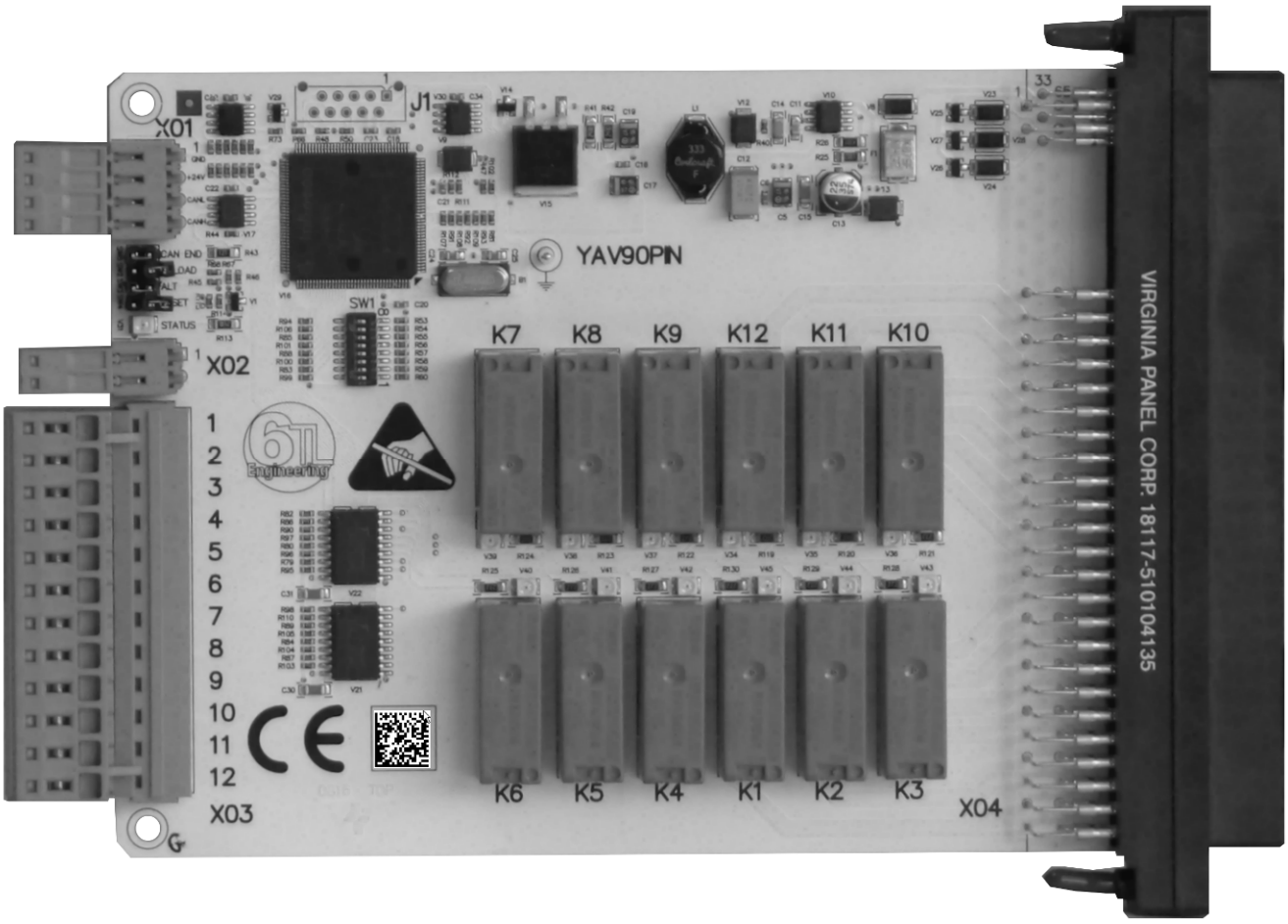
Created 13/02/07
Updated 24/11/09

12 power Relays

YAV90PIN

620018E1



This manual is related to the following product :

Product – P/N	**YAV90PIN**
Hardware version	**01**
Software version	**01**
Issued date	**11/07/2007**

Check signatures

Structure Sales	Contents Integrtation Mgr	Schematics R+D	Technical features R+D (Lab)

Document History

Version	Issued date	Reason
V1	09/2007	Preliminar version

TABLE OF CONTENTS

All **S.A. Sistel**'s hardware and software products are covered by national and international patents and/or copyright or with pending trade marks or patents. Any violation of the intellectual copyrights will be prosecuted with all legal means available.

S.A. Sistel Solsonès, 87-89 E-08211 BARCELONA

This technical information has been produced, written and checked ensuring the greatest accuracy and simplification. Despite this, should you find any mistake or detail that could contribute to improving the product or its documentation, we would appreciate you letting us know. Your contribution will be very welcome.

0. Before you begin

Thank you very much for purchasing this system/module.

This manual contains the information of the characteristics, performance and usage of the system/module required for using it.

When using the system, observe the following:

- Read this manual carefully to understand the contents well, and make the proper use of this system accordingly.
- Keep the manual safely for ready reference at any time. For basic operation of the system/module,alse read the relevant manuals carefully to understand the contents well, and then make the proper use of this system accordingly.

1. Safety

Follow the following safety measures to avoid and prevent damaging this product, products connected to it, or people.

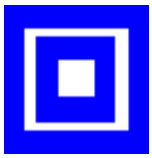
Only qualified and entitled[1] *personnel are authorized to carry out operations of installation and routine on the devices described in this manual. The company installing it would bear responsibility for any security or operating failure of the lift, when such failure is due to the parameters incorrect programming.*

The product described in this manual can be configured to comply with the ruling of different countries. The manufacturer does not hold any responsibility if the company installing it does not configured it according to the legal, commercial or security prescriptions that may be in force in the place of installation or otherwise agreed with the customer.

Should you need to access other components of the system while you are using this product, as a measure of precaution, read the *General Safety Summary* in the other products manual.

1.1 Symbols and safety terms

The following symbols may appear on the product or its documentation

			
DANGER High Voltage	Earth protection	WARNING See manual	Double isolation

Consult the specifications of the product for IEC Installation Category and Safety Classification.

[1] The qualified staff must have proved their technical knowledge of this product and should have the corresponding accreditation.

1.2 Precautions against damage to people

Do not work on the product with the power on.	To avoid electrical discharge, this product must not be handled with the system powered on and in any case can operate without the protective covers.
The device has mobile parts that can be in motion by operating electric or electronic control units.	Before starting any operation, make sure that there are no people who could be affected by any moving part.
Check through-out each one of the security devices before the unit comes into operation.	Each one of the safety switches must be individually checked and, under no circumstances, the device must remain on service without ensuring the correct operation of the security devices.

