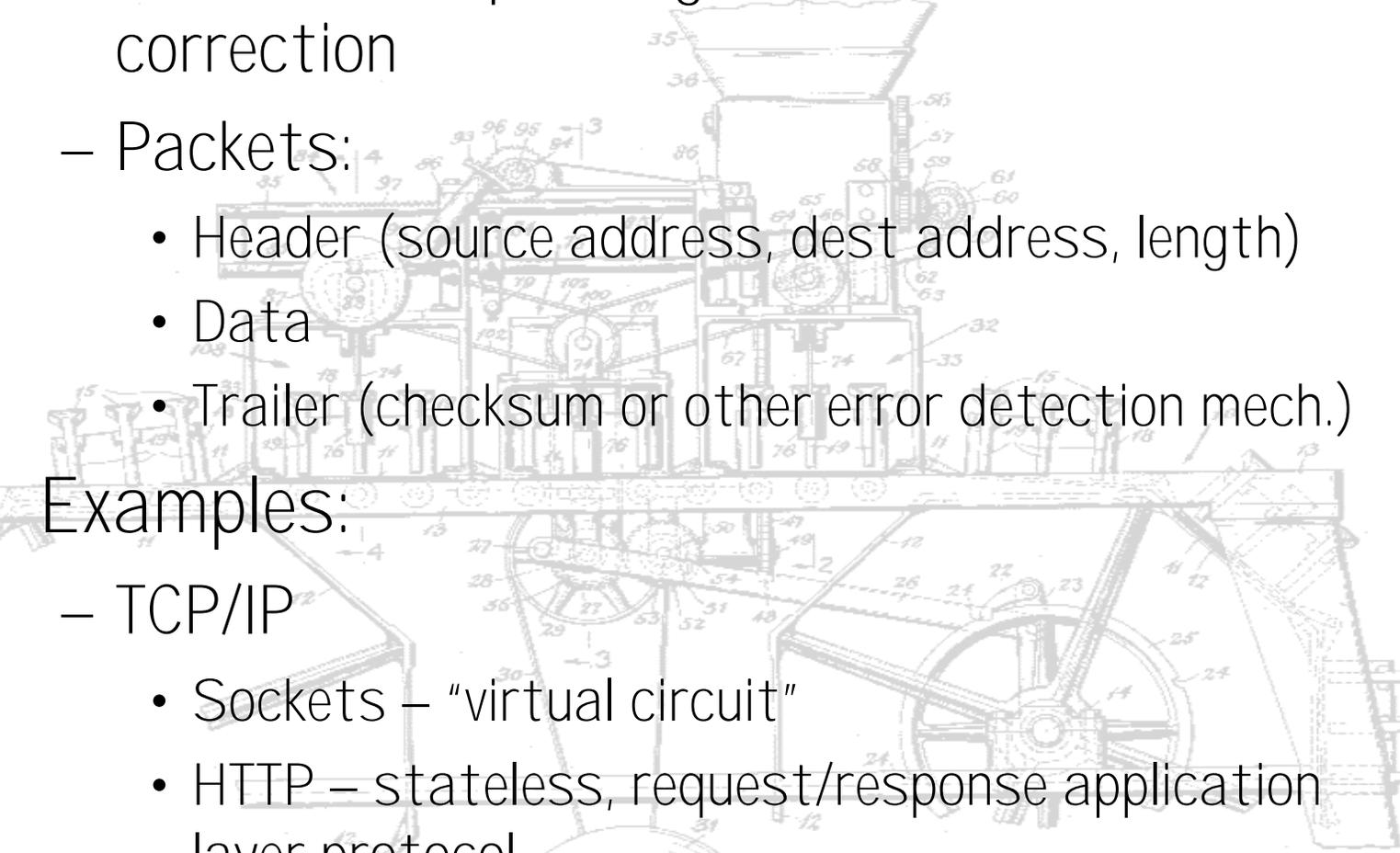
