

தமிழ்நாடு எடையளவு
உற்பத்தியாளர்கள் விற்பனையாளர்கள்
பழுதுபார்ப்பவர்கள் சங்கம்

TAMILNADU WEIGHTS AND MEASURES
MANUFACTURERS, DEALERS & REPAIRERS
ASSOCIATION - MADURAI.

Seminar on:

CONCEPTS ,TECHNIQUES

& TROUBLE SHOOTING

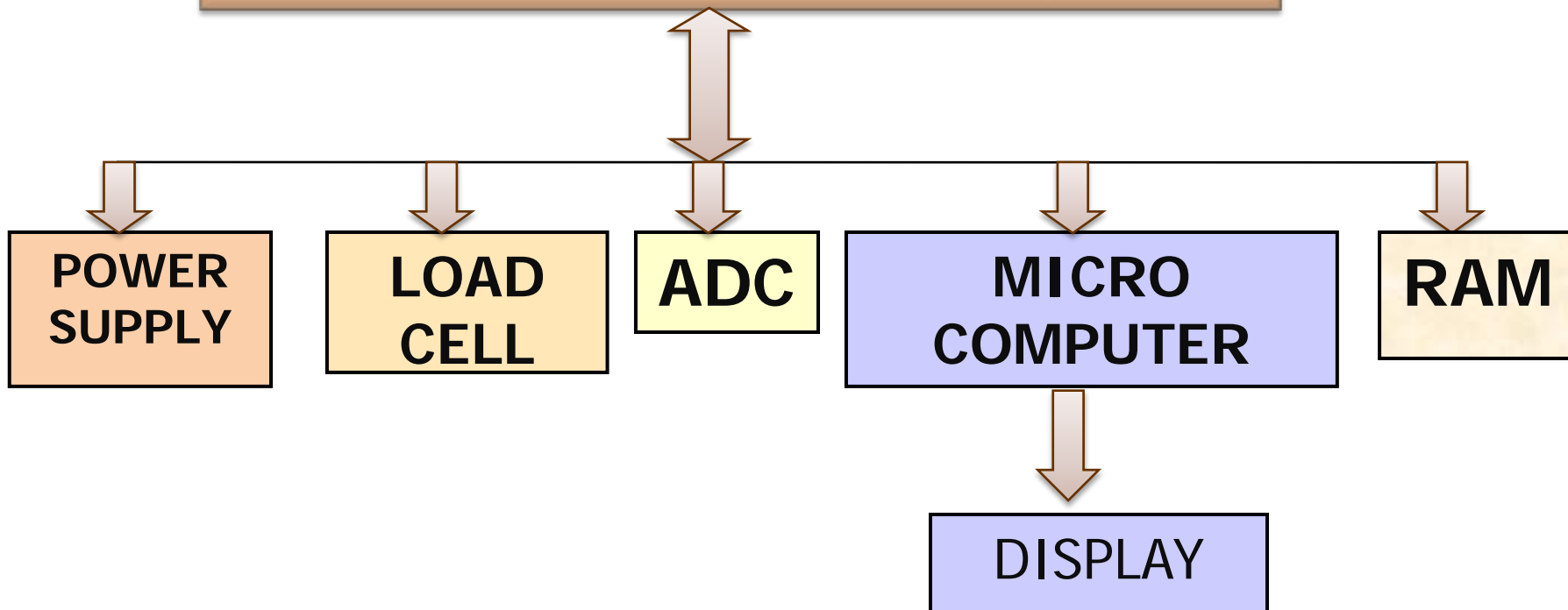
IN ELECTRONIC WEIGHING SCALES

CONTENTS

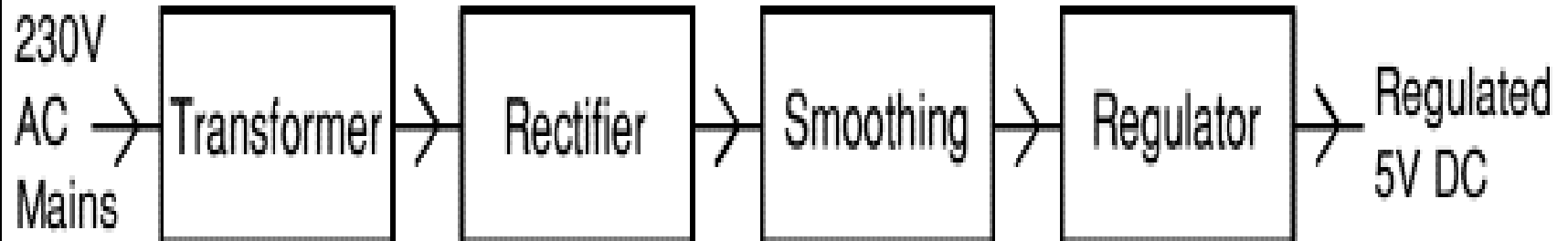
- **BASICS OF ELECTRONIC SCALE**
- **TECHNIQUES & TROUBLE SHOOTING**
- **ADVANCEMENTS IN WEIGHING
SYSTEMS**

