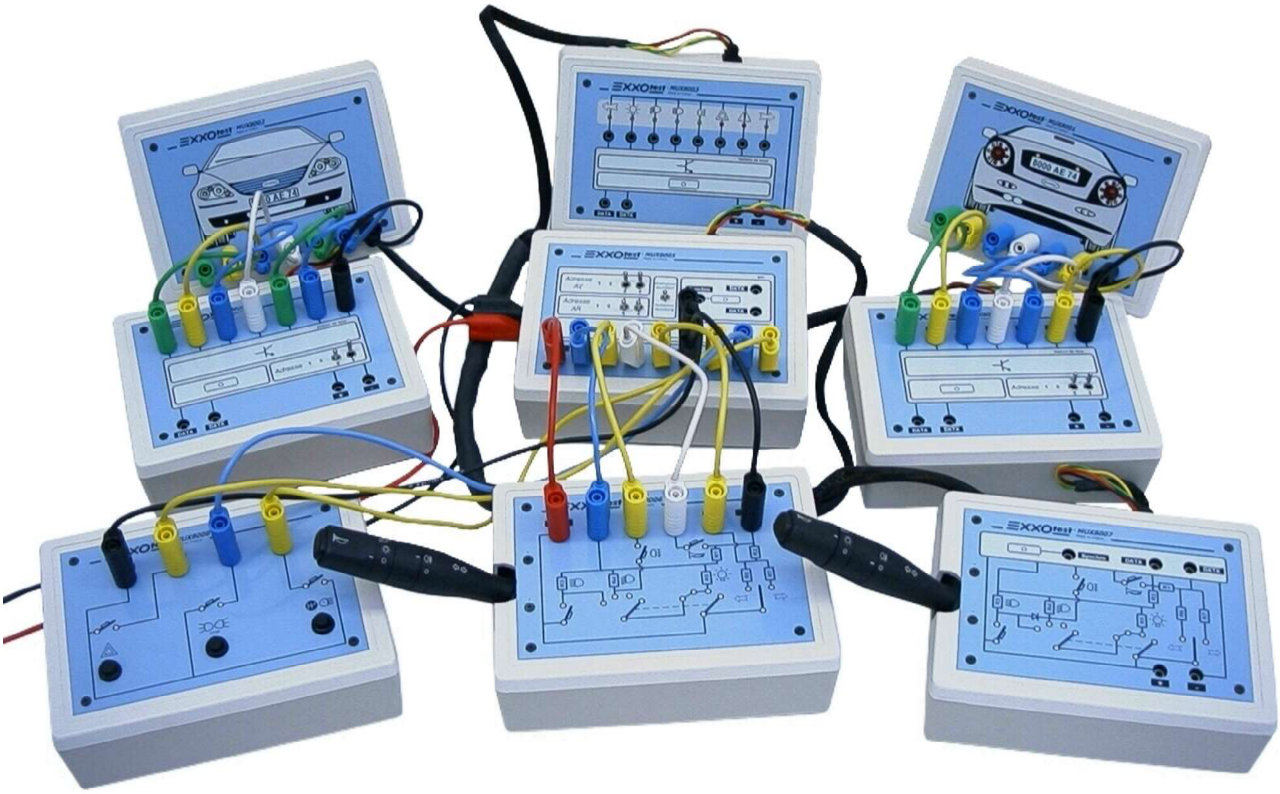
EXXOTEST EDUCATION

Vehicle training equipment



User's guide for DTM-MUX8000:

MODULES FOR STUDYING THE MULTIPLEXING

SOMMAIRE

1. Introduction

1.1. Multiplexing

In view of the many different types of systems embedded in cars today, as well as the growing length and complexity of the bundles of cables used in cars, manufacturers have attempted to find a solution to reduce the number of cables and connections. Multiplexing is the solution.

1.1.1. The aim of multiplexing

In the 1960's, the DS was fitted with approximately 200 m in cabling, with 200 interconnections. The Xantia, for example, is fitted with almost 2000 m in cabling and almost 1500 interconnections.

Using multiplexing can divide these figures by three while offering a wider range of services.

Using a multiplexed electrical architecture can simplify the network of electrical bundles and reduce the number of electronic components while allowing more client functions to be offered for an equivalent number of cables.

A multiplexed structure is also compatible with downgraded system operating modes.

1.1.2. The multiplexing system

The multiplexing system differs from former electrical technologies due to digital information flux. Unlike analogue signals which require a specific cable, the different types of digital information can transit via one single line consisting of two copper wires, carrying all data: the bus.

A central unit known as a BSI (built-in systems interface) combines most of the electrical control and command functions required for the vehicle, which previously required one interface per function in the vehicle.

A cab network communications protocol defines the rules and format of exchanges between the computers, via the VAN (Vehicle Area Network).

Another protocol is also used, for the CAN (Controller Area Network).

The VAN protocol is ideal for bodywork and passenger comfort equipment, while the CAN protocol is designed for inter-system exchanges or electronic interfaces. The two networks are interconnected and must interact rapidly and independently. Manufacturers opted for the CAN protocol for the engine and some items of safety equipment (ABS – ESP).

1.1.3. Multiplexing components (within the PSA group)

The **BSI (Built-in Systems Interface)** is a computer which centralises all data received from the different vehicle sensors and distributes this data via the CAN bus to the different electronic management systems (injection computer, ABS, HVAC, central computer, etc.).

The BSI also centralises all signals from miscellaneous switches and control buttons, manages various functions (e.g. the turning indicator frequency, windscreen wiper speed, etc.), and controls the various actuators via the VAN bus.

The BSI is actually the "brain" of the vehicle, and software has been installed, indicating all of the characteristics and options of the host vehicle in its memory: these interfaces cannot be exchanged between vehicles.

The **dashboard**: 100% multiplexed, supplied by a + and an earth and by the VAN bus, which consists of two wires (DATA and DATA).

All dashboard instruments (speed indicator, tachometer, fuel gauge, etc.) are controlled by this bus.

Switches: Various types exist.

Traditional switches: the power control is fitted internally. The switches consist of contacts which control the lights and actuators directly, with one wire per actuator controlled.

Analogue switches: + and – supply and no control of power due to the direct link with the BSI. The switches issue different voltage values for each control (e.g. 1V for the right turning indicator and 2V for the left turning indicator), they have a few less wires than traditional switches, but sections are smaller.

Multiplexed switches: + and – supply and only 2 DATA and DATA command cables, directly controlling the VAN bus.

Decoding modules: These modules are not integrated in all current systems but will be omni-present in a few years' time. They are used to decode binary signals from the VAN bus transmitted by the BSI or multiplexed switches and to send the necessary power to the actuators.

Each decoding module has a personalised address, enabling it to sort incoming signals.

The PEUGEOT 607 is fitted with a front receiver and a rear receiver, unlike the CITROËN XSARA PICASSO, which has no receivers fitted.

1.2. The coding principle for DTM MUX8000 modules

A bit can have 2 logic states (state 1 or state 0).

All signals are sent via the 2 wires (DATA and DATA):

- DATA is in fact the data wire,
- $\overline{DATA}$ is the reverse of DATA (if a bit is at state 1 for DATA, this bit is at state 0 for $\overline{DATA}$).