1.3 Precautions against damage to the product

Do not insert / unplug cards or other electronic elements when powered up	The connection/disconnection of the I/O's when plugged to the power could produce a sequence of connections that could damage electronic components which had been previously connected to their corresponding reference earth.
Do not use insulation testers.	The insulation testers work at very high voltages, and are capable of destroying the semiconductors. Under no circumstances should the "Megger" type of testers be used between electronic systems.
Do not force the connection tag strips	The connection tag strips are connected exerting a small pressure. If you encounter difficulty to plug them this may mean that they are upside down or not aligned. If they are forced, besides the damage to the strip you can cause damages on the electronics.
Secure the ground connections quality.	All the ground connections must be star-type and with the suitable section. Loop ground connections are potential receptor antennas with capacity to generate important current peaks.
Use suitable packing material for transportation	An electronic module with a lot of fragile components should be transported with a good protection packaging. A collision can cause damages that could appear long time after the start up.
Do not install this product near heat sources, strong vibrations or high humidity that exceeds the technical specifications.	Check that the product works without vibrations that exceed the maximum levels specified, and which could damage its integrity or cause a contact to become disconnected. The product should work without humidity and in the temperature range detailed in the technical specifications.

2. Limits of the guarantee

1. Products are supplied to the latest available development state at the time of manufacture. Should there be any future changes for functional or productive improvements of the products; the manufacturer does not hold any obligation to reprocess at no charge the products that have been already manufactured to upgrade them to the latest versions.
2. All the products supplied by S.A. Sistel have passed all established quality controls as well as the EMC (Electromagnetic Compatibility Checks). The manufacturer cannot be held responsible for any damage produced by defective manipulation, installation or incompatibility with other products.
3. The products' guarantee will only be in force when the installation has been done in accordance with the technical prescriptions in this manual and the settled general standards: Low Voltage Electro Technical Regulation (or equivalent for each country) and CE regulations for the Electromagnetic Compatibility.
4. The commutation of highly unsettling loads nearby (Frequency converters, doors operators, coils, fluorescent lamps, contactors, etc.), require the installation of the corresponding interference suppression/reduction resources and connections to earth are required[2]. If these requirements are not followed or are defectively installed there may be severe failures in the electronic devices, for which the installing company will be held responsible.
5. All equipment under guarantee that be sent for repair must have the manufacturing label with its serial number
6. The guarantee period is two working years.
7. Device operation under thermal or voltage conditions out of technical specifications detailed in this operation manual cancels guarantee terms.

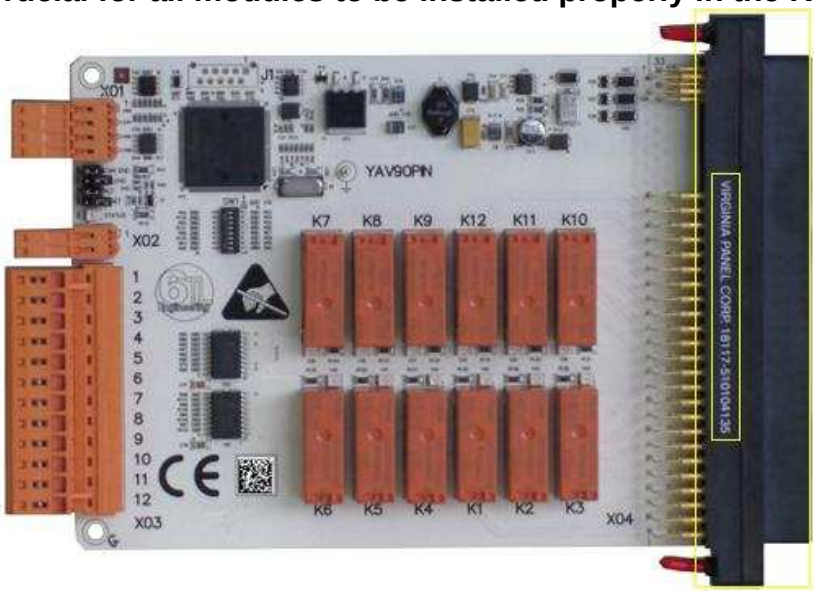
[2] RF filters on the input and output frequency converters, RC net, diodes and/or varistors in the coils, screened cables in the VVVF motors, screened starters, etc.

3. Install / Uninstall YAV boards into / from a VPC Receiver

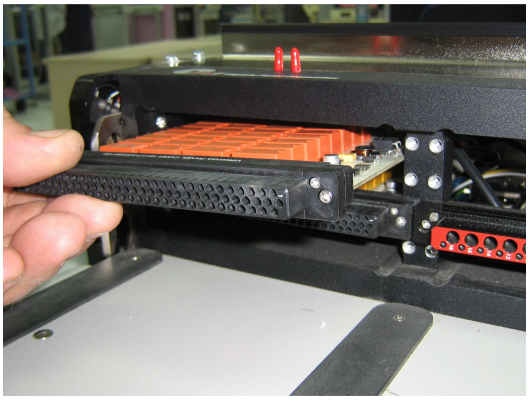
3.1 Receiver connector

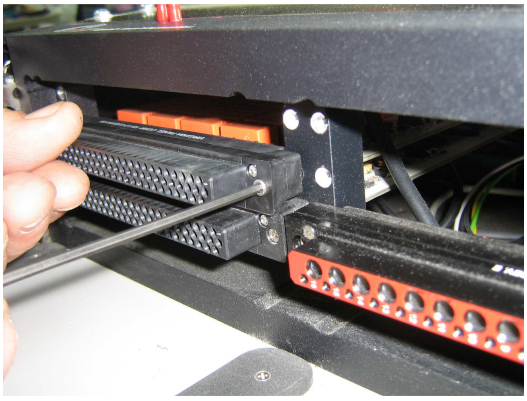
3.1.1 YAVs with 96 pin connector

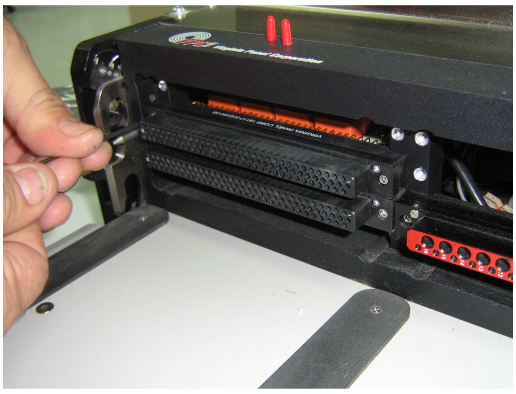
YAV boards are using a high reliable professional receiver connectors from VPC (Virginia Panel Corporation). **It is crucial for all modules to be installed properly in the Receiver.**



Following pictures are showing the sequence for mounting a YAV board into a VPC receiver. The boards are comming with Allen screws that will fit into receiver positions. 3/32 Allen Wrench is needed to screw the board into the receiver. Screw both sides evenly.







