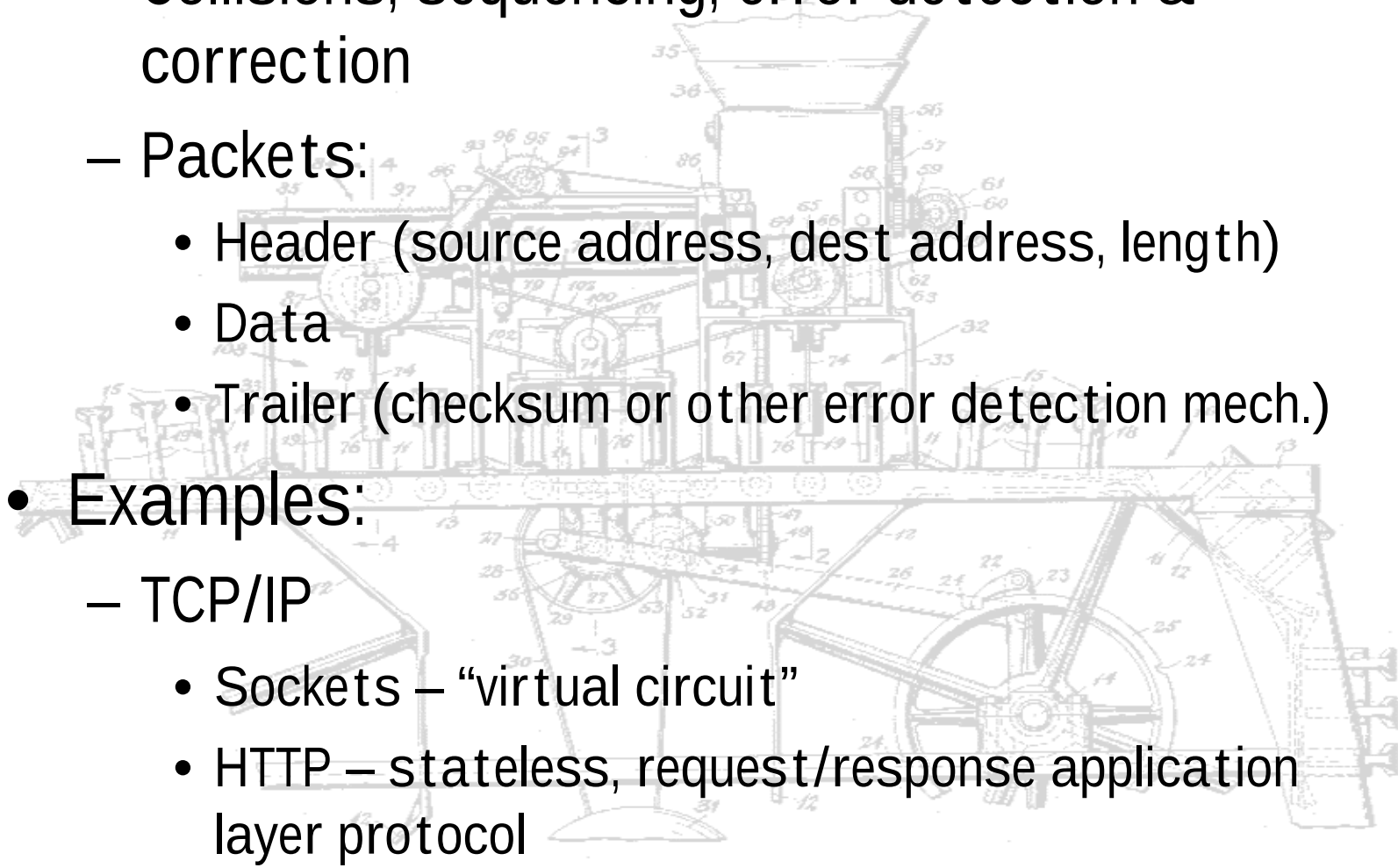