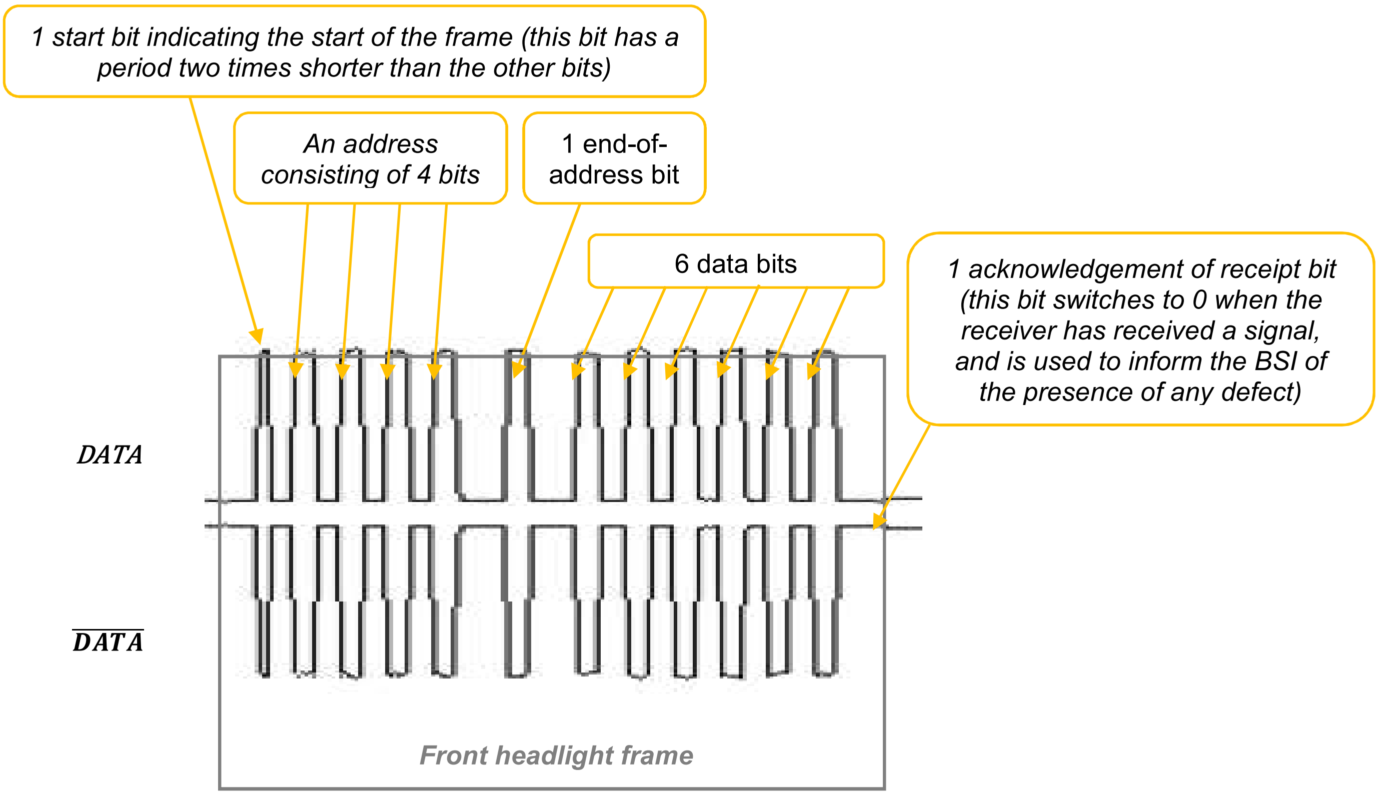
The BSI subtracts DATA and $\overline{DATA}$ potential and constantly ensures that the value obtained is equal to 2.5V, and if this is not the case, the BSI will detect a default and receivers will switch to downgraded mode (see chapter).

This principle enables the BSI to carry out self-checks, avoiding interference caused by an independent circuit (ignition coil, high-voltage lines, etc.) being considered by the receiver as a data bit.

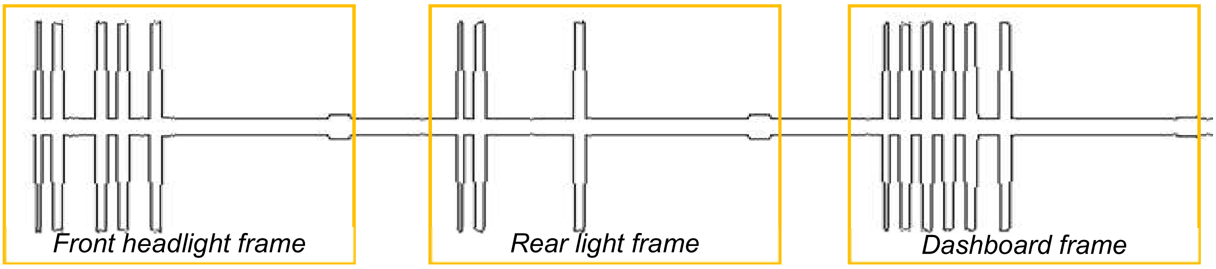
Furthermore, the DATA and $\overline{DATA}$ wires are twisted, which reinforces protection against interference.

Ironically, this system is not considered as a high security system, it is not used by the steering and brake management systems.

Each frame includes several sections:

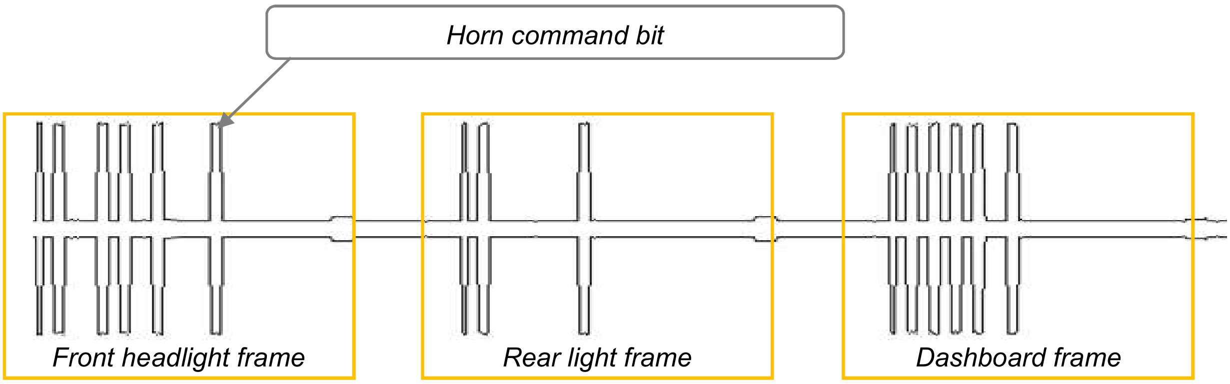


When the BSI receives no signal, the frames are pending (all data bits are at 0), but the address, frame start, end-of-address and acknowledgement of receipt bits are still active:



Exemple : The driver presses the horn button.

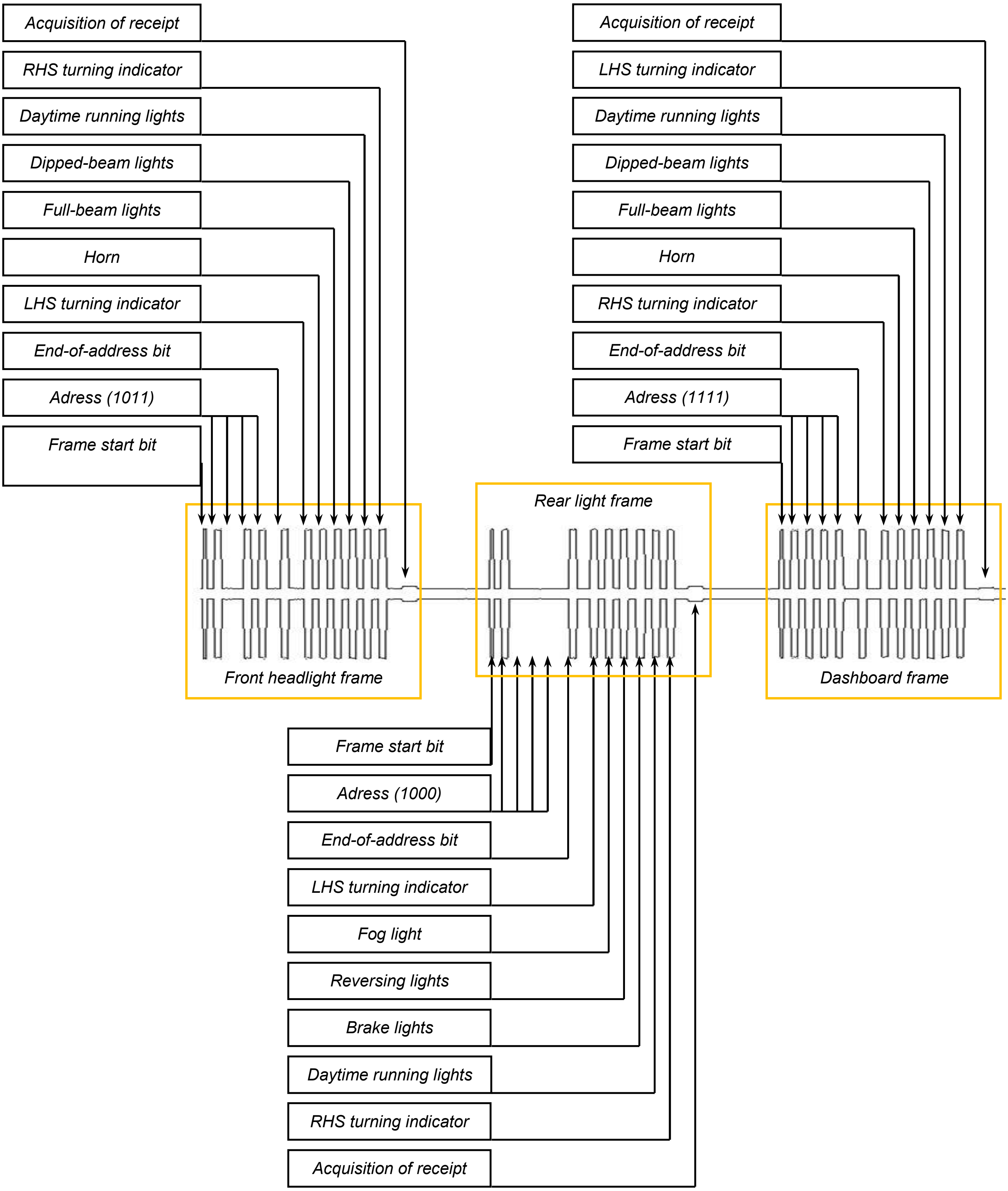
- The BSI receives an analogue signal from one of the cables connected to the lighting switch (the warning system cable is earthed).
- \- The BSI will position the horn command bit on the front headlight frame:



- The front headlight receiver will check that the address indicated by the BSI matches the receiver address. If this is not the case, the acknowledgement of receipt bit will switch to 1 and the BSI will be informed of a defect.
- If the address is correct, the system will read the data bits and control the corresponding actuators, and will then change the acknowledgement of receipt bit to 0, while informing the BSI that the signal has been correctly received and processed.