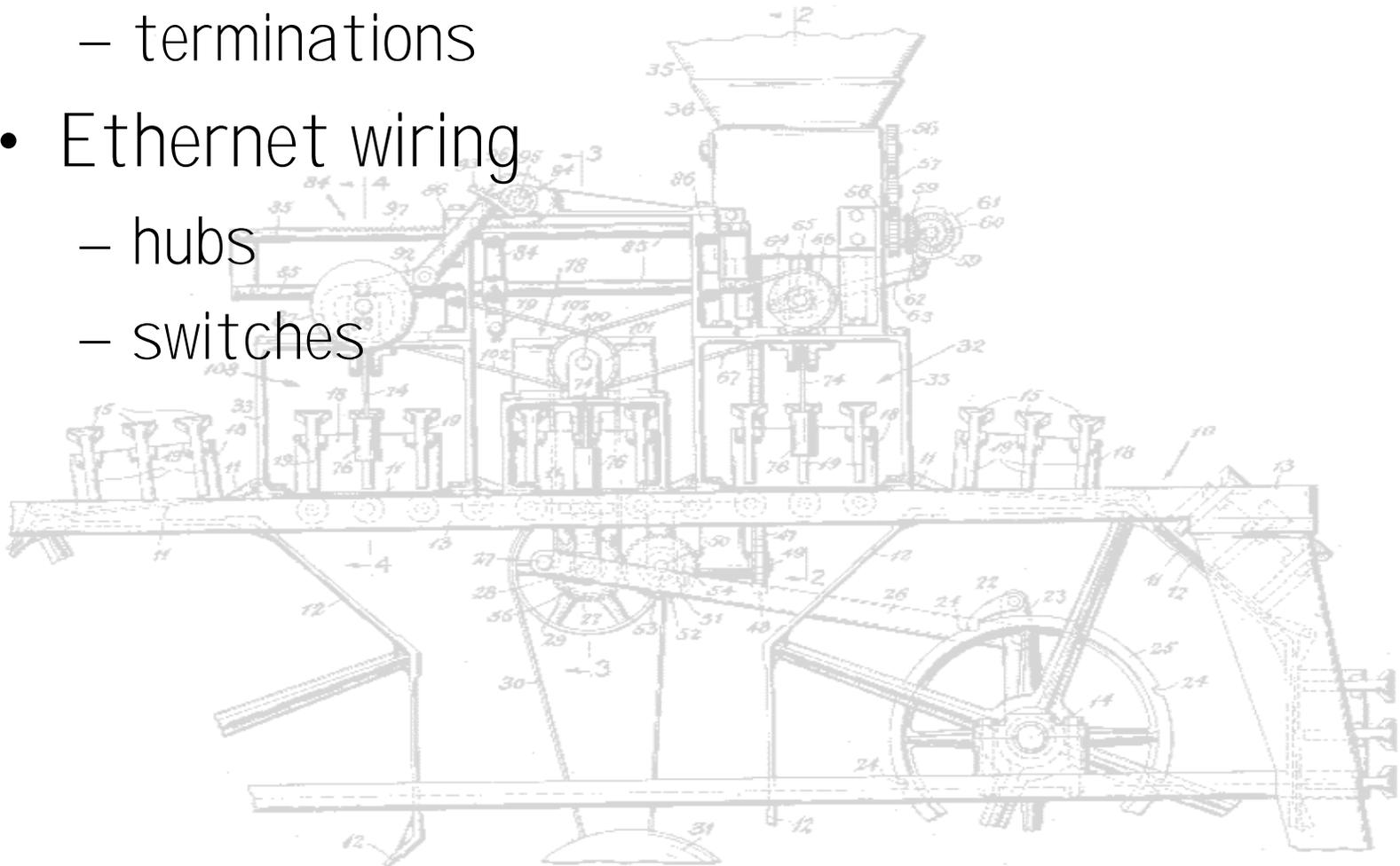