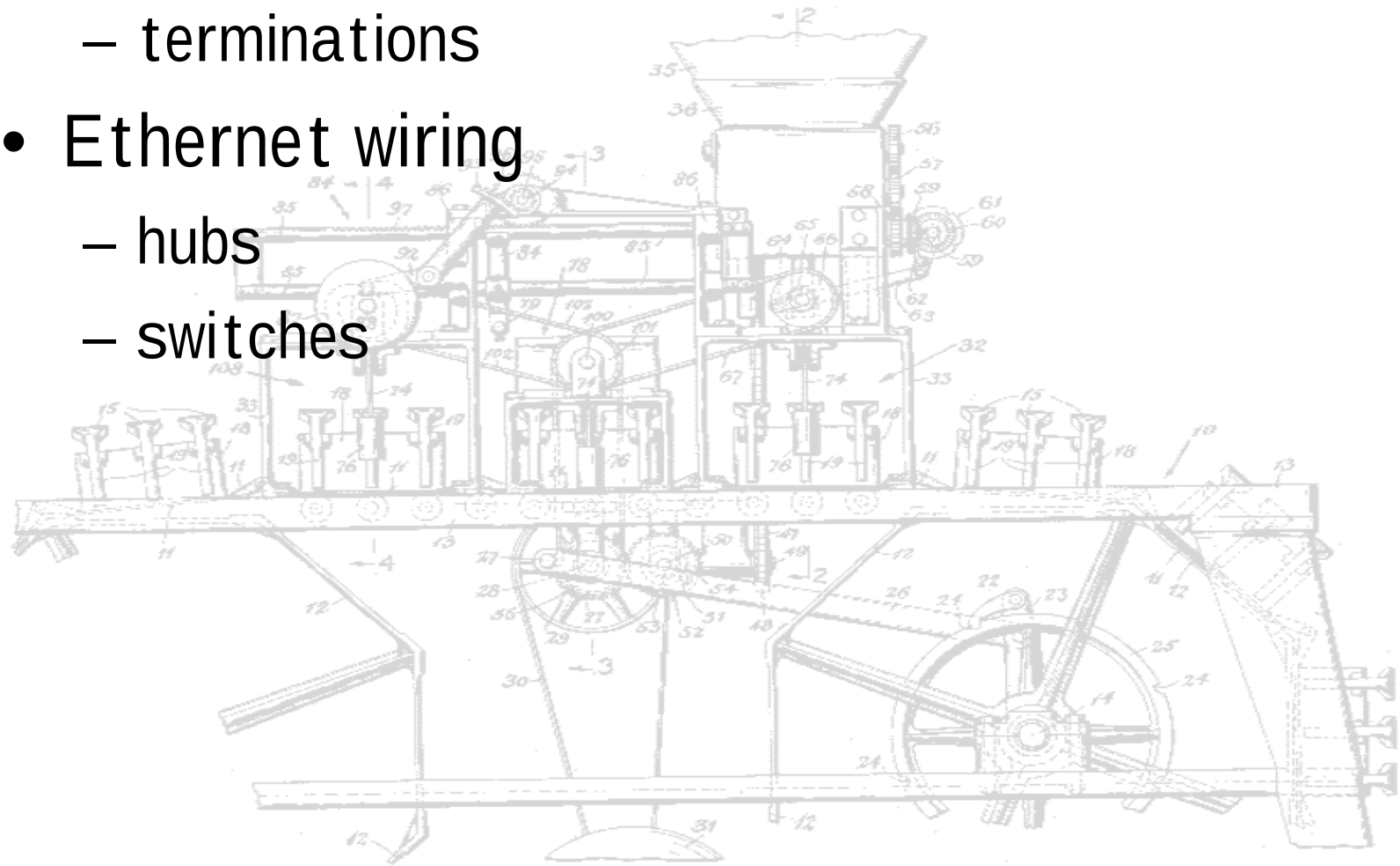
Protocols

