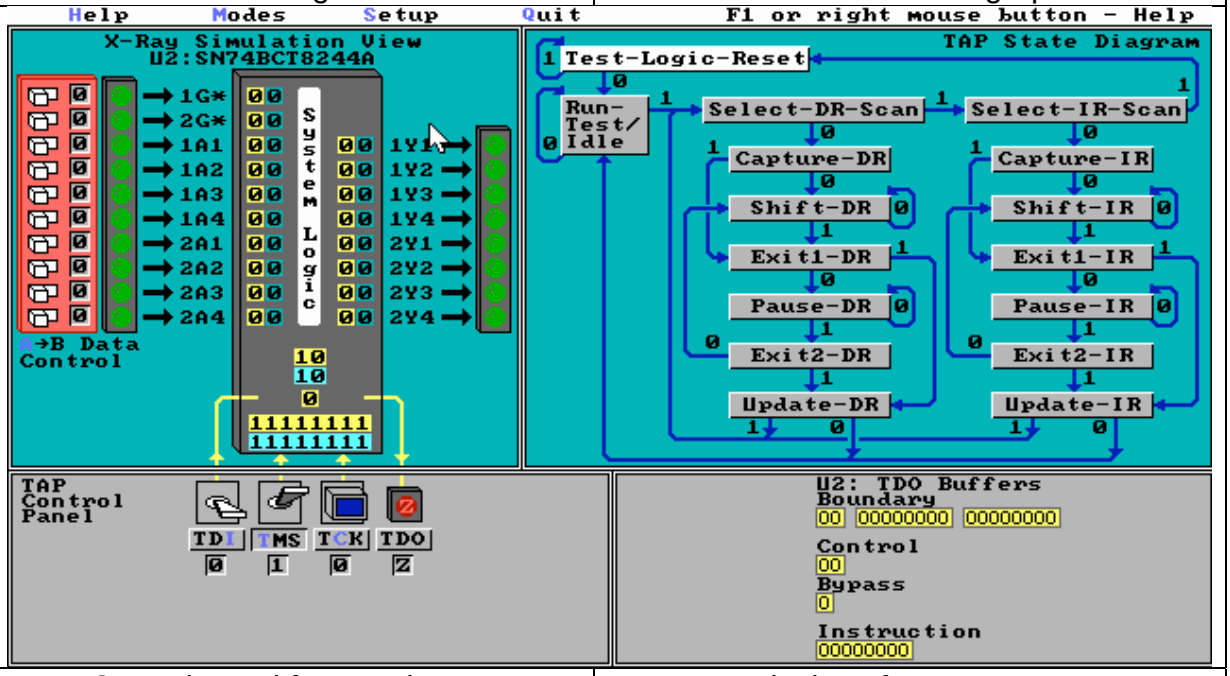
Lessons for Boundary Scan (BS)

The Scan Educator from Texas Instruments demonstrates the processes of boundary scans. The used IC is a driver circuit containing boundary scan cells.
All functions of BS are to be controlled via the Test Access Port (TAP).
For preparation of the practice please repeat the BS slides of the lecture.
The Scan Educator software can be found at G:\WORK5. Please start scaned.exe

Lesson 1: TAP Control mode

Driver-IC including BS Interface	TAP automaton graph
Control panel for TAP inputs	Display of TAP outputs



Port description:
TDI: Test Data In to put values into the instruction register (IR) and into the boundary scan register (data register DR).
TMS: Test Mode Select to modify the TAP automaton
TCK: Test Clock for the TAP automaton
TDO: Test Data Out (not modifiable)

Description of the TAP automaton:
The TAP automaton consists of two main parts. The left-hand-side flow is for manipulation of the boundary scan cells, the right-hand-side flow manipulates the instruction register. The automaton will return to reset if a logic '1' is applied to TDI within a maximum of 5 TCK cycles.
Capture-DR: Takeover of the BSR inputs into the BS chain.
Shift-DR: Read in one bit into the BS chain latches (yellow)
Update-DR: Takeover of the BS chain latch into the BS chain registers (cyan)
Capture-IR: not used in this practice.
Shift-IR: Read in one bit into the instruction latch (yellow)
Update-IR: Takeover of the instruction latch into the instruction register (cyan)

The current value of the registers is shown in the X-Ray Simulation View (up left). The display of the TAP outputs is only for visualization of the shift process and has no functional behavior.