Each of the 6 data bits in each frame will inform the receivers of the tasks they must carry out.
Each bit therefore has a function.

Bits correspondence:



The 3 frames are sent by the BSI approximately 4 times per second for the DTM MUX8000 modules (with analogue lighting switch).

Much larger volumes of frames are transmitted in current vehicles, travelling at such a speed that a traditional oscilloscope is not sufficient to display the signals.

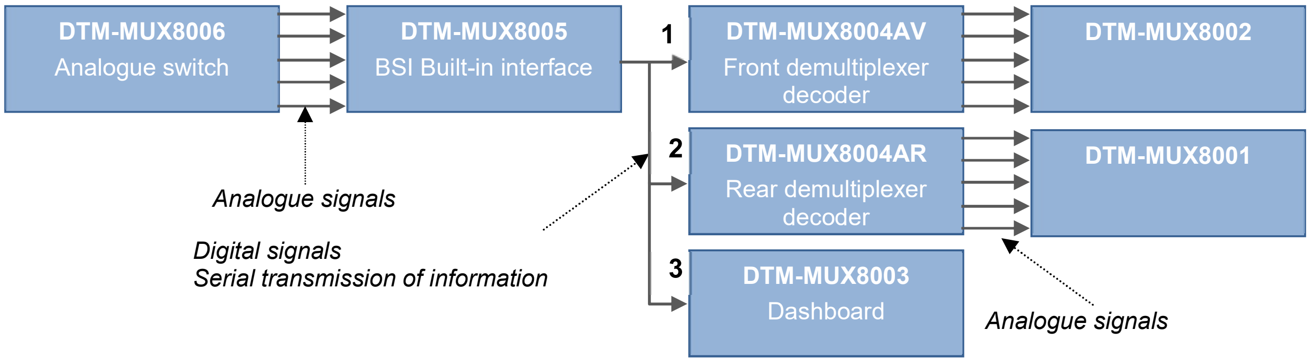
For this reason, DTM MUX8000 modules have deliberately been modified from reality in order to display and understand the signals transiting via the bus.

1.3. Light switches and operation

The DTM-MUX8000 assembly has two types of light switches:

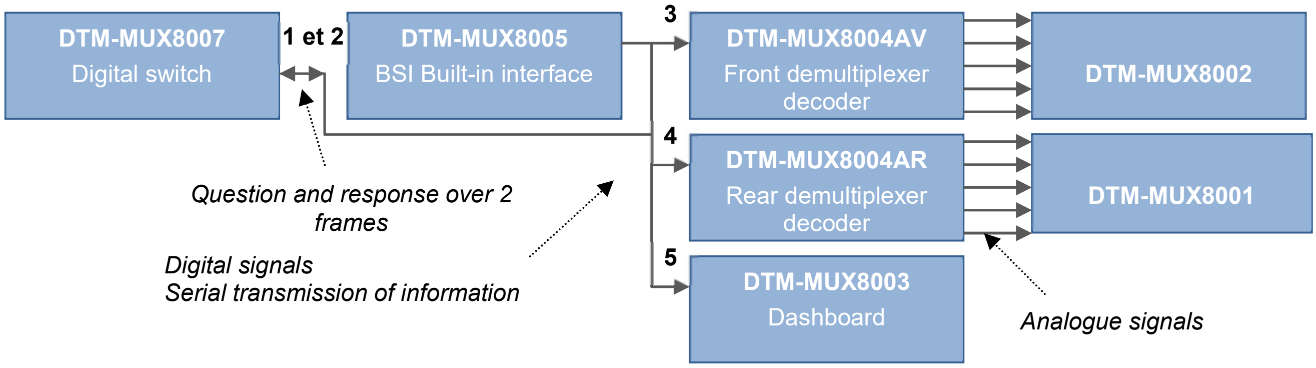
One analogue switch (MUX8006), the BSI built-in interface (MUX8005 module) transforms the analogue signals into binary signals before transmitting them to three 13 bit frames on the bus:

- 1 frame for the front headlights,
- 1 frame for the rear lights,
- 1 frame for the dashboard.



1 multiplexed switch (MUX8007), which transforms the analogue signals into binary signals internally before transmitting them to the BSI bus (DTM8004 module). The 5 bus frames are as follows in this mode:

- 1 BSI frame designed for the multiplex switch, which will transmit questions,
- 1 multiplexed switch frame designed for the responding BSI,
- 1 frame for the front headlights,
- 1 frame for the rear lights,
- 1 frame for the dashboard.



1.4. Downgraded mode

The BSI transmits frames which will be decoded by the demultiplexers, the front and rear MUX8004 modules and the dashboard.

All stations on the network have their own separate addresses.

You may select the address for the MUX8005, MUX8004AV and MUX8004AR assemblies.

The addresses for the MUX8003 and MUX8007 modules are fixed.

Example of settings for the MUX8005 module.

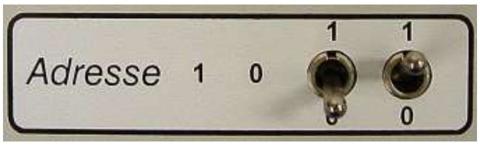
Settings for the rear MUX8004 module

The Frames transmitted by the MUX8005 module are received by the front and rear MUX8004 modules and the MUX8003 dashboard.

The receivers will overwrite the acknowledgement of receipt bit to confirm the reception of a frame.

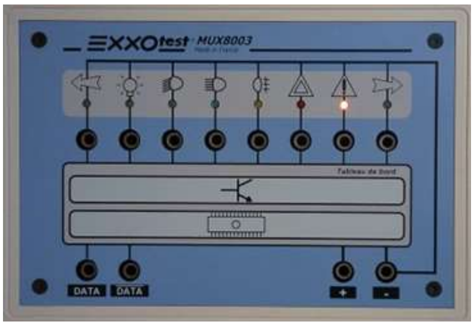
<u>Error example no 1:</u>

The rear MUX8004 module is adjusted as follows.



The BSI (MUX8004) transmits a frame which has not been cleared by the MUX8004AR module.

1 - The BSI detects that the information sent to the address '11' has not been received. The BSI lights up the defect indicator on the dashboard to inform the driver about the problem.



2- The MUX8004AR module detects that no information is being received from the BSI and switches to downgraded mode: the parking lights are turned on after 2 seconds.

