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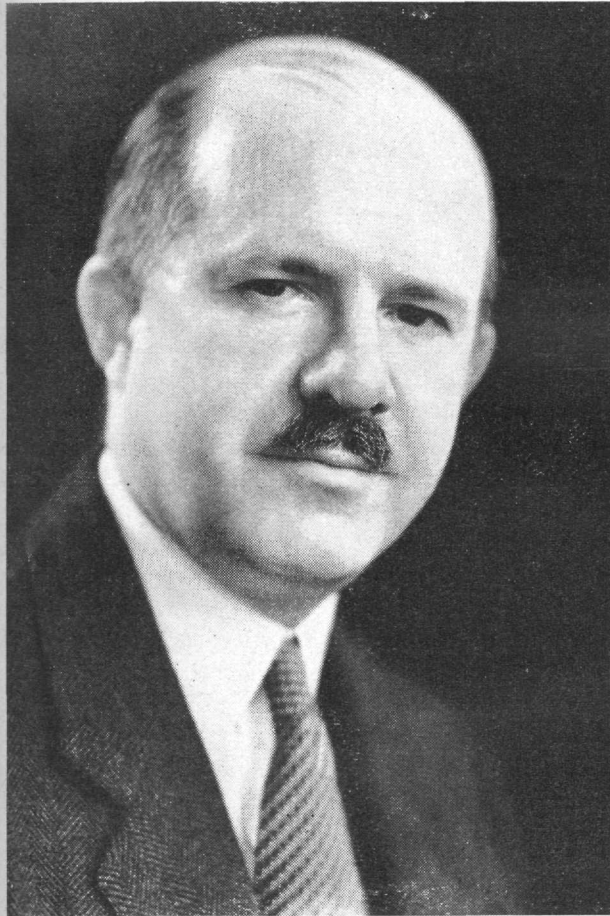
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# LEADERSHIP IN ENGINEERING

John A. Borman, Weld.E.III

*Based on a speech by Dr. A. R. Stevenson, delivered to the Ohio State University student branch of the American Society of Mechanical Engineers and on a paper written by Dr. Stevenson*



In order to determine what further educational benefits industry should desire for its employees who already have a college education, it might first be well to state the fundamental purpose of industry which is: To make more goods for more people at less cost and to maintain sufficient profits so that new products can be financed. For these employees industry desires the following additional educational benefits.

## Courage and Vision

Our country needs courageous leadership which will develop and exploit new and unusual projects and be willing to make an educated gamble. A college team which does not have the courage to expect to win is very unlikely to win the game; military leaders have always realized the importance of enthusing their troops to expect victory.

It is adventurous leadership which has made America great in the past and will be needed to preserve us economically as well as politically from the competition of the dictatorship countries.

In the individuals' range, courage to venture with confidence into unknown fields is one of the first requisites for leadership in industry and engineering. For the young engineer, industry often tries to build such confidence by making him responsible for the testing of large expensive equipment.

Courage must be included among the qualities to be developed. It is not what a man knows but what he can accomplish that counts.

## Responsibility

A man must feel a real responsibility for his work. One way to develop it is to give young men a chance to be responsible in small things where they can get the thrill of succeeding. It must be remembered that where there is no authority, there is no responsibility.

## Character

The importance of character is so universally recognized that it is an assumed necessity for the successful conduct and completion of any enterprise. In

Dr. Stevenson is staff assistant to the General Electric vice-president in charge of engineering, Schenectady. He was born at Schenectady in 1893. After obtaining a C.E. degree from Princeton in 1914, he returned to Schenectady to earn his M.S. and Ph.D. from Union College. Then in June, 1917 he formally made his debut with the General Electric Company. But he soon found himself test officer, U. S. Air Service, at Langley Field, Hampton, Va.

Following this he was chief of the radio and electrical section of the Air Service in Paris, and then flying officer at the experimental field, technical section. In 1919 he returned from France and entered the industrial engineering department of G.E. In 1923 he became a member of the engineering general department, later being appointed to his present position.

Dr. Stevenson started and has since conducted the advanced course in engineering presented by the company.

developing this trait most large corporations use the old axiom that people tend to become what you think they are, and the assumption is readily made that every one is honest.

#### **Energy and Willingness to Work**

Genius has been defined as "an unlimited capacity for hard work". This is not a complete definition but it does emphasize an important point. Almost all great men such as Lamme, Westinghouse, Carnegie, and Edison were hard workers. It has been said that "inspiration is mostly perspiration".

