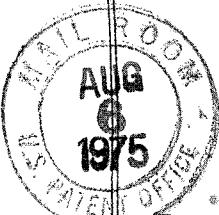


AUG 6 1975 -5-

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IN THE UNITED STATES PATENT OFFICE

1 In the Application of

2 JAMES R. DIEHR and THEODORE A. LUTTON

3 Continuation of: Serial No. 472,595

4 Filed May 23, 1974

AUG 5 1975

5 For DIRECT DIGITAL CONTROL
OF RUBBER MOLDING PRESSES

6 Group Art Unit 236

7 Examiner Joseph F. Ruggiero

9 Commissioner of Patents

10 Washington, D. C. 20231

11
12 Dear Sir:

14 PRELIMINARY AMENDMENT

16 Please amend the application as follows:

18 In the specification:

19 Page 1:

20 line 15, replace "this material" with --these data--

22 Page 6:

23 line 2, delete "by random access,"

24 line 22, before "second" insert --each calculation
25 cycle, e.g., once each--

27 Page 7:

28 line 27, before "once" insert --, e.g.--

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30

1 In the specification

2 Page 9:

3 line 22, replace "retrieves" with --retrieves--

4 Page 10:

5 line 24, replace "compounded" with --compound--

6 In the claims

7

8 Please rewrite claim 1 as follows:

9

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Sub D' --1. (Amended) A method of operating a rubber-molding press for precision molded compounds with the aid of a digital computer, comprising:

providing [a] said computer with [time-temperature cure data for the compound being molded in the press] a data base for said press including at least,

natural logarithm conversion data (ln),

the activation energy constant (C) unique to

each batch of said compound being

molded, and

a constant (x) dependent upon the geometry

of the particular mold of the press,

initiating an interval timer in said computer upon the closure of the press for monitoring the elapsed time of said closure,

constantly determining the temperature (Z) of the mold at a location closely adjacent to the mold cavity in the press [at every instant] during molding,

-2-

23

D/cntd

1 constantly providing [keeping] the computer
2 [informed as to] with the temperature (Z) [of the mold cavity],
3 repetitively calculating in the computer, at frequent
4 intervals during each cure, the Arrhenius equation for reaction
5 time during the cure, which is

6 $\ln v = C Z + x$

7 where [lnv] v is [the natural logarithm of]

8 the total required cure time,

9 [C is the activation energy constant unique to
10 each batch of compound being molded,

11 Z is the present temperature of the mold, and

12 x is a constant dependent upon the geometry of
13 the particular mold of the press,]

14 repetitively comparing in the computer at said

15 frequent intervals during the cure each said calculation of
16 the total required cure time calculated with the Arrhenius
17 equation and [the] said elapsed time, and

18 opening the press automatically when [the] a said
19 comparison indicates [completion of cure] equivalence.--

21 Please rewrite claim 2 as follows:

23 --2.(Amended) The method of claim 1 including
24 measuring the [time-temperature cure data] activation energy
25 constant for the compound being molded in the press with a
26 rheometer and automatically updating said data base within
27 the computer in the event of changes in the compound being
28 molded in [each] said press as measured by said rheometer.--

omit

1 Please rewrite claim 5 as follows:

2
3 Sub D2 --5.(Amended) A method of operating a [series]
4 plurality of rubber-molding presses simultaneously curing
5 precision molded compounds in conjunction with a computer,
6 comprising:

7 providing [the] said computer with [time-temperature
8 cure data for the compounds to be molded,] a data base for
9 each said press including at least,

10 natural logarithm conversion data (ln),

11 the activation energy constant (C) unique to

12 each batch of said compound being

13 molded, and D

14 a constant (x) dependent upon the geometry

15 of the particular mold of the said press,

16 constantly informing the computer of the temperature
17 (Z) of each mold,

18 informing the computer of the batch of the compound
19 being molded in each mold,

20 constantly informing the computer of the elapsed
21 time that the compound has been in each mold,

22 repetitively calculating for each said press at

23 frequent periodic intervals during each cure in the computer
24 the Arrhenius equation to determine the total required cure
25 time, which is ln v = C Z + x, where v is the total required
26 cure time,

27 repetitively comparing at said frequent periodic
28 intervals in the computer the calculated total required cure
29 time and the elapsed time for each said press, and

30 opening [the] each said press automatically when

PJW
1 [the] its elapsed time has reached [the] its calculated total
2 required cure time.

3
4 Please add the following claims:
5

6 --6. (To follow claim 1) The method of claim 1
7 wherein each said frequent interval is no longer than approxi-
8 mately one second.--

9
10 *Sub D3* --7. A method of manufacturing precision molded
11 articles from selected synthetic rubber compounds with the aid
12 of a digital computer, comprising:

13 providing said computer with a data base for a molding
14 press to be used in the molding, including at least,

15 natural logarithm conversion data (\ln),
16 the activation energy constant (C) unique to
17 each batch of said compound being molded, and
18 a constant (X) dependent upon the geometry of
19 the particular mold of the press,

20 installing prepared unmolded synthetic rubber of one
21 said compound in a molding press cavity,

22 closing said press,

23 initiating an interval timer associated with said
24 computer upon the closure of the press for monitoring the
25 elapsed time of said closure,

26 constantly determining the temperature (Z) of the
27 mold at a location closely adjacent to the mold cavity in the
28 press during molding,

29 constantly providing the computer with the temperature
30 (Z),

D3 cont'd

1 repetitively calculating in the computer, at frequent
2 intervals during each cure, the Arrhenius equation for reaction
3 time during the cure, which is

4 $\ln v = C Z + x$

5 where v is the total required cure time,

6 repetitively comparing in the computer at said
7 frequent intervals during the cure each said calculation of the
8 total required cure time calculated with the Arrhenius equation
9 and said elapsed time,

10 opening the press automatically when a said comparison
11 indicates equivalence, and

12 removing the resulting precision molded article from
13 the press.--

14

15 --8. The method of claim 7 including measuring the
16 activation energy constant for the compound being molded in
17 the press with a rheometer and automatically updating said
18 database within the computer in the event of changes in the
19 compound being molded in said press as measured by said
20 rheometer.--

21

22 --9. The method of claim 7 including in addition,
23 providing the computer with a mold temperature set
24 point for each mold and a constant of proportionality with which
25 a range of permissible mold temperature variation may be calcu-
26 lated,

27 calculating at frequent periodic intervals in the
28 computer said range of permissible mold temperature variations,

29 comparing at frequent periodic intervals in the
30 computer said calculated range of permissible mold temperature

B3entz

1 variation and the actual temperature (Z) in the press, and
2 controlling the mold heater from said computer to
3 keep the mold temperature (Z) within said calculated range of
4 the set point.--

5
6 --10. The method of claim 9 wherein the frequent
7 periodic interval is approximately 10 seconds.

8
9
10 R E M A R K S

11
12 The amendments to the specification are those
13 presented in Serial No. 472,595 in the amendment dated March 13,
14 1975. They correct certain typographical errors and clarify
15 the meaning. No new matter is presented.

16
17 Four new claims have been added to cover the specific
18 aspect of the invention relating to making precision-molded
19 synthetic rubber compounds.

20
21 These Remarks respond inter alia to the Final Rejection
22 of the Examiner dated May 14, 1975 of the parent application,
23 Serial No. 472,595. Therein the Examiner objected to the speci-
24 fication under 35 U.S.C. 112 and rejected claims 1-6 under 35
25 U.S.C. 112 as drawn to insufficient disclosure and also under
26 35 U.S.C. 101 as drawn to non-statutory subject matter. The
27 Examiner did not in that action reject claims 1-6 on prior art
28 under either 35 U.S.C. 102 or 35 U.S.C. 103. Applicants infer
29 that the Examiner has now recognized the unobvious differences
30 of the present invention over the cited prior art and that the
issue is to Sections 101 and 112.

