Tamilnadu Weights and Measures Manufacturers, Dealers & Repairers Association - Madurai.

Seminar on:
CONCEPTS, TECHNIQUES & TROUBLE SHOOTING IN ELECTRONIC WEIGHING SCALES
Contents

- Basics of Electronic Scale
- Techniques & Trouble Shooting
- Advancements in Weighing Systems
BASICS OF ELECTRONIC SCALE

BASICS OF ELECTRONIC WEIGHING SCALE

POWER SUPPLY
LOAD CELL
ADC
MICRO COMPUTER
RAM
DISPLAY
POWER SUPPLY

Block Diagram of a Regulated Power Supply System

230V AC Mains → Transformer → Rectifier → Smoothing → Regulator → Regulated 5V DC
TRANSFORMER
TYPES OF TRANSFORMER

- TRANSFORMER HAVING TWO WINDINGS
  - Primary coil winding & secondary coil winding

  In Weighing Scales STEP DOWN transformer is used

- STEP DOWN Transformer
  - 12 V Transformer
  - 230 V input AC voltage is converted into 12 V AC Voltage
Rectifier converts Alternating current into Direct current (AC in to DC)

- Rectifier comprises of capacitors & Diodes
FILTER (CAPACITOR)

FILTER IS USED TO REDUCE (or)
FILTER OUT UNWANTED NOISE
REGULATOR IS USED TO REGULATE AND PROVIDE CONSTANT OUTPUT VOLTAGE.

NORMALLY IN WEIGHING SCALES LM 317, 7808

7805 VOLTAGE REGULATOR ARE USED.
POWER SUPPLY DIAGRAM

Transformer  Rectifier  Smoothing  Regulator

Output: regulated DC
WHAT IS LOAD CELL?

HEART OF THE WEIGHING SCALE

- LOAD CELL – LOAD RECEPTOR – SENSOR – TRANSDUCER,
- TRANSDUCER – CONVERTS ONE FORM OF ENERGY INTO ANOTHER FORM OF ENERGY.
- LOAD CELL CONVERTS MECHANICAL ENERGY (FORCE) INTO ELECTRICAL ENERGY (mV).
- LOAD CELL CONSIST OF THIN TYPE OF RESISTIVE FOILS.
DEPENDING UPON THE APPLIED FORCE THE LENGTH CROSS SECTIONAL AREA & RESISTIVITY OF THE MATERIAL CHANGES., ACCORDING TO THAT THE OUTPUT “m V” CHANGES.

\[ R = \ell \frac{L}{A} \]

IT INCORPORATES WHEATSTONE’S BRIDGE
CHARACTERISTICS OF LOAD CELL

- EXCITATION VOLTAGE - 0 ~ 15V DC
- NORMAL OUTPUT - 0 ~ 2mv / V
- LINEARITY
- HYSTERESIS
- REPEATABILITY
- CREEP
- ZERO BALANCE
- INPUT RESISTANCE ~ 380 to 450 ohms
- OUTPUT RESISTANCE ~ 350 to 380 ohms
- SAFE OVER LOAD ~ 150 %
- TEMPERATURE RANGE ~ 0 – 50 °C
- ENVIRONMENTAL PROTECTION CLASS
RED & BLACK  Impedance - 380 to 450 ohms
GREEN & WHITE  Impedance - 350 to 380 ohms
TYPES OF LOAD CELLS & ITS APPLICATIONS

- Table top loadcell
- Jewellery load cell
- Platform load cell
- ‘S’ type load cell
- Single Ended shear beam Load cell
- Double ended shear beam with ball & Cup Type
- Compression Type Loadcell
Applications

- Precision Jewellery Scales.
- Small Bagging Machines.
- Thread Tension Measurements.
FEATURES
Single Point Off-centre Load Measuring Capability.
Economical and Low Profile Cell.

APPLICATION
Bench, Counting & Postal Scales.
Check Weighers
PLATFORM LOAD CELL

APPLICATION

• Platform Scales
• Check Weighers
• Bag Weighers.
‘S’ TYPE LOAD CELL

APPLICATIONS:

- Conversion of Mechanical scale into Electronic
- Tank, Hopper & Bag Weighing
- Hanging Scale & Crane Scale
- Force Measurement-Tension & or Compression
- Spring testing
LOW PROFILE

HIGH SENSITIVITY : 3mV/V

PROTECTION TO IP66, IP 67, IP 68

FLAME PROOF LOAD CELL

THIS TYPE USED FOR FOUR LOAD CELL PLATFORMS, TRUCK SCALES & TANK WEIGHING SYSTEMS.
DOUBLE ENDED SHEAR BEAM LOAD CELL

THIS TYPE OF LOAD CELLS USED FOR TANK WEIGHING, WEIGH BRIDGES & TRUCK SCALES

- Input Resistance 770 20.0 Ohms
- Output Resistance 700 7.0 Ohms
Applications

- Weigh bridge
- Rail bridges
- Industrial automation
IC 7135
- 30000 internal counts
- Resolution-20000
- Operating Voltage-5V-External OP Amp

IC 5460-24 Pin IC
- 1.6 Crores counts, & high internal resolutions.
- 24 Bit IC
- Operating voltage 4.4v to 6.5 v DC.
ADC
(ANALOG TO DIGITAL CONVERTER)

- ADS -1230
- 24 bit
- 50 Lakhs internal counts
- Operating voltage 3 - 5V DC
- Inbuilt OP Amp
- 16 Pin IC
Act as a storage device.

