plura

TIMING SOLUTIONS

Rubidium Series
Standalone Systems

Alarm GPO

Rubidium Switcher
SB, SI, SL, SR, SV, SW
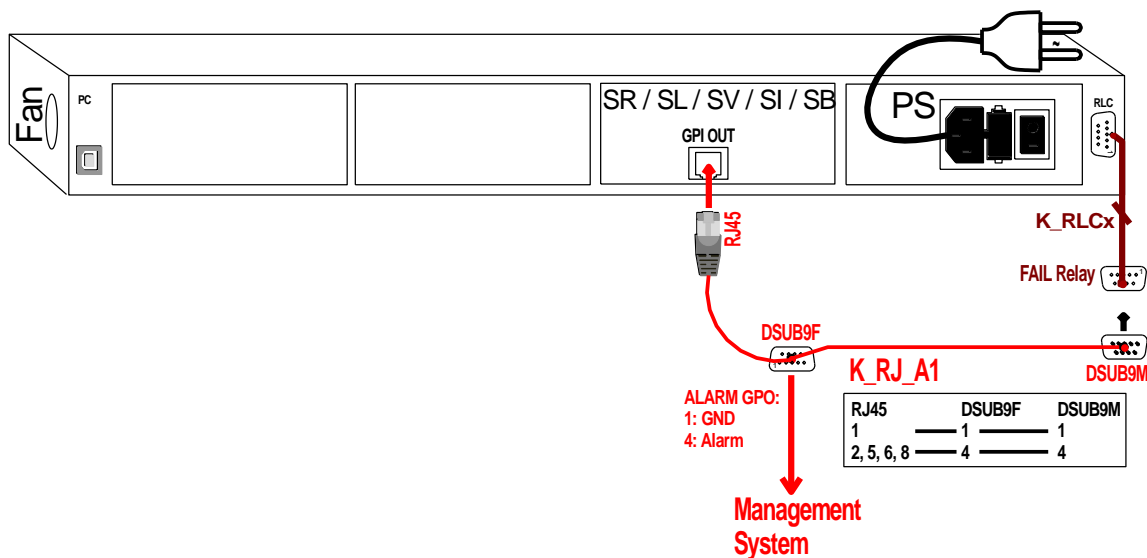
Rubidium Application Note
Revision: 5
February 7, 2024

"Alarm GPO" offers a simple way of monitoring a RUBIDIUM system. The idea is to have a single alarm which indicates signal failures in a redundant system as well as a failure of any module including power supply and fan. This can be achieved combining the GPI/GPO outputs of the changeover ("S" modules) with the FAIL relay outputs.

In a system of more than one RUBIDIUM chassis, please have the chassis interconnected with the supplied RLC cable.
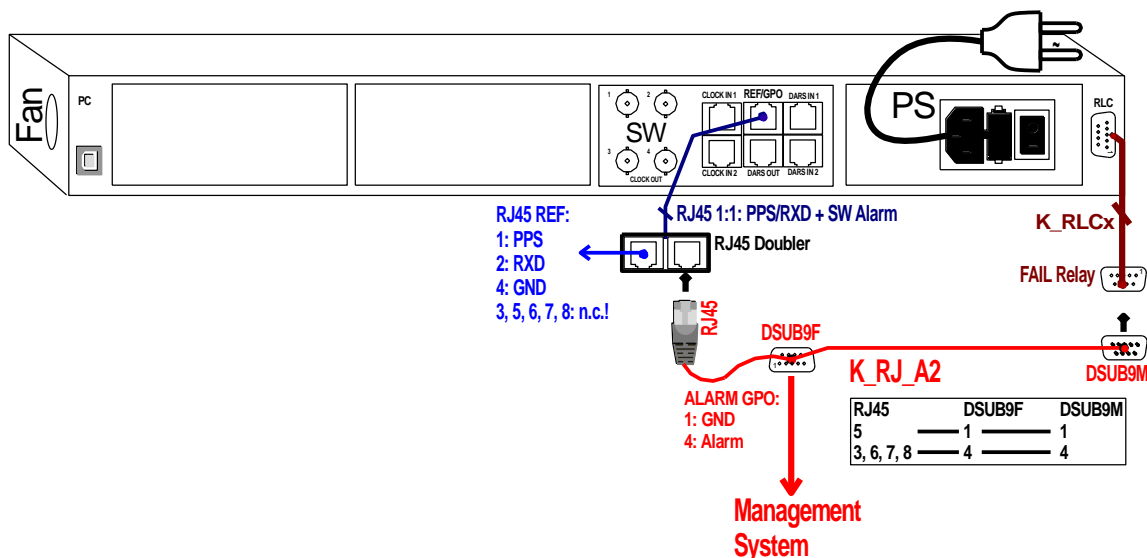
Any failure condition raises an alarm by short-circuiting the Alarm signal to GND.