1 A new affidavit under Rule 132 is presented showing
2 that reduction to practice of the invention need not take a
3 long time so long as one is not setting up a complete factory.
4 The new affidavit answers questions raised in the Final Rejec-
5 tion of the parent application, Serial No. 472,595, as to the
6 reasonableness of the time it would take for a reader of this
7 application to reduce the invention to practice, as stated in
8 prior affidavits filed in said parent application and incor-
9 porated into this continuation application by reference thereto
10 (copies attached hereto). As the accompanying new affidavit
11 shows, the invention could be reduced to practice in only about
12 six weeks if one were to use only one molding press with one
13 type of mold cavity to make one type of product and were to
14 use only one compound for it. One would still have to get data
15 for that compound and feed it to the computer. It would still
16 take some time to adapt that one press, but it is apparent that
17 such time would be much less than the time actually taken in
18 adapting sixty presses, involving two-hundred mold cavities,
19 for fifty different product types and thirty different compounds.
20 The time estimate in the earlier affidavits under Rule 132 was
21 based on the use of that large number of products, mold cavities,
22 and so on. The new affidavit shows how relatively simple the
23 invention is, as compared with application of the invention to
24 an entire factory.

25
26
27 Re: Paragraph 5 of the "Final Rejection" of May 14, 1975

28
29 The rejection of the claims as being drawn to non-
30 statutory subject matter is not in accordance with, and is in

1 effect contrary to, Gottschalk v. Benson. Justice Douglas,
2 who wrote that opinion, has not been considered to be liberal
3 on patent matters, but he did say the following: "It is said
4 that the decision precludes a patent for any program servicing
5 a computer. We do not so hold." The Justice Douglas statement
6 is contrary to the statement by the Examiner, "Computer programs
7 have been held to be non-statutory subject matter by the
8 Supreme Court in Gottschalk v. Benson..."
9

10 Moreover, Justice Douglas, in speaking of what makes
11 a process claim patentable, quotes from Cochran v. Deener,
12 94 U.S. 780, "A process is a mode of treatment of certain
13 materials to produce a given result. It is an act, or a series
14 of acts, performed upon the subject-matter to be transformed
15 and reduced to a different state or thing." Justice Douglas
16 then says that "Transformation and reduction of an article 'to
17 a different state or thing' is the clue to the patentability of
18 a process claim that does not include particular machines."
19 Claims 7 to 10, which definitely relate to the treating of the
20 material, are therefore introduced. However, even though claims
21 1 through 6 relate to the control of a press or of a plurality
22 of presses, they also act upon the material which is put into
23 the mold, to produce a different state or thing. In other words,
24 the synthetic rubber begins as a piece of "prep," an uncured
25 annulus of elastomer, and it ends up being a precision-molded
26 oil seal or similar product. Therefore the claims in this
27 application come under exactly what Justice Douglas said is a
28 patentable process.
29
30

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1 In each of claims 1, 5, and 7, the first step is
2 providing the computer with a data base. All these data have
3 particular applicability to the "transformation and reduction
4 of an article to a different state or thing." The activation
5 energy constant depends upon the batch of the compound, and
6 the constant(X) depends upon the geometry of the particular mold
7 of the press. The natural logarithm conversion data is not
8 relied on alone for patentability but is necessary to handle
9 the calculations relating to the data.

10
11 New claim 7 recites as the second step "installing
12 prepared unmolded synthetic rubber of one said compound in a
13 molding press cavity. This clearly is an act performed on a
14 material or article. The third step, "closing said press" is
15 also clearly not part of "computer programming." Both are
16 important physical steps.

17
18 The second step in claim 1 and the fourth step of
19 claim 7 is the initiation of the interval timer upon closure
20 of the press. This is not part of a "computer program."

21
22 The third step of claim 1 and the fifth step of
23 claim 7 calls for a constant determination of the temperature
24 in the mold--not in the computer.

25
26 The information is given to the computer in the fourth
27 step of claim 1, the second step of claim 5, and the sixth
28 step of claim 7. In claim 5 the third step is to inform "the
29 computer of the batch of the compound being molded in each mold",
30 and the fourth step is that of "constantly informing the computer
31 of the elapsed time that the compound has been in each mold."
32 These steps are quite physically embodied.

1 Next in all of claims 1, 5 and 7, the computer then
2 does the necessary repetitive calculation. The claims have
3 given the Arrhenius equation, but no assertion is made that the
4 Arrhenius equation is patentable, because it has long been
5 known. This necessary step is stated in order to make the
6 claim complete.

7
8 The subsequent repetitive comparing in the computer
9 is important. It states what the computer is called upon to
10 do in order for the result to follow.

11
12 Finally, the last step of claims 1 and 5 and the
13 next-to-last in claim 7, calls for opening the press automatic-
14 ally; this is a physical opening. Moreover, the articles
15 that were put into the press before the initiation of the timer
16 are now in a different state or are a different thing. Claim
17 7 follows with the step of physically "removing the resultant
18 precision-molded article from the press."

19
20 The other claims all depend on one of these three
21 independent-form claims. Thus, it should be clear that
22 Gottschalk v. Benson, instead of being authority for calling
23 the subject matter of the claims non-statutory, is actually
24 persuasive authority for indicating that the kind of subject
25 matter covered by the claims is statutory subject matter.

26
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30

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- 11 -

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1 Re: Paragraph 6 of the Final Rejection

2
3 In paragraph 6, the Examiner refers to the affidavits
4 which had earlier been presented under Rule 132. He first
5 disposes of the Ekland affidavit, which was corroborative of
6 applicants' first affidavit under Rule 132 by saying, without
7 any authority for the statement, that it is questionable whether
8 the 6-months' limitation could be considered reasonable. To
9 make a statement like this, according to Patent Rule 107, the
10 Examiner should set forth more than a mere allegation.

11
12 Furthermore, the significance of the six-month period
13 has been overlooked. The Ekland affidavit was based on the
14 same material as that stated in detail in the first affidavit
15 under Rule 132 by the applicants, which goes through the times
16 involved step by step and explains both why it took applicants
17 14 months and how the time can now be substantially shortened.
18 As noted above, even the shortened version set forth in that
19 affidavit was for instituting a complete program for a complete
20 factory. There were sixty presses, which take up a considerable
21 area of floor space--a complete factory full,--and each of these
22 sixty machines holds a number of mold cavities and is used by
23 two hundred sets of such cavities, only one set being in use
24 at any one time. Thirty compounds were used, and fifty different
25 types of articles were made, as disclosed in the accompanying
26 Second Affidavit Under Rule 132, filed along with this paper.
27 Thus, it will be seen that a much shorter time (only six weeks)
28 is involved in reducing to practice the invention set forth in
29 claims 1 and 7. "Reasonableness of time" should be considered
30 on a reasonable basis.

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29

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1 While the Examiner might have considered it unreasonable
2 for one familiar with the instant disclosure to take
3 six months to reduce the claimed invention to practice--
4 i.e., to apply it to one machine with one cavity to one type
5 of molding compound, he should have noted that the six-months'
6 period estimated (as well as the fourteen-months' actual period
7 taken) was for the entire factory of sixty presses with many
8 products, many mold cavities, and several molding compounds.

