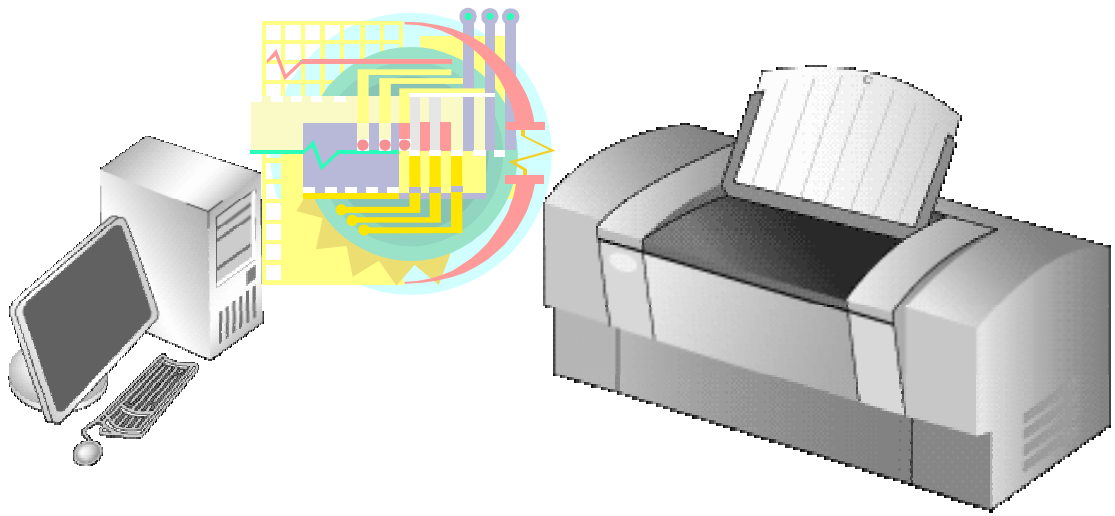
Welcome to Trendsetter Maintenance MCE Upgrade

Course Introduction

Overall Performance Goals

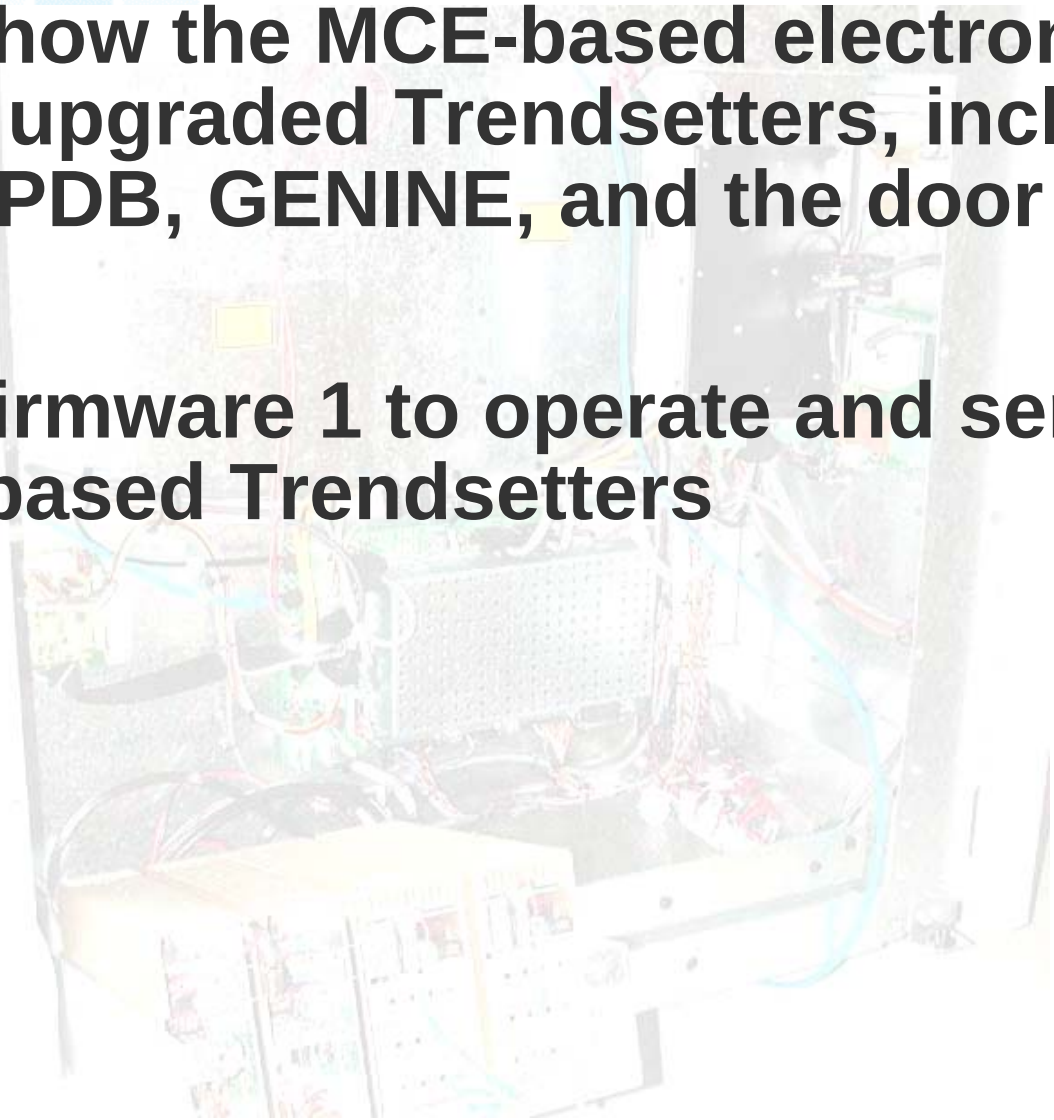
- Describe the MCE-based electronics of the Trendsetters
- Use Firmware 1 as the diagnostics tool for servicing the systems



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Learning Outcomes

- State how the MCE-based electronics works in the upgraded Trendsetters, including the MCE, PDB, GENINE, and the door safety loop
- Use Firmware 1 to operate and service the MCE-based Trendsetters



Course Pre-requisites

- Trendsetter Maintenance Part I
- Trendsetter Maintenance Part II

Learning Resources

- Instructors



Doug Jeffery



Stewart Taylor

Learning Resources

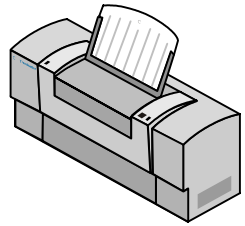
- Student Guide
- Slides (pdf)
- Simulators
- TechPlanet: Trendsetter 400/800 Power Box

Instructional Approach

- Interactive
  - You LEARN; we facilitate
  - Team work
- Participative
  - Discussion
  - Hands-on
  - Problem-solving
  - Q&A
- “Parking Lot”

Creo WebEx Meeting Center

- **WebEx**
  - Connection speed: >56K
  - Screen size: adjust the display resolution setting for Windows if necessary
  - Raising hand
  - Sending messages
  - Sharing document/application
- **Telephone/Noises**
  - *6 to activate mute/un-mute function
  - Turn off sound on your computer



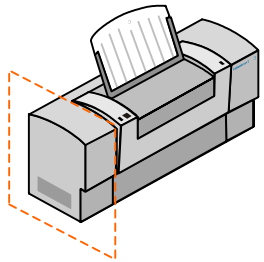
Trendsetter Maintenance MCE Upgrade

Module 1: Electronics System

Module 1: Electronics

- Learning Objectives
  - Describe the architecture and configuration of the TSM base machine, Autoloader, NEWS 200, and Spectrum
  - Identify key components and the wiring connection
  - Describe the Master Control Electronics (MCE) board
  - Describe the Power Distribution board (PDB)
  - Describe two Input/output Node Electronics boards – GENINE (generic) and LIONEL (little)
  - Describe the Controller Area Network (CAN) bus
  - Describe MCE connectivity issues

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Lesson 1.1
MCE Architecture

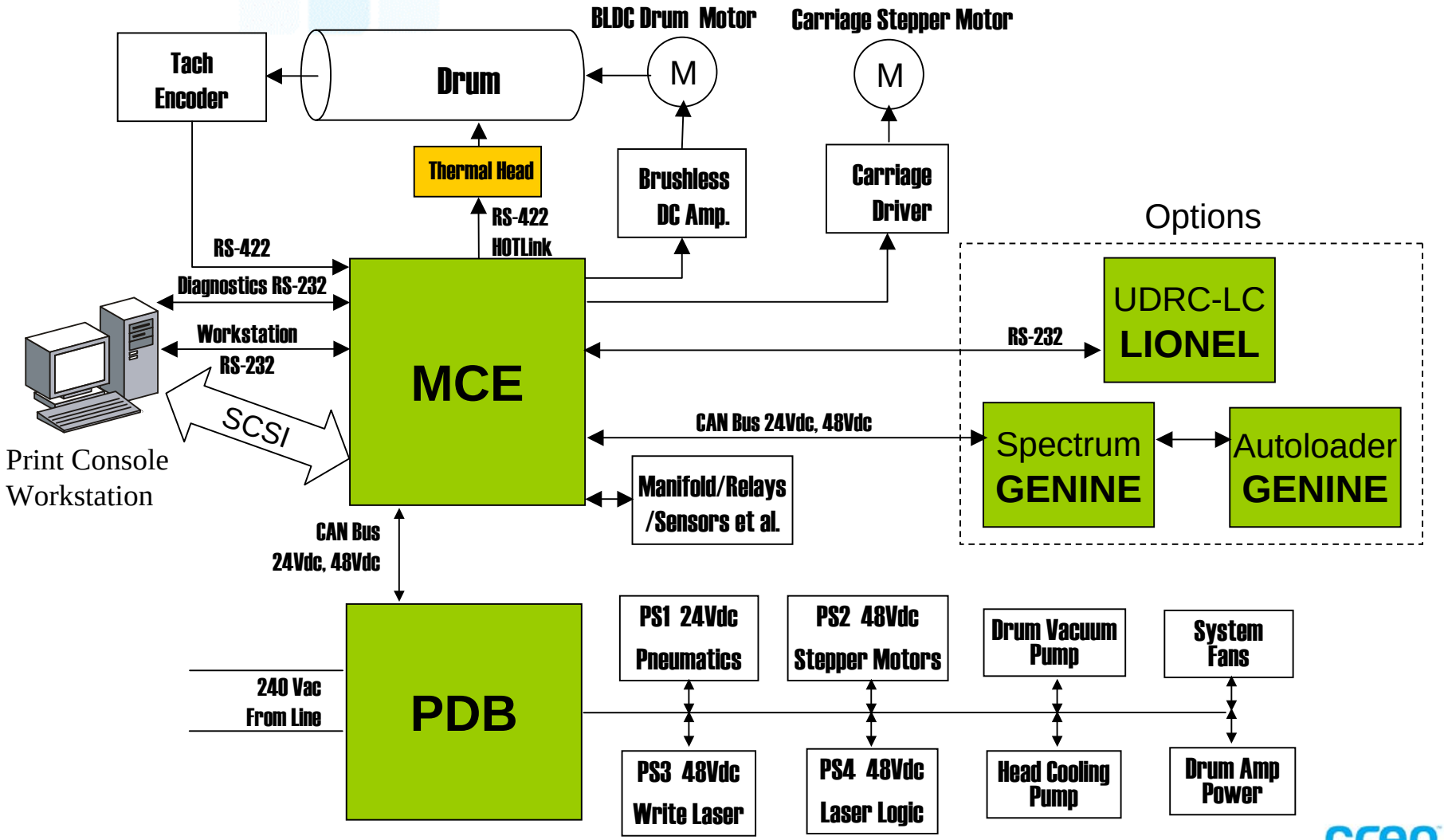
Module 1: Electronics System

Module 1: Electronics

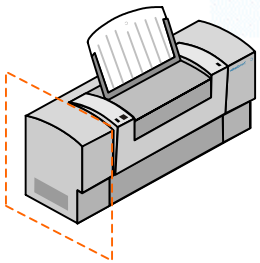
- **Discuss**
  - **Based on your experiences, what improvement would you like to see for the Trendsetter's electronics system?**

