

# ROSTEC Engineering

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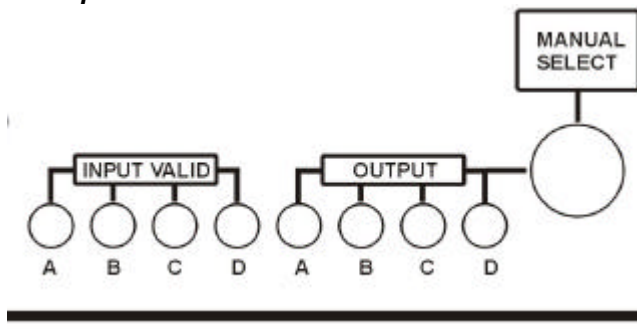
## ROSTEC AS41 T1/E1 Autoswitch G.703 / 704/ 1.544 MHz / 2.048 MHz Autoswitch for the GPU frame

### General Description

The AS41 is an automatic/manual 4 into 1 data switch intended for use in the GPU frame. The switch runs in two distinct modes, selected by a jumper on the PCB.

When the G703/704 mode is selected, inputs and output are compliant with the ITU G703 Pulse Mask Template. When the 2.048 MHz mode is selected, inputs and output are TTL compatible. The auto/manual switching function is identical in both modes. However, the input detectors validity criteria differ in the two modes.

### Front panel



The INPUT VALID LEDs indicate validity for each of the four input signals, based on the detectors LOS criterion. (Loss Of Signal)  
The OUTPUT LEDs indicate which input is routed to the output, selected either by the auto function or the manual select switch.

### Automatic and manual switching

Only valid inputs will be routed to the output, and only one input can be routed at a time.  
At power up the circuit establishes a default input priority order as A B C D, i.e. it starts by selecting input A. If A is not valid, it jumps to B and stays if it is valid. If B is not valid it jumps to C and so on. The search for a valid input goes in a ring like A B C D A B etc.  
If no input is valid, the output is disabled.  
Pushing MANUAL SELECT on the front panel will initiate an unconditional jump to the next input in the priority order. If this input happens to be not valid, the switch will automatically jump to the next valid input.

The automatic switching has a **fast** and a **slow** mode setting, selected by a jumper on the PCB.  
In **slow** mode, the circuit will accept an absence of signal for 1 second before declaring the input not valid. If the signal returns before the 1 second time out, the switch will not initiate a jump.  
In **fast** mode, the switch jumps immediately when the input detector declares the input not valid (see detector specs below).

### External Alarm

An alarm output to a LED is available on pin 19 on the back panel connector. The output goes high

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when an automatic jump has taken place. It is reset by bringing pin 6 to ground.  
The alarm is not initiated by a manually initiated jump.

## ***G703/704 detector***

The switch contains four independent transformer balanced receiver channels, compliant with ITU G.703 Pulse Mask Template for 2.048Mbps (E1) Rates  
Each channel performs the receiver functions necessary to provide a LOS indication signal with thresholds and delay that comply with the ITU G.775 requirements. The LOS signals are sent to the microprocessor to facilitate auto switching.

Loss of signal is detected upon receiving from 10 to 255 consecutive zeroes, depending on signal amplitude. The signal is accepted again when the signal has more than 10 transitions based on 255 bits periods

The incoming signal is sampled and evaluated by means of a precision peak detector and a 50% slicing circuit, establishing a threshold that accepts up to 12 dB of line loss.

The switch also has dynamic duty cycle correction circuitry and active pulse shaping ensuring output pulses are fully compliant with the G703 Pulse Mask Template.

## ***1.544/2.048 MHz detector***

The switch contains four independent peak detectors and comparators with fixed thresholds and fast attack and release times.

The LOS signals are sent to the microprocessor to facilitate auto switching

Loss of signal is detected when input amplitude is below 1.8 Volt peak and is accepted again when slightly above this threshold.

The attack time is approx. 2 usec, release time is approx. 20 usec.

The circuit also performs active pulse shaping before the signal is routed to the output.

## ***Input circuit***

The four input circuits are transformer balanced and 75 Ohms terminated/ 4 kohms unterminated. Four jumpers on the PCB are available for termination of the individual channels.

## ***Output circuit***

The output circuit is transformer balanced 75 ohms. The output level is 2.5 Volts into 75 Ohms when 2.048 MHz mode is selected.

When G703/704 mode is selected, the output is 5 Volts into 75 ohms (+/- 2.5 Volts as described in G703 requirements)

## ***Back Panel***

On the back panel connector of the GPU are five outputs and one input that can be connected to a separate LED and switch panel.

One ALARM output: This output becomes active when an automatic jump has taken place.

