Testing individual **CSB** modules

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1 Introduction

This document describes how to test individual CSB-modules. When a CSB-module is broken it will come back from DESY to NIKHEF for repairs and will have to be diagnosed, repaired and tested without having a complete CSB available.

2 Hardware Requirements

In addition to the CSB-module under test the following items are needed:

- 1 good TRP-module (in case a CSB-module other than TRP has to be tested)
- special test flatcables (with written text saying -for example-: **LKC test-cable** + 2 **CAB3M** adapterboards (code printed on PCB: **NH32-5-8-2-2 CAB3M EH-174**) (cables and boards to be found at NIKHEF in a box labeled *CSB test kabels*)
- 1 or 2 2TP-VME modules
- 2 VME-crates or 1 VME-crate with 2 backplanes (1 crate or backplane for TRP + the CSB-module under test, 1 crate or backplane for the 2TP(s))
- transputer link cables
- 14-wire ARE cables
- manual *Hardware Description of the Control and Switch Box Crates* by Arthur de Waard, for backpanel connector layout descriptions
- this document, for link/cable configurations

3 Test Programs

If working on host **mic.nikhef.nl** the following script has to be sourced to enable using the test programs for the different CSB modules:

```
#!/bin/sh
setenv TOOLDIR "/micro/n48/zeus/csb_test"

# Peek/poke tool for a (TRP) T222 transputer (connected to a T800)
alias peekt2            boot $TOOLDIR/peekt2/pphostt2.b8h

# TRP-board
alias pmt2test          boot /micro/n48/2tp_test/pmt2test/pmhost.b8h
alias trpreset          boot $TOOLDIR/trpreset/arireset.btl
alias trpana            boot $TOOLDIR/trpana/ariana.btl
alias trplinkreset      boot $TOOLDIR/trplinkreset/trplinkreset.b8h
alias trpevt            boot $TOOLDIR/trpevt/trpevt.btl
alias trperrorout       boot $TOOLDIR/trperrorout/trperrorout.btl
alias trperrorin        boot $TOOLDIR/trperrorin/trperrorin.btl

# EVT-board
alias evt               boot $TOOLDIR/evt/evt.btl

# ARE-board
alias arereset          boot $TOOLDIR/are1/are1.btl
alias areanalyse        boot $TOOLDIR/are2/are2.btl
alias areerror          boot $TOOLDIR/are3/are3.btl

# LKC-board
alias lkcout            boot $TOOLDIR/lkc1/lkc1.btl
alias lkcin             boot $TOOLDIR/lkc2/lkc2.btl
alias lkcinout          boot $TOOLDIR/lkc3/lkc3.btl
alias lkcreset          boot $TOOLDIR/lkc4/lkc4.btl
alias lkcinoutint       boot $TOOLDIR/lkc5/lkc5.btl
#alias lkcbroadc        NOT IMPLEMENTED
#alias lkcselbroadc     NOT IMPLEMENTED

# LKS-board
alias lks               boot $TOOLDIR/lks/lks.btl

# LKB-board
alias lkb               boot $TOOLDIR/lkb/lkb.btl

# LKBT2-board
alias lkbt2             boot $TOOLDIR/lkbt2/lkbt2.btl

# 2TP-module connections to CSB (via 64-wire cable)
alias csbcal_test       boot $TOOLDIR/csb_cal/csbcal_test.btl
```

The source code of the tests can be found in the same directories as the executables; all test software is written in OCCAM using the D705B toolset.