Lesson 1.1: TSM Architecture

Block Diagram



Power Box: TSM Base Machine





Drum Amp

Drum Brake Board

Carriage Driver

CAN bus

MCE

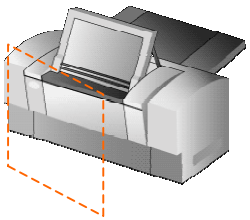
Power Supplies

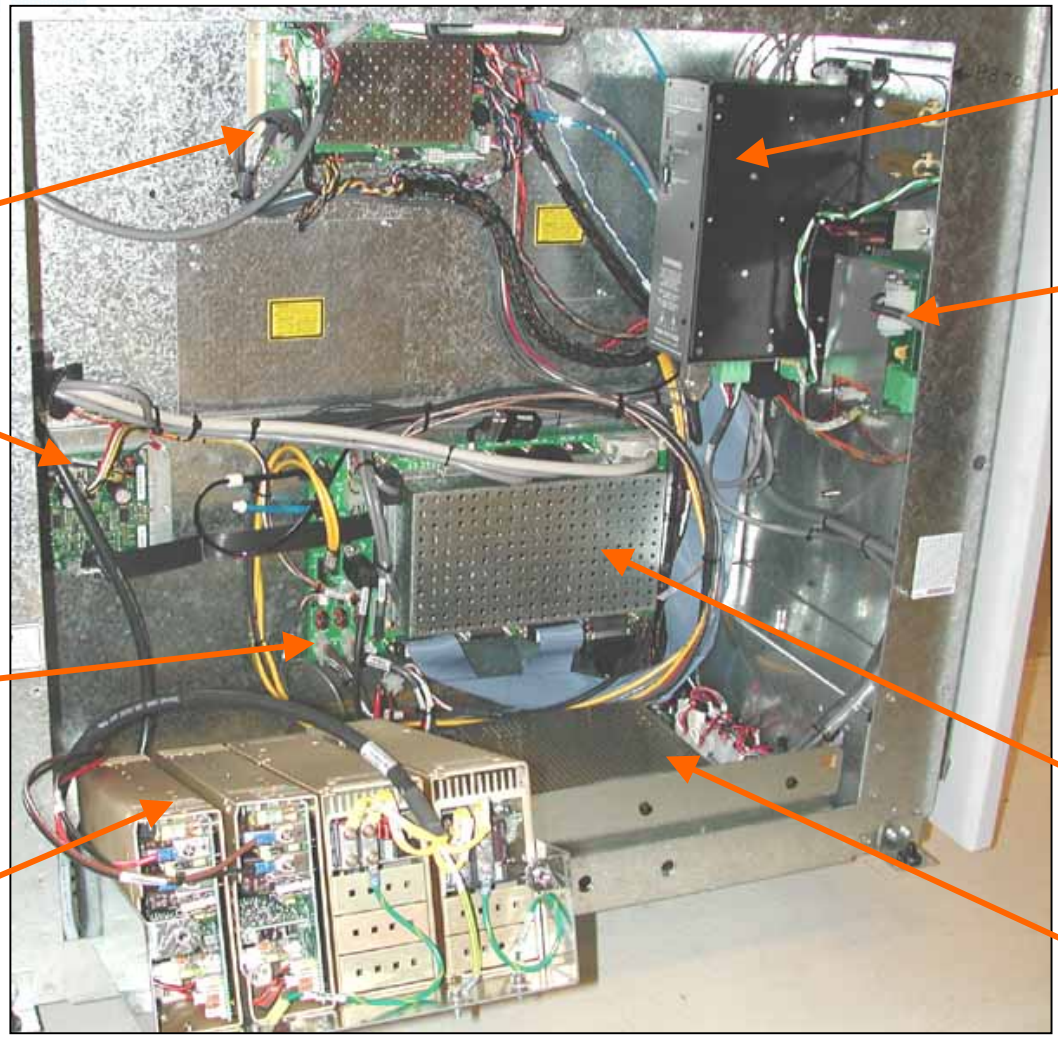
PDB

Note: No GENINE board

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Power Box: Autoloader/NEWS





GENINE

Carriage Driver

CAN bus

Power Supplies

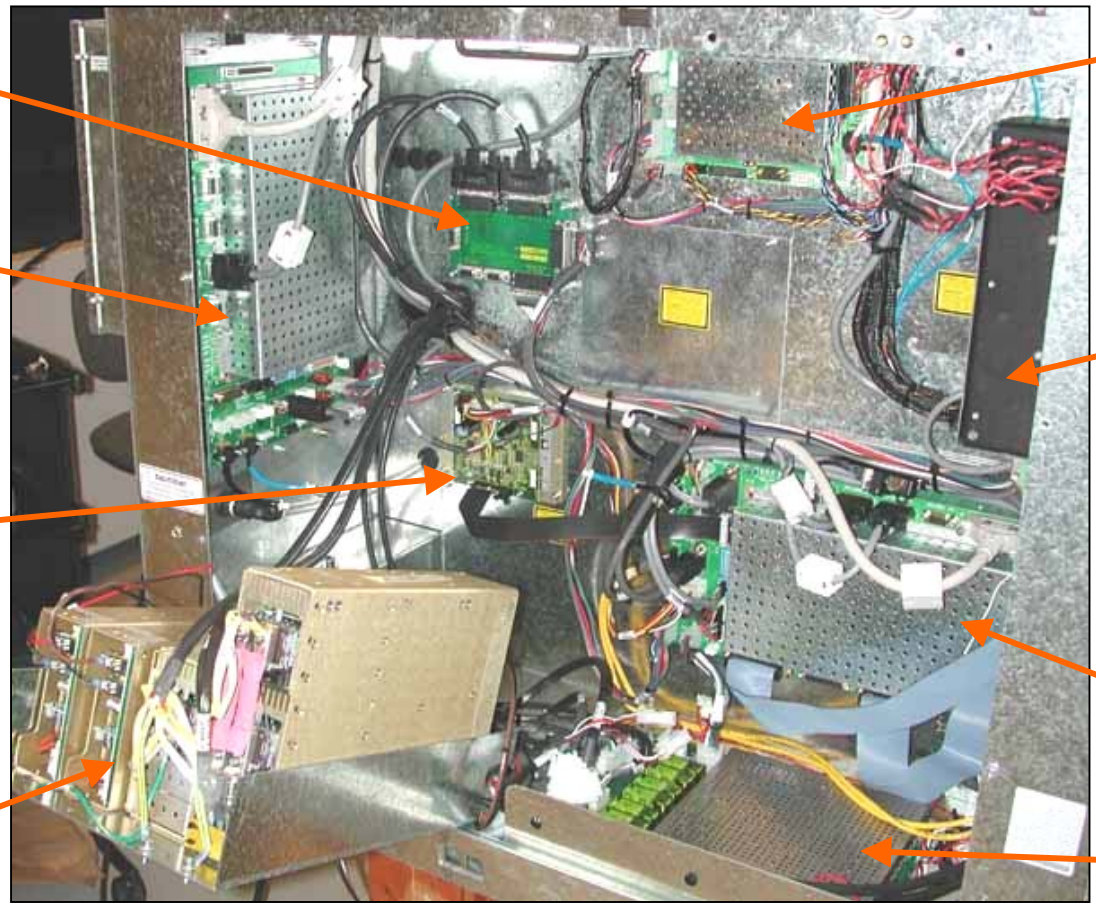
Drum Amp

Drum Brake Board

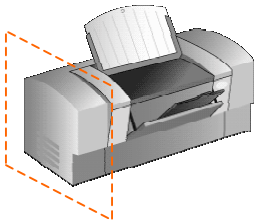
MCE

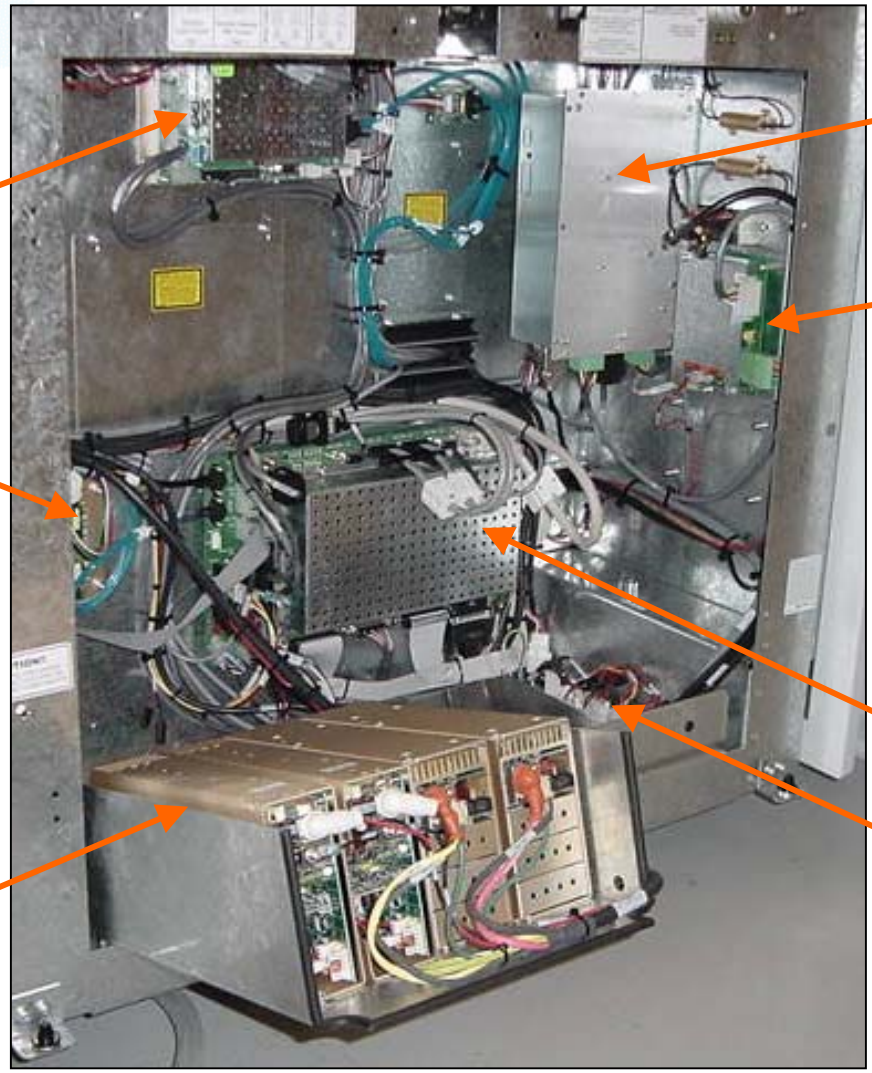
PDB

Power Box: NEWS 200 (Hydra)



Power Box: TSM Spectrum



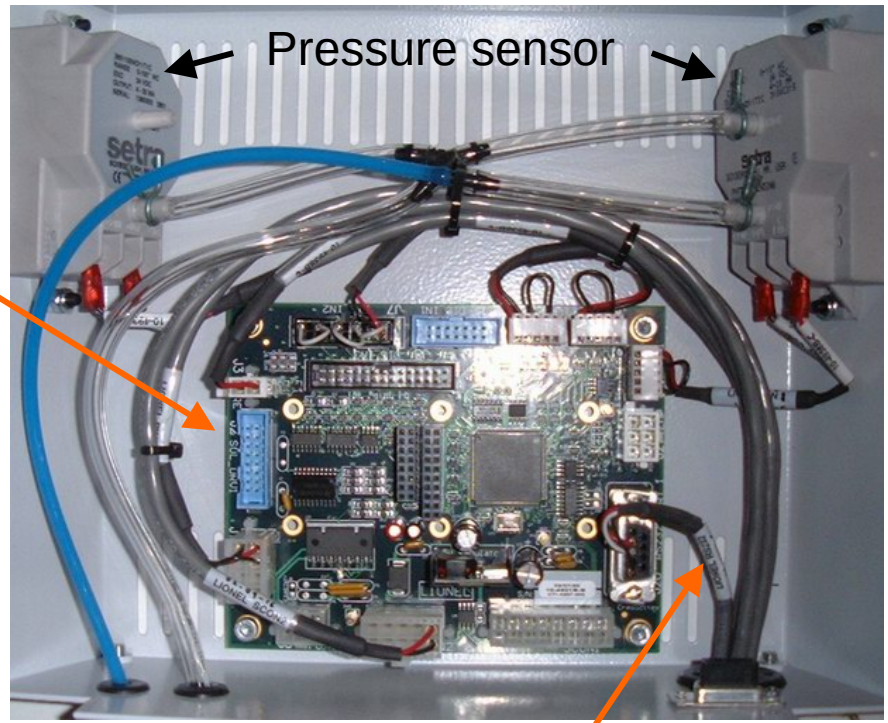


Power Box: TSM – UDRC option



Universal Debris Removal Cabinet

LIONEL Board



RS232 to MCE
(J40 SPR_COMM)
of a TSM device

Note: A LIONEL board is used on a UDRC-LC cabinet which is used for Chemistry Free option on all Trendsetters (Base, AL and SP) and enables the use of certain processless plates, thus far only Presstek Anthem plates.

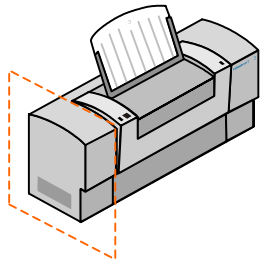
Power Box: AC Power Entry Box



SIO
Keyswitch

Exercise 1.1

- Name the components of the MCE power box
- Check the items for the following models:
  - Base
  - Autoloader
  - News
  - Hydra
  - Spectrum