9
10 The Examiner, in the bottom paragraph of page 3 of
11 the "Final Rejection" in Serial No. 472,595, appears to challenge
12 long-standing practice and possibly to confuse "the invention"
13 with the entire technological complex related to the invention.
14 As proven by the new Rule 132 affidavit, applicants' "working
15 program listing" which "applicants chose to withhold...from the
16 application" is largely comprised of a huge mass of data
17 applicable only to applicants' assignee's molds, presses,
18 products, and compounds, almost all of which are proprietary.

19
20 Applicants' affidavits show that they have disclosed
21 the process of the invention "in such full, clear, concise,
22 and exact terms as to enable any person skilled in the art to
23 which it pertains...to make and use the same." It also "sets
24 forth the best mode contemplated by the inventor of carrying
25 out his invention."

26
27 The affidavits and application show that one skilled
28 in the computer programming art can expeditiously prepare a
29 working program tailored to press geometries and compounds
30 quite different from those known to the inventors. The

1 original affidavit by applicants under Rule 132 disclosed that
2 the flow sheet is itself basically a program and that the only
3 difference between the flow sheet as a program and the form
4 taken by the program when it gets into the computer is trans-
5 lation into a suitable computer language, whether that be
6 Basic Assembly language or Fortran, or whatever is available.
7 That affidavit shows that any operator who knows such language
8 can translate the flow sheet program into computer language
9 and place it in the computer. Most of the time involved in
10 "programming" the computer was simply the heavy load of placing
11 the large amount of data required into the machine itself,
12 and this is comparable to giving a typist a long document to
13 type.

14

15 What the Examiner calls, "withholding a disclosure
16 of the complex means necessary to achieve that result", is
17 of questionable value to competitors as to enabling them to
18 practice the invention--since their products are at present
19 sufficiently different and their compounds and molds are also
20 different-- but of considerable harm to applicants' assignee,
21 because the competitors would find out things about that
22 assignee's products and compounds which have no relation to the
23 present invention. Moreover, such a program--some hundreds of
24 pages-- would overload the printing office and cost applicants
25 an issue fee of thousands of dollars--all with no real public
26 benefit and without complying any more than has already been
27 done with the Statute.

28

29 If the issue is one of preventing undue experimen-
30 tation, then the application does that. Applicants cannot

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1 be expected to present enough data so that competitors with
2 their different products would not have--with or without the
3 "program"--to determine data for each of their products, their
4 compounds, their molds, and so on. Outside of compiling such
5 data, the competitor would--and will if the patent issues--
6 be able to use the flow sheet (plus the still needed data) to
7 compile a program with little or no experimentation.

8

9 The final paragraph of the Examiner on page 4 is
10 interesting but appears to be immaterial. The Examiner has
11 given no citation to support this argument, and it appears
12 that the Examiner, in talking about a program, is equating a
13 specific program to the obvious measure of producing a computer
14 translation of what is, in effect, a program already.

15

16 Respectfully submitted,

17 *Robert E. Wickersham*

18 _____
19 Attorney for Applicants
20 Robert E. Wickersham
Reg. No. 16,150
(415) 781-6361

21 Attachments:

22 RULE 132 AFFIDAVIT
Diehr and Lutton
March 6, 1975

23 RULE 132 AFFIDAVIT
Joseph D. Ekland
March 7, 1975

24 RULE 131 AFFIDAVIT
with Exhibits A-G
Diehr and Lutton
March 3, 1975

25 SECOND RULE 132 AFFIDAVIT
Diehr and Lutton
July 18, 1975

26

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30
38
602, 463

IN THE UNITED STATES PATENT OFFICE

1 In the Application of
2 JAMES R. DIEHR and THEODORE A. LUTTON
3 Continuation of: Serial No. 472,595
4 Filed May 23, 1974
5 For DIRECT DIGITAL CONTROL
6 OF RUBBER MOLDING PRESSES
7 Group Art Unit 236
8 Examiner Joseph F. Ruggiero
9

10 Commissioner of Patents
11 Washington, D. C. 20231

12
13 Dear Sir:

14
15 SECOND RULE 132 AFFIDAVIT

16
17 JAMES R. DIEHR, II and THEODORE A. LUTTON, being first
18 duly sworn, depose and say:

19
20 THAT in our "Rule 132 Affidavit" dated March 7, 1975,
21 in application Serial No. 472,595, the data stated and the
22 estimate of time to reproduce our invention was all based on
23 a complete factory installation involving sixty presses, as
24 stated in the affidavit, and (as not stated there) 200 mold
25 cavity types, each installable in any of the sixty presses,
26 to manufacture 50 different product types, from 30 different
27 compounds;

28
29 THAT if one were to make only one product type on
30 one press from a single compound, the estimates of approximate

1 times actually involved would be considerably shortened, as
2 follows:

3	Selection of standard computer hardware	one man day
4	Design of modification of existing press (unchanged)	two man weeks
5	Actual installation and checkout of the hardware	three man days
6	Collection and insertion into the computer of parameters and data	five man days
7	Design of the application code of the computer program in Basic Assembly language, including programming of the Arrhenius equation	three man weeks
8	Total time involved	approximately six man weeks

12
13 THAT most of the time involved from initial start to
14 full production involves placing in the computer a huge mass
15 of data;

16
17 THAT actual "programming" in the sense of placing the
18 computer in condition to perform the necessary manipulations of
19 the data plus the values fed in during operation is a relatively
20 simple matter which any skilled programmer with the patent
21 specification and drawings before him could readily perform;

22
23 THAT the program shown in the flow sheets, Figs. 3A and
24 Fig. 3B, is actually a "program" so far as the programmer is
25 concerned and that to apply the "program" of Figs. 3A and 3B
26 to a computer merely involves translation of the symbolic flow
27 sheet into FORTRAN which anyone skilled in FORTRAN can do,
28 or else it involves translation of the symbolic flow sheet into
29 Basic Assembler Language (MSP-7) or some other suitable language
30 which anyone skilled in that language can do as a substantially

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1 routine matter once he has the flow sheet of Figs. 3A and 3B
2 and once the data has been properly stored in a conventional
3 manner in such a computer;

4

5 THAT applicants' assignee uses the invention in the
6 field of precision molded synthetic rubber products, especially
7 for lip-type rotary shaft seals;

8

9 THAT many of the products and the manufacturing
10 methods for making these products are patented, that others
11 are the subject matter of pending patent applications, and that
12 still others were the subject matter of now expired patents,
13 all of which are proprietary products and methods of applicants'
14 assignee;

15

16 THAT the synthetic rubber compounds used in manu-
17 facture are mostly proprietary compounds of applicants'
18 assignee;

19

20 THAT the presses are purchased from press manufacturers
21 but the molds are made by applicants' assignee;

22

23 THAT applicants' present invention is applicable to
24 the manufacture of precision molded products of anyone, whether
25 proprietary or not;

26

27 THAT the invention itself, the subject matter of
28 the claims, has been fully disclosed in the above-identified
29 patent application, but that actual practice of the method
30 will depend upon the products to be made, the manufacturing

1 processes employed, the characteristics of the molds and of the
2 presses, and the synthetic rubber compounds to be used;

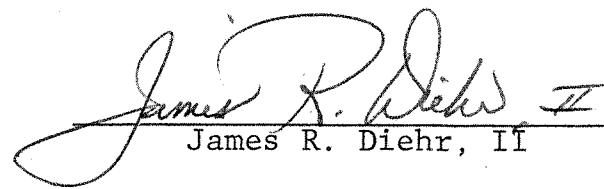
4 THAT a machine printout of the completed computer
5 program as reduced to practice included 16,000 separate
6 instructions as well as 6 tables of data and conversion
7 factors, the listing thereof requiring 300 pages; and

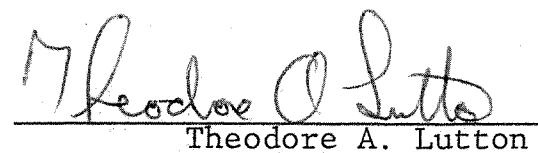
9 THAT of those 300 pages of the printout, fully
10 three-fourths thereof (~~or whatever it is~~) comprises proprietary
11 data uniquely applicable to applicants' assignee's molds,
12 presses, products and molding compounds, and that said pro-
13 prietary data is not needed by other persons to understand or
14 practice the present invention.