PROTOCOLS

- 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
- 
- A detailed technical drawing of a mechanical assembly, possibly a steam engine or a similar industrial machine. The drawing shows various components like gears, pistons, and structural frames, with numerous numbered callouts (e.g., 1, 2, 3, 4, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100) pointing to specific parts. The drawing is rendered in a light gray color, serving as a background for the text.

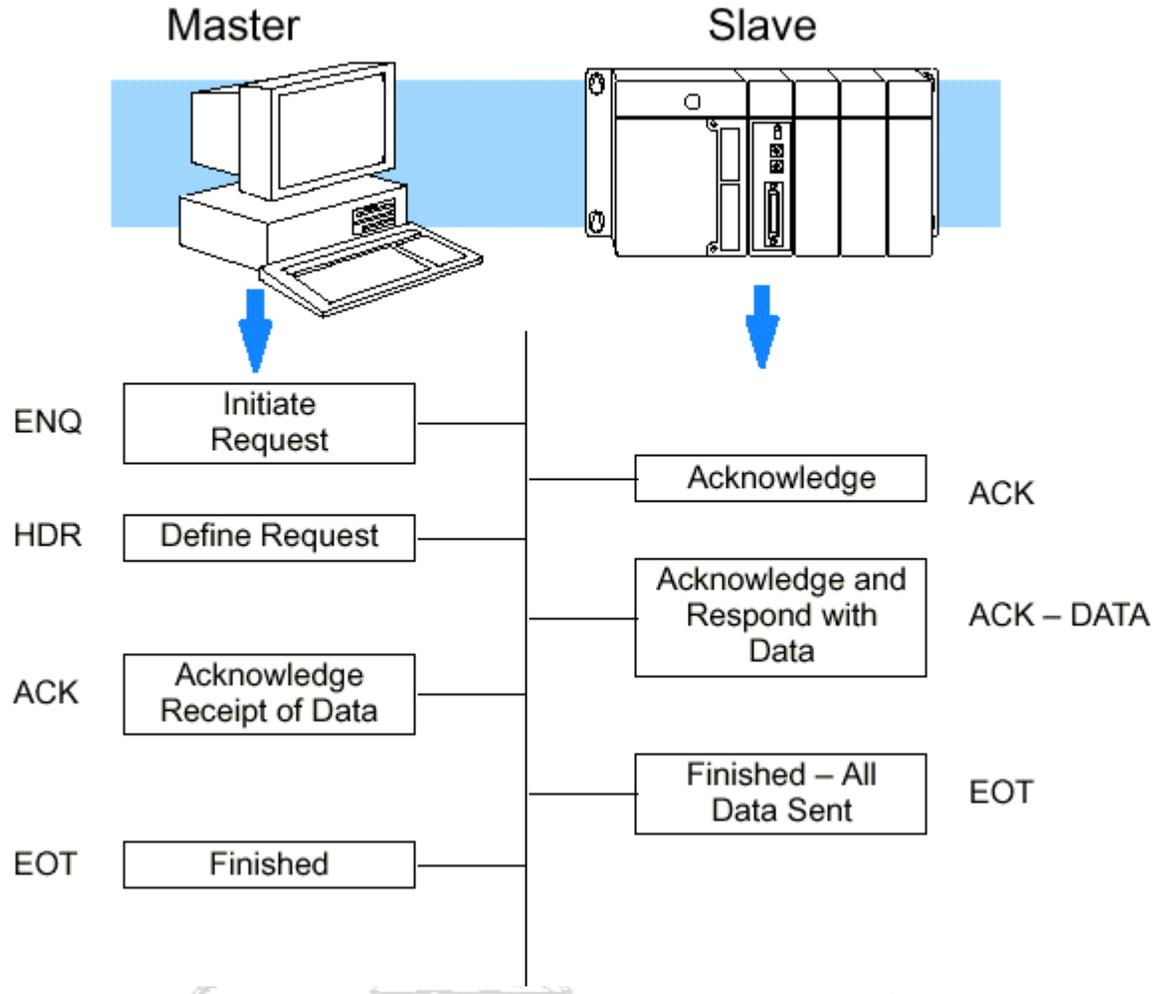
WIRING UP THE SYSTEM

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



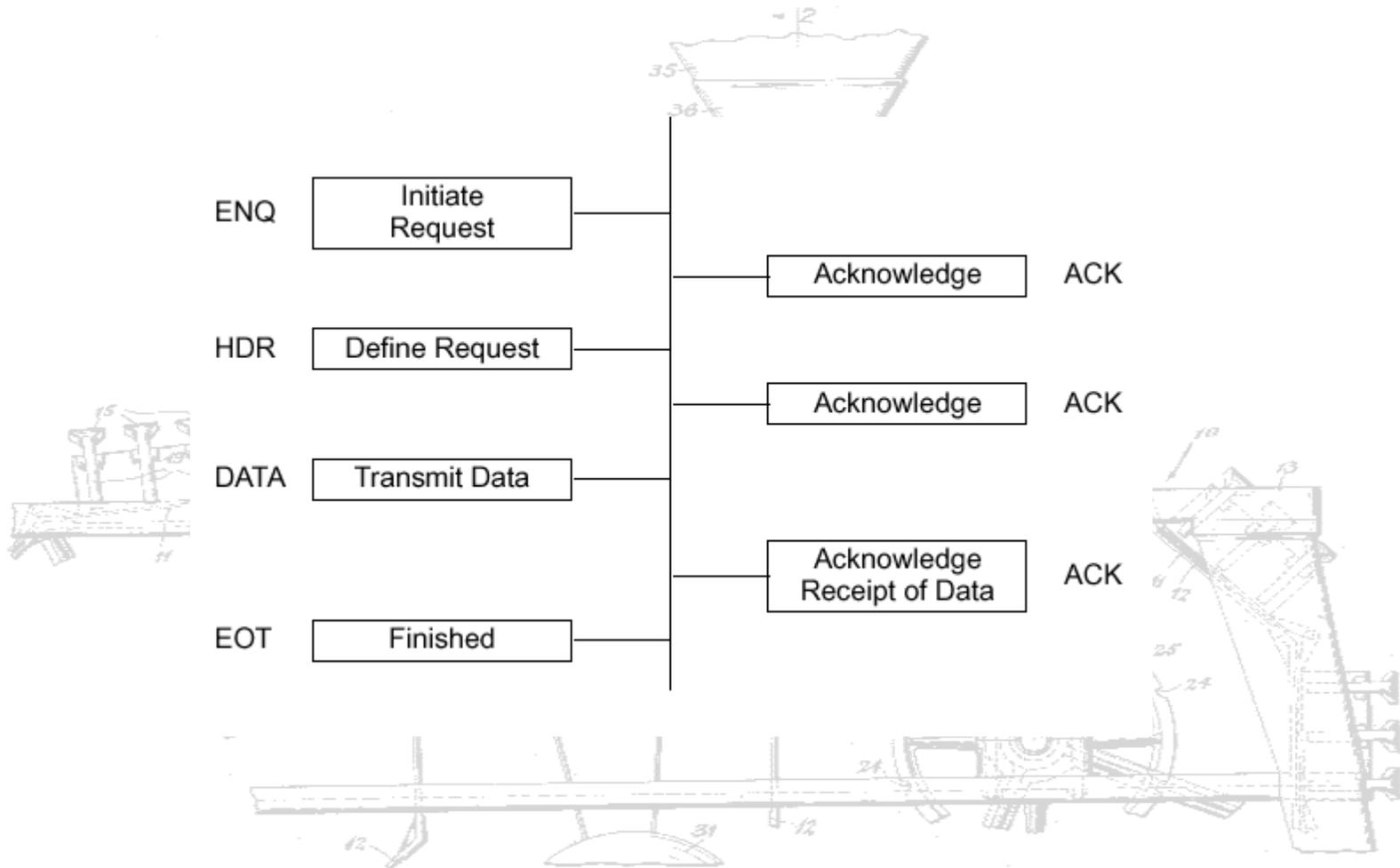
DL05 COMMUNICATIONS

