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PRELIMINARY SIMULATION OF THE MDAC
RECEIVER PANEL TEST SEQUENCES TO BE
IMPLEMENTED AT THE CR-STTF

23 February 1979

Prepared by

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Submitted as a partial account of work
performed for the Department of Energy,
on Advanced Central Power System Studies
and Support Tasks, under Contract No.
EY-76-C-03-1101 (PA #14).

Introduction

One of the principal projects undertaken by the U.S. Department of Energy (DOE) in its program to develop alternate sources of energy is the Barstow, California 10MW Solar Thermal Pilot Plant. A McDonnell-Douglas/Rocketdyne (MDAC) "once-through" central receiver design has been selected as that plant's solar-to-electrical energy conversion device.

In this design, feedwater entering at the bottom of the tower-mounted receiver flows up through 1680 vertically-mounted external tubes. The feedwater is converted by the radiant solar energy focussed by a large surrounding field of mirrors into superheated steam in a single pass.

Though the once-through boiler concept is familiar to the electric power industry, its application to the solar energy conversion process introduces certain concerns, among which are reliability and performance of the boiler under the projected high flux levels of a commercial unit. The Pilot Plant flux levels, being less than half those of a commercial unit, cannot completely resolve these concerns.

In order to augment the data which will be produced by the Pilot Plant operation and to assist in the detail design of the Pilot Plant receiver itself, an early series of tests on a full-size MDAC receiver panel has been planned. The tests are scheduled to begin at the DOE Central Receiver-Solar Thermal Test Facility (CR-STTF) in Albuquerque during March, 1979.

Under the auspices of DOE, a dynamic digital computer simulation of that STTF-MDAC receiver panel configuration has been developed by the Aerospace Corporation. The purpose of such a simulation is to permit early, inexpensive studies of proposed test sequences and rapid investigations of potential control schemes. The results of those studies could give experimenters valuable insight into equipment performance parameters, and thus permit prudent limiting of actual hardware test time on the more expensive facility.

References 1 and 2 contain fairly complete descriptions of the models employed in the simulation program. The following section is excerpted from those documents to present here a concise overview of the computer program.

Simulation Program Description

The program contains modules to simulate the collector field, cooling subsystem, steam depressurization and desuperheat subsystem, feedwater regenerative heat exchanger, MDAC receiver panel, and control subsystem. Figure 1 shows the interconnection of these subsystems at the STTF.

Insolation data for Albuquerque were extracted from the data tapes described in Reference 3. Each month of the year is represented by one typical clear day near the 21st of each month. A table was developed of the insolation level at each hour of the day. Given an actual time of the day, the table is linearly interpolated for the appropriate value.

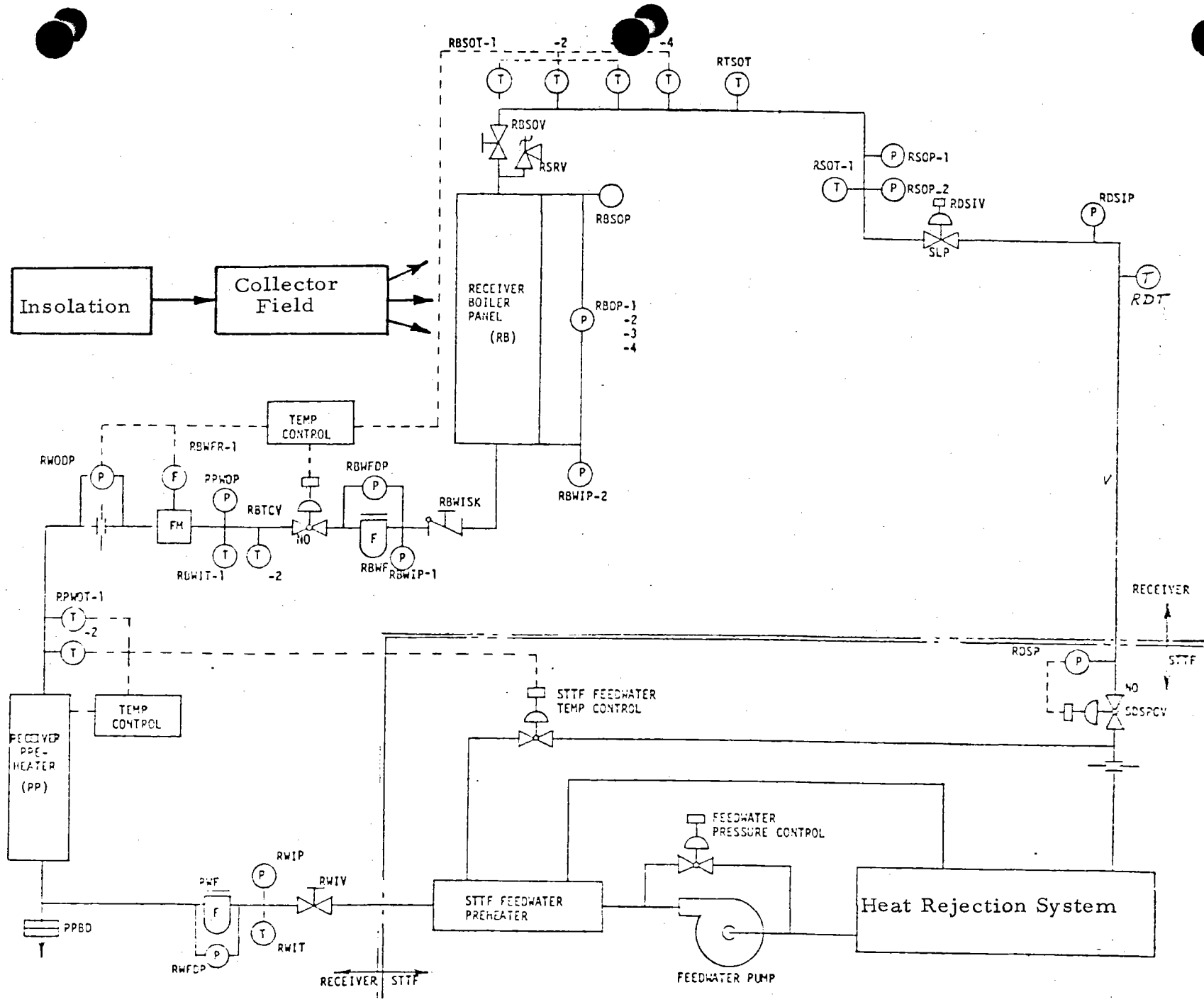


Figure 1. STTF Schematic With MDAC 5MWt Receiver Experiment

The collector module calculates the flux distribution on the receiver at the specified time. Heliostat reflectivity and atmospheric attenuation coefficients are provided by the executive routine, direct insolation by the insolation module, and from these the appropriate value of power is provided to the receiver.

The depressurization-desuperheater subsystem takes superheated steam from the receiver, depressurizes it using a pressure control valve, and injects it into the desuperheater drum. Water spraying from the cooling module condenses the steam and produces subcooled condensate. A portion of the condensate is extracted for feedwater and the remainder used for the water sprays. The cooling module circulates the condensate through the shell side of a heat exchanger to reject heat to the environment through cooling towers.

During the early part of a startup procedure, feedwater is heated to the desired inlet temperature by a receiver module electrical heater. When sufficient energy is available at a later point in the sequence, all feedwater heating is accomplished with the facility preheater, using receiver-generated steam.

The receiver panel model is based on the performance of a typical tube, which is (mathematically) partitioned into three sections: subcooled water, saturated two-phase mixture, and superheated steam. The length of each of these sections is allowed to vary with time. The basic model equations were derived from the integral form of the fundamental equations of conservation of mass, momentum, and energy using the control volume approach.

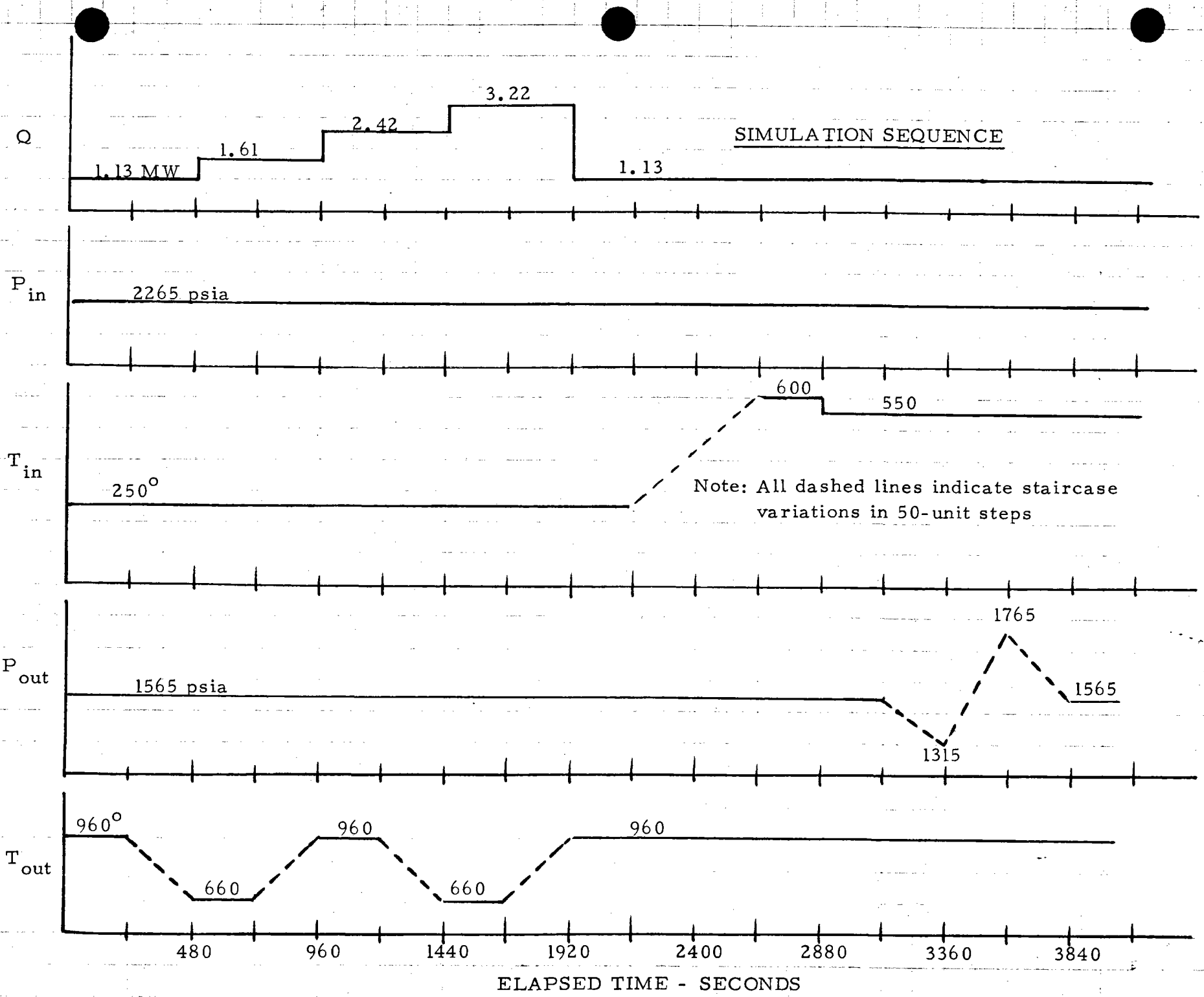
The temperature controller strives to maintain the panel outlet temperature at a selected set point value by commanding the position of the inlet flow control valve. The control logic proposed by MDAC (see Reference 4) was modelled in the simulation. Values of controller gain constants, however, were not available, necessitating usage of values judged by Aerospace to be typical.

STTF Test Program

The kinds of tests and the sequence of procedures planned at the STTF for the MDAC receiver panel are described in Reference 4. Presently that Plan consists of two test categories: those with and without the addition of special reflectors which produce greater-than-normal heat flux. Altogether there are thirty test sequences outlined. For these initial simulations, MDAC Test #20 was selected to show the capabilities of the computer program.