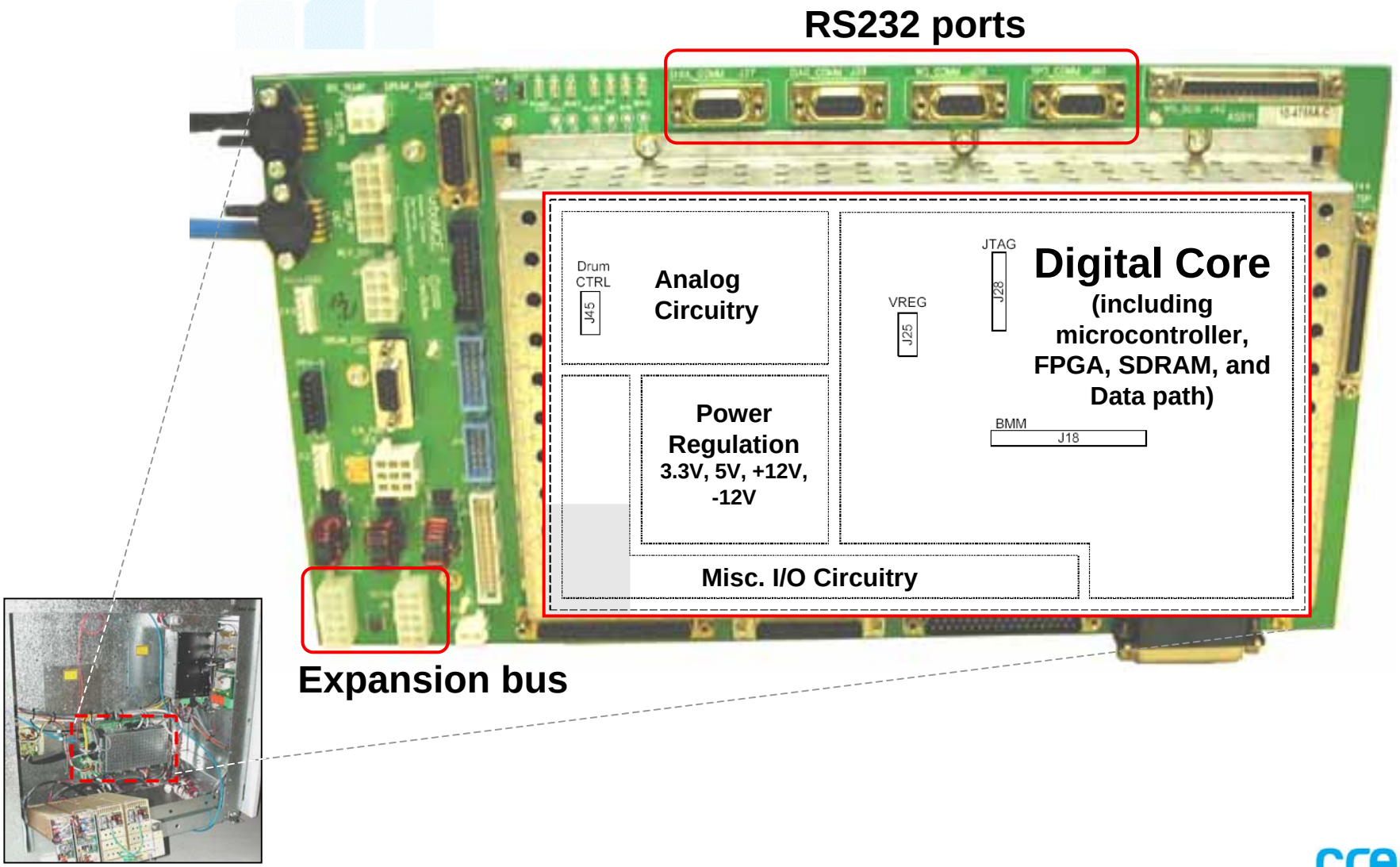


Lesson 1.2
MCE Board

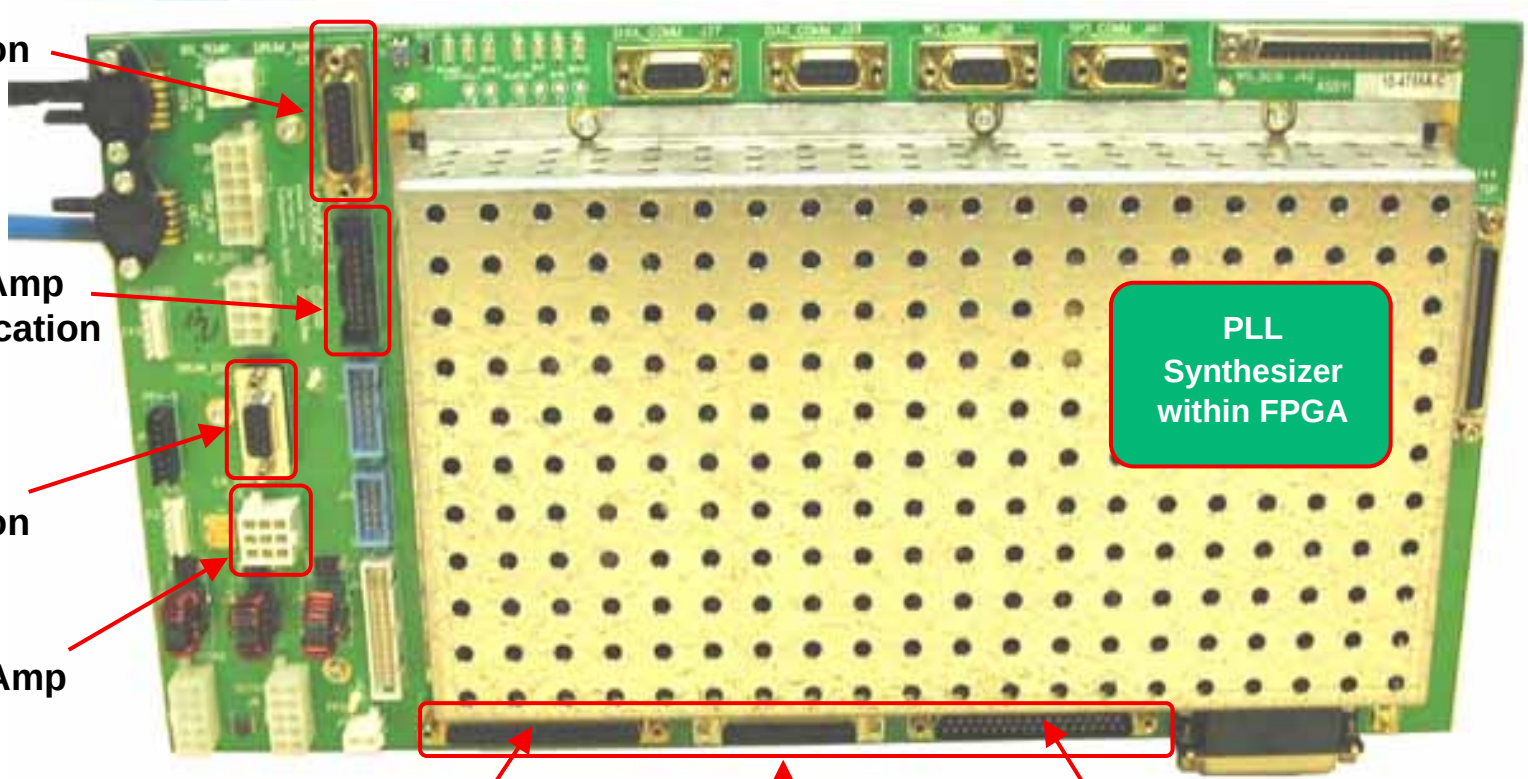
Module 1: Electronics System

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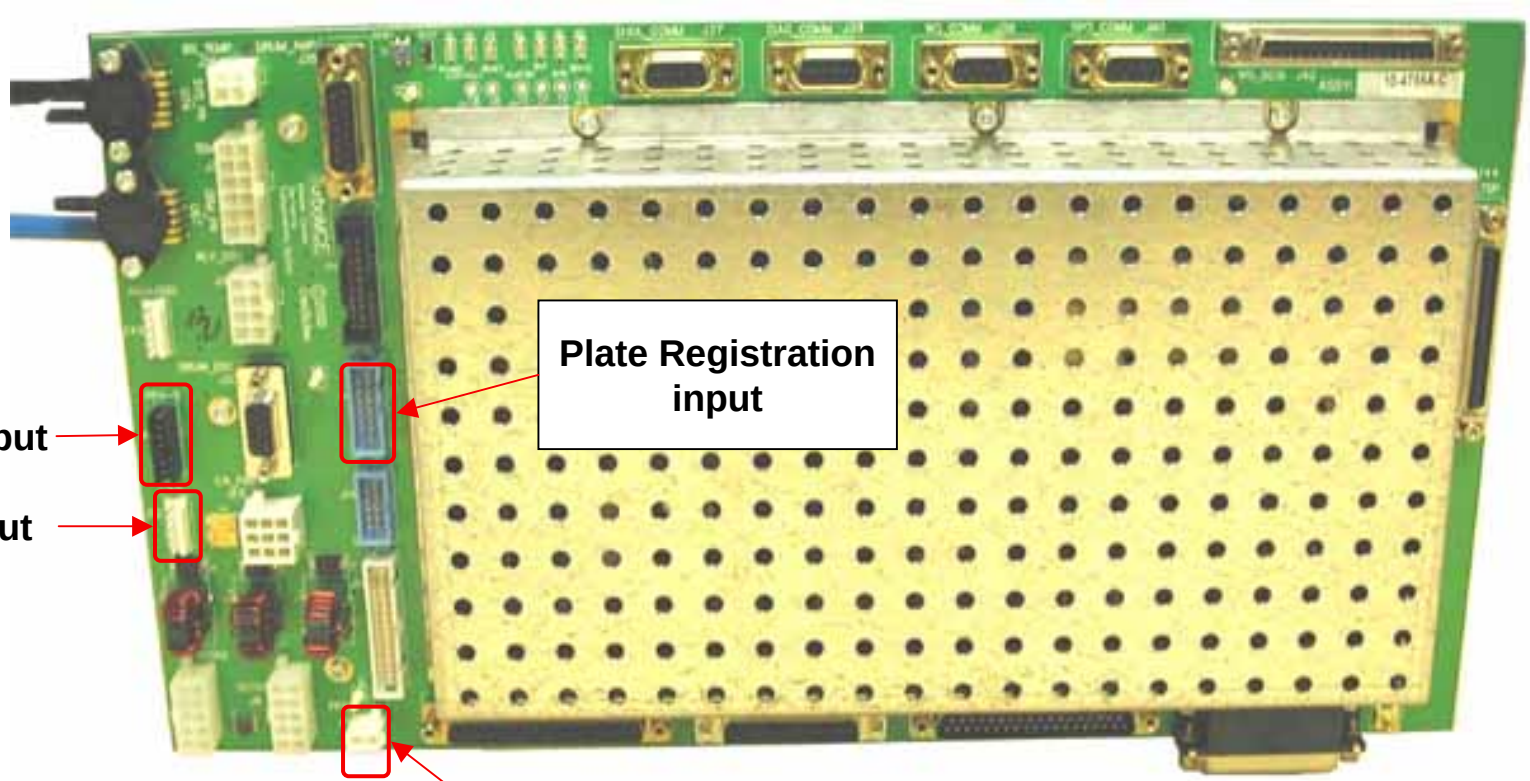
Lesson 1.2: MCE—Master Control



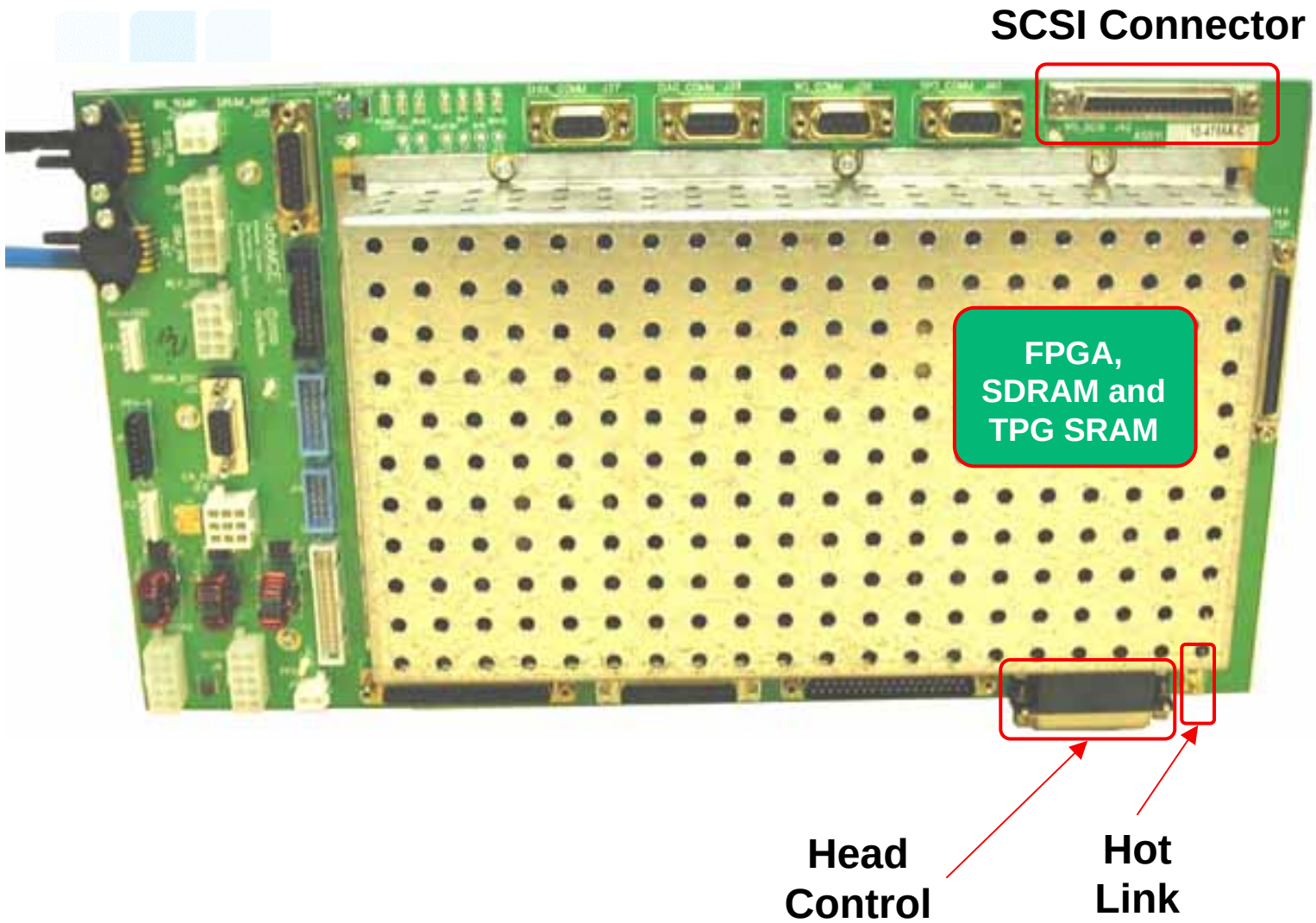
Lesson 1.2: MCE—Plate Handling Engine Electronics (1)



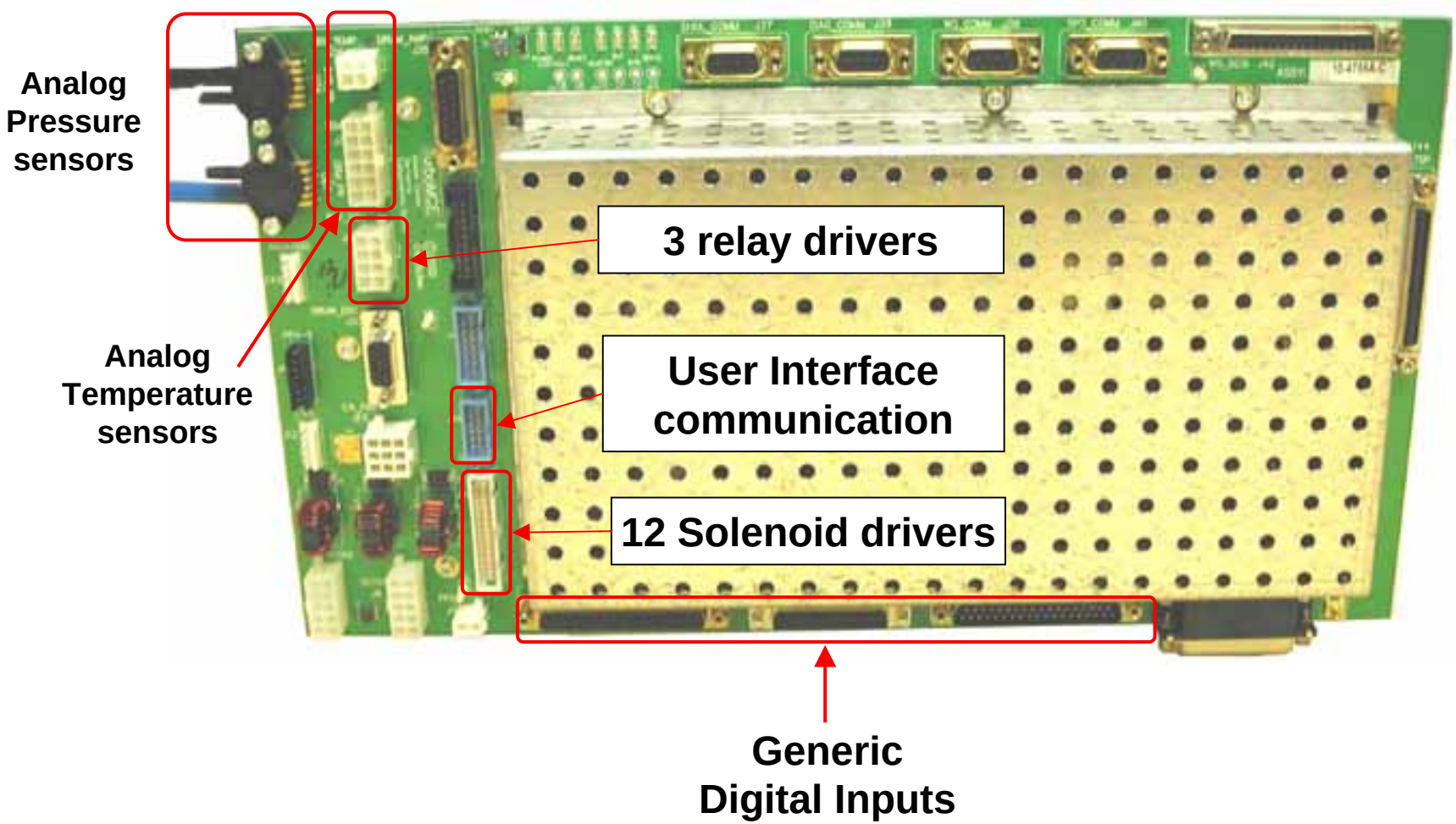
Lesson 1.2: MCE—Plate Handling Engine Electronics (2)



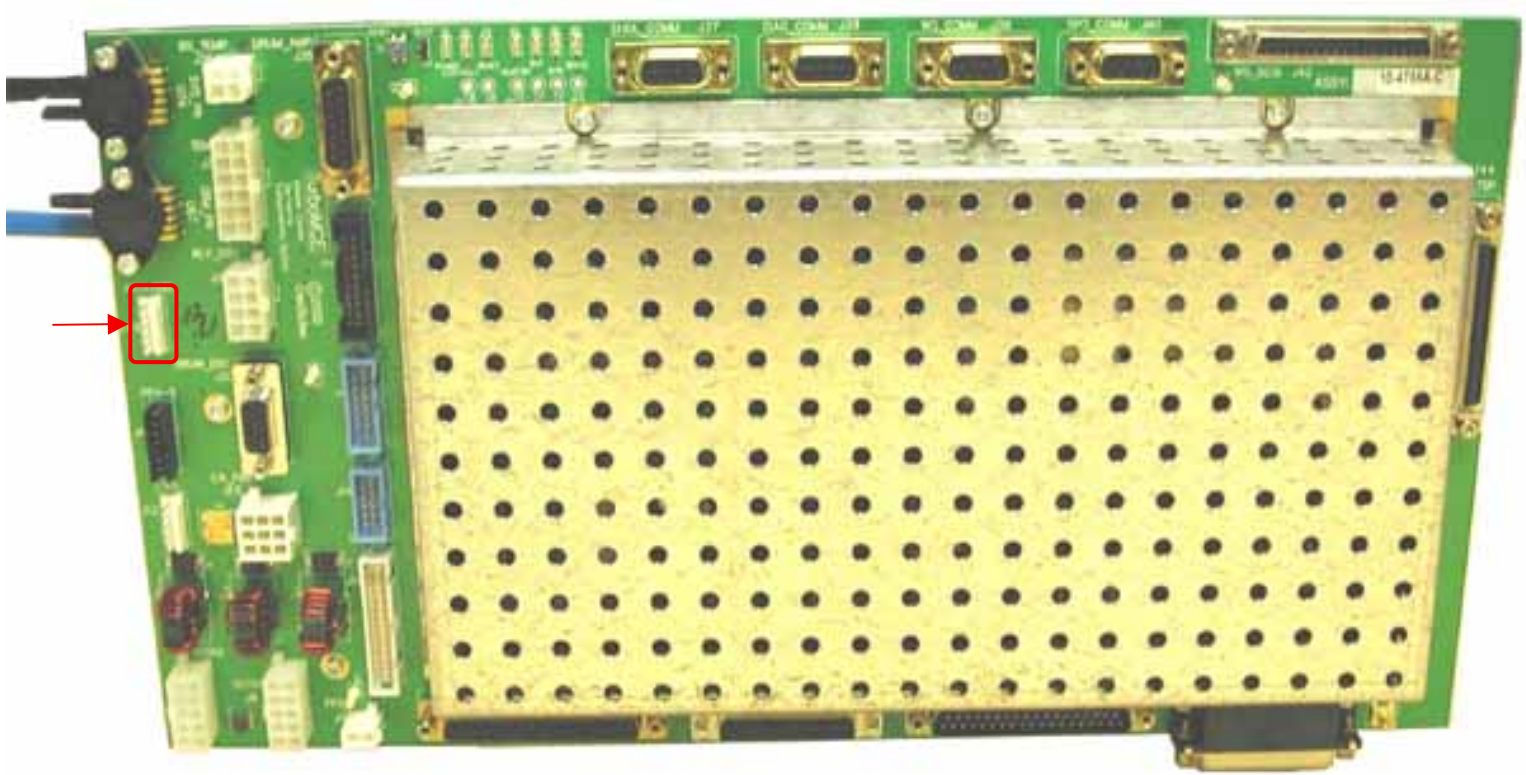
Lesson 1.2: MCE—Image Data-path & Head Interface



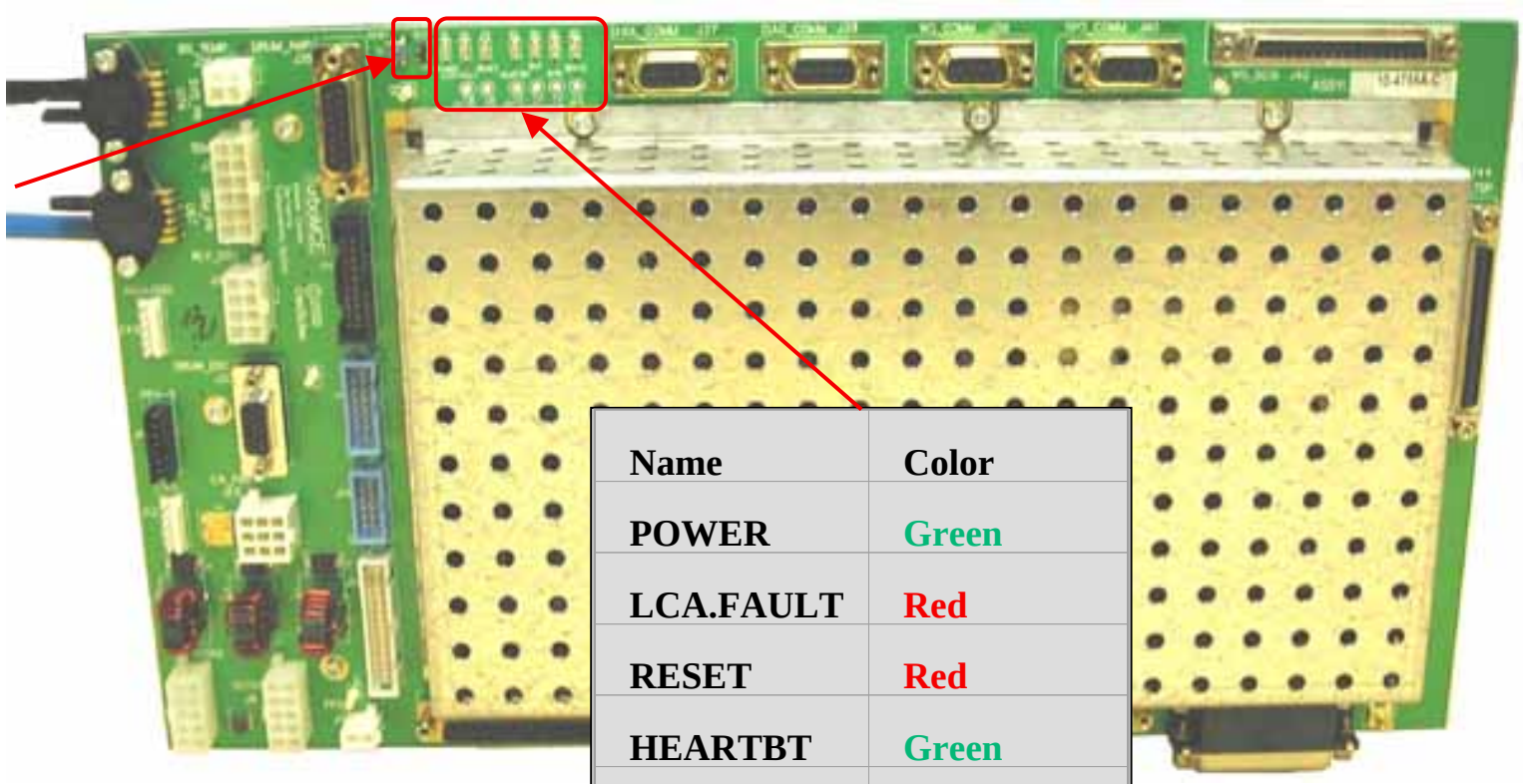
Lesson 1.2: MCE—Trendsetter Engine Electronics