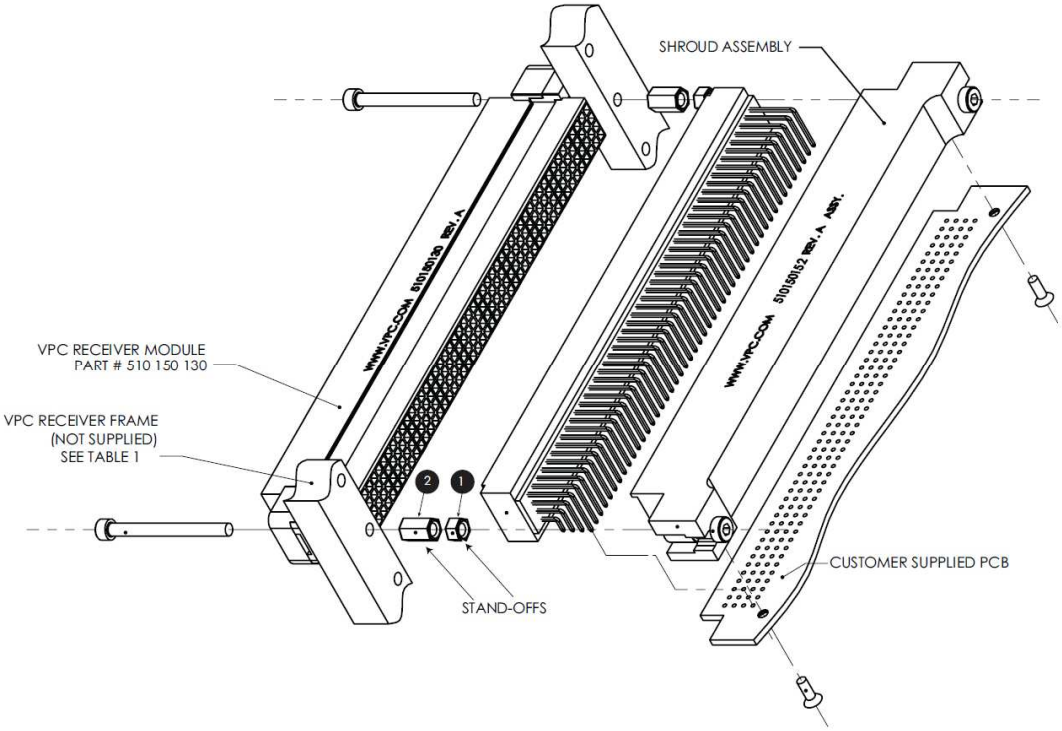
For removing the boards, unscrew and hold the board with two hands from both sides and pull straight out.

3.1.2 YAVs with 192 pin connector

Some YAV boards come with 192 pin connector P/N 510150152 from VPC (high density connector). As this connector is a male, it will be necessary to place an additional connector into the receiver, prior to connecting the YAV board.

Following image (source VPC) can be used to explain the procedure for mounting the YAV board.

Using the supplied 3/32 Allen wrench, install the receiver module into the receiver frame with the two 4-40 x 1¼ screws. Torque screws to 4 in-lbs [0.45 Nm]. Note that screw will extend approximately 0.75”-1.0” [19-25 mm] beyond the rear of the receiver frame.



Access the rear of the receiver frame and install the 4-40 stand-offs to the 4-40 X 1¼" module retaining screws. For G12 or 9025 receivers, use item 1 as stand-off (⅛" [3.18 mm] stand-off per mounting screw).

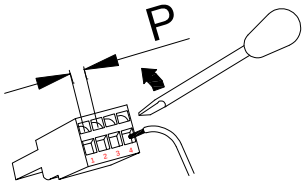
Using the 3/32 Allen wrench, carefully install the YAV board by tightening the retaining sockets, turning each no more than 1½ to 2 full revolutions before alternating to the other socket. Repeat this step until the YAV board is firmly engaged with the receiver module, taking care not to over-tighten. Torque screws to 4 in-lbs [0.45 Nm].

To remove the YAV board from the receiver frame and module, use the same alternating method of 1½ to 2 turns until YAV board is fully disengaged.

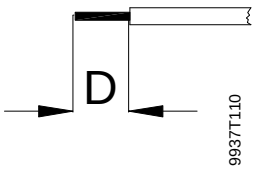
3.2 Connections

3.2.1 Connecting cables into YAV board terminals

Following table is to show the distance (D) at what we have to cut the isolation to connect a cable into the aerial clamp terminal that connects unto X1 of the YAV board.



P (mm)	D (mm)
3,5	6
5,08	10
7,62	10



4. Getting started with your YAV board

4.1 NI CAN board

To control the YAV board you will need a CAN interface. We recomend using NI-CAN, from National Instruments.

4.2 CAN bus wiring

- We need to supply CAN-H, CAN-L, +24Vdc and GND to X1 connector of the YAV board.

X1 connector of YAV board	
Pin	**Function**
1	0V
2	+24Vdc
3	CAN_Low
4	CAN_High

- 0V from NI-CAN and from YAV must be joined toghether in no galvanic isolation in the YAV.

4.3 PHI6-EXPLORER

- Install the Software PHI6-EXPLORER to manually control the board. Refer to PHI-6 software manual, our reference 680020Ex.

5. YAV boards overview

The use of YAV boards and modules provide a real technical, economical and logistic advantage against all other classic instrumentation solutions. YAV Boards are the solution for typical practical problems that occur while designing test platforms. They provide a considerably test system performance increase. The minimal amount of connections and wiring length reduction maintain the best quality and integrity of the signals and provide a short assembly and wiring time.

Being a combination of hardware modules and software drivers, the implementation of the YAV boards in your test system is very fast. When connected, the YAV boards are immediately operative. YAV Boards make your test system very flexible, re-configurable, easy to expand and maintain. Each board can work independently form the tester so you can just plug each of them directly into the ITA of a fixture to start debugging the software without the need of using the test platform. While the tester is being used to test electronics you have the advantage to debug or build any new configuration in a few minutes.

