Stage E
out of
A to T.

SEPR No. 6

A Working Paper Draft
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SOCIO-ENGINEERING PROBLEMS REPORT NO. 6

A series of manuscripts on the social relations of engineering and related philosophical questions dealing with the interaction of science and society. Distribution is limited to reviewers and discussion groups for criticism prior to consideration for possible publication.

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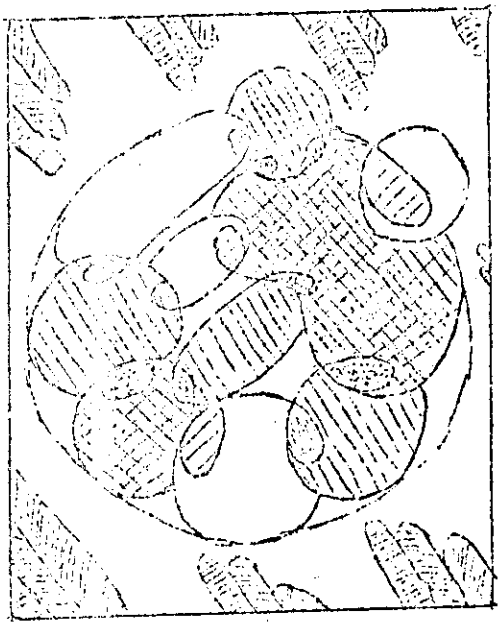
	SEP No. 6	Mimeo	SEPR No. 6

"A Review of the Previous Five Issues of Socio-Engineering Problems Reports."

C O N T E N T S

ART and SCIENCE



A Man and Computer Struggling to Cope with the Problems of an Increasingly Complex

A series of working papers dealing on the subject of the social relations of engineering. This series of reports on ideas developed in the pursuit of my hobby of considering the potential analogies of various engineering concepts in the social sciences as a way of establishing a technique for engineers to discharge their responsibility for the social use of their ideas and inventions. The function of this newsletter is to provide a limited distribution of some preliminary ideas for discussion prior to editing for submission to established journals and engineering societies. In some cases no formal publication is planned, since this medium of communication will be used to suggest ideas to universities and research institutes who are better prepared to evaluate and develop the ideas.