BASICS OF ELECTRONIC SCALE

BASICS OF ELECTRONIC WEIGHING SCALE

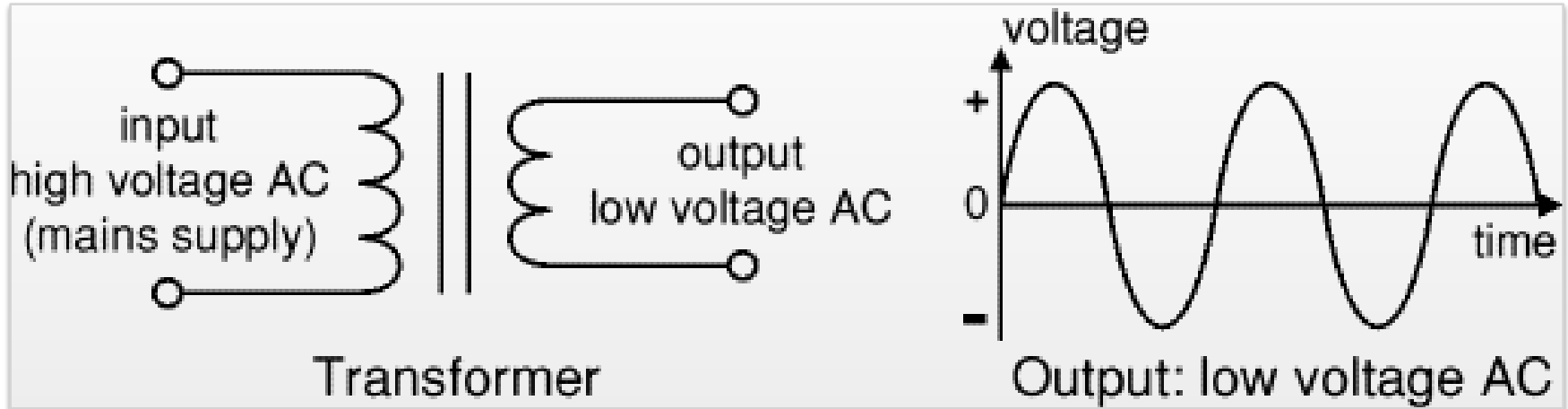


POWER SUPPLY



Block Diagram of a Regulated Power Supply System

TRANSFORMER



TYPES OF TRANSFORMER



STEP UP

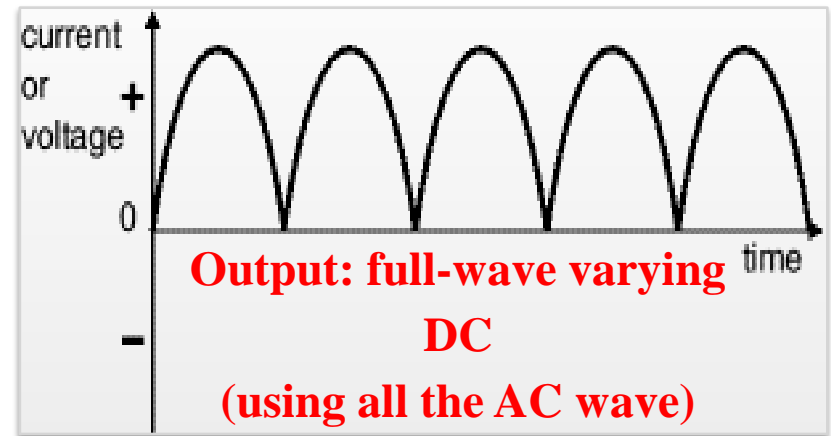