Lesson 1.2: MCE—Trendsetter UDRC Option



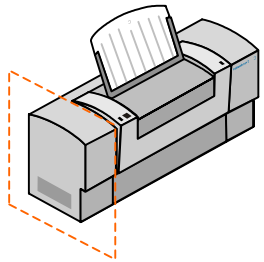
Lesson 1.2: MCE—Status LEDs & Boot Jumper



Name	Color
POWER	Green
LCA.FAULT	Red
RESET	Red
HEARTBT	Green
IDLE	Green
INTR	Yellow
SERVC	Red

Exercise 1.2

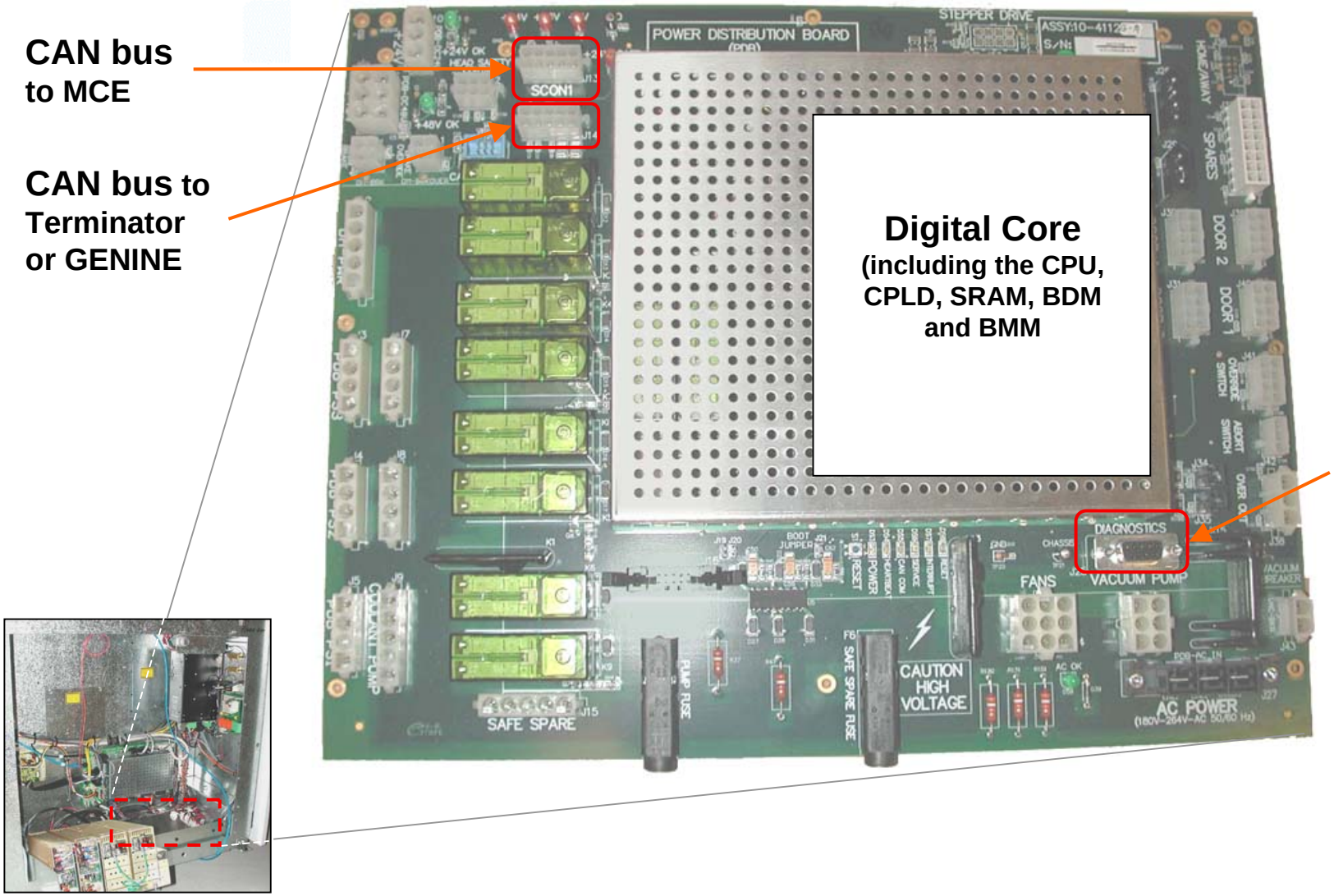
- Bring up the MCE block diagram
- Indicate elements that provide the following functionality:
  - Plate handling
  - Trendsetter engine electronics
  - Image data path
  - Master control of the system



