4-6 GND*	Digital in ground
8z		*PE*	
10z	O	*DOut_3B*	Digital output
12z		*DOut_B GND*	Digital out ground
14z		*PE*	
16z	I	*Supply +*	Power input
18z	I	*Supply -*	Power input
20z		*PE*	
22z	I	*DIn_3A*	Digital input
24z		*DIn_A-GND*	Digital in ground
26z		*PE*	
28z	O	*DOut_3A*	Digital output
30z		*DOut_A-GND*	Digital out ground
32z		*PE*	

4.2 Analogue inputs connectors

Text, STMA-21189 - For the analogue input signals front connectors of type SubD-15 female and SubD-15 male, are defined (STMA-8241 and STMA-8276).

Definition, STMA-8241 - (table)
AD-A Front connector, SubD-15-F

Pin	I/O	Pin name	Description
1	I	*Rconfig_A*	Configuration resistor input
15	I	*AIn_1A+*	Coil input
7	I	*AIn_1A-*	Coil input
14	I	*Rg_1A+*	Coil gain resistor
6	I	*Rg_1A-*	Coil gain resistor
13		*AIn_A_GND*	
5	I	*AIn_2A+*	Coil input
12	I	*AIn_2A-*	Coil input
4	I	*Rg_2A+*	Coil gain resistor

11	I	*Rg_2A-*	Coil gain resistor
3		*AIn_A_GND*	
10	I	*AIn_3A+*	brake pipe pressure input
2	I	*AIn_3A-*	brake pipe pressure input
9	I	*AIn_A_GND*	
8	I	*Rconfig_A_ret*	Configuration resistor return
Sh		*PE*	Shield

Definition, STMA-8276 - (table)
AD-B Front connector, SubD-15-M

Pin	I/O	Pin name	Description
8	I	*Rconfig_B*	Configuration resistor input
9	I	*AIn_1B+*	Coil input
2	I	*AIn_1B-*	Coil input
10	I	*Rg_1B+*	Coil gain resistor
3	I	*Rg_1B-*	Coil gain resistor
11		*AIn_B_GND*	
4	I	*AIn_2B+*	Coil input
12	I	*AIn_2B-*	Coil input
5	I	*Rg_2B+*	Coil gain resistor
13	I	*Rg_2B-*	Coil gain resistor
6		*AIn_B_GND*	
14	I	*AIn_3B+*	brake pipe pressure input
7	I	*AIn_3B-*	brake pipe pressure input
15	I	*AIn_B_GND*	
1	I	*Rconfig_B_ret*	Configuration resistor return
Sh		*PE*	Shield

4.3 Profibus connectors

Requirement, STMA-8244 -

The STM ATB shall be equipped with a male and a female profibus connector (internally connected for daisy chaining) as defined in STMA-8172.

Definition, STMA-8172 - table

Profibus connector pinning (Sub-D9)

Pin	Name	Description
1	not used	
2	not used	
3	RxD/TxD?P	Data line plus (B)
4	not used	
5	DGND	Data ground
6	VP	+5V supply for bus termination
7	not used	
8	RxD/TxD-N	Data line minus (A)
9	not used	

5 ATB specific messages (packet 44)

Text, STMA-43143 -

NO FUNCTIONS WHICH REQUIRE ADDITIONAL TRACK TO TRAIN INFORMATION TO BE COMMUNICATED USING PACKET-44 (SS026) AND PACKET STM-45 (SS058), SHALL BE IMPLEMENTED IN THE STM ATB. THEREFORE THE DEFINITIONS BELOW DO NOT APPLY FOR THE STM ATB DEVELOPMENT. THE CONCERNING TEXT IS MARKED IN RED.

Text, STMA-21194 - The ETCS specification offers the possibility to pass national data to an STM. This option will be used for the following functionalities. This option will be used to partly replace national beacons which are used

- Adapting ATBEG speed levels, equivalent to the original ATB function "ATBM+ mode" (replacing ATBNG beacons)
- Distance to a signal at danger, equivalent to the ATBVv function (replacing ATBVv beacons),

5.1 Definition of packet 44 for adapting speed levels

Text, STMA-21196 - Apart from the standard data in packet 44, including the address information NID_XUSER and NID_NTC (which in the case of an STM ATB have the values "102" and "1"), a packet 44 includes a national defined data block:
"Other data depending on NID_XUSER" (see ss026, v3.6.0, 7.4.2.11).
The "other data" shall for the purpose of ATBM+ mode (adapting speed levels) be defined as:

Definition, STMA-13935 - The data block (MSB first) in a packet 44 (= M_DATA(k) in packet STM-45, see subset026 chapter 7) providing new speed levels includes:

- Packet Identifier (Identifier); number distinguishing between different packet-44 types used by the ATB STM = "0"
  range: (0,..,255)
- Distance in m [0,..,2^16-1] the new speeds are valid (D_Validity_Speeds), 2 bytes
- Train category (NC_TRAIN), value "undefined" implies "valid for all trains" (extended to 16 bits)
- One new speed in km/h [0,..,255] per ATBEG code (CodeSpeeds, range: 0,..,255, steps: 1km/h i.e. one byte)
  - V_code96_temp
  - V_code120_temp
  - V_code147_temp
  - V_code180_temp
  - V_code220_temp
  - V_noCode_temp
- Braking percentage below which the new speeds are valid (MaxBrakingPercentage [0,..,200]), 1byte

5.2 Definition of packet 44 for distance to a signal at danger

Text, STMA-21192 - Apart from the standard data in packet 44, including the address information NID_XUSER and NID_NTC (which in the case of an STM ATB have the values "102" and "1"), a packet 44 includes a national defined data block:
"Other data depending on NID_XUSER" (see ss026, v3.6.0, 7.4.2.11).
The "other data" shall for the purpose of sending ATBVv information be defined as:

Definition, STMA-13937 - The data block (MSB first) in a packet 44 (= M_DATA(k) in packet STM-45, see subset026, chapter 7) providing distance to a signal at danger includes:

- Packet Identifier (Identifier); number distinguishing between different packet-44 types used by the ATB STM = "1"
  range: (0,..,255), 1 byte
- Distance to the next signal in m [0,..,2^16-1], 2 bytes
  note only the range [3,..,2000m] shall be used for distances, any value > 2000 shall be interpreted as "Release"

5.3 Definition of packet 44 for "remtabel"

Text, STMA-34497 - Apart from the standard data in packet 44, including the address information NID_XUSER and NID_NTC (which in the case of an STM ATB have the values "102" and "1"), a packet 44 includes a national defined data block:
"Other data depending on NID_XUSER" (see ss026, v3.6.0, 7.4.2.11).
The "other data" shall for the purpose of sending "remtabel" information be defined as:

Definition, STMA-34496 - The data block (MSB first) in a packet 44 (= M_DATA(k) in packet STM-45, see subset026, chapter 7) providing "remtabel"values includes:

- Packet Identifier (Identifier); number distinguishing between different packet-44 types used by the ATB STM = "2"
  range: (0,..,255)
- Distance in m [0,..,2^16-1] the new "remtabel" values are valid (D_Validity_Remtabel), 2 bytes
- Flag indicating if safe maximum speed values are included in the table
  note: in some circumstances (e.g. in tunnels) overspeed must be allowed.
- Twenty speed levels in km/h, range: (0,..,255), 1 byte