ncr5385 scsi controller on MAME

- TL;DR Reading works, Writing sometimes fails with a hang.
- Appears to be a timing issue / assumption by host about how fast things happen.
- Can wait for 5-10 minutes before hang occurs.
- Has a register **Transfer Counter** that counts number of bytes to transfer before raising an Interrupt.

Host loop writing data to ncr5385 scsi controller chip

```
    LAB_.writing_buffer

        ; check SCSI data is empty (not full)
        move.b      (A1)=>SCSI_AUX_STATUS,D7b
        and.b       D1b,D7b                         ; AUX_STATUS_DATA_FULL
        cmpi.b      #0x0,D7b
        beq.b       LAB_full_is_clear

        ...

    LAB_full_is_clear

        move.b      (A0)+,(A2)=>SCSI_DAT
        ; non-interruptable very short delay
        move        D2w,SR
        movea.l     A0,A0
        movea.l     A1,A1
        move        D3w,SR

        dbf         D0w,LAB_.writing_buffer         ; 18us / loop

        bra.b       scsi_block_END

        ....

     scsi_block_END
        move.b      (A1)=>SCSI_AUX_STATUS,D7b
```

ncr5385 scsi controller processing

- When *Transfer Counter* reaches zero, chip raises an IRQ
- On the host, after writing the last byte of data, host assumes it has time to run a couple of functions to update some state. It jumps to scsi_block_END and calls them:

  set_flags_handling_clear_pending()
  scsi_update_pending_flags()

- Then the IRQ3 arrives at host which is setup to call:

  scsi_IRQ3_handler()

  To give time for this *housekeeping*, we need to add **20us** delay to NCR5385 **before** raising IRQ

What does sequence look like in the logs?

Last byte has been processed and Transfer Count falls to zero, so..

```
[:scsi:7:ncr5385] 533.95729320: XFI_OUT_ACK delay 20000          “Start of 20us delay"
[:] tek4404: 533.95730020: scsi block END                        "7us later on host"
[:scsi:7:ncr5385] 533.95731320: xfi_out: transfer complete
[:scsi:7:ncr5385] 533.95731320: update_int 1                      “Request IRQ be raised"
[:] tek4404: 533.95731620: set_flags_handling_clear_pending      “housekeeping func”
[:] tek4404: 533.95732300: scsi_update_pending_flags             “housekeeping func”
[:] tek4404: 533.95742880: scsi_IRQ3_handler    ********       “IRQ3 arrives 105us later"
[:] tek4404: KERNEL:  scsi_read_ncr5385_status                 “reading nc5385 status”
```

Host has time to run housekeeping functions before IRQ arrives. Everything works.

What does sequence look like very rarely?

[:scsi:7:ncr5385] 725.44999740: XFI_OUT_ACK delay 20000 “Start of 20us delay"

[:scsi:7:ncr5385] 725.45001740: xfi_out: transfer complete
[:scsi:7:ncr5385] 725.45001740: update_int 1 “Request IRQ be raised"
[:] tek4404: 725.45018820: scsi_IRQ3_handler ********** "IRQ3 arrives 170us later"
[:] tek4404: KERNEL: scsi_read_ncr5385_status “reading nc5385 status”

[:] tek4404: 725.45028240: scsi block END "265us later!!”

scsi block END not reached by host until **after** the IRQ has occurred.. everything HANGS

Why does it not get to Housekeeping functions?

- I am logging every IRQ level
- Something is delaying host getting to run.