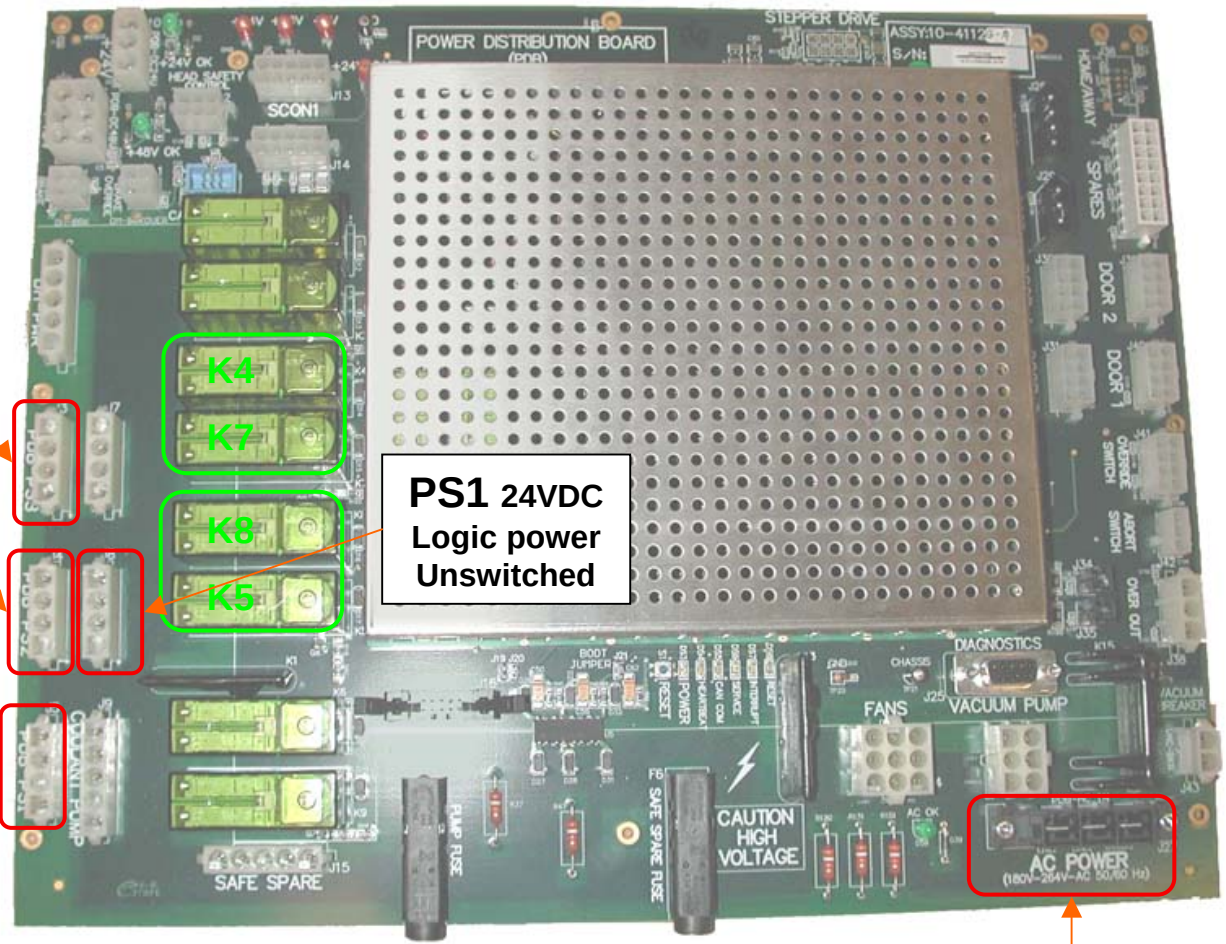
Lesson 1.3
PDB Board

Module 1: Electronics System

Lesson 1.3: PDB—General Control



Lesson 1.3: PDB—Control and Distribute AC Power



PS3 48VDC
Write Laser
Switched

PS2 48VDC
Carriage motor
Switched

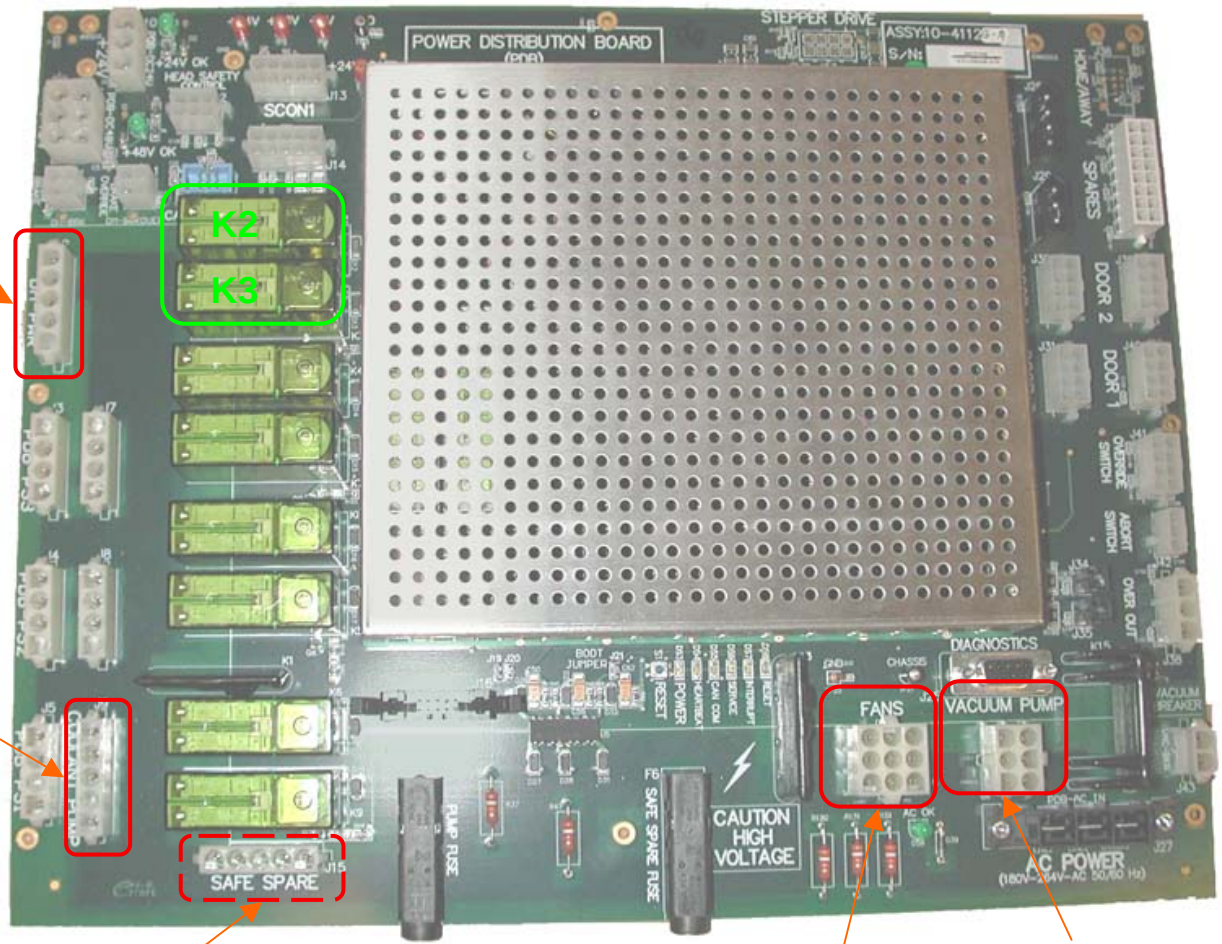
PS4 48VDC
Laser Logic
Unswitched

PS1 24VDC
Logic power
Unswitched

240VAC Power

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Lesson 1.3: PDB—AC Power



Drum Amp Power

Coolant Pump

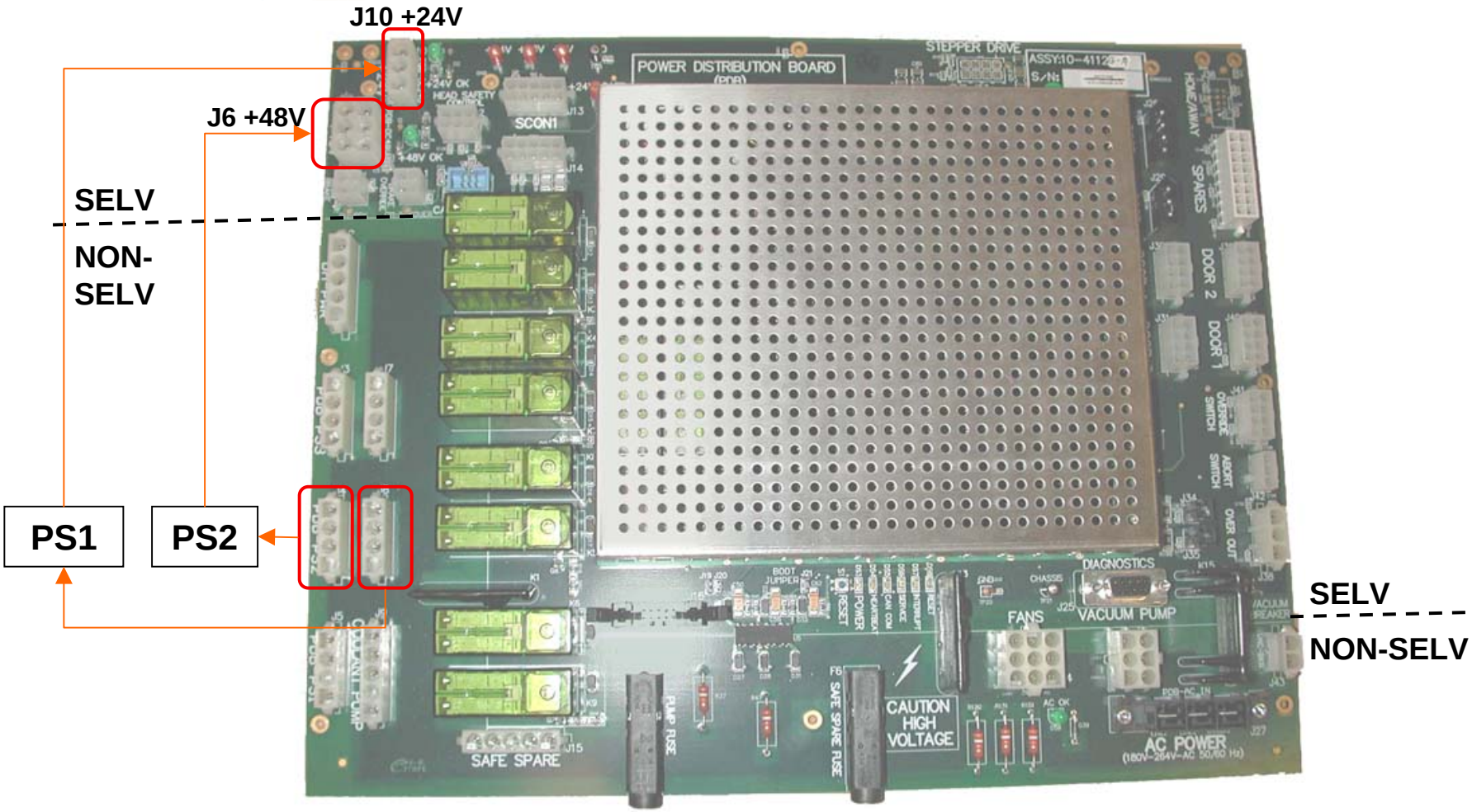
Switched spare AC output

Fans

Vacuum Pump

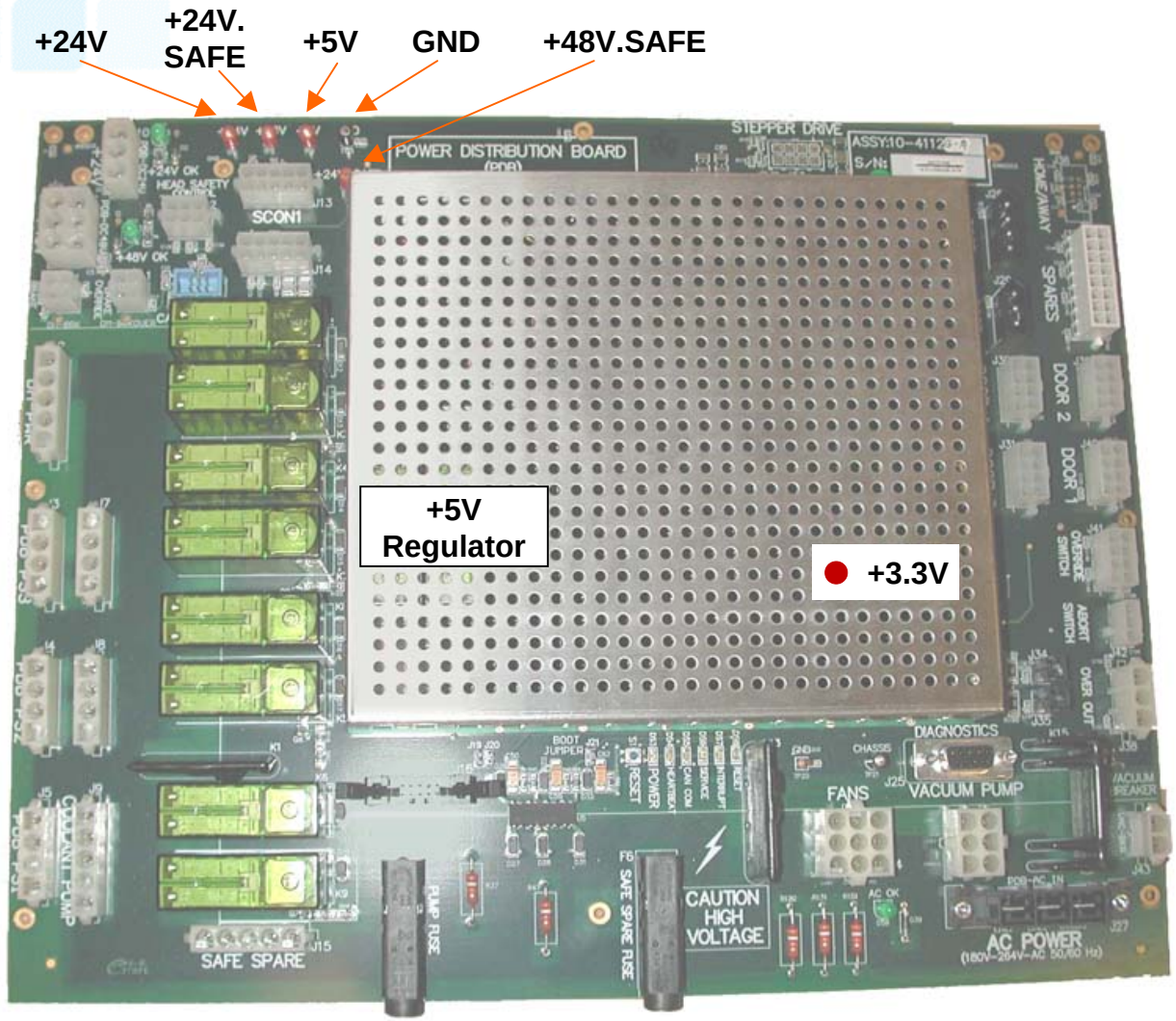
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Lesson 1.3: PDB—DC Power

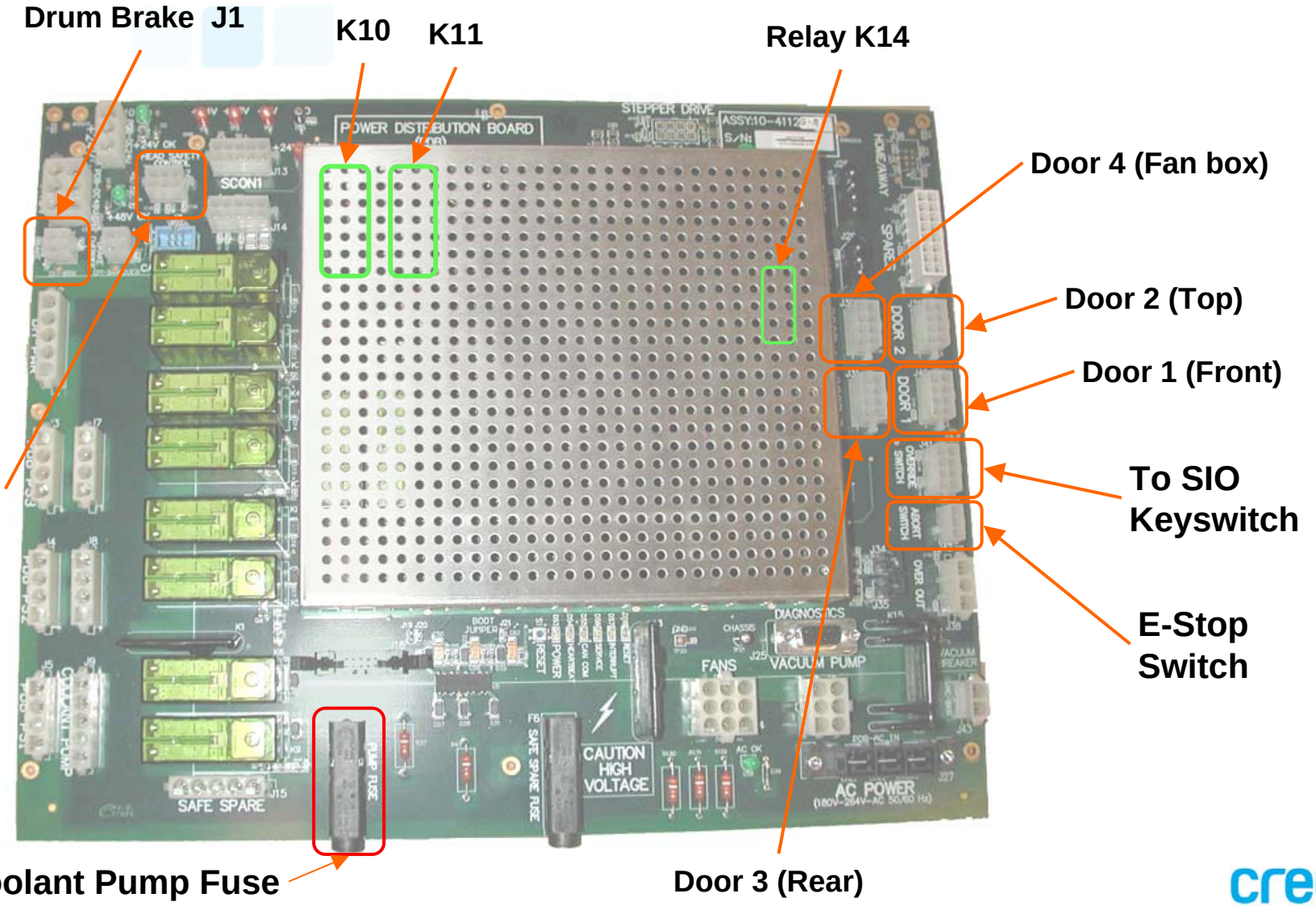


Lesson 1.3: PDB—DC Power

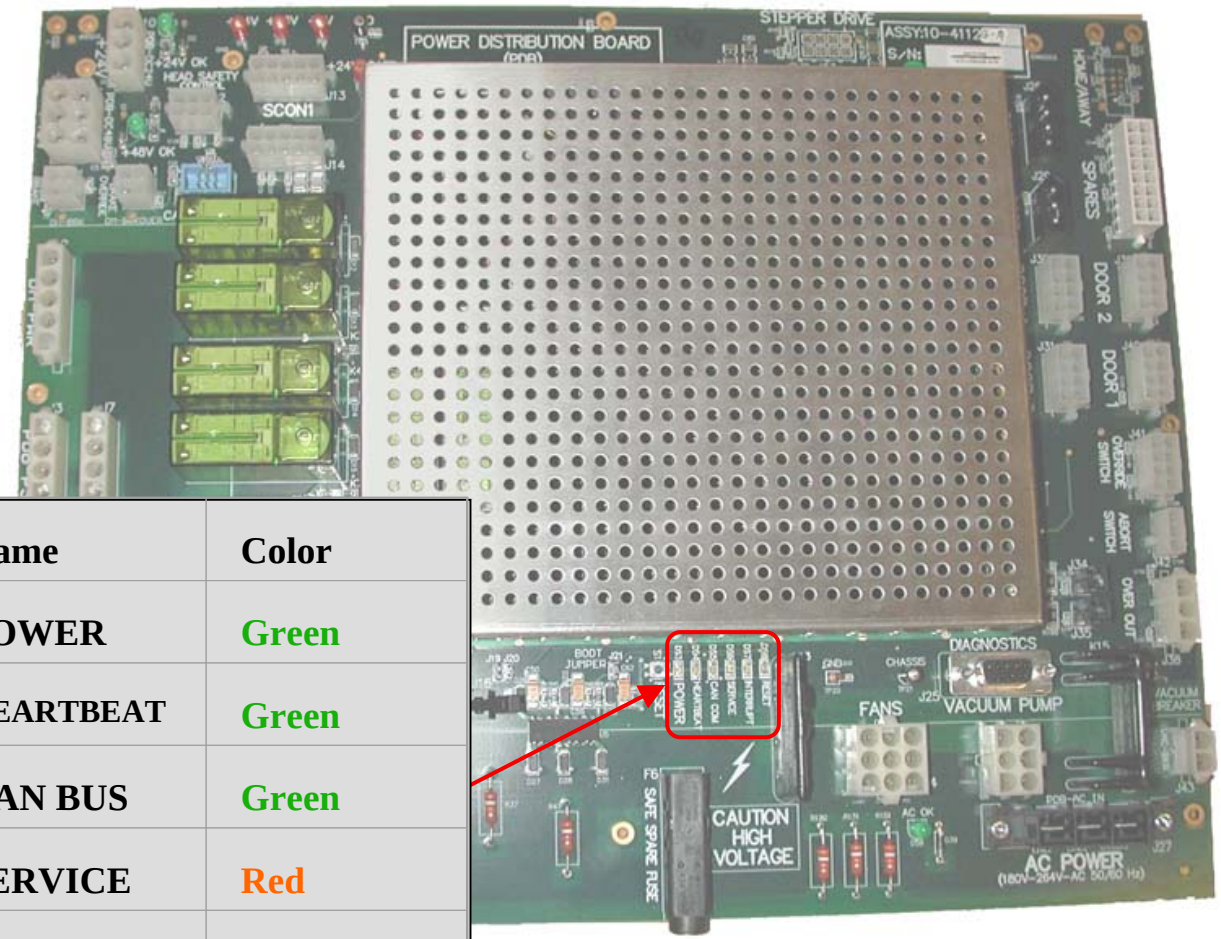
SELV Voltages Test Points



Lesson 1.3: PDB—Safety Loop



Lesson 1.3: PDB—Status LEDs

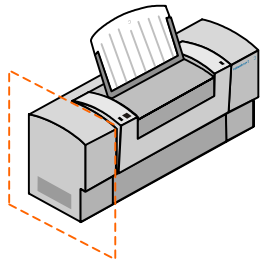


Name	Color
POWER	Green
HEARTBEAT	Green
CAN BUS	Green
SERVICE	Red
INTRRUPT	Yellow
RESET	Red