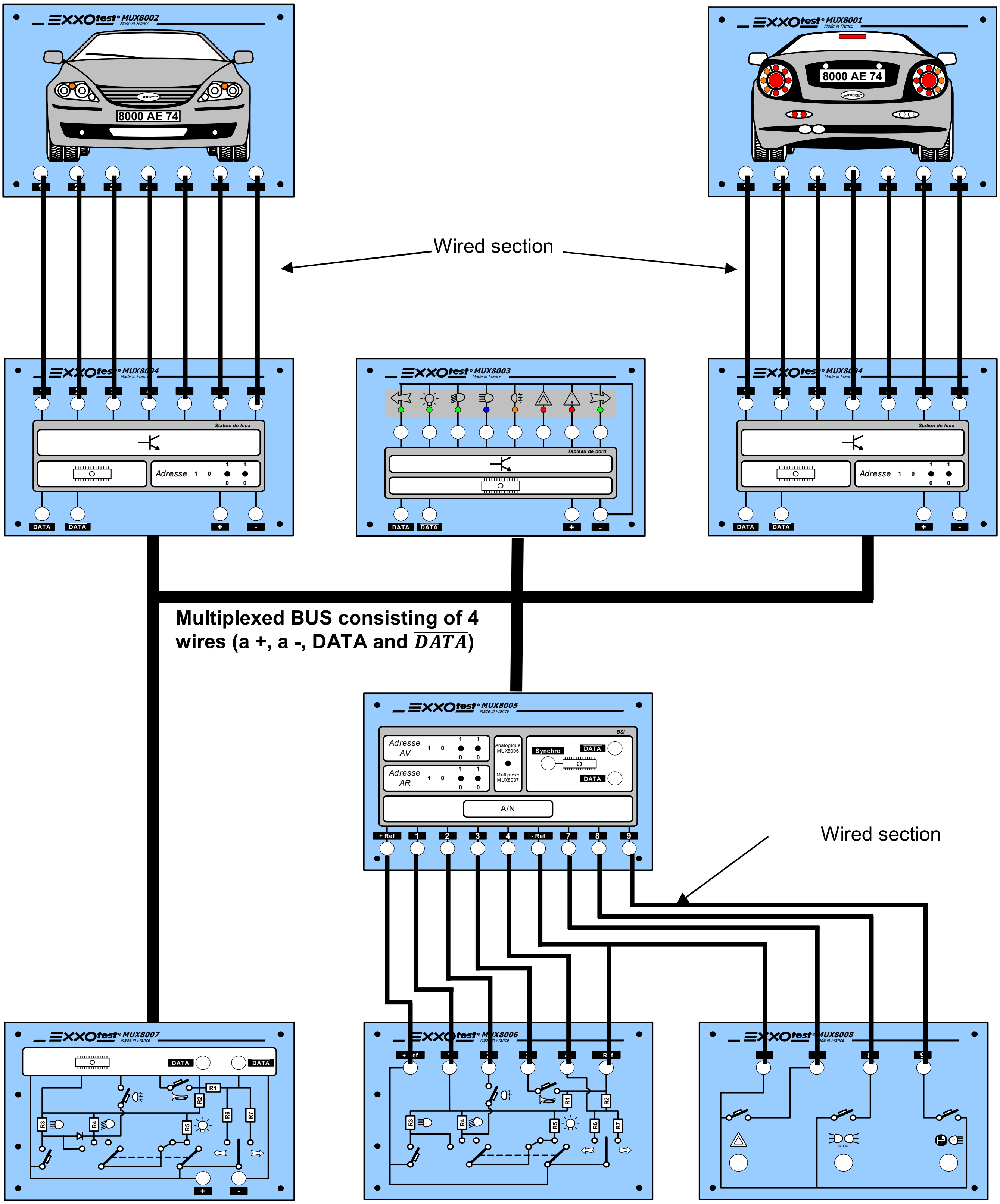
Troubleshooting table:

	Dashboard indicator ON	Front downgraded mode	Rear downgraded mode	Operation of the front section	Operation of the rear section	Inoperative
Black connector disconnected from MUX8003	NO	NO	NO	YES	YES	Dashboard
Black connector disconnected from MUX8004AV	YES	NO	NO	NO	YES	Front section
Black connector disconnected from MUX8004AR	YES	NO	NO	YES	YES	Rear section
Black connector disconnected from MUX8005 (BSI)	NO	NO	NO	NO	NO	All modules
Black connector disconnected from MUX8007	YES	NO	NO	No command possible		
Black connector disconnected from MUX8007 (dipped beam position)	YES	NO	NO	The headlights will remain on dipped-beam, and the BSI will remain at the last item of data received before the failure		
Front address modified	YES	YES	NON	NO	YES	Front section
Front address modified	YES	NO	YES	YES	NO	Rear section

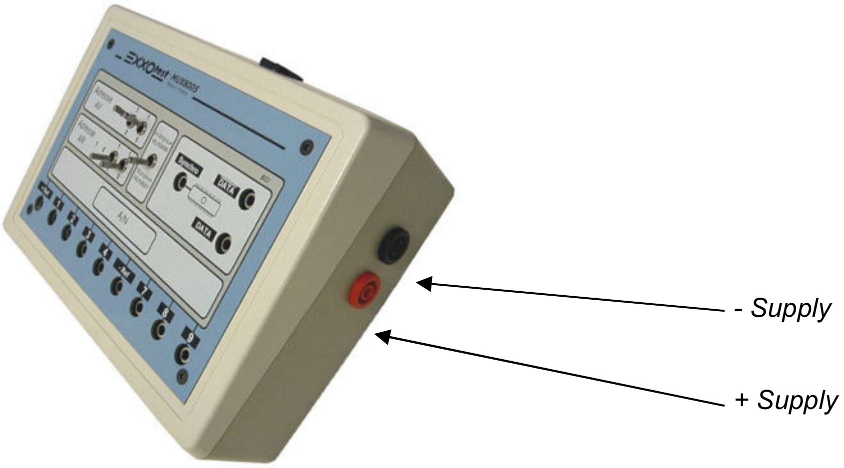
2. PRESENTATION OF MODULES

2.1. Instruction manual

Installation and start-up of the DTM-MUX8000 training modules:
The interfaces are connected together as shown on the following diagram:



Use 12 - 18 Volt DC 3 A supply (not provided) to be connected to the DTM-MUX8005 module



Operational environment:

All DTM-MUX8000 modules are placed on a table in a clean, dry location, free of dust, water vapour and combustion fumes.
The modules require a lighting level of approx. 400 to 500 Lux.
The modules can be installed in a Practical Workshop classroom; the noise generated will not exceed 70 dB.
Modules are protected from potential user errors.

Calibration and servicing of the DTM-MUX8000 training bench:

Calibration:	Factory Settings.
Servicing interval:	N/A
Cleaning:	Use a soft, clean cloth with a window cleaning product.

Number of stations, user position:

The set of DTM-MUX8000 modules can be taken as a single workstation.
Module users will remain sat down throughout the practical work.

Method for removal from service:

Power down and disconnect.
Disconnect all modules and then store in a lockable cabinet with a front panel marked 'Equipment removed from service'.

Residual hazards:

Trainees will spend the entire period of practical works on the front part of the modules.

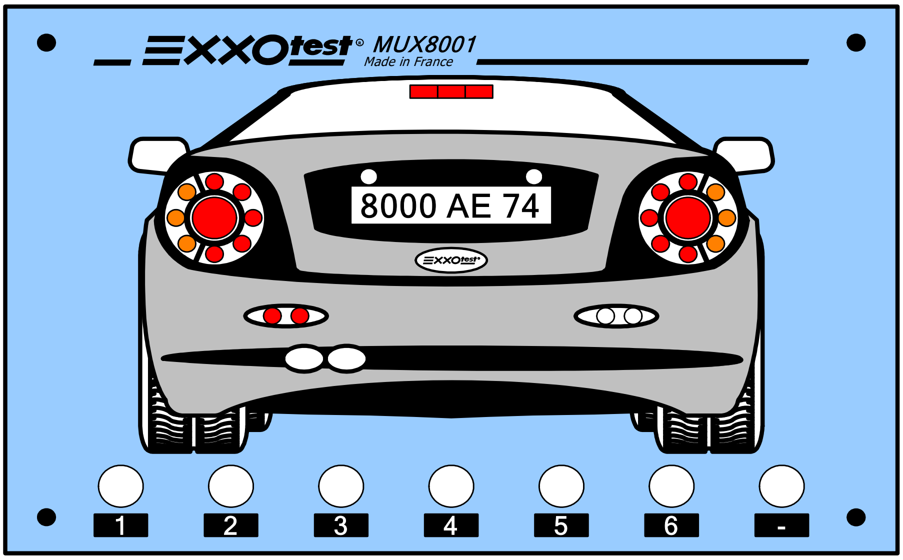
Transport of the DTM-MUX8000 assembly:

The modules must be turned off and removed from service before transport (see instructions on removal from service).
The console can be carried by one person.

2.2. Studying with the DTM MUX8000-serie of modules

2.2.1. MUX8001 module

FUNCTION: Simulate the rear vehicle lights.

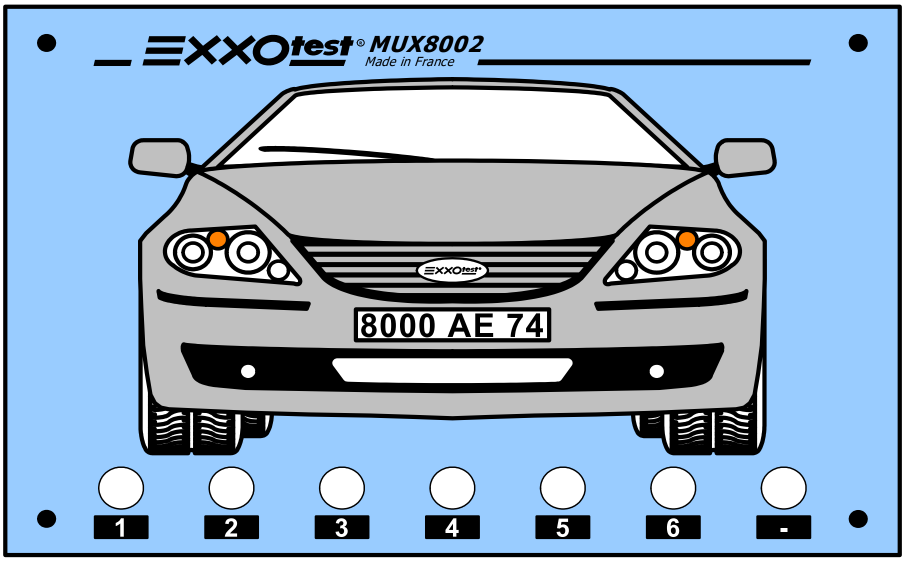


DESCRIPTION:

ID	Type of terminal	Measurements taken	Correspondence
1	Command	+12V	Indicator - RHS
2	Command	+12V	Daytime running lights
3	Command	+12V	Brake lights
4	Command	+12V	Reversing lights
5	Command	+12V	Rear fog light
6	Command	+12V	Indicator - LHS
-	Earth	-0V	Earth for all rear lights

2.2.2. MUX8002 module

FUNCTION: Simulate the front vehicle lights.

