

**Global Actions**

**Concurrent Statements**

**Architecture Declarations**

**Signals Status**

**State Register Statements**

**Process Declarations**

**Pre Actions:**

**Post Actions:**

**Package List**

LIBRARY ieee;  
 USE ieee.std\_logic\_1164.all;  
 USE ieee.std\_logic\_arith.all;  
 USE ieee.STD\_LOGIC\_UNSIGNED.all;

SIGNAL	SCOPE	DEFAULT	RESET	STATUS
do	OUT	(OTHERS => '0')	(OTHERS => '0')	CLKD
inc_rescntr	OUT	'0'	'0'	CLKD
inhibit_lls	OUT	'1'	'1'	CLKD
low_rate	OUT	'0'	'0'	CLKD
norm_rate	OUT	'0'	'0'	CLKD
ptc_error	OUT	'0'	'0'	CLKD
ptc_fsm_states	OUT	(OTHERS => '0')	(OTHERS => '0')	CLKD
ptc_status	OUT	X"4"	X"A"	CLKD
ptcstat2led	OUT	B"010"	B"010"	CLKD
res_evnr	OUT	'0'	'0'	CLKD
start_run_fsm	OUT	'0'	'0'	CLKD
stop_run_fsm	OUT	'0'	'0'	CLKD

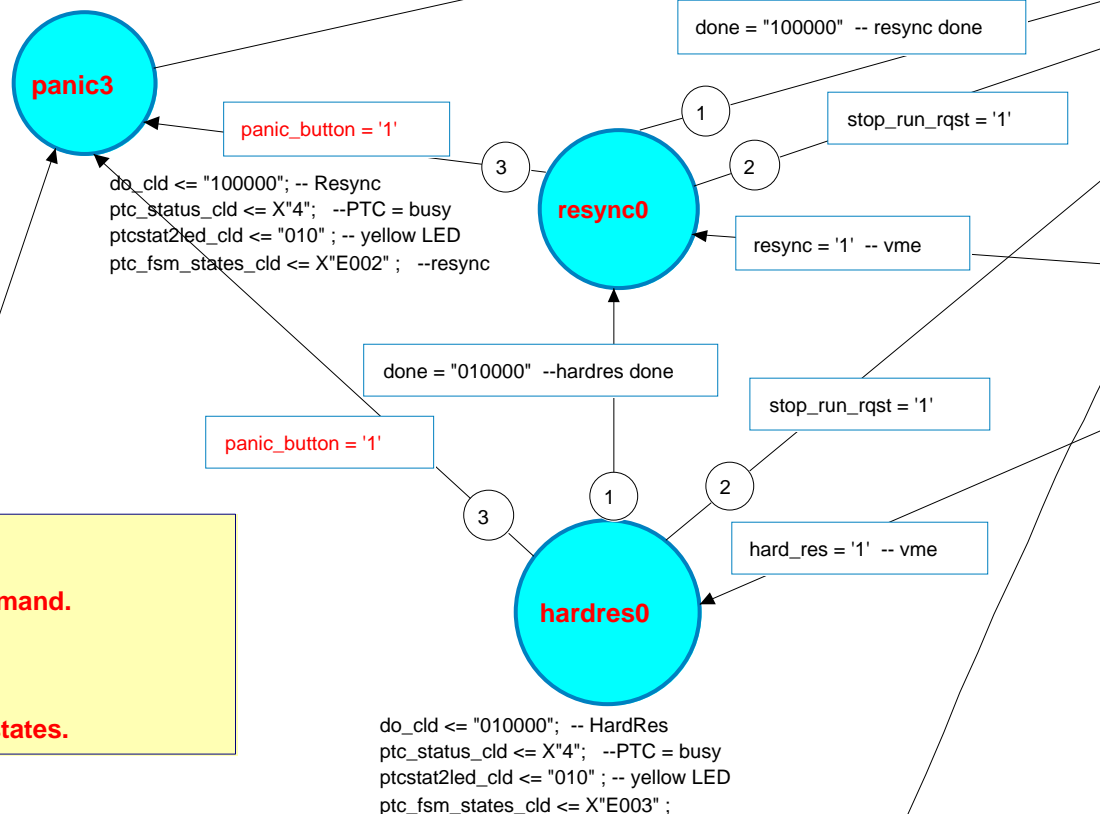
**Default values:**  
 inhibit\_l1a = '1'  
 ptc\_status = X"4" = busy  
 ptcstat2led = "010" --yellow  
 low\_rate = '0'  
 norm\_rate = '0'