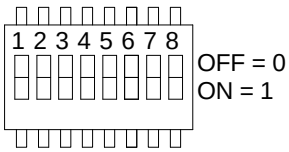
Can bus control has a big advantage; it provides all the control and power supply signals to power the YAV Boards in just 4 wires. Therefore the modules can be mounted in any part of the test system or test fixture. The Can bus transmission speed might be lower than the one available in parallel busses, but it is at least 100 times faster than the speed needed to control all the available functions in each of our YAV modules.

5.1 YAV boards common information

5.1.1 SW1 DIP switch functionality

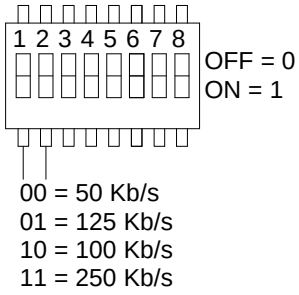
The eight switches contained in SW1 have the following functionality

- Set CAN bus speed
- Set board address



5.1.2 CAN bus communication speed.

Switches 1 and 2 set the CAN communication speed:



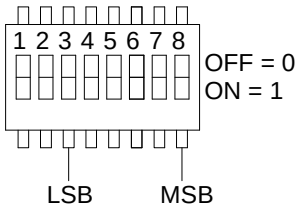
Select 50Kb/s to communicate with Phi6 and 6TL products. All devices communicating through the CAN network must have the same speed configured in order to communicate properly.

5.1.3 YAV board address

The logic address is composed by 2 elements: the module identificator and the hardware address.

The hardware address is selected by switches 3 to 8 of SW1, being 3 the least significant bit (LSB). The module identificator is contained in the board firmware and cannot be changed. There is a different identificator for each YAV board type. Therefore, boards of different module identificator can have the same hardware address.

Since there are 6 bits there are up to 64 possible addresses (from 0 to 63).



5.2 YAV boards standard addressing

Although the user can set any address for his modules, 6TL defines standard addressing for the modules that are installed by default in 6TL testing platforms.

The motivation is to ease compatibility between platforms and systems and 6TL strongly recommend following this standard in order to facilitate platforms setup and maintenance.

The following table shows the standard addressing for the YAV boards and modules installed in the different slots of the Virginia Panel receivers:

SW1 Address (Binary code) MSB LSB	Phi6 Address	Skeeter S6	Gemini 10	Gemini 12	Gemini 12X	Gemini 25	Gemini 50
00 0001	**1**	A1	1	A1	A1	1	1 UP
00 0010	**2**	A2	2	A2	A2	2	2 UP
00 0011	**3**	B1	3	A3	A3	3	3 UP
00 0100	**4**	B2	4	A4	A4	4	4 UP
00 0101	**5**	C1	5	B1	B1	5	5 UP
00 0110	**6**	C2	6	B2	B2	6	6 UP
00 0111	**7**		7	B3	B3	7	7 UP
00 1000	**8**		8	B4	B4	8	8 UP
00 1001	**9**		9	C1	C1	9	9 UP
00 1010	**10**		10	C2	C2	10	10 UP
00 1011	**11**			C3	C3	11	11 UP
00 1100	**12**			C4	C4	12	12 UP
00 1101	**13**				A5	13	13 UP
00 1110	**14**				A6	14	14 UP
00 1111	**15**				B5	15	15 UP
01 0000	**16**				B6	16	16 UP
01 0001	**17**				C5	17	17 UP
01 0010	**18**				C6	18	18 UP
01 0011	**19**					19	19 UP
01 0100	**20**					20	20 UP
01 0101	**21**					21	21 UP
01 0110	**22**					22	22 UP
01 0111	**23**					23	23 UP
01 1000	**24**					24	24 UP
01 1001	**25**					25	25 UP
01 1010	**26**						1 DOWN
01 1011	**27**						2 DOWN
01 1100	**28**						3 DOWN
01 1101	**29**						4 DOWN
01 1110	**30**						5 DOWN
01 1111	**31**						6 DOWN
10 0000	**32**						7 DOWN
10 0001	**33**						8 DOWN
10 0010	**34**						9 DOWN
10 0011	**35**						10 DOWN
10 0100	**36**						11 DOWN
10 0101	**37**						12 DOWN
10 0110	**38**						13 DOWN
10 0111	**39**						14 DOWN
10 1000	**40**						15 DOWN
10 1001	**41**						16 DOWN
10 1010	**42**						17 DOWN
10 1011	**43**						18 DOWN
10 1100	**44**						19 DOWN
10 1101	**45**						20 DOWN
10 1110	**46**						21 DOWN
10 1111	**47**						22 DOWN
11 0000	**48**						23 DOWN
11 0001	**49**						24 DOWN

11 0010	**50**						25 DOWN

Next table shows the list of YAV boards that are installed in each of the 6TL platforms. Note that the "Platform" column indicates whether the board is actually installed in the platform or not:

YAV Module Identificator	Phi6 Address	SW1 Address (Bin Code) MSB.....LSB	YAV Board	Firmware Name	Function (Board Alias)	Platform TTT-1	Platform 6TL-22	Platform 6TL-32	Module P/N
YAV90304	0	00 0000	MW0304	YAV-90304	6TL_Platform_Status	X	X		8TTT2BOX
YAV90304	63	11 1111	H5400 0100	MMI5400	6TL_MMI		X	X	H7300 03 XX
YAV90304	62	11 1110	YAV90304	YAV-90304	6TL_Beacon	-/X	-/X	-/X	H7800 10 XX
YAV90304	61	11 1101	MW0304	YAV-90304	6TL_Rejection_Channel	-/X	-/X		H7300 06 00
YAV90304	60	11 1100	8710061E02	R300K	6TL_Conveyor_Control			X	H710061
YAV90304	59	11 1011	8710061E02	R300K	6TL_Feed_Control			-/X	H710061
YAV90304	58	11 1010	8710061E02	R300K	6TL_Outp_Control			-/X	H710061
YAV90304	57	11 1001	YAV90304	YAV-90304	6TL_Apil_Control			-/X	H7800 10 XX
H710061	0	00 0000	8710061E02	H7100-61	6TL_Conveyor_Belt			X	H710061
H710061	1	00 0001	8710061E02	H7100-61	6TL_Conveyor_Wide			X	H710061
H710061	2	00 0010	8710061E02	H7100-61	6TL_Feed_Belt			-/X	H710061
H710061	3	00 0011	8710061E02	H7100-61	6TL_Feed_Wide			-/X	H710061
H710061	4	00 0100	8710061E02	H7100-61	6TL_Outp_Belt			-/X	H710061
H710061	5	00 0101	8710061E02	H7100-61	6TL_Outp_Wide			-/X	H710061
H710061	6	00 0110	8710061E02	H7100-61(V02.xx)	6TL_Apil_Belt			-/X	H710061
H710061	7	00 0111	8710061E02	H7100-61(V02.xx)	6TL_Apil_Wide			-/X	H710061
H710060	0	00 0000	87100600	H7100-60	6TL_Pusher		-/X	X	H710060
H710060	1	00 0001	87100600	H7100-60	6TL_Lifter			X	H710060
H710060	7	00 0111	87100600	H7100-60	6TL_Selector			-/X	H710060
YAVCANCON	0	00 0000	YAVCANCON	YAV-CANCON	6TL_Fixture_ID_Master	X	X	X	YAVCANCON
YAVCANCON	1	00 0001	YAVCANCON	YAV-CANCON	6TL_Fixture_ID_Slave		-/X	X	YAVCANCON
YAV90PNE*	25	01 1001	YAV90PNE	YAV-90PNE	6TL_Pneumatic			X	YAV90PNE

* Installed in G25 receiver

First (YAV Module Identificator) and second (Phi6 Address) columns are composing the address of the module when it is part of a 6TL testing platform.