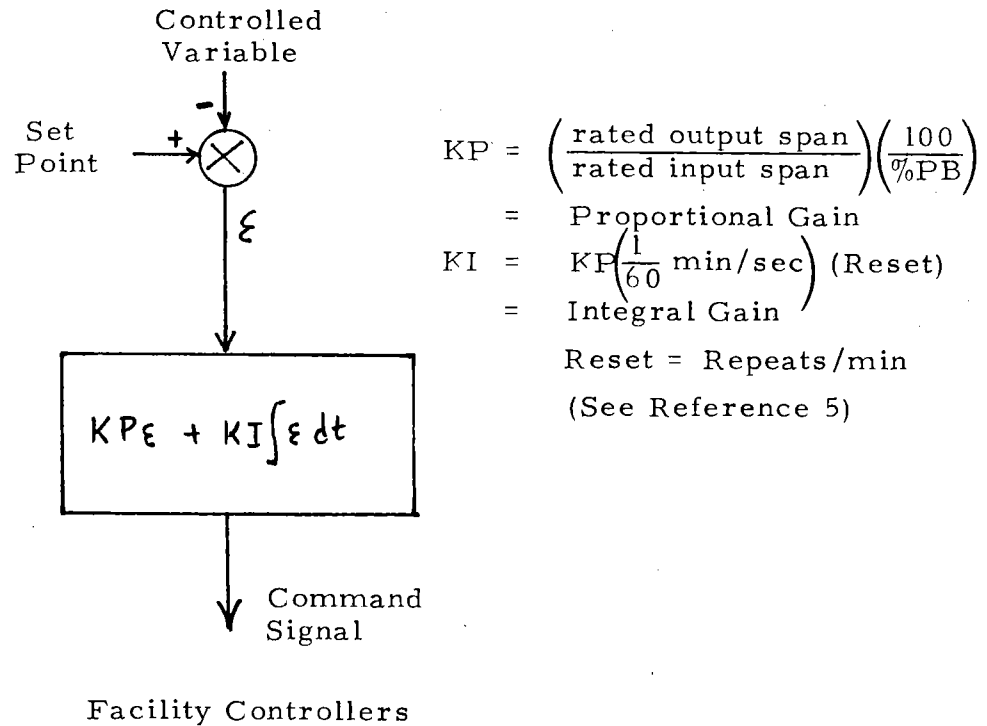
Simulation Case Study

The sequence of selected simulation events representing Test #20 is shown schematically in Figure 2. Note that the transitions from one power level to another are introduced instantaneously, and that the transitions



in state variable set points are introduced gradually through a series of step variations. Another technique for varying set points, which the computer program could also simulate, is a ramping transition (not shown here).

The Heat Rejection System of the STTF contains four Proportional-Integral (P-I) controllers to maintain prescribed conditions at the Receiver test panel inlet and outlet. A general block diagram of the control logic for these controllers is:



Preliminary values for three of the four STTF controllers had been determined by STTF personnel* and were provided to Aerospace. The data provided were:

Feedwater Pressure Controller

Proportional Band (PB) = 90%
Reset = 0.2 repeats/min

*Private Communication, W. McAtee, 12 December 1978

Desuperheater Pressure Controller

Proportional Band (PB) = 10%
Reset = 1.0 repeats/min

Outlet Steam Pressure Controller

Proportional Band (PB) = 60%
Reset = 1.0 repeats/min

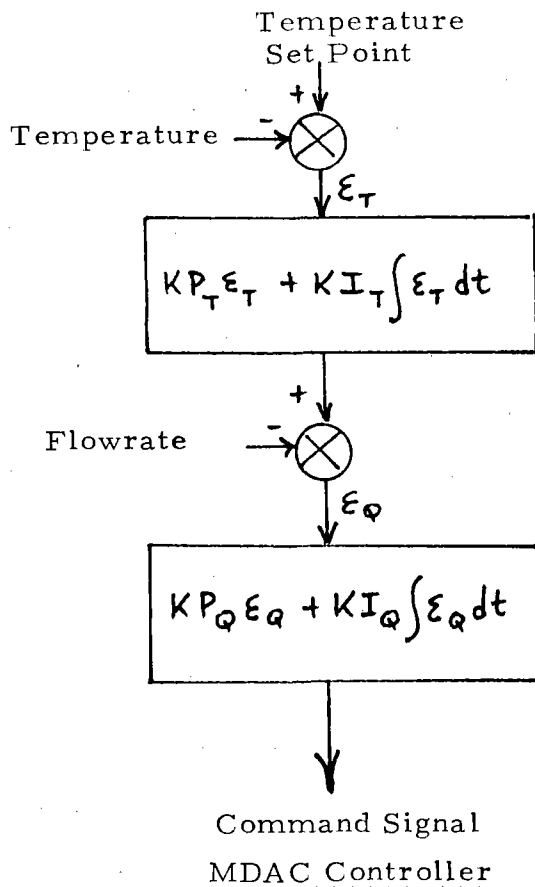
Data were not available for the Feedwater inlet temperature controller or the MDAC Receiver outlet temperature controller. Values which Aerospace determined to be reasonable for purpose of the simulation were:

Feedwater Temperature Controller

Proportional Band = 50%
Reset = 1.0 repeats/min

MDAC Temperature Controller

Temperature PB = 20%
Temperature Reset = 0.1 repeats/min
Flow rate PB = 75%
Flow rate Reset = 2.0 repeats/min



$$KP = \left(\frac{\text{rated output span}}{\text{rated input span}} \right) \left(\frac{100}{\%PB} \right)$$

= Proportional Gain

$$KI = KP \left(\frac{1 \text{ min}}{60 \text{ sec}} \right) \text{ Reset}$$

= Integral Gain

Reset = Repeats/min

(See Reference 5)

Preliminary checkout runs revealed that the Feedwater Pressure Control Loop was unstable. Specifically, the control valve associated with this loop was continually ratcheting between the full open and minimum stop positions. An increase of the proportional band to its maximum value (1000%) resulted in what was judged to be adequate feedwater pressure control. No problems were encountered with the other facility control loops.

Simulation Results

Figures 3 through 12 are plots of selected variables for a simulation run lasting 3800 seconds. Many other variables, e. g., valve positions, are available as outputs of the program but are not included here.

Figure 3 (each figure comprises four sheets to cover the total simulation time) shows the power incident on the receiver for this test. For such a short run, sun and cloud motions are neglected and thus a time invariant flux distribution on the panel is assumed. It should be noted that the 3.2 MW level is the maximum power expected on any panel in Pilot Plant operation.

Figure 4 indicates the actual power absorbed by the water/steam in the receiver. In steady-state this is slightly less than the incident power due to radiation loss, convection loss, etc. At 240 seconds the first effect of lowering the steam temperature set point is seen. As the set point is lowered, increased flow temporarily increases the absorbed power due to the greater kinetic energy of the feedwater. Absorbed power settles back to its nominal value in about 40 seconds. At 480 seconds the first effect of an increase in the incident power is also seen.

As shown in Figure 5, the preheater outlet temperature is held close to the desired 250° to about 2160 seconds. At that time an increase to 400° is desired, but because the facility preheater is not active below a value of 400°, the change must be implemented in the simulation by adjusting the desuperheater pressure (and hence temperature) which is seen not to be very effective. The next step, however, to a desired level of 550° does activate the preheater temperature controller. The rapid control action is quite obvious. The temperature never achieves the set point, however, since the desuperheater temperature did not reach 400° until the end of the run, and below that level the preheater has insufficient capacity.

Feedwater pressure was scheduled to be held constant throughout the run at 2265 psia and is seen on Figure 6 to be tightly controlled at that value. Note that this controller proportional gain was the parameter altered by Aerospace from the value originally specified.

Figure 7 shows the variation in the inlet flow rate with time. A point of interest is the very slowly decaying flow rate starting at 1920 seconds in response to an abrupt drop in incident power from 3.22 to 1.13 MW. This shows that the receiver temperature controller, with the gains selected by Aerospace, was unable to respond rapidly to the transient, and the receiver effectively lost steam conditions altogether at that point.

The above effect is seen dramatically in Figure 8 where the outlet temperature is seen to immediately drop to 600° at 1920 seconds. This is the saturated steam temperature for the existing pressure. Steam conditions are reestablished at 2080 seconds.

Figure 9 indicates the performance of the outlet steam pressure controller. It is seen to be very effective until the large transient at 1920 seconds. At 3120 seconds the planned variations in set point begin. These variations present no problem to the controller.

Figure 10 shows the levels of the three phases of water/steam in a typical tube as the simulation progresses. The lower third (approximately) of the tube contains subcooled water; the middle third, saturated two-phase mixture; and the top third, superheated steam. Note that at 1920 seconds the superheated steam region disappears, to return again at 2080 seconds.

Figures 11 and 12 show the effects of the various programmed changes on the desuperheater temperature and on the cooling tower inlet temperature. No unanticipated results occur.

Conclusions

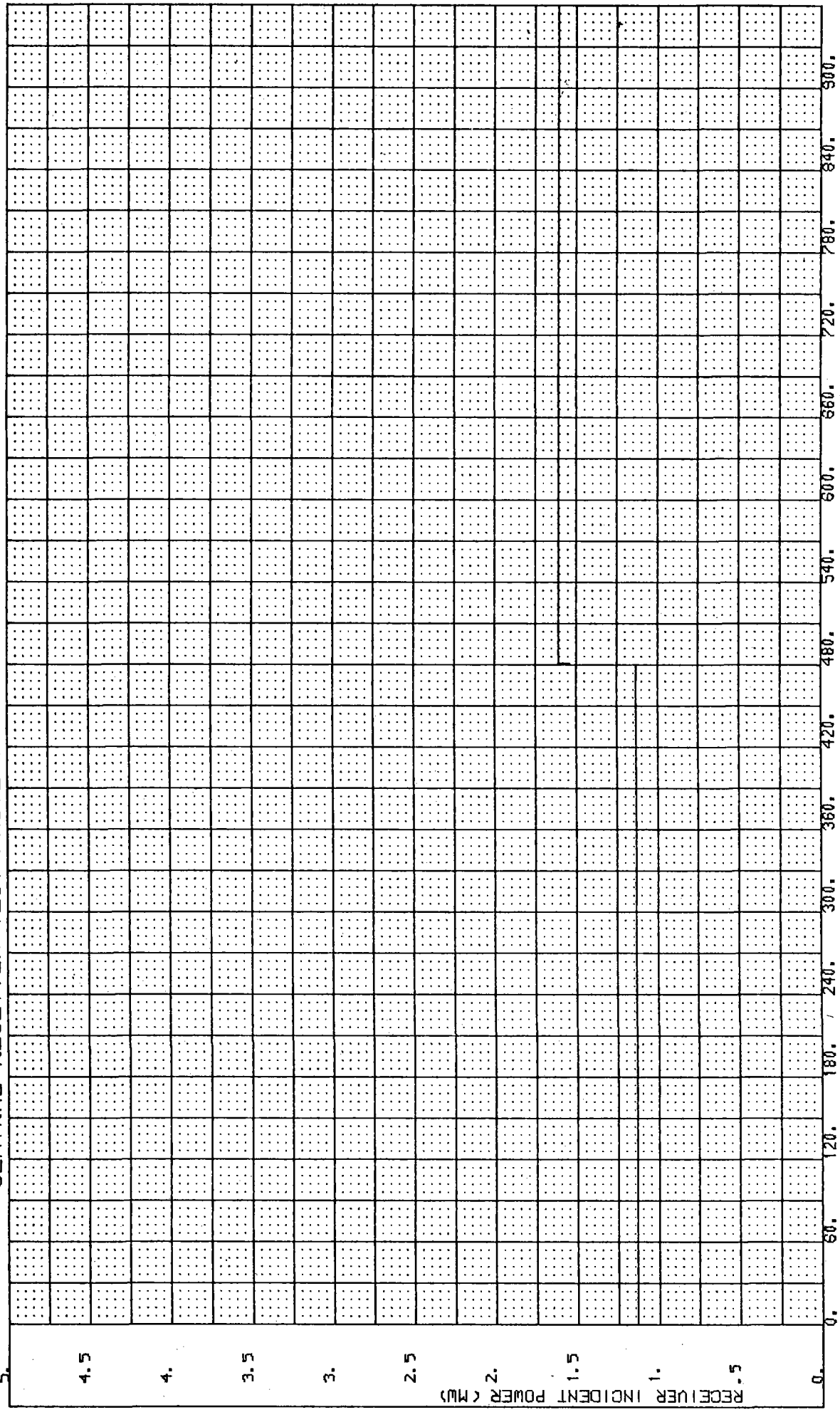
A dynamic simulation computer program has been developed for the STTF-MDAC Receiver test configuration. An example case has been presented showing the effects of changes planned in MDAC test No. 20.