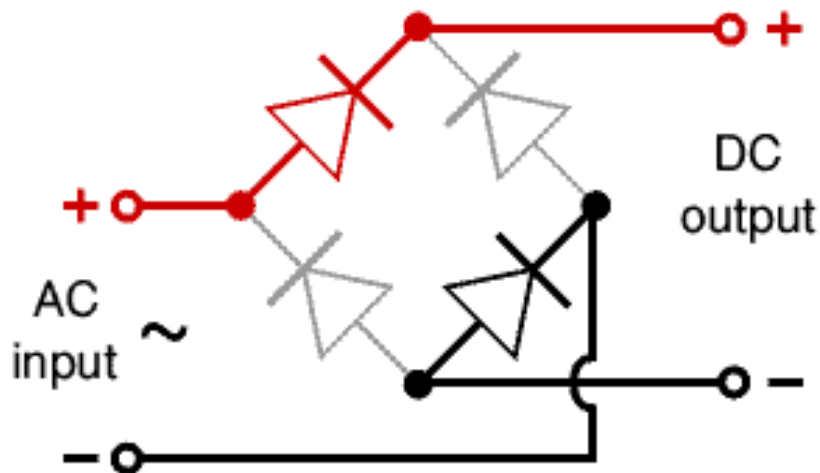
STEP DOWN

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

In Weighing Scales STEP DOWN transformer is used

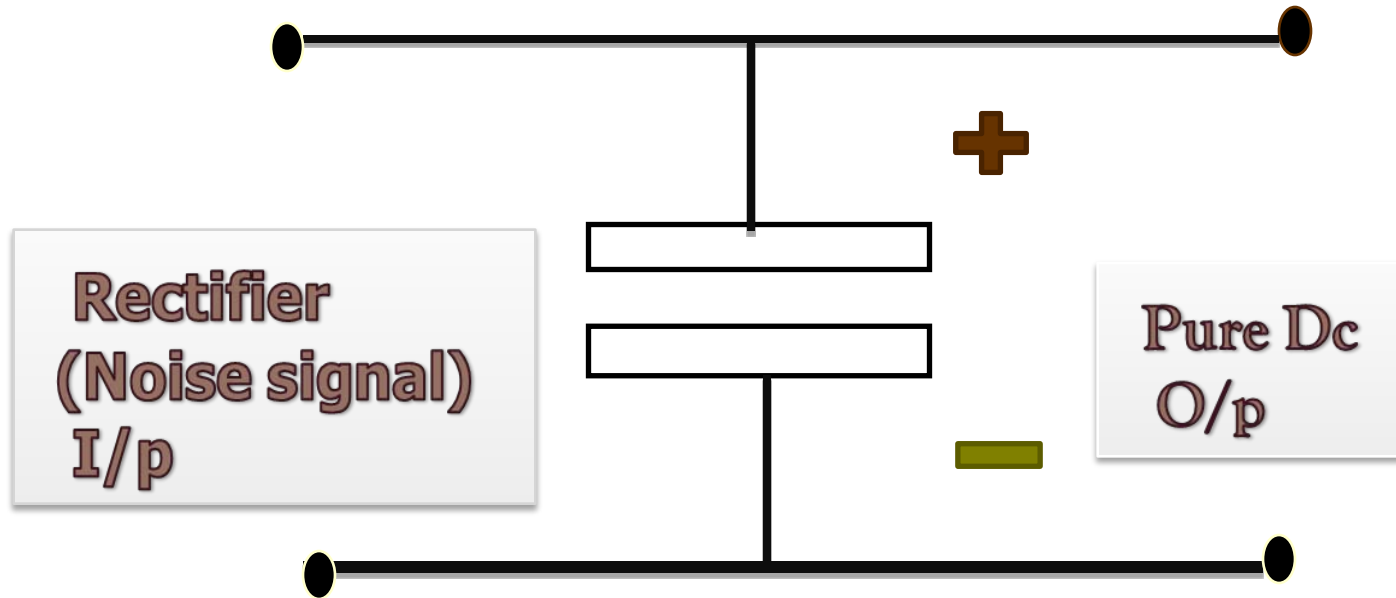
- STEP DOWN Transformer
 - 12 V Transformer
 - 230 V input AC voltage is converted in to 12 V AC Voltage