Here is a short description of each of the available tests, ordered by the type of CSB-board on which they operate:

- **TRP**; there is a separate testprogram for memory and each type of connection or signal:
  - ◇ **pmt2test**: tests the 64 KByte of TRP onboard memory,
  - ◇ **trpreset**: tests the ARI-connector's reset signal,
  - ◇ **trpana**: tests the ARI-connector's analyse signal,
  - ◇ **trplinkreset**: tests the reset signal via the links,
  - ◇ **trpevt**: tests the external event input/output (TRP-EVT),
  - ◇ **trperrorout**: tests the ARI connector's error-out signal,
  - ◇ **trperrorin**: tests the ARI and ARO connector's error-in signals.
- **EVT**:
  - ◇ **evt**: tests EVT in/outputs.
- **ARE**; there is a separate testprogram for each signal:
  - ◇ **arereset**: tests an ARE reset signal,
  - ◇ **areanalyse**: tests an ARE analyse signal,
  - ◇ **areerror**: tests an ARE error signal.
- **LKC**:
  - ◇ **lkcout**: tests an LKC (C012) parallel output,
  - ◇ **lkcin**: tests an LKC (C012) link input using TRP IINT interrupts,
  - ◇ **lkcinout**: performs the previous 2 tests in parallel,
  - ◇ **lkcreset**: tests an LKC reset output signal,
  - ◇ **lkcinoutint**: as **lkcinout** using TRP IINT and OINT interrupts
  - ◇ **lkcbroadc**: tests broadcast mechanism (to all LKC link outputs) **(NB: test NOT (yet) available!)**
  - ◇ **lkcselbroadc**: tests selective broadcast mechanism (to selected LKC link outputs (via LKC broadcast-select register)) **(NB: test NOT (yet) available, but mechanism used in ZEUS!)**
- **LKS** connections:
  - ◇ **lks**: tests one link connection made through the LKS at a time.
- **LKB**:
  - ◇ **lkb**: tests one pair of LKB link connections at a time (broadcast to 2 links).
- **LKBT2**:

- ◇ **trpreset, trpana trplinkreset, trperrorout, trperrorin**: tests LKBT2 T222 reset/analyse/error signals as for TRP,
- ◇ **lkbt2**: LKBT2 T222 transputer tests one pair of LKBT2 link connections at a time (broadcast to 2 links; LKBT2 link broadcast selection register set by TRP T222 transputer).

Test **csbcal_test** is a test for a complete CSB_*n*CAL, when not incorporated in the ZEUS Calorimeter transputer network (there is a slightly different testprogram available -described elsewhere- when the CSB is in its place in the Calorimeter system), and is mentioned here in case a whole CSB is returned for repairs.

4 Test Configurations

The figures 2, 3, 4, 5 and 6 show how to connect modules and transputers for the individual tests. Connections from and to TRP and other CSB-modules always have to go through a CSB adapter board (**CAB3M** board, PCB code: **NH32-5-8-2-2 CAB3M EH-174**). Figure 1 shows how in the subsequent figures a CSB-module is always connected through such an adapter board.

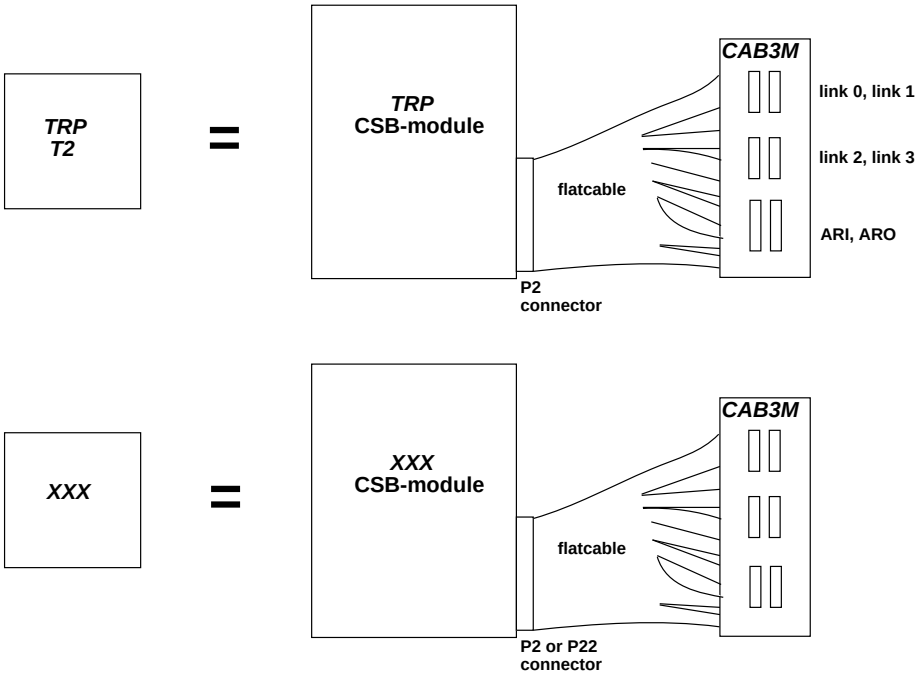
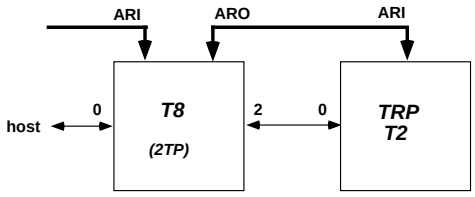
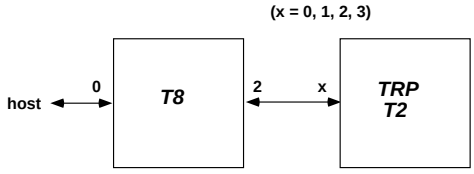