Facility controllers have been modeled pursuant to data received from STTF personnel, but in one case (the Feedwater Pressure Control Loop) a simulation gain constant had to be altered to prevent instability. Two other controllers, the Feedwater Inlet Temperature and the Receiver Outlet Steam Temperature, were also modeled with gain constants selected by Aerospace in the absence of any specified values. The results reported here indicate that the gains selected by Aerospace for that steam temperature controller are not optimum and must be further refined.

REFERENCES

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2. Transient Simulation of the MDAC Receiver Test Panel In Its STTF
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Report No. ATR-76(7523-11)-9, The Aerospace Corporation, Decem-
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5. Industrial Process Control, Lloyd and Anderson, Fisher Controls
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CENTRAL RECEIVER TEST FACILITY SIMULATION



TIME (SECS)

Figure 3

CENTRAL RECEIVER TEST FACILITY SIMULATION

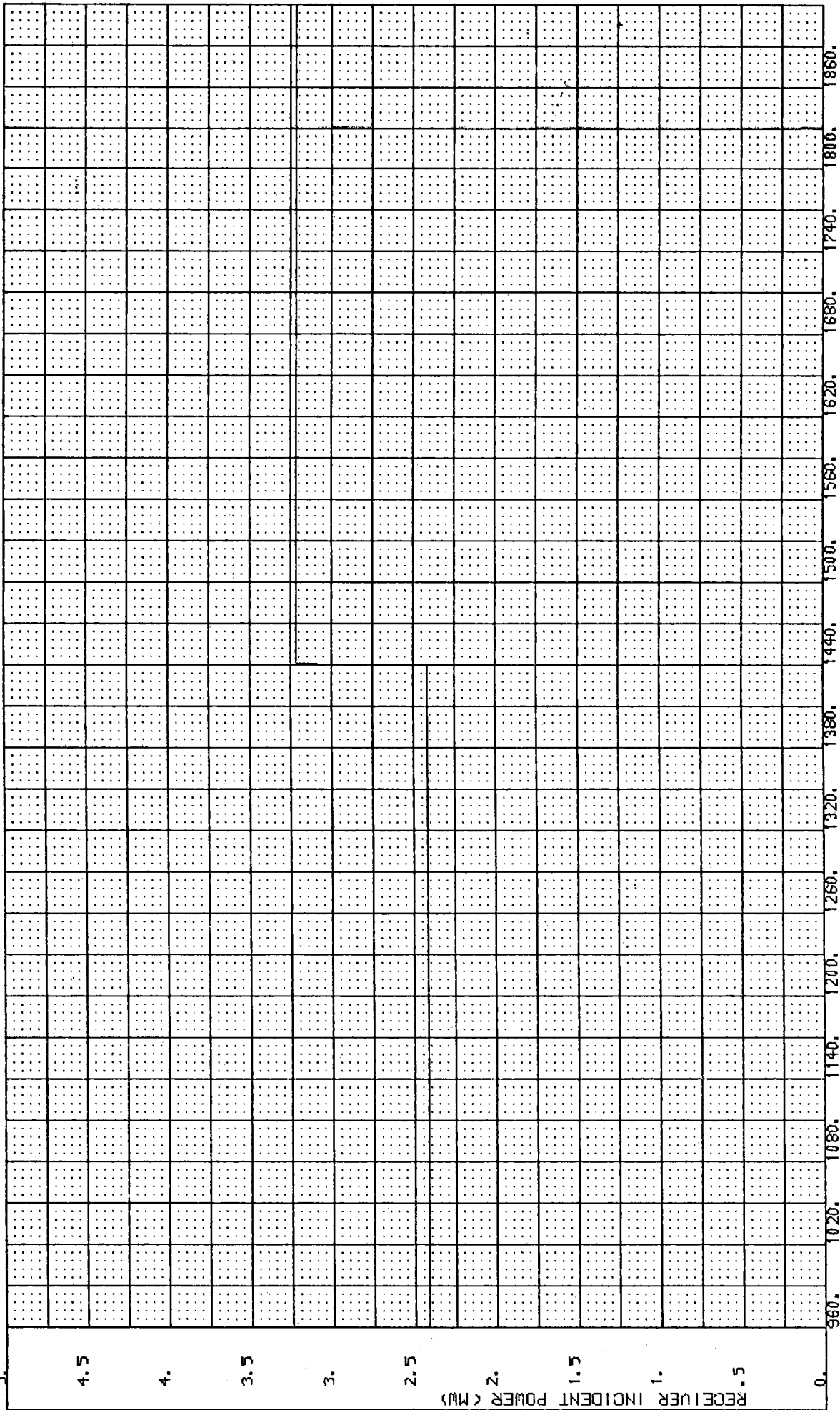


Figure 3

CENTRAL RECEIVER TEST FACILITY SIMULATION

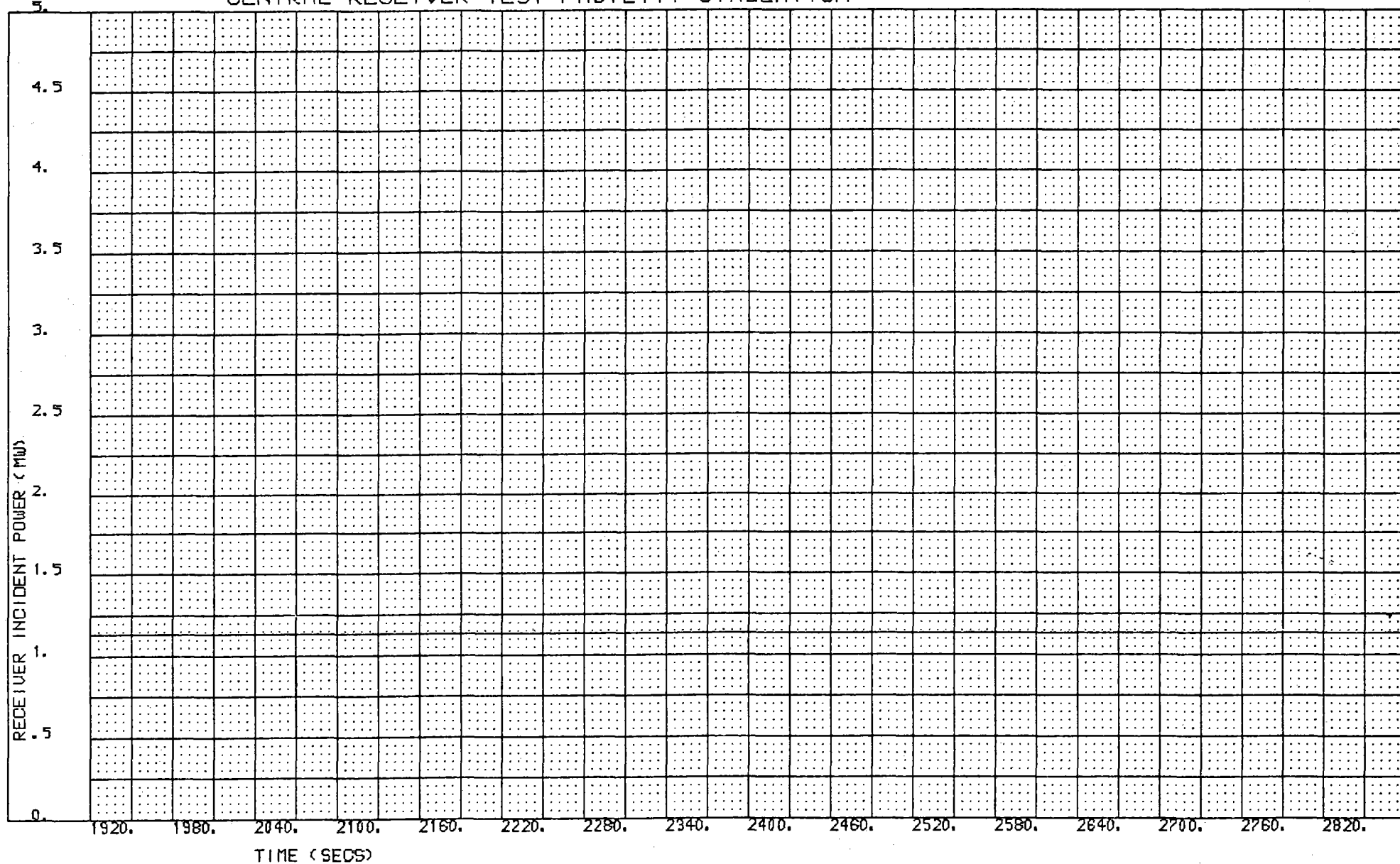


Figure 3

CENTRAL RECEIVER TEST FACILITY SIMULATION

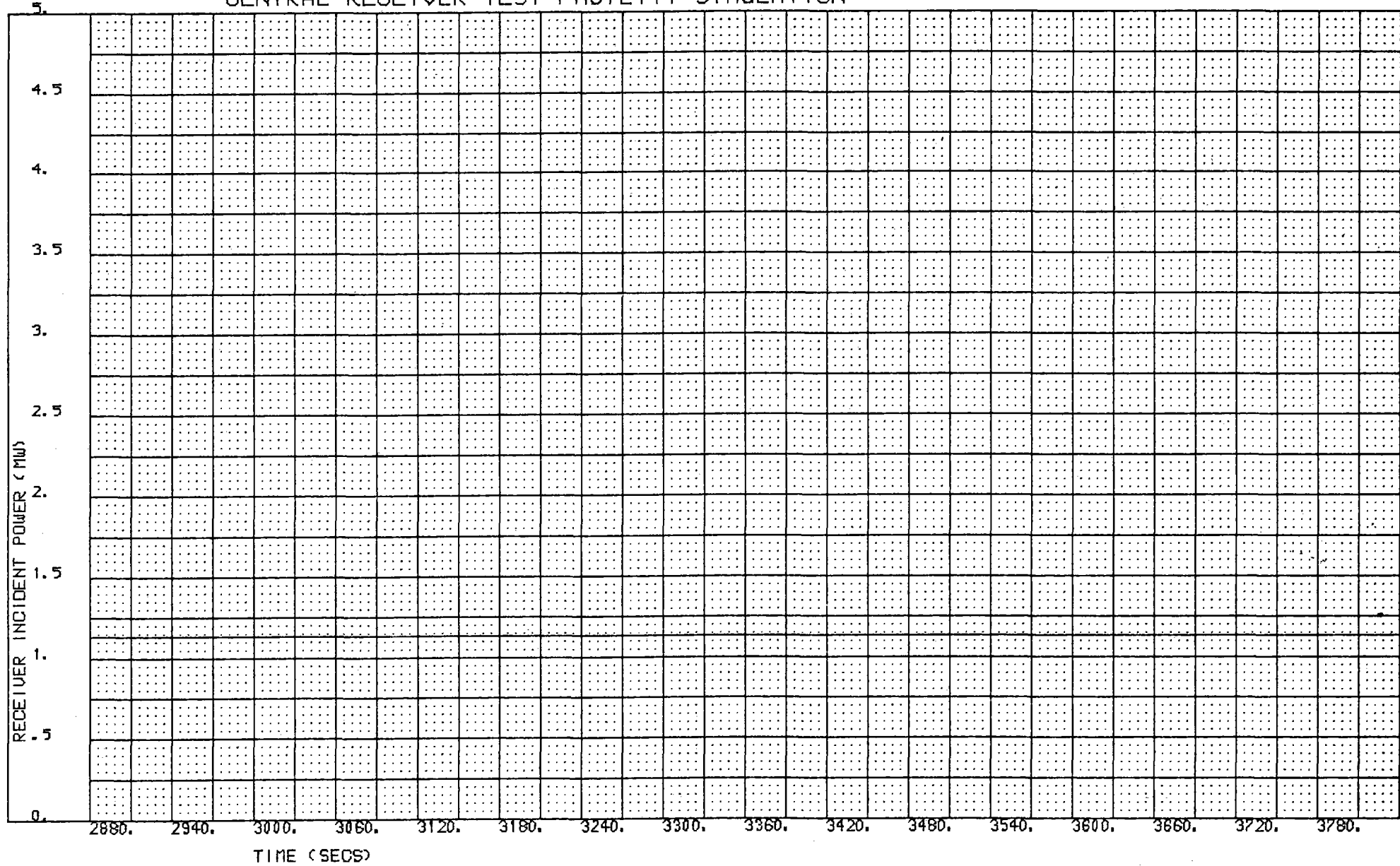


Figure 3

CENTRAL RECEIVER TEST FACILITY SIMULATION



Figure 4

CENTRAL RECEIVER TEST FACILITY SIMULATION

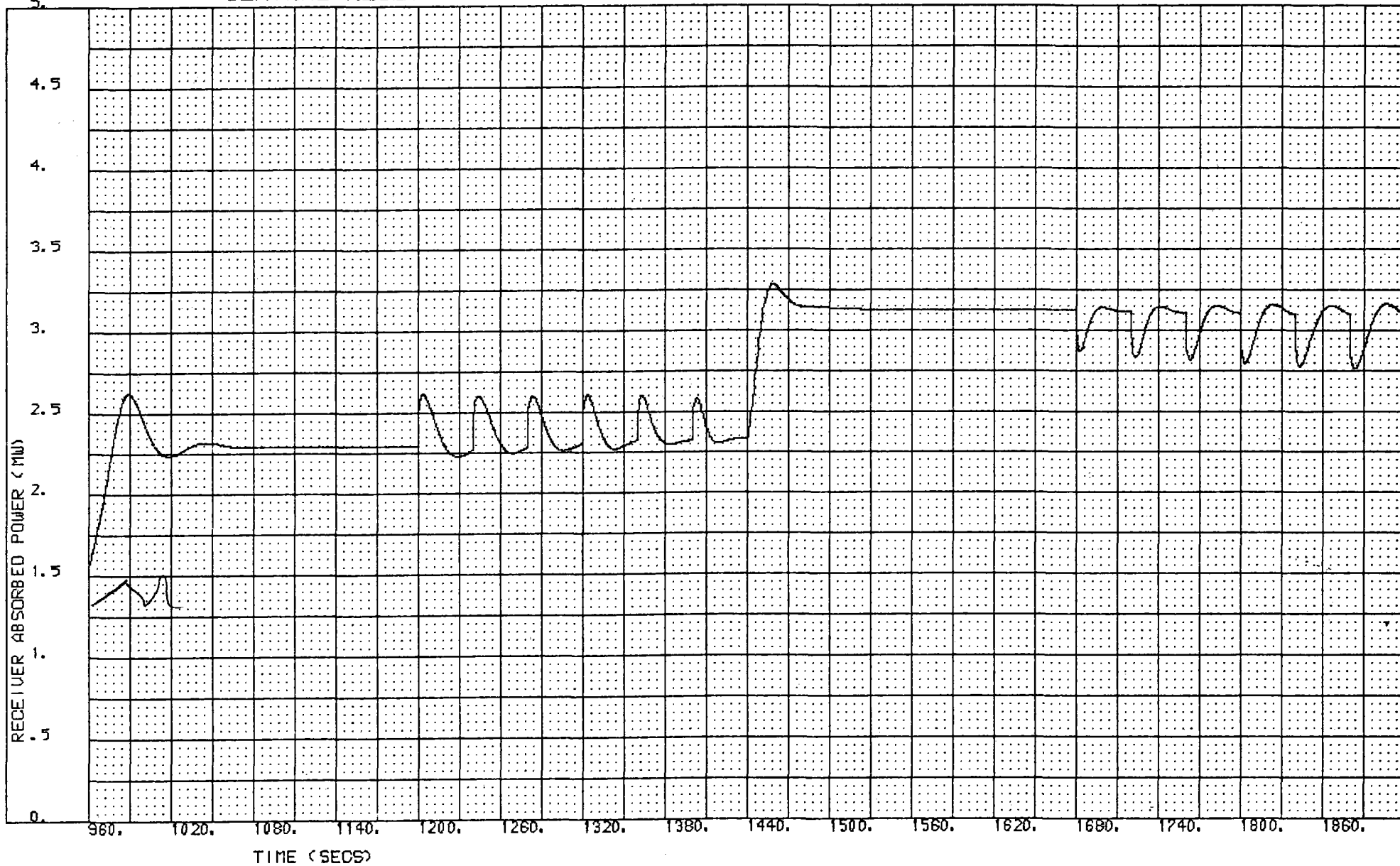


Figure 4

CENTRAL RECEIVER TEST FACILITY SIMULATION

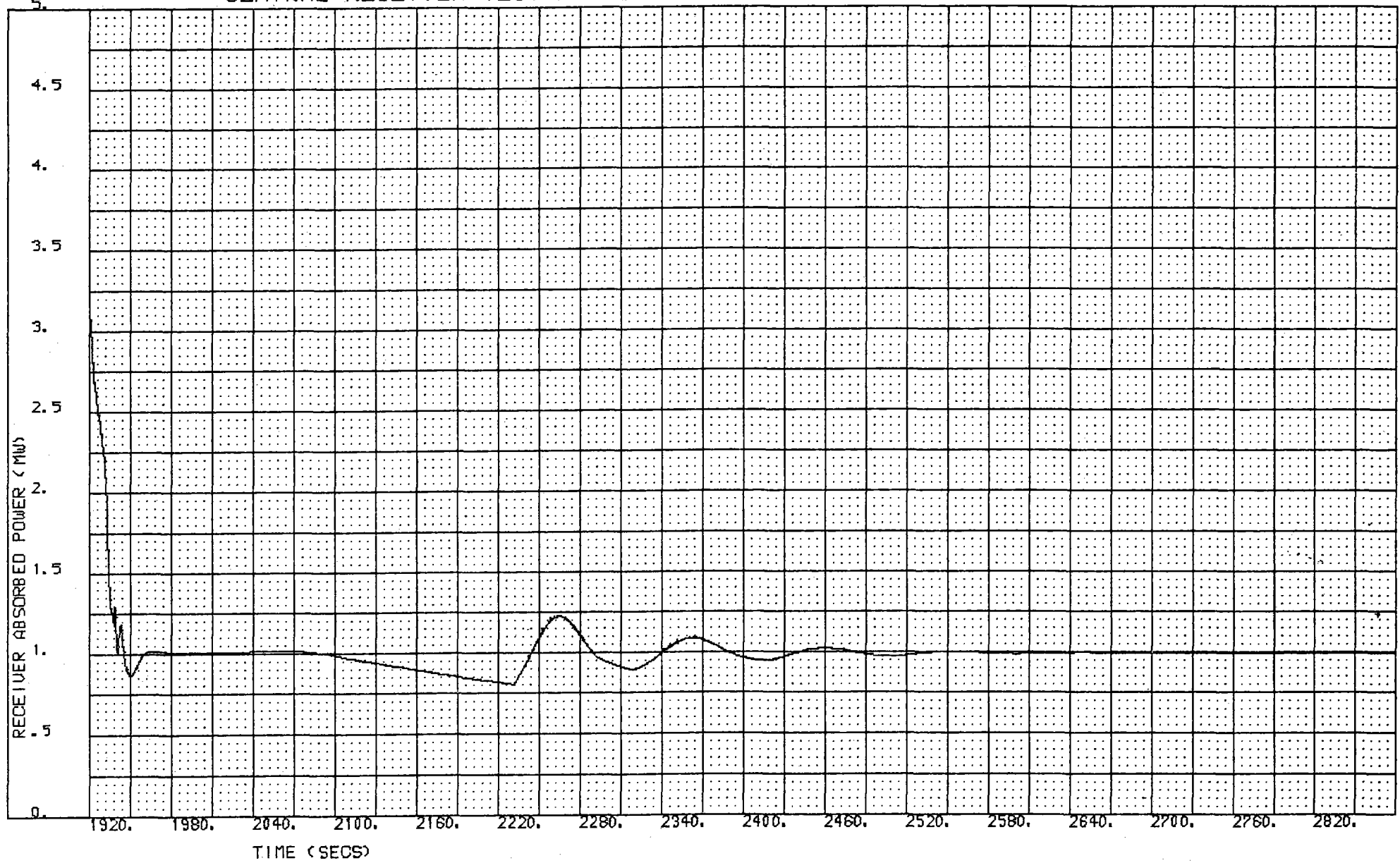


Figure 4

CENTRAL RECEIVER TEST FACILITY SIMULATION

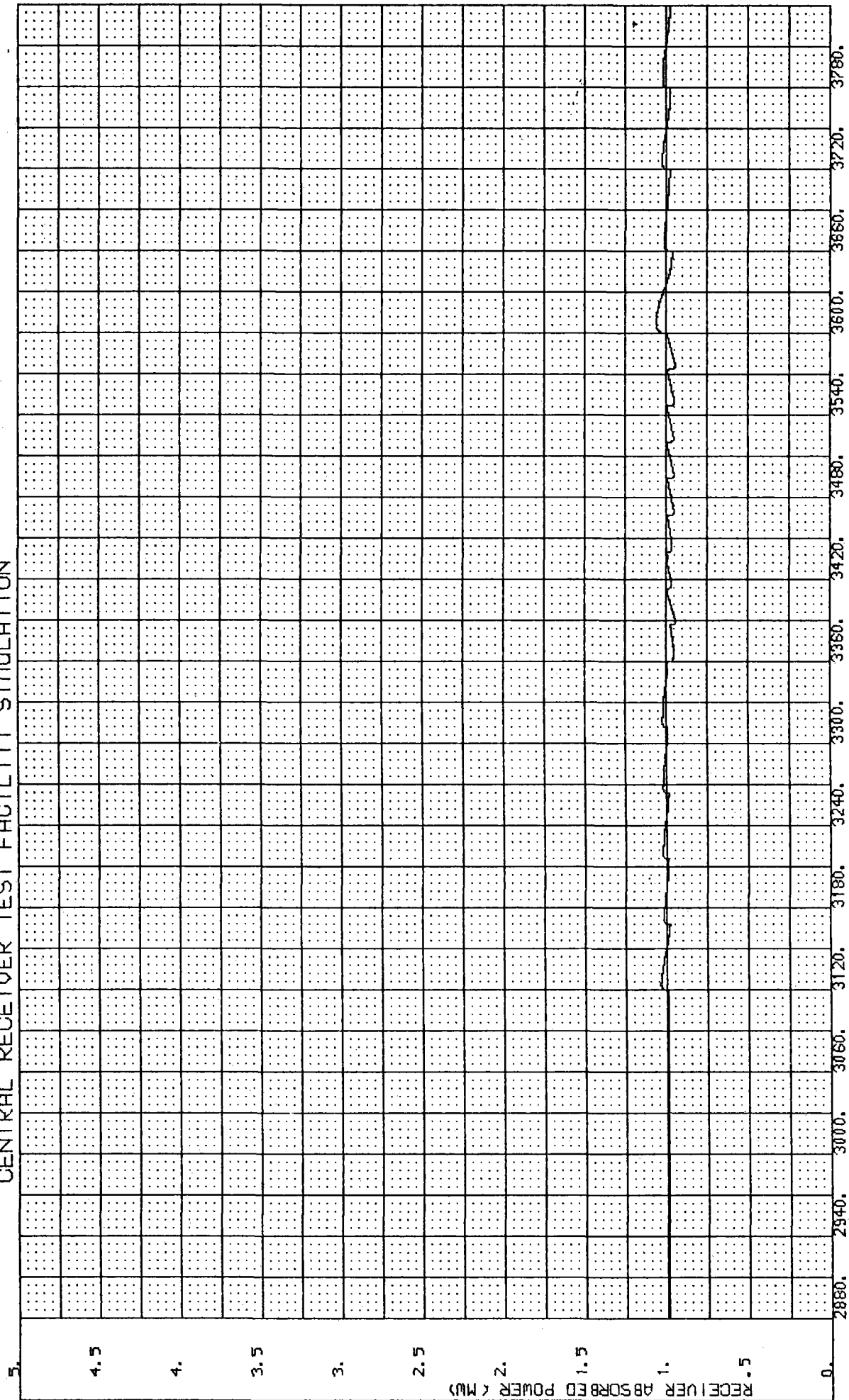
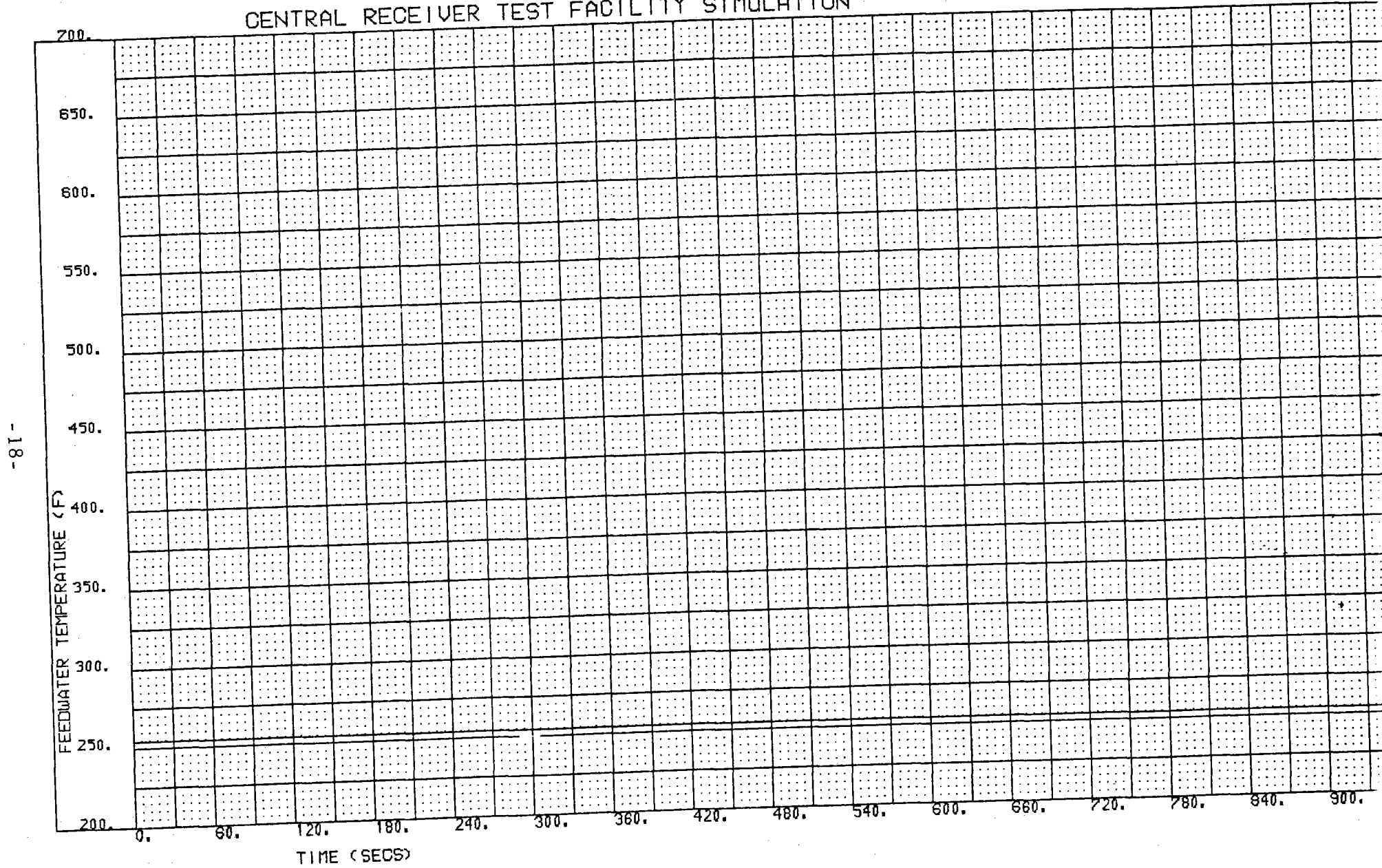