BRIDGE RECTIFIER



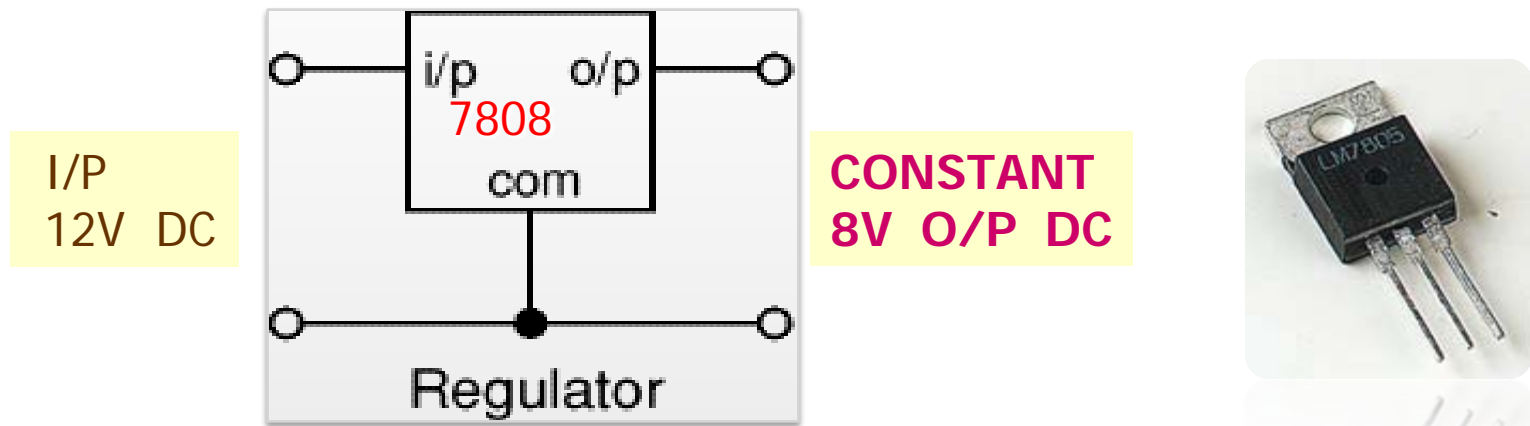
- Rectifier converts Alternating current in to Direct current (AC in to DC)
- Rectifier comprises of capacitors & Diodes

FILTER (CAPACITOR)