- DirectNet Protocol - read request



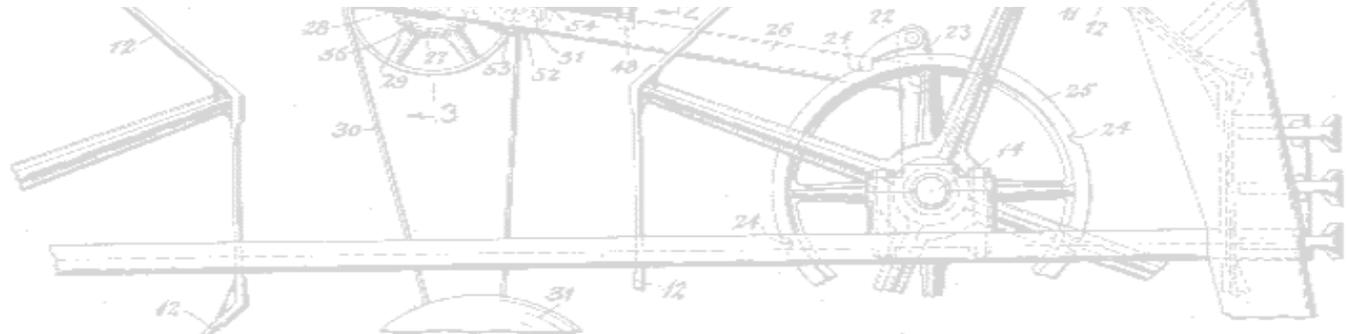
DL05 COMMUNICATIONS

- DirectNet Protocol - write request



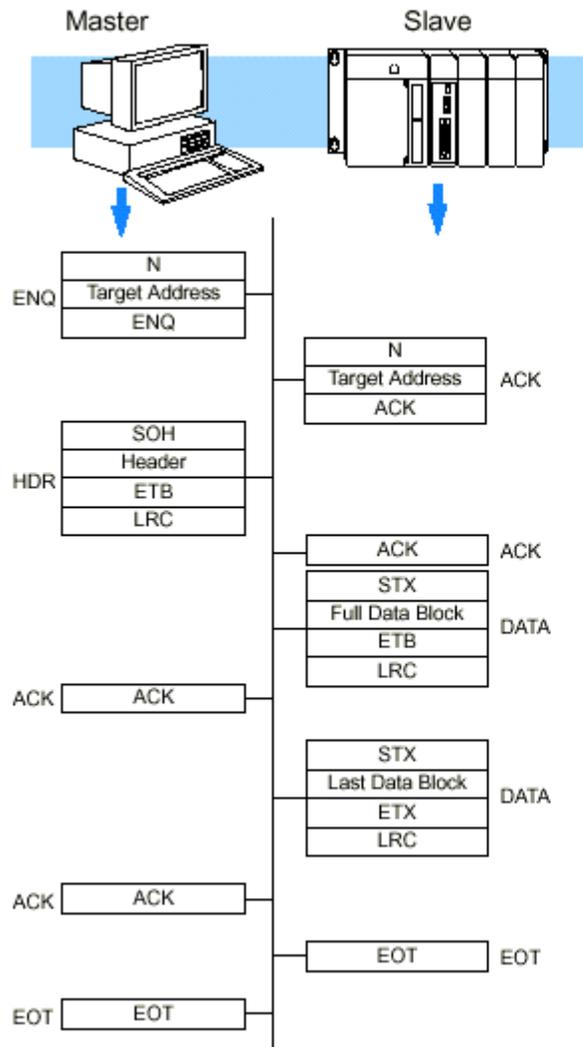
DL05 COMMUNICATIONS

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.

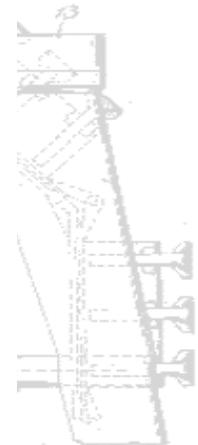
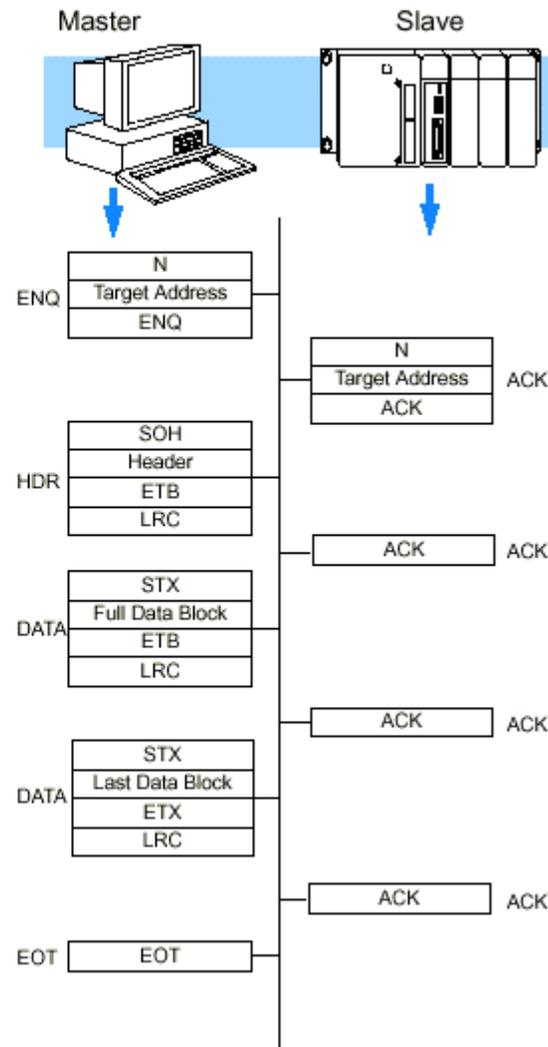


