IPET NEWS July 2009

THE INSTITUTE OF PROFESSIONAL ENGINEERING TECHNOLOGISTS
(Association Not For Gain)

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"Tackle a Block at a Time".

In this issue

No 1. A New Engineering Council of SA Soon!

Your association, along with other ECSA recognized associations, were tasked to find volunteers to serve on the next ECSA Council. Your association published the request and subsequently submitted the names and associated paperwork to ECSA.

The new Council will consist of a total of 50 persons. This comprises 30 registered persons, 10 professionals of whom 6 must be in the service of the State and 10 members of the public.

ECSA got an independent panel to make the final selections and these were submitted to the Minister of Public Works who makes the final decision. Final results expected soon!

No 2. SAIEE Celebrates 100 Years.

IPET Chief Operations Officer, Viv Nel, and President of SAIEE, Du Toit Grobler, at their recent Centenary Function.

The South African Institute of Electrical Engineers was founded in June 1909 and this year celebrated the Centenary with a garden party. The Guest of Honour was the Honorable Minister of Science and Technology, Mrs Naledi Pandor. A Centenary Plaque was unveiled by the President of the SAIEE. After the formalities the guests were invited to mingle and network in a convivial setting and to view the museum and technical library. Some guests also visited the SAASTA Interactive Science Centre and the observatory dome.

Congratulations SAIEE.

No 3. Complaints against ECSA Registered Engineering Persons.

The following figures show the number of formal complaints currently being investigated by ECSA.

Prof Engineers –	89
Prof Engineering Technologists –	12
Prof Engineering Technicians –	5
Lift Machinery Inspectors –	2
Lift Inspectors -	0.

No 4. Past Vice President of the Engineering Council of SA (ECSA) wins an award in the annual National Science Technology Forum (NSTF) awards.
Activities other than research and its outputs over the last five years or less - Robert (Bob) Pullen, Senior Specialist in Water Engineering, BKS Group - for his contribution to the regulation of the engineering professions, to civil engineering and environmental practice.

No 5. The DDT (Digital Terrestrial TV) rollout

The switch-on from analogue to Digital Terrestrial Television (DDT) officially occurred on the 1st November 2008.

The change to a digital signal is to allow for more channels on the same bandwidth currently used for just one analogue TV signal. ICASA, the regulatory body, will determine how the spectrum released by migration from analogue to digital TV will be used. The migration is in accordance with the International Telecommunications Union (ITU) directive to ensure ongoing co-ordination and protection from interference. It is expected that all countries will have to comply with the directive by 2015.

The Ministers of Communication in the South African Development Community, including South Africa's Minister Siphhiwe Nyanda, have stated that the region should work to completing the switch over by 2013. The original deadline for South Africa was 2011 but this will probably have to be extended to 2013 to allow for a better dual coverage period. ICASA has started consultations regarding the broadcasting frequency plan and it is hoped that this would be finalised by the end of August. It also hoped to finalise the licensing of mobile TV services by the end of the year. ICASA has decided to allocate 100% of multiplex 1, as part of DTT to the SABC. Trinity Broadcasting Network (TBN) would have 10% capacity in multiplex 1 in the Eastern Cape. E-TV has been allocated 60% capacity in multiplex 2. A third multiplex would be created for M-Net subject to it conducting a hard switchover within 12 months. This latter switch over would then create additional capacity for a competitor to M-Net at the end of the hard switchover. M-Net would then be allocated 50% of the third multiplex at the end of the dual switchover. This would then free up the spectrum in the 709Mhz ban to the 862MHz band, as this is required for broadband purposes.

For viewers to receive the DTT signal they will need a Set Top Box (STB), which the government and industry hopes will only cost around R700. The government previously stated that it would subsidise the cost of the STB for poorer households providing some 70% (R490) towards its cost. The estimated bill will be around R2.45 billion !! The STB would convert the received MPEG 4 for use by the TV set.

Compiled from information from Sentech and various sources on the internet.

No 6. FIFA Related Spam and Fraud.

Symantec internet security reports have indicated that as countries introduce greater bandwidth services cyberspace threats increase. During the last FIFA World Cup phising attacks jumped by some 40% and attacks in 2008 were some 66% more than the previous year.
These scams and fishing attacks are on Websites and by E mails to E Mail users. E Mailers get messages that often appear genuine to persuade the user to click onto an illegitimate website where their personal information can be harvested.
As South Africa's broadband services improve over the coming year an increase in these illegal activities is expected.