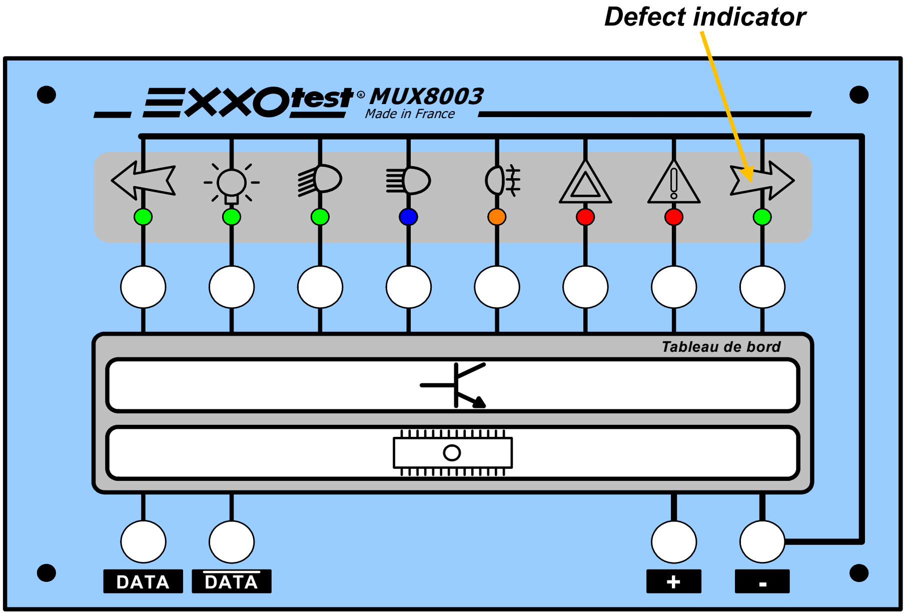


DESCRIPTION:

ID	Type of terminal	Measurements taken	Correspondence
1	Command	+12V	Indicator - RHS
2	Command	+12V	Daytime running lights
3	Command	+12V	Dipped beams
4	Command	+12V	Full-beam lights
5	Command	+12V	Horn
6	Command	+12V	Indicator - LHS
-	Earth	-0V	Earth for all front lights

2.2.3. MUX8003 module

FUNCTION: Simulate the vehicle control panel.

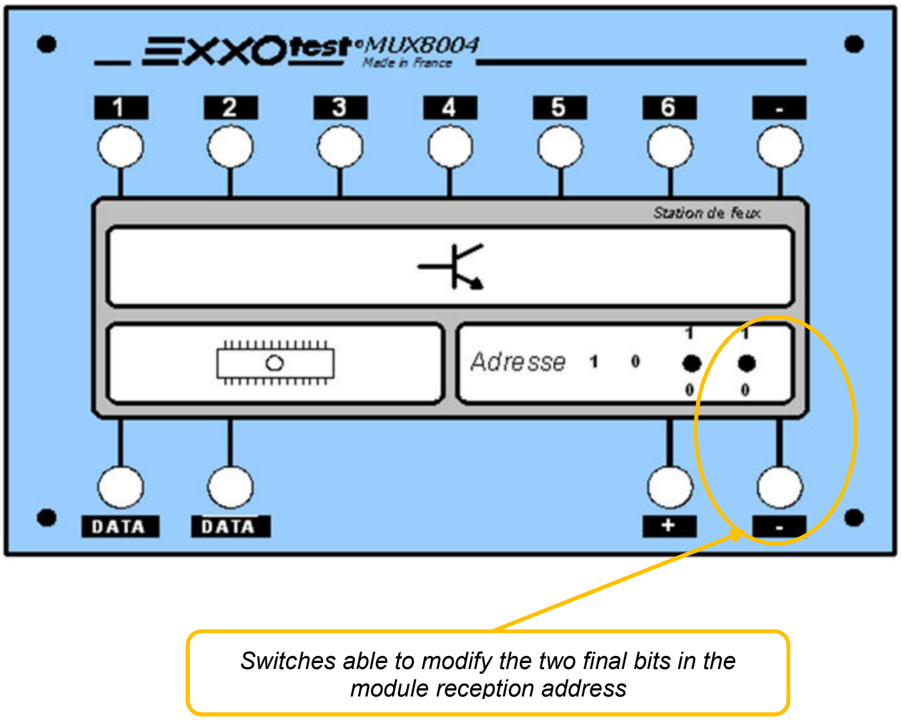


DESCRIPTION:

ID	Type of terminal	Measurements taken	Functionalities
$DATA$	Measuring terminal	Binary signal	Coded 13-bit signal
$\overline{DATA}$	Measuring terminal	Inverse of the DATA signal	
+	Measuring terminal	+12V	Supply from the multiplexed bus
-	Measuring terminal	-0V	Earth from the multiplexed bus
No ID	Measuring terminals	0V or 12V	Change logic state when the indicators light up

2.2.4. MUX8004 modules (1 front module and 1 rear module)

FUNCTION:
Decode signals from the bus and command the front or rear groups of headlights.



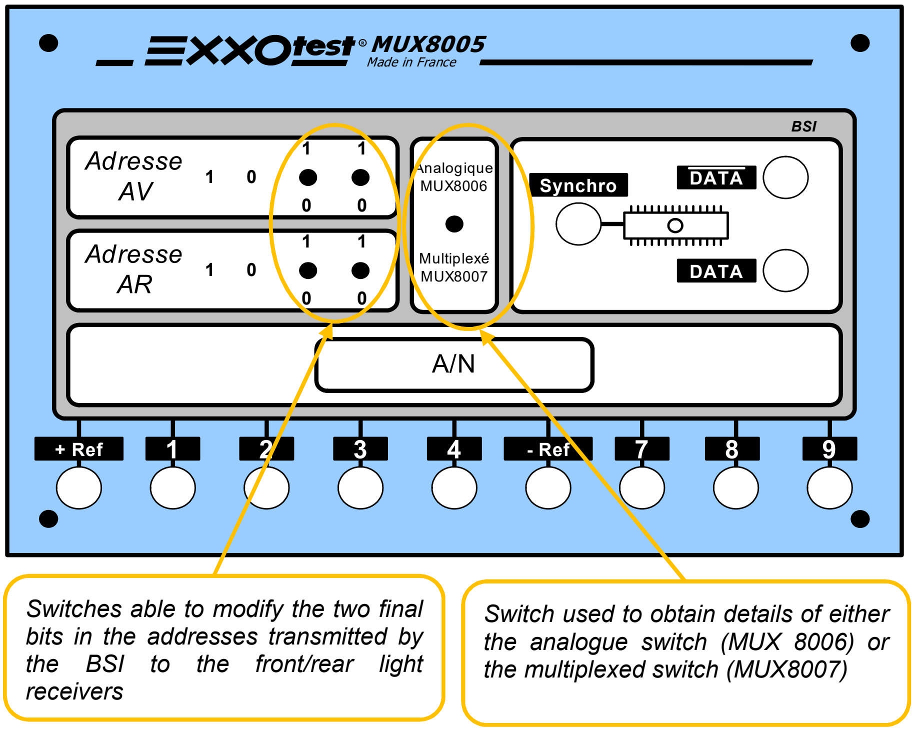
DESCRIPTION:

ID	Type of terminal	Measurements taken	Correspondence
1	Command	+12V	Front or rear RHS turning indicator
2	Command	+12V	Daytime running lights
3	Command	+12V	Dipped headlights or brake lights
4	Command	+12V	Full-beam headlights or reversing lights
5	Command	+12V	Horn or anti-fog lights
6	Command	+12V	Front or rear LHS turning indicator
-	Earth	-0V	Earth for all front or rear lights
DATA	Measuring terminal	Binary signal	Coded 13-bit signal
$\overline{DATA}$	Measuring terminal	Inverse of the DATA signal	
+	Measuring terminal	+12V	Supply from the multiplexed bus
-	Measuring terminal	-0V	Earth from the multiplexed bus

2.2.5. MUX8005 module (known as BSI = built in systems interface)

FUNCTION:

Code and address orders from the analogue switch and reversing, brake, and hazard light sensors and transmit by the multiplexed bus to the different receivers in question.