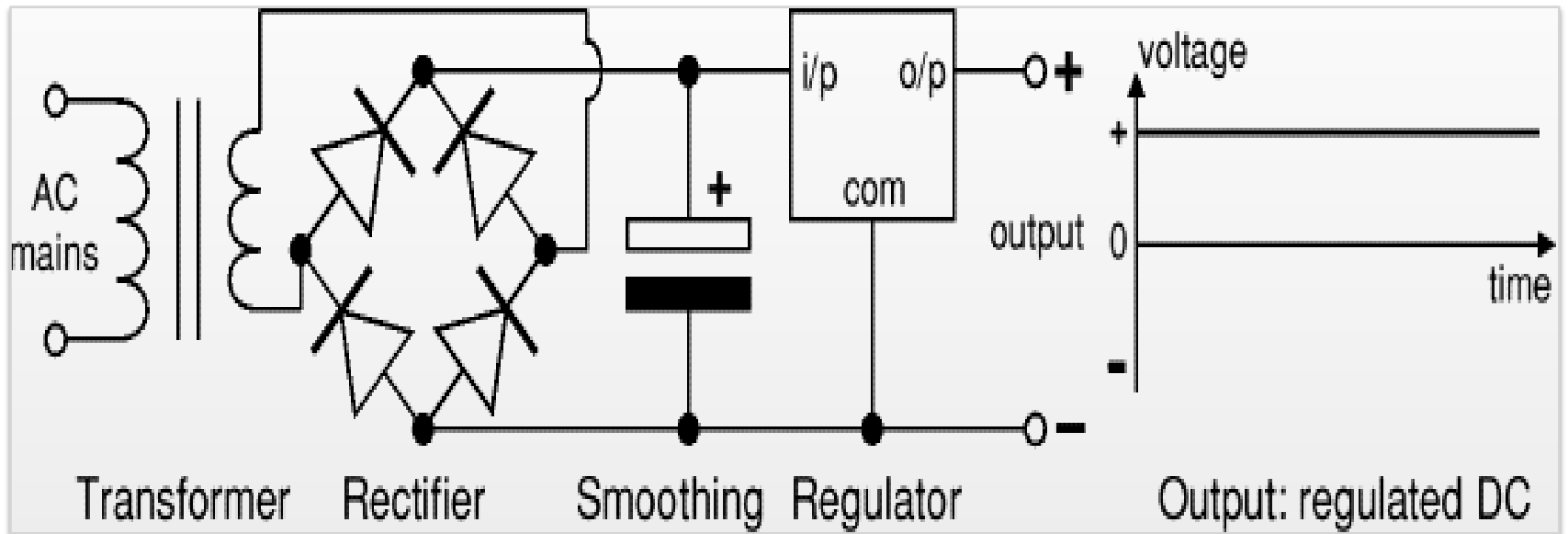
FILTER IS USED TO REDUCE (or)
FILTER OUT UNWANTED NOISE

VOLTAGE REGULATOR



- 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



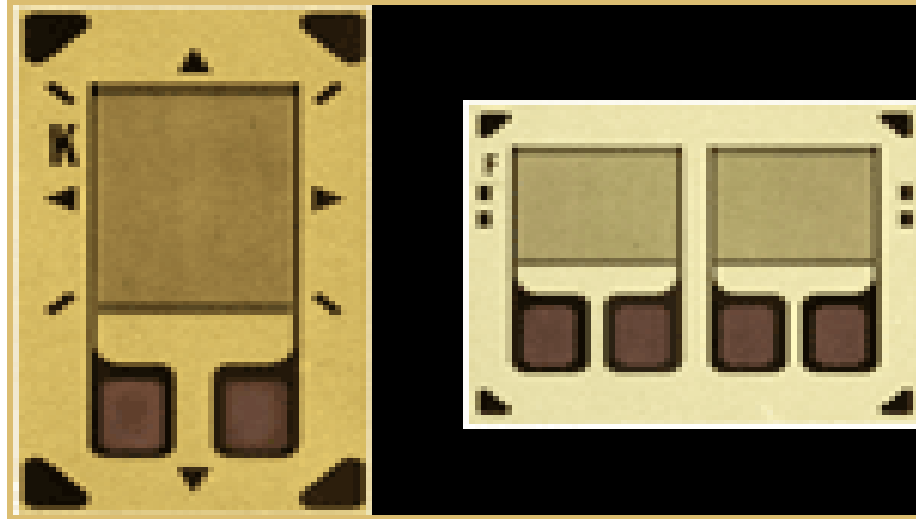
LOAD CELL

WHAT IS LOAD CELL ?

HEART OF THE WEIGHING SCALE

- LOAD CELL - LOAD RECEPTOR - SENSOR—
TRANSDUCER,
- TRANSDUCER - CONVERTS ONE FORM OF ENERGY IN
TO ANOTHER FORM OF ENERGY.
- LOAD CELL CONVERTS MECHANICAL ENERGY (FORCE)
IN TO ELECTRICAL ENERGY (m v).
- LOAD CELL CONSIST OF THIN TYPE OF RESISTIVE FOILS.

LOAD CELL



DEPENDING UPON THE APPLIED FORCE THE LENGTH CROSS SECTIONAL AREA & RESISTIVITY OF THE MATERIAL CHANGES.., ACCORDING TO THAT THE OUTPUT “m V” CHANGES.