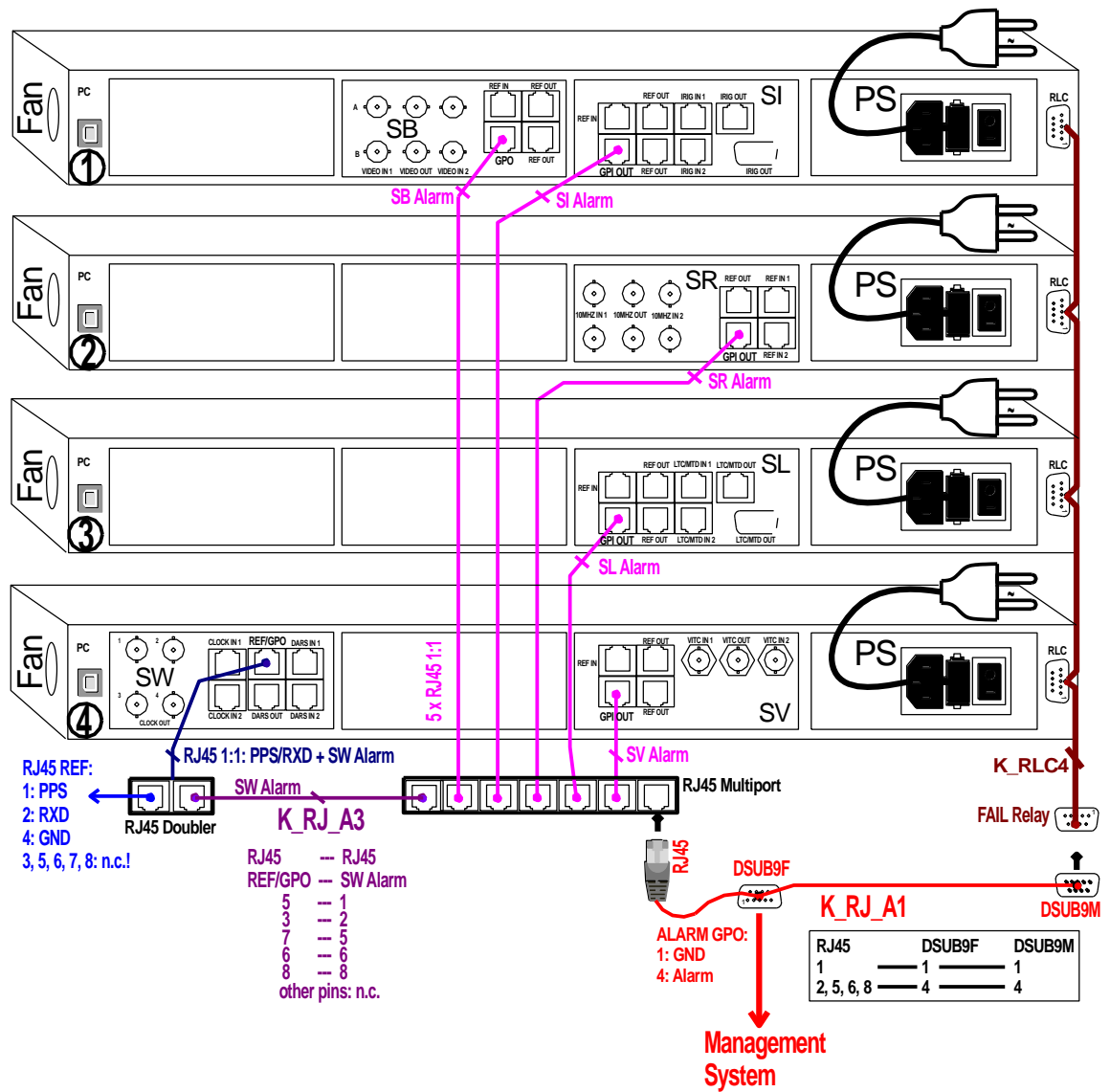Please connect the Alarm signal to a suitable GPI management system.

Connection in a system with only one changeover module SR or SL or SV or SI or SB:

RJ45	DSUB9F	DSUB9M
1	1	1
2, 5, 6, 8	4	4

ALARM GPO:
1: GND
4: Alarm

K_RJ_A1

Management System

Connection in a system with only one changeover module SW:

RJ45 REF:
1: PPS
2: RXD
4: GND
3, 5, 6, 7, 8: n.c.!

