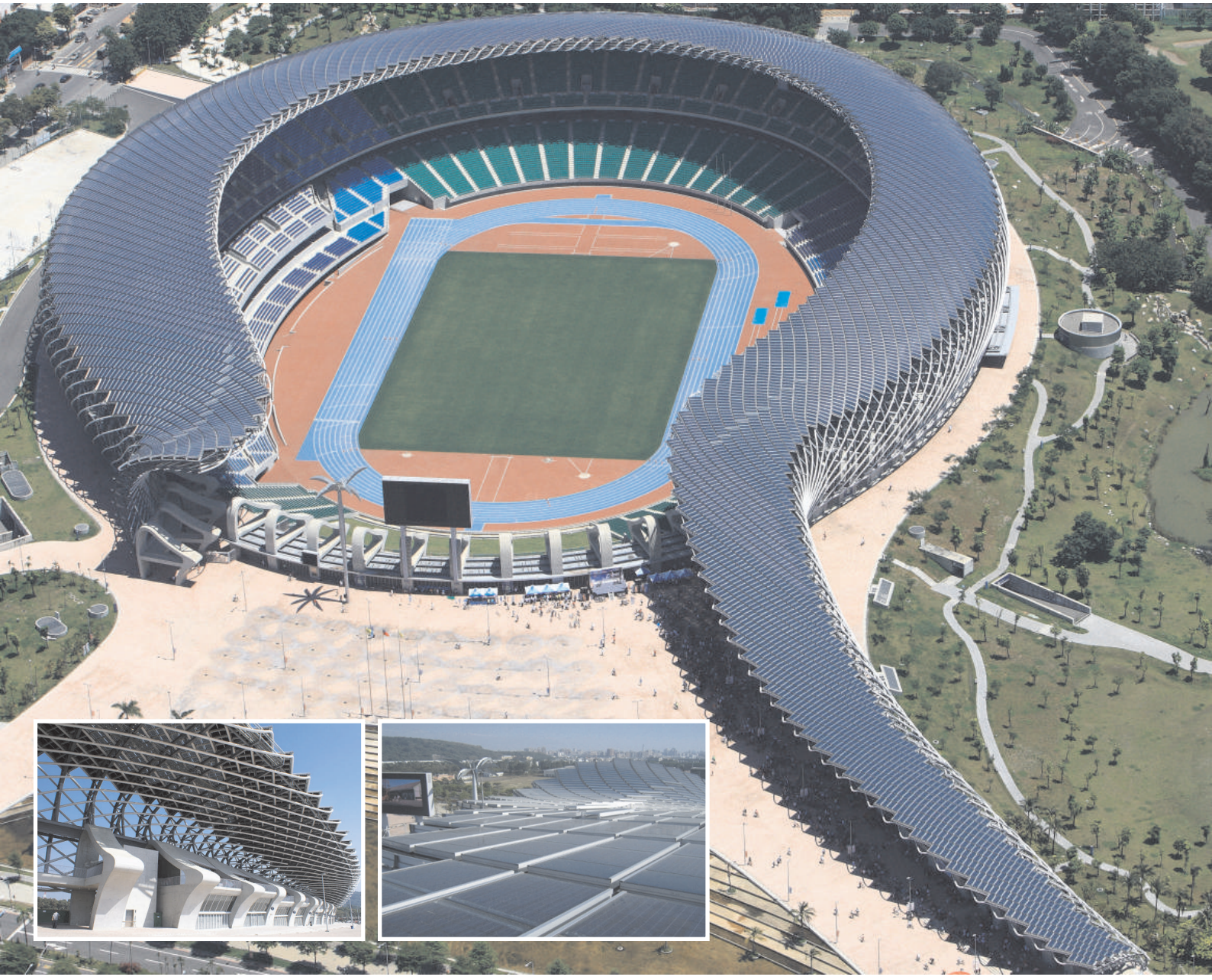
Issue No. : 2/2014
April, 2014

(FOR PRIVATE CIRCULTION ONLY)

S P E NEWS LETTER

A QUATERLY PUBLICATION OF THE SOCIETY OF POWER ENGINEERS (INDIA)



THE SOCIETY OF POWER ENGINEERS (INDIA)

(VADODARA CHAPTER) ESTD. 1996

FF-48, Avishkar Complex, Old Padra Road, Vadodara – 390 007
Phone: (0265)232 2355
E – Mail: spe.cbip@gmail.com, spevadodara01@rediffmail.com
Web: www.spevadodara.in

EXECUTIVE COMMITTEE FOR THE YEAR 2013-14

1	Er. G V Akre	-	Chairman
2.	Er. S B Lele	-	Vice Chairman
3.	Er. V B Harani	-	Secretary
4.	Er. G P Shukla	-	Jt. Secretary
5.	Er. A N Makwana	-	Treasurer
6.	Er. R N Purohit	-	Member
7.	Er. N D Makwana	-	Member
8.	Er. K N Rathod	-	Member
9.	Er. P O Kulshrestha	-	Member

SPECIAL INVITEE TO THE EXECUTIVE COMMITTEE

Er. N. Dinker

ADVISORY COMMITTEE

1. Er. SM Takalkar
2. Er. NV Rede
3. Er. KG Shah
4. Er. GM Bahudhanye
5. Er. PA Shah
6. Er. MM Naik
7. Er. VB Kambad
8. Er. NC Solanki
9. Er. Nimil Baxi
10. Er. JN Pancholi
11. Er. NV Vaidya

OFFICE ADMINISTRATION COMMITTEE

1. Er. PO Kulshreshtha
2. Er. GM Bahudhanye
3. Er. NC Solanki

EDITORIAL BOARD

1. Er. SM Takalkar
2. Er. NV Rede
3. Er. KN Rathod
4. Er. N. Dinker

New members during the Quarter

Sr. No.	G.R. No.	Name	Member	Sr. No.	G.R. No.	Name	Member
1	2146	Patel Mayur	Student Member	12	2157	Trivedi Rajendrakumar P	Life Member
2	2147	Patel Hemilkumar M	Student Member	13	2158	Chauhan Krishna B	Life Member
3	2148	Chawda Harnish S.	Student Member	14	2159	Agravatt Asha M	Life Member
4	2149	Chokshi Harsh A	Student Member	15	2160	Patel Sanjaykumar R	Life Member
5	2150	Majmundar Mukesh P	Life Member	16	2161	Mistry Bhpendrakumar L	Life Member
6	2151	Nayak Sanjaykumar S	Life Member	17	2162	Naik Jignesh H	Life Member
7	2152	Parikh Ajaykumar	Life Member	18	2163	Basva Naveen K	Life Member
8	2153	Jayswal Sunil S	Life Member	19	2164	Bhumkar Sujit S	Life Member
9	2154	Parmar Hitesh K	Life Member	20	2165	Patel Dhirubhai B	Life Member
10	2155	Purohit Bhavin R	Life Member	21	2166	Doshi Paresh N	Life Member
11	2156	Trivedi Hasitkumar P	Life Member				

Coverpage Theme : National Stadium (Solar) Taiwan

From The Chairman's Desk

Dear Readers,

The year 2014 started with very spectacular event, Elecrama-2014 which is world's largest exhibition of electrical and electronic products held during 2nd week of January in Bangalore. About 970 numbers of exhibitors from India and other countries participated in this exhibition which covered the area of more than 70,000 Sqm. in world class exhibition center, BIECO.It attracted thousands of visitors from electrical industry and relevant sectors from India and abroad.It showcased products from T&D sector to industrial electronics manufactured in India and abroad. The objective of ELECRAMA exhibitions is to showcase to the world the capabilities of Indian manufacturers to offer reliable and globally competitive product using modern technology. ELECRAMA-2014 is successful in providing platform to promote "Made-in-India" brand to the world in true sense.