16 Further, affiants saith not.

18 Dated at Southfield, Michigan, this 18th day of

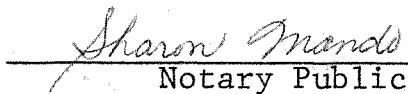
19 July, 1975.

20 
James R. Diehr, II

23 
24 Theodore A. Lutton

26 Subscribed and sworn to before me this 18th day of

27 July, 1975.

29 
Sharon Mando
Notary Public

30 My commission expires:

SHARON MANDO
Notary Public Wayne County, Mich.
Acting in Oakland County, Mich.
My Commission Expires Aug. 28, 1977

36

602,463

IN THE UNITED STATES PATENT OFFICE

In the application of

JAMES R. DIEHR, II and THEODORE A. LUTTON

Serial No. 472,595

Filed May 23, 1974

For DIRECT DIGITAL CONTROL OF
RUBBER MOLDING PRESSES

Group Art Unit 236

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Dear Sir:

RULE 132 AFFIDAVIT

JAMES R. DIEHR, II and THEODORE A. LUTTON, being first duly sworn,
depose and say:

THAT they are Senior Technical Analyst for the Corporate Engineering
Group and Central Manufacturing Engineering Manager for the Rubber and Plastics
Group, respectively, of Federal-Mogul Corporation, assignee of the above-
entitled application, and that they were each so employed at the time the
invention described and claimed therein was made;

THAT they have read the Office Action of January 24, 1974, in the
parent application, Serial No. 401,127, filed September 26, 1973, and the
statute set forth in 35 U.S.C. 112;

THAT they have recommended to the attorney of record certain clarifications and additions to the specification of the above-entitled application, which have been incorporated into the continuation-in-part application, entitled above, including the flow chart set forth as new Fig. 3;

THAT they have read the Office Action of December 17, 1974;

THAT, for reasons set forth herein below it is affiants best belief the specification meets the requirements of 35 U.S.C. 112 and would enable one of ordinary skill in the art of programming to practice the invention, including the design of the application code, within a reasonable time not exceeding six months.

THAT they carried out their invention with a small general purpose IBM System/7 computer having multilevel hardware interrupt and process input/output capabilities; that the system was designed to control 60 standard rubber molding presses utilizing existing in-place control circuitry such as thermocouples and timer switches; and that commercially available items such as relays were used to enable computer control press operations such as high current electrical heater elements;

THAT six analog inputs, five digital outputs and two digital inputs each requiring sixteen thousand words of on-line storage were employed; and that for data files containing synthetic rubber cure data and batch data an additional two and a half million words of memory storage was provided by the inclusion of two standard disc storage modules; and that operator-computer communication was provided through a standard key board/printer device;

THUS, as illustrated by the Figures in the present application, the internal organization of the computer problem was interpretive, with the user portion of the program made up of tables of parameters and the application code passing across these tables to determine the specific computer control operation, and that each table was designed so that each press was represented by a single fixed length record containing all of the parameters necessary to control the operation and regulation of the subject press;

THAT the selection of the standard computer hardware required about

two man weeks;

THAT the design of the modification of the existing presses required about two man weeks;

THAT the actual installation and checkout of the hardware utilized by their invention required about eight man weeks;

THAT the collection and insertion into the computer of parameters and data applicable to all sixty molding presses in the manufacturing facility owned by the assignee of this invention required about six man months;

THAT the design of the application code of the computer program in Basic Assembler language, including programming of the Arrhenius equation, was completed in about fifty man weeks.

THAT Basic Assembler language is also customarily referred to in the trade as MSP-7, which is the abbreviated form of the designation Macro System Program - 7;

THAT the total time required from initial conception to successful testing and reduction to practice of our invention was approximately fourteen man months.

THAT two programming personnel were involved in the work outlined above, and spent a total of approximately 2000 hours;

THAT the level of skill for such programmers is no more than that held by any Basic Assembly language programmer;

THAT, given the information now found in the specification, the total time required from initial start through full scale production on all sixty presses would be reduced from the initial fourteen man months to approximately seven man months; and

FURTHERMORE, THAT the design of the application code could be done in

FORTRAN; and

THAT the level of skill necessary to program in FORTRAN is less than that required for basic Assembler language, and consequently, could also have accomplished in substantially less time than that stated above for a series of as many presses as can be scanned in the time needed by the computer to implement the algorithim, which said scanning time is dependent upon computer internal speed and peripheral device speed, as is well known to those of ordinary skill in the art.

Further, affiants saith not.

Dated at Southfield, Michigan, this 6th day of March, 1975.

James R. Diehr, II
James R. Diehr, II

Theodore A. Lutton
Theodore A. Lutton

Subscribed and sworn to before me this 6th day of March, 1975.

Kaye L. Lang
Notary Public
Kaye L. Lang, Livingston County, MI.
Acting in Oakland County, MI.

My commission expires: 8-23-78

-4-

40

602,463

IN THE UNITED STATES PATENT OFFICE

In the application of

JAMES R. DIEHR, II and THEODORE A. LUTTON

Serial No. 472,595

Filed May 23, 1974

For DIRECT DIGITAL CONTROL OF
RUBBER MOLDING PRESSES

Group Art Unit 236

Commissioner of Patents and Trademarks

Washington, D. C. 20231

Dear Sir:

A F F I D A V I T

JOSEPH D. EKLAND, being first duly sworn, deposes and says:

THAT he is Manager, Manufacturing Systems, Manufacturing Engineering Services at Federal-Mogul Corporation;

THAT at the time the parent application of the above-entitled application was filed (the parent application being Serial No. 401,127, filed September 26, 1973) he was employed by IBM Corporation as Senior Marketing Representative;

THAT throughout his twelve years employment with IBM Corporation his work responsibilities consisted of the design of process controls and application of digital computers thereto including hardware selection and further including programming design and implementation;

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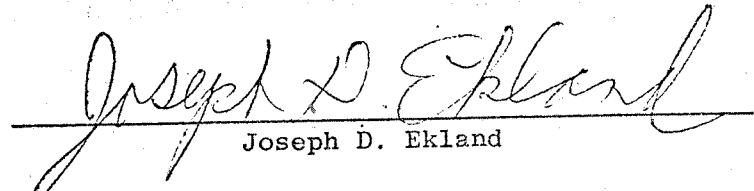
THAT his technical background further includes the degrees of BEE from Rensselaer Polytechnic Institute, 1960, and MSEE, Purdue University, 1962;

THAT he has studied the above-entitled patent application, the parent patent application, the official Office Action of December 17, 1974, and the provisions of 35 U.S.C.112;

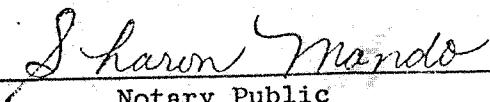
THAT he considers himself to be thoroughly familiar with the invention as described and claimed in the above-entitled application, including the details of programming as set forth therein; and

THAT to affiant's best belief the specification in the continuation-in-part application meets the requirements of 35 U.S.C. 112 and would enable one of ordinary skill in the art of programming to practice the invention, including the development of the complete program, within a reasonable time, not exceeding six months.