Figure 1: In the following figures the connections to a CSB-module always runs through a **CAB3M** adapter board.

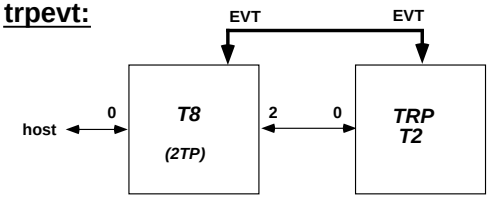
trpreset, trpana, trperrorout:



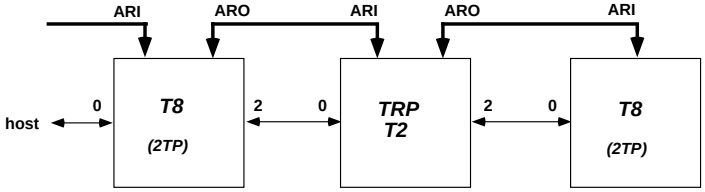
trplinkreset:



trpevt:



trperrorin:



peekt2, pmt2test:

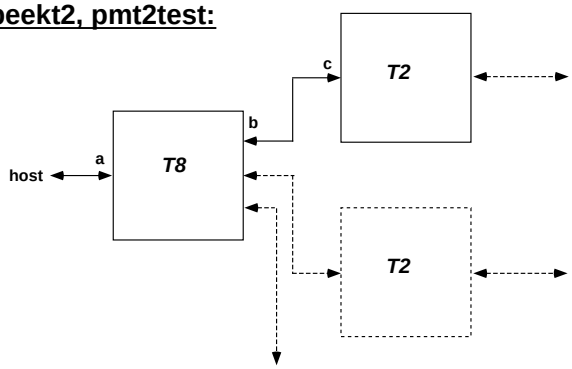
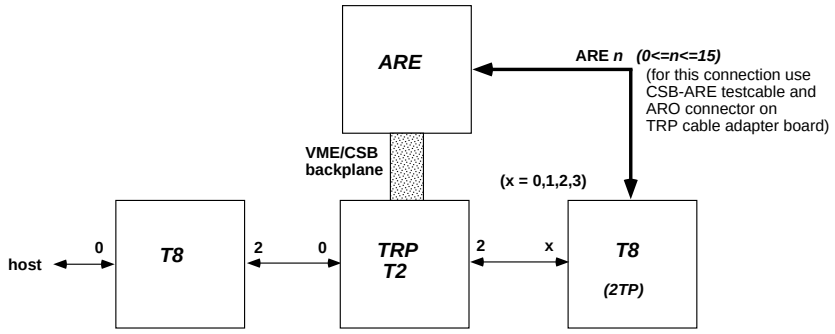
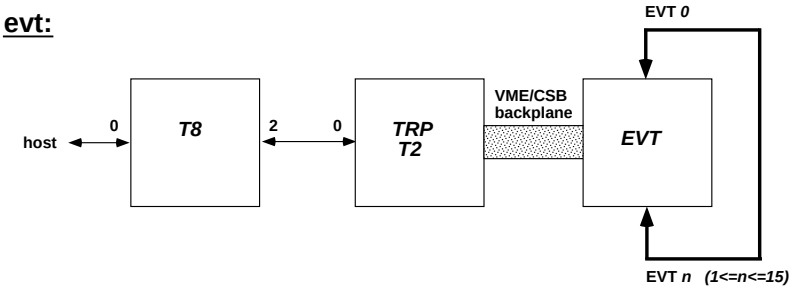