**-- BAD CODE is ignored by FSM.**

*-- do() = long signal...reset by done()  
 -- do() as 1Tpulse: delete do command in states.*

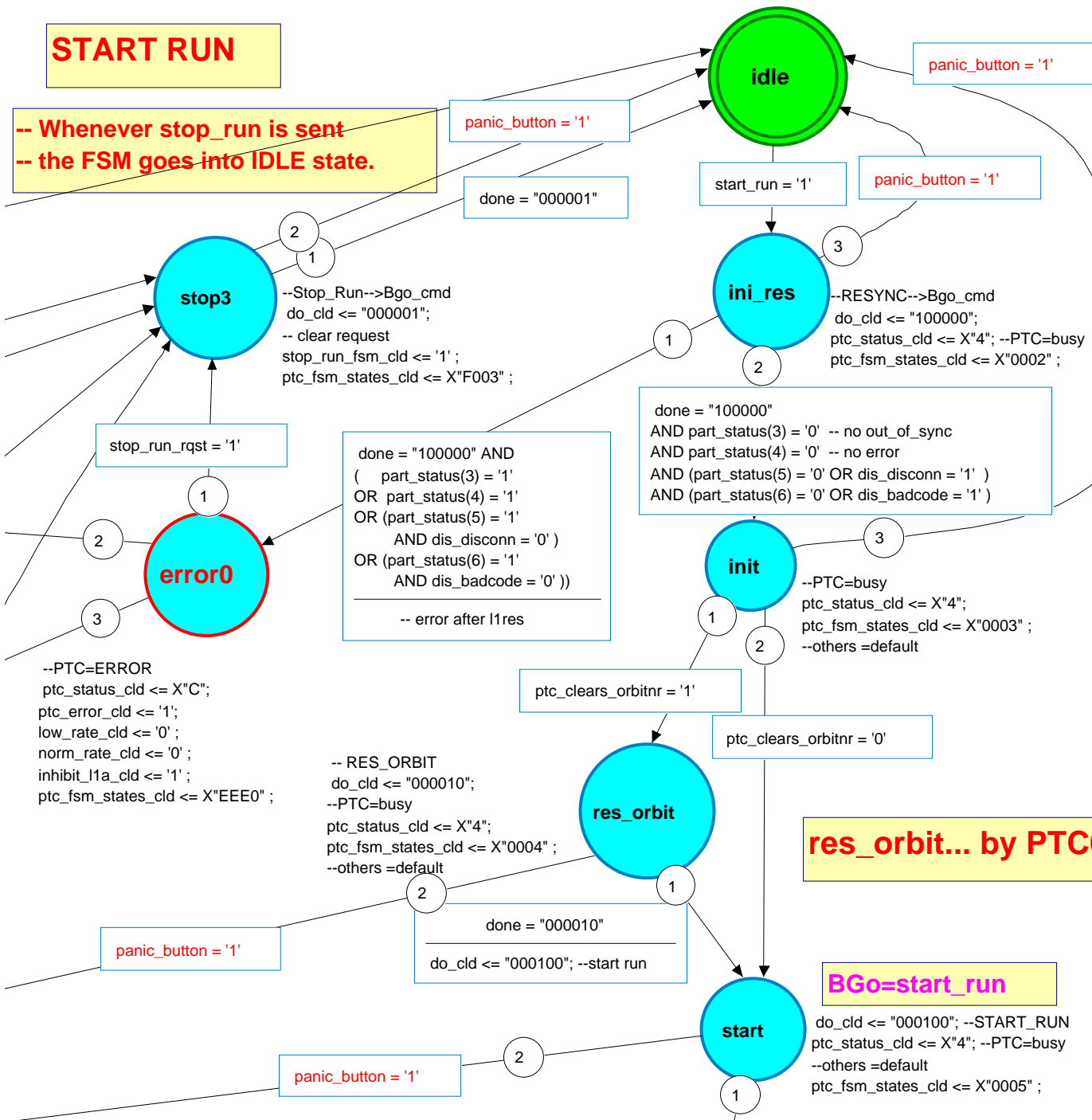
**-- V0015: Start independently from input status.**  
 -- PANIC BUTTON returns ptc\_sm to IDLE status if 'done' bit is missing  
 -- because the BC-table does not contain the bit for this BGo command.  
 -- ptc\_clears\_orbitnr = '1' ..optional reset of orbit counter  
 -- IDLE: stop\_run\_fsm\_cld <= '1'; ' ignore old stop request  
 -- 'hard\_res' is possible when in out\_of\_sync status  
**-- V0011: resync\_vme, hardres\_vme possible when in busy, warn, ready states.**