RJ45 1:1: PPS/RXD + SW Alarm
RJ45 Doubler

ALARM GPO:
1: GND
4: Alarm

K_RJ_A2

RJ45	DSUB9F	DSUB9M
5	1	1
3, 6, 7, 8	4	4

Management System

Connection in a system with various changeover modules:

1.1   In case of an alarm: How you find out the source of the failure

First Step:

Disconnect the RJ45 of the K_RJ_A1 (K_RJ_A2) adapter but keep the DSUB9M of the adapter connected. If the alarm disappears, you can be sure that no FAIL alarm has been raised. It is now sufficient to evaluate the "Changeover Alarm" section.

If the alarm still is indicated:

Disconnect the DSUB9M of the K_RJ_A1 (K_RJ_A2) adapter and connect the RJ45 of this adapter. If the alarm disappears, you can be sure that no changeover alarm has been raised. It is now sufficient to evaluate the "FAIL Relay Alarm" section.

If the alarm still is indicated: Evaluate the "FAIL Relay Alarm" and the "Changeover Alarm" sections.

FAIL Relay Alarm:

The FAIL relay indicates a complete failure of a module. Especially it indicates a failure of a fan or a power supply module. It is important to check the fans and the power supplies in any case – no matter what the source of the failure will be at the end.

Check the fans:

Just verify that there is sufficient air flowing out of the ventilation openings. Check it with your fingers or with a small piece of paper. Testing it this way is much more convincing than watching the status monitor.

At the H1 or D1 chassis: The ventilation opening is located at the left side of the chassis looking at the rear.

At the H3 chassis: Two fans are located behind the front plate. Unscrew both the collar screws and then fold down the front plate.

Check the power supplies:

The FAIL relay of the power supply raises an alarm if the output voltage (nominal 23.7 V) falls below 20 V approximately.

At the H1 chassis: Look at the front. The OPER LED of the power supply should light up. If not, this power supply has been damaged. Additionally, you may open the status monitor of a module in this chassis. The module should have the "Fan monitoring" at the **System** function enabled.

At the H3 chassis: Open the status monitor of a module in this chassis. The module should have the "Fan monitoring" at the **System** function enabled.

Check the modules:

If any other module raises the FAIL alarm, you probably will notice any malfunction or any failure of output signals.

Changeover Alarm:

Open the status monitor of the changeover module(s). In case of a H1 or D1 chassis, you may have a look at the front. If the lamp of the FAIL button or the ERROR LED is lighting, than choose this changeover unit for your first check.

The status monitor indicates every failure and error.

Alarms of individual errors can be disabled via configuration. In case of such an error, this error will be indicated but no alarm or warning has been raised.

Having finished your check, you can reset all error counters and error indications:
- Clicking the **Error Reset** button on the "Switcher" page of one of our configuration tools.
- For modules in a H1 or D1 chassis: By pressing the **FAIL** button on the front.

If you are not sure about the meaning of individual errors, please send screen shots of the status monitor pages to *Alpermann+Velte* and ask for assistance.

SR: The standard configuration of the four GPI outputs is:

GPI_1 = RJ45.2 = Signal 1 Fail.

GPI_2 = RJ45.6 = Signal 2 Fail.

GPI_3 = RJ45.5 = Signal 1 Warning.

GPI_4 = RJ45.8 = Signal 2 Warning.

Signal 1/2 Fail: Active under one of the following conditions:
- PPS/serial timeout: No valid reference signal (PPS or serial data) received since about 20 seconds.
  REF IN cable defective or unplugged? GPS receiver defective?

- Sync loss fail: The duration of an "unlock" status exceeds the limit "Limit Sync Loss Fail".
  GPS antenna or antenna cable defective? GPS receiver defective?

- Cont. wave: Continuous wave (10 MHz) at input A or B has a failure.
  One of the 10 MHz IN cables defective or unplugged? GPS receiver defective?

Signal 1/2 Warning: Active under one of the following conditions:
- PPS timeout: No valid PPS signal received since about 10 seconds.
  REF IN cable defective or unplugged? GPS receiver defective?

- PPS timing: The interval between two consecutive PPS signals does not correspond to one second.
  GPS receiver defective? GPS antenna signals disturbed?

- Serial timing: The serial data string is not synchronized with the PPS.
  GPS receiver defective? GPS antenna signals disturbed?

- Serial sequence: Time discontinuity detected. This yields an error even at a valid time discontinuity in case of a leap second or a DST switching of a local time zone.
  Leap second? DST switching? GPS receiver defective? GPS antenna signals disturbed?