There are some modules that do not feature SW1, therefore, user can not change the address. This modules are YAVCANCON's and the MMI, P/N H730003xx, and their address is programmed in the factory with the address shown in the table.

Fourth column (YAV board) refers to 6TL's internal code for the PCB HW used by the module.

Fifth column (Firmware name) is referring to 6TL's internal name given to the firmware running in the PCB HW of the module.

Sixth column (Function; Board Alias) refers to the default (and standard 6TL) name given by Phi6 to each board, depending on his function in the 6TL platform. These alias could be changed through Phi6 Explorer, edit Tags.

Seventh column (Platform) is informing about what platform uses what modules. A cross [X] is indicating that the module is always installed as standard delivery. A cross with bar [-/X] is indicating that that module is a potential option for that platform.

Eighth column (Module P/N) is showing the module commercial P/N of the module (Typically 8 or 9 digit number. If less numbers in the table, complete with 0's).

6. Certifications

89/336/CEE Directive Declaration of Conformity

S.A. Sistel declare, under our sole responsability, that the product

YAV90PIN – 12 Power Relays

to which this declaration relates, meets the provisions of the EU Directives listed below:

- Electro Magnetic Compatibility (EMC) directive, 89/336/ECC referreing to
- Low voltaje directive, 73/23/EEC

and therefore, the CE mark showed below is applied.

For accessories or other elements that can be connected to this product, see their corresponding Declaration of Conformities

The conformity mark is given by the CE mark and the year when it was applied

CE

Authorized by:

Representative: Jordi Batet
Title: General Manager

Company: SA Sistel - Barcelona

Barcelona, September 12h 2009

7. Description and main features

YAV90PIN board is designed to cover the need to control the available power supplies and loads in a test system. A VPC 90 series connector is used as interface with the fixture, guaranteeing more than 20.000 mating cycles. Two connector contacts per relay contact are used.

The board features three connectors in the back. X01 is used to power the board and to connect it to the CAN network. X02 is used to disconnect all the relays when needed (Enable function). This contact is usually in series with the security system (emergency stop,…)m to guarantee a rapid disconnection of all loads and power supplies to the DUT when necessary.

Each of the terminals featured in the X03 connector are connected to the fixture through relays or directly from the power supply. This configuration provides the option for the designer to connect, for instance, loads or power supplies needed inside the fixture directly or through a relay.

7.1 General features

- 12 relays 8A 250V
- Rear Plug in connector for power supplies and loads
- Inhibit input for disconnection of all realys
- CAN bus control
- VPC connector, with double tripaddle contact per connection

7.2 Typical applications with YAV90PIN

- Power input/output in test systems with VPC receivers

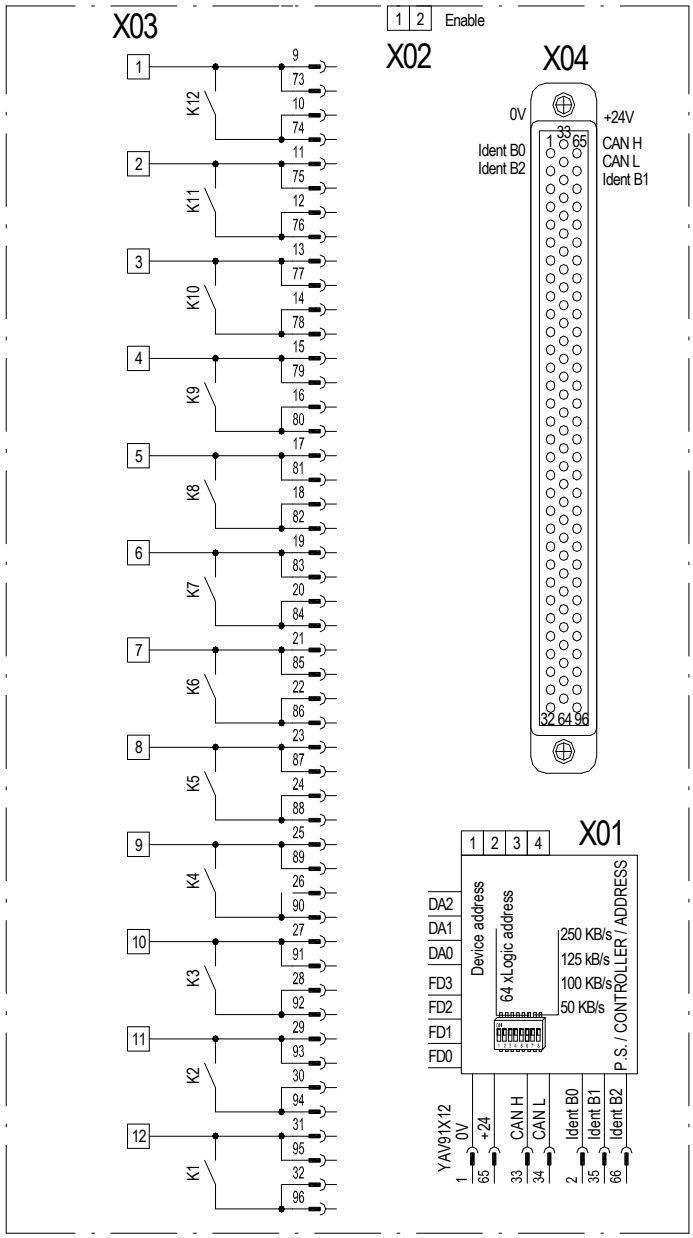
7.3 Ordering information

Descripción	P/N
12 Power Relays	**YAV90PIN**

7.4 Device electrical Characteristics

Parameter At Te= 5 … 65ºC, unless otherwise specified	**Symbol**	**Values**			**Unit**
		Min.	**Typ.**	**Max.**	
Operating Parameters					
Operating voltage	Vbb	18	-	30	V_{DC}
Operating current @24V_{DC}	I_{GND}	-	-	210	mA
Thermal Ratings					
Ambient operating temperature	T_A	5	-	70	ºC
Power Dissipation (T_A = 25 ºC)	P_D	-	-	4	W
Module Switching specifications					
Rated current (Cos ø =1)	I_N	-	-	8	A
Maximum switching voltage DC/AC	$V_{M\ DC/AC}$	-	240	-	V
Cable section in X03					
Section		0,13	-	3,31	mm^2
Relay Contact specifications					
Maximum switching power		-	1920	-	VA
Mechanical endurance		-	$30x10^6$	-	Cycles
Electrical endurance @8A Load Resistive		-	$>10^5$	-	Cycles
Operate time	T_{ON}	-	9	-	ms
Release time	T_{OFF}	-	5	-	ms