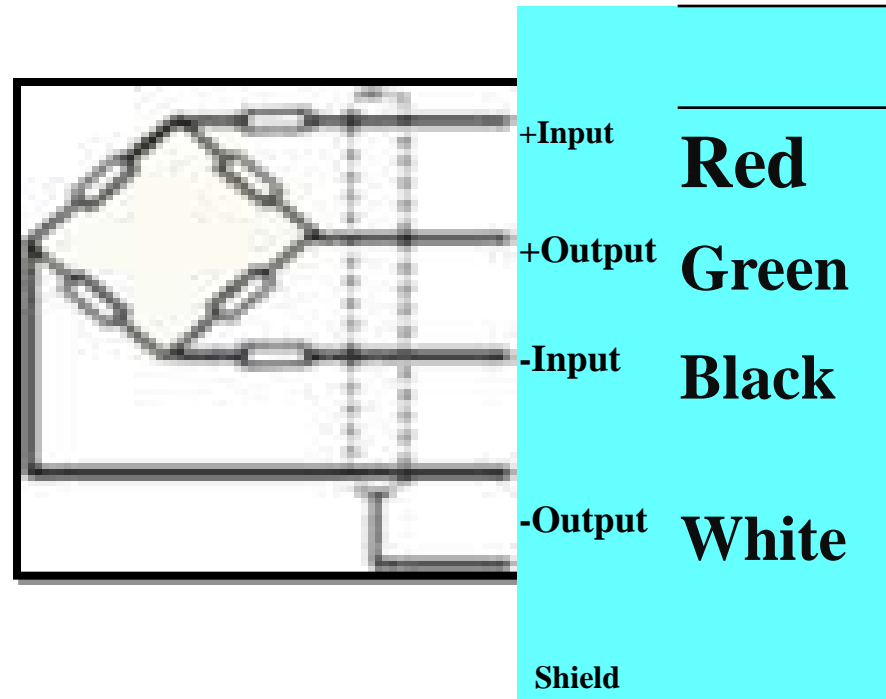
$$R = \rho L / A$$

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

EXCITATION OF LOAD CELL



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

JEWELLERY LOAD CELL

Applications

- Precision Jewellery Scales.
- Small Bagging Machines.
- Thread Tension Measurements.



TABLE TOP LOAD CELL

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



SHEAR BEAM LOAD CELL

- 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



COMPRESSION TYPE LOAD CELL

Applications

- ❖ Weigh bridge
- ❖ Rail bridges
- ❖ Industrial automation

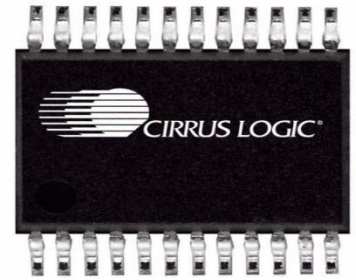


ADC

(ANALOG TO DIGITAL CONVERTER)

➤ 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**

RAM

RANDOM ACCESS MEMORY

- ❖ 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)

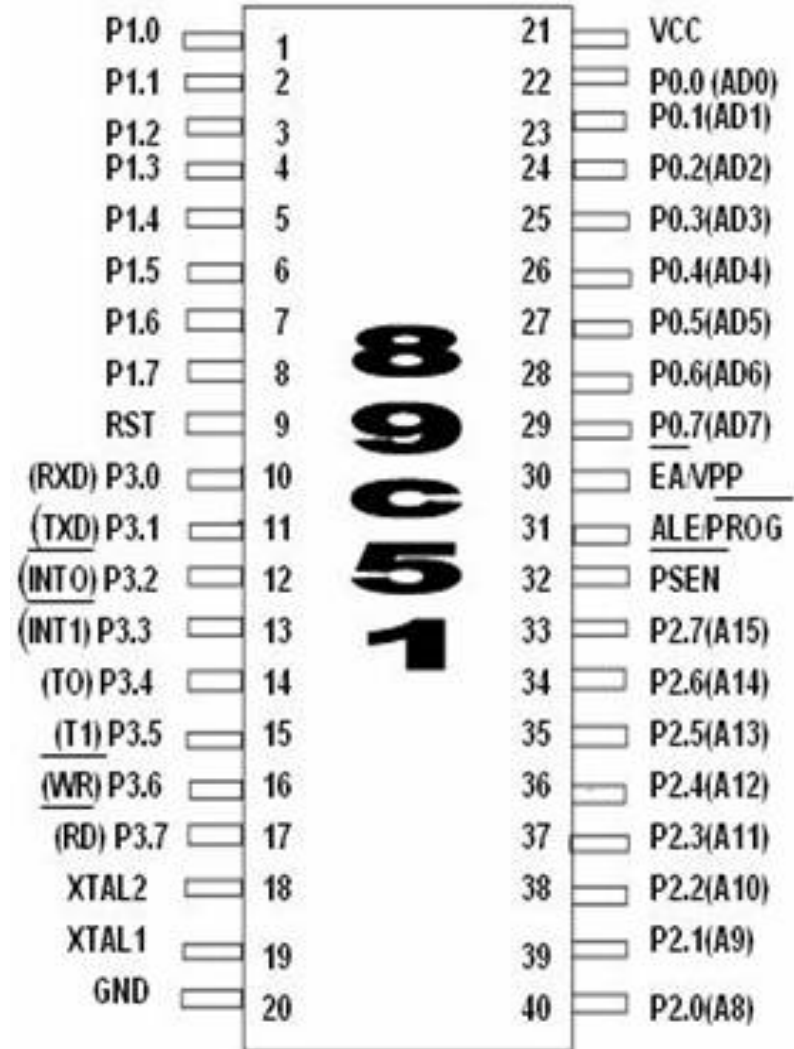
MICRO COMPUTER (MICRO CONTROLLER)

BRAIN OF THE ELECTRONIC WEIGHING SCALE

- 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 support 128 Bytes RAM
- Its support two level of interface
- It support two software selectable power saving modes.
- Operating temperature ...-55'c to 125'c
- Operating Dc volt 4.4v to 6.6volt
- It support parallel port.

COMPARISON OF IC 89c51, 89s52

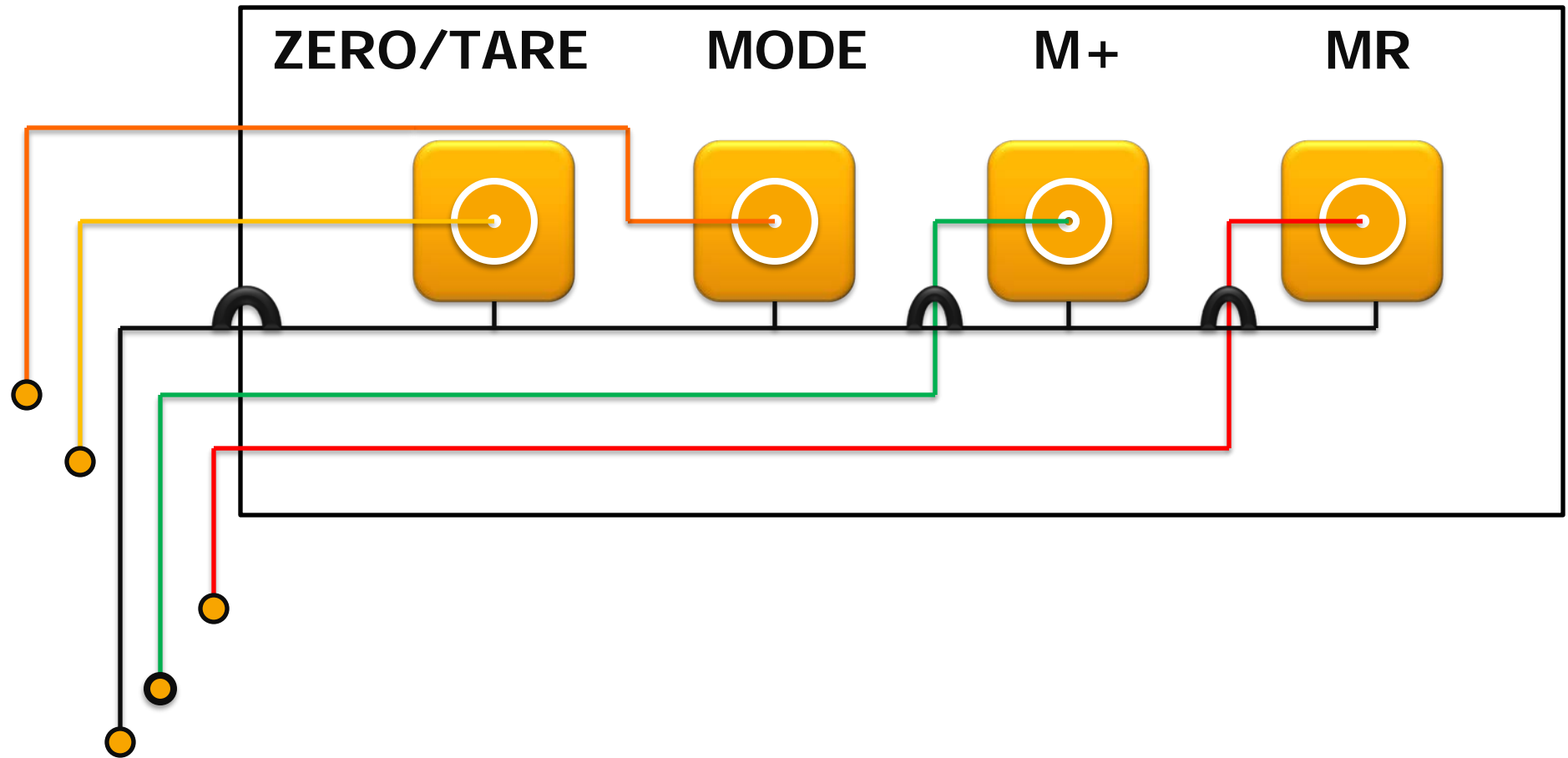
- 8k Bytes ROM
- It support 256 Bytes RAM
- It support serial port
- Re programme up to 1000 time/cycle
- Operating temperature ... -55'c to 125'c
- Operating Dc volt 4.4v to 6.6volt

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

KEY BOARD BLOCK DIAGRAM



RS-232

- 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

TROUBLE SHOOTINGS IN WEIGHING SCALES

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

DRIFTING (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

CHECK WEIGHING SCALE

APPLICATION

- TEA packing industries
- 100% EOU industries
- Match packing industries.



TABLE TOP COUNTING SCALE



APPLICATIONS

- FASTNERS PRECISION INDUSTRY
- LABEL COUNTING
- PAPER INDUSTRY.

WIRE LESS 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)



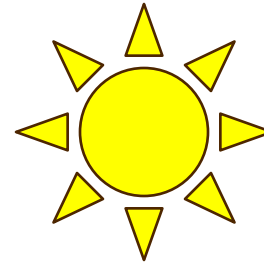
BARCODE & LABEL PRINTING SCALE

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

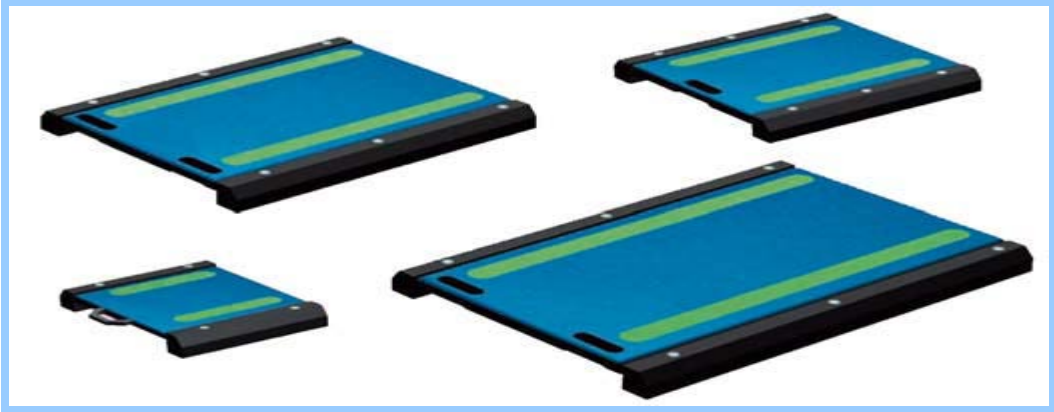
WIRE LESS WEIGHING INDICATOR WITH PLATFROM

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



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