Further affiant saith not.


Joseph D. Ekland

Subscribed and sworn to before me this 7th day of March,
1975.


Sharon Mando
Notary Public

My commission expires:

SHARON MANDO
Notary Public Wayne County, Mich.
Acting in Oakland County, Mich.
My Commission Expires Aug. 28, 1977

-2-

462

602, 463

IN THE UNITED STATES PATENT OFFICE

1 In the Continuation-in-Part Application of

2 JAMES R. DIEHR, II and THEODORE A. LUTTON

3 Serial No.: 472,595

4 Filed: May 23, 1974

5 For: DIRECT DIGITAL CONTROL OF
RUBBER MOLDING PRESSES.

6 Group Art Unit: 236

7 Examiner: Joseph F. Ruggiero

8

9 Commissioner of Patents

10 Washington, D.C. 20231

11

12 Dear Sir:

13

14 STATE OF MICHIGAN)
15 COUNTY OF OAKLAND) ss.
16

17 RULE 131 AFFIDAVIT

18

19 JAMES R. DIEHR, II and THEODORE A. LUTTON being duly
20 sworn depose and say:

21 THAT they are the inventors who on September 26,
22 1973, filed the parent application Serial No. 401,127, of
23 which the above identified application is a continuation-in-
24 part thereof;

25 THAT they completed their invention, having made
26 drawings, computer programs, and operative units thereof and
27 disclosed the same to others including Robert E. Wickersham,
28 in this country long prior to September 17, 1973, the filing
29 date of the application from which U.S. Patent No. 3,819,915
30 matured;

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1 THAT long prior to September 17, 1973, James R.
2 Diehr, II prepared writings disclosing their invention, photo-
3 static copies of said writings being attached hereto as
4 Exhibits A1 and A2, B1 and B2, C1 and C2. Exhibits A1 and A2
5 are block diagrams of their invention, Exhibits B1 and B2
6 are two pages of general program flow chart; and, Exhibits
7 C1 and C2 are two pages of computer program of record data
8 for each press controlled by their invention;

9 THAT long prior to September 17, 1973, the invention
10 was reduced to actual practice at the Van Wert Laboratory,
11 National Seal Division, FEDERAL MOGUL CORPORATION, the assignee
12 of record of the present invention; that at the time of said
13 actual reduction to practice and long before September 17, 1973,
14 James R. Diehr, II recorded data from the practice of said
15 invention and then prepared written analyses comparing said
16 invention with prior art practices; that photostatic copies
17 of said written analyses are attached hereto as Exhibits D and
18 E; that in these exhibits the notation S/7 signifies System/7,
19 the popular name affiants ascribe to their invention; that
20 Exhibit D records the time savings for each press operation
21 realized by their invention over the regular calculated cure
22 time (CCT) of the prior art; and, that Exhibit E records the
23 savings in machine hours realized by their invention over the
24 regular machine control method of the prior art;

25 THAT their parent patent application identified here-
26 inabove was prepared by Robert E. Wickersham and forwarded to
27 them via their resident patent counsel within two weeks
28 prior to September 17, 1973; and that affiants are informed
29 and believe and thereon state that Exhibit F is a copy of the
30 letter of transmittal by which the application was forwarded

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1 to them by Mr. Wickersham; and further that their joint
2 declaration in their parent application was executed on
3 September 14, 1973, a copy thereof being attached hereto
4 as Exhibit G;

5 THAT they do not know and do not believe that their
6 invention has been in public use or on sale in this country,
7 or patented or described in a printed publication in this or
8 any foreign country for more than one year prior to their
9 application; and they have never abandoned their invention;

10 Further affiants saith not.

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James R. Diehr, II
James R. Diehr, II

Theodore A. Lutton
Theodore A. Lutton

Kaye L. Lang
Notary Public
Kaye L. Lang, Livingston County, MI
Acting in Oakland County, MI