Exercise 1.3

- Polling on WebEx

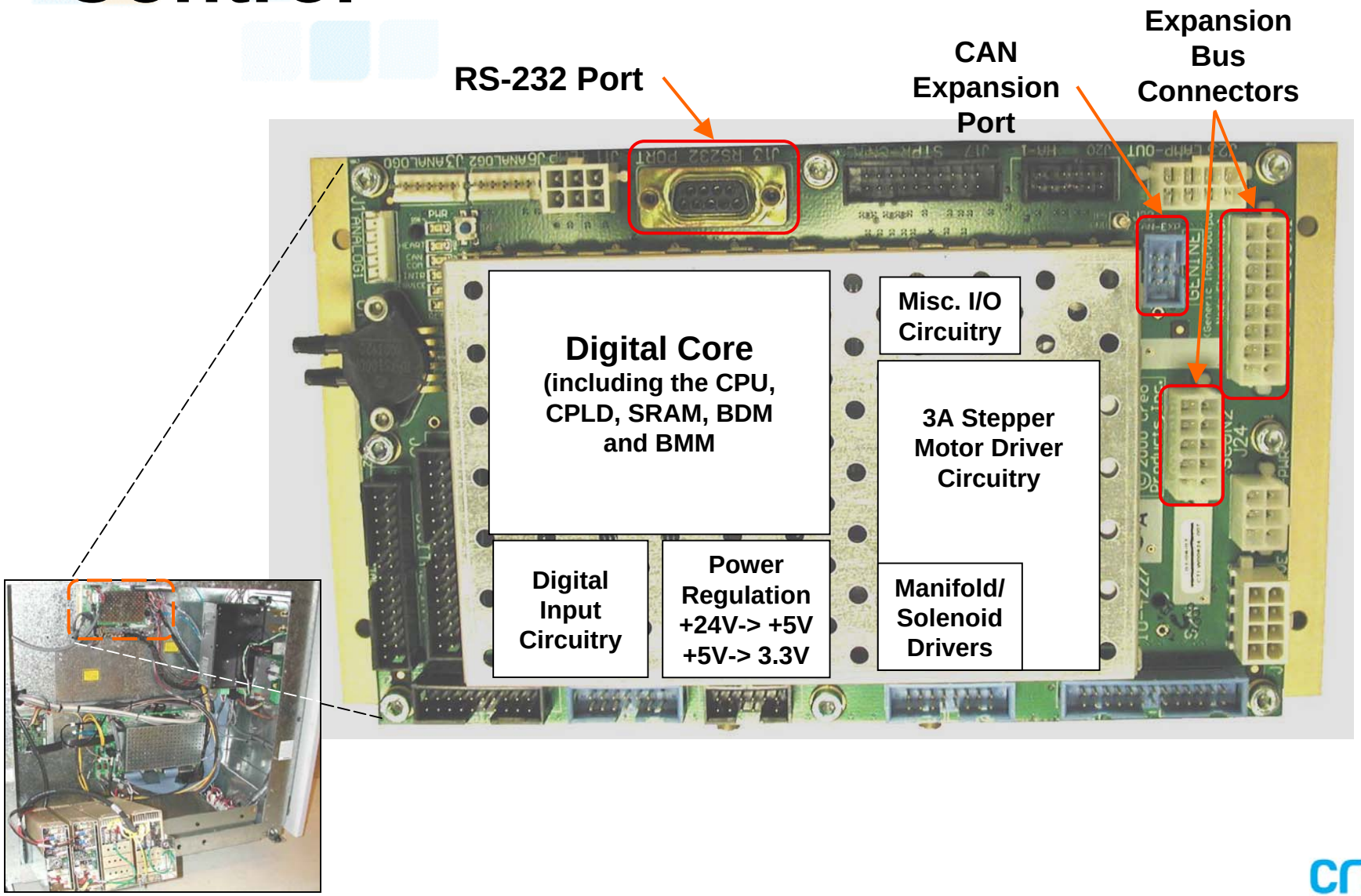




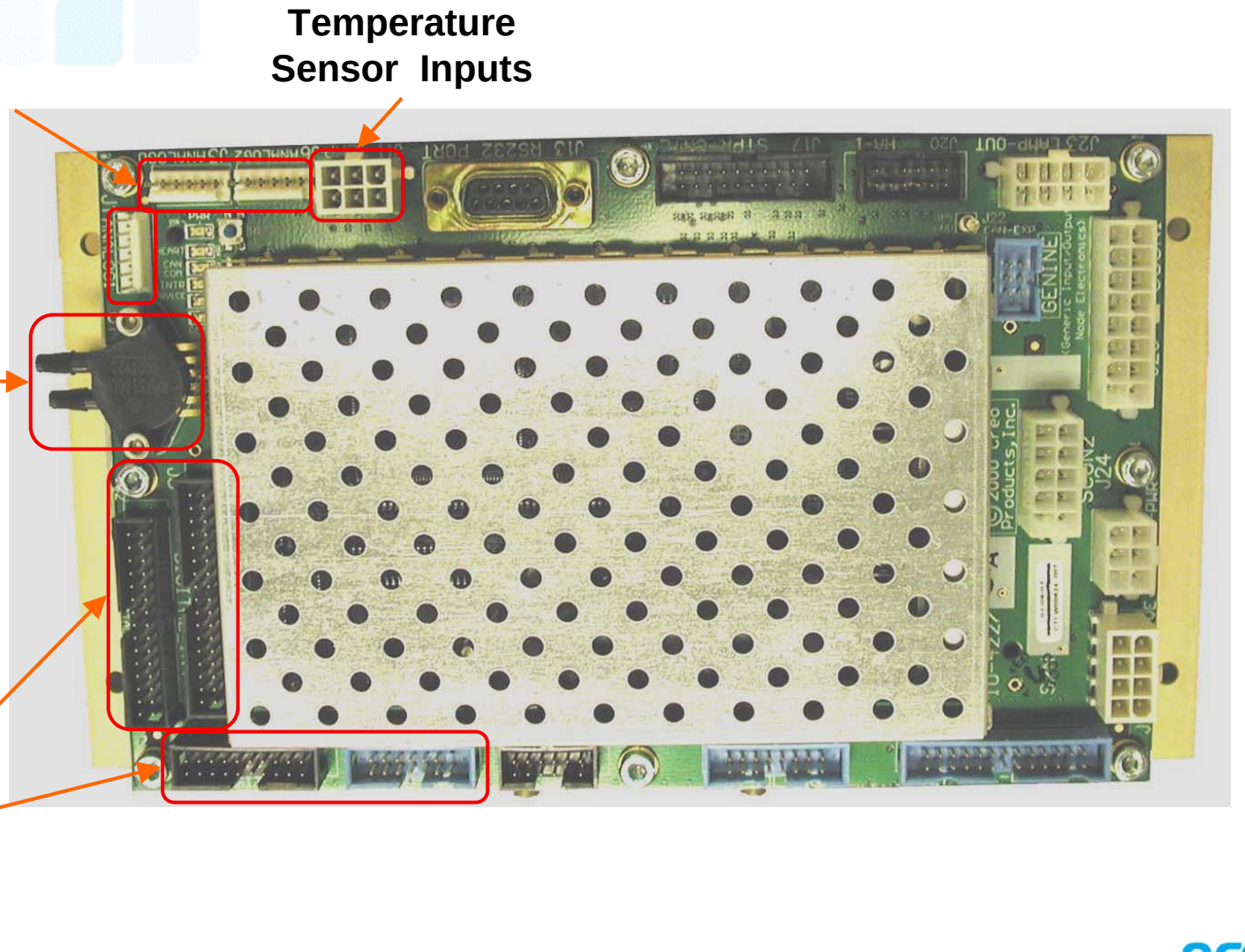
Lesson 1.4 I/O Boards: GENINE & LIONEL

Module 1: Electronics System

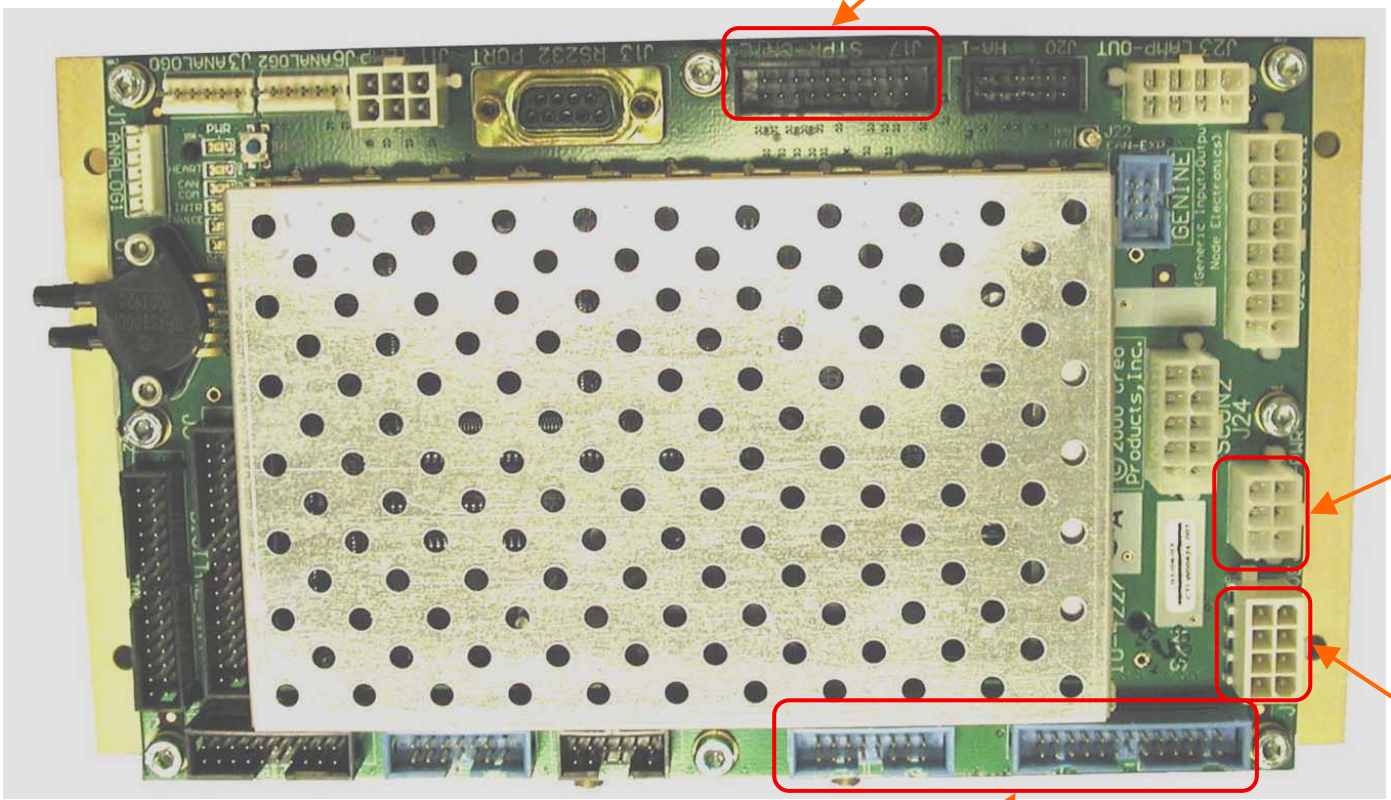
Lesson 1.4: GENINE—General Control



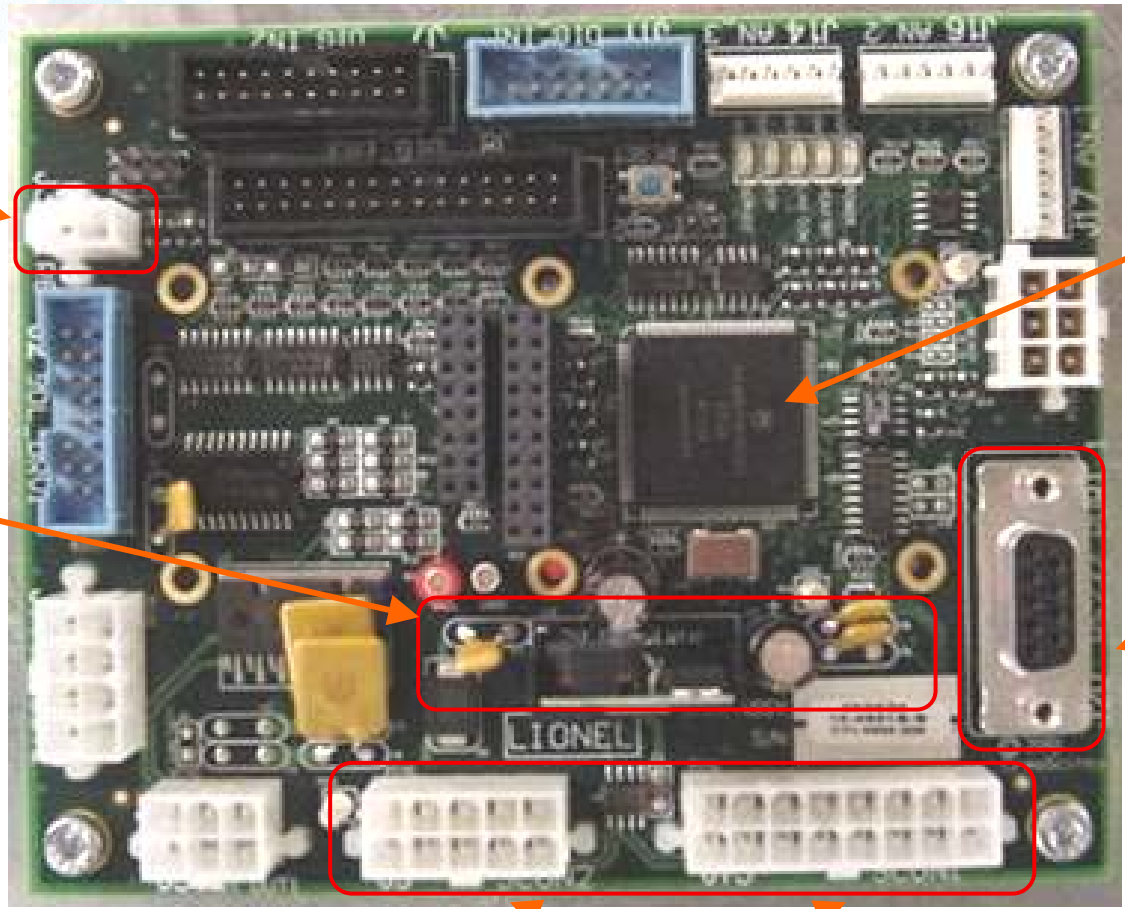
Lesson 1.4: GENINE—Sensors



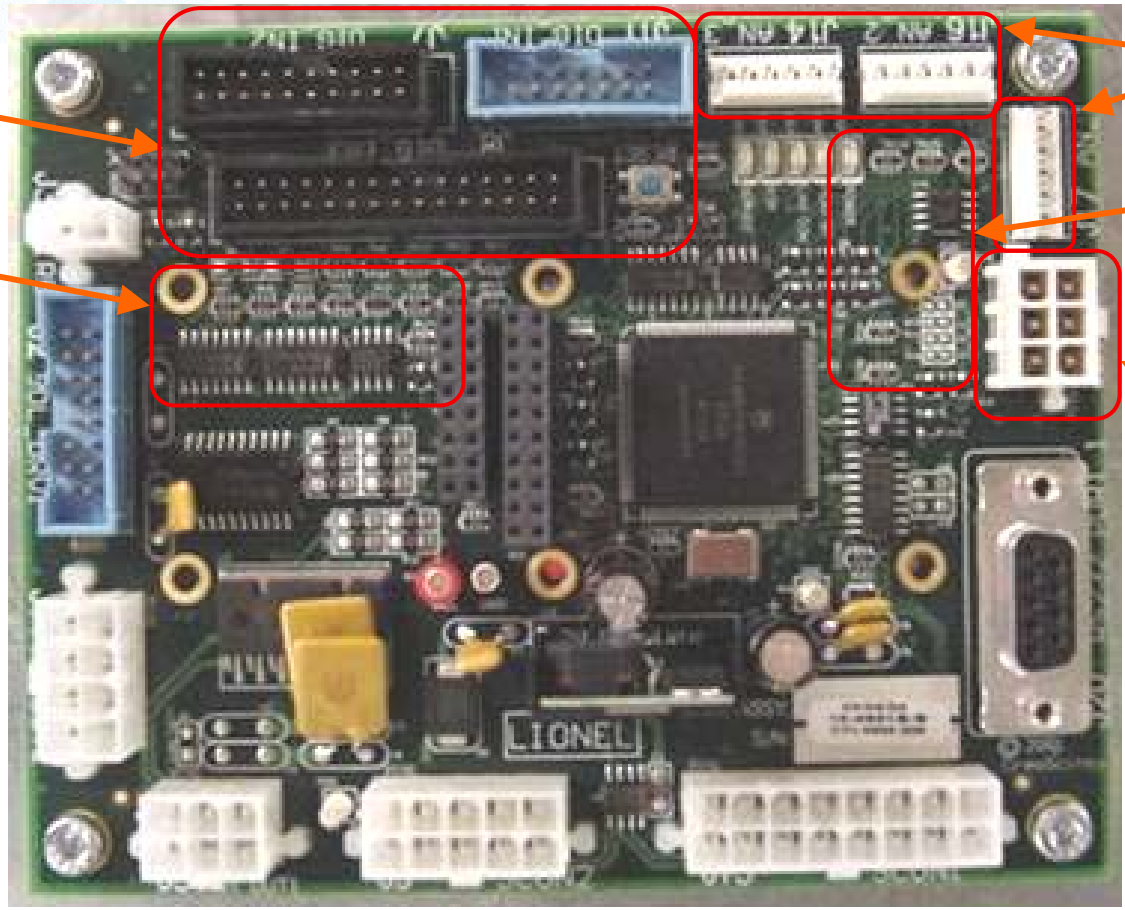
Lesson 1.4: GENINE—Solenoid Outputs and Stepper Motor