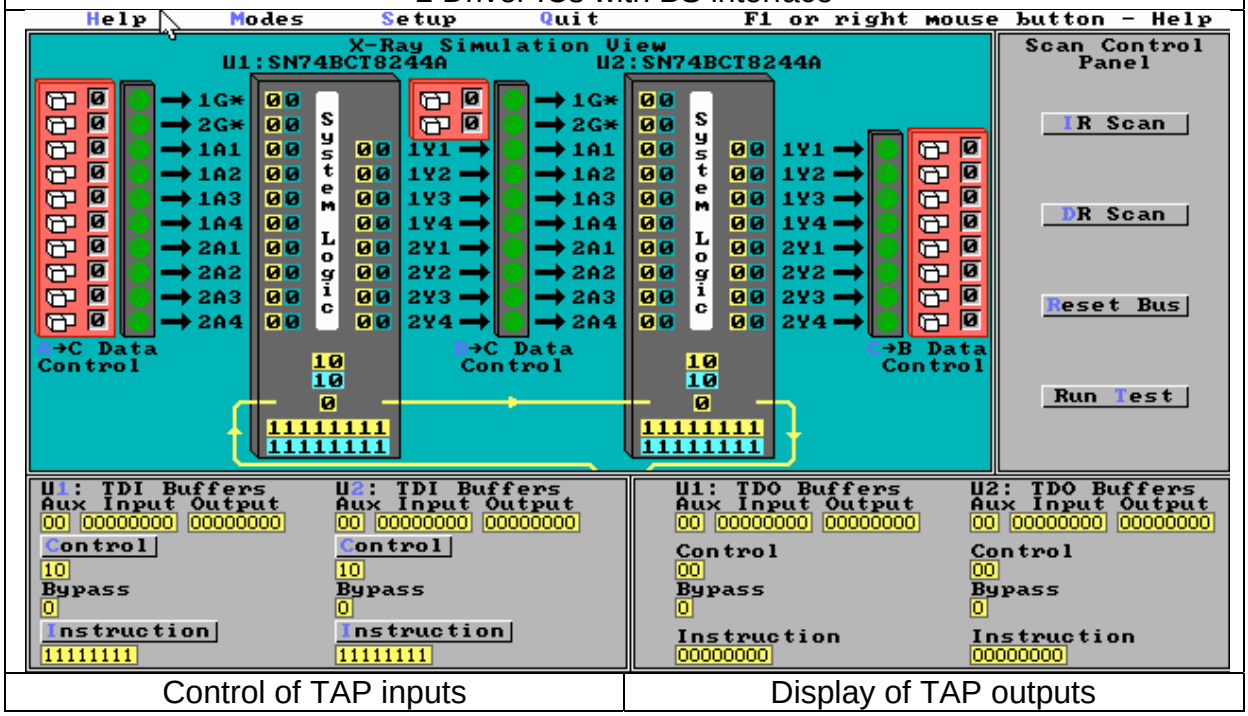
Please consider that the most significant bit has to be shifted in at first and the additional bit shift at the transition from Shift-IR to Exit1-IR and Shift-DR to Exit1-DR!

Make a test of the external interfaces of the IC (EXTEST). Load the opcode for PRELOAD (0000 0010b) into the instruction register. After Update-IR the BS register can be written. Load the bit series 00 1100 0000 0011 0000 into the BSR. Activate the DIP-switches at 1A1, 1A3, 1A4, 2A2. Now load the opcode for EXTEST (0000 0000b) into the instruction register. Following shift the content of the BSR to TDO (18 cycles). Compare the content of the shifted TDO buffer with your DIP-switches. Restore the normal IC functionality by setting the instruction register to BYPASS (1111 1111b).

Lesson 2: Scan Mode

Switch the simulator to Scan Mode (menu Modes).

2 Driver ICs with BS interface



Control of TAP inputs | Display of TAP outputs

Connect both ICs for the boundary scan in series (Setup → Scan Path → Both). Check the connect wires between the ICs. Set some IC outputs of U1 to '1' using the SAMPLE instruction (click on "Instruction", then make an IR Scan on the Scan Control Panel on the right). The BSR values can be written by input in the field TDI Buffers with a following DR Scan.
Make an EXTEST. Now shift the scan chain to the output (SAMPLE, DR-Scan) and check the result of TDO.