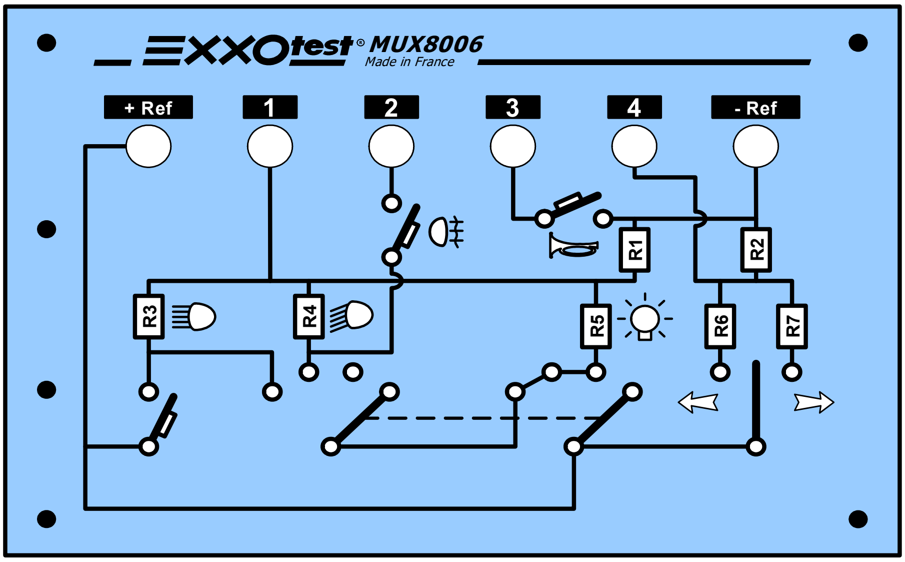
DESCRIPTION :

ID	Type of terminal	Measurements taken	Correspondence
+ID	Power supply	+5V	Supply to the MUX8006 interface
1	Information	2.5V, 3.75V, 1.25V	Full-beam lights, dipped-beam lights, daytime running lights
2	Information	5V	Rear fog light
3	Information	-0V	Horn
4	Information	1.25V, 3.75V	Right or left turning indicator
-ID	Earth	-0V	Earth for the MUX8006 and MUX8008 interfaces
7	Information	-0V	Hazard lights
8	Information	-0V	Brake lights
9	Information	-0V	Reversing lights
DATA			
$\overline{DATA}$	Measuring terminal		
Synch	Binary signal		

2.2.6. MUX8006 module

FUNCTION:

Inform the BSI MUX8005 module of the position of the lighting switch.



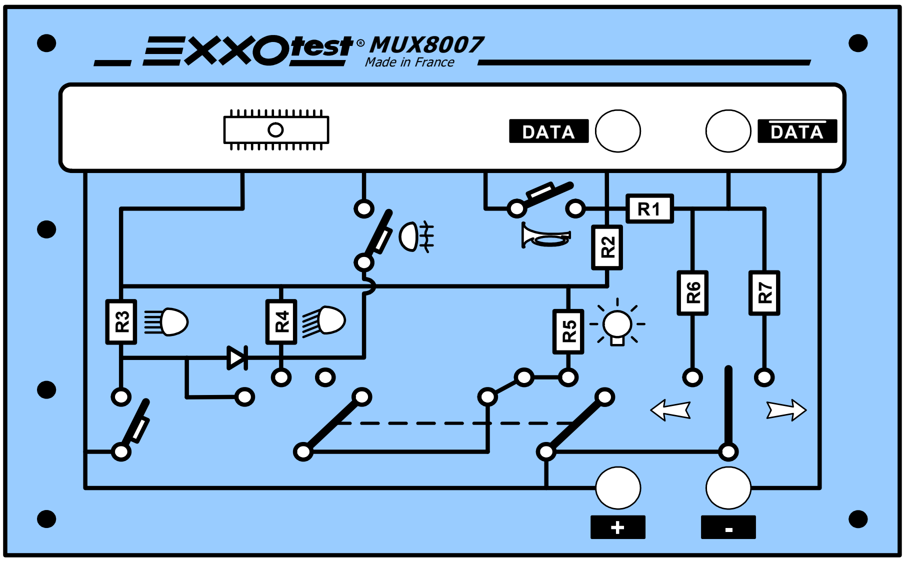
DESCRIPTION:

ID	Type of terminal	Measurements taken	Correspondence
+Ref	Power supply	+5V	Supply to the interface
1	Order	2.5V, 3.75V, 1.25V	Full-beam lights, dipped-beam lights, daytime running lights
2	Order	5V	Rear fog light
3	Order	-0V	Horn
4	Order	1.25V, 3.75V	Right or left turning indicator
-Ref	Earth	-0V	Earth for the interfaces

2.2.7. MUX8007 module

FUNCTION:

Code the signals transmitted by the switch directly using the multiplexed bus without using the MUX8005 module.



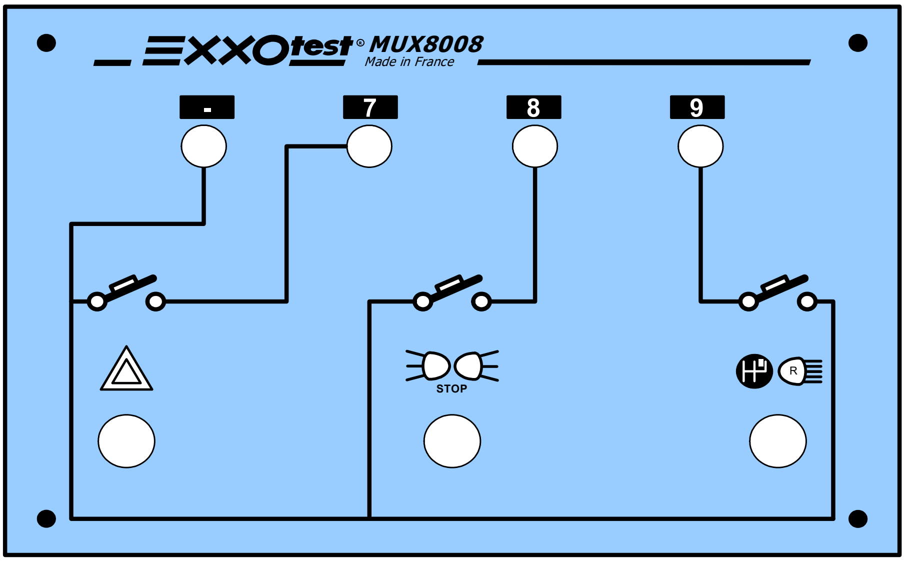
DESCRIPTION:

ID	Type of terminal	Measurements taken	Correspondence
DATA	Measuring terminal	Binary signal	Coded 13-bit signal
$\overline{DATA}$	Measuring terminal	Inverse of the DATA signal	

2.2.8. MUX8008 module

FUNCTION:

Inform the MUX8005 module of the position of the brake light, reversing light and hazard light contactors.