ELECRAMA also held number of seminars concurrently like TRAFOTECH, CIGRE Technical Session, High performance conductor, Buyer-Seller meets, T&D Conclave etc. Since last few years, ELECRAMA has undertaken special initiative towards unleashing the creative potential of students and youths by allotting large space for exhibiting their projects and innovations. This event known as Engineer Infinite 2014, received overwhelming response from students with more than 1800 entries out of which 74 were displayed and demonstrated.

ELECRAMA exhibitions are being organized by IEEMA which is representative organization of electrical and electronics manufacturers in India. It was founded in 1948 and today it is representing more than 800 members who are contributing more than 95% of total generating capacity in India.IEEMA's main aim is disseminating information on government policies, representing views of industry to the government, evolving price variation clauses for products and circulating their price indices. It formulates industry standards, and conducts many technical activities like seminars workshops, trainingprograms, publishing monthly IEEMA Journal apart from many other technical and commercial publications. It is also a part of committees and councils formed by the Government and actively participate in implementation of R-APDRP and RGGVY and formulating BEE etc. It helps members in developing business opportunities in international trade by interacting with overseas counterpart associations and organizing delegation visits in other countries for promotion of export.My active involvement with IEEMA as chairman of Instrument Transformers Division, provided me excellent opportunities to participate in many useful activities in technical and commercial field in the country.

Power industry is growing with phenomenal speed in India to cater for the energy requirement for economic development of our country. Our engineers are greatly contributing their expertise in the growth of both these sectors and IEEMA provides great opportunity for student engineers to display their practical applications and innovations. Power engineers must visit exhibitions like ELECRAMA regularly, which is organized every alternate year, for better exposure to the modern technology in T&D products which is likely to result into enhancing their knowledge and ability in power engineering field.

Thanking you,

GV Akre
Chairman

Editorial

For the last couple of years, the country has witnessed economic slowdown. This has resulted in to retardation of infrastructure development. The slowdown may be due to political reasons or international market trends. In spite of the slowdown, it is accepted that ours is one of the fastest growing economies. The Governments in India had realized in the last decade of 20th century that power sector is the most important amongst all the infrastructures for the speedy growth in the economy. The power reforms were given top priority. Unbundling of power utilities,power business by private players and power trading are few steps which were suggested by international funding agencies and ultimately implemented in most of the parts of the country.

Accelerated growth of the power sector needed very large technical manpower. Thus, the first decade of this century witnessed mushrooming of engineering colleges by the private entrepreneurs. The campus interviews and placement was rampant. There was a competition to hire the fresh talent from engineering colleges. There was really a shortage of fresh

qualified engineers, leave alone the experienced one. This further enthused the private parties to set up new engineering colleges. The senior professors and readers from Government and trust owned colleges, who retired around this time, were in bad demand to head the departments in private engineering colleges.

The sudden growth of the private engineering colleges brought down the percentage level for admission under the management quota and the general quota. The donation amount to be paid to the management of the self financed institutions escalated. The amount of donation was inversely proportional to the percentage scored by a student at 10th or 12th examinations.

The craze for engineering education increased multifold. Amongst the engineering branches, the most sought after was Information Technology (IT) and the Computer Science. The IT related out sourcing from USA and other Western countries, added fuel to the fire. The supply and demand of qualified man power were proportionate till the year of 2008. Most of the pass outs were absorbed in campus interview or otherwise. The scenario started changing thereafter. The campus interview came on low key. The students with less percentage at the final year started setting with lower pay packages. The recession in USA and the European countries also impacted the job market.

In the last 2-3 years, the employment prospects of Degree and Diploma holders have been extremely bleak. The passing out students do not find any job even when they try to settle for the salary which is much below the income of a daily wage earner. Retardation of growth engine has cast a shadow on job opportunities. The boom in employment prospects seen in the year 1998-2005 had put the employer in the defense mod. The table has now turned the other way now.

However, this situation is likely to change with Indian and International economy showing the sign of recovery. If the statistics of National Planners is to be believed, the infrastructure development during 12th& 13th five year plans may need huge manpower. The present rate of Engineering Graduates/Diploma pass out per year may fall much short of the actual requirement. Even skilled/unskilled labours and ITI certificate holders are likely to receive good pay packages. The changing political scenario in the country may add one more dimension to the good employment prospects.

What is expected from the technical institutions is the quality education through expert faculties, good laboratories and industry oriented syllabus. Continuous interaction between the academy and the industry is likely to take a call on the quality employment to the fresh engineers.

- Er. SM Takalkar

COMING EVENTS

1. The Vadodara Chapter of Indian Geotechnical Society (IGS), with the support of SPE (I) Vadodara have organized a 2-Day Seminar on the topic of "Geotechnical Considerations for the design of power equipment foundations'' at I.G. Patel Auditorium, Faculty of Social Works, M.S.U., Vadodara on 6&7 June 2014. The civil engineers of power utilities (Public/private) should participate in the seminar. For further information Er. SM Takalkar (Mobile No 9925233951) or SPE (I), Vadodara office may be contacted.
2. SPE (I) Vadodara has organized a 2-Day National Seminar on the topic of "Substation Design, Engineering and Construction" on 10th & 11th October 2014 at "APPUSON Banquet" Akota, Vadodara. This is perhaps one of the biggest events being organized by SPE(I) Vadodara Chapter. The seminar is supported by CBI&P, New Delhi. GETCO is a knowledge partner. For further information, contact Er. VB Harani Mobile No.09925238450 and Er. SM Takalkar Mobile No. 9925233951 or the office of SPE(I) Vadodara.

CHAPTER'S ACTIVITIES

1. On 10 Feb 2014, the chapter organized a lecture on the topic of Power Quality & Solutions. The speakers were 1. Mr. Suraj Dodeja, Director, Vashi Electricals(P) Ltd. and 2. Mr. Jagtap Babajeeh, Sr. Manager (Power Quality) Emerson Network Power (I) Pvt. Ltd. The lecture was informative. There was good interaction during and after the lecture.
2. On 03 Apr 2014, the chapter organized a lecture on the topic of "Electric Traction". The lecturer was Er. CG Ramatirth (Life Member SPE (I), Vadodara) Retd. Divisional Engineer. Western Railway. He was supported by Er. Kaushik Dharwadkar, Trainee Engineer, Takalkar Power Engineers & Consultants Pvt. Ltd. (TPEC). Er. Ramatirtha gave detailed account of Electrical, Mechanical and Pneumatic system of Electric Locomotives. Er. Kaushik Dharwadkar presented live Demo of Locomotives in action. Er. Ramatirtha also described in detail the circuits and protection system in the engines and bogies. The lecture received very good response which was evident from the questions from the members.

Interview of Er. PN Trivedi

Er. Pravinchandra Narmadashankar Trivedi born on 23rd March 1943 at Bhadi Bhandaria, district Bhavnagar. He had his primary schooling at Bhandaria and Secondary Schooling at Alfred High School, Bhavnagar. He did his DME & DEE in 1967 at BPTI, Bhavnagar and completed his BE(Electrical) in 1978 from Kalabhavan, MSU, Vadodara. He has five brothers and three sisters. Having born to a teacher couple, proper qualification was always a top agenda of his family.

Er. Pravinchandra is fond of agriculture, swimming, wrestling and Malkhamb. He is a trainer for these activities. Cooking is one of his hobbies. Simple living and high thinking is his way of life. He has contributed a lot to the development of young engineers and still doing it. Er. Pravinchandra Trivedi, in an exclusive interview with Er. SM Takalkar and Er. MG Mehta, reveals some finer aspects of his career as an engineer.

INTERVIEW

Q-1: You are an Alumni of Kalabhavan Electrical & Electronics Engineerss' Alimni Association. What are your memories of Student Life?