- Deterministic vs. asynchronous
  - Collisions, sequencing, error detection & correction
  - Packets:
    - Header (source address, dest address, length)
    - Data
    - Trailer (checksum or other error detection mech.)
- Examples:
  - TCP/IP
    - Sockets – "virtual circuit"
    - HTTP – stateless, request/response application layer protocol



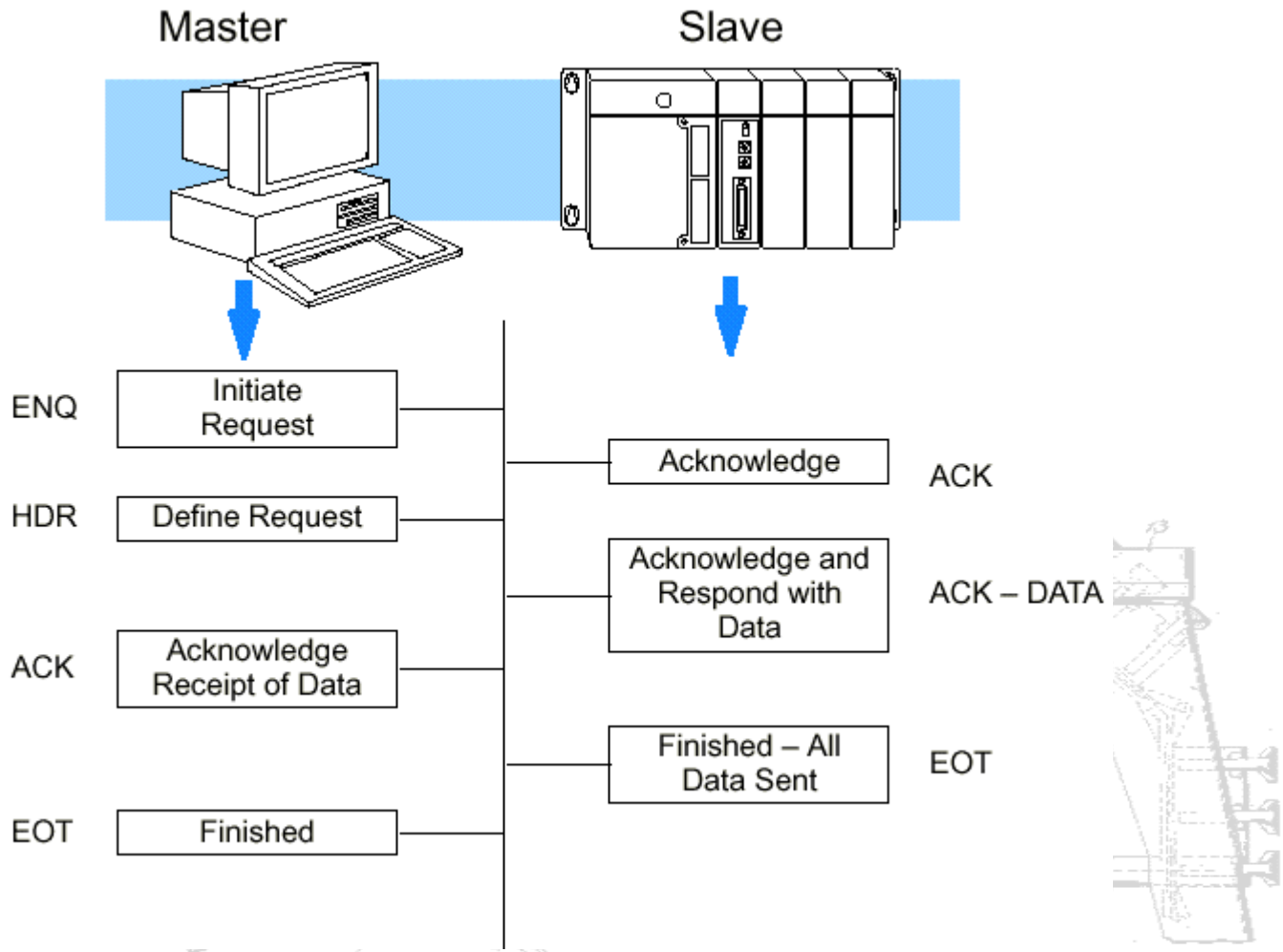
Wiring up the System

- Transmission line theory
  - reflections
  - terminations
- Ethernet wiring
  - hubs
  - switches