Figure 2: Configurations for the TRP tests.

arereset, areanalyse,areerror:



evt:



lks:

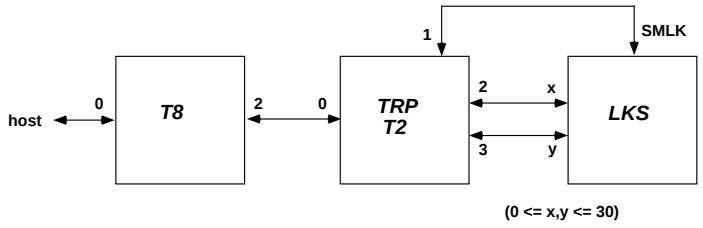


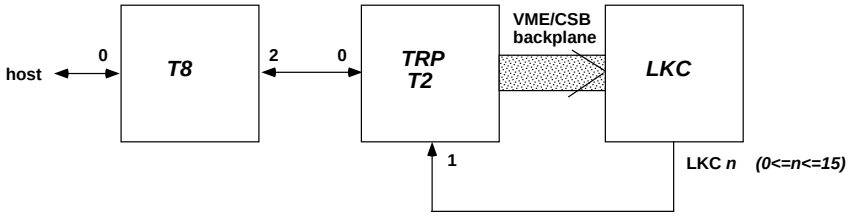
Figure 3: Configurations for the ARE, EVT and LKS tests.

(lkcinout = lkcin,lkcout parallel**)**

(lkcinoutint = lkcinout using LKC1.OINT interrupt**)**

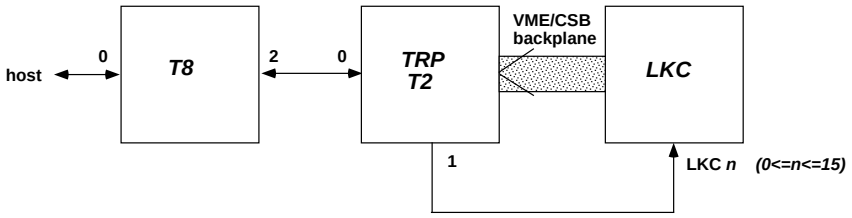
lkcout:

(C012 out / link in)



lkcin:

(link out / C012 in, LKC1-IINT interrupt)



lkcreset:

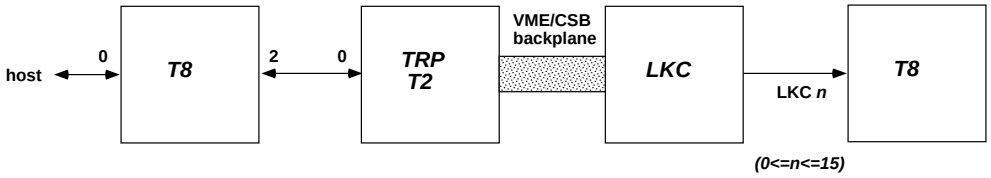


Figure 4: Configurations for the LKC tests.