All the manual parameter setting & calibration stored in the RAM memory

In weighing scales 8 pin IC’s 93c46, 24c02 & 24c04 were used.

Capacity of the RAM IC : 128kb to 256kb (depending upon ic’s)
- Which controls – Display segments – ADC – keyboard – RS-232 serial port & USB port etc…
- In weighing scales 8 bit micro controllers are used
BLOCK DIGRAM OF MICROCONTROLLER
IC 89c51, 89s52
COMPARISON OF IC 89c51, 89s52

- 8 Bit Microcontroller
- 4K Bytes of flash
- Reprogrammable up to 10,000 times/cycles
- It supports 128 Bytes RAM
- It supports two levels of interface
- It supports two software selectable power saving modes.
- Operating temperature ...-55°C to 125°C
- Operating DC volt 4.4v to 6.6volt
- It supports parallel port.
COMPARISON OF IC 89c51, 89s52

- 8k Bytes ROM
- It support 256 Bytes RAM
- It support serial port
- Re programme up to 1000 time/cycle
- Operating temperature ... -55’c to 125’c
- Operating Dc volt 4.4v to 6.6volt
DISPLAY

TYPES OF DISPLAY

- LED – LIGHT EMITTING DIODE (RED, GREEN, BLUE etc...)
- LED HAVING TWO TYPE
  COMMON ANODE - COMMON CATHODE.
- LCD – LIQUID CRYSTAL DISPLAY
- VFD – VACUUM FLOURSCENT DISPLAY
- GRAPHICAL DISPLAY
ZERO/TARE  MODE  M+  MR
RS—232

- Transfers the weighing data from scale to computer – continuously...
- Weighing data transfers to printer on request.
- Interface with billing machine.
- To maintain data management systems.
TROUBLE SHOOTINGS IN WEIGHING SCALES

DISPLAY DEAD?

- Check POWER CORD
- Check FUSE
- Check TRANSFORMER
- Check On/off switch
- Check Power supply connector
- Check Display connector
TROUBLE SHOOTINGS IN WEIGHING SCALES

ERRATIC DISPLAY?

- Check Display Driver IC
- Display cord & Connectors
- Display transistors may fault
- FRC adapter may fault
- LED segment may blown
TROUBLE SHOOTINGS IN WEIGHING SCALES

NON- SENSING PROBLEM (GENERAL) ?

- Load cell may fault
- Load cell terminal may have dry soldering
- Battery voltage may low
- 9 pin connectors / connectors may fault
- Check over load screws
- Check scale parameter settings
TROUBLE SHOOTINGS IN WEIGHING SCALES

NON-SENSING PROBLEM (PCB SIDE)?

- Check A/D I/p Voltage & Loadcell I/p voltage
- A/D may Fault.
- RAM IC may Fault
- Crystal may Fault
POWER INDICATION IS ON BUT DISPLAY DEAD?

TO CHECK EPROM INPUT VOLTAGE

- EPROM may FAULT
- RAM IC may FAULT
- Check display connector
- Check power regulator IC.
TROUBLE SHOOTINGS IN WEIGHING SCALES

DRIFITING (ZERO SHIFTING) COMPLAINT?
TO CHECK A / D & LOAD CELL VOLTAGE

- A /D may FAULT
- LOAD CELL may FAULT
- BATTERY may FAULT
- Check load cell connectors
- Load cell mounting
TROUBLE SHOOTINGS IN WEIGHING SCALES

DISPLAY SHOWS  888888 ?

- TO CHECK EPROM
- RAM IC & CRYSTAL may FAULT
TROUBLE SHOOTINGS IN WEIGHING SCALES

WEIGHT DIFFERENCE?

- Check load cell mounting
- Check load cell connectors
- Check Space between two frames
- RAM IC may fault
- Check leveling legs
- Check calibration
ADVANCEMENTS IN ELECTRONIC WEIGHING SYSTEMS

- Check weighing scale
- Counting scale
- Wire less crane scale
- Barcode & label printing scale
- Solar power panel
- Portable weighing pad
APPLICATION

- TEA packing industries
- 100% EOU industries
- Match packing industries.
TABLE TOP COUNTING SCALE

APPLICATIONS

- FASTNERS  PRECISION INDUSTRY
- LABLE COUNTING
- PAPER INDUSTRY.
WIRELESS CRANE SCALE

APPLICATIONS

- Multiple Scales In A Location Possible
- Built-in Battery Backup
- Remote ON / OFF Of Weighing Hook
- Rugged Housing IP 65 Protected
- Weighing Hook With Safety Latch
- With In-built Thermal Printer (50mm Paper Width)
BARCODE & LABEL PRINTING SCALE

FEATURES

- Built-in USB Port For Data Transfer.
- Built-in RS Ethernet and 232 Serial Port
- Built-in Thermal Printer (50 mm Print Area.)
- PC Software For Upload and Download Of Data.
SOLAR POWER SUPPLY KIT

FEATURES

- Save power
- Cost effective
- Maintenance free
WIRE LESS WEIGHING INDICATOR
WITH PLATFORM

FEATURES

- High capacity hard disk
- Management of 1 to 3 scales (multi-channel with summation)
- Serial ports
- Analogue outputs
- Parallel port
- Ethernet port
- USB port for removable memory (USB key)
PORTABLE WEIGHING PAD
COMPILLED BY

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