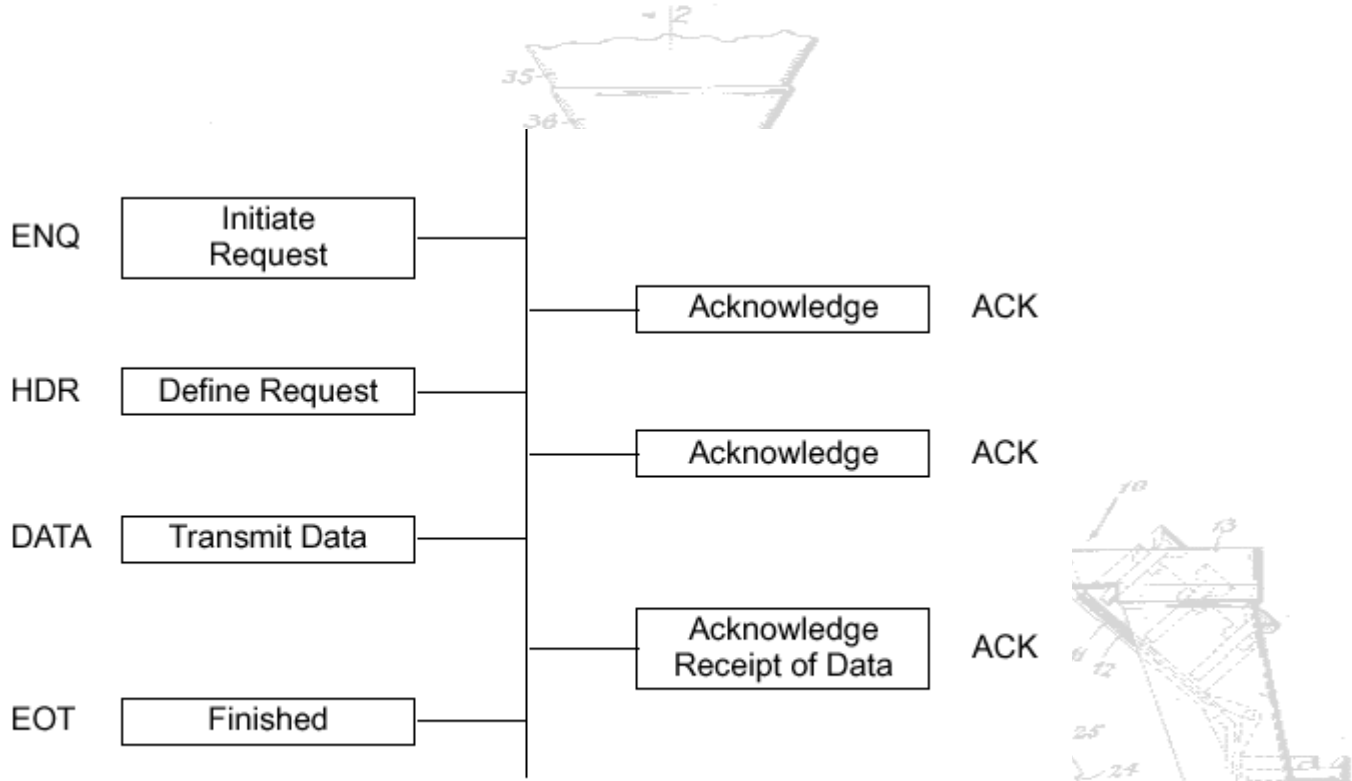
DL05 Communications

- DirectNet Protocol - read request



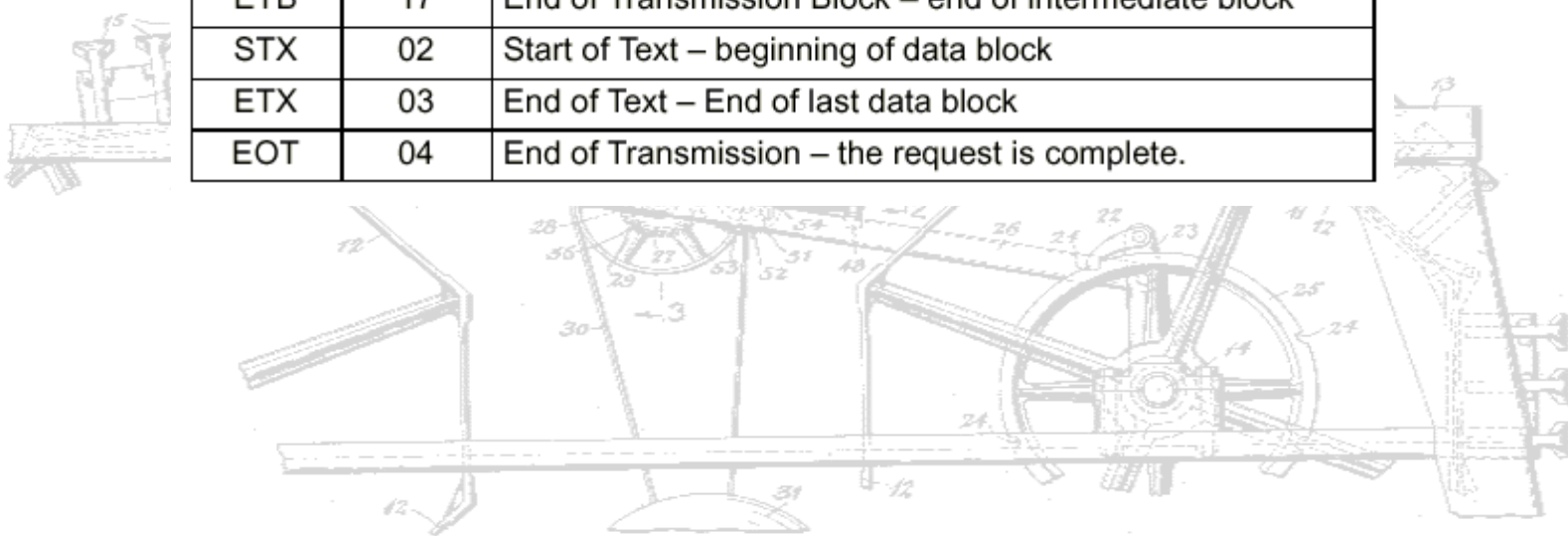
DL05 Communications

- DirectNet Protocol - write request

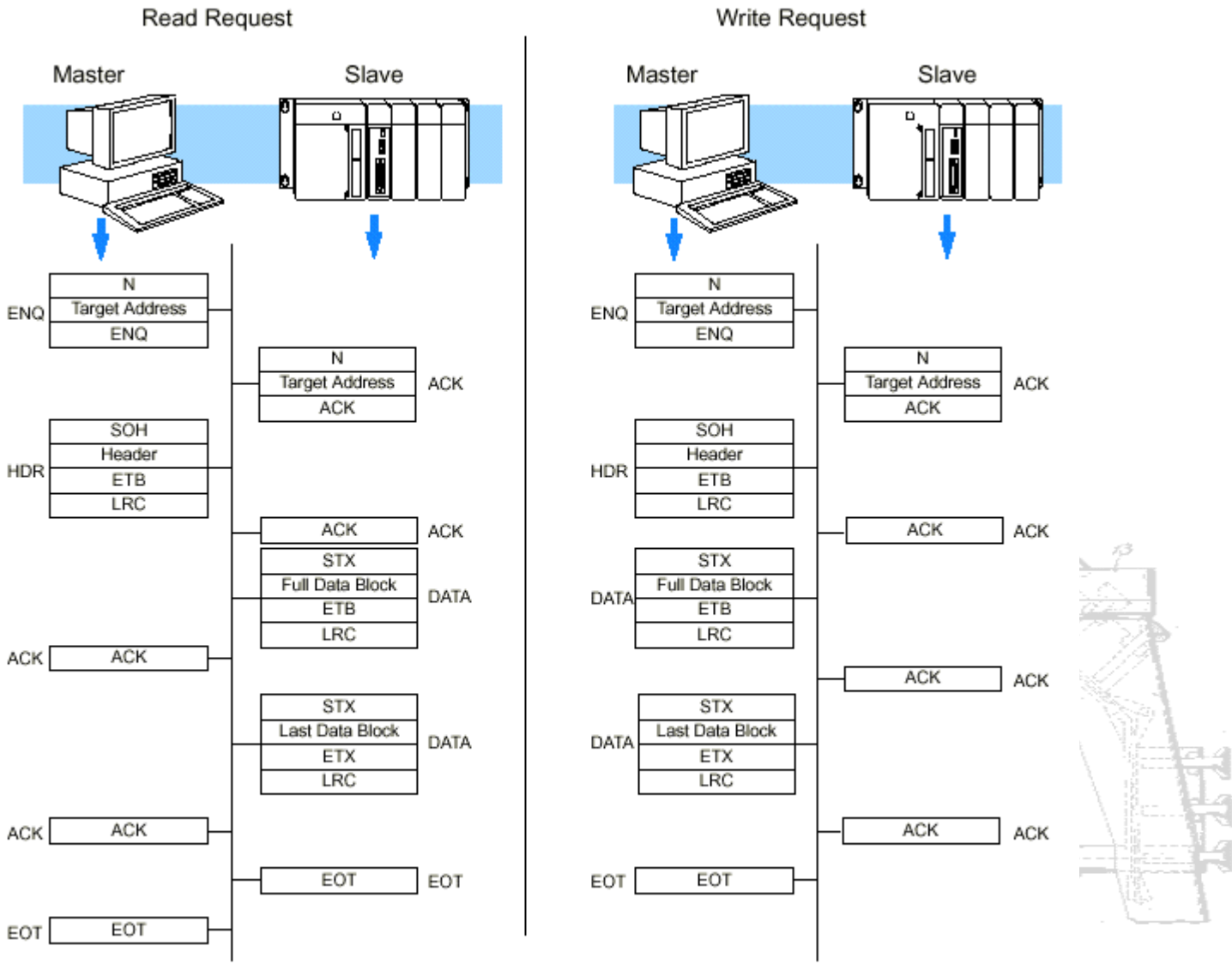


DL05 Communications

Symbol	HEX ASCII Code	Description
ENQ	05	Enquiry – initiate request
ACK	06	Acknowledge – the communication was received without error
NAK	15	Negative Acknowledge – there was a problem with the communication
SOH	01	Start of Header – beginning of header
ETB	17	End of Transmission Block – end of intermediate block
STX	02	Start of Text – beginning of data block
ETX	03	End of Text – End of last data block
EOT	04	End of Transmission – the request is complete.