7.5 Block Diagram



7.6 Connectors & Jumpers

7.6.1 X1 Connector (Device Power & CAN)

Pin	Description
1	GND
2	+24V
3	CAN Low
4	CAN High

7.6.2 X2 Connector (Relays)

Module function	Receiver Pos. #	
YAV91X12: 12 Power relays	I.T.A. Module P/N	510 108 126
	I.T.A. contact P/N	610 110 108
	I.T.A. Patchcord	720 102 101

Pin	Description	Pin	Description	Pin	Description
1	0V	33	CAN L	65	+24V
2	Position ID Bit 0	34	CAN H	66	Position ID Bit 2
3		35	Position ID Bit 1	67	
4		36		68	
5		37		69	
6		38		70	
7		39		71	
8		40		72	
9	NO K12	41		73	NO K12
10	Common K12	42		74	Common K12
11	NO K11	43		75	NO K11
12	Common K11	44		76	Common K11
13	NO K10	45		77	NO K10
14	Common K10	46		78	Common K10
15	NO K9	47		79	NO K9
16	Common K9	48		80	Common K9
17	NO K8	49		81	NO K8
18	Common K8	50		82	Common K8
19	NO K7	51		83	NO K7
20	Common K7	52		84	Common K7
21	NO K6	53		85	NO K6
22	Common K6	54		86	Common K6
23	NO K5	55		87	NO K5
24	Common K5	56		88	Common K5
25	NO K4	57		89	NO K4
26	Common K4	58		90	Common K4
27	NO K3	59		91	NO K3
28	Common K3	60		92	Common K3
29	NO K2	61		93	NO K2
30	Common K2	62		94	Common K2
31	NO K1	63		95	NO K1
32	Common K1	64		96	Common K1

7.6.3 Jumpers

Jumper	Description
SW1: Address	CAN bus speed and the device address in the network can be set.
SW2: UPLOAD	**FACTORY USE; Must be OPEN when normal operation**. With the jumper set, we can enable the YAV board for firmware downloading through serial port
SW3: ALT	**FACTORY USE; Must be CLOSED when normal operation**. With the jumper set, we can enable the YAV board for firmware downloading through CAN bus
SW4: RESET	**FACTORY USE; Must be OPEN when normal operation**. Temporary bridge here, causes a reset of the board.
SW4: CANEND	When the device is network end, 120 Ohm resistor is mandatory. Bridging SW4, will place 120 Ohm resistor between CAN_High and CAN_Low.

7.6.4 LEDs

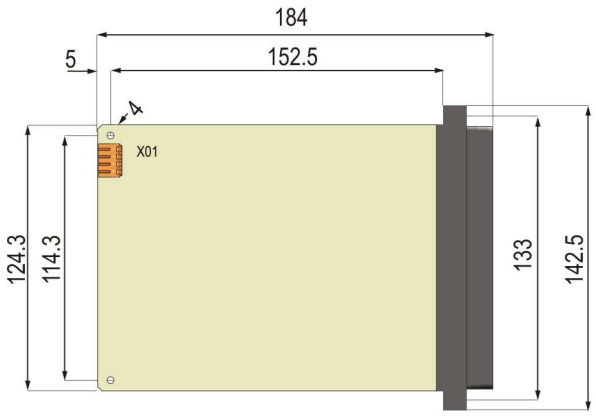
Led	Description
STATUS	This led will bright if the module has firmware loaded and is powered on. If the module is powered on but no firmware is running, led will not bright.

7.7 YAV90PIN Dimensions

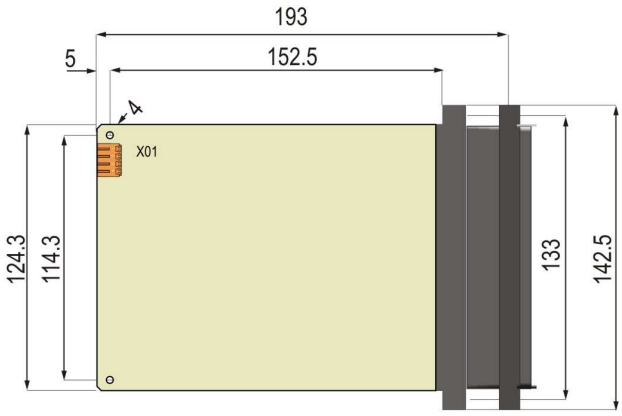
YAV boards for factors are showed below.

YAV90PIN is Form A.

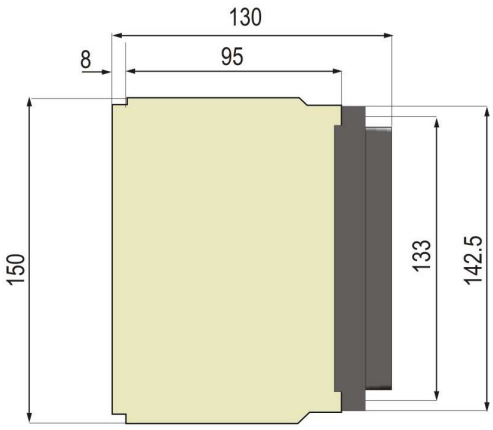
Form A (Tripaddle)



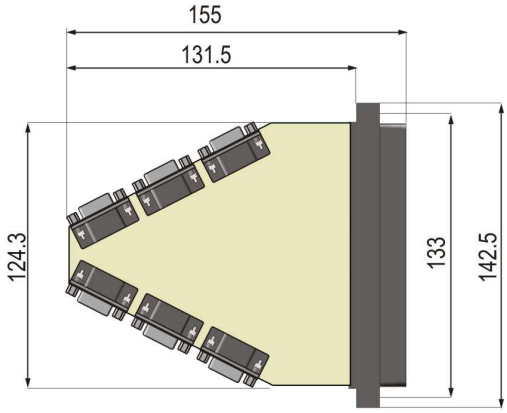
Form B (Quadrapaddle)