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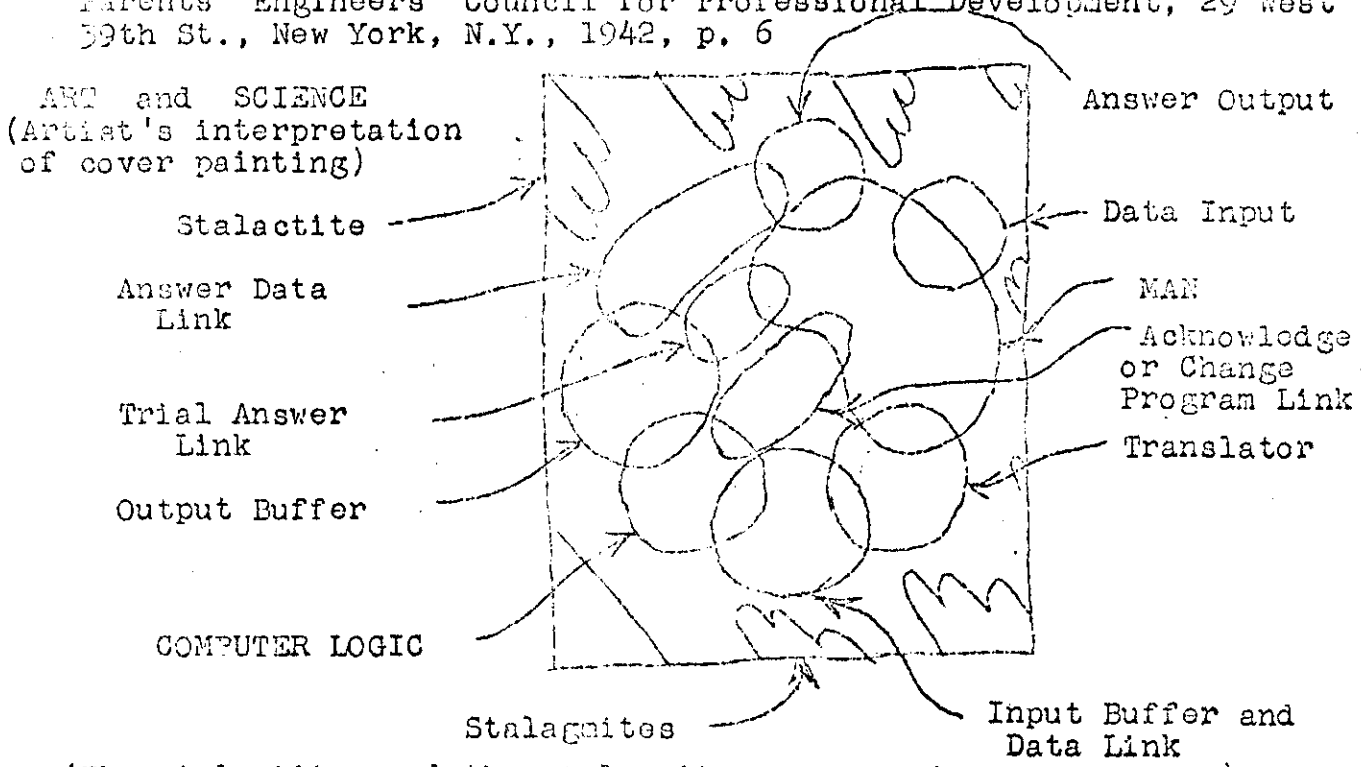
E. C. P. D. DEFINITION.

> "The engineer may be regarded, therefore, as an interpreter of science in terms of human needs and a manager of men, money, and materials in satisfying these needs." 1

This series deals with the function of the engineer as an "interpreter" on the assumption that other people are dealing with the management functions which many engineers acquire.

1. "Engineering as a Career - A Message to Young Men, Teachers, and Parents" Engineers' Council for Professional Development, 29 West 39th St., New York, N.Y., 1942, p. 6



(The stalactites and the stalagmites represent the problems closing in on mankind.)

A Man and Computer Struggling to Cope with the Problems of an Increasingly Complex Society

WHY A WORKING PAPER DRAFT?

The reason for the existence of this "working paper draft" is that preliminary work in the area of social responsibility of engineers has to be done by conference or correspondence between individuals who are interested in the subject but may be geographically distant. Engineers with ideas on the social relations of their engineering work are somewhat rare and are not likely to be easily available at a common place for round table discussions like some social scientists have done as is reported in Behavioral Science (1). After some correspondence and exchange of notes, the material may be referred to some one in the social sciences who may be better prepared to continue the investigation of the problem or it may be revised for submission to one of the engineering or scientific journals.

Where articles may be at different stages of development, we have to pay more attention to the process of solving problems, including the statement of the problem, forming and testing hypotheses in the process of scientific research. It is important that such work be properly identified so that preliminary hypotheses are not confused with logical conclusions. An investigation of the social consequences of some invention might go through the following stages:

A: Searching for background reference material.
B: Brief reading of background material.
C: Study and discussion of background material.
D: Summarizing of previous research worker's results.
E: Definition of the immediate problem.
F: Tabulation of references for the specific problem.
G: Brief study of the specific problem.
H: Formulation of preliminary hypotheses.
I: Checking of preliminary hypotheses for agreement with known data.
J: Collection of new data or setting up experiments.
K: Checking of hypotheses with cultural values in art, music, poetry, ethics, religious experience, etc.
L: Critical testing and revision of hypotheses.
M: Preliminary report writing.
N: Circulation of preliminary reports to others for criticism.
O: Revision of reports.
P: Publication of articles.
Q: Experimental use of ideas with small groups of specialists and/or laymen.
R: Review of the value of hypotheses as tried in practice.
S: Preparation of popularized versions for public use.
T: Preparation of more technical versions for social science research.