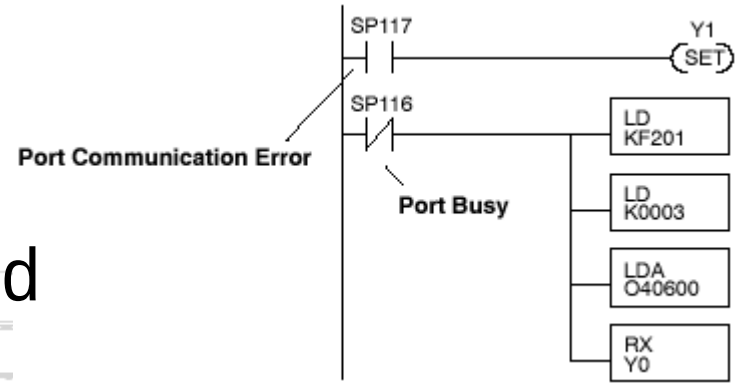


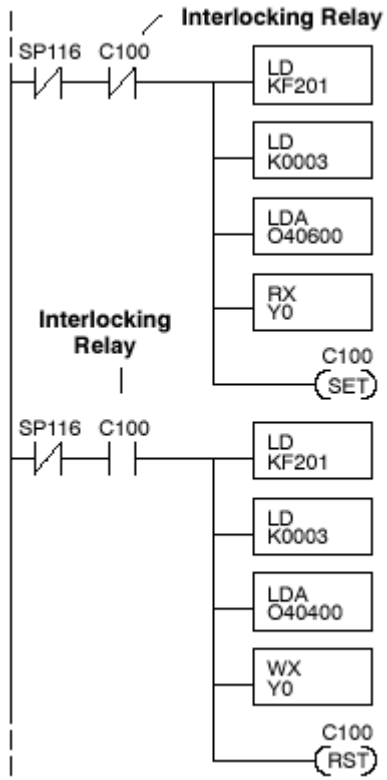
DL05 Communications



Doing DL05 Communications

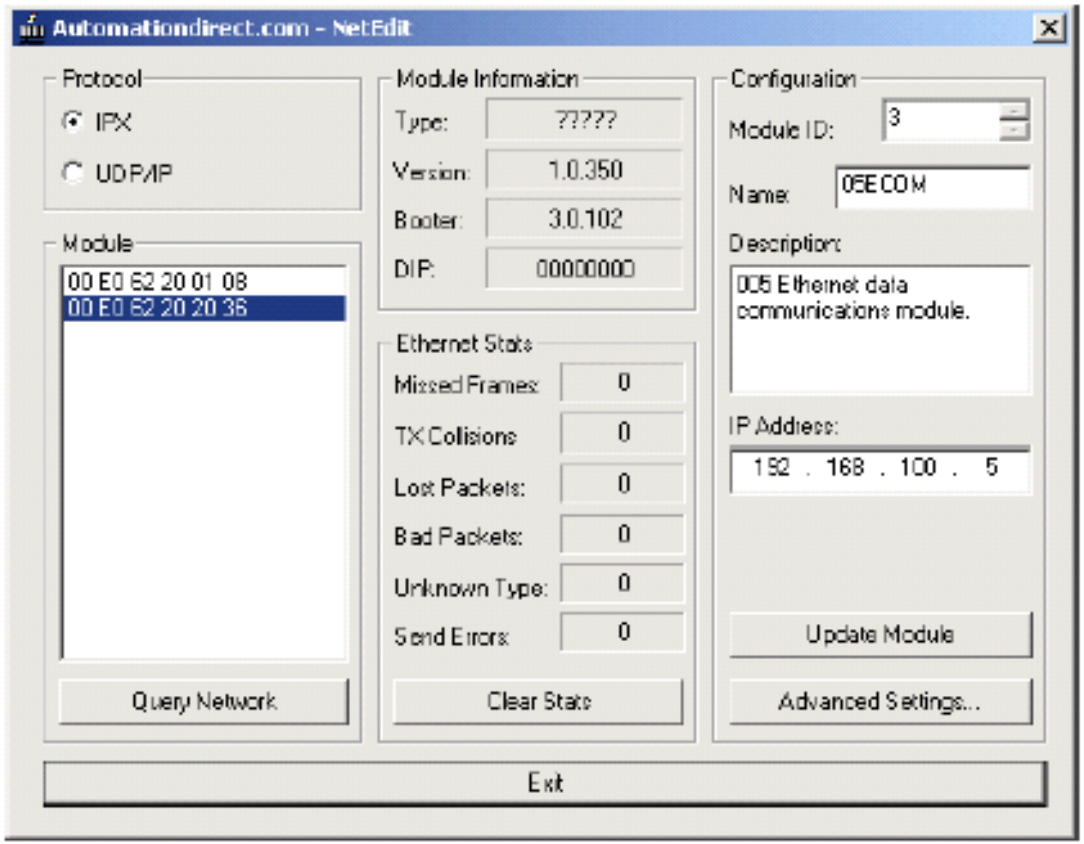
- RLL logic in master
  - accumulator stack
  - identify master port and slave address
  - load # of bytes to transfer
  - specify master memory area
  - specify slave memory area
  - use interlock contacts to "handshake"