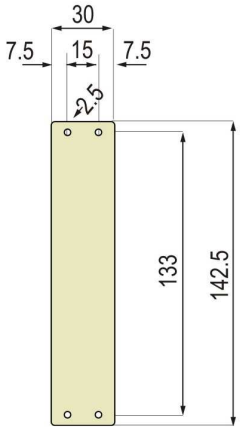
Form C (Tripaddle)



Form D (Tripaddle)



Form E (Module)



8. Low level CAN commands

Following, details on all CAN messages available to manage the YAV90PIN module

YAV90PIN

Action	Dir	Ident	Length	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Set OFF One Relay	Rx	0x155105xx	4	0x05	0x01	Relay	0x00				
Set ON One Relay	Rx	0x155105xx	4	0x05	0x01	Relay	0x01				
TOGGLE One Relay	Rx	0x155105xx	4	0x05	0x01	Relay	0x02				
BLINK One Relay	Rx	0x155105xx	4	0x05	0x01	Relay	0x03				
PULSE ON One Relay	Rx	0x155105xx	5	0x05	0x01	Relay	0x04	Time (10ms)			
PULSE OFF One Relay	Rx	0x155105xx	5	0x05	0x01	Relay	0x05	Time (10ms)			
ASK One Relay	Rx	0x155105xx	3	0x05	0x02	Relay					
One Relay Status	Tx	0x155205xx	4	0x05	0x02	Relay	Status				
Set OFF Several Relays	Rx	0x155105xx	7	0x05	0x03	Relays 0	Relays 1	0x00	0x00	0x00	
Set ON Several Relays	Rx	0x155105xx	7	0x05	0x03	Relays 0	Relays 1	0x00	0x00	0x01	
TOGGLE Several Relays	Rx	0x155105xx	7	0x05	0x03	Relays 0	Relays 1	0x00	0x00	0x02	
BLINK Several Relays	Rx	0x155105xx	7	0x05	0x03	Relays 0	Relays 1	0x00	0x00	0x03	
PULSE ON Several Relays	Rx	0x155105xx	8	0x05	0x03	Relays 0	Relays 1	0x00	0x00	0x04	Time (10ms)
PULSE OFF Several Relays	Rx	0x155105xx	8	0x05	0x03	Relays 0	Relays 1	0x00	0x00	0x05	Time (10ms)
Set OUT All Relays	Rx	0x155105xx	7	0x05	0x03	Relays 0	Relays 1	0x00	0x00	0x06	
ASK ALL Relays	Rx	0x155105xx	3	0x05	0x04	Autosend					
All Relays Status	Tx	0x155205xx	6	0x05	0x04	Relays 0	Relays 1	0x00	0x00		

Action	Dir	Ident	Length	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Read I2C Data Word 24LC256	Rx	0x155105xx	5	0x05	0xFA	0xF1	ADD LOW	ADD HIGH			
Write I2C Data Word 24LC256	Rx	0x155105xx	7	0x05	0xFA	0xF2	ADD LOW	ADD HIGH	DAT LOW	DAT HIGH	
Write I2C Page (32 Words) 24LC256	Rx	0x155105xx	7	0x05	0xFA	0xF3	ADD LOW	ADD HIGH	DAT LOW	DAT HIGH	
Write I2C All (16384 Words) 24LC256	Rx	0x155105xx	5	0x05	0xFA	0xF4	DAT LOW	DAT HIGH			
Data Word Readed I2C 24LC256	Tx	0x155205xx	7	0x05	0xFA	0xF1	ADD LOW	ADD HIGH	DAT LOW	DAT HIGH	
Action I2C OK 24LC256	Tx	0x155205xx	3	0x05	0xFA	0xF2					
Action I2C NOT OK 24LC256	Tx	0x155205xx	3	0x05	0xFA	0xF3					

8.1 Example: Managing a YAV board using C language

Following example is showing how to manage a YAV board by using NI-CAN interface and C language.

We strongly recommend the software engineer to read NI-CAN manual for clear understanding on how to implement the communication with YAV boards (http://www.ni.com/pdf/manuals/370289k.pdf)

The YAV board used for this example is YAV904X8.

```
/*********************************************************
Example showing how to command the YAV904X8 board from a PC,
using a National Instruments NICAN interface board.

To be compiled with MS Visual C as a console application.
*********************************************************/

#include <stdio.h>      // Include file for printf
#include <stdlib.h>     // Include file for strtol
#include <windows.h>    // Include file for Win32 time functions
#include <conio.h>      // Include file for _getch/_kbhit
#include <string.h>
```