Source; www.symantec.com

No 7. Mars Close to Earth; Its Fake!

The Email going the rounds that states that Mars will be visible as large as the moon on the 27th August is a fake and a hoax.
This E mail surfaces annually and says that no one alive today will ever see this again.
NASA says Mars and Earth were relatively close on the 27th August 2003 - a mere 56million km away! This was a 60 000 year record.
Even using a 75X magnification telescope will not make Mars appear to be the same size as the moon.
So if you get this E Mail hit the delete button immediately*!*
Source; Many E Mails!

No 8 eta Awards - Turning ideas into energy Rewarding energy efficiency in all sectors.

Eskom and the Department of Minerals and Energy are calling for entries or nominations for the 20th annual eta Awards. This competition will kick off in May 2009 and the gala awards evening will be hosted in Gauteng towards the end of October.
eta is the Greek symbol for efficiency, hence the name of the Awards. The purpose of the eta Awards is to reward exceptional effort in the more efficient use of energy by individuals, students, companies or other institutions.
Given the significant emphasis placed on energy efficiency by the government of South Africa, the Minister of Minerals and Energy is the official eta patron.
Why the need for energy efficiency?
The more electricity we use, the more electricity needs to be generated. We flick on switches without thinking that behind the supply of power to our homes and businesses is a complex chain of supply that stretches back hundreds of kilometers to power stations across the country.
The higher peak demand for electricity grows, the more new power stations are required. This requires massive capital investment and, in turn, pushes up consumer energy costs.
The environment will benefit from the efficient use of energy. For example, every kWh (Kilowatt hour) of electricity saved means a saving of 1,4 litres of water and one less kilogram of carbon dioxide generated by a power station.
Award categories
Commercial – for the application of sound energy efficiency principles for at least 12 months in the commercial sector, for instance projects in hotels, shopping centres, businesses or hospitals
Industrial - for the application of sound energy efficiency principles for at least 12 months in the industrial sector, for instance projects at manufacturing plants, smelters, mines, etc
Residential - for the application of sound energy efficiency principles for at least 12 months in the residential sector, such as people reducing their household consumption drastically, or residential street lighting projects
Women in communities – aimed at women who have a demonstrable impact in their communities in terms of sustainable energy or energy efficiency
Women in Industry – for women who have made a major impact in the energy sector and who have spearheaded a project with potential for replication in the rest of the industry
Young designers – aimed at school-going children with a creative idea, programme, design or prototype that looks at the efficient use of energy and not the generation of energy.
Power fitness – aimed at communication managers within large corporates who have made an exceptional effort to promote energy efficiency to employees.
Innovation – this new category recognises prototypes that reduce the energy consumption of equipment of buildings in any way, or brilliant ideas that could contribute to energy efficiency
Prizes
All of the awards comprise a cash amount of R30 000 for the winner in each category and R5 000 for each of the two runners-up in each category, subject to the judges' discretion.
Judging
The independent panel of judges includes experts from universities and other bodies such as the Department of Minerals and Energy, University of Stellenbosch and Department of Science and Technology, Department of Education and specialists in the arena of energy efficiency.
There will be two judging sessions - on 27 August and 10 September 2009 - , with semi-finalists interviewed at the latter. Winners will be announced at a gala event, held in Gauteng towards the end of October.
eta Awards competition details
Entries should be sent to:
eta Awards Administrators:
PO Box 40397,
Moreleta Park
0044
Phone and fax: (012) 997 1334
email: amroux@mweb.co.za
Website: www.eta-awards.co.za
Entries close on 14 August 2009

Note.

The following mini articles follow the trend of interesting scientific and engineering developments we put in our last newsletter. We hope you find them of general interest!
Ed.

No 9. Satellites Collide.

The February the 10th collision involving the active U.S. commercial Iridium satellite and an inactive Russian Cosmos 2251 satellite in low Earth orbit has demonstrated an urgent need to establish a civil space traffic control system.
The U.S. satellite is one of a 66-member constellation of communications satellites.
Both were completely destroyed, producing two large debris clouds. The U.S. Air Force's Space Surveillance Network reported over 500 pieces from

the Cosmos satellite and 194 pieces from the Iridium satellite were tracked in two separate debris clouds. There was apparently a data warning about the possibility of the collision before it happened according to Brian Weeden, Technical Consultant for Secure World Foundation. It was stressed that close approaches between satellites somewhere in Earth orbit occurs on almost a weekly basis…and until this event, have never before resulted in an actual collision.