Ans.-1: During my persuation of Diploma in Mechanical / Electrical Engineering my only dream was to achieve a Degree in Engineering i.e. Graduation from Kalabhavan, M.S.U., Baroda which was also a life motto of my parents. So while serving at Amul Dairy, Anand and subsequently at IPCL, Vadodara, I put-up lot of efforts and faced hardships. But ultimately I got the Graduation in Engineering from M.S.U., Vadodara in 1978.

Q-2: What are the professions persued by you after graduation and which one you rank the best in terms of achievements?

Ans.-2: I served in Amul Dairy, Anand for about five years and then joined IPCL, Vadodara in 1972. During my stint at IPCL, being a graduate engineer, I was frustrated due to exploitation of engineers even in public sector and injustice in promotion policy. So I decided to achieve a higher position in the field of engineering and left IPCL and joined as a head of Electrical and instrumentation dept. of M/s Gujarat Carbon Ltd. in 1978 and subsequently became Chief Engineer at M/s Gujarat Spinners Ltd., Rajpipala in 1983. Thus I got satisfaction of achieving highest engineering position of reputed organisation / company. During 1978 to 1983, I also served at Dinesh Mill, Ankleshwar.

Q-3: What prompted you to start Trivedi & Associates Company?

Ans.-3: Being an unlimited dreamer, I had a dream to establish my own engineering company. After putting up 21 years of services in diversified industries and gaining wide experience, I decided to become entrepreneur and started my own venture namely M/s Pratibha Engineering Services (proprietary firm) at Vadodara on 01.03.1988 and started providing engineering services in the field of mechanical and electrical engineering.

Prompted by a serious industrial accident which occurred in 1985, GoI constituted a law under which statutory inspection, testing and certification of factory equipment was made mandatory for all the industries as a safety measure. So to serve my engineering fraternity and industries and spreading technical knowledge and awareness about safety and statutory obligation / requirements, I launched M/s Trivedi & Associates, a proprietary firm in 1992 and commenced rendering honest, prompt and quality technical services to the industries under factory act, explosive act, petroleum rules, electrical safety act. etc.

With all ups and downs and by putting up very hard work, company made an impressive progress and "M/s Trivedi and Associates" was converted into a private limited company in 1999.

Q-4: M/s Trivedi & Associates Technical Services Private Ltd. have completed 25 years recently. What are the major jobs done by your company which satisfied you most in terms of technicality?

Ans.-4: Technical services were provided to the industries of Gujarat and India as well under factory act and rules. We earned a very good reputation as a prompt, honest and quality technical service provider amongst multinational companies, corporate sectors and public sectors. This satisfied me the most.

In this regard, with noble purpose to spread safety awareness, we organize frequent seminars and in-house training programmes on diversified topics at various locations of Gujarat. This is just a social gesture to payback the services to the industries, which I got from them and also to have some selfsatisfaction.

Q-5: You have published numbers of handbooks for the day to day use of engineering branches. Who were the architects behind this publication?

Ans-5: I had a dream to provide a handy technical data book and reference books to young engineers/supervisors and practicing engineers working on shop floor so that they can have a 'on hand' solution and ready reckoner for all their day to day technical problems.

During last ten years, we have published seven different reference books pertaining to field of mechanical, electrical, petroleum, explosive, safety, statutory provisions etc. To be honest this activity does not have any commercial interest. This is just to serve engineering fraternity, and for this all credit goes to sincere and concentrated hard work put up by our team of highly knowledgeable and experienced senior business associates. They responded nicely to my enthusiasm. I am very much happy that my directors and training division contributed support to this noble cause.

We have already launched quarterly newsletter of the company titled "Techno Trend" for free of cost circulation to our valuable clients and well-wishers, where in different

technical articles are included.

Q-6&7: What are your future plans of expansion of your company? What are the factors which inspired you to do lot of social work?

Ans-6&7: Over and above, being ISO 9001:2008 company, we have recently received accreditation from National Accreditation Board of Laboratories (NABL), New Delhi and authorization to train the industrial personnel in the field of safety and statutory requirements. And recently we also got the contract of third party inspection for micro irrigation system equipment in Kutchh and Saurashtra regions from M/s GRC of GoG. I am duly satisfied with my company's achievement and reputation earned. Now I would like to continue and concentrate to return and reciprocate to society which has given me a lot during my critical period of life. So it is time to pay back to society by way of social welfare activity in a spiritual manner by constituting a 'trust' for the same. This is my heartiest wish. Let us hope that I can fulfill it.

Q-8: What message would you like to give to young engineers?

Ans-8: My few words to young and enthusiastic generation of engineers and entrepreneurs:

"Be honest.... Be hardworking"

"Be ethical.... Be social.... Be spiritual....."

Slogan of my life: "Knowledge is Power and Work is Worship"

Thanks to one and all.

Energy Saving Tips for Air Conditioning Units

Air conditioners are used to evacuate heat from specific area called controlled area. Chill water plant, central ac plant and package units are used for big premises. For home and office small units of capacity 1 to 2 tones are mostly used. Earlier commonly used window units are now obsolete and split units are most common. Normally controlled area is closed and inside cold air is circulated in close loop. Now onward such controlled area shell be referred to as ROOM. Air conditioning units are used for small area like bed room, seating room, cabin, laboratory, etc.

Heat flow from higher temperature to lower temperature in natural course. But in this case heat is required to transfer from lower temperature area to higher temperature area and therefore has to be forced by some means. This is achieved by means of circulating refrigerant in closed path. By compression, refrigerant gets heated up to temperature higher than ambient and is sent to condenser where heat is thrown off to atmosphere by forced air by fan and the gas condenses to liquid. This liquid is allowed to expand (release pressure) when it cool down below the room temperature and sent to evaporator cooling coils. The air blower forces the air over cooling coils where refrigerant absorb heat from air and evaporate to gas whereas the air loose heat and cool down and is delivered in the room.

The whole process is similar to removing splashed water from the floor. House maid unfolds mop and spread over the water. Mop absorbs some water and then she takes it out and squeeze to release water. This process is repeated continuously so that water from floor is transferred outside. Refrigerant in air conditioner works as mop to absorb and release the heat.

Electricity supplied to air conditioner for its functioning is principally consumed by following three motors.

Compressor Motor: This motor is of highest capacity in the unit and consumes maximum energy. During the operation of air conditioner, this motor runs intermittently as per signal from thermostat.

Condenser Fan Motor: This motor drives fan having three or four blades that forces air through condenser coils to discharge maximum heat of refrigerant. This fan works only when compressor is working

Air Fan Motor: This motor drives blower that circulates cold air in the room. Comparative hot air is drawn from the top and forced to pass through evaporator (cooling coils) and after cooling delivered in the room. This motor runs continuously till air conditioner in on.

There may be very small motors for movement of louver for distribution of cold air as desired. These motors run as per requirement of operator but its energy consumption is insignificant.

The function of thermostat control is very important. Desired temperature can be set by operator. When room temperature falls below the set value, the supply to compressor and condenser fan is cut off and further cooling is suspended. As result of stoppage of these two motors, power consumption is reduced. Afterward when room temperature rises above the set value, the compressor and condenser motors are again started.

Thermostat temperature setting has an important role in economical operation of air conditioner. Start and stop of compressor and condenser motors are controlled by thermostat. When thermostat setting at lower temperature, compressor and condenser ON period is long and OFF period is short. Whereas when thermostat setting at higher temperature, ON period is short and OFF period is long. Power consumption of air condition unit depends on running period of these main motors. Higher the Run/Rest ratio of compressor, more is energy consumption

It is estimated that raising of temperature setting by 1^{o}C, results in reduction of about 2.5 % in energy consumption.

Ambient temperature in hot zone is uncomfortable and so also temperature in cold zone. Whenever temperature is abnormal, it can be brought in comfortable zone by operating

air conditioner. The comfortable zone may be in the range of 24^{0}C to 28^{0}C depending on metabolic rate of user. Very low temperature is uncomfortable and uneconomical and therefore undesirable. But practically some air conditioners are operating in cold zone as under.