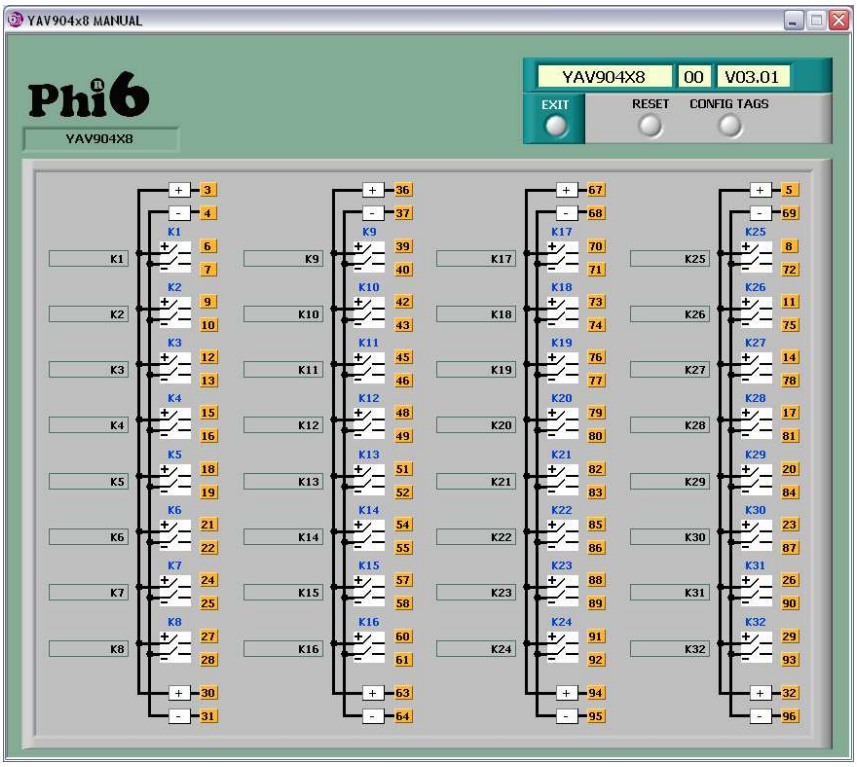
```
#include "Nican.h"      // Include file for NI-CAN functions and constants

/* NI-CAN handle */
NCTYPE_OBJH TxHandle=0;

/* Print a description of an NI-CAN error/warning. */
void PrintStat(NCTYPE_STATUS status, char *source)
{
    char statusString[1024];

    if (status != 0)
    {
        ncStatusToString(status, sizeof(statusString), statusString);
        printf("\n%s\nSource = %s\n", statusString, source);

        // close object handle, then exit.
        ncCloseObject(TxHandle);
        exit(1);
    }
}

int main ()
{

    NCTYPE_STATUS       Status;
    NCTYPE_CAN_FRAME    Transmit;
    NCTYPE_ATTRID       AttrIdList[8];
    NCTYPE_UINT32       AttrValueList[8];
    NCTYPE_UINT32       Baudrate = 50000;
    char                Interface[7] = "CAN0";
    int                 ch;

    /* Configure the CAN Network Interface Object */
    AttrIdList[0] =    NC_ATTR_BAUD_RATE;
    AttrValueList[0] = Baudrate;
    AttrIdList[1] =    NC_ATTR_START_ON_OPEN;
    AttrValueList[1] = NC_TRUE;
    AttrIdList[2] =    NC_ATTR_READ_Q_LEN;
    AttrValueList[2] = 0;
    AttrIdList[3] =    NC_ATTR_WRITE_Q_LEN;
    AttrValueList[3] = 1;
    AttrIdList[4] =    NC_ATTR_CAN_COMP_STD;
    AttrValueList[4] = 0;
    AttrIdList[5] =    NC_ATTR_CAN_MASK_STD;
    AttrValueList[5] = NC_CAN_MASK_STD_DONTCARE;
    AttrIdList[6] =    NC_ATTR_CAN_COMP_XTD;
    AttrValueList[6] = 0;
    AttrIdList[7] =    NC_ATTR_CAN_MASK_XTD;
    AttrValueList[7] = NC_CAN_MASK_XTD_DONTCARE;

    Status = ncConfig(Interface, 8, AttrIdList, AttrValueList);
    if (Status < 0)
    {
        PrintStat(Status, "ncConfig");
    }

    /* open the CAN Network Interface Object */
    Status = ncOpenObject(Interface, &TxHandle);
    if (Status < 0)
    {
        PrintStat(Status, "ncOpenObject");
    }


    /* print the Help to the I/O window */
    printf("\n\ninitialized successfuly on CAN0 ...\n\nPress 't' to transmit a frame \n\nPress 'q' to
quit \n\n");

    /* Pulse YAV904X8 relay 1 second, each time the user is pressing a key */
    do
    {
        ch = _getch();
```

```
        if (ch == 't')
        {
            Transmit.Data[0]        = 0x02;         // YAV command prefix
            Transmit.Data[1]        = 0x01;         // YAV command prefix
            Transmit.Data[2]        = 0x00;         // relay number
            Transmit.Data[3]        = 0x01;         // YAV set relay ON command
            Transmit.DataLength     = 4;            // Set CAN frame lenght
            Transmit.IsRemote       = 0;            // This is not a remote frame
            Transmit.ArbitrationId  = 0x15510200;   // assume board address is 0
            Transmit.ArbitrationId |= 0x20000000;   // NICAN specific, set 29 bit id length

            Status= ncWrite(TxHandle, sizeof(Transmit), &Transmit);
            if (Status < 0)
            {
                PrintStat(Status, "ncWrite");
            }

            Sleep(1000);

            Transmit.Data[0]        = 0x02;         // YAV command prefix
            Transmit.Data[1]        = 0x01;         // YAV command prefix
            Transmit.Data[2]        = 0x00;         // relay number
            Transmit.Data[3]        = 0x00;         // YAV set relay OFF command
            Transmit.DataLength     = 4;            // Set CAN frame lenght
            Transmit.IsRemote       = 0;            // This is not a remote frame
            Transmit.ArbitrationId  = 0x15510200;   // assume board address is 0
            Transmit.ArbitrationId |= 0x20000000;   // NICAN specific, set 29 bit id length

            Status= ncWrite(TxHandle, sizeof(Transmit), &Transmit);
            if (Status < 0)
            {
                PrintStat(Status, "ncWrite");
            }

            Sleep(1000);
        }
    } while (ch != 'q');

    /* Close the Network Interface Object */
    Status = ncCloseObject(TxHandle);
    if (Status < 0)
    {
        PrintStat(Status, "ncCloseObject");
    }

    return 0;
}
```

9. PHI6-Explorer panel

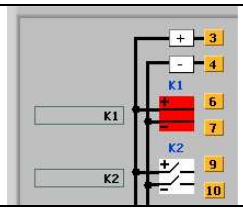
Thanks to the PHI6-EXPLORER panel, the operator can manage YAV904X8 board manually. This is a very powerful tool for table-top debugging of test-systems or system maintenance on-site.

The interface is very user-friendly:



Activating a relays

By clicking a relays in the panel, the relays will close, and its status in the panel will change. See image, with K1 in 'closed' status.



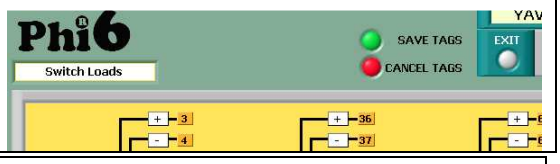
Reset

Reset button will put all relays in 'Open' status.

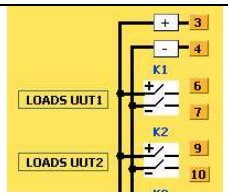
Config tags

We can give a the name desired to each relays in the board with this function. By clicking this button, the panel will change its background color from grey to yellow, and we will be able to change tags.

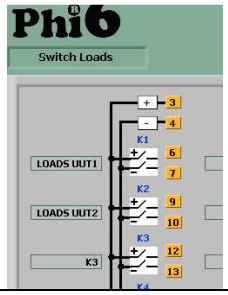
In the image left hand, the user is changing the tag of the module. Now, for the environment, the board will be called 'Switch boards'.



The name of K1 and K2 has also been changed, because in his design, the user will connect pins 3 and 4 to a load that is shared by different UUTs.



When pushing 'save tags' green button, changes will be set and the background will be grey again.



Exit
Click this button to exit the phi6 panel.