DL05 COMMUNICATIONS

Read Request

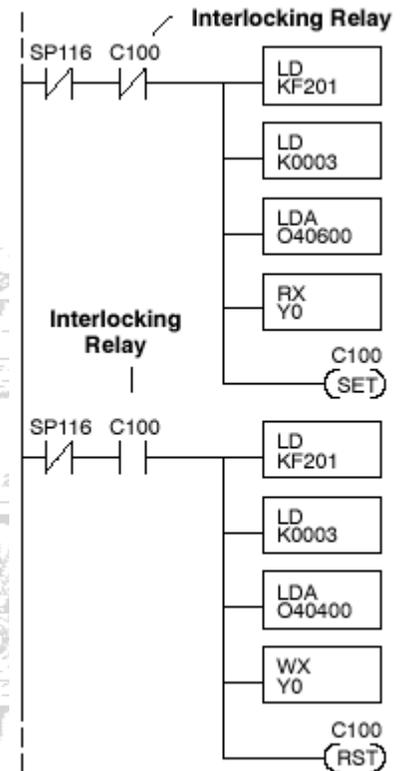
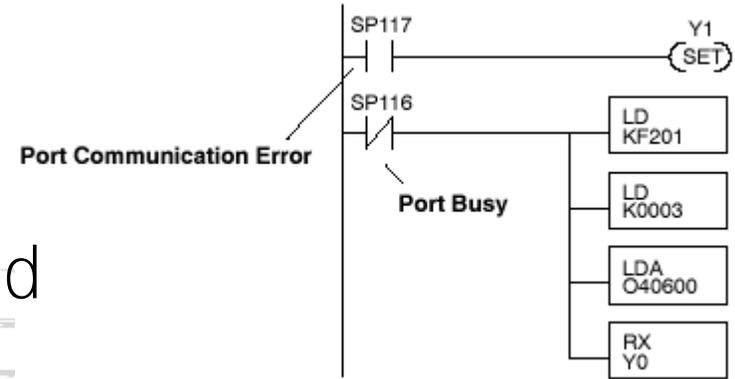