When person from outside hot atmosphere enters the room and start air conditioner, he feels very poor cooling. Actually the body including clothes and accessories is at atmospheric temperature. Air conditioner has to draw out all this additional heat also and therefore it may take little time. But due to impatience and ignorance the temperature setting is reduced to minimum. In fact, cooling cannot be fast by reducing temperature setting but it takes its own time as per capacity of the unit. Eventually lower setting continues and results in over cooling. Some air conditioners have facility of turbo cooling mode. This may serve the purpose for fast cooling but care has to be taken to switch to normal operation once cooling is achieved. As far as possible setting should not be disturbed and kept at comfort zone only.

Other way is to start air conditioner in advance so that by the time of entry, room is already cool. This can be possible by instruction to watchmen/attendant/assistant to start the air conditioner before the time of arrival. Some air conditioners have facility of remote operation through device like mobile. This can be used for advance starting for pre cooling. However care should be taken not to start much in advance because it may be wasteful.

Almost similar situation occurs in the case of bed room. At the time of entry in the room, cooling seems to be insufficient. As usual temperature setting is kept minimum for fast cooling. At late night temperature drops and has to use blanket. Similar observation may be in air conditioned train. At the start, few passengers complain to attendant for insufficient cooling but at late hours most of the passengers are using blanket. Does it not seem to be ridiculous that on one hand to spent money for over cooling and on other hand face shivering and use blanket for protection? Such situations can be solved by pre cooling the bed room and using sleep mode that raise the setting in steps at late night.

Some users just start the air conditioner when required but unaware of significance and implementation of temperature setting. Therefore air conditioner runs on default minimum setting.

Increasing setting from 22^{0}C to 26^{0}C results in 10% saving of energy. In many cases, setting is at 18^{0}C or 20^{0}C. If this is revised to 26^{0}C or 28^{0}C, there may be energy saving of 20%. So the first and foremost tip is to have proper temperature setting.

Other energy saving tips are as under.

Installation: Internal unit should be installed in such a way that air flow is not obstructed. Air is taken in the unit from the top. There should be sufficient space at top and there should not be any decorative hanging etc in the air path that obstructs the air circulation. Cooled air is delivered from bottom. There should not be any cupboard, curtain, etc under the unit that obstruct the air path. Any obstruction can reduce air flow and result in less cooling. Ultimately to reach set temperature, compressor has to work more, requiring more energy. Also fan load increase due to obstruction in the air path and consume more energy.

External unit should also have the similar arrangement for free air flow. There has to be sufficient space on back and top of the unit. Location of the unit should be such that it may not be in direct sun ray during operation. Condenser unit has to reject the maximum heat of compressed refrigerant in atmosphere. Direct sun ray heat the unit and condensing may be partial. Mostly air conditioner is operated in afternoon and night and therefore external unit should preferably be on east side. However, due to practical constraint it is on west side, it should have shed to protect from direct sun ray in such a way that air flow is not blocked.

Heat Ingress: Air conditioners are used when outdoor is very hot. If this external heat enters the room, the machine has to draw out this additional heat also to attain temperature as per setting. This results in longer running of compressor consuming more energy. Therefore all efforts have to be made to restrict the entry of heat in the room.

If the room is on top floor, the terrace is heated by sun ray and this heat is conducted to the room. This can be avoided/minimized by painting terrace with white glossy paint, so that sun ray is reflected. Alternatively for better and lasting solution, white glassed tiles or mosaic with pieces can be fixed in terrace. Additionally shedding green net can be installed at about two feet above the terrace which may prevent sun ray striking and heating the terrace. The air trapped between terrace and net act as an insulation. Ceiling of the room can have thermocol lining as heat insulator or false ceiling made of plaster of paris or gypsum board. Air trapped between ceiling and false ceiling acts as an insulator.

Where the wall of the room is facing the west, it is heated by sun ray in the afternoon. This heat is conducted in the room and increase the heat load of air conditioner. The outer side of the wall can be painted with light color glossy paint so sun ray is reflected and heating is minimized. Wooden or thermocol lining can be provided on inside of the wall.

Window of the room having glass shutters and facing west can be covered with sun ray control film. Double glass (inside and outside) shutters will be better as the air trapped between glasses will act as thermal insulation. Additionally light colored cotton curtain on window is also helpful. Light color reflects the sun ray and air between shutter and curtain acts as an insulator.

Care is required to avoid intermix of cold air in the room and hot air outside. Any vent or gap in door/window/partition should be sealed to avoid transfer of air. Generally there is gap between bottom of door and floor. Strip of Door Seal available at hardware shop should be fixed. Door and window should

remain closed when air conditioner is operating. Door closer should be installed to avoid instances of open door by mistake. Air curtain or automatic door control (open close device) can be installed where frequent entry / exit is expected. Air buffer is better solution where feasible. It is intervening closet having two doors, one to the room and other outward. Doors are interlocked not to open simultaneously and may have door closers.

For bed room condition is different. Long period of about 6 to 8 hours is passed continuously sleeping when inattentive to any abnormalities in the room. Air condition running with minimum setting and without sleep mode may cause over cool during last segment of the night. Blood may become thicker at low temperature requiring more pressure for circulation. Also due to breathing of occupant oxygen is consumed and carbon dioxide is released. In totally sealed room proportion of oxygen reduces and that of carbon dioxide increases. Condition may be worst during last segment of the night and may be harmful for occupant. Therefore intentional slit has to be provided to maintain proportion of oxygen and carbon dioxide by diffusion through it. This is more relevant to those having cardiac and breathing problems.

Doors and windows of the car have rubber lining and hermetically sealed. The volume of air in car is very less as compare to room. Number of occupants may be up to 5 as against 2 in bed room. Air conditioner is operated in air circulation mode and windows are close for better cooling. In long run oxygen and carbon dioxide proportion is disturbed due breathing of passengers. Even though comfortable temperature and seating condition, passengers may feel weary. Therefore while on long run it is important to change from circulation mode to fresh air mode for 1 minute at every hour.

Capacity of air conditioner depends on air volume (room size), numbers of occupants (persons in the room) and heat load (heat ejected by gadgets in room). In case capacity is less than needed, cooling as required, is not achieved and compressor runs continuously without rest. Similar condition occurs where room is open to kitchen, other room or up stair.

Maintenance: Air filters of internal unit should be cleaned periodically. Reverse air flow through condenser and evaporator coils by vacuum cleaner is required to remove any deposition and blocking. Any blocking may restrict air flow, resulting in less heat transfer and lesser cooling and longer compressor operation.

Occupancy sensors are useful to avoid wasteful running of air conditioner in absence of occupant. Iron or hot plate / stove should not be used in the air conditioned room. It has dual disadvantage. It adds undue heat load increasing energy consumption. Part of the heat generated by iron or hot plate is taken away by air conditioner and hence iron or plate takes more time consuming more energy. Stove consumes oxygen and emits carbon dioxide in the closed room.

Up to 30% energy saving is possible by adopting applicable measures as above.

Primarily above measures are useful for energy saving and cut in electricity bill. At the same time it will be contribution towards saving of scarce entity like electricity and also indirectly instrumental in the control of Green House Gases and thereby Global Warming.

Now air conditioners have star rating by regulation. Bureau of Energy Efficiency (BEE) the regulating authority has implemented star rating and corresponding Energy Efficiency Ratio (EER) as under.