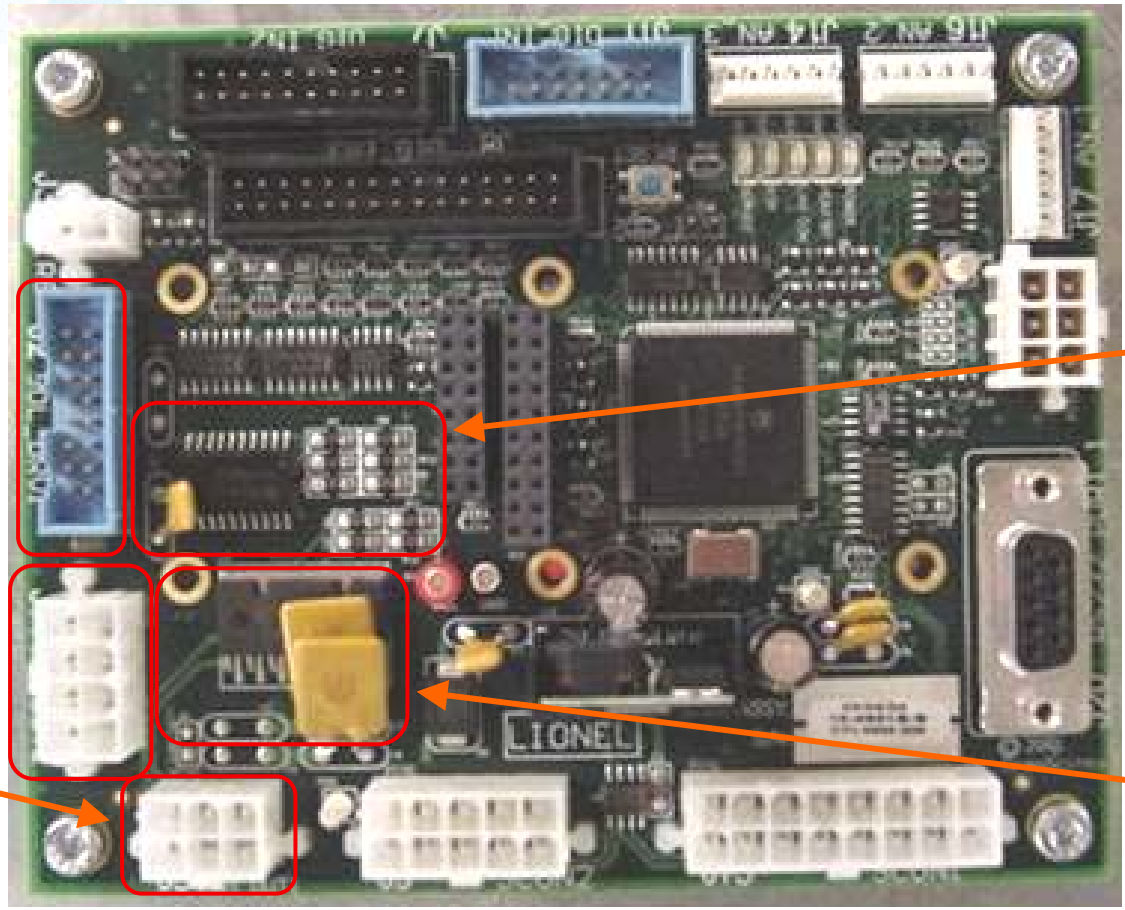
Lesson 1.4: LIONEL—General Control



Lesson 1.4: LIONEL—Sensor Inputs



Lesson 1.4: LIONEL—Control Outputs



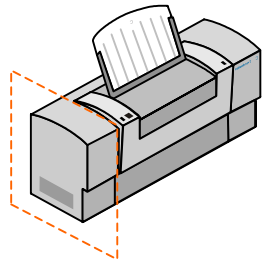
Note: PWM—Pulse Width Modulation

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Exercise 1.4

- Q&A Worksheet





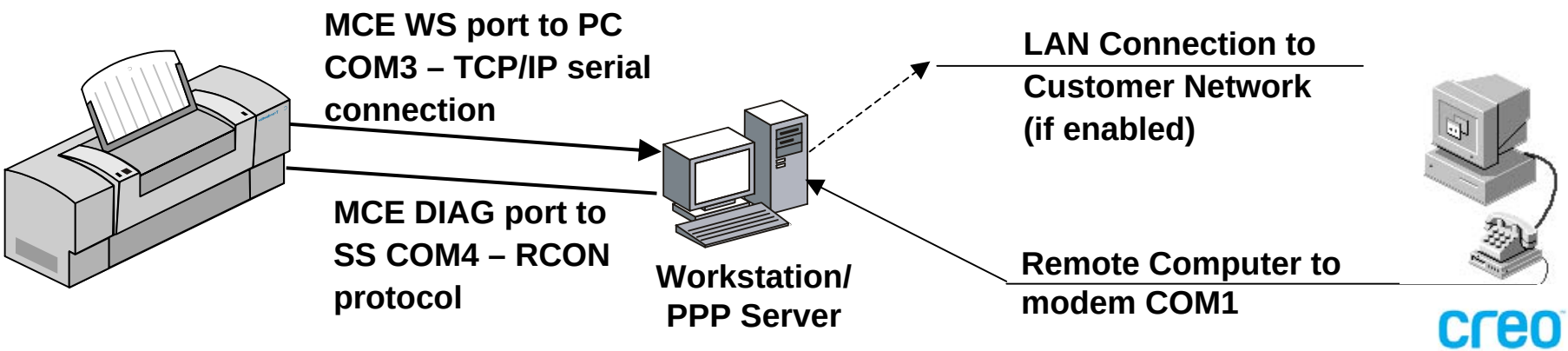
Lesson 1.5
MCE Connectivity Issues

Module 1: Electronics System

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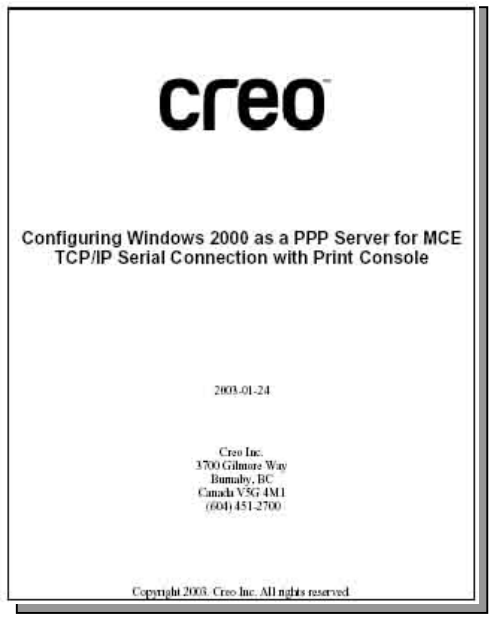
MCE Connectivity

- Setup
  - Workstation – Print Console (COM3)
    - TCP/IP Point-to-Point Protocol
    - 3 sequential IP addresses required
  - MCE Device – Service Shell (COM4)
    - RCON protocol
  - Remote Access Server – modem (COM1)



MCE Connectivity

- **Procedure**
  - **Use the PPP Server Setup procedure**
    - **TechPlanet > … Print Console > 3.1 > Procedures > PPP Server Setup**
    - **Note: Don't use Windows 2000 software install document to set the RAS connection. This will interfere with the MCE connection.**


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Configuring Windows 2000 as a PPP Server for MCE TCP/IP Serial Connection with Print Console

2003-01-24

Creo Inc.
3700 Gilmore Way
Burnaby, BC
Canada V5G 4M1
(604) 451-2700

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MCE Connectivity

- **Possible configurations for the server:**
  - **Workgroup with customer provided range of addresses**
    - **With or without access to the customer's corporate LAN**
  - **Domain with customer provided range of addresses**
    - **With or without access to the customer's corporate LAN**

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MCE Connectivity

- **Minimum requirements**
  - **Microsoft Windows 2000 Server or Professional**
  - **Prinergy 2.1 or later**
  - **Print Console 3.1 (build 36) or higher**
  - **MCE firmware version that supports TCP/IP**

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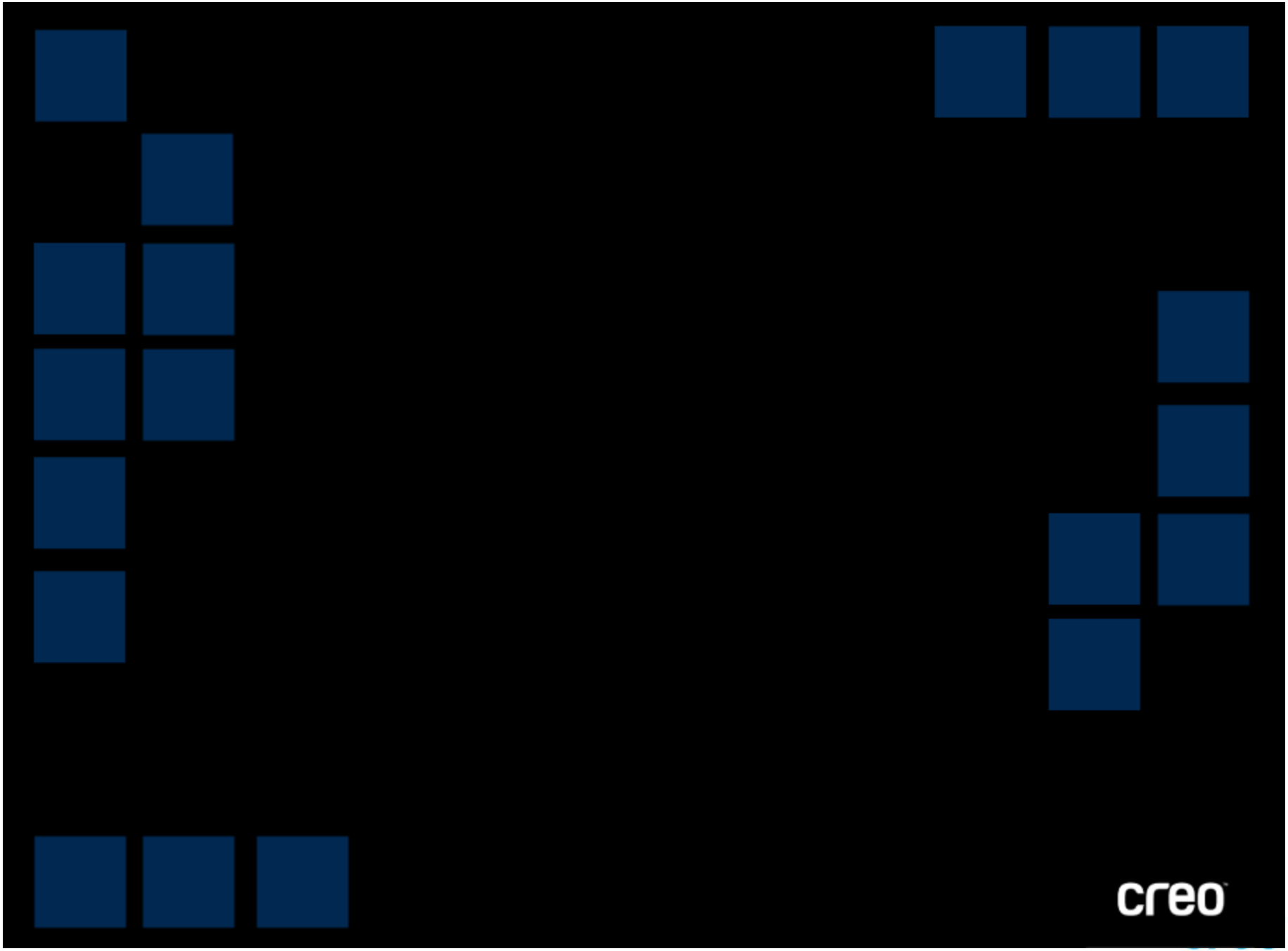
Exercise 1.5

- Verbal Q&A



Module Review

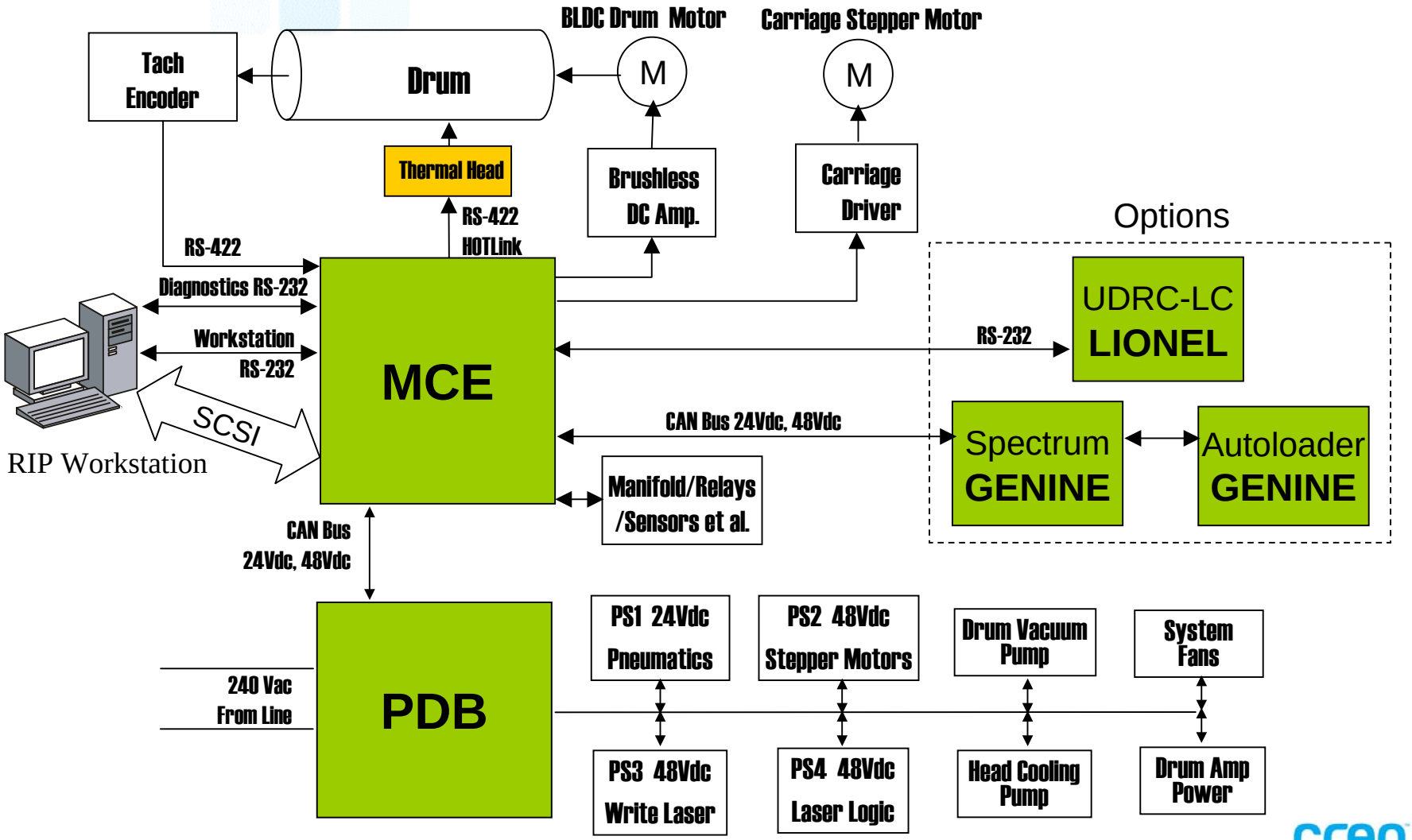
- Drag and Drop Exercise
  - Choose a component
  - Drag and drop it to the appropriate place in the Power Box
  - Explain its features and functionality


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Module Review

- **Re-create an MCE Block Diagram**
  - **Draw your own block diagram on a blank page in MS Word, which includes key hardware components, communication connections, expansion buses and voltages**
  - **Email it to the instructor**

Module 1: Review



Module 1: Electronics

- Review
  - Describe the architecture and configuration of the MCE-based Trendsetters
  - Identify key components and the wiring connection
  - Describe the Master Control Electronics (MCE) board
  - Describe the Power Distribution board (PDB)
  - Describe the Generic Input/output Node Electronics (GENINE) board
  - Describe the Controller Area Network (CAN) bus

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Self-assessment-1

- How much have you got so far?
- Areas needs more inputs or practice…

_____

_____

_____

Break



Manneke-Pis, Brussels

Trendsetter Maintenance MCE Upgrade

Module 2: Firmware

Module 2: Firmware

- Learning Objectives
  - Describe the general architecture and features of Firmware 1
  - Use Firmware 1 on an MCE-based Trendsetter to control the device operation

Lesson 2.1 Firmware Architecture & Features

Module 2: MCE Firmware

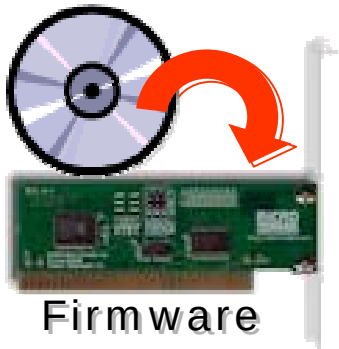
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Lesson 2.1: Firmware Architecture and Features

- Learning Objectives
  - Describe the multiple layers firmware architecture
  - List the new units of measure
  - Summarize the new routines for commands and parameters
  - Describe the new firmware functionality

General Firmware Architecture

- Multiple Layers:



Boot Block Recovery Code (BBR)

Boot Code (BOOT)

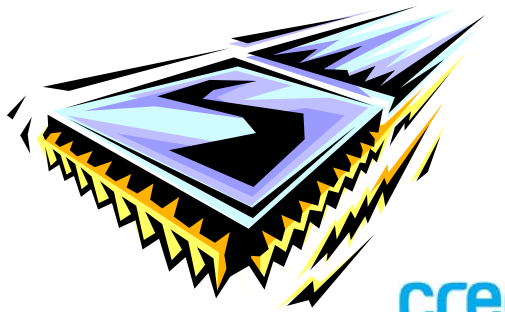
Power On Self-Test Code (POST)

Main Firmware Code (MAIN)

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General Firmware Architecture

- **Boot Block Recovery Code (BBR)**
  - Runs from a protected block of memory
  - Ensures recovery if BOOT code is corrupt or missing
  - The very first thing that starts up if it exist



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General Firmware Architecture

- **Boot Code (BOOT)**
  - Allows for downloading of BOOT, POST and MAIN code into FLASH memory
  - On start up it checks for POST or MAIN code:
    - If POST exists it starts the POST code
    - Otherwise it starts the MAIN code



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General Firmware Architecture

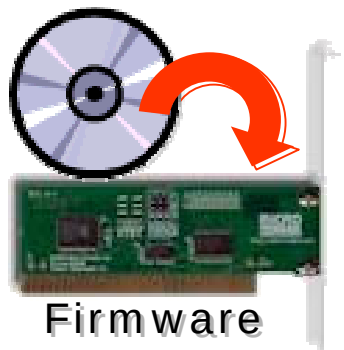
- Power On Self Test Code (POST)--optional
  - Tests the board's hardware before it starts the MAIN code
- Main firmware code (MAIN)
  - Controls the output device



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Firmware Architecture on the MCE

- Xilinx Code running on the FPGA
  - An extension of the firmware
  - Much faster
  - Closer connection to machine hardware
  - Generic across all products; but is very specific to the MCE board



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Standardization of Units of Measure

- The CAU are gone
  - No more inches, mils, and ticks
- Metric across the board
- Uses real units
- Examples

  `>>Carriage:` position in mm, velocity in mm/sec

  `>>Drum:` position in degrees

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Commands and Parameters

- More ordinary English words
- Fewer acronym
- Examples:
  - Old (FW 0)
    - `rlr [on/off]`
    - `set al tls`
  - New (FW1)
    - `roller [on/off]`
    - `scan tec_sensorlock`