#### **Personality**

The young engineer cannot liken himself to Robinson Crusoe and live with the assumption that he need only change the personality of his man Friday and not his own personality. However, he should not be constantly changing his personality to please his co-worker but rather try to constantly improve so as to meet, on equal grounds, the attitudes of all co-workers both present and future.

Some people say that men change and must be taken as they are, but they are wrong. Even older men improve considerably in personality with proper encouragement and supervision. It is obviously easier for a young man to change his ways than for the older "die-hard". Love or religion should not be the only motives for personality changes, but happiness in one's work, security in one's profession, and ability to cooperate with others should be equally influential in correcting and improving personality.

Likes and dislikes are largely intuitional. If one likes and respects one's associates, the feelings will probably be reciprocated. It is said that an organization reflects the personality of its leaders. If the leaders are polite and considerate to everyone, the young men absorb the same attitude. The engineering profession strives constantly to attract young men with not only technical ability but the naturally outstanding personalities for future leadership.

#### **Common Sense**

It is so easy to go astray. A man should always be trying to get a perspective, a sense of proportion, a sense of humor. A man must know many things outside his own specialty in the proper proportions. Sometimes it is hard to see the forest for the trees. One should usually try to guess ("estimate" in the language of the engineer) the answer to a problem before trying to calculate it. Every answer should be examined in the light of common sense. In this way, bad slips in elaborate calculations can be detected.

Amazing solutions of problems are credited to the sub-conscious mind. No thinking mechanism, however, can produce accurate results from inaccurate or wrong data. If vague or incorrect information floats into the subconscious mind without challenge, it pops up years later, warping the judgment. The people

with the best common sense and intuitional judgments are those who make a habit of challenging new information and at least briefly examining its verity before letting it slip into the storehouse of the mind.

If one is thoroughly familiar with a few fundamentals, it is often easy to decide quickly on the probable accuracy of various statements.

#### **Ability to Think for One's Self**

Like other desirable traits which are attainable by deliberate cultivation of habits, the ability to think for one's self can also be developed. Each logical sequence, regardless of its complicated nature, can be broken down into simple steps that can be easily understood. If a man takes anything for granted because the book says so or the teacher says so, the ability to think for himself becomes endangered.

It is often necessary to take some other person's word for something but, before storing the information away in the pigeon-holes of the mind, it should be tagged with a label "second hand and subject to question".

#### **Ingenuity and Inventiveness**

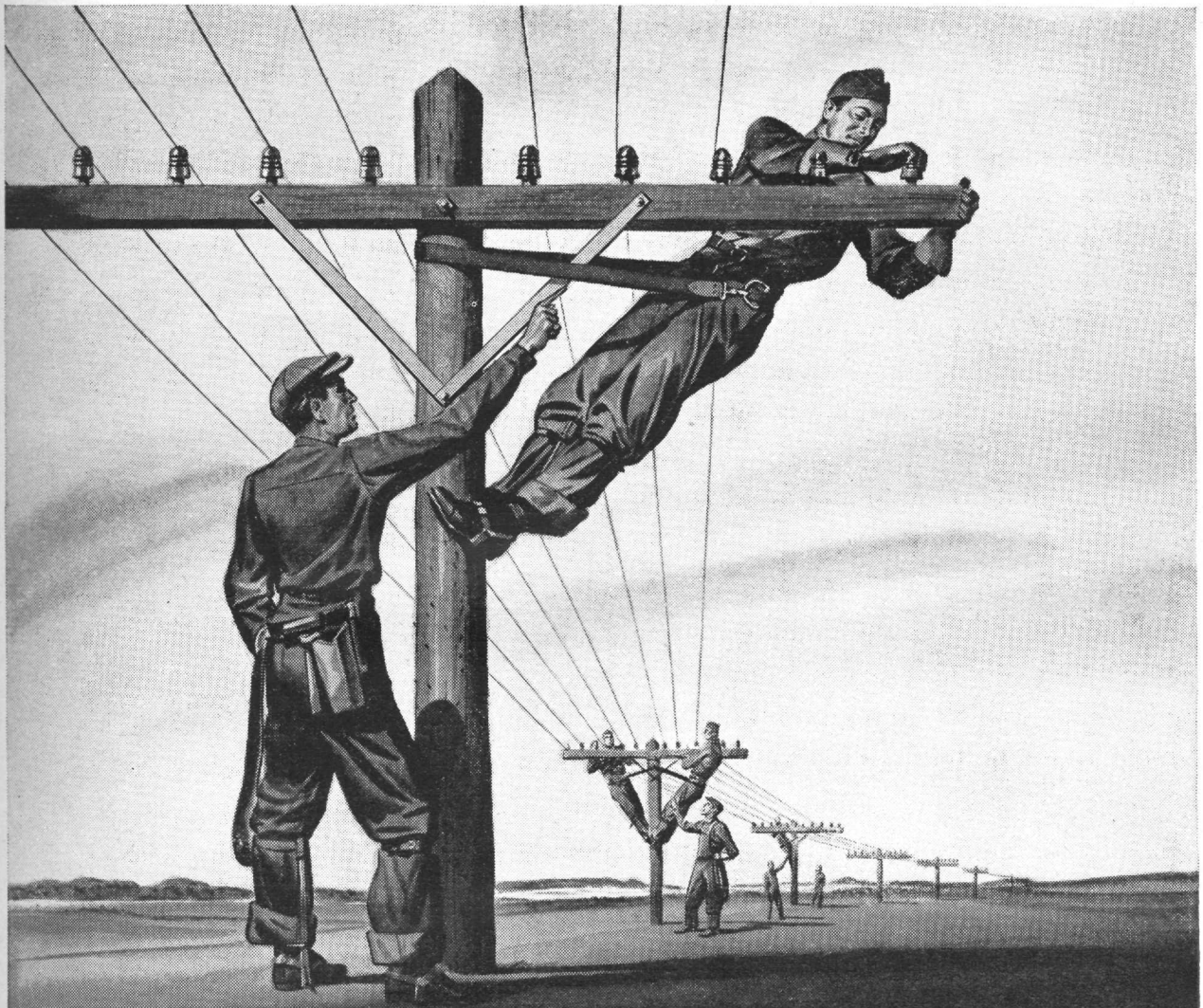
Old men make many improvement inventions, but it is said that really outstanding discoveries are all made by young men. How can they be started inventing at an early age while they still have this faculty? The colleges do little to discover it or develop it. Industry appeals to schools to develop this trait but attempts to make up the deficiencies by giving the new employee a chance to develop it in design courses which could more fittingly be called "classes in ingenuity".