This series of working paper drafts are more likely to be at stages D, E, F, H, N, O, R, or S since it may be more efficient to exchange ideas at an early stage to determine whether the problems are being adequately investigated.

1. Behavioral Science, vol. 1, No. 1, p. 69.

[illegible] PROBLEM

[illegible] Q R S T

[illegible] Talk at [illegible]

[illegible] Lec, [illegible]

[illegible] WGCB [illegible]

[illegible] indicates stages for which some work has been d[illegible]
indicates some informal discussion at the level [illegible]
indicates some formal presentation at an engine[illegible]
society meeting, radio broadcast, or church di[illegible]
group open to the public.

[illegible] paper resulting from stage Q of problem 4.5 is:

[illegible] "The Social Responsibility of Engineers and Scient[illegible]" [illegible] Proceedings of the Western Joint Computer Conference, pp. [illegible] [illegible] available from the Institute of Radio Engineers, [illegible] [illegible], New York 21, N.Y., at $6.00 per copy)

[illegible] OF WESTERN [illegible]

[illegible] historical [illegible] [illegible] in the [illegible] [illegible] [illegible] [illegible] William [illegible] [illegible] the [illegible] King School [illegible] [illegible] very important [illegible] [illegible] Although Mr. [illegible] [illegible] way, his [illegible] [illegible] of the program [illegible] [illegible] living for a civilization that [illegible]

"On the [illegible] of Western Civilization- - - -

[illegible] (Anselm)

[illegible] is divine and has been divinely revealed

[illegible] (Descartes)

Truth is pure and can be scientifically represented

[illegible] (Rosenstock-Huessy)

Truth is vital and must be socially represented

. . . . However, finally

Credo ut intelligam

led to

the Inquisition,

Cogito ergo sum

into

an ammunition factory."

[illegible] Rosenstock-Huessy *Out of Revolution* (1938), pp. 741, 755. [illegible] in Univ. of Calif. Library)

[illegible] PROBLEMS DISCUSSED IN SOCIO-ENGINEERING PROBLEMS ISSUES No. 1-5.

[illegible] supply of copies of most of these issues is exhausted, [illegible] copies can be made on request from the vellum master by [illegible] process.

[illegible] The discussion was given in the article, "The [illegible] Social Responsibility of Engineers," and the problems [illegible] in No. 2, p. 11.

[illegible] this kind of paragraph [illegible] [illegible] fields of science [illegible] [illegible] as interpreters of [illegible]

[illegible] moral responsibility of [illegible]

[illegible] the [illegible] of [illegible] [illegible] mind's [illegible] [illegible]?

[illegible] the [illegible] [illegible] Heart — a [illegible] [illegible] Human [illegible] and [illegible]."

[illegible]
(d) [illegible] buildings whose [illegible] increase [illegible] increasing distance from the center [illegible] communication between the people [illegible] large city?
(e) [illegible] spatial distribution of buildings [illegible] natural [illegible] beds, canyons, lakes, and hills [illegible] human needs?

[illegible] 1958. The principal discussion is the article "[illegible] Circuits in Computers and Society."

[illegible]: How can engineers explain their work to the educated [illegible] in a way that is general, but is still specific enough [illegible] of value? Hypothesis: Negative feedback circuits [illegible] described by Norbert Wiener may be useful to show the common [illegible] of phenomena in related fields and for conveying basic [illegible] to the educated layman. (See pp. 1-2, Figures 1-2.)