Vienna		Project:	tcs_chip
		<b>V0015</b>	
Title:	PTC State Machine		
Path:	tcs_chip_lib/ptc_sm/fsm		
Edited:	by taurok on 21 Nov 2007		



**START RUN**

-- Whenever stop\_run is sent  
-- the FSM goes into IDLE state.



```

do_cld <= (others => '0'); -- default
ptc_error_cld <= '0'; -- default
ptc_status_cld <= X"A"; -- IDLE ...default
inhibit_l1a_cld <= '1'; -- default
low_rate_cld <= '0'; -- default
norm_rate_cld <= '0'; -- default
res_evr_cld <= '0'; -- default
ptcstat2led_cld <= "010"; -- default
ptc_fsm_states_cld <= X"0001";
-- clear old stop rqst from a bad end of run
stop_run_fsm_cld <= '1';
    
```

**panic\_button = old 'res\_ptc'**

- do <= 000 001 = StopRun
- do <= 000 010 = ResOrbit
- do <= 000 100 = Start Run
- do <= 001 000 = ResEvrnr
- do <= 010 000 = Hardres
- do <= 100 000 = Resync

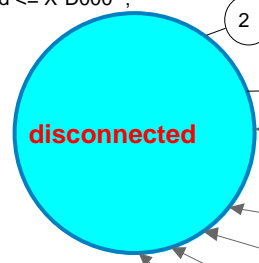
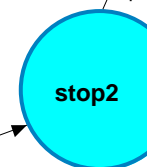
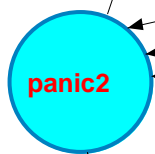
- Input
- PARTITION STATES
- part\_status :=decoded bits
- bit 0: READY
  - bit 1: WARNING
  - bit 2: BUSY
  - bit 3: OUT\_OF\_SYNC
  - bit 4: ERROR
  - bit 5: DISCONNECTED
  - bit 6: BAD CODE
  - bit 7: ---free

- Output
- PTC STATUS --> DAQ
- 4 bits encoded
- 0000=X"0": OFF
  - 0001=X"1": WARNING
  - 0010=X"2": OUT\_OF\_SYNC
  - 0100=X"4": BUSY
  - 1000=X"8": READY
  - 1010=X"A": IDLE
  - 1100=X"C": ERROR

**res\_orbit... by PTC0 or by VME only**

**BGo=start\_run**

- FRONT PANEL LEDs
- ptcstat2led(2) = ready --> green LED
  - ptcstat2led(1) = idle, busy, warn --> yellow LED (default)
  - ptcstat2led(0) = error, resync --> red LED



```
--PTC=waiting for detector  
ptc_status_cld <= X"0"; --disconnected input  
ptc_error_cld <= '0';  
low_rate_cld <= '0';  
norm_rate_cld <= '0';  
inhibit_l1a_cld <= '1';  
ptc_fsm_states_cld <= X"D000";
```

ptc\_fsm\_states\_cld <= X"F002";

stop\_run\_rqst = '1'

-- connected again  
part\_status(5) = '0' OR dis\_disconn = '1'

-- disconnected  
part\_status(5) = '1' AND dis\_disconn = '0'

-- disconnected  
part\_status(5) = '1' AND dis\_disconn = '0'