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Commands and Parameters

- help table




```
3244>> help
Available commands:
        a               abort           access          ajet
        autocalibrate   bay             board           carriage
        cassette        cr              door            drum
        dvac            edge            eject           engine
        fans            feature         flush           flyoff
        fw              group           help            hlt
        ibm             image           init            lec
        list            load            loaded          macro
        mask            mce             media           memory
        mh              mode            msg             owb
        picker          pload           plot            post
        prm             product         proof           punload
        ramp            release         reset           resume
        roller          safety          scan            scheduler
        sif             sio             smc             status
        stg             suspend         system          table
        tec             temp            tr              u
        unload          vbs             vr

        Type 'help <command>' for help on a specific command.

*** Command Complete
Available commands:
        fload           focus           head            help
        hotlink         laser           nvs             opt
        redirect        run             scorr           set
        shutter         spot            stroke          th2

        Use `help <command>' for short description and syntax.
```

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Access Levels

- Field
  - Basic commands to run the system
- Expert
  - More complicated, or more dangerous commands
- Developer
  - For debugging; not needed in the field
- Command: `>>access field|expert|dev`

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Verbosity Levels

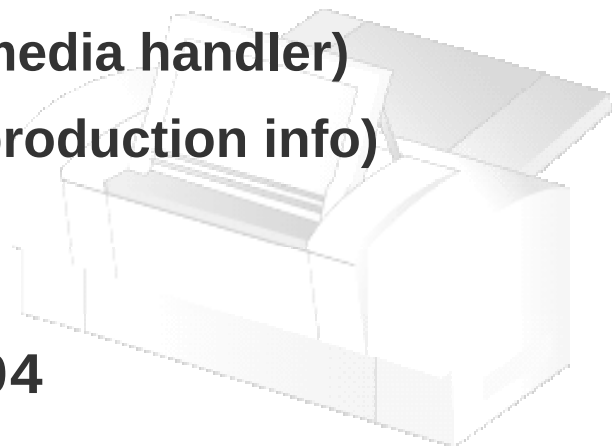
- Four levels
  - C: customer
  - S: service
  - E: engineer / eng
  - D: developer / debug
- Text is only displayed at the specified or higher level, for example
  - `D MDH: Command sent properly`
  - `E DRS: Drum command received 4704`

Verbosity Level

- Task names common to all TSM devices
  - `ERR` (error)
  - `NUC` (nucleus kernel)
  - `MOP` (monitor-parsing)
  - `UTL` (utilities)
  - `VBS` (verbose)
  - `MON` (diagnostics monitor)
  - `DRS` (drum servo)
  - `CRG, CAR` (carriage)
  - `MPC` (main plot control)
  - `MIC` (main image control)
  - `376` (microprocessor controller)
  - `MSG` (message)
  - `PRM` (parameter)
  - `MDH` (media handler)
  - `PRD` (production info)

Example of diagnostic output

```
E DRS: Drum command received 4704
```



Further info: http://techplanet.creo.com/firmware/fw1ctpxml/Search.htm

Verbosity Levels

Commands to change verbosity levels

- `>>vbs user customer` ← minimum amount of information
- `>>vbs user service`
- `>>vbs user eng`
- `>>vbs user debug` ← maximum amount of information

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Commands and Parameters



- Non-Volatile Storage (NVS) parameters
  - No RAM copy
    - Once changed, the new value will be written directly to non-volatile memory and saved
    - Resetting the MCE will NOT revert back to the previous value
  - NVS RAM now stores:
    - Machine-independent “configuration and calibration parameters”: remain intact between power cycles
    - “State variables”: allows a machine to resume where it left off if power is cycled during loading or imaging

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Commands and Parameters

- To list NVS parameters
  - **`prm all`** – displays all parameters
  - **`prm diff`** – displays those parameters of which saved values are different from default
- To view and modify NVS parameters:
  - **`set media <#>`** – configures media parameters (stored in NVS)
  - **`set hdm <#>`** – configures head dependent media (stored in the head)
  - **`nvs upgrade`** does NOT exist any more

Further Info: Mapping of MPE to MCE commands

http://techplanet.creo.com/output/computer_to_plate/trendsetter_3244/nav/mce_firmware.htm

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Commands and Parameters

- Firmware subsystems
  - drum
  - mode
  - mh
  - prd
  - gc
  - media
  - edge
  - proof
  - bay
  - exit
  - carriage
  - prd2
  - alproof
  - hHead
  - hdp
  - hdm
  - sys
  - servo_stat

Interpreting the Diagnostic Monitor

- I/O scanner commands and signals

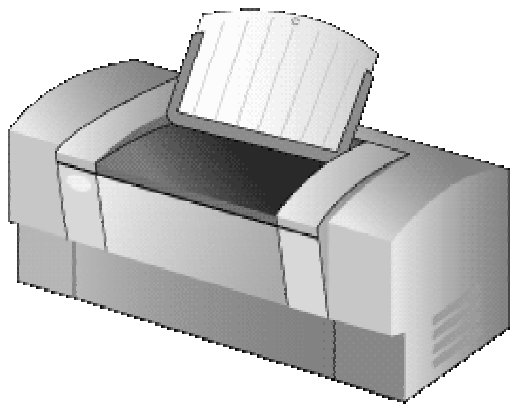
```
>>scan bits
>>scan presence
>>scan <sensor name or grouping>
```

  - 0 = false or off
  - 1 = true or on
  - & = presence detect
  - ~ = inverted
  - b = having a bypass status
  - x = bypass status turned on
  - ** = not applicable to the product options enabled

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Commands and Parameters

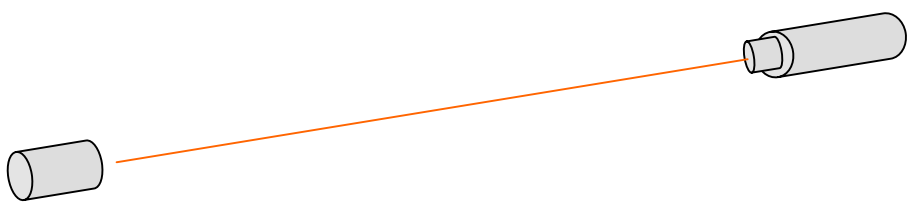
- Simplified load and unload commands
  - `>>load` (replace `pick` + `load`)
  - `>>unload` (replace `unload` + `process`)
  - Rationale:
    - Allows easier scheduling of media for full throughput
    - Be consistent across all products



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Commands and Parameters

- Sensor names
  - Example: bypass (or not) the table down sensor
    - `>>scan AL_SensorTableUp <bon|boff>`
    - NOT `>>set al uts <0|1>`
  - Rationale:
    - Standardize names across products
    - Do not require a long list of `<<set al>>` parameters
    - Be able to bypass any sensor



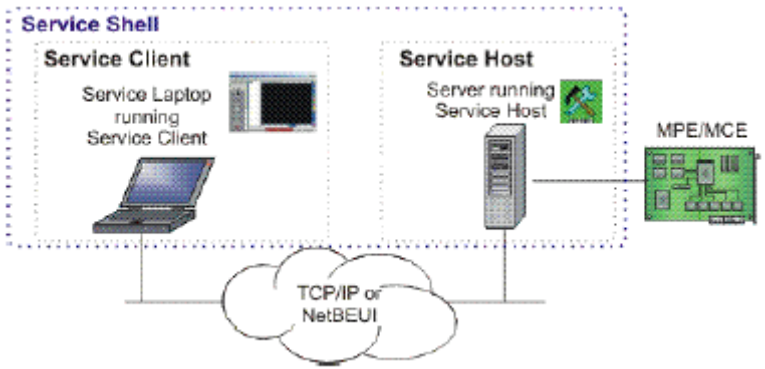
Functionality: Suspend responses

- **>>resume–try the last step again**
- **>>release–releases the media from a suspended Media Scheduler or an idle media handler (replace <<clear>>)**
- **>>eject–immediately unload the media as soon as it gets loaded onto the drum**
- **>>cancel–to cancel the job**
- **NB: When the device is suspended, it cannot move the actuators**

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Diagnostics: Service Shell

- Connects to a device directly or remotely





- Will take over the diagnostic serial when running
  - Cannot run other terminal programs such as HyperTerminal, ProComm or Splot at the same time

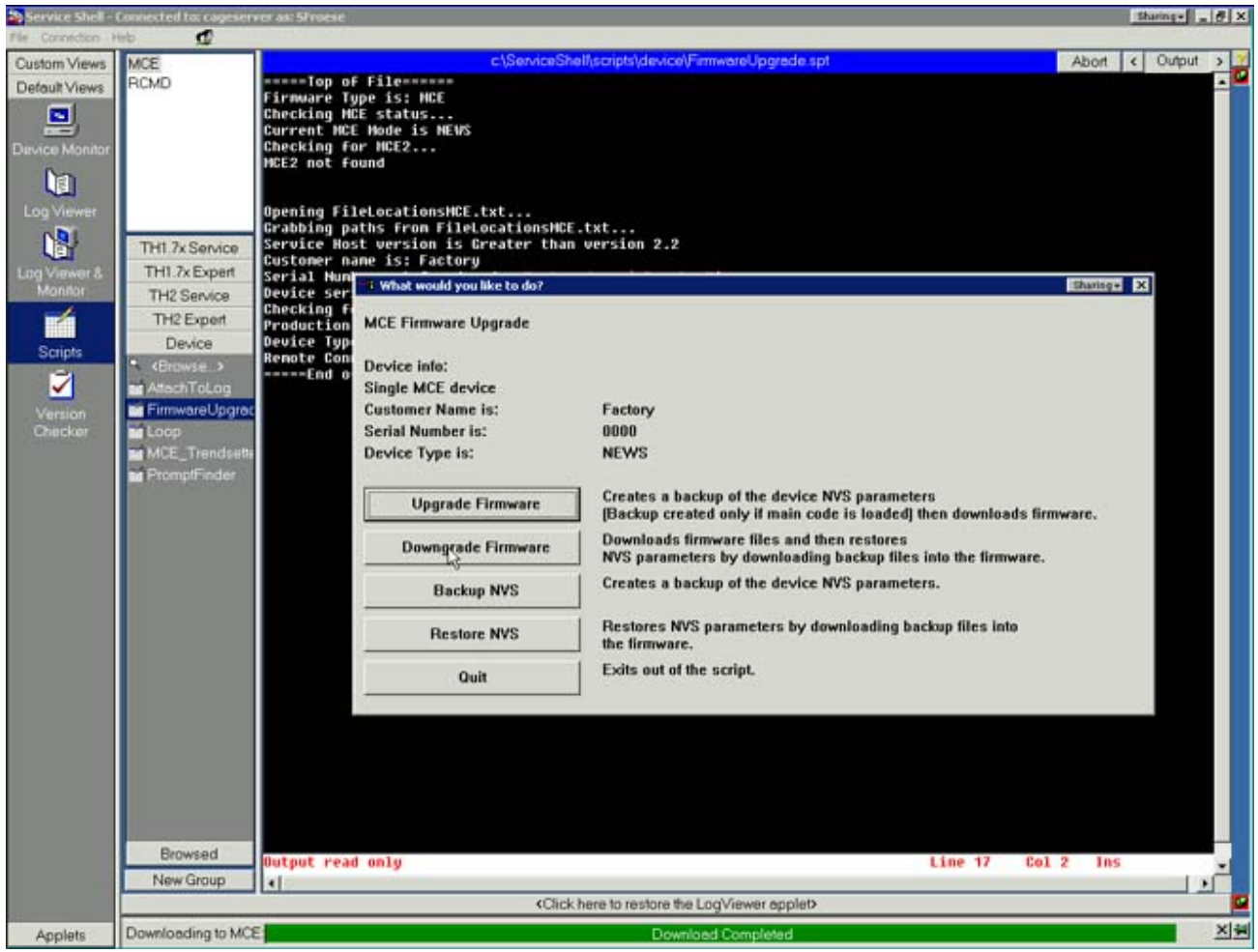
Diagnostics: Service Shell

- Current features:
  - Easy downloads
  - Automatic logging to log files
  - Supports multiple connections to the same device
  - Includes splot for scripts
- Future plans: “applets” for
  - Automatic firmware upgrades/downgrades
  - Version checking
  - Automatic system pressure logging

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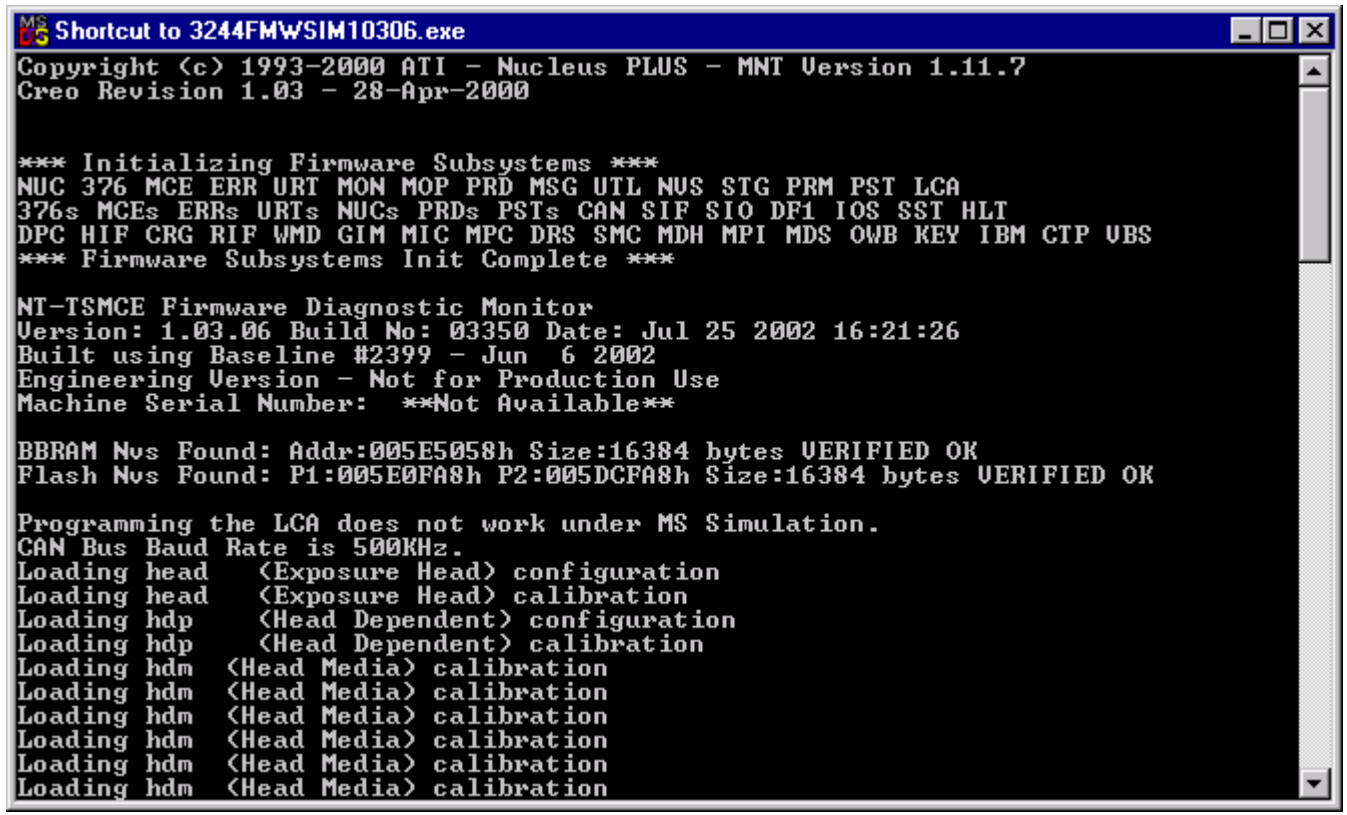
Demo

- Upgrade firmware using Service Shell



Apply what you know…

- Practice with your simulator



Summary

- Firmware layout
  - BBR, BOOT, POST, MAIN; Xilinx
- Units of measure
- Commands and parameters
  - Status and state variables
  - NVS; I/Os
- Functionality
  - Suspend responses

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Lesson 2.2 Use Firmware 1 to Control the Trendsetter

Module 2: MCE Firmware

Lesson 2.2: Use Firmware 1 to Control the Trendsetter

- Check the status of the system
- Initiate a specific tasks or action
- Set specific NVS parameters
- Maintain the firmware
- Troubleshoot electronic-related problems

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Exercise 2.1 Hands-on Laboratory

- **Remote control of the system via WebEx**



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Exercise 2.2

- Q&A Worksheet



Module Review

- Describe the general architecture and features of Firmware 1
- Use Firmware 1 on an MCE-based Trendsetter to control the device operation

Self-assessment-2

- How much have you got so far?
- Areas needs more inputs or practice…

_____

_____

_____

Course Evaluation

- Complete the course evaluation form
  - Outlook format
- Email it to Rob Harraway, Team Lead of the CAM Product Training