Four Output LEDs: These outputs mirror the status of the OUTPUT LEDs on the front plate.

One external switch input: This input has two modes selected by a jumper on the PCB.

In MANUAL SWITCHING mode the input is connected directly in parallel with the switch on the front plate.

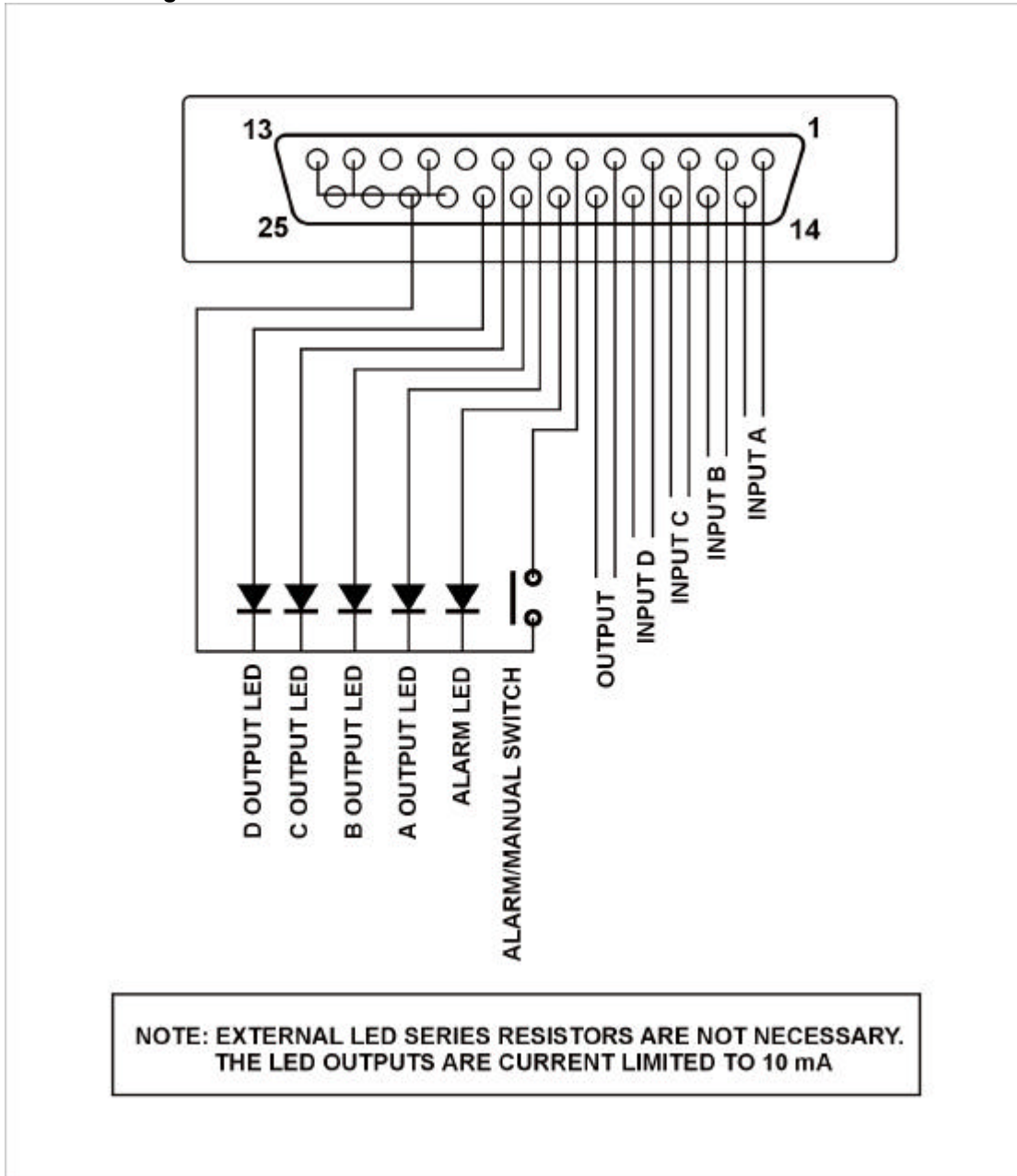
In EXTERNAL ALARM mode, the input is used to reset the alarm indication.