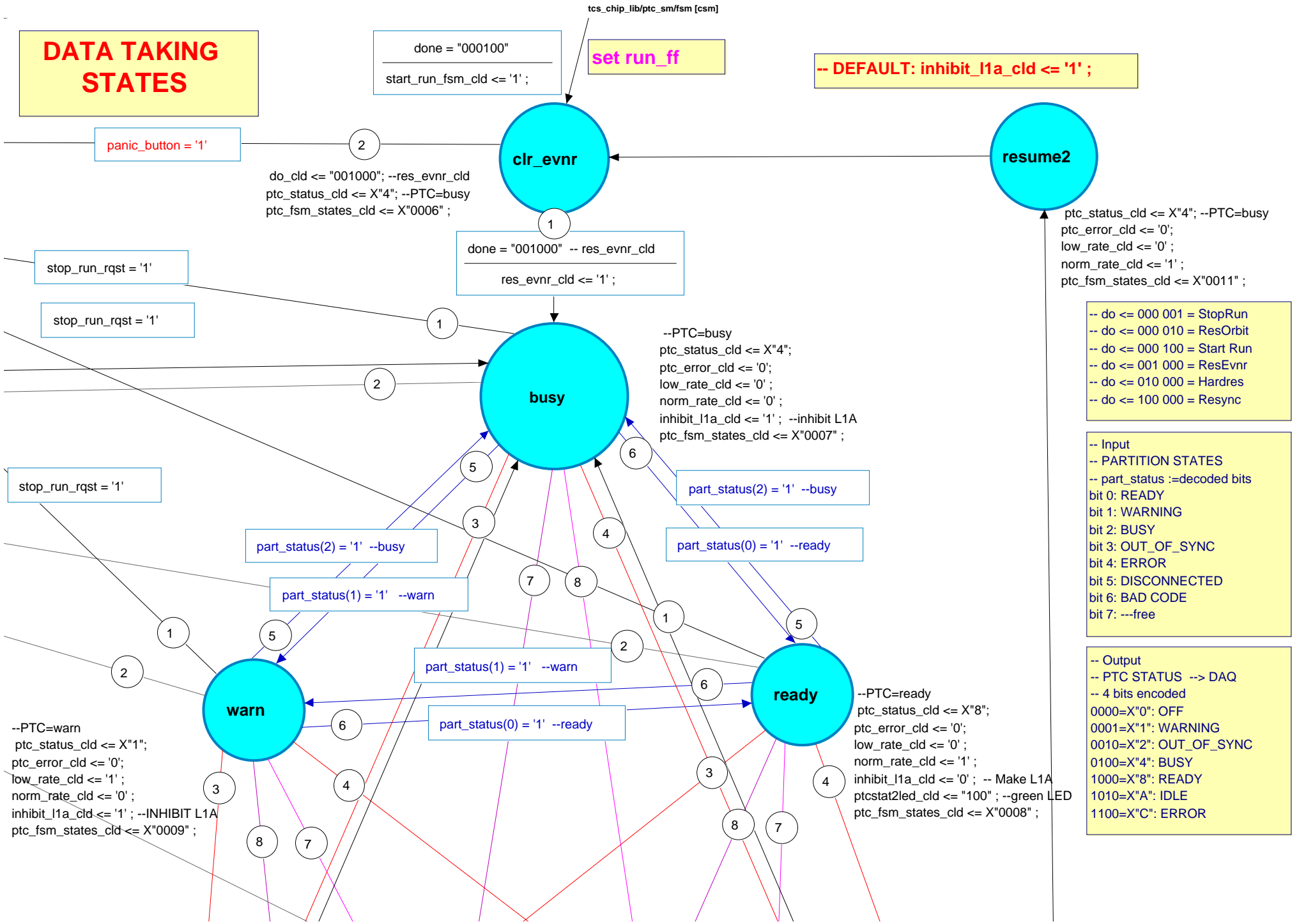
-- disconnected  
part\_status(5) = '1' AND dis\_disconn = '0'