"Getting the right information to the right authorities in time to make the right avoidance manoeuver decision is a very complicated process that doesn't entirely exist yet," Weeden said. "The Secure World Foundation is working with many other organizations around the world to try and develop this process."

That process involves the creation of a space traffic control system.

Increasingly congested environment

"This collision underscores in a dramatic way the importance of instituting an international civil space situational awareness (SSA) system as soon as possible," said Dr. Ray Williamson, Executive Director of Secure World Foundation.

Adapted from materials provided by Secure World Foundation, *via* Newswise.

No 10. Seacom Communications in service date hijacked by pirates!

Seacom undersea fibre-optics cable in service date has been delayed by approximately a month due to the increased pirate activity along the eastern African coast. The in service target date service date of 27 June has been moved to a target date of 23rd July 2009.

Seacom is working with its contractor Tyco Telecommunications to find ways of accelerating the outstanding work and improving the safety of the ship crews from pirates.

The cable section from South Africa (Mtunzini) to Kenya (Mombasa) has already undergone successful testing.

Sources; various.

No 11. Dow Chemicals Looks To Algae For Fuel.

Michigan, US-based Dow Chemicals has backed Algenol Biofuels' pioneering pilot-scale project to convert algae and carbon dioxide into ethanol fuel.

The project will use Algenol's technology that calls for carbon dioxide and saltwater supplied to algae in photobioreactors to produce the biofuel.

The project aims to create a breakthrough in ethanol production that does not use food sources.

The US, the world's top producer of corn-based ethanol, is looking to divert away from fuel from food supplies due to rising food prices on world markets.

The algae-to-ethanol facility will be located at Dow's Freeport, Texas site.

Also involved in the project are the National Renewable Energy Laboratory, the Georgia Institute of Technology and Membrane Technology & Research.

Sources; Various on the Internet.

No 12. Musings from the Editor during a Power Failure.

Sitting with another power failure and watching the flickering candlelight playing with the shadows of the dark, the windmills of my mind started turning as well.

After some pencilled notes the following finally lit up the paper. OK so it is a bit tongue in cheek, but then many a truth is spoken in jest.

Looking at the transport scene an interesting picture emerges. Yes, the figures are all approximate but reasonably typical.

Coal is used to fire boilers to make steam to power turbines to rotate alternators to generate electricity.

The overall efficiency input to output with the thermal, mechanical, electrical conversions is around 35%.

Electrical transformation and distribution efficiency is around 98%.

The A/C to D/C conversion efficiency to charge a storage device (battery) is around 90%.

The D/C to chemical conversion efficiency in one of the best power to weight batteries like Lithium is around 99%.

The battery is now used to drive an electric car, that's chemical, to electric conversion with efficiency around 95% and an Electric motor efficiency of around 90%.

So the overall input to output efficiency would be a maximum of;

100 X 35/100 X 98/100 X 90/100 X 99/100 X 95/100 X 90/100 = 26.13%

An internal combustion (IC) engine has an efficiency of a maximum of around 30% while the overall for a car fitted with the IC engine could be as low as 15%

(It all depends on how and what you include in the measurement process).

The thought comes to mind that electric cars are still problematic because of batteries; the Eskom woes and coal fired power stations, so perhaps we should be looking at a steam-engined car!

The efficiency could be around 35% and it is an ideal traction motor! It does not have to look like the century old Stanley Steamer. It could have a flash boiler, which means no large volumes of steam stored so it could be as safe as a hot Lithium battery or a tank of petrol. It could be around the same size as the much-vaunted Toyota Prius. Condensing the steam back to water pushes the water usage down dramatically.

Oh and fuel, well why not powdered or pelleted coal with an electric auto feed system.
As for smoke and fumes, it might be less than all the taxis and heavy vehicles that pass me on the roads everyday!
This could be an interesting project for University Mechanical engineering students!

It all goes to show that while the electric vehicle has its place, the internal combustion engine is probably going to be around for quite a long time yet (even if it's powered by green fuels and not petrol). Certainly if as much funding as is going to the South African Jewel car (which is going to depend on scarce Lithium for its battery) was pushed into this or some method of turning Kikuyu grass into fuel we could just have a winner!