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## External wiring



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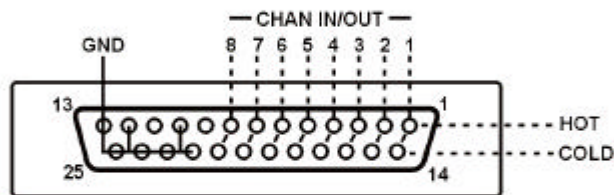
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## Input/output connections

### IN/OUT CONNECTIONS AS41

#### 25 POLE SUB-D FEMALE CONNECTOR AT THE GPU BACK PANEL

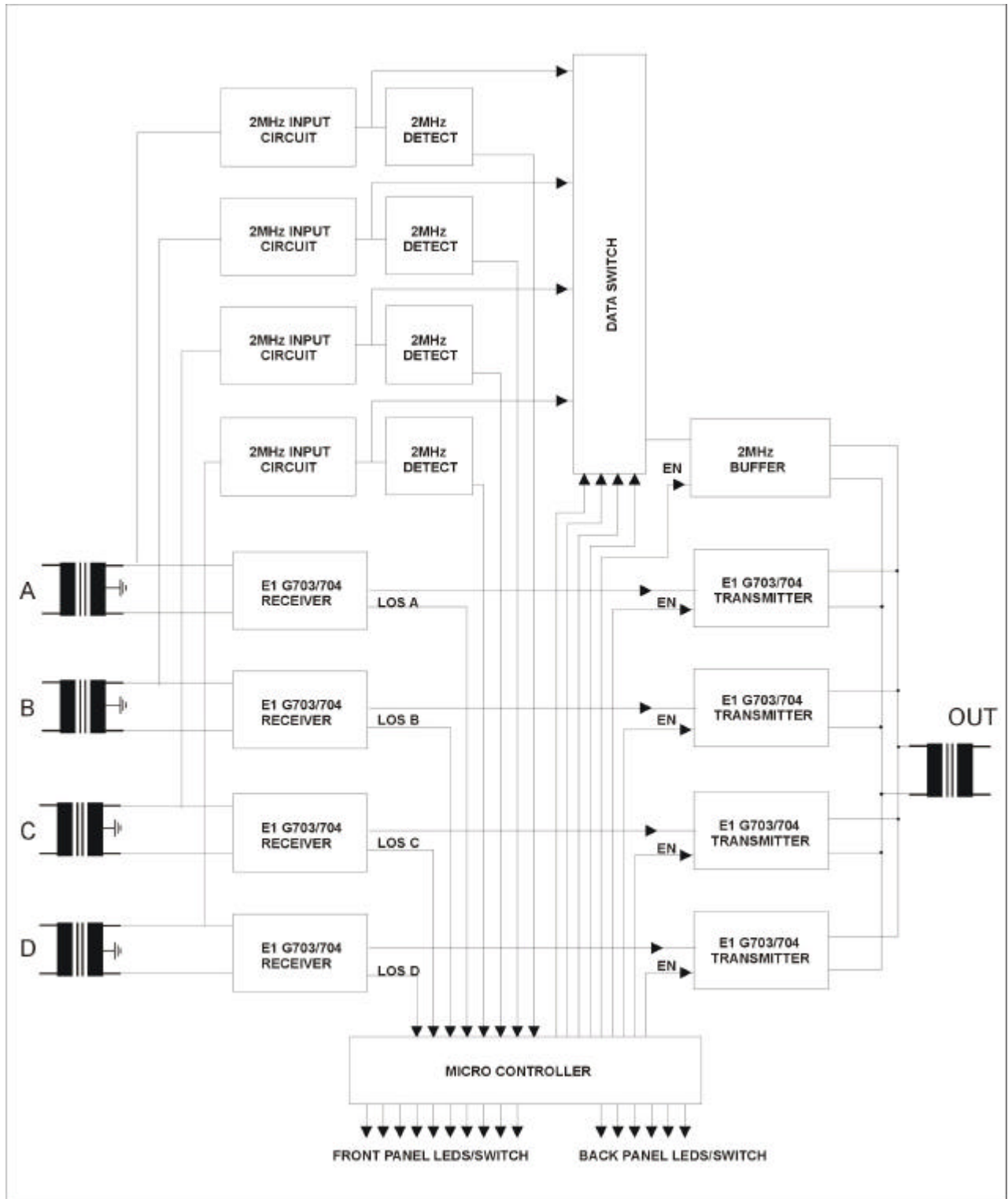


INPUT A : Hot pin1, Cold pin14  
INPUT B : Hot pin2, Cold pin15  
INPUT C : Hot pin3, Cold pin16  
INPUT D : Hot pin4, Cold pin17  
OUTPUT : Hot pin5, Cold pin18  
ALARM SWITCH : pin6  
ALARM LED : pin19  
A OUTPUT LED : pin7  
B OUTPUT LED : pin20  
C OUTPUT LED : pin8  
D OUTPUT LED : pin21