[illegible]: Can we develop a feeling of relatedness of phenomena [illegible] different fields by use of negative feedback circuits?
(a) [illegible] Form (pp. 1-2, 9-10. Fig. 3)
(b) Electronic Circuits (pp. 2-3. Figs. 3-5.)
(c) Computer Logic (pp. 3-4. Figs. 6-7.)
(d) Computer Programming (pp. 4-5. Figs. 8)
(e) Computer Memory, Mechanical Access (pp. 5-7. Figs. 9-13.)
(f) Business Organization (pp. 7-8. Figs. 14-16.)
(g) Capitalist Economic System (pp. 8-9. Figs. 17-19.)

[illegible] 3: To what extent do proceedings of the earlier cybernetics conferences satisfy the above problems?

[illegible] 1959. The principal article is "Different Versions [illegible] on Social Responsibility Prepared for Different [illegible]" contains outlines and bibliographies, but not the text [illegible] manuscripts.

[illegible] of man and society
[illegible] also in the animal world
[illegible]

[illegible]
[illegible] How can [illegible]
[illegible] related to the problems of
[illegible] and engineering?

[illegible] the [illegible] social responsibility of
[illegible] in a way that is [illegible]
[illegible] such [illegible]
[illegible] given at the [illegible] Session
[illegible]?

[illegible] the [illegible] charts for developing an [illegible]
[illegible] more logically from a "gun to [illegible]
[illegible] of culture?

[illegible] on this [illegible] of the social responsibility of
[illegible] that distinguishes between the [illegible]
[illegible] and any special responsibility
[illegible] such material be written in a
[illegible] for engineers to comprehend, instead of in a form
[illegible] should [illegible] to study?

[illegible] 1958). The principal discussion is "The United
[illegible] Information Theory, Cybernetics, and Decision Theory."

[illegible] 5.1: How can engineers and physicists communicate their
[illegible] need of understanding the evolution of civilization
[illegible] there can be creative cooperation with the appropriate social
[illegible] and humanists? The following possibilities appear to
[illegible]:

(a) They can write letters to individuals.

(b) They can write letters to the editors of certain journals and newspapers.

(c) They can try to find interested social scientists in nearby colleges who either are interested in these problems or need assistance in the use of engineering or mathematical concepts in their own research.

(d) They can find national organizations which are interested in specific aspects of the problems such as:
Federation of American Scientists,
Society for General Systems Research,
Society for Social Responsibility in Science.

[illegible] 5.2: How can the challenge of the Russian technological [illegible] be used to ask more important questions as to mankind's [illegible] goals?

[illegible] 5.3: Can information theory which gives higher value [illegible] (entropy) to rare events (individual creative ideas) be [illegible] help formulate theories of the balance between organization [illegible] and freedom (individual creativity)?

[illegible] way of showing what
[illegible]tions and individual nations
[illegible] national and interna[illegible]
[illegible] to allocate space to tra-
[illegible] progress?

[illegible] understanding of [illegible] potential
[illegible] through the concept of energy
[illegible] values such as weight, length,
[illegible] an adaptive or emotional [illegible] values such as
[illegible] love?

[illegible] scientists and humanists develop
[illegible] they can develop their truly human
[illegible] time they specialize in narrow sections of

[illegible] our society become more responsive to the simple
[illegible], the unpopular, the poor, the [illegible],
[illegible], etc., that our [illegible]
[illegible] of [illegible] in the
[illegible] which is often [illegible]
[illegible] economic decision-making organizations [illegible]

How can the arts, musicians, and poets be [illegible]
ethical values inherent in science through information
theory, and decision theory, so that they may become
needs of the people and the dreams of the scientists?

How can we develop ways to let our teenage youth
[illegible] carry out their ideals of a "better world" through
[illegible] jobs, instead of letting them feel that their
[illegible] high ideals they learned in Church Sunday School?

How can we develop an information retrieval system
isolated scientists and scholars in the exchange of ideas
might help in the solution of the problems of our civilization?

How can we protect individual freedom in general in
[illegible] massive organizations, either state or corporate,
[illegible] many areas of human activity?