- Sync loss error: The duration of an "unlock" status exceeds the limit "Limit Sync Loss Error".
  GPS antenna or antenna cable defective? GPS receiver defective?

SI: The standard configuration of the four GPI outputs is:

GPI_1 = RJ45.2 = Signal 1 Fail.

GPI_2 = RJ45.6 = Signal 2 Fail.

GPI_3 = RJ45.5 = Signal 1 Warning.

GPI_4 = RJ45.8 = Signal 2 Warning.

Signal 1/2 Fail: Active under one of the following conditions:

- Timeout: No valid IRIG format detected since about one second or no valid IRIG time data detected since about 3.5 seconds.
  IRIG IN cable defective or unplugged? IRIG generator defective? IRIG input circuit of the "SI" module defective?

- Sequence: IRIG signal produces multiple drop-outs or time discontinuities.
  IRIG synchronization of the generator defective?

- Data: Invalid data detected: Time, day of year, or SBS > 86400.
  Incorrect set-up of the IRIG generator?

- TC/ref fail: The difference between IRIG time and reference time exceeds the limit "Limit TC/Ref Fail".
  Incorrect set-up of the IRIG generator? IRIG generator does not receive the time & date reference signals?

Signal 1/2 Warning: Active under one of the following conditions:

- TC/ref error: The difference between IRIG time and reference time exceeds the limit "Limit TC/Ref Error".
  Incorrect set-up of the IRIG generator? IRIG generator does not receive the time & date reference signals?

- Lock range: The difference between IRIG time and reference time exceeds the limit "Limit Lock".
  Incorrect set-up of the IRIG generator? IRIG generator does not receive the time & date reference signals?

- Lock drift: The difference between IRIG time and reference time exceeds the limit "Limit Drift".
  Incorrect set-up of the IRIG generator? IRIG generator does not receive the time & date reference signals?

SL: The standard configuration of the four GPI outputs is:

GPI_1 = RJ45.2 = Signal 1 Fail.

GPI_2 = RJ45.6 = Signal 2 Fail.

GPI_3 = RJ45.5 = Signal 1 Warning.

GPI_4 = RJ45.8 = Signal 2 Warning.

Signal 1/2 Fail: Active under one of the following conditions:

- Timeout: No LTC signal detected since about 140 ms.
  LTC/MTD IN cable defective or unplugged? LTC generator defective? LTC input circuit of the "SL" module defective?

- Sequence: LTC signal produces multiple drop-outs or frame jumps.
  LTC synchronization of the generator defective?

- Frame rate: LTC signal runs with wrong frame rate.
  Incorrect set-up of the LTC generator?

- TC/ref fail: The difference between LTC time and reference time exceeds the limit "Limit TC/Ref Fail".
  Incorrect set-up of the LTC generator? LTC generator does not receive the time & date reference signals?

Signal 1/2 Warning: Active under one of the following conditions:

- TC/ref error: The difference between LTC time and reference time exceeds the limit "Limit TC/Ref Error".
  Incorrect set-up of the LTC generator? LTC generator does not receive the time & date reference signals?

- Lock range: The difference between LTC time and reference time exceeds the limit "Limit Lock".
  Incorrect set-up of the LTC generator? LTC generator does not receive the time & date reference signals? LTC synchronized to a blackburst, but the blackburst generator (SPG) is not locked to the reference signals (10 MHz genlock)?

- Lock drift: The difference between LTC time and reference time exceeds the limit "Limit Drift".
  LTC synchronized to a blackburst, but the blackburst generator (SPG) is not locked to the reference signals (10 MHz genlock)?

SV: The standard configuration of the four GPI outputs is:

GPI_1 = RJ45.2 = Signal 1 Fail.
GPI_2 = RJ45.6 = Signal 2 Fail.
GPI_3 = RJ45.5 = Signal 1 Warning.
GPI_4 = RJ45.8 = Signal 2 Warning.

Signal 1/2 Fail: Active under one of the following conditions:

- Timeout: No VITC signal detected since about 140 ms.
  VITC IN cable defective or unplugged? VITC generator defective? Incorrect set-up of the time code generator (VITC disabled)? VITC input circuit of the "SV" module defective?

- Video timeout: No video signal detected since about 140 ms.
  VITC IN cable defective or unplugged? VITC output at generator defective? Video input circuit of the "SV" module defective?

- Sequence: VITC signal produces multiple drop-outs or frame jumps.
  Time code synchronization of the generator defective? Time code not locked to video?