Figure 4

CENTRAL RECEIVER TEST FACILITY SIMULATION



-81-

Figure 5

CENTRAL RECEIVER TEST FACILITY SIMULATION

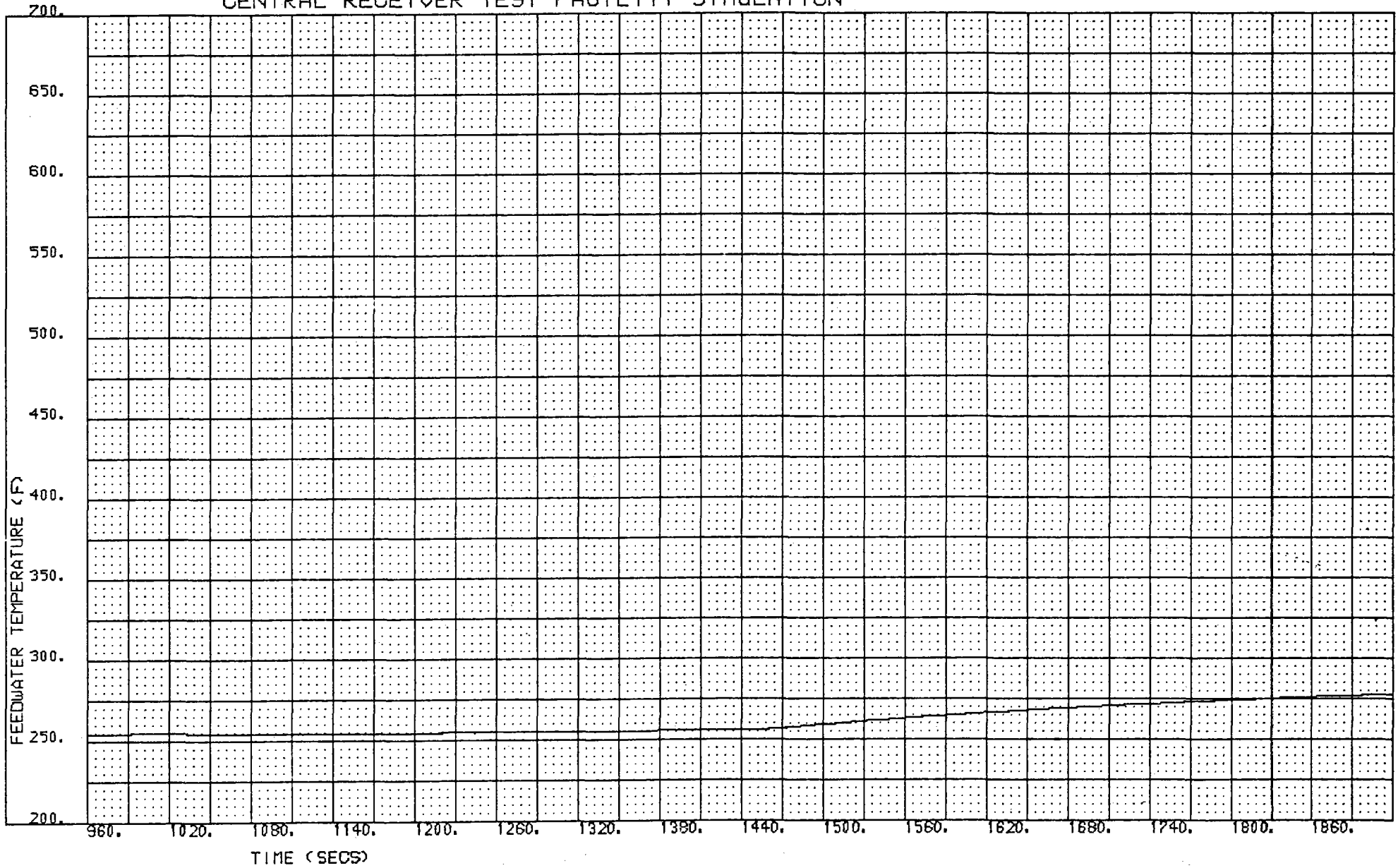


Figure 5

CENTRAL RECEIVER TEST FACILITY SIMULATION

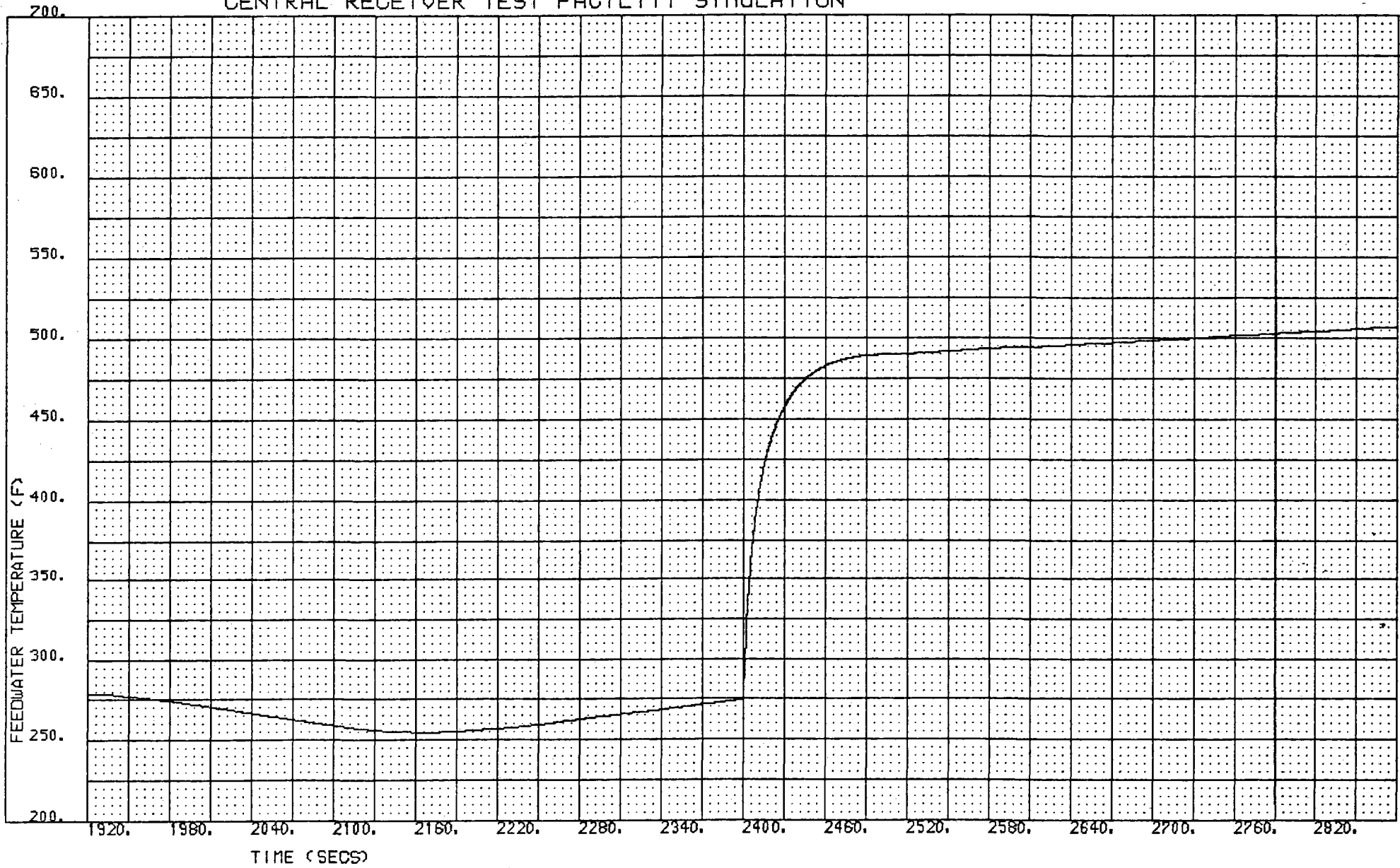
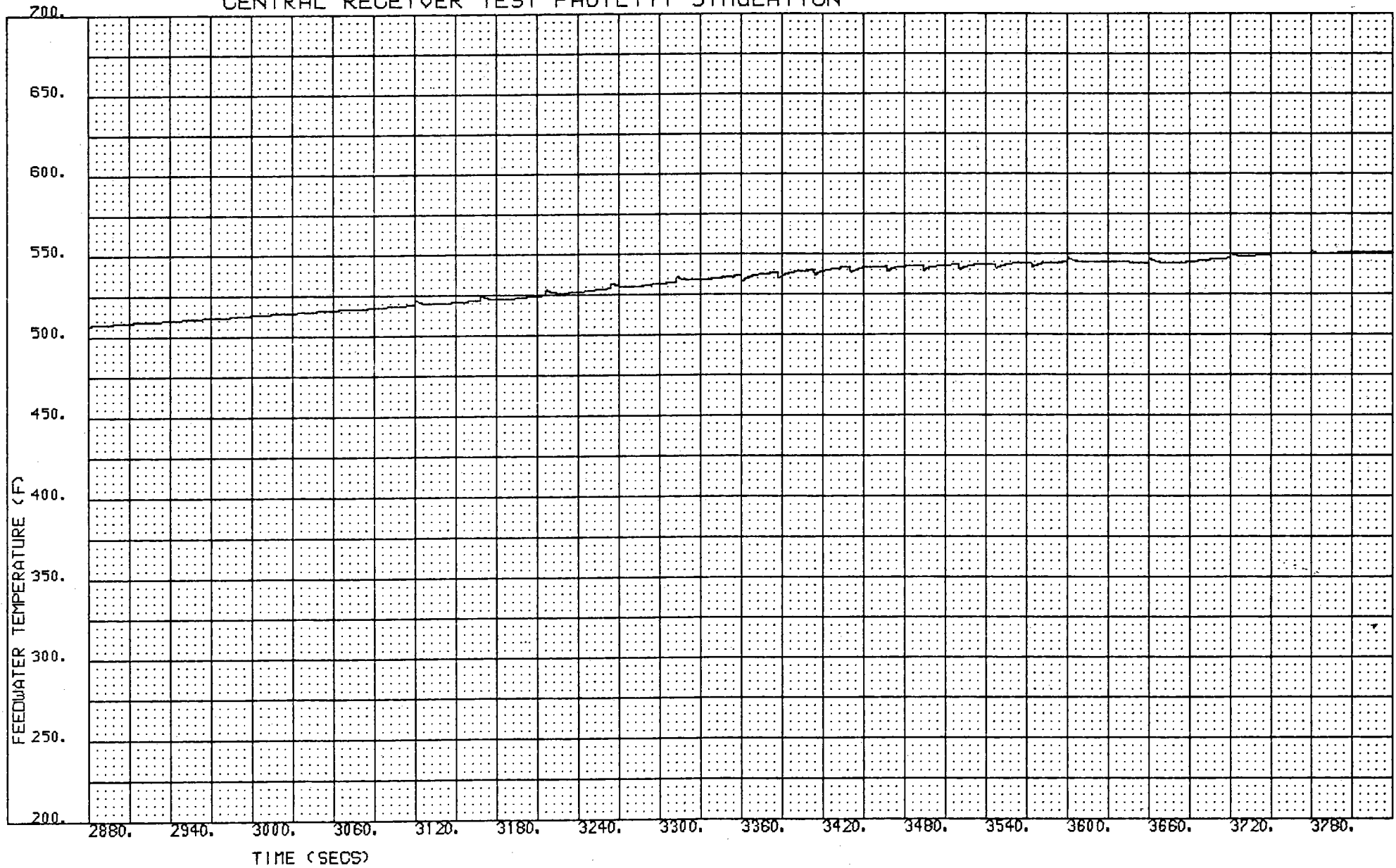