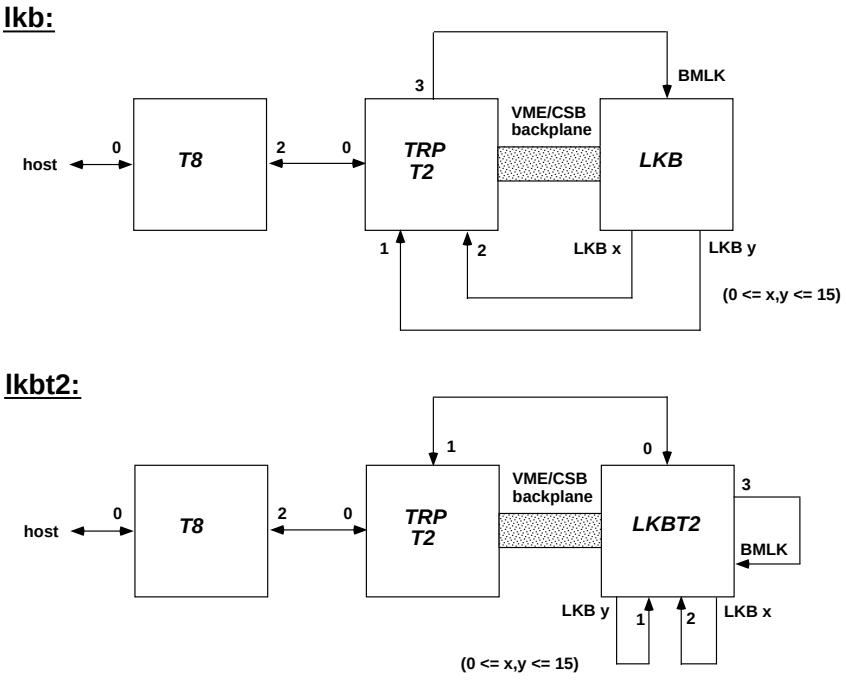


Figure 5: Configurations for the LKB and LKBT2 tests.

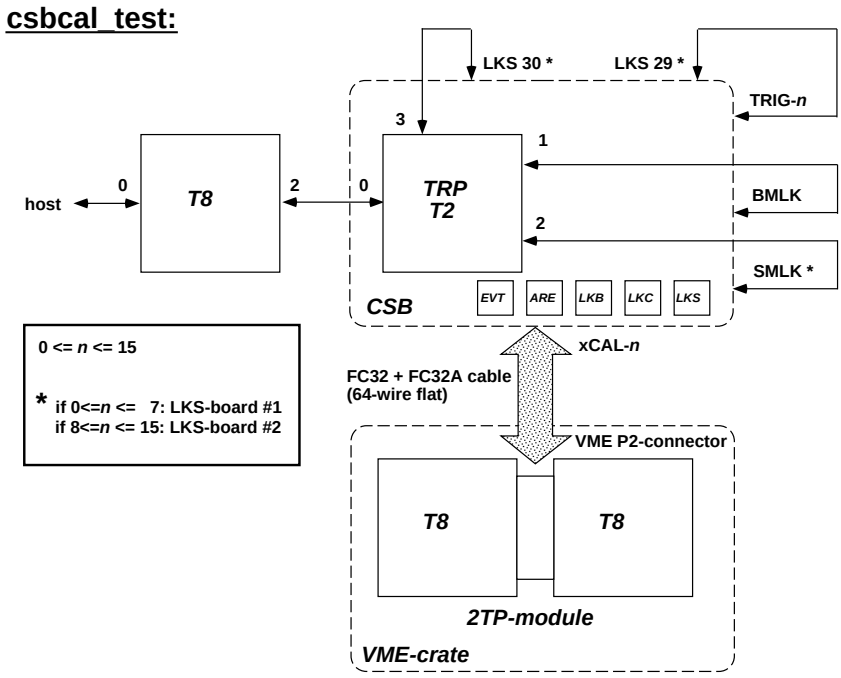


Figure 6: Configurations for a CAL CSB-crate test.