- Frame rate: VITC signal runs with wrong frame rate.
  Incorrect set-up of the time code generator?

- TC/ref fail: The difference between VITC time and reference time exceeds the limit "Limit TC/Ref Fail".
  Incorrect set-up of the time code generator? Time code generator does not receive the time & date reference signals?

Signal 1/2 Warning: Active under one of the following conditions:

- TC/ref error: The difference between VITC time and reference time exceeds the limit "Limit TC/Ref Error".
  Incorrect set-up of the time code generator? Time code generator does not receive the time & date reference signals?

- Lock range: The difference between VITC time and reference time exceeds the limit "Limit Lock".
  Incorrect set-up of the time code generator? Time code generator does not receive the time & date reference signals? Time code synchronized to a blackburst, but the blackburst generator (SPG) is not locked to the reference signals (10 MHz genlock)?

- Lock drift: The difference between VITC time and reference time exceeds the limit "Limit Drift".
  Time code synchronized to a blackburst, but the blackburst generator (SPG) is not locked to the reference signals (10 MHz genlock)?

- Video field: Odd/even field detection error at sync pulse separation circuit.
  Video signal corrupted? Sync separation circuit of the "SV" module defective?

- VITC/Video field: Odd/even field detection does not match the VITC field flag.
  Time code synchronization of the generator defective? Time code not locked to video? Sync separation circuit of the "SV" module defective?

- VITC field flag: Error at the VITC field mark flag.
  Incorrect set-up of the time code generator? Time code generator does not receive the correct video format?

- Field 2 time address: VITC time at field 2 different to VITC time at field 1.
  Time code synchronization of the generator defective? Time code not locked to video? Sync separation circuit of the "SV" module defective?

SB: The standard configuration of the four GPO outputs is:

GPO_1 = RJ45.3 = Signal 1 Fail.

GPO_2 = RJ45.6 = Signal 2 Fail.

GPO_3 = RJ45.7 = Word Clock Warning.

GPO_4 = RJ45.8 = System Warning.

Signal 1/2 Fail: Active under one of the following conditions:

Active, as long as there is any major video or VITC error at *VIDEO IN 1* or *VIDEO IN 2* respectively. In detail, this GPO becomes active if one of the following errors has occurred and has been enabled to indicate a failure (checkbox '**disable**' not checked):

VIDEO	VITC
timeout	timeout
format	frame rate
video/pps drift fail	sequence
	vitc/ref fail

Signal 1/2 Warning: Active under one of the following conditions:

Active, as long as there is any minor video or VITC error at *VIDEO IN 1* or *VIDEO IN 2* respectively. In detail, this GPO becomes active if one of the following errors has occurred and has been enabled to indicate a failure (checkbox '**disable**' not checked):

VIDEO	VITC
video/pps phase	vitc/ref error
video/pps drift error	field 2 time address
video field	vitc field flag
	vitc/video field

SW: The standard configuration of the four GPO outputs is:

GPO_1 = RJ45.3 = Signal 1 Fail.

GPO_2 = RJ45.6 = Signal 2 Fail.

GPO_3 = RJ45.7 = Word Clock Warning.

GPO_4 = RJ45.8 = System Warning.

Signal 1/2 Fail: Active under one of the following conditions:

- Signal loss: Level of a word clock signal falls below the threshold.
  CLOCK IN cable defective or unplugged? Word clock generator defective? Too much load on the signal? Level adjustment at the word clock generator or at the "SW" module incorrect?

- Frequency: Difference between measured and selected frequency detected.
  Incorrect set-up of the word clock generator or of the "SW" module?

- Signal to pps drift: Drift of a word clock signal against the PPS exceeds the limit.
  Incorrect set-up of the word clock generator? Word clock generator does not receive the time & date reference signals? Disable this alarm if no real-time synchronization of the word clock signals is provided.

Word Clock Warning: Active under one of the following conditions:

- Word clock frequency difference: Frequency difference between signals within a signal pair detected.
  Incorrect set-up of the word clock generator? CLOCK IN cable incorrect assembled?

- Word clock signal to signal drift: Drift between signals within a signal pair detected.
  Synchronization of the word clock generator fails?

System Warning: Active under one of the following conditions:

- Power on: Error found after checking the system after power-on.
  Please mail a screen shot of the "System" page of the Status Monitor to *Alpermann+Velte*.

- Relays: Error found at one of the latching relays.
  Please contact *Alpermann+Velte*.

- Reference: Any fail detected at the reference signals (PPS IN, RXD IN).
  REF/GPO cable defective? Failure of the reference signals generator?

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