New BEE Energy Efficiency Ratings (EER) for Room Air Conditioners

STAR RATING LEVELS - Jan 1, 2014 - Dec 31, 2015

EER (W/W)

WINDOW AC			SPLIT AC		
Star Rating	Minimum	Maximum	Star Rating	Minimum	Maximum
1 Star ★	2.50	2.69	1 Star ★	2.70	2.89
2 Star ★★	2.70	2.89	2 Star ★★	2.90	3.09
3 Star ★★★	2.90	3.09	3 Star ★★★	3.10	3.29
4 Star ★★★★	3.10	3.29	4 Star ★★★★	3.30	3.49
5 Star ★★★★★	3.30	-	5 Star ★★★★★	3.50	-

Cost of higher star rated unit is more but the additional cost is recovered as saving in electricity bill.

One ton equals 3515 watts cooling capacity.

Power consumption = cooling capacity ÷ EER

For 1.5 ton 5 star unit, power = 3515×1.5÷3.3= 1598 Watts =1.598 Units per Hour

For 1.5 ton 1 star unit, power = 3515×1.5÷2.5= 2109 Watts = 2.109 Units per Hour

Sample calculation for cost-benefit analysis

Case 1: selection of 1.5 ton 5 star unit for bed room.

Let us presume that the cost difference of 5 star and 1 star unit of same capacity and quality is Rs 8000

Equipment life span is taken as 10 years. Hence flat depreciation at 10%.

Interest rate of capital 10%

Energy charge Rs 6.5 per unit

Annual charges for additional cost=8000×(10+ 10) = 1600

Usage in bed room

Noon from 12 Hrs to 17 Hrs = 5 Hrs

Night from 23 Hrs to 07 Hrs = 8 Hrs

Total = 13 Hrs
Annual utilization 140 days (summer + period between end of monsoon and start of winter)
Annual saving on energy bill = (2.109-1.598)× 13×140×6.5= Rs 6,045 per year.
Annual Net Saving= 6,045-1,600=Rs 4,445 per year
Additional cost of Rs 8,000 is recovered almost in 2 years. Hence acceptable.
Case 2: selection of 1.5 ton 5 star unit for guest room.
Usage in guest room
Night from 23 Hrs to 07 Hrs = 8 Hrs
Annual utilization 25 days (summer+period between end of monsoon and start of winter)
Annual saving on energy bill = (2.109-1.598)× 8×25×6.5 = Rs 664 per year.
Annual Net Saving=664-1600=Rs -936 i.e. Loss per year.
Additional cost of Rs 8,000 can not be recovered. Hence not acceptable
Air conditioner is the highest energy consuming gadget as compared to geyser and fridge and has scope for energy saving up to 30% as above. Maximum benefit can be availed by implementing applicable measures as discussed.

Er. N. D. Makwana
nd_makwana@yahoo.co.in

Random Thoughts

- N. Dinker

Who is the Messiah? Where is he?
How to get him?

(Our country is at crossroads now; it is passing through a Crucial phase. A paradoxical situation prevails; though blessed with various enormous resources, enviable to others, it is beyond the reach of common man. Though started well in its initial growth and development, same or other, down the lane, the country has lost all its moorings and direction. A State of helplessness prevails as the common man finds it difficult to get his requirements met, unless some irregularities are committed. The country's one of the noble saying 'Satyam evaJayate' has to be brought back in practice, which is otherwise now. 'Truth' is the foundation on which the edifice is to be built. Who, where and how this will be done, time only can tell. However, it is beyond an individual. He can only be a Catalyst; this is possible for the individual, only with a coordinated connectiveness with his colleagues and people.

A sample story narrated below illustrates as to how a coordinated activity can achieve good results. Hope we will be able to achieve this.

Life has all the ingredients

A young boy left his home in search of Truth. He met many people; he became richer in awareness of his ignorance. Since people went to forests to meditate, he too went to a thick forest. He did not know how to mediate so he screamed at the forest to give him knowledge. For years his only mantra was screamings at the forest to give him knowledge. He believed that if you are committed, you will get an answer to your problem.

One day, a monk, came to him. He asked "What do you want, my son? I want to know what the meaning of life is,' he replied "Go to the town. The first three persons, that you meet will give you the meaning of life," the monk replied.

The boy went to the town. The first man he met was doing carpentry work. The next man he met was doing sheet metal work. The third man he met was making strings. Disappointed, he sat on the bank of river. Suddenly, he heard the sweet strains of violin music. Something mysterious touched him. He suddenly got the answer, he was looking for and he started dancing.

The carpenter was preparing the wood for the violin. The sheet metal worker was preparing metal for the strings and the strings were meant for the violin. Life has everything; all you need is to be able to connect the dots. You need to work out new combinations.

And for that you need creative perception.

[How true it is for the country which has all the resources.]

Quote for the day

- Management is doing things right, leadership is doing the right things.
- Knowledge is a process of filing up facts, wisdom lies in its simplification.
- Pain is inevitable. Suffering is optional.
- When you are feeling your worst that's when you get to know what your values are.
- We often take for granted the very things that most deserve our gratitude.
- When you are for perfection, you discover it is a moving target.
- There are three ingredients in the good life: learning, earning and yearning.
- Success is falling nine times and getting up ten.

It matters in life

- Better be careful about what you like to get in life; otherwise you will have to like what you get in life.
- If you have love in your life it can make up for a great many things you lack. If you don't have it, no matter, what else there is it is not enough.
- The most honorable journey you can ever take is the journey from being wrong to being right.
- People say that "no sorry" and "no thanks" in friendship or in a relationship. But the reality is that these two words actually save the relations.

RAM SETU; HEY RAM

(An interesting article is reproduced below which vividly and in a humorous vein, brings out the present day life in the country, made complicated, though not intentionally, by authorities with complex Rules & Regulations, over a period of time. Hope the Readers will enjoy the article.)

The Lord Surveyed the Ram Setu and said "Hanuman how diligently and strenuously you and your VanarSena built this bridge several centuries back. It is remarkable that it has withstood the ravages of the climate and geographical changes over the centuries. It is indeed an amazing feat especially considering the fact that a bridge in Hyderabad built by Gammon using the latest technology collapsed the other day even before they could stick posters on the pillars."

Hanuman with all humility replied. "Jai Sri Ram. It is all because of your grace. We just scribbled your name on the bricks and threw them in the Sea and they held. No steel from TISCO or Cement from Ambuja or Binani was ever used. But lord, why rake up the old issue now?"

Ram spoke, "Well, Hanuman, some people down there want to demolish the bridge and construct a canal. The contract involves a lot of money. They will make money on demolition and even move on construction."

Hanuman humbly bowed down and said why not we go down and present our case?

Ram said "Times have changed since we were down there. They will ask us to submit proof of age and we don't have either a birth certificate or school leaving certificate. We travelled mainly on foot and sometimes on bullock carts and so we don't have a driving license either. As far as the proof of address is concerned, the fact that I was born in Ayodhya is itself under litigation for over half a century. If I go in my traditional attire with bow and arrow, the ordinary folks will recognize me but SIBAL may take me to be some tribal and admit me in an IIT under the reserved category for learning how to construct a bridge. Also, a God cannot walk in, dressed in a three piece suit and announce his arrival. It would make even the devotees suspicious. So it is a dilemma so to say."

Hanuman said, "I can vouch for you by saying that I personally built the bridge." "My dear, Anjaniputra, it will not work. May will ask to produce the layout plan, the project details, approval, Municipal Building permit, excavation permit, the name of the Contractor who built it, his financial status, how the project cost was met and its completion certificate. And who inaugurated it? Nothing is accepted now by these people in India without a certificate or documentary evidence. You may cough but under a doctor certifies it, you have no cough. A pensioner may present himself personally but the authorities do not take it as proof. He has to produce a life Certificate to prove that he is alive. It is that complicated."

"Lord, I can't understand these historians. Over the years you have given darshan once every hundered years to saints like Surdas, Tulsidas, Saint Thyagaraja, Jayadeva, Bhadrachala Ramdas and even SantTukaram and still they disbelieve your existence and say Ramayana is a myth. The only option, I see is to re-enact Ramayana on earth and set the government records straight once for all."