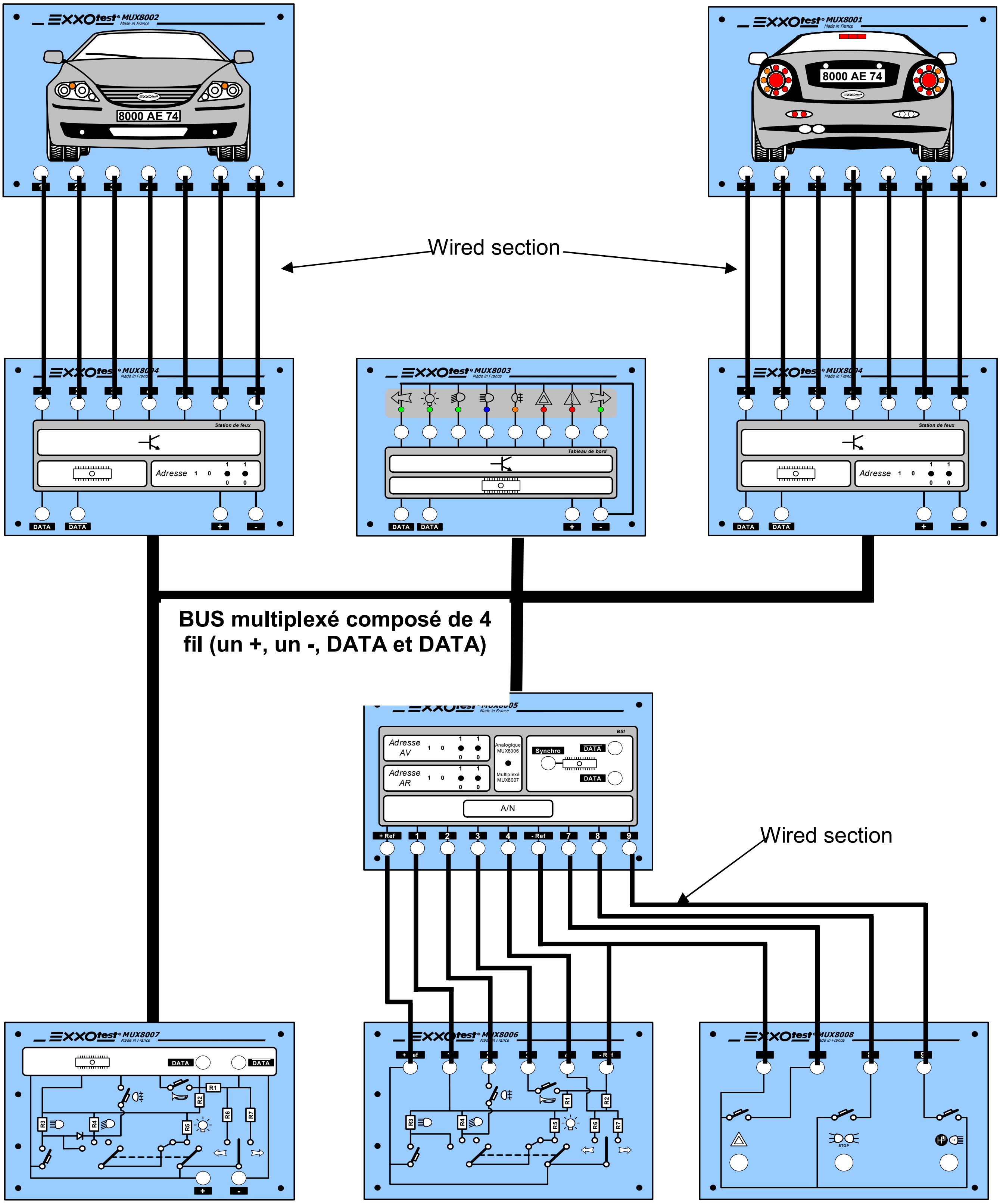


DESCRIPTION:

ID	Type of terminal	Measurements taken	Correspondence
-	Earth	-0V	Earth for the interface
7	Order	-0V	Hazard lights
8	Order	-0V	Brake lights
9	Order	-0V	Reversing lights

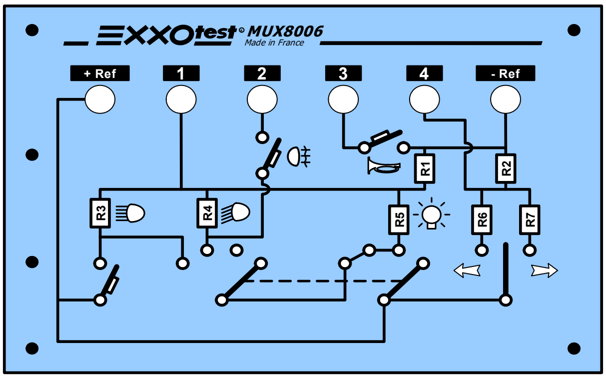
3. PRACTICAL WORKS

3.1. Cabling of modules



3.2. Practical works for the MUX8006 module

Analogue switch discovering



The "analogue" switch informs the BSI of its position via 4 wires, which indicate different voltage values depending on whether the resistors are fitted in series or in parallel.

This switch requires less wires than a traditional switch, why is this?

Several items of data can be routed via the same wire (e.g.: left or right turning indicator.)

Why can't all items of data be routed by the same wire?

The switch can transmit several items of information simultaneously (e.g.: daytime running lights at the same time as the right turning indicator and the rear fog light) therefore, therefore one wire must exist for each option.

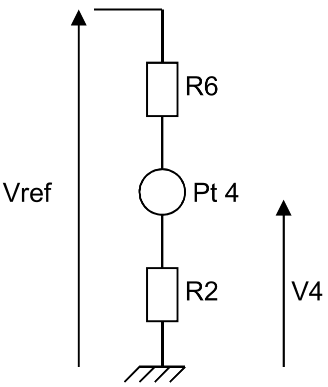
The following values will be recorded using Reflet or a multimeter:

FP: Side lights
FC: Dipped beams
FR: Full-beam lights
FBAV: Front fog lights
CG: Left turning indicator
CD: Right turning indicator
K: horn

Position:	+ ref	Channel 1	Channel 2	Channel 3	Channel 4	- ref
No lights or horn	5 v	0	0	4.7	0	0
FP	5 v	1.25	0	4.7	0	0
FC	5 v	2.86	0	4.7	0	0
FR	5 v	3.82	0	4.7	0	0
Full-beam flash	5 v	3.73	0	4.7	0	0
FP + FBAR	5 v	1.23	1.2	4.7	0	0
FC + FBAR	5 v	2.86	5	4.7	0	0
FR + FBAR	5 v	3.83	5	4.7	0	0
CG	5 v	0	0	4.7	3.77	0
CD	5 v	0	0	4.7	1.26	0
K	5 v	0	0	0	0	0

LHS turning indicator

Draft a simplified wiring diagram for the switch in LHS turning indicator position using the front panel of the MUX8006 module.



$R2=3000\Omega$
$Vref=5v$
$V4=3.77v$

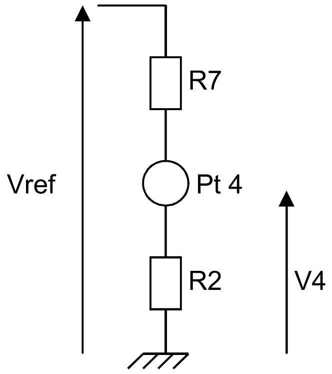
Find the value of the resistor R6:
Reminder: U=RI

Vref=(R6+R2)xI et V4=R2xI

Therefore Vref = (R6+R2)x(V4/R2) VrefR2=V4R6+(V4R2)
VrefR2 - V4R2 = V4R6 R6 = R2(Vref-V4)/V4
R6 = 3000x(5-3.77)/3.77 **R6 = 979 Ω**

RHS turning indicator

Draft a simplified wiring diagram for the switch in RHS turning indicator position using the front panel of the MUX8006 module.



R2=3000Ω
Vref=5v
V4=1.26v

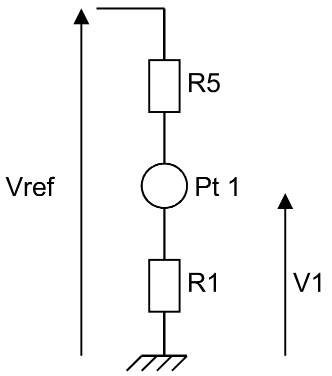
Find the value of the resistor R7: Reminder: U=RI

Vref=(R7+R1)xI et V4=R2xI

Therefore	Vref = (R7+R2)x(V4/R2)	VrefR2=V4R7+(V4R2)
	VrefR2 - V4R2 = V4R7	R7 = R2(Vref-V4)/V4
	R7 = 3000x(5-1.26)/1.26	**R7 = 8905 Ω**

Side lights

Draft a simplified wiring diagram for the switch in side light position using the front panel of the MUX8006 module.



R1=3000Ω
Vref=5v
V1=1.25v

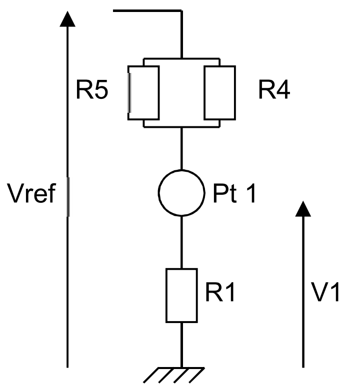
Find the value of the resistor R5:
Reminder: U=RI

Vref=(R5+R1)xI et V1=R1xI

Therefore	Vref = (R5+R1)x(V1/R1)	VrefR1=V1R5+(V1R1)
	VrefR1 – V1R5 = V1R1	R5 = R1(Vref-V1)/V1
	R5 = 3000x(5-1.25)/1.25	**R5 = 9000 Ω**

Dipped-beam lights

Draft a simplified wiring diagram for the switch in dipped-beam position using the front panel of the MUX8006 module.