This hopefully gets some debate going!
Hopefully its positive and not just criticism.
Send in your comments, thoughts etc so we can share information! Lets hear from you!

Viv Nel, Pr Tech Eng. (editor).

Picture of British Steam Car in trial runs on land speed record. They hope to break the 200mph barrier.

Steam powered car land speed record of the Stanley Steamer of 127mph (203 km/hr still stands.

The Steam Powered Doble car circa 1923

No 13. OPINION SURVEY; VALUE MANAGEMENT IN THE MANUFACTURING SECTOR , REPEAT REQUEST.

Dear Fellow Professional

You will have read in previous Newsletters that the Department of Construction Economics and Management at the University of Cape Town is conducting a project to establish the nature and extent of value management / value engineering (VM / VE) in the manufacturing sector - as practised by clients, engineers, designers, etc. To date only 8 responses have been received. We need at least 30 responses, preferably in the order of 50. Please assist us if you possibly can.

Please record your views by linking to the questionnaire located at the following website. The survey is entirely web-based and the results are captured and processed electronically. The questionnaire can be found at the following website. Please call 021 - 650 3443 if you have any queries.

http://webdav.uct.ac.za/research/fews/mft/survey.html

Kindly complete the survey by Friday 24th July 2009 if at all possible.

Target communities include the following sub-sectors: food and beverages; textiles; paper and paper products; chemical, rubber and plastic products; basic metals, fabricated metal products, machinery and equipment; radio, TV and communication equipment, electrical machinery; transport equipment; furniture and manufacturing; and non-metallic mineral products (e.g., glass and glass products).

To recap, the opinion survey deals with issues such as: demographic information (to provide a contextual background); familiarity with value management; use of value management; and the nature of the use of value management. The questions are topical and relevant to persons involved in VM in the manufacturing sector.

Thank you for participating in this survey. The results of the survey will be made public once they are analysed.

Professor Paul Bowen
Department of Construction Economics and Management
University of Cape Town

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Fax: +27 - (0)21 - 689 7564
Email: paul.bowen@uct.ac.za

No 14 The Joke Column.

Warning / Disclaimer.

Sensitive readers are warned that the following may erroneously be taken to contain sex, violence, strong language, gender, race, ethics etc. Readers are warned not to read or have any of the following read to them. Recommended readers age is limited to 120 and 121 years of age. A further requirement is you must have a sense of humour.

Common tool names and their purpose.

***DRILL PRESS**; A tall upright machine useful for suddenly snatching flat metal bar stock out of your hands so that it smacks you in the chest and flings your beer across the room, denting the freshly-painted vertical stabilizer which you had carefully set in the corner where nothing could get to it.
* **WIRE WHEEL;** Cleans paint off bolts and then throws them somewhere under the workbench with the speed of light. Also removes fingerprints and hard-earned calluses from fingers in about the time it takes you to say, "Oh sh!!**!!
* **SKILL SAW**: A portable cutting tool used to make studs too short.
* **PLIERS**: Used to round off bolt heads. Sometimes used in the creation of blood blisters.
*** BELT SANDER;** An electric sanding tool commonly used to convert minor touch-up jobs into major refinishing jobs.
*** HACKSAW;** One of a family of cutting tools built on the Ouija board principle. It transforms human energy into a crooked, unpredictable motion, and the more you attempt to influence its course, the more dismal your future becomes.
* **VICE-GRIPS;** Generally used after pliers to completely round off bolt heads. If nothing else is available, they can also be used to transfer intense welding heat to the palm of your hand.
* **WELDING GLOVES**: Heavy duty leather gloves used to prolong the conduction of intense welding heat to the palm of your hand.
*** OXYACETYLENE TORCH**: Used almost entirely for setting various flammable objects in your shop on fire. Also handy for igniting the grease inside the wheel hub out of which you want to remove a bearing race. (And when you can't get that rounded bolt off with the Vice Grips just use the Blue Wrench)!
* **TABLE SAW**: A large stationary power tool commonly used to launch wood projectiles for testing wall integrity.
* **E-Z OUT BOLT AND STUD EXTRACTOR**: A tool ten times harder than any known drill bit that snaps neatly off in bolt holes thus ensuring no possible future use.
* **BAND SAW**: A large stationary power saw primarily used by most shops to cut good aluminium sheet into smaller pieces that more easily fit into the trash can after you cut on the inside of the line instead of the outside edge.
* **TWO-TON ENGINE HOIST**: A tool for testing the maximum tensile strength of everything you forgot to disconnect.
* **CRAFTSMAN 1/2 x 24-INCH SCREWDRIVER**: A very large pry bar that inexplicably has an accurately machined screwdriver tip on the opposite end to the handle.
* **STRAIGHT SCREWDRIVER;** A tool for opening paint cans. Sometimes used to convert common slotted screws into non-removable screws.
* **PHILLIPS SCREWDRIVER;** Normally used to stab the vacuum seals under lids or for opening old-style paper-and-tin oil cans and splashing oil on your shirt; but can also be used, as the name implies, to strip out Phillips screw heads.
* **PRY BAR;** A tool used to crumple the metal surrounding that clip or bracket you needed to remove in order to replace a 50 cent part.
* **HOSE CUTTER**;A tool used to make hoses too short.
* **HAMMER**: Originally employed as a weapon of war, the hammer nowadays is used as a kind of divining rod to locate the most expensive parts adjacent the object we are trying to hit.