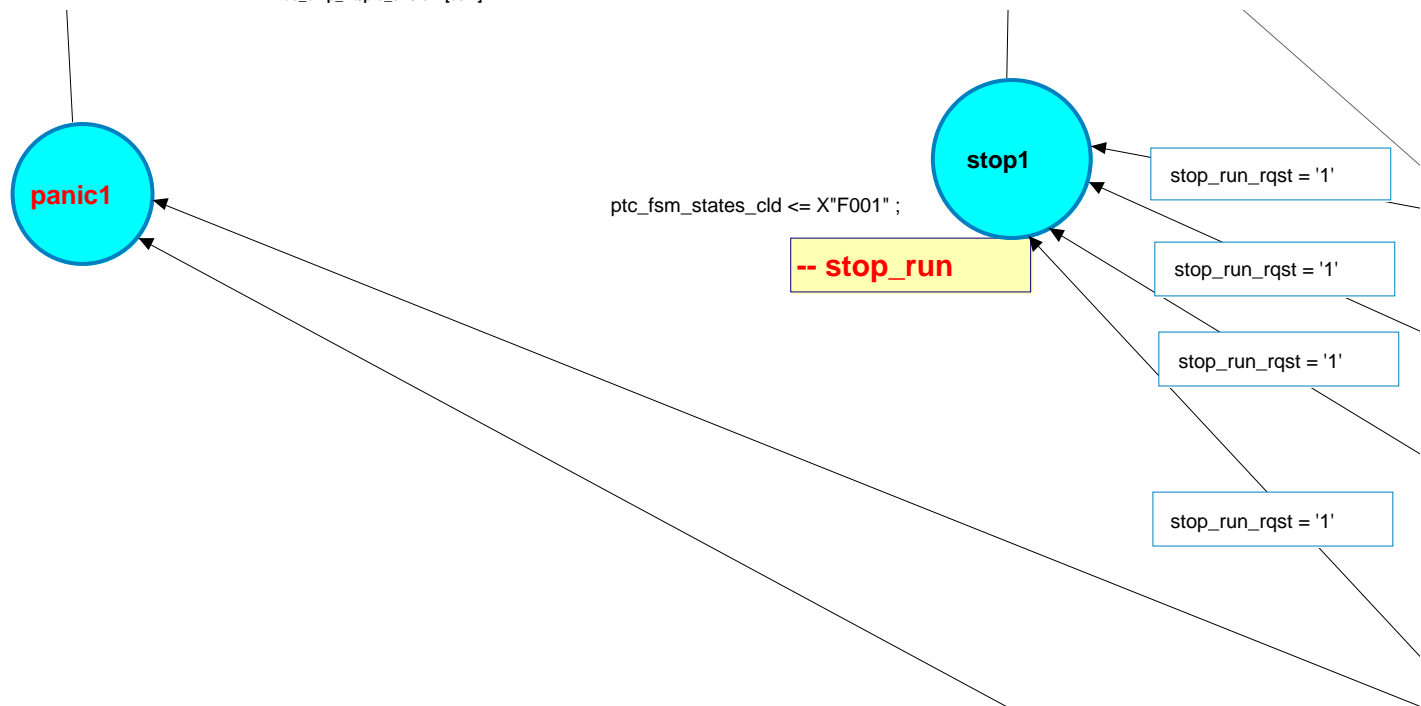
-- disconnected  
part\_status(5) = '1' AND dis\_disconn = '0'

-- disconnected  
part\_status(5) = '1' AND dis\_disconn = '0'

**-- PTC waits until disconnected Detector Partition has been reconnected to resume.**

# DATA TAKING STATES





ptc\_fsm\_states\_cld <= X"F001" ;

-- stop\_run

```
-- do <= 000 001 = StopRun
-- do <= 000 010 = ResOrbit
-- do <= 000 100 = Start Run
-- do <= 001 000 = ResEvnr
-- do <= 010 000 = Hardres
-- do <= 100 000 = Resync
```

```
-- Input
-- PARTITION STATES
-- part_status :=decoded bits
bit 0: READY
bit 1: WARNING
bit 2: BUSY
bit 3: OUT_OF_SYNC
bit 4: ERROR
bit 5: DISCONNECTED
bit 6: BAD CODE
bit 7: ---free
```