The Lord smiled, "It isn't that easy today. Ravan himself is apprehensive that he may look like a saint in front of today's politicians. I also spoke to his mama Mareecha, who appeared as a golden deer to tempt SitaMaiyya. When I was in the forest and he said that he won't take a chance of stepping on earth, so long as Salman Khan is around.

----(Courtesy:P.R.Shenoy, SGS Sabha News.)

Amazing, Incredible India

- The largest epic in the world, is 'Mahabharat', which contains more than 1.8 million words, spread over 74,000 distinct verses. It covers a great deal of subjects, ranging from simple history to complex philosophy.
- The KumbhMela is the world's largest gathering of pilgrims and tourists at an event that witnesses a massive out pouring of faith. An estimated 12 million people visited the MahaKumbhMela at Allahabad in 2013.
- Indians have a passion for gold, and India is the world's biggest gold buyer, and the world's largest market for gold.
- India leads the world in the amount of remittances it receives from Indians working abroad, India received a whopping $ 71 billion in remittances from Indians living and working in other countries in 2013.
- Takshasila in Ancient India is believed to be the oldest university in the world. It existed more than 2700 years ago.
- The village of Mawsynram is renowned for being the wettest place on Earth. It receives an awesome 11,872 mm. of rain annually, beating Cherrapunji, which receives 11,777 mm to the first place.
- The Indo-Gangotri, Brahmaputra plain is the largest alluvial plain in the world.
- India has the most number of cattle in the world. Estimated to be about 1.3 billion cattle world wide, of which India has 400 million. India has around 55 % of the world's buffalo population,
- India ranks first in the World in fruit production, providing about 8 % of the world's fruits. India is the second largest producer of Vegetable and accounts for about 15% of the world's vegetables.
- Almost 85 % of the world's Jute comes from the Ganges delta, making India the largest producer of Jute in the world.
- Hero Motor Corporation Ltd. based in India, is the world's largest manufacturer of two-wheelers.
- India has established the world's largest Solar Cooking System to serve 15,000 pilgrims daily at the Tirumala temple in Andhra Pradesh. Now, an even bigger new system has been installed at the shrine of Saibaba in Shirdi. It can feed upto 20,000 people a day by generating some 3500 kg. of steam daily.

Continued on : 12...

Special Protection Scheme on Mixed Transmission Technology

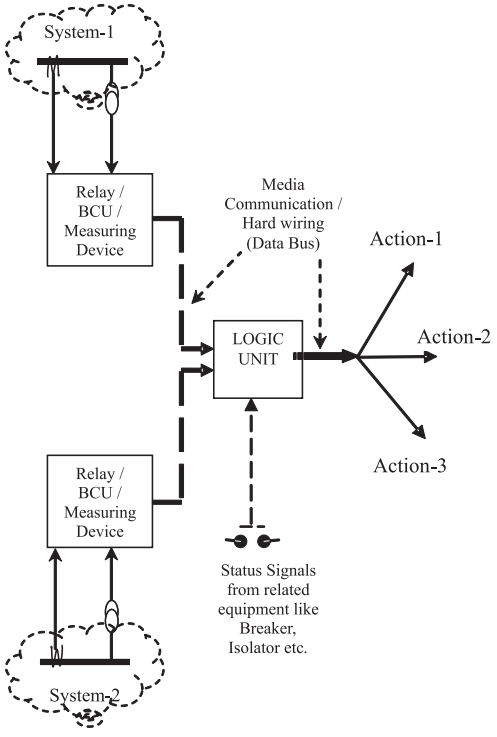
Uday Trivedi
Protection Automation and Metering
Adani Power Limited, Ahmedabad
uday.trivedi@adani.com

1. **BACKGROUND:** During last decade or so, world over, there has been unprecedented growth in Power Generation, Transmission and Distribution technologies and practices; more so in developing countries in line with qualitative variations and quantitative leap in loading patterns. Conventional &unconventional sources are being integrated in increasingly vast grids. Innovative technologies are developed and being used with an aim to seamlessly integratethese sources to loads. Transmission systems with Switchable/Non Switchable reactors, Fixed/Variable series capacitors are being used enhancing capabilities and reliability of the interconnections. Asynchronous mode of interconnection,like the HVDC systemsare used for interconnecting large grids and transmit more power over long distances.
2. **INTRODUCTION:** Traditionally, the protections are designed to protect an equipment or group of equipments; lines and 'zones'. These protections are designed with clear objective of detecting the 'faulty' section or equipment reliably& selectively, and isolating the same selectively with required speed.

   With increasing interconnections and contingencies arising out of usage of 'mixed' technologies; additional requirement of looking differently in providing adequate protection arose; which can be termed as 'Special Protection Schemes'. Regulatory aspects & considerations brought additional complexities, necessitating the schemes to be designed and implemented accordingly.
3. **OBJECTIVES:** Special Protection Schemes are intended to achieve following possible objectives:
   a. Grid Stability: To facilitate stability of thetargeted network either by automatically reducing excess generation and / or shedding loads with required speed.
   b. To trigger automatic connection or disconnection of any element in the grid
   c. To meet requirements from regulatory & statutory bodies
   d. Any other requirements uncovered by 'conventional' protections.
4. **PRINCIPLE:** Special Protection Schemes are application specific and are designed on following criteria:
   a. Understanding of the application / demand
   b. Judging the parameter/s to be monitored and their thresholds for reliable detection for the application.
   c. The scheme has to be so designed as to avoid conflicts with other protections and control schemes
   d. Selecting the devices' from where the required parameters can be measured / monitored and captured
   e. Designing the logic based on parameters being monitored and actions to be taken.
   f. Using adequate medium to carry the control signals to targeted equipment and locations.
   g. Devising adequate mechanism to execute received command/s

   Following parameters can be monitored:
   1. Current
   2. Voltage
   3. Frequency
   4. Rate of change of frequency
   5. Impedance
   6. Rate of Change of Impedance
   7. Power (under power / overpower)
   8. Rate of Change of Power
   9. Direction of flow
   10. Status of equipment (Tripping, breaker status etc.)

   COMPONENTS: Following devices can be used to build the Special Protection Scheme:
   a) Relays (detection and monitoring of selected parameters)
   b) Control Cables
   c) Selector switches
   d) Bay control units / Data concentrators
   e) RTU's / PLCs'
   f) Communication networks
   g) Couplers



General Structure of SPS

5. EXAMPLES OF SPECIAL PROTECTION SCHEMES

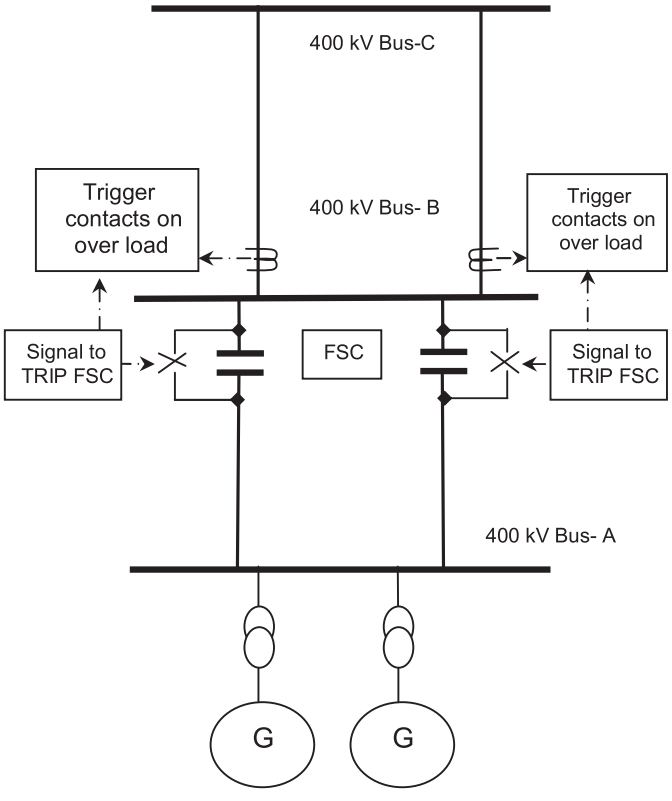
Special Protection Schemes, aimed to support Grid stability in case of any contingency, can be termed as System Protection Schemes. Some of the examples of System Protection Schemes are as following:

CASE I:

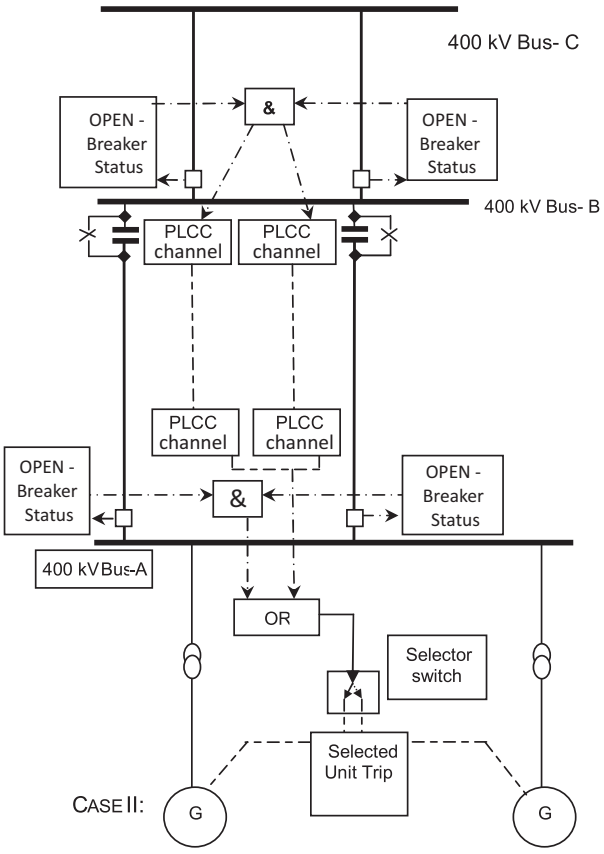
Requirement: To monitor overloading of lines emanating from a stronger source being offloaded to a weaker transmission passage beyond next bus.

The emphasis here; is to detect possible stress on the network rather than a particular line; thermal capability of the line conductor of the lines directly connected to the source is not the area of concern in this case. Reduction in source within required time is the need.

Scheme: Over current or Over Power function of the relay can be used to detect the overloading of each line at pre-selected stages of loading. Operation of any of these protection features will be directed to trip or reduce generation on selected unit/s.



SPS for FSC line overload to bypass FSC



SPS for FSC line trip to Trip Generators at Source

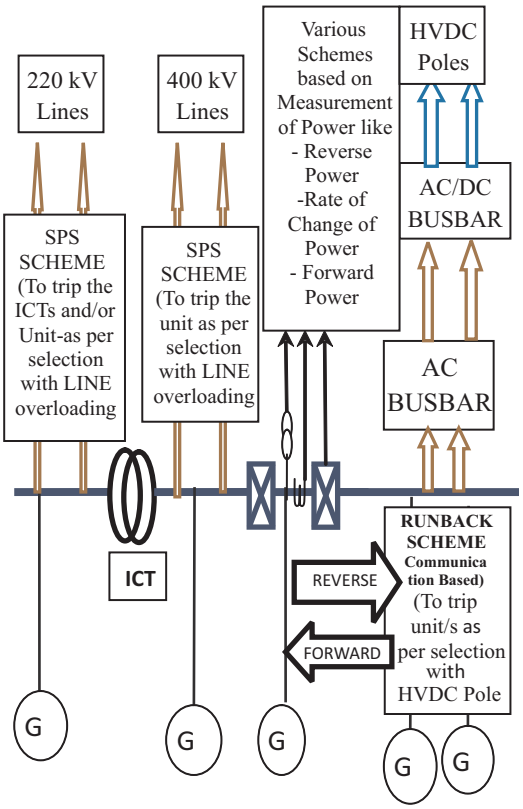
Requirement:Automatic Reduction of excess generation on tripping of transmission line, emanating from large generating source, inter-connectingtwo large networks while transmitting bulk power. Time critical action is to be ensured here to avoid excess generation being offloaded to the remaining transmission lines & possibly stressing the network connected to those lines.

Tripping of loaded HVDC lines interconnecting large generating station and HVAC networkat the other end can create severe contingencies at either ends.At source end, excess generation because of sudden load throw off of HVDC link may stress HVAC network connected to the generating station; while at the other end, HVAC network may become unstable because of higher demand against reduced generation. Tripping or backing down of the generation is required at the source end while load shedding action is required at the load end of the HVDC transmission line.

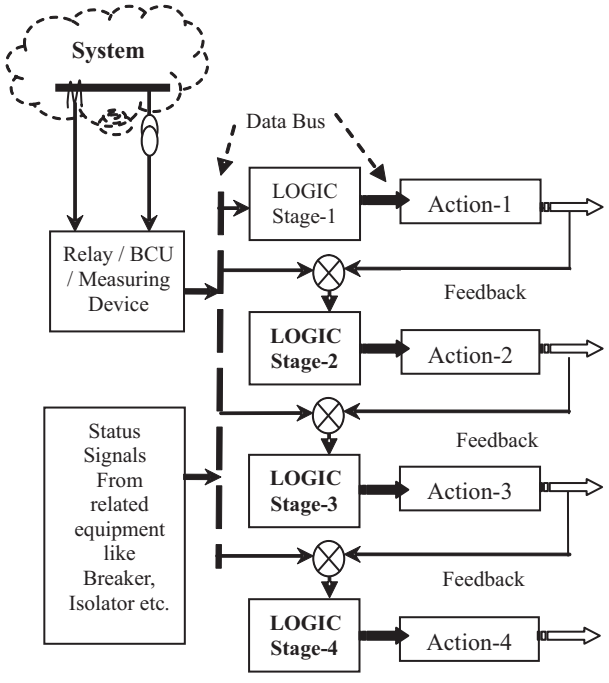
Scheme at Source end: Automatic action based on following information can be designed:

- Tripping of HVDC pole/s
- Pre fault load on HVDC link
- Laudability of HVAC lines connected to the generating station
- Available generation

Communication network can be used for reliable transmission of analog and digital information to the PLC or RTU where the appropriate logic can be built. Outcome the logic can be transmitted to respective relays / DCS for tripping of the unit or backing down the generation.



SPS for Mixed HVAC & HVDC



Multi Stage SPS Actions

Scheme at Load end: Logic triggered by pole trip signals and the pre fault loading can be developed to initiate different stages of load shedding action. Considering that the network is spread over large area involving many locations, the signals can be transmitted over Optic fiber cable network. Digital protection couplers can be used to transform electrical signals to communication signals at HVDC inverter station end and vice versa at sub-station end

EXAMPLES OF OTHER SPECIAL SCHEMES:

Schemes are also designed for certain specific applications; some examples of which are mentioned below:

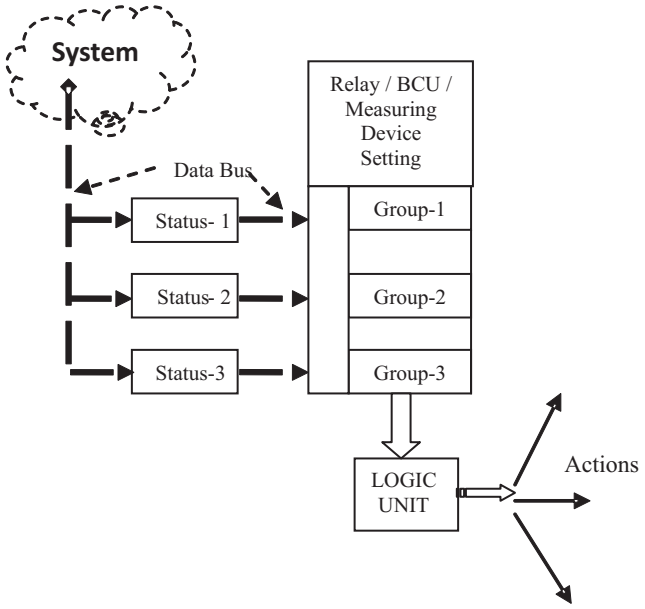
EXAMPLE I:

Requirement: Adaptive change in relay settings with change in network configuration.