How can we use cybernetics to simulate a model of
[illegible] components of our society to see if loyalty oaths and
security investigations disable important feedback loops
[illegible] keep our society functioning in a creative but stable

How can we evaluate the possible psychological
[illegible] many potentially creative individuals through the social
[illegible] which inhibits their normal feelings for peace and a
[illegible] better social order?

[illegible] Footnote 2 of page5:
[illegible]-Brunswick-Hussey, Out of Revolution: An Autobiography of
[illegible], Translated from German, Morrow(N.Y.), 1938. [illegible]
[illegible], 1940. U.S. Library of Congress No. 38-30579(Cat. Card)

[illegible] Relevant To Some [illegible]
[illegible])

[illegible] - [illegible], 1955, 310 pp.
[illegible] for [illegible], but in the [illegible] society would be [illegible] level as Christ taught. [illegible] one and another.

[illegible], New York:
[illegible]
[illegible] Automation
[illegible]
[illegible] and Automation

[illegible] editors. Automation and [illegible], [illegible] 1957), 555 pp.
[illegible] of [illegible]
[illegible]
[illegible] and Responsibility
[illegible] and Society
[illegible] Automation Dictionary
[illegible] Thirty-Seven Short Cases of Automation in the U.S. and Canada.

PROFESSIONAL ENGINEERING POLICIES

[illegible] prepared this material as an individual professional engineer, [illegible] consideration has been paid to the state regulations and [illegible] societies' standards in respect to engineering work.

First, I am following the limitations implied by the state registration [illegible] administered by the California Board of Registration for [illegible] Professional Engineers, namely that I state positive conclusions [illegible] the branch of engineering in which I am registered as [illegible], i.e., electrical engineering. The way I deal with subjects [illegible] over into other specialized fields of science or engineering [illegible] to the problems, ask questions, and propose working [illegible]. The determination of definitive answers is left to the [illegible] specialists such as civil engineers, mechanical engineers, [illegible] sociologists, psychologists, anthropologists, political [illegible], lawyers, economists, etc.

[illegible] I aim to follow the rules of ethics established by the [illegible] Society of Professional Engineers and affiliated state [illegible]. I interpret my hobby of preparing this series of [illegible] engineering problems as a "professional" activity as defined [illegible] of engineering activities proposed by the American [illegible] Electrical Engineers and summarized in NSPE Professional [illegible]. My use of the initials "P.E." after my name on the title [illegible] series is the abbreviation for "Professional Engineer" [illegible] with the policies of the N.S.P.E.

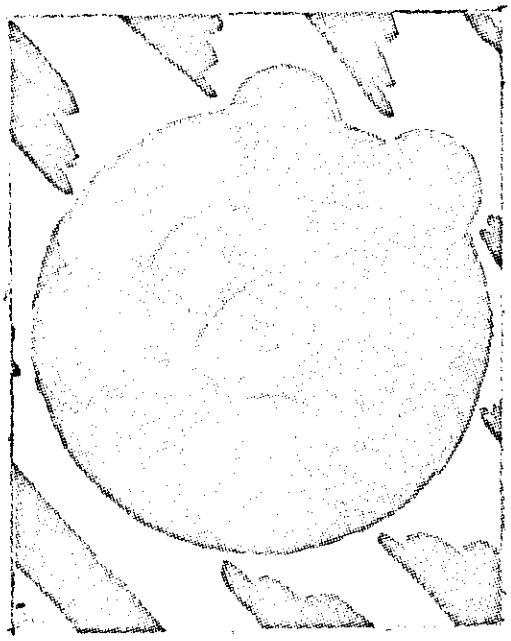
[illegible] Society of Professional Engineers, 2029 K St., N.W., Washington 6, D.C. Ethics for Engineers (Canons of Ethics, [illegible] Rules of Professional Conduct)
[illegible] Society of Professional Engineers, Professional Policies, [illegible] as of July 1, 1958, pp. 42-43.

INDEX OF ITEMS INCLUDED IN NUMBERS 1 - 5.