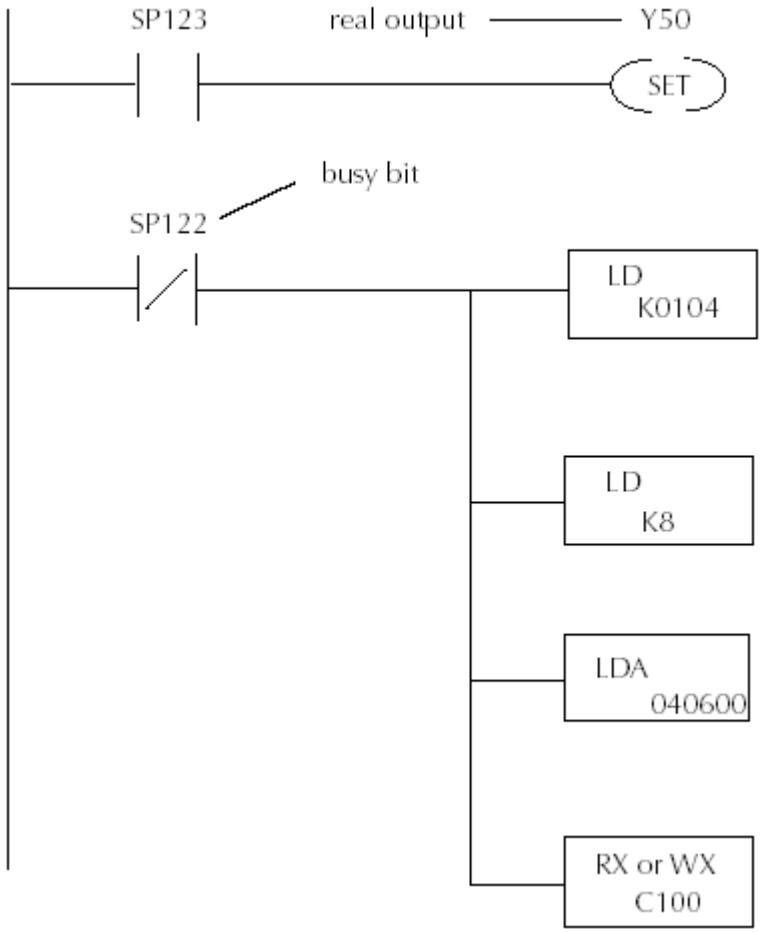


DL05/06 Ethernet Module

- New H0-ECOM module
- 10Base-T ethernet (10MBPS)



DL05/06 Ethernet Module



Comm Error

Base/Slot/Mod ID

bytes to transfer

Address in memory of this unit.

Read or Write from/to Addr in remote unit

What is the Future?

- "Plug-N-Play" sensors and actuators
- decentralized control functions
- vendor independent open standards