But the student should not think of ingenuity and inventiveness as inherent traits. Both can be developed in school and on the job. Industry tries to place the novice in positions where he must make use of his acquired mental ability and where he can work in direct contact and under the personal supervision of older, experienced men who are ingenious and inventive designers.

#### **Experience**

Experience can best be acquired in partnership with an older man. The fact that the young man is able to calculate complicated problems gives him a quicker opportunity to associate with older men of experience from whom he can learn more practical things. There are a good many informal partnerships in all companies between an older man with a lifetime of experience and a younger man who can calculate. The older man is willing to spend time helping to educate the younger man in practical matters because the younger man has the theoretical equipment which makes him useful to the older man. This prevents a one-sided relation. Just as in social intercourse the favor should not be all one way, so the younger man should leave the satisfaction of making a real contri-

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## Teaching a new Army old "tricks" in telephony

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bution at the same time that he is receiving an education in practical matters and experience.

### **Cultural Subjects**

The ability to use the English language is of such great importance in securing cooperation that it should be one of the student's most important studies. Because industry cannot take time to teach English, history, music and the other "charms" of education, the student must feel that it is his obligation to acquire these "charms" along with his technical training.

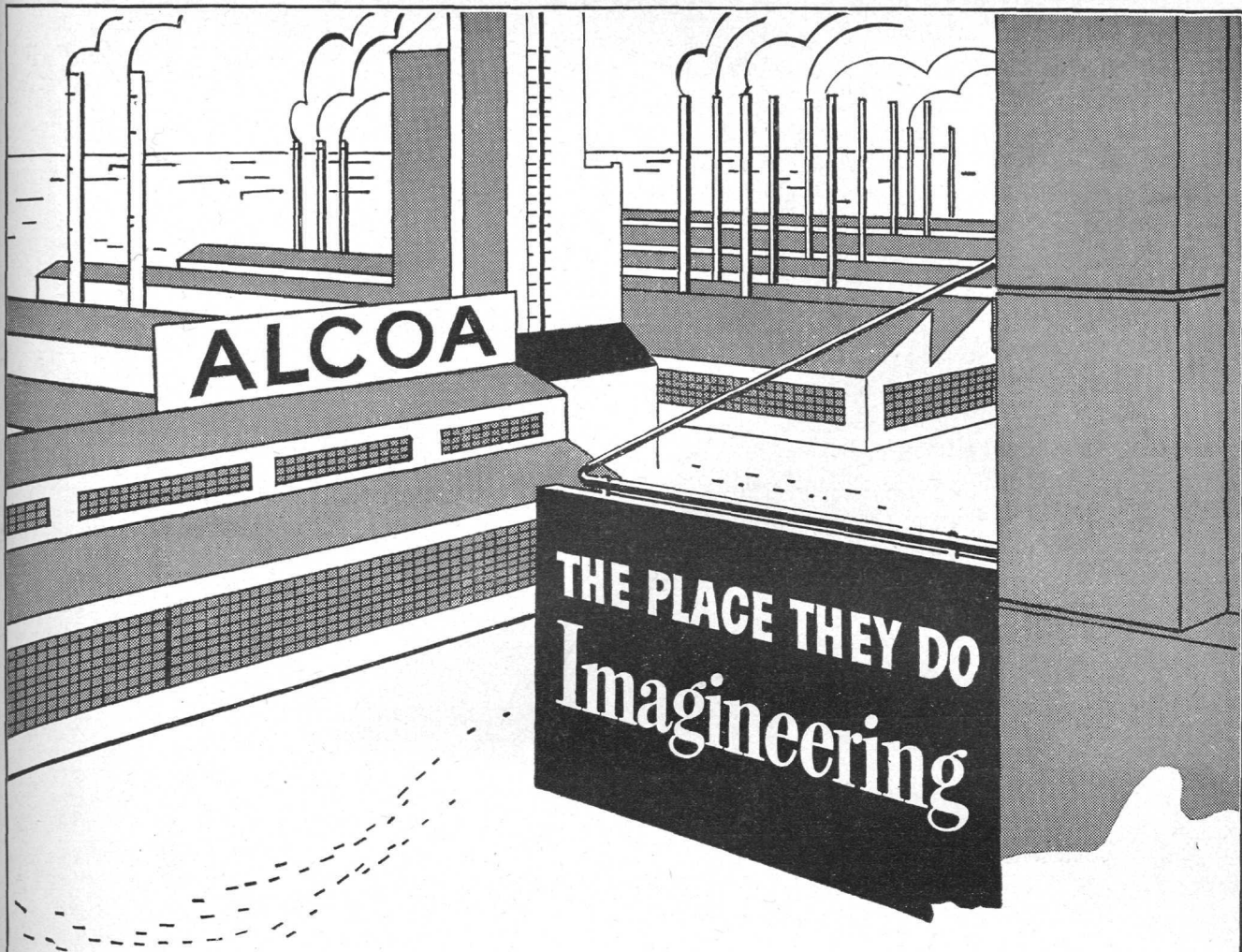
### **Technical Ability**

Uppermost in the minds of every professional man is the question "What is my real technical ability"? The engineer can rate himself by an inventory of his abilities to calculate, to analyze, to exercise common sense and good judgement.

While the ability to calculate may be called the "Open Sesame" to engineering, it must be remembered that engineering mathematics is no better than the

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assumptions on which it is based. Hence the need for correct analysis and use of common sense is apparent to every engineer.

### Conclusion

Many, indeed, are the examples of the Philosophy that the most worthwhile things in life are obtained best as by-products of striving for some other more primary objective. This is true in engineering education. If the student's main objective is to learn, he can learn most and quickest by reading the works of others; the better it is explained, the fewer thoughts he need originate and the faster his progress.

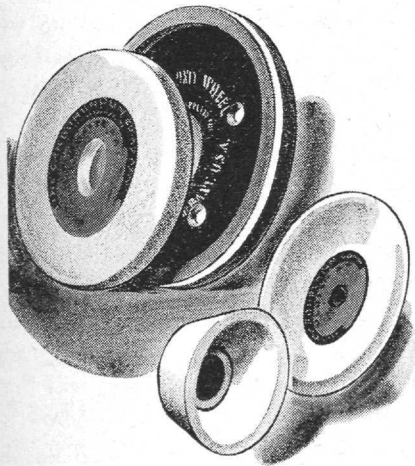
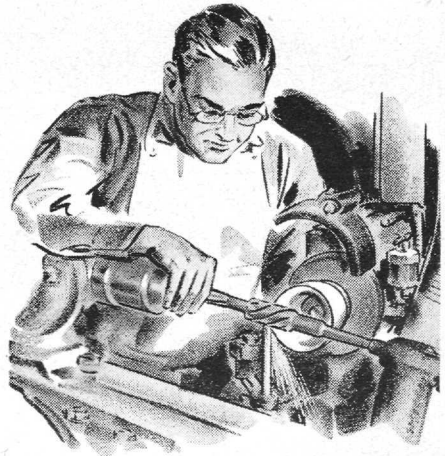
Industry needs courage, character, energy, and the other qualities listed here. Industry prospers in proportion as it serves the public. There is plenty to be done. On his deathbed, Cecil Rhodes said: "So much to do, so little accomplished." The young man coming to industry must ask himself "What can I do to help?"

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