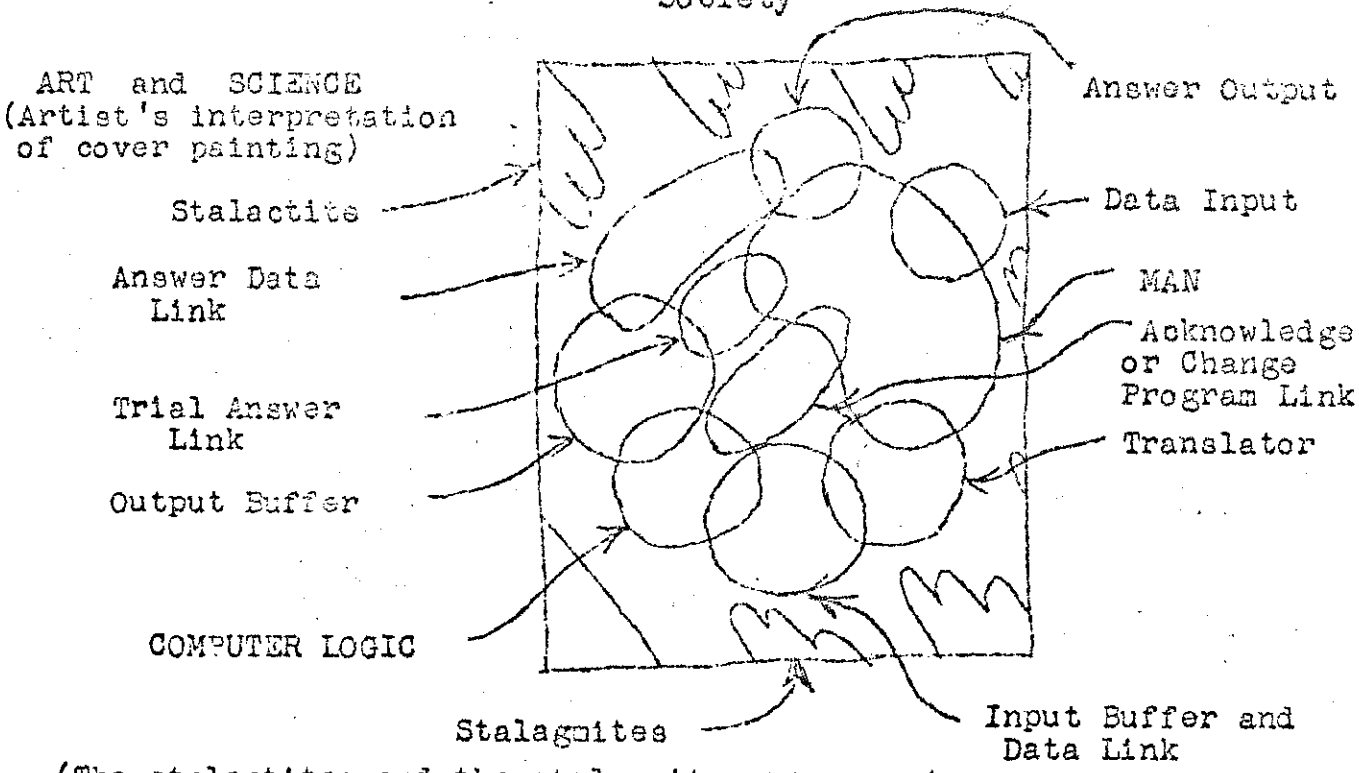
Note: The diagram "A Man and Computer Struggling....." on pages 1 and 2 is from a tempera painting. A few special copies of this issue of Socio-Engineering Problems have been issued with a color photograph of the painting mounted on the cover page.

A Section of SEPR No. 6
Painting of 1958, text
first issued July 1959.

ART AND SCIENCE
An artist's conception of man
struggling with cybernetic
technology.



A Man and Computer Struggling to Cope with
the Problems of an Increasingly Complex
Society



(The stalactites and the stalagmites represent
the problems closing in on mankind.)

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