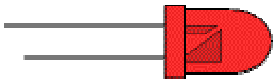
Message from your organisation!!

Our print newsletter and more is on the Web. Join us at; www.ipet.co.za and you'll find far more news, articles and information.

No 15. **For Our Electronically Minded Members.**

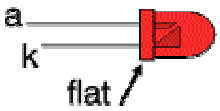
ALL YOU HAVE EVER WANTED TO KNOW ABOUT

Light Emitting Diodes (LEDs)

Example:  Circuit symbol: 

Function

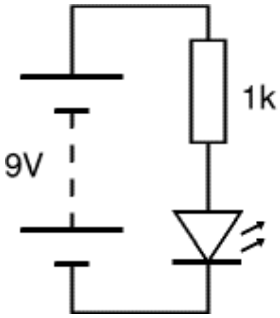
LEDs emit light when an electric current passes through them.



Connecting and soldering

LEDs must be connected the correct way round, the diagram may be labelled **a** or **+** for anode and **k** or **-** for cathode (yes, it really is k, not c, for cathode!). The cathode is the short lead and there may be a slight flat on the body of round LEDs. If you can see inside the LED the cathode is the larger electrode (but this is not an official identification method).

LEDs can be damaged by heat when soldering, but the risk is small unless you are very slow. No special precautions are needed for soldering most LEDs.



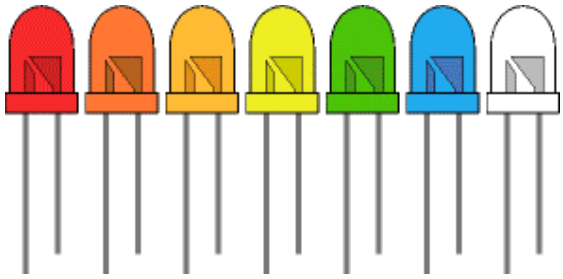
Testing an LED

Never connect an LED directly to a battery or power supply!
It will be destroyed almost instantly because too much current will pass through and burn it out.

LEDs must have a resistor in series to limit the current to a safe value, for quick testing purposes a 1kΩ resistor is suitable for most LEDs if your supply voltage is 12V or less. **Remember to connect the LED the correct way round!**

For an accurate value please see calculating an LED resistor value below.

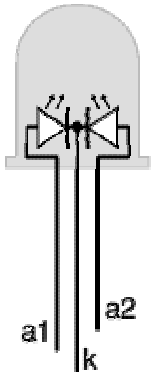
Colours of LEDs



LEDs are available in red, orange, amber, yellow, green, blue and white. Blue and white LEDs are much more expensive than the other colours.

The colour of an LED is determined by the semiconductor material, not by the colouring of the 'package' (the plastic body). LEDs of all colours are available in uncoloured packages which may be diffused (milky) or clear (often described as 'water clear'). The coloured packages are also available as diffused (the standard type) or transparent.

Tri-colour LEDs



The most popular type of tri-colour LED has a red and a green LED combined in one package with three leads. They are called tri-colour because mixed red and green light appears to be yellow and this is produced when both the red and green LEDs are on.