My commission expires: 8-23-78

-3-

45

602,463

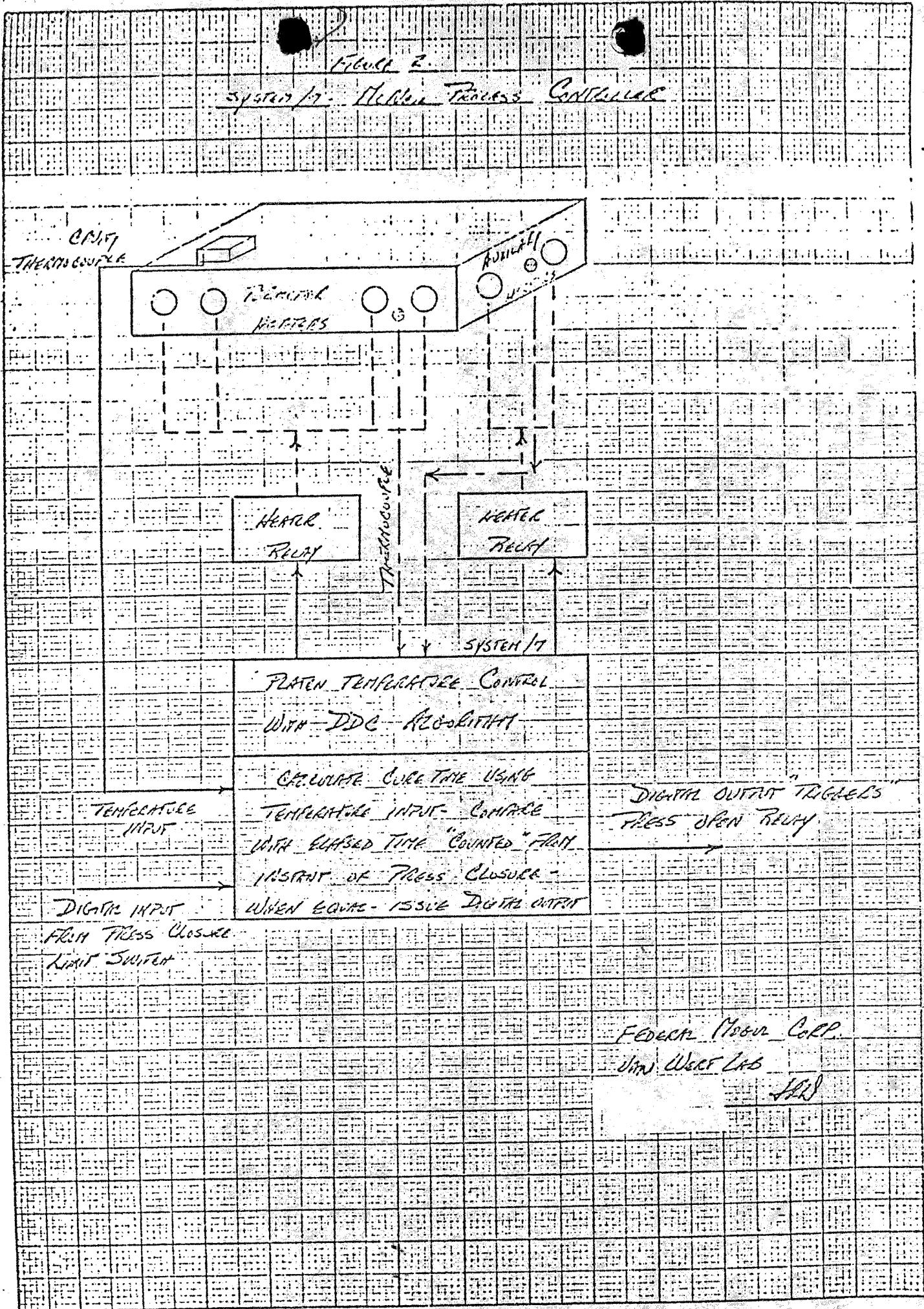


Exhibit A1

46

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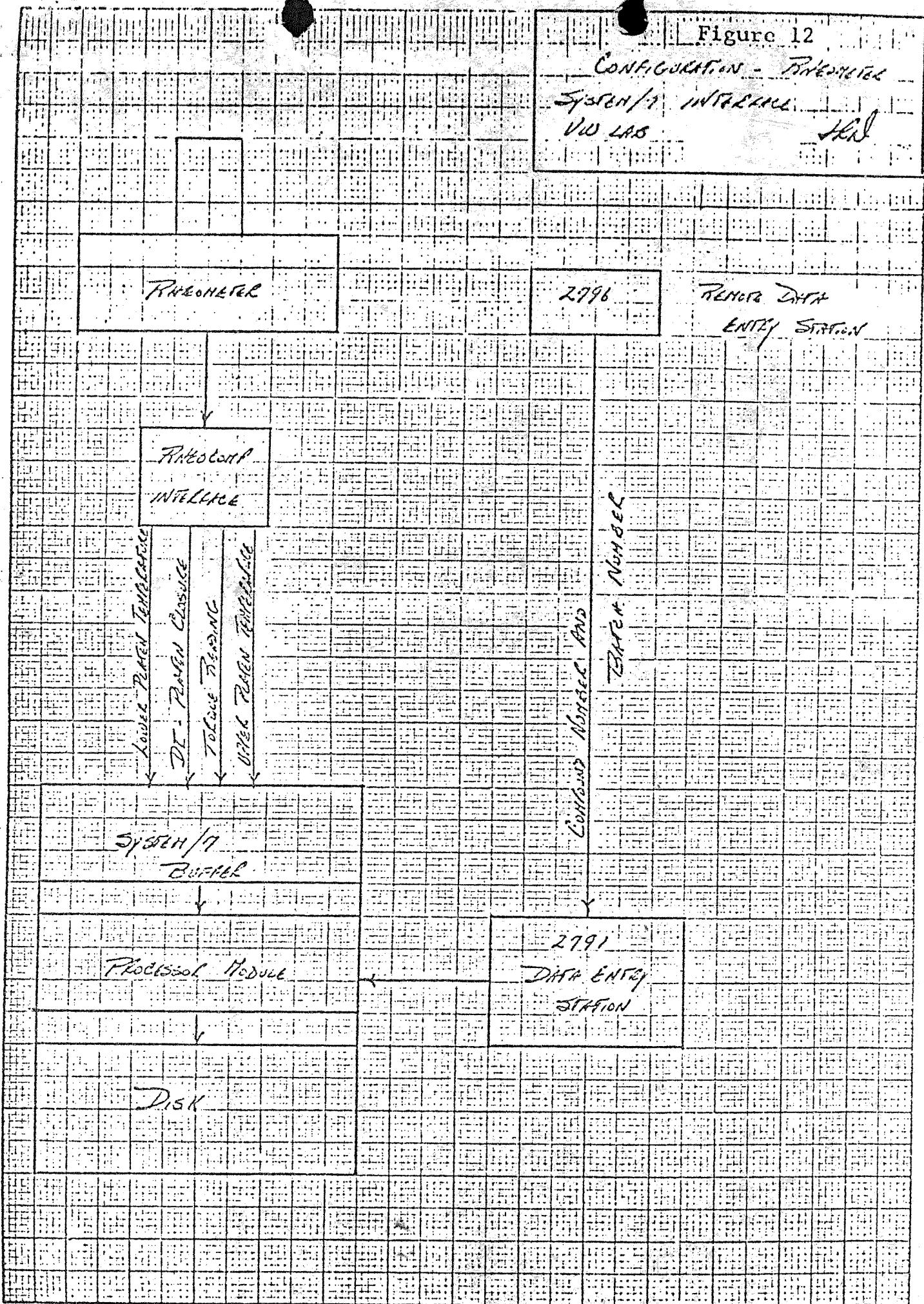