R1=3000Ω
Vref=5v
V1=2.86v

Use the ID R54 for
1/R54 = 1/R5 + 1/R4

Find the value of the resistor R4:

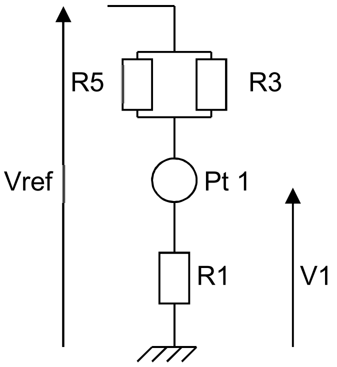
Reminder U=RI ***Vref=(R54+R1)xI et V1=R1xI***

Therefore Vref = (R54+R1)x(V1/R1) VrefR1=V1R54+(V1R1)
VrefR1 – V1R54 = V1R1 R54 = R1(Vref-V1)/V1
R54 = 3000x(5-2.86)/2.86 R54 = 2244.75 Ω

Therefore 1/R54 = 1/R5 + 1/R4 R5R4 = R54R4 + R54R5
R4 (R5-R54) = R54R5 R4 = R54R5/R5-R54
R4 = (2244.75 * 9000) / (9000-2244.75) **R4 = 2991 Ω**

Full-beam lights

Draft a simplified wiring diagram for the switch in full beam position using the front panel of the MUX8006 module.



R1=3000Ω
Vref=5v
V1=3.84v

Use the ID R53 for
1/R53 = 1/R5 + 1/R3

Find the value of the resistor R3:

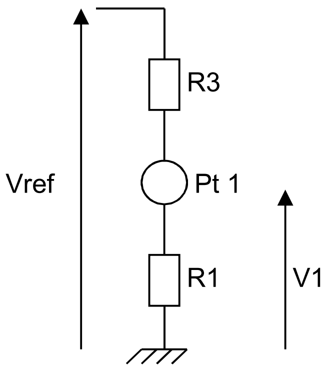
Reminder U=RI **Vref=(R53+R1)xI et V1=R1xI**

Therefore Vref = (R53+R1)x(V1/R1) VrefR1=V1R53+(V1R1)
VrefR1 – V1R53 = V1R1 R53 = R1(Vref-V1)/V1
R53 = 3000x(5-3.84)/3.84 R53 = 906 Ω

Therefore 1/R53 = 1/R5 + 1/R3 R5R3 = R53R3 + R53R5
R3 (R5-R53) = R53R5 R3 = R53R5/R5-R53
R3 = (906 * 9000) / (9000-906) **R3 = 1007 Ω**

Full-beam flash

Draft a simplified wiring diagram for the switch in full-beam flash position using the front panel of the MUX8006 module.



R1=3000Ω
Vref=5v
V1=3.73v

Find the value of the resistor R3:

Reminder: U=RI

Vref=(R3+R1)xI et V1=R1xI
Therefore Vref = (R3+R1)x(V1/R1)
VrefR1=V1R3+(V1R1)
VrefR1 – V1R3 = V1R1
R3 = R1(Vref-V1)/V1
R3 = 3000x(5-3.73)/3.73
R3 = 1021 Ω

3.3. Practical works with analogue switch

Enter the address 1011 for the front and 1000 for the rear.
Set the oscilloscope to DATA (with the synch) and then reply to the following questions:

How many different frames can you find for DATA: 3 frames.

Determine the frame order: front frame, rear frame, and control panel frame and so on.

Indicate the length of the frame in bits, and draft a diagram using the different sections.

Number of bits: 13

START	IDENT	COM	INFO	ACK	IT

START: 1 bit
IDENT: adjustable 4-bit identifier for the front and rear decoders, fixed in all other cases.
COM: 1 bit for end-ID and start-data.
INFO: 6 bits
ACK: acknowledgement of receipt and end of the frame
IT: inter-frame

Fill in the following table based on the different actions on the analogue switch and the buttons on the MUX8008 module. You will determine the correspondence between bits and frames.

For example:
CG: LHS turning indicator
FP: Side lights
FRE: Reversing light
CD: RHS turning indicator
FC: Dipped beams
FB: Rear fog lamp.
K: Horn
FR: Full-beam lights
FS: Brake lights

	START	**IDENT**				**COM**	**INFO**						**ACK**
Front frame	1	1	0	1	1	1	CG	K	FR	FC	FP	CD	0
Rear frame	1	1	0	0	0	1	CG	FB	FRE	FS	FP	CD	0
Control panel	1	1	1	1	1	1	CD	FB	FR	FC	FP	CG	0

ACK = 0 if cleared.
Decoding:
Decode the following frames:
1100010011000 => Frame: rear, Info: FRE and FS
1111111000110 => Frame: control panel, Info: CG, FP and CD
1101110110000 => Frame: Front, Info: K and FR

Enter the address 1010 in the BSI for the front data. Leave the address 1011 for the front decoder. No action on the switch and on the buttons of the MUX8008 module.

Take note of the frame using the oscilloscope:
1101010000001

What do you notice for this frame?
The last bit is at 1 (0 if cleared). This means that the BSI transmits a frame to the address 1010, nobody receives this frame, and therefore nobody clears it.

What do you notice for the other interfaces?
The defect indicator is lit on the control panel module. The module has detected an unclear frame on the network, and immediately lights up the defect indicator to notify a network an error on the network. The side lights are active on the front of the vehicle. The front decoder module switches to downgraded mode as it no longer receives data from the BSI.

3.4. Practical works with multiplexed switch (see switch on MUX8005)

Enter the address 1011 for the front and 1000 for the rear.
Set the oscilloscope to DATA (with the synchro) and then reply to the following questions:

How many different frames can you find for DATA? 5 frames

Determine the frame order: BSI-Switch frame, Switch-BSI switch, front frame, rear frame, and control panel frame and so on.

What differences arise when compared with use of an analogue switch? Two additional frames are added.

BSI-Switch: requests position with immediate response

Switch-BSI: immediate response for the positioning of the switch

Note: the switch is systematically preceded with a frame from the BSI, the question frame. The switch will be able to communicate and indicate its position, its response. The Master slave role will be considered. A slave will not communicate on a network, it will communicate when requested to.

Fill in the following table based on the different actions on the multiplexed switch and the buttons on the MUX8008 module. You will determine the correspondence between bits and frames.

For example:
CG: LHS turning indicator
FP: Side lights
FRE: Reversing light
CD: RHS turning indicator
FC: Dipped beams
FB: Rear fog lamp.
K: Horn
FR: Full-beam lights
FS: Brake lights

	START	IDENT				COM	INFO						ACK
BSI-SWITCH	1	1	1	0	1	1	0	0	0	0	0	0	0
SWITCH-BSI	1	1	1	0	0	1	FB	CD	FP	FC	FR	K	CG
Front frame	1	1	0	1	1	1	CG	K	FR	FC	FP	CD	0
Rear frame	1	1	0	0	0	1	CG	FB	FRE	FS	FP	CD	0
Control panel	1	1	1	1	1	1	CD	FB	FR	FC	FP	CG	0

ACK = 0 if cleared.

With reference to the BSI-Switch question-response frames, you can see that the clearance bit of the SWITCH-BSI frame is used as CG data.

The BSI detects the presence of the multiplexed switch when clearing the first BSI-SWITCH frame.

Decode the following frames:

1100011001000 => Frame: rear, Info: CG and FS

1111110001100 => Frame: control panel, Info: FC and FP

1101110110000 => Frame: Front, Info: K and FR

1110010100011 => Frame: SWITCH-BSI, Info: CD, K and CG

1110110000000 => Frame: BSI-SWITCH, Info: position request

DECLARATION CE OF CONFORMITY

By means of this declaration of conformity, as defined by the European Directive on Electromagnetic Conformity 2004/108/EC, the company:

ANNECY ELECTRONIQUE SAS
Parc Altaïs – 1, rue Callisto
F-74650 CHAVANOD

Declares that the following product:

Brand	Model	Description
EXXOTEST	**DTM-MUX8000**	**TEACHING MODULES Studying Multiplexing**

I - Has been manufactured in accordance with the requirements of the following European Directives:

- LV Directive 2006/95/EC - 12 December 2006
- EMC Directive 2004/108/EC - 15 December 2004

and satisfies the requirements of the following standard:

- NF EN 61326-1 dated 07/1997 +A1 of 10/1998 +A2 of 09/2001
- Electrical measurement, control and laboratory equipment, EMC-related requirements.

II - Has been manufactured in accordance with the requirements of the European Directives relating to EEE design and WEEE management for the EU:

- Directive 2002/96/EC dated 27 January 2003 on Waste Electronic and Electrical Equipment (WEEE)
- Directive 2002/95/EC dated 27 January 2003 on the limitations for the use of certain hazardous substances in the construction of Electronic and Electrical Equipment (EEE).

Drawn up in Saint-Jorioz on 24 July 2007.

CEO - Stéphane SORLIN