The diagram shows the construction of a tri-colour LED. Note the different lengths of the three leads. The centre lead (k) is the common cathode for both LEDs, the outer leads (a1 and a2) are the anodes to the LEDs allowing each one to be lit separately, or both together to give the third colour.

Bi-colour LEDs

A bi-colour LED has two LEDs wired in 'inverse parallel' (one forwards, one backwards) combined in one package with two leads. Only one of the LEDs can be lit at one time and they are less useful than the tri-colour LEDs described above.

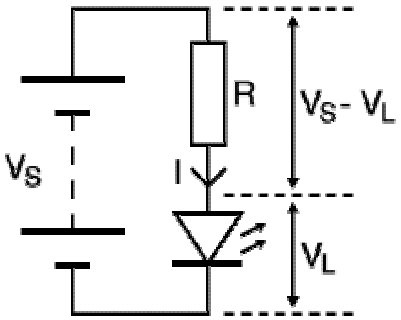
Sizes, Shapes and Viewing angles of LEDs

LEDs are available in a wide variety of sizes and shapes. The 'standard' LED has a round cross-section of 5mm diameter and this is probably the best type for general use, but 3mm round LEDs are also popular.

LED Clip

Round cross-section LEDs are frequently used and they are very easy to install on boxes by drilling a hole of the LED diameter, adding a spot of glue will help to hold the LED if necessary. LED clips are also available to secure LEDs in holes. Other cross-section shapes include square, rectangular and triangular.

As well as a variety of colours, sizes and shapes, LEDs also vary in their viewing angle. This tells you how much the beam of light spreads out. Standard LEDs have a viewing angle of 60° but others have a narrow beam of 30° or less.



Calculating an LED resistor value

An LED must have a resistor connected in series to limit the current through the LED, otherwise it will burn out almost instantly.

The resistor value, R is given by:

$$R = (V_S - V_L) / I$$

V_S = supply voltage
V_L = LED voltage (usually 2V, but 4V for blue and white LEDs)
I = LED current (e.g. 20mA), this must be less than the maximum permitted

If the calculated value is not available choose the nearest standard resistor value which is **greater**, so that the current will be a little less than you chose. In fact you may wish to choose a greater resistor value to reduce the current (to increase battery life for example) but this will make the LED less bright.

For example

If the supply voltage V_S = 9V, and you have a red LED (V_L = 2V), requiring a current I = 20mA = 0.020A,
R = (9V - 2V) / 0.02A = 350Ω, so choose 390Ω (the nearest standard value which is greater).

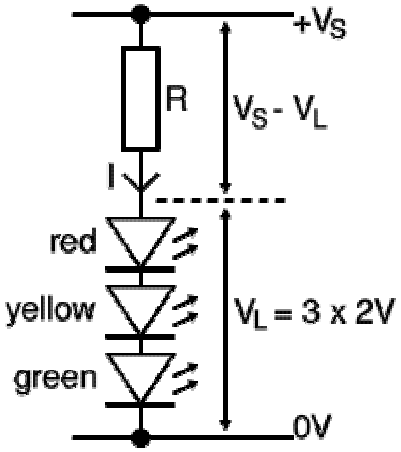
Working out the LED resistor formula using Ohm's law

Ohm's law says that the resistance of the resistor, R = V/I, where:
V = voltage across the resistor (= V_S - V_L in this case)
I = the current through the resistor

So R = (V_S - V_L) / I

For more information on the calculations please use Ohms Law.

Connecting LEDs in series



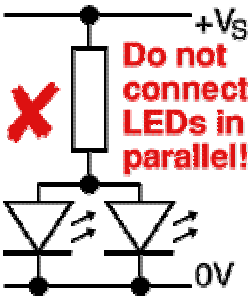
If you wish to have several LEDs on at the same time it may be possible to connect them in series. This prolongs battery life by lighting several LEDs with the same current as just one LED.

All the LEDs connected in series pass the **same current** so it is best if they are all the same type. The power supply must have sufficient voltage to provide about 2V for each LED (4V for blue and white) plus at least another 2V for the resistor. To work out a value for the resistor you must add up all the LED voltages and use this for V_L.

Example calculations:
A red, a yellow and a green LED in series need a supply voltage of at least 3 × 2V + 2V = 8V, so a **9V battery** would be ideal.
V_L = 2V + 2V + 2V = 6V (the three LED voltages added up).