Figure 5

CENTRAL RECEIVER TEST FACILITY SIMULATION



-12-

Figure 5

CENTRAL RECEIVER TEST FACILITY SIMULATION

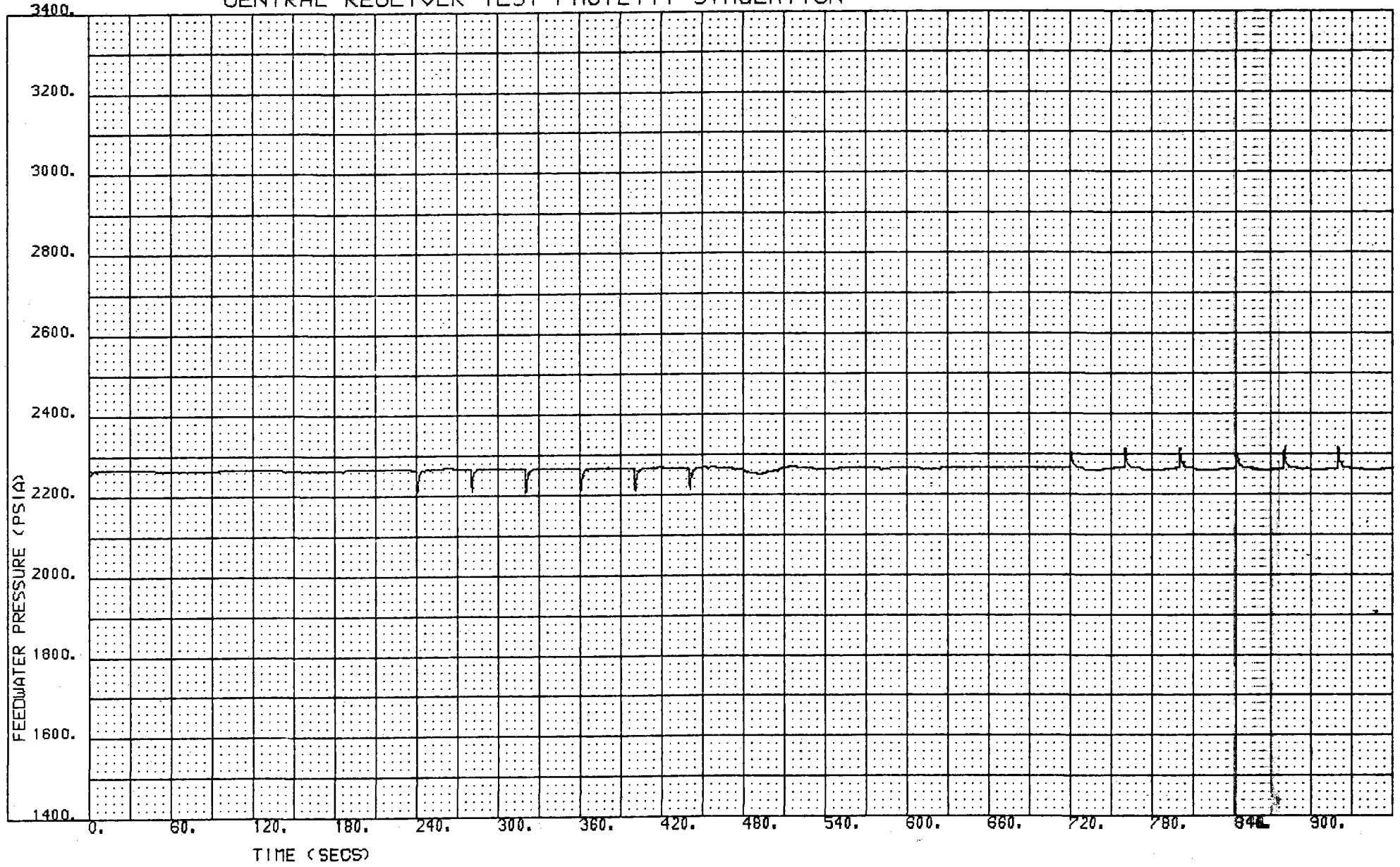
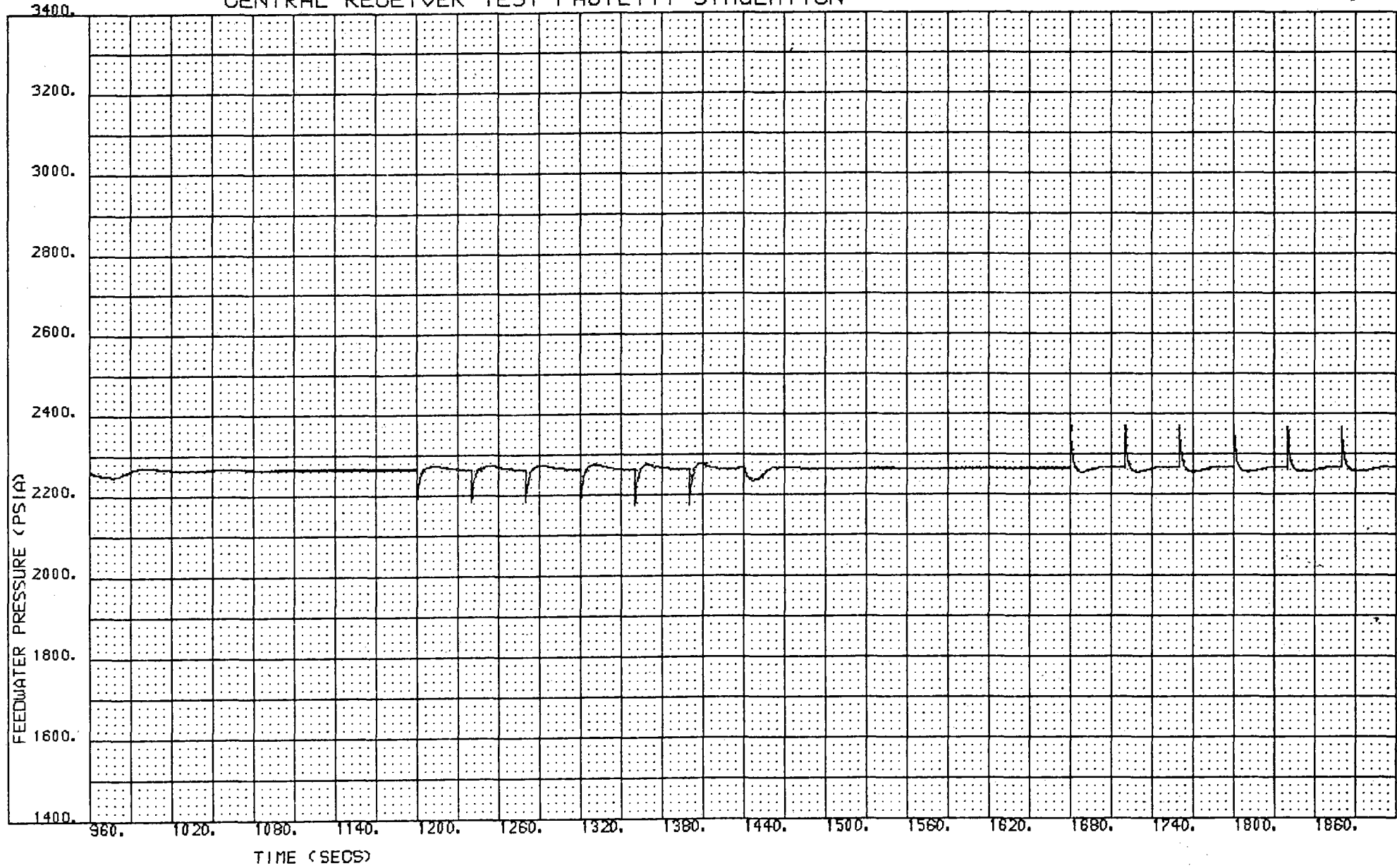


Figure 6

-22-

CENTRAL RECEIVER TEST FACILITY SIMULATION



-23-

Figure 6

CENTRAL RECEIVER TEST FACILITY SIMULATION

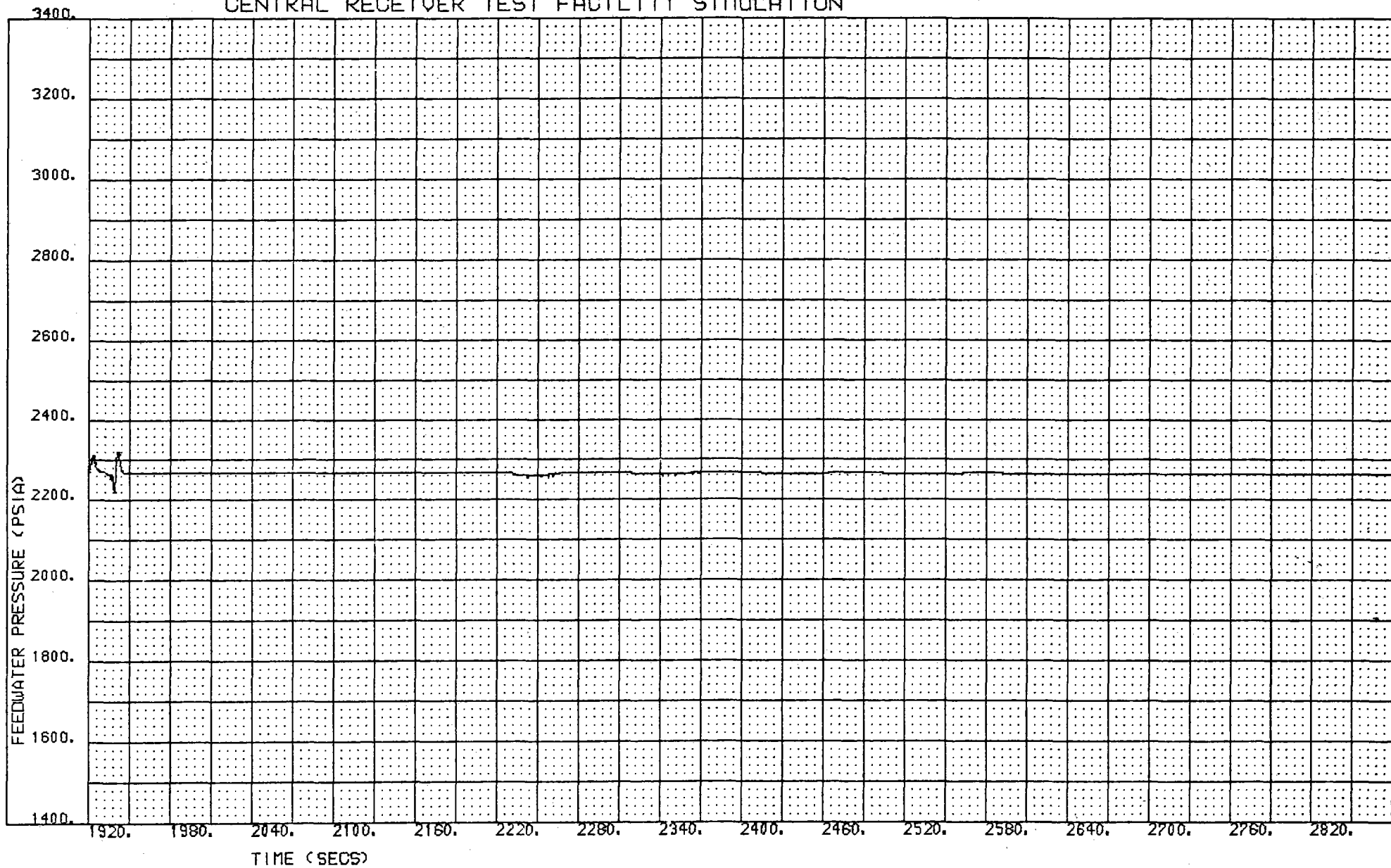


Figure 6

CENTRAL RECEIVER TEST FACILITY SIMULATION

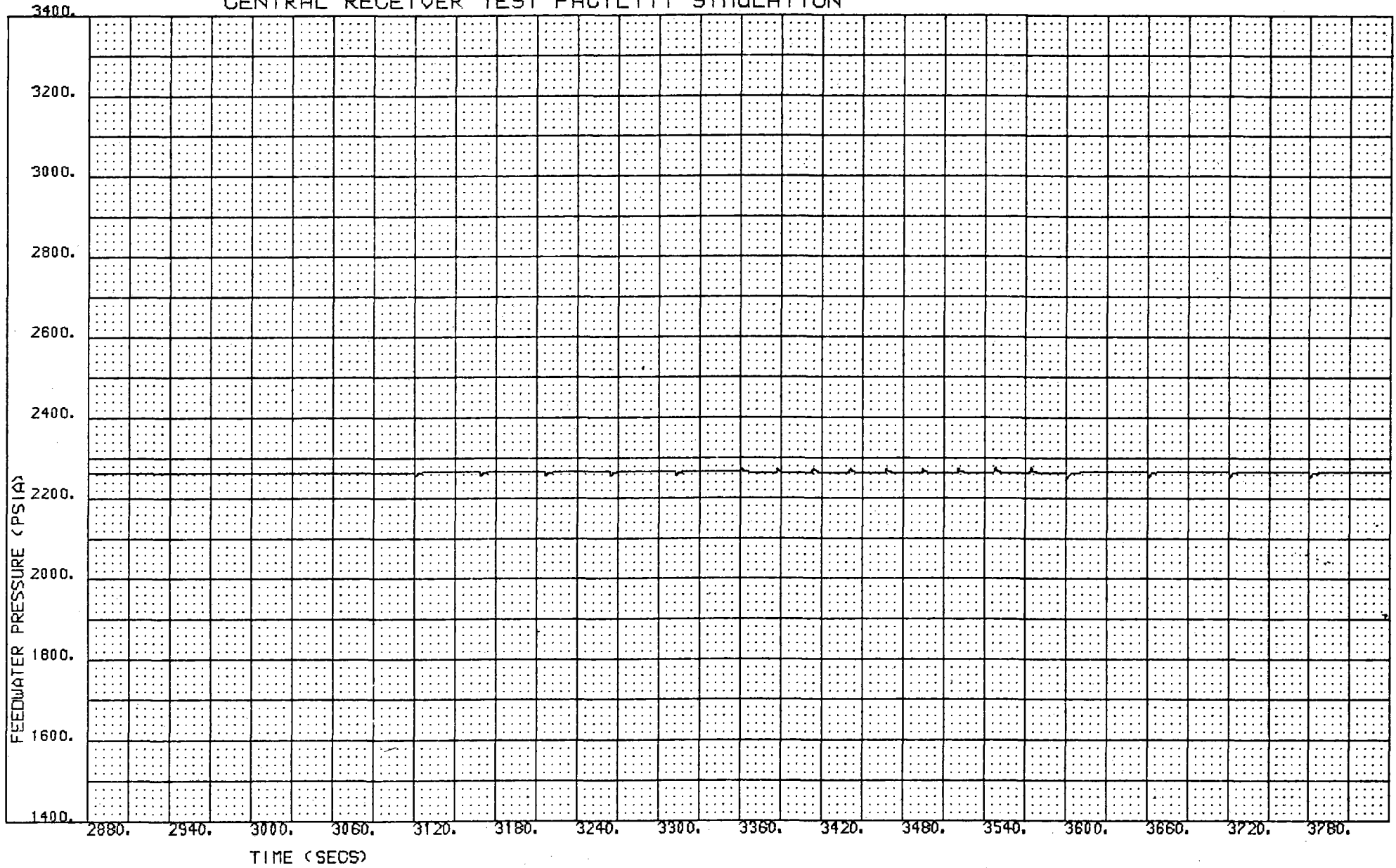


Figure 6

CENTRAL RECEIVER TEST FACILITY SIMULATION

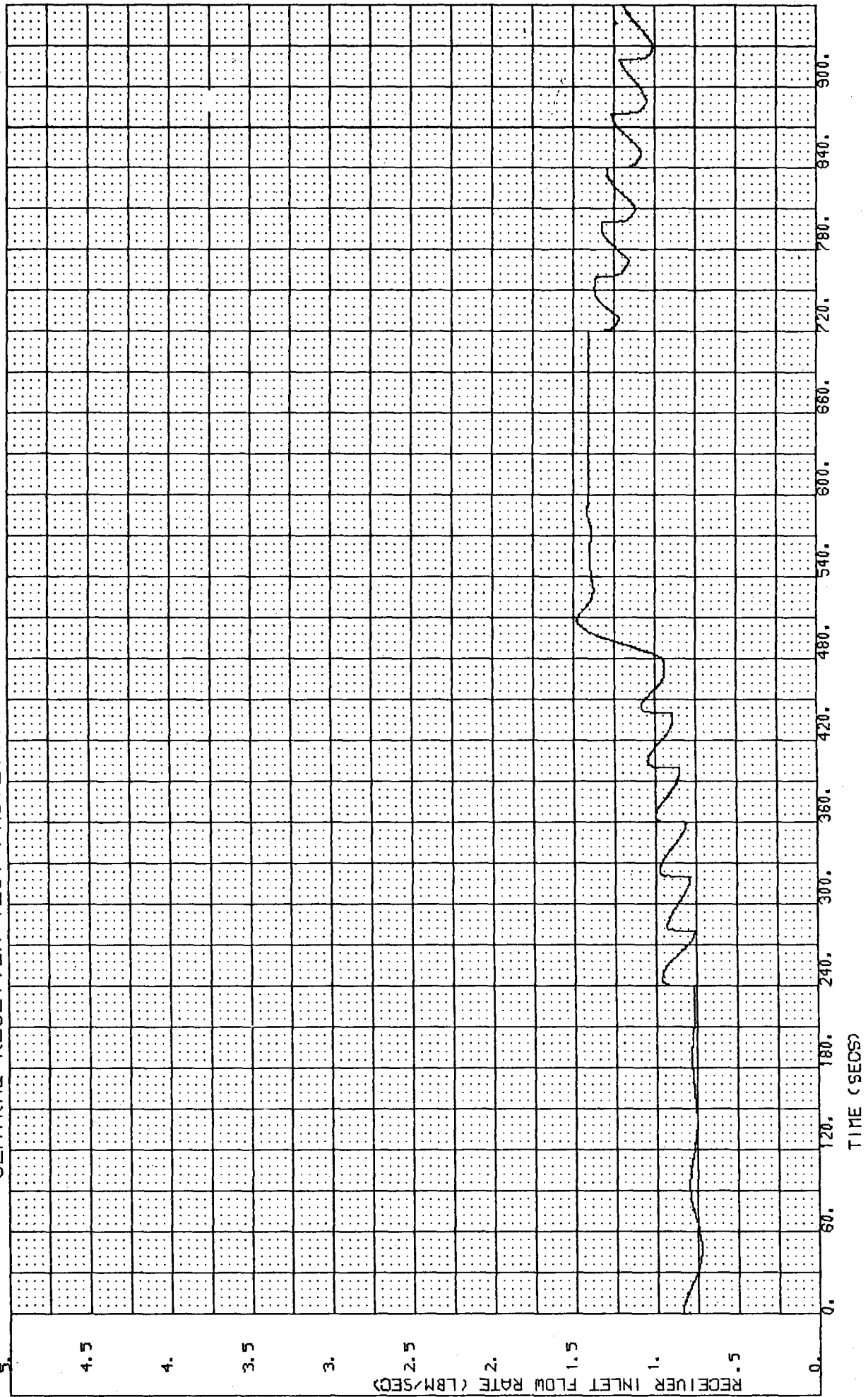


Figure 7