Write Request



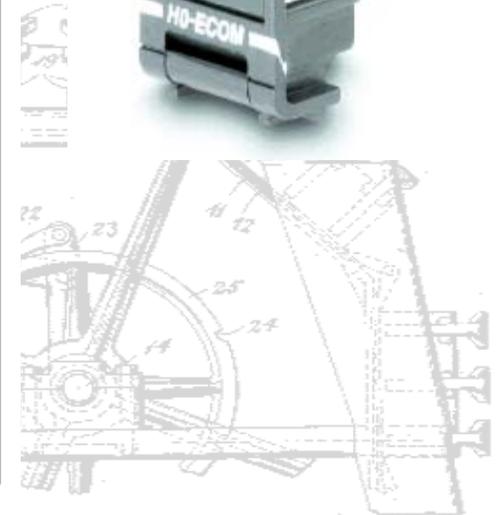
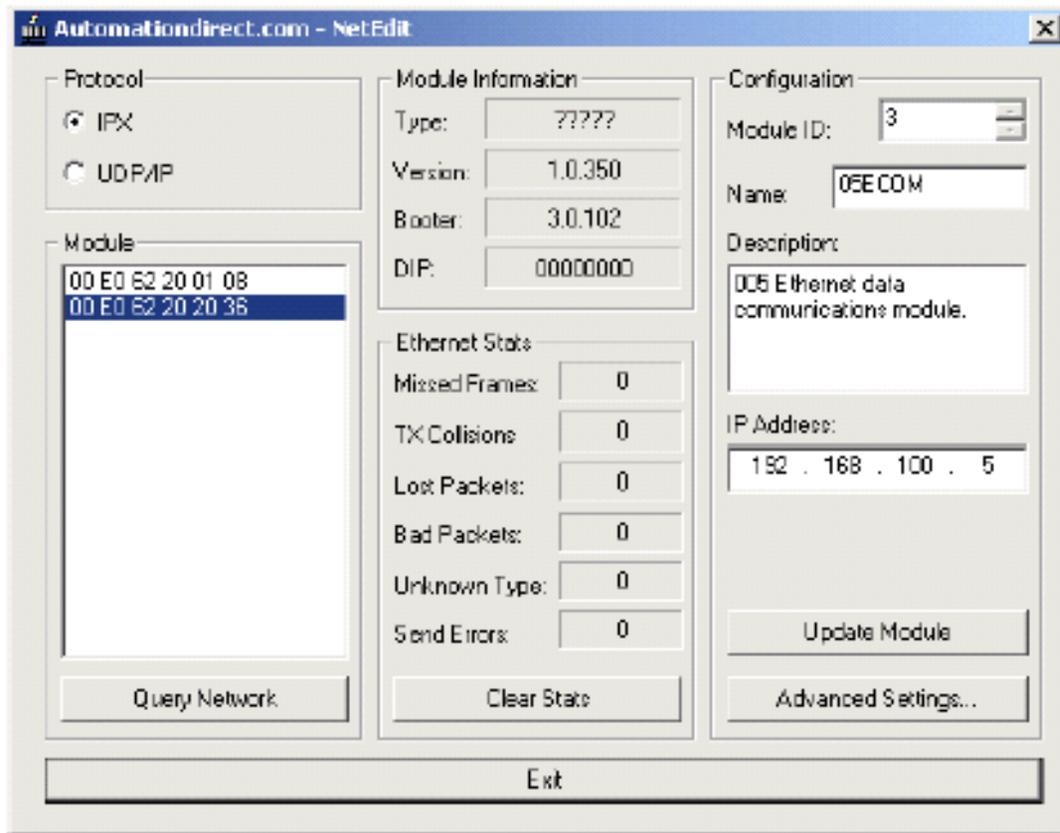
DOING DL05 COMMUNICATIONS

- 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”

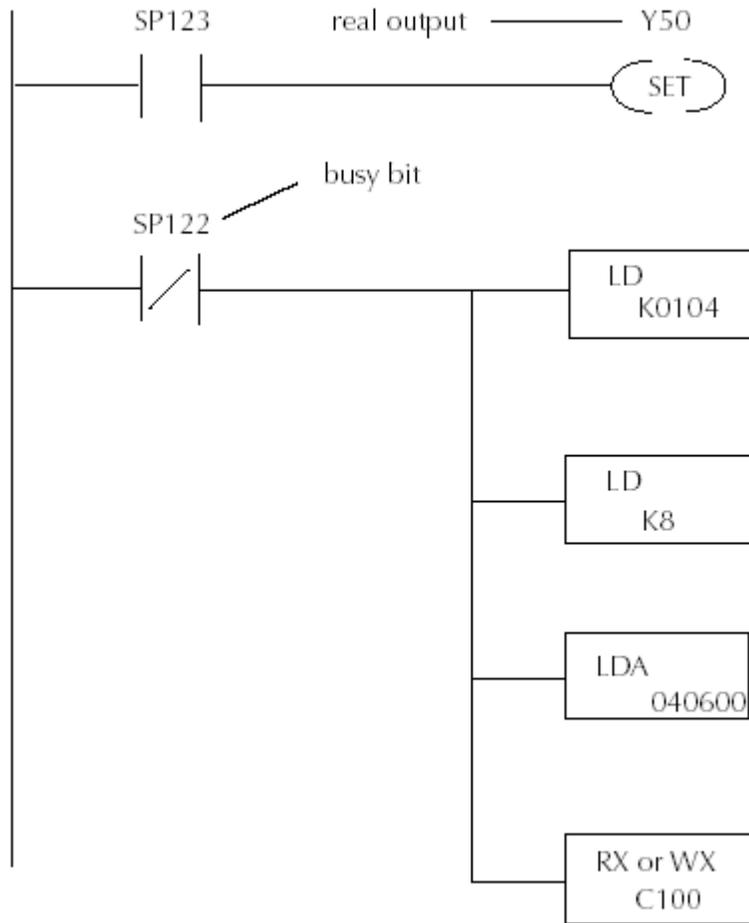


DL05/06 ETHERNET MODULE

- New HO-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