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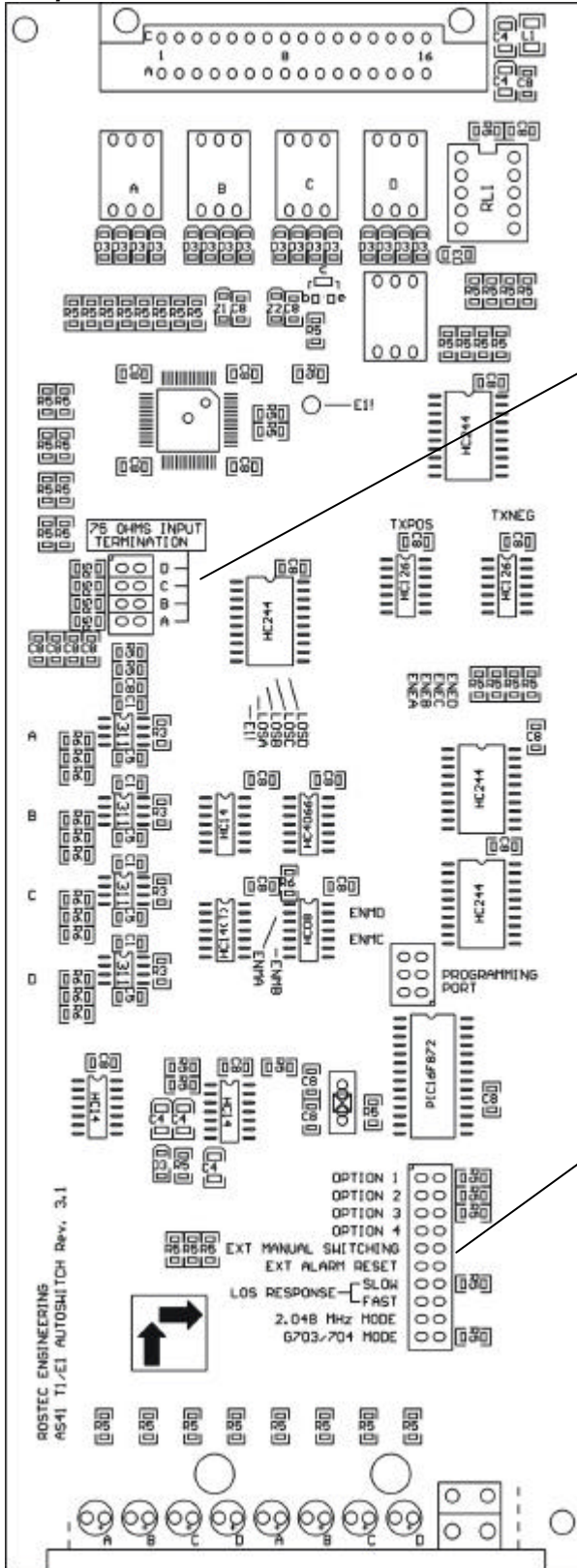
## Block schematic



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## Jumpers on the PCB



Individual channel Input termination.  
 A jumper placed here selects 75 ohms input impedance. No jumper selects no termination.

**Option 1 -4**  
 Future use

**Ext. manual switching**  
 An external switch connected to pin 6 on the back panel connector will be connected in parallel with the front plate switch.

**Ext. alarm reset**  
 An external switch connected to pin 6 on the back panel connector will function as a reset for the alarm indication

**Los response slow/fast**  
 These two jumpers set the response time for the automatic switching. Slow is 1 second. Fast is as fast as the input detectors react.

**2.048 MHz mode**  
 A jumper placed here selects 2.048 MHz mode and TTL compatibility.

**G703/704 mode**  
 A jumper placed here selects E1/T1 mode and G703 compatibility

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## Electrical specifications

G703/704 input:	Impedance 75 ohms/4 kohms transformer balanced Nominal sensitivity 2.37 Volts peak Allowable cable loss < 12 dB Compliant with ITU G.775 LOS Declaration/Clearing Receiver return loss < 18 dB at 2.048 MHz Return loss exceeds ITU G.703
1.544/2.048 MHz input:	Impedance 75 ohms/4 kohms transformer balanced Nominal sensitivity 2.5 Volts peak Detector threshold 1.8 Volts peak LOS Declaration/Clearing 20usec/2usec Receiver return loss < 18 dB at 2.048 MHz
Output:	Impedance 75 ohms Output level G703/704 mode +/- 2.5 Volts into 75 ohms Output level 2.048 MHz mode 2.5 volts into 75 ohms Max output swing 10 Volts Return loss exceeds ETSI 300 166 specification (G703/704 mode) Output pulse width 244 nsec +/-10% (G703/704 mode) Delay in/out G703/704 mode < 80 nsec Delay in/out 2.048 MHz mode < 40 nsec

## G703 Pulse Mask template:

