ELECTRONICS AND INSTRUMENTATION ENGINEERS ASSOCIATION

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INSTRONICS

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DC VOLTAGE CALLIBRATOR

CAMERA MASK

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EDITORS:

The Editors and Publishers of this magazine do their best to verify the information published, but do not take responsibility for the absolute accuracy of the information.

Your comments are welcomed and you can send your newsletters through email to the mail-ID **instronicsmagazine@gmail.com**

CONTENTS

“Our life is what our thought makes of it
Great thought comes from the heart”

We thank Our Beloved Principal ***Dr.M.Madheswaran***
For his valuable guidance and encouragement in bringing up this magazine ***“INSTRONICS”*** *successfully.*

- ***EIE ASSOCIATION***

TERMS &DEFINITIONS:

Manual Reset (Adjustment):

The adjustment on a proportioning controller which shifts the proportioning band in relationship to the set point to eliminate offset errors.

Mass Flow Rate:

Volumetric flow rate times density, pounds per hour or kilograms per minute.

Mass Storage:

A device like a disk or magnet that can store large amounts of data readily accessible to the central processing unit.

Maximum Elongation:

The strain value where a deviation of more than ±5% occurs with respect to the mean characteristics (diagram of resistance change vs. strain).

Maximum Excitation:

The maximum value of excitation voltage or current that can be applied to the transducer at room conditions without causing damage or performance degradation beyond specified tolerances.

Mechanical Hysteresis:

The difference of the indication with increasing and decreasing strain loading, at identical strain values of the specimen.

Medium Effect (fm):

For solvents other than water the medium effect is the activity coefficient related to the standard state in water at zero concentration. It reflects differences in the electrostatic and chemical interactions of the ions with the molecules of various solvents.

Method of Correction:

A procedure whereby the mass distribution of a rotor is adjusted to reduce unbalance or vibration due to unbalance, to an acceptable value. Corrections are usually made by adding the material to the rotor, or removing it from the rotor.

Milli Volt:

Unit of electromotive force. It is the difference in potential required to make a current of 1 milli ampere flow through a resistance of 1 ohm; symbol is mV.

Mineral-insulated Thermocouple:

A type of thermocouple cable which has an outer metal sheath and mineral (magnesium oxide) insulation inside separating a pair of thermocouple wires from them and from the outer sheath. This cable is usually drawn down to compact the mineral insulation and is available in diameters from .375 to .010 inches. It is ideally suited for high-temperature and severe-duty applications.

Mueller Bridge:

Mueller bridge is used to measure the high-accuracy bridge configuration for three-wire RTD thermometers.

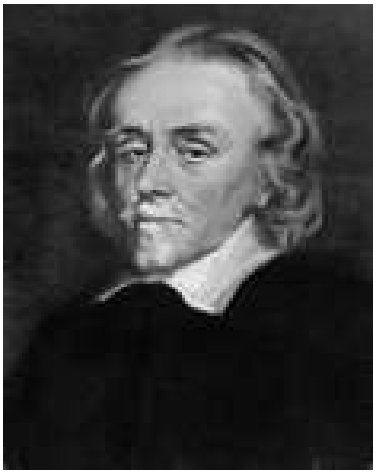
Multiplex:

A technique which allows different input signals to use the same lines at different times, controlled by an external signal. Multiplexing is used to save on wiring and I/O ports.

By:

Mr.K.Anand,
Second Year (MEIEA).

William Harvey



Born: 1 April 1578

William Harvey was an English physician who was the first person to describe completely and in detail about the systemic circulation and properties of blood being pumped to the body by the heart, although blood circulation was described earlier in his Commentary on Anatomy in Avicenna's Canon (1242). After his death the William Harvey Hospital was constructed in the town of Ashford, several miles from his birthplace of Folk stone.

Early life:

Harvey's initial education was carried out in Folk stone, where he learned Latin. He entered the King's School (Canterbury) and remained for five years, after which he joined Caius College in Cambridge.

Harvey graduated as a Doctor of Medicine at the age of 24 from the University of Padua on 25 April 1602. It reports that Harvey had "conducted himself so wonderfully well in the examination and had shown such skill, memory and learning that he had far surpassed even the great hopes which his examiners had formed of him."

After his graduation from Padua, Harvey immediately returned to England where he obtained the degree of Doctor of Medicine from the University of Cambridge that same year. Following this, Harvey established himself in London, joining the College of Physicians on 5 October 1604.

He became the Physician in charge at St. Bartholomew's Hospital, which enjoined him, "in God's most holy name" to "endeavor yourself to do the best of your knowledge in the profession of physics to the poor then present, or any other of the poor at any time of the week which shall be sent home unto you by the Hospitable... You shall not, for favor, lucre or gain, appoint or write anything for the poor but such good and wholesome things as you shall think with your best advice will do the poor good, without any affection or respect to be had to the apothecary.

Harvey died at Roehampton in the house of this brother Eliab on 3 June 1657. Descriptions of the event seem to show that he died of a cerebral hemorrhage from vessels long injured by gout.

Motion of the Heart and Blood:

This initial thought led Harvey's ambition and assiduousness to a detailed analysis of the overall structure of the heart (studied with less hindrance in cold-blooded animals). After this, Harvey goes on to an analysis of the arteries, showing how their pulsation depends upon the contraction of the left ventricle, while the contraction of the right ventricle propels its charge of blood into the

pulmonary artery. Whilst doing this, the physician reiterates the fact that these two ventricles move together almost simultaneously and not independently like had been thought previously by his predecessors.

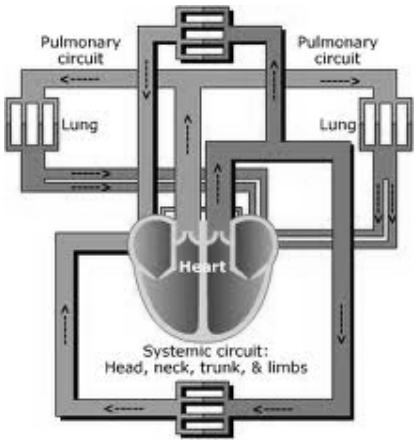


Fig. Blood circulation

He was estimated that the capacity of the heart was 1.5 imperial fluid ounces (43 ml), and that every time the heart pumps 1/8 of that blood is expelled. This led to Harvey's estimate that about $\frac{1}{6}$ imperial fluid ounces (4.7 ml) of blood went through the heart every time it pumped.

The next estimate he used was that the heart beats 1000 times every half an hour, which gave 10 pounds 6 ounces of blood in a half an hour, and when this number was multiplied by 48 half hours in a day he realized that the liver would have to produce 540 pounds of blood in a day.

Having this simple but essential mathematical proportion at hand - which proved the overall impossible. A fore mentioned role of the liver Harvey went on to prove how the blood circulated in a circle by means of countless experiments initially done on serpents and fish tying their veins and arteries in separate periods of time, Harvey noticed the modifications which occurred; indeed, as he tied the veins, the heart would become empty, while as he did the same to the arteries, the organ would swell up.

This discovery was made was performed on the human body (in the image on the right): the physician tied a tight ligature onto the upper arm of a person. This would cut off blood flow from the arteries and the veins. When this was done, the arm below the ligature was cool and pale, while above the ligature it was warm and swollen. The ligature was loosened slightly, which allowed blood from the arteries to come into the arm, since arteries are deeper in the flesh than the veins. When this was done, the opposite effect was seen in the lower arm. It was now warm and swollen. The veins were also more visible, since now they were full of blood.

Harvey then noticed little bumps in the veins, which he realized were the valves of the veins, discovered by his teacher, Hieronymus Fabricius. Harvey tried to push blood in the vein down the arm, but to no avail. When he tried to push it up the arm, it moved quite easily.

The same effect was seen in other veins of the body, except the veins in the neck. Those veins were different from the others - they did not allow blood to flow up, but only down. This led Harvey to believe that the veins allowed blood to flow to the heart, and the valves maintained the one way flow.

By:

Mr.N.Yuvaraj,
Pre-Final Year (MEIEA).

1010 DC Voltage Calibrator:

Fig. DC Voltage Calibrator

Features:

- 0.01µV to 10V in 5 ranges
- 0.02% accuracy
- Battery or mains operation
- 30mA output current
- 10ppm/hr stability
- Battery level indicator
- Safety terminals

A highly stable and accurate mains or battery powered calibrator for applications requiring a precision voltage source of low internal resistance. It has five ranges from (0 to 10V) with a resolution up to 0.01µV.

The compact and robust design makes it easily portable and well suited for laboratory. Voltage outputs are set by selecting the range switch and dialing up the desired value on the thumbwheel switch. Output polarity may be selected using the normal/off/reverse switch.

The calibrator's output resistance is typically 500mΩ on the 10V, 1V and 0.1V ranges. The maximum output current that can be drawn on these ranges is limited to 25mA maintaining specification. The lower ranges have an output resistance of 1Ω and will supply current up to 30mA.

A precision Zener diode is used as a reference source that provides an input to a FET chopper amplifier system operating in a feedback stabilized mode. The gain value is determined by a set of precision metal film resistors, selected by the 5-decade thumbwheel switch on the front panel. The output voltage is variable from 0.01µV to 9.9999V in 5 ranges. For complete reliability, the calibrator range switch employs two contacts in parallel for each position in case one contact fails, ensuring the calibrator will still function correctly.

The DC Voltage Calibrator can be powered from mains supply or by the internal rechargeable battery pack. When the calibrator is plugged into the mains supply the internal batteries will automatically start to recharge. If unplugged from the mains during operation the internal batteries will continue to power the instrument. Full charge allows 40 hours typical use. The battery condition monitored by a meter on the front panel.

Safety Terminals:

Fitted with safety terminals that are fully compatible with the dimension of 4mm shrouded plugs, as well as standard plugs, bare wires, and spade terminals.

Applications:

The DC Voltage Calibrator can be used for calibration, linearity, and gains stability measurements on DC amplifiers, digital and electronic voltmeters, data loggers and chart recorders. The stability of the calibrator is high 10ppm per hour and the noise levels are very low for ideal cases.

1007 DC Millivolt Potentiometer

Fig. DC Millivolt Potentiometer

Features:

- 3 ranges up to 1V
- 0.02% accuracy
- 20mA output current
- Short circuit/overload protection
- LED null measuring facility
- 100 hours typical battery life
- Portable with protective cover

The DC Millivolt Potentiometer is a handheld calibrator that can be used for potentiometric voltage measurement in addition to its operation as a mill volt source. The null zero and sensitivity are adjustable via front panel controls. Maximum sensitivity enables null balance to resolve 3 microvolt.

Three outputs are provided to give adjustable output values and the range is varied from 1μV to 1V with a accuracy of 0.02%. For signal injection, the operator needs to switch on, check the battery condition, select the range, and set the required voltage using the thumbwheel switches. It uses a precision reference diode and low temperature coefficient resistors to give a highly stable output.

Power is provided by 6 AA batteries. Battery life is several months, depending on usage. The battery condition is monitored by an indicator mounted on the top of the unit. The drive current of DC Millivolt Potentiometer is varied upto 20mA, short circuit and overload protected. A n off/normal/reverse output polarity switch is provided.

Safety Terminals:

The safety terminals are fitted as standard and fully compatible with 4mm shrouded plugs, as well as standard plugs, bare wires, and spade terminals.

Added Protection:

It has a textured grip for comfortable handling and openings at the top and bottom to allow access to the battery meter and a position to place labels if required. It is easy to remove if the user prefers a stand-alone unit.

Applications:

The DC Millivolt Potentiometer is used for calibration and simulation of thermocouples. Accurate voltages equivalent to the output from a thermocouple can easily be set on the 1007, enabling fast calibration of temperature measuring equipment.

Alternatively, the 1007 can measure thermocouples output by operating as a potentiometer. Other applications include chart recorder calibration, A/D converter and DMM calibration, and use as a stable voltage for backing off DC offsets.

By:

Mr.C.S.Muraleedharan,
Second Year(MEIEA).

THE FOUR BIGGEST MISTAKES IN INSTRUMENTATION:

Mistake #4:

Quitting Too Soon:

Even when the data filters are in place and the last loop has been tuned, the project isn't over. There are some commonly neglected chores that should continue as long as the instrumentation system is in place. Calibration is instrumentation engineers know that a sensor must be calibrated in order to associate a numerical value with the electrical signal coming out of the transmitter.

Yet all too often, the instruments are calibrated just once during installation then left to operate unattended for years. The result is an insidious problem known as drift. A sensor's output tends to creep higher and higher (or lower and lower), even if the measured variable hasn't changed. Deposition on the sensing surfaces, corrosion in the wiring, and long term wear on moving parts can all cause an instrument to begin generating artificially high (or low) readings.

As a result, the controller will gradually increase or decrease its control efforts to compensate for a non-existent error. Analog instruments are particularly susceptible to drift, much like old FM radios. The slightest nudge on the dial could cause the radio to lose its signal. With modern digital radios, the one true frequency for each station is digitally encoded data fixed value.

Similarly, the modern instruments that employ digital signal processing can't be "nudged." It maintains the same calibration in the field as in the lab. Drift can also be reduced by the choice of sensing technology.

Temperature sensors with mineral insolated cables, for example, are less prone to drift. Drift due to wear can be eliminated entirely by choosing instruments with no moving parts, like ABB's swirl and vortex meters. When drift cannot be eliminated, recalibrating every sensor in the plant at intervals recommended by their manufacturers can accommodate it.

Unfortunately, the project engineers are often so anxious to finish a job and get on with operating the process that they neglect such basic maintenance. Arguably the most challenging sources of drift are those that vary over time. Deteriorating probes and moving parts beginning to wear out can slowly change an instrument's accuracy.

The maintenance calibration is required periodically even if there are no known issues with the instrument. Some manufacturers are recognizing the time and efforts involved in traditional recalibration exercises and are designing instrumentation products to simplify matters. For example, the CalMaster portable calibrator from ABB provides in-situ calibration verification and certification of ABB's MagMaster electromagnetic flow meters without requiring access to the flow meter or opening the pipe. Instead, the operator simply connects a CalMaster to the flow meter's transmitter and a PC.

A Windows interface guides the operator through a series of tests to evaluate the status of the transmitter, sensor, and interconnecting cables. The tests are complex, but so automated that the whole calibration routine can be accomplished in 20 minutes.

Once the tests are complete, CalMaster will evaluate the measurements taken. If all satisfy the calibration requirements, then a calibration certificate can be printed either at that time or later. These certificates can then be catalogued in order to meet auditing and regulatory requirements such as ISO 9001.An added benefit of CalMaster is that it can be used as a diagnostic and condition monitoring tool. It automatically stores all measured values and calibration information in its own database files for each meter, thus maintaining a calibration history log and making it easier to undertake long term trend analysis.

Detailed observation can give early warning of possible system failure, enabling the maintenance engineer take proactive remedial action. Such automated systems make routine verification of flow meter calibration and the traceability of information much less cumbersome and costly than in the past.

In the water industry, for example, such tasks formerly entailed mechanical excavation of the flow meter resulting in a disruption of the water supply and a substantial investment in manpower and equipment.

Planning for the road ahead All too often, an expansion project begins with weeks of wondering why the existing instrumentation system was constructed the way it was and why it doesn't match the project's original plans.

To avoid this, future planning should be a part of your implementation process and also include thorough documentation of what's been done before. Someone will eventually want to expand the project and will need to know exactly which instruments have been placed where, what the instruments were supposed to be accomplishing, and how they were installed and configured.

Even if the instrumentation system is never expanded, it will eventually have to be repaired. Wires break and sensors wear out. A good inventory of the system components will indicate what needs to be replaced, but that's only half the battle. Replacement parts must be acquired along with the technical specs necessary to install them correctly.

An ongoing replacement parts program is a must. Either the original vendor must make provisions for stocking replacements (or upgrades) for all the instruments they've provided to date, or the project engineers must continue to monitor their suppliers to make sure that spare parts remain available. For hard-to-find instruments, it may even be necessary to maintain an in-house supply of replacement parts, just in case.

By:

Mr.S.Mohammed Javeeth,
Final Year(MEIEA).

CAMERA MASK

This mask is one of the latest technology inventions in underwater photography. The "Liquid Image Digital Underwater Camera Mask" as the name implies, is an underwater mask with a built in digital camera.

It records photos and videos by pressing a shutter button on the top of the mask. It also features bright LED lights for illumination.

Fig. Camera Mask

The camera mask is powered by two 1.5 AAA batteries and images are uploaded from a USB port. Photo/video software is included. The maximum operating depth is about 30 meters.

3D TV:

Light actually travels in waves that have various properties. An image can be projected using specific wave characteristics of light, and another angle of the same image can be projected using another wave characteristics.

Polarized glasses filter these light rays to only allow the right eye to see one wave of light, and the left eye to see another, which gives us two viewing angles of same image. Again, these two images combine in our head to give us a 3D perception of the image.

Fig. 3D Glass

These alternating images are seen with glasses that have dark panels over the eyes. The right-eye image flashes on the TV screen, the right-eye panel on the glasses turns clear allowing your right eye to see the image on the screen.

When the left-eye image flashes on the TV screen, the left eye panel on the glasses turns clear, while the right-eye panel turns dark, allowing your left eye to see the image on the screen.

These alternating views of different angles of an image occur at 120 times a second, which creates depth in our perception of images. But many in the television industry believe that consumers will not fully embrace 3D TV because wearing glasses is uncomfortable, inconvenient and unnatural.

The next generation of TV technology promises 3D TV without glasses using innovative television screens. Yet another TV technology for creating 3D TV is to flash alternating angles of an image to the left and right eyes.

By:

Mr.P.Arun Mozhi Devan,
Second Year(MEIEA).

DIRECT IMAGE SENSORS

The **Foveon X3** is the most advanced direct image sensor. It represents a giant leap forward in color photography and is the only image sensor technology that combines the power of digital with the essence of film.

A direct image sensor is directly captures red, green, and blue light at each point in an image during a single exposure. Foveon pioneered the development of the direct image sensor using the most advanced developments in semiconductor design, image processing, and signal processing. The performance of a film and typical CCD sensors as explained as follows:

Film:

For over 100 years, color film has traditionally been held as the gold standard for photography. It produces rich, warm tones and incredible color detail that consumers around the world have become accustomed to. Film has achieved this by using three layers of emulsion to capture full color at every point in the image.

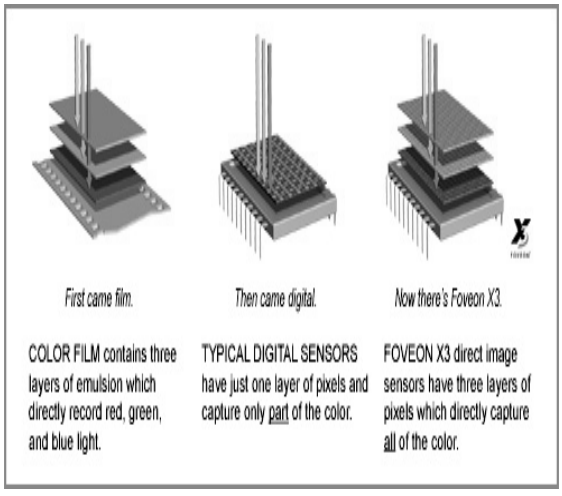


Fig. Image Sensor's Films

Digital:

Charged Couple Device (CCD) image sensors were developed approximately 30 years ago, ushering in the era of digital photography. Unfortunately, the rich, warm tones and detail of color film that the world came to expect from film based cameras were not achievable with the new digital cameras. This was due to the fact that CCD digital image sensors were only capable of recording just one color at each point in the captured image instead of the full range of colors at each location.

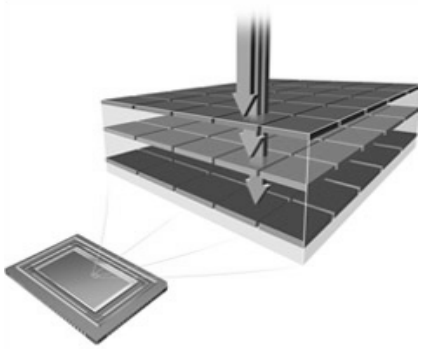


Fig. Direct Image Sensor

Foveon X3 image sensors have three layers of pixels. The layers of pixels are embedded in silicon to take advantage of the fact that red, green, and blue light penetrate silicon to different depths – forming the first and only image sensor that captures full color at every point in the captured image.

By:

Mr.S.Karthik,
Pre-Final Year(MEIEA).

Company Profile

National Instruments transform the way engineers and scientists around the world to design, prototype, and deploy systems for test, control, and embedded design applications. NI can also offer open graphical programming software and modular hardware, customers at more than 30,000 companies simplify development, increase productivity, and dramatically reduce time to market. With this approach, NI empowers customers to more rapidly develop innovative technologies that address many of the grand challenges for Engineering facing the world such as making solar energy more economical, restoring and improving urban infrastructure, and engineering better medicines.

NI is also committed to being a responsible citizen to its global communities and stakeholders. The company achieves this by maintaining a fun and innovative corporate culture , providing tools that inspire and empower engineers and scientists to improve the world, working to reduce its environmental footprint , and giving back to the global community.

Investment in R&D:

More than 16% of annual revenue National Instruments is a technology pioneer, industry leader and solutions provider that delivers today's most advanced technologies for automated test, embedded control, and monitoring and system design. Using open PC technologies and modular hardware, NI customers have been able to simplify development, increase code reuse and dramatically reduce time to market. For next generation monitoring and control systems, NI continues to provide graphical system tools to aid engineers and scientists in developing next generation systems within industries such as energy, manufacturing, industrial control, life sciences, and transportation.

NI is Reconfigurable I/O (RIO) hardware and NI LabVIEW system design software, smaller design teams can prototype and deploy embedded control and monitoring systems faster.

The automated test and measurement, engineers and scientists all over the world in industries including academia, research, telecommunications and defense rely on National Instruments' flexible, high performance technologie s and solutions for creating reliable, user-defined systems. Customers at more than 25,000 companies around the world simplify development, increase productivity, and dramatically reduce time to market using NI open graphical programming software and modular hardware. From testing next-generation gaming systems to advanced automated inspection on the production line, NI technologies are continuously used to develop innovative technologies that impact the lives of millions of people.

By:

Ms.S.Kalaivani,
Lecturer (MEIEA).

METAL DETECTOR:

A metal detector is a device which responds to metal that may not be readily apparent.

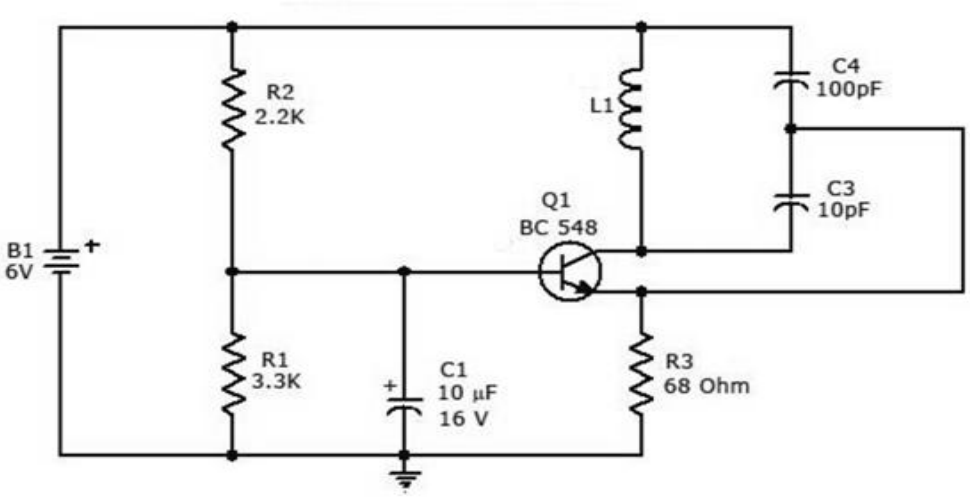


Fig. Circuit diagram of Metal Detector

The simplest form of a metal detector consists of an oscillator producing an alternating current that passes through a coil producing an alternating magnetic field. If a piece of

electrically conductive metal is close to the coil, eddy currents will be induced in the metal, and this produces an alternating magnetic field of its own. If another coil is used to measure the magnetic field (acting as a magnetometer), the change in the magnetic field due to the metallic object can be detected.

The first industrial metal detectors were developed in the 1960s and were used extensively for mining and other industrial applications. Uses include de-mining (the detection of land mines), the detection of weapons such as knives and guns (especially in airport security), geophysical prospecting, archaeology and treasure hunting. Metal detectors are also used to detect foreign bodies in food, and in the construction industry to detect steel reinforcing bars in concrete and pipes and wires buried in walls and floors.

The modern development of the metal detector began in the 1920s. Gerhard Fisher had developed a system of radio direction-finding, which was to be used for accurate navigation. The system worked extremely well, but Fisher noticed that there were anomalies in areas where the terrain contained ore-bearing rocks. He reasoned that if a radio beam could be distorted by metal, then it should be possible to design a machine which would detect metal using a search coil resonating at a radio frequency.

In 1925 he applied for, and was granted, the first patent for a metal detector. Although Gerhard Fisher was the first person granted a patent for a metal detector, the first to apply was Shirl Herr, a businessman from Crawfordsville, Indiana. His application for a hand-held Hidden-Metal Detector was filed in February 1924, but not patented until July 1928.

Herr assisted Italian leader Benito Mussolini in recovering items remaining from the Emperor Caligula's galleys at the bottom of Lake Nemi, Italy, in August 1929.

Herr's invention was used by Admiral Richard Byrd's Second Antarctic Expedition in 1933, when it was used to locate objects left behind by earlier explorers. It was effective up to a depth of eight feet. However, it was one Lieutenant Jozef Stanislaw Kosacki, a Polish officer attached to a unit stationed in St Andrews, Fife, Scotland, during the early years of World War II, who refined the design into a practical Polish mine detector. They were heavy, ran on vacuum tubes, and needed separate battery packs.

The design invented by Kosacki was used extensively during the clearance of the German mine fields during the Second Battle of El Alamein when 500 units were shipped to Field Marshal Montgomery to clear the minefields of the retreating Germans, and later used during the Allied invasion of Sicily, the Allied invasion of Italy and the Invasion of Normandy. As it was a wartime research operation to create and refine the design of the detector, the knowledge that Kosacki created the first practical metal detector was kept secret for over 50 years.

Basic operation:

The basic principle of operation for the common industrial metal detector is based on a 3 coil design. This design utilizes an AM (amplitude modulated) transmitting coil and two receiving coils one on either side of the transmitter. The design and physical configuration of the receiving coils are instrumental in the ability to detect very small metal contaminates of 1mm or smaller. Today modern metal detectors continue to utilize this configuration for the detection of tramp metal.

The coil configuration is such that it creates an opening whereby the product (food, plastics, pharmaceuticals, etc.) passes through the coils. This opening or aperture allows the product to enter and exit through the three coil system producing an equal but mirrored signal on the two receiving coils. The resulting signals are summed together effectively nullifying each other.

When a metal contaminant is introduced into the product an unequal disturbance is created. This then creates a very small electronic signal that is amplified through special electronics. The amplification produced then signals a mechanical device mounted to the conveyor system to remove the contaminated product from the production line. This process is completely automated and allows manufacturing to operate uninterrupted.

By:

Ms.M.Gowri,
Second Year(MEIEA).

TECHS & APPS:

1) The cost of 16 packets of salt, each weighing 900 grams is Rs.28.What will be the cost of 27 packets, if each packet weighs 1Kg?
1.Rs.52.50
2.Rs.56
3.Rs.58.50
4.Rs.64.75

2) A papaya tree was planted 2 years ago. It increases at the rate of 20% every year. If at present, the height of the tree is 540 cm, what was it when the tree was planted?
1.432 cm
2.324 cm
3.375 cm
4.400 cm

3) A boy has Rs 2. He wins or loses Re 1 at a time if he wins he gets Re 1 and if he loses the game he loses Re 1. He can lose only 5 times. He is out of the game if he earns Rs 5. Find the number of ways in which this is possible?
1.14
2.23
3.16
4.12

4) A is twice as good a workman as B and together they finish a piece of work in 18 days. In how many days will A alone finish the work?
1.27
2.26
3.25
4.24

5)2 numbers differ by 5.If their product is 336, then the sum of the 2 numbers is:
1.21
2.51
3.28
4.37

6) The sum of 5 successive odd numbers is 1075. What is the largest of these numbers?
1.215
2.223
3.219
4.217

7) (1/10)18 - (1/10)20 =?
1.99/1020
2.99/10
3.0.9
4. None of these

8) One ship goes along the stream direction 28 km and in opposite direction 13 km in 5 hrs for each direction. What is the velocity of stream?
1. 1.5 kmph
2. 2.5 kmph
3. 1.8 kmph
4. 2 kmph

9) Complete the series: 5, 20, 24, 6, 2, 8,?
1. 12
2. 32
3. 34
4. 36

10) If (2x-y) =4 then (6x-3y) =?
1.15
2.12
3.18
4.10

11) An emergency vehicle travels 10 miles at a speed of 50 miles per hour. How fast must the vehicle travel on the return trip if the round-trip travel time is to be 20 minutes?
1.72 miles per hour
2.75 miles per hour
3.65 miles per hour
4.78 miles per hour

12) There is a certain relation between two given words on one side of: : and one word is given on another side of : : while another word is to be found from the given alternatives, having the same relation with this word as the given pair has. Select the best alternative. Horse: Jockey: : Car : ?
1.Mechanic
2.Chauffeur
3.Steering
4.Brake

13) Which of the following numbers should be added to 11158 to make it exactly divisible by 77?
1.9
2.8
3.7
4.5

14) There are 3 societies A, B, C. A lent cars to B and C as many as they had Already. After some time B gave as many tractors to A and C as many as they have. After sometime c did the same thing. At the end of this transaction each one of them had 24. Find the cars each originally had.
1. A had 21 cars, B had 39 cars & C had 12 cars
2. A had 39 cars, B had 39 cars & C had 12 cars
3. A had 39 cars, B had 21 cars & C had 19 cars
4. A had 39 cars, B had 21 cars & C had 12 cars

15) Superheroes Liza and Tamar leave the same camp and run in opposite directions. Liza runs 1 mile per second (mps) and Tamar runs 2 mps. How far apart are they in miles after 1 hour?
1. 10800 mile
2. 19008 mile
3. 12300 mile
4. 14000 mile

16)To 15 lts of water containing 20% alcohol, we add 5 lts of pure water. What is % alcohol?
1. 20%
2. 34%
3. 15%
4. 14%

17)Find the average of first 40 natural numbers.
1. 40
2. 35
3. 30.6
4. 20.5

18) 1,2,6,24,?
1. 111
2. 151
3. 120
4. 125

19) Which of the following numbers is divisible by 3? (i) 541326 (ii) 5967013
1. (ii) only
2. (i) only
3. (i) and (ii) both
4. (i) and (ii) none

20) On sports day, if 30 children were made to stand in a column, 16 columns could be formed. If 24 children were made to stand in a column, how many columns could be formed?
1. 20
2. 30
3. 40
4. 50

By:

Ms.S.A.Diana Mary,
Pre-Final Year(MEIEA).

"A Group Becomes A Team When Each
Member Is Sure
Enough Of Himself And His contribution
To Praise The Skills Of Other . "