CENTRAL RECEIVER TEST FACILITY SIMULATION

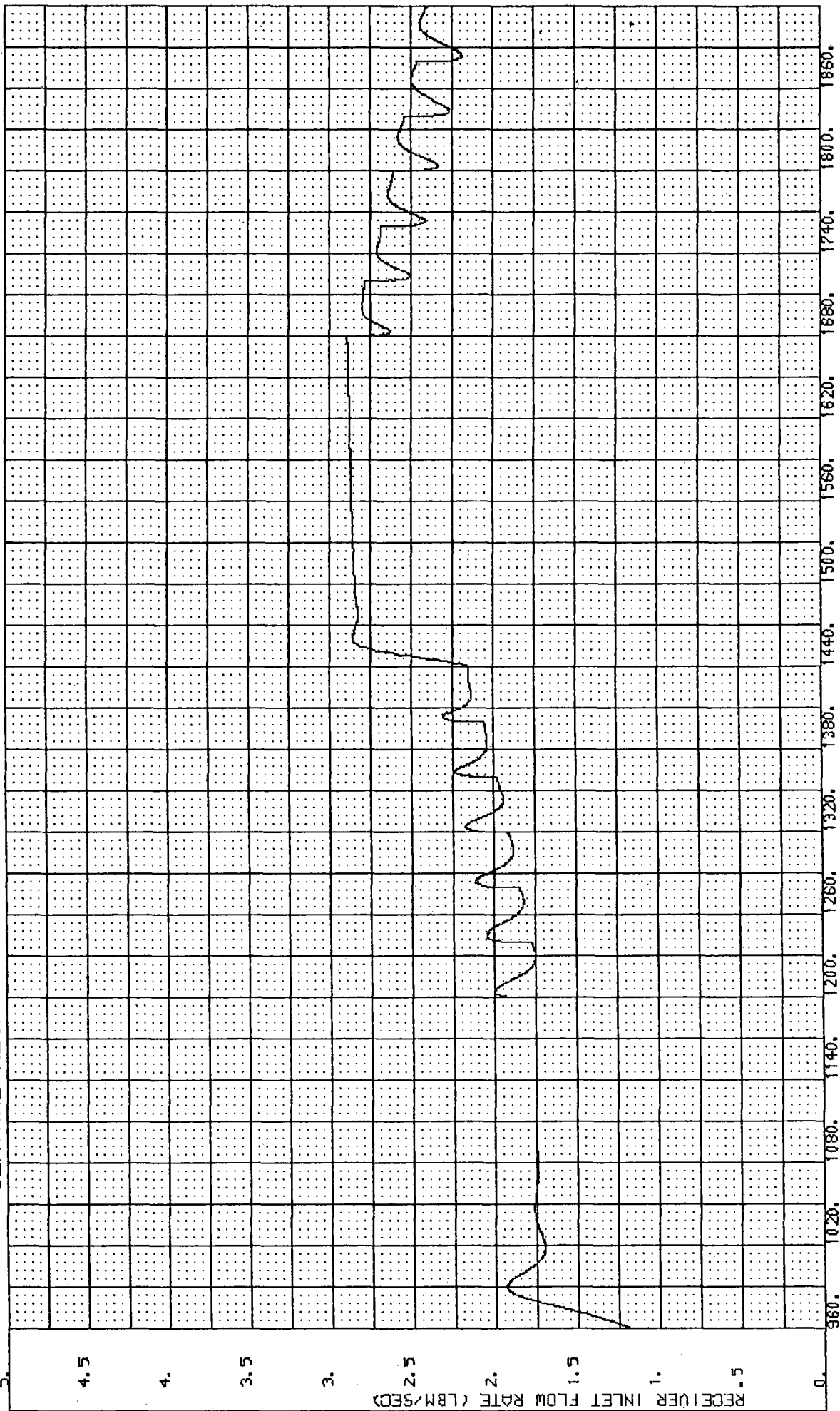


Figure 7

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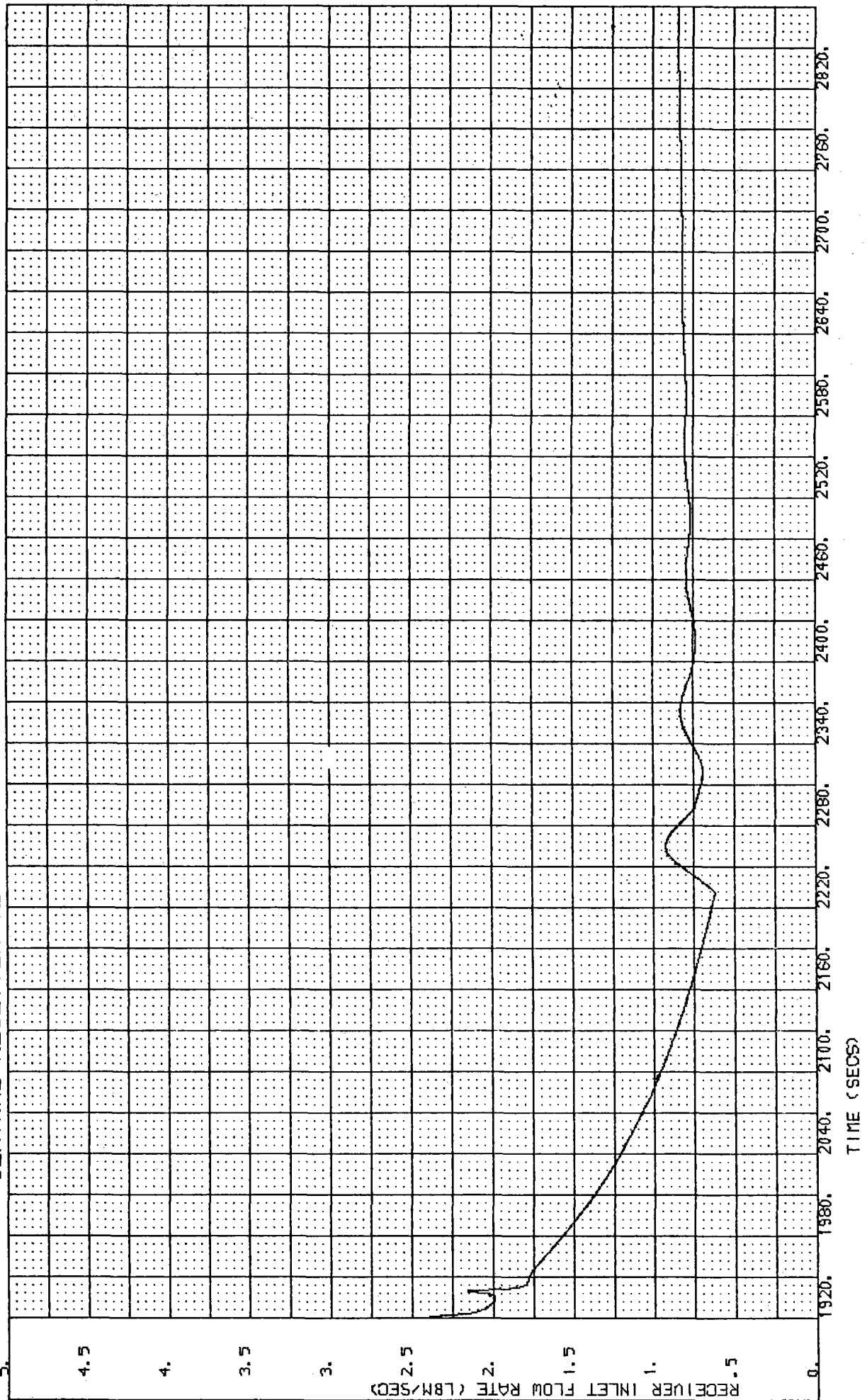


Figure 7

CENTRAL RECEIVER TEST FACILITY SIMULATION

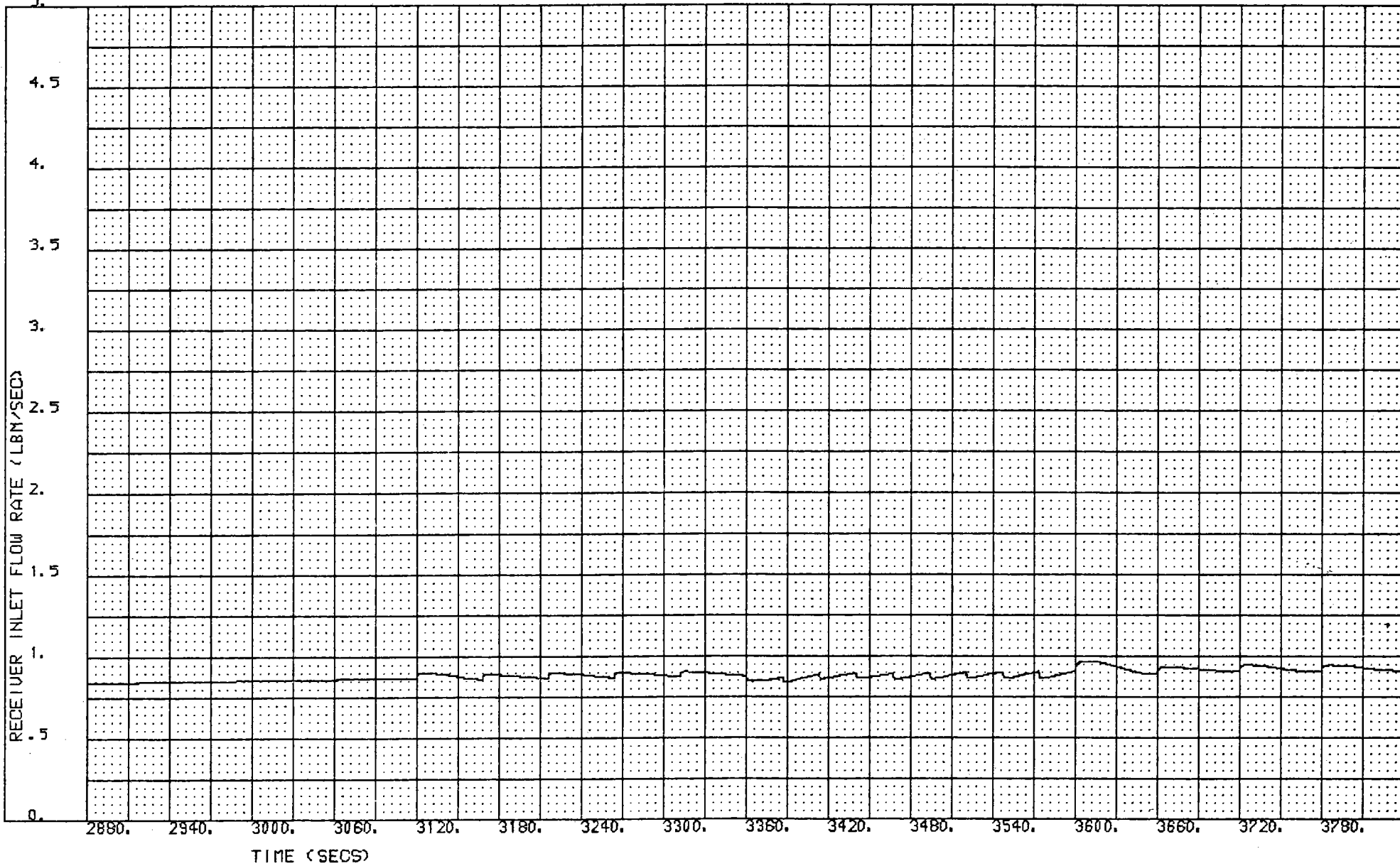


Figure 7

CENTRAL RECEIVER TEST FACILITY SIMULATION

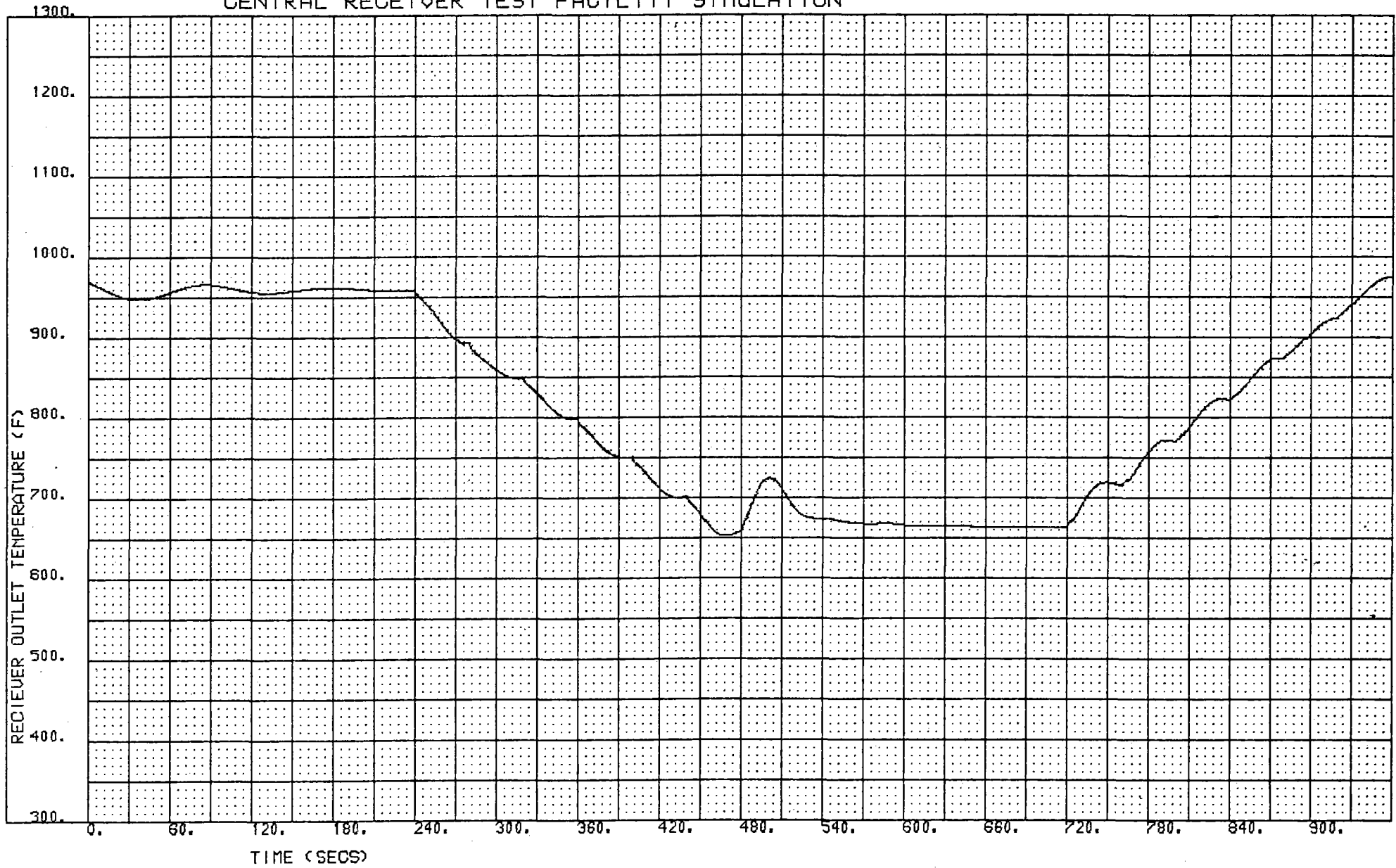