If the supply voltage V_S is 9V and the current I must be 15mA = 0.015A,
Resistor R = (V_S - V_L) / I = (9 - 6) / 0.015 = 3 / 0.015 = 200Ω,
so choose R = 220Ω (the nearest standard value which is greater).

Avoid connecting LEDs in parallel!



Connecting several LEDs in parallel with just one resistor shared between them is generally not a good idea.

If the LEDs require slightly different voltages only the lowest voltage LED will light and it may be destroyed by the larger current flowing through it. Although identical LEDs can be successfully connected in parallel with one resistor this rarely offers any useful benefit because resistors are very cheap and the current used is the same as connecting the LEDs individually. If LEDs are in parallel each one should have its own resistor.

Reading a table of technical data for LEDs

Suppliers' catalogues usually include tables of technical data for components such as LEDs. These tables contain a good deal of useful information in a compact form but they can be difficult to understand if you are not familiar with the abbreviations used.

The table below shows typical technical data for some 5mm diameter round LEDs with diffused packages (plastic bodies). Only three columns are important and these are shown in bold. Please see below for explanations of the quantities.

Type	Colour	I_F max.	V_F typ.	V_F max.	V_R max.	Luminous intensity	Viewing angle	Wavelength
Standard	**Red**	**30mA**	**1.7V**	2.1V	5V	5mcd @ 10mA	60°	660nm
Standard	**Bright red**	**30mA**	**2.0V**	2.5V	5V	80mcd @ 10mA	60°	625nm
Standard	**Yellow**	**30mA**	**2.1V**	2.5V	5V	32mcd @ 10mA	60°	590nm
Standard	**Green**	**25mA**	**2.2V**	2.5V	5V	32mcd @ 10mA	60°	565nm
High intensity	**Blue**	**30mA**	**4.5V**	5.5V	5V	60mcd @ 20mA	50°	430nm
Super bright	**Red**	**30mA**	**1.85V**	2.5V	5V	500mcd @ 20mA	60°	660nm
Low current	**Red**	**30mA**	**1.7V**	2.0V	5V	5mcd @ 2mA	60°	625nm

I_F max. Maximum forward current, forward just means with the LED connected correctly.

V_F typ. Typical forward voltage, V_L in the LED resistor calculation.
This is about 2V, except for blue and white LEDs for which it is about 4V.

V_F max. Maximum forward voltage.

V_R max. Maximum reverse voltage
You can ignore this for LEDs connected the correct way round.

Luminous intensity Brightness of the LED at the given current, mcd = millicandela.

Viewing angle Standard LEDs have a viewing angle of 60°, others emit a narrower beam of about 30°.

Wavelength The peak wavelength of the light emitted, this determines the colour of the LED.
nm = nanometre.

Flashing LEDs

Flashing LEDs look like ordinary LEDs but they contain an integrated circuit (IC) as well as the LED itself. The IC flashes the LED at a low frequency, typically 3Hz (3 flashes per second). They are designed to be connected directly to a supply, usually 9 - 12V, and no series resistor is required. Their flash frequency is fixed so their use is limited and you may prefer to build your own circuit to flash an ordinary LED using a 555 astable circuit.

LED Displays

LED displays are packages of many LEDs arranged in a pattern, the most familiar pattern being the 7-segment displays for showing numbers (digits 0-9). The pictures below illustrate some of the popular designs:

Bargraph

7-segment

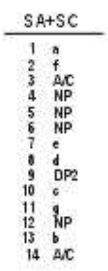
Starburst

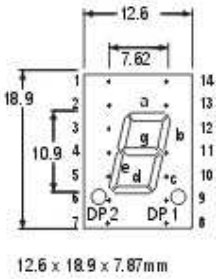
Dot matrix

Photographs © Rapid Electronics

Pin connections of LED displays

There are many types of LED display and a supplier's catalogue should be consulted for the pin connections. The diagram on the right shows an example from the Rapid Electronics catalogue. Like many 7-segment displays, this example is available in two versions: Common Anode (SA) with all the LED anodes connected together and Common Cathode (SC) with all the cathodes connected together. Letters a-g refer to the 7 segments, A/C is the common anode or cathode as appropriate (on 2 pins). Note that some pins are not present (NP) but their position is still numbered.





The information for the LED article was downloaded from a number of sources on the Internet. Ed.

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