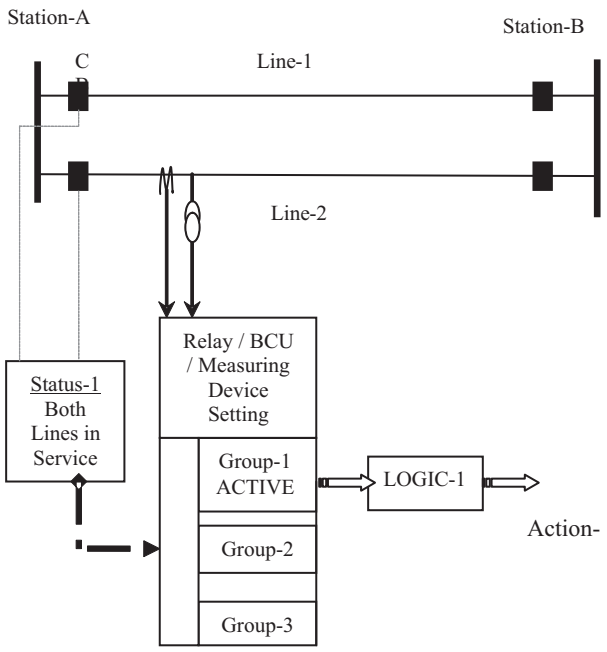
Conventionally, the relays adopt predefined settings for a particular configuration and for any change in the parameter or configuration of targeted equipment of zone; the required change in settings are triggered generally by manual intervention. Numerical relays offer multiple setting groups; with each group having different set of parameter settings to suit different configuration or network topologies.

Scheme: A scheme based on information of change in status of any of the associated network element can be developed to trigger automatic change in setting group, which are preconfigured to anticipated change in the network configurations.

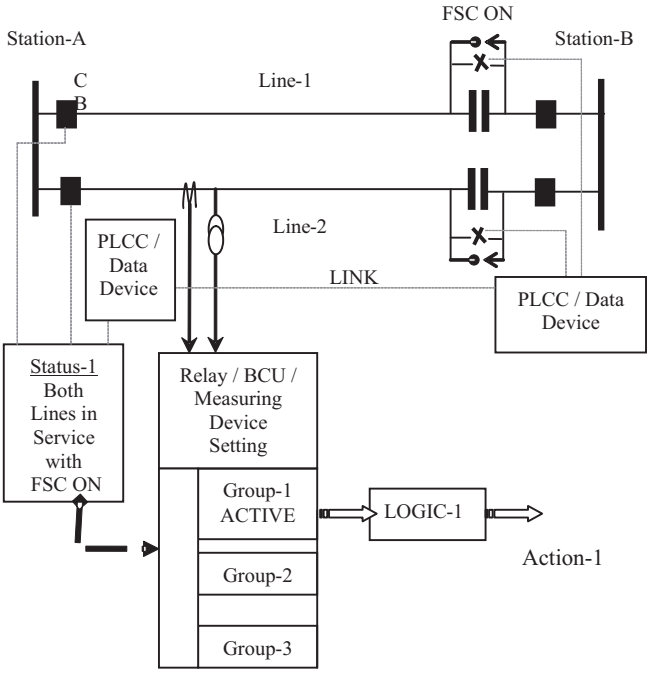
For an example, information about activation or deactivation of series capacitor at the remote bus can be used for automatic change in line protection relaysettings at the relaying end. Communication network like PLCC or Phasor Measurement Units with relevant communication link can also be used for transmitting the status information to the relaying terminal.



SPS Actions on Setting Group Change as per system status



Automatic Setting Group Change for Both Parallel Lines in Service



Automatic Setting Group Change for Both Parallel Lines in Service with both FSC ON

EXAMPLE II:

Requirement: Automatic disconnection of some of the elements from the system in certain contingencies.

Classic example here; is use of series capacitors in long transmission line/s to enhance power transfer capabilities. Though the Series capacitors are extremely useful here; it may create resonance conditions in certain network configurations; with possibility of sub-synchronous oscillations. Electrical proximity of the series capacitors with rotating machines can possibly create vibrations which can severely damage rotors of the synchronous electrical machines. It is critical to avoid such a possibility.

Scheme: A Special Protection Scheme can be designed based on:

(i) Detection of sub-synchronous frequencies or;

(ii) Estimated network configurations, which can be outcome of system study; to detect the possibility of sub-synchronous resonance conditions.

A logic so designed can then be used to bypass the series capacitor by using appropriate Relay or Bay Control unit and communication network to transmit the command to bypass Series Capacitor.

Continued from : 8...

- The highest peak in the world lies in the Himalayas. It is Mount Everest and it is over 8848 metres in height.
- The Indira Gandhi National Open University (IGNOU), the largest open University in the world was established in New Delhi in 1985.
- City Montessore School - also known as CMS, located in Lucknow, is today the world's biggest school with 47,000 Pupils, 1,000 Classrooms having 3,700 Computers, Staff of 3,800. The school was awarded the prestigious UNESCO Prize for Peace Education 2002, becoming the only school worldwide ever to receive this honour.
- The world's highest radio station is perched at an altitude of 3,596 metres above sea level in the Leh district of Ladakh.
- The Indian Postal network is the largest network in the world in terms of area covered and population served.
- Indian Railways is known to be the largest railway network in Asia and world's largest railway system under a single management.
- Bollywood's Kumar Sanu holds the Guiness Book World Record for the most number of songs recorded in a day - 28 in all.
- " AshaBhonsale, entered the GuinessWorld Records in 2011 for the most single studio recordings - 11,000 solos, duets and Chorus backed songs in over 20 Indian languages since 1947.
- Sri Ranganathswamy Temple, Srirangam occupies an area of 156 acres, making it the largest temple in India.
- One of the 'Rameshwaram Temple'scorridors (3,850 feet long) is reputed to be longest in the world. There are about 1,212 Pillars in the outer corridor, measuring about 30 feet from floor to ceiling.

LECTURE PROGRAMME ON ELECTRIC TRACTION

August gethering during lecture programme

Er. SM Takalkar facilitating Er. Kaushik Dharwadkar by presenting a memento. Others on the dias (LtoR) Er. SB Lele, Er. CG Ramatirtha. Er. VB Harani (extreme right) looks on.

LECTURE PROGRAMME ON ELECTRIC TRACTION

Er. SB Lele, Vice-Chairman felicitating speaker Er. CG Ramatirtha by presenting a momento.
Er. Kaushik Dharwadkar (extreme left) and Er. VB Harani, Secretary (extreme right) look on.

Speaker Er. CG Ramatirth explains working of Electric Locomotive

Printed Matter

Book - Post

To _____

_____

_____

From :
The Society of Power Engineers (India)
Vadodara Chapter
FF-48, Avishkar Complex,
Old Padra Road, Vadodara - 390 007.

Printed by : Manish Art, Pratapnagar Road, Vadodara & **Published by : Er. SM Takalkar** for Society of Power Engineers (I) Vadodara Chapter