Exhibit A2

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GENERAL FLOWCHART:
SYSTEM/7 PROGRAM
ORIENTATION

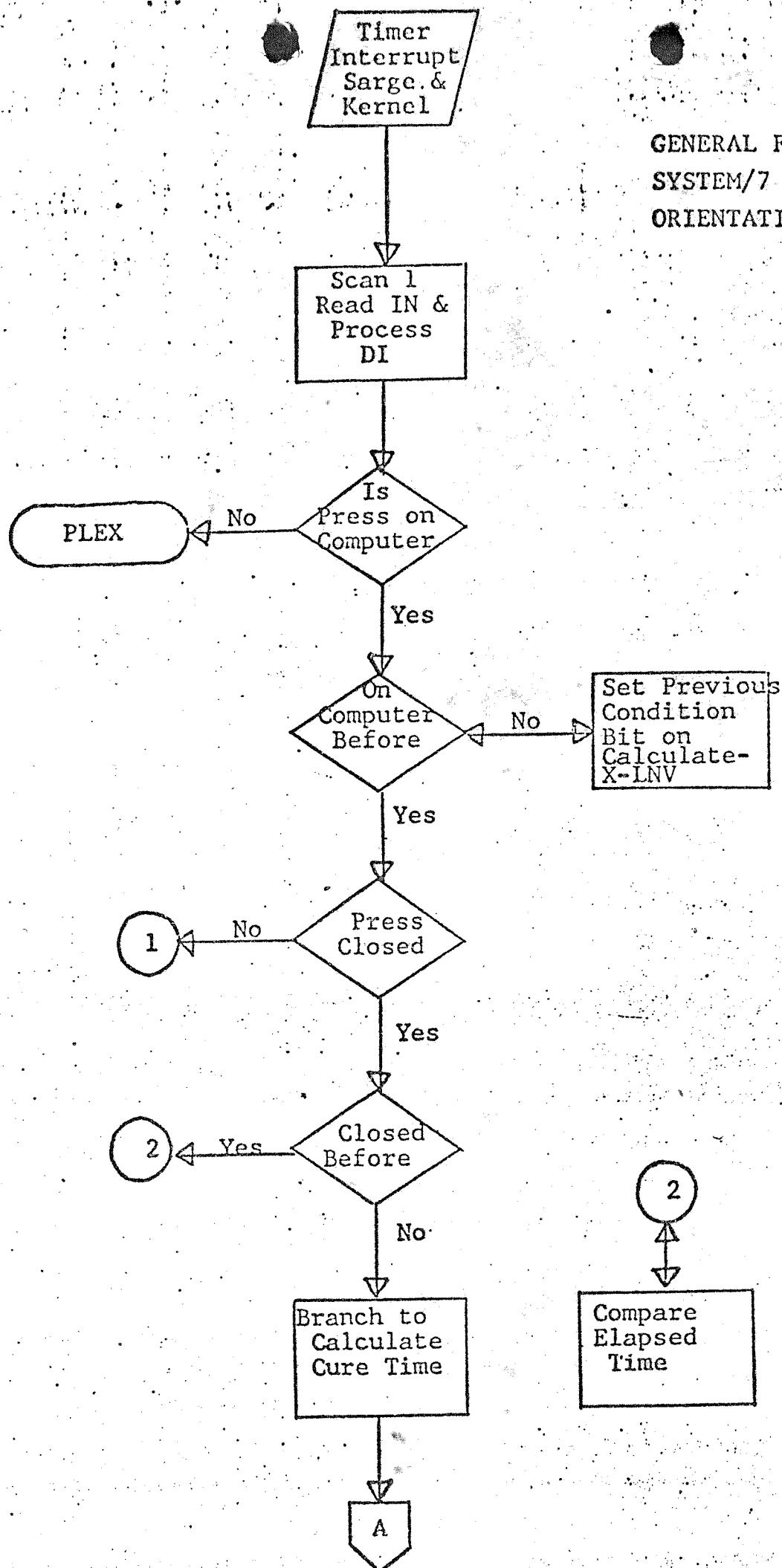


Exhibit B1

48 602,468

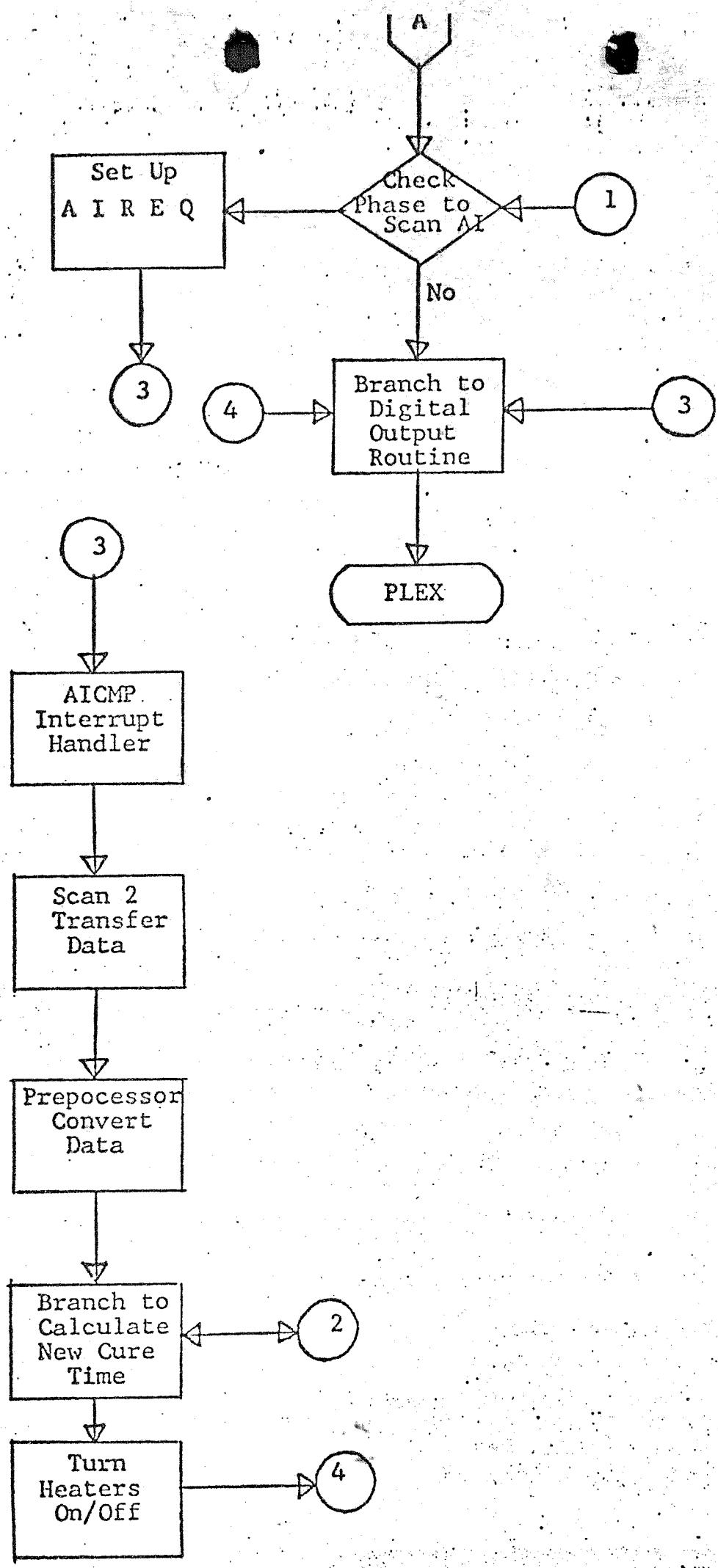


Exhibit B2

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TABLE II					
PRESS RECORD					
WORD NUMBER	WORD NAME	BIT NAME	BIT No.	No. of BITS	DESCRIPTION
1	LWD1	LSFT	0	2	Press Number Service Bits: 00, 01, 11 10 = IN SERVICE; 11 = Service + Running
		LTHDL	2	1	TIME DIAL
		LTSUB	3	4	INPUT SUBSTINE
		LPREV	7	1	PREVIOUS CONDITION: W/OIN SERVICE
		LCYCL	8	4	CYCLE TIME
		LPRES	12	4	PULSE
2	LWD12	LFILT	1	2	FILTER OPTION
		LFCON	2	4	FILTER CONSTANT
		LDSPZ	6	4	DISPLAY INFORMATION
		LEUNT	10	3	DECIMAL POINTS FOR LENGTH UNITS
		LEODD	13	2	ENGINEERING CODES
		LPREL	15	1	PREVIOUS CONDITION - RUNNING
3	LWD13	LMENS	4	16	MEASUREMENT ADDRESS (AI'S)
4	LWD14	LTC1	0	16	UPPER CRUTY TEMPERATURE
5	LWD15	LTC2	0	16	LOWER CRUTY
6	LWD16	LTC3	0	16	TOP PERIMETER
7	LWD17	LTC4	0	16	LOWER
8	LWD18	LTC5	0	16	TOP AUXILIARY
9	LWD19	LTC6	0	16	LOWER
10	LWD10	LLHTE	0	13	LOW LIMIT POSITION
		LLAST	14	2	ACTION ON THE LIMIT
11	LWD11	LLHLMT	0	13	HIGH LIMIT POSITION
		LLHTF	14	2	ACTION ON THE LIMIT
12	LWD12	LLALM	0	2	INPUT NORMAL STATUS
		LDEND	2	2	DEAD BAND 01 = 3.115% 10 = 6.25%
		LLHTC	4	2	LIMIT COUNTER
		LLHTC	6	2	INPUT RATE COUNTER
		LCNTL	8	2	RATE OF CHANGE LIMIT

Exhibit C1

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TABLE II PAGE
PARAMETERS (CONT.)

WORD NUMBER	WORD NAME	BIT NAME	BIT NO.	BITS	DESCRIPTION
12	LWD12	LPARH	10	1	Press in Alarm?
		LMESS	11	4	MESSAGE INFORMATION
			15	1	Not used
13	LWD13	LALGO	0	5	ACCELERATION OPTIONS
		LINUT	5	1	NUCLEAR OUTPUT
		LLRFT	6	11	LARGE TYPE COUNTER
14	LWD14	LBCK1	0	16	VALUE OF 1ST ASSOCIATED BLOCK
		LDEVR	19	1	Value of Deviation - Control
		LOUTP	14	2	OUTPUT ON/OFF: THESE SIGN
15	LWD15	LSERP	0	16	PERIMETER SET POINT
16	LWD16	LODOR	0	16	OUTPUT ADDRESS
17	LWD17	LGAIN	0	16	PROPORIONAL GAIN
18	LWD18	LCOMP	0	16	COMBINED INITIALIZATION
19	LWD19	LRSET	0	16	RESET ACCUMULATION
20	LWD20	LIGGC	0	4	INTEGRAL GAIN CONSTANT
		LDIAD	4	8	DI ADDRESS
		2400T	12	4	HEATER OUTPUT
21	LWD21	LCACC	0	16	ACTIVATION ENERGY CONSTANT (E)
22	LWD22	LCOMN	0	16	COMBINED CONSTANT (a)
23	LWD23	LTZMR	0	16	Avg. TEMPERATURE VARIE (E _{n-1})
24	LWD24	LTIME	0	16	CURE TIME CALCULATED (V _{n-1})
25	LWD25	LTMC	0	16	RUBBER THICKNESS (y)
26	LWD26	LTREN	0	16	ACT. ACTIVATION ENERGY (e)
27	LWD27				NOT USED
28	LWD28	LLIMIT	0	16	INTERCEPT (B)
29	LWD29	LCMT	0	16	GRAVITY TEMPERATURE MEDIUM (T ₀)
30	LWD30	LSYN	0	16	SYNTHETIC NUMBER
31	LWD31	LSERA	0	16	HEATER SET POINT ADJUST

Exhibit C2

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FLANGE	CCT SET		CCT		S/7 SET		S/7		CALCULATED	
	POINT	TIME	POINT	TIME	POINT	TIME	A	A'		
C42-52628	395	2'01"			400	1'31"	-30	-30		
C93-7281A	405	2'01"			410	1'42"	-29	-31		
L34-54418 J	370	1'55"			380	1'45"	-10	-10		
L34-56431 A	370	1'52"			380	1'47"	-5	-10		
C64-52624	380	1'57"			385	1'49"	-8	-20		
V7-63188	405	2'43"			410	2'25"	-18	-22		
B86-3592	415	1'37"			430	1'15"	-22	-25		
B86-54448	415	1'37"			430	1'17"	-20	-25		
C93-7456	405	2'7"			420	1'40"	-27	-31		
L34-6620	370	1'52"			400	1'45"	-7	-10		
L34-4570	370	1'52"			380-400	1'48"	-3	-10		
L34-4480	370	1'55"			370-390	1'45"	-10	-10		
C39-7528	390	2'11"			410-430	1'50"	-21	-31		
B86-5030	400	1'34"			440-460	1'17"	-17	-23		
C39-4095	390	2'4"			410-430	1'50"	-14	-27		
B86-4095	415	1'34"			450-470	1'27"	-7	-23		
L34-4616	370	1'52"			390-410	1'48"	-4	-10		
B86-6835	420	1'34"			450-470	1'22"	-12	-23		
C44-3954	415	1'26"			450-470	1'21"	-5	-13		
B86-6620	415	1'34"			450-470	1'29"	-5	-25		
C39-7540	405	2'4"			430-450	1'49"	-15	-23		
B86-5240	415	1'34"			450-470	1'23"	-11	-23		
B86-4136	415	1'34"			450-470	1'24"	-10	-23		
C39-7634	405	2'4"			430-450	1'52"	-12	-21		
B86-4775	420	1'23"			450-470	1'15"	-8	-20		
C44-4371	415	1'26"			450-470	1'18"	-8	-13		
B86-5104	415	1'34"			450-470	1'20"	-14	-23		
B86-4112	420	1'23"			450-470	1'15"	-8	-20		

4-000 on one in one dimension or 100% utilization of mass
and not random density. See.

ITEM #	JOB %	5/1	CURE TIME (MINUTES)		JOB	SIZING MATERIAL HS.
			REGULAR	STL		
2-5262	69.1	82.8	0.222	0.185	10,000	3.7
3-7281	51.7	61.5	1.509	1.270	1,000	16.7
4-5448	51.7	55.0	0.580	0.548	15,000	4.8
4-3555	47.1	50.0	0.520	0.450	18,000	12.6
4-5262					800	
7-6318	56.1	62.2	0.274	0.246	17,250	4.83
8-3592	56.1	67.5	0.499	0.415	2,600	2.18
8-5448					500	
3-7456	82.8	76.5	0.751	0.645	2700	2.86
4-6620	58.2	61.0	0.325	0.306	8600	1.64
4-4590	51.7	52.9	0.580	0.545		
4-4480	72.7	79.0	0.211	0.200		
9-7528	64.6	71.5	0.634	0.529	2500	2.62
8-4095	80.2	95.0	0.180	0.152	1060	0.30
8-4095	68.0	80.0	0.226	0.193	5500	1.82
8-5030	47.4	56.5	0.487	0.411		
4-4616	56.9	60.5	0.325	0.307	1100	0.20
8-6835	62.7	75.0	0.250	0.211	150	0.06
44-3754	71.2	78.0	0.180	0.164	10,000	1.60
8-6620	62.0	75.0	0.278	0.230	1650	0.08
39-7570	34.2	39.0	1.352	1.180	1100	1.90
86-5240	62.0	74.0	0.278	0.234	5000	2.20
86-4136	50.5	60.0	0.445	0.374	1000	0.71
39-7634	27.9	32.0	1.355	1.190	2500	4.13
8-4715	86.6	100.0	0.166	0.142	5500	1.33
44-4871	67.2	74.0	0.276	0.250	1000	0.26
86-5104	62.0	74.0	0.278	0.234	1320	0.60
86-4612						
					Total Pcs	121,030
					Total Sizess	67.12

Exhibit E

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602,463

September 4, 1973

Robert F. Hess, Esq.
Patent Counsel
Federal-Mogul Corporation
P. O. Box 1966
Detroit, Michigan 48235

Re: Patent Application on DIRECT DIGITAL
CONTROL OF RUBBER MOLDING PRESSES
OWE Case No. 319

Dear Bob:

Enclosed are two copies of the drawings and specification for the above case incorporating Jim Diehr's changes.

We do not have Jim's address for the enclosed assignment and also need his address, as well as his citizenship status, noted on the enclosed declaration.

Upon receipt of the above signed documents, we will forward this application to the Patent Office for filing.

Sincerely,

Robert E. Wickersham

REW:iif

Enclosures

cc: Mr. Alfred S. Berens (w/encl.)
Mr. James R. Diehr, II

Exhibit F

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602,463

DECLARATION COMBINED WITH POWER OF ATTORNEY

We, the undersigned James R. Diehr, II. and Theodore A. Lutton declare that we are respectively a citizen of the United States of America residing at Troy, Michigan and Birmingham, Michigan respectively; that we have read the foregoing specification and claims and we verily believe we are the original, first and sole inventors of the invention in DIRECT DIGITAL CONTROL OF RUBBER MOLDING PRESSES described and claimed therein; that we do not know and do not believe that this invention was ever known or used before our invention thereof, or more than one year prior to this application; or in public use or on sale in the United States more than one year prior to this application; that this invention has been patented in any country foreign to the United States on an application filed by us or our legal representatives or assigns more than twelve months before this application; and that no application for patent on this invention has been filed by us or our representatives or assigns in any country foreign to the United States, except as follows: NONE.

And we hereby appoint ROBERT E. WICKERSHAM of Owen, Wickersham & Erickson, 310 Sansome Street, San Francisco, California, 94104, Registration No. 16,150 and telephone number 415/781-6361 our attorney with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith.

And we declare further that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

55

Exhibit G.

602, 463

Wherefore we hereby subscribe our names to the foregoing specification and claims, declaration and power of attorney this 14th day of September, 1973.

Inventor

James

First Name

R.

Middle Name

Dick

Last Name

Post Office Address

(2379 Waltham Drive

(

Troy, Michigan 48084

Inventor

Markel A Sutton

First Name

Middle Name

Last Name

Post Office Address

(15668 Dunblaine

(

Birmingham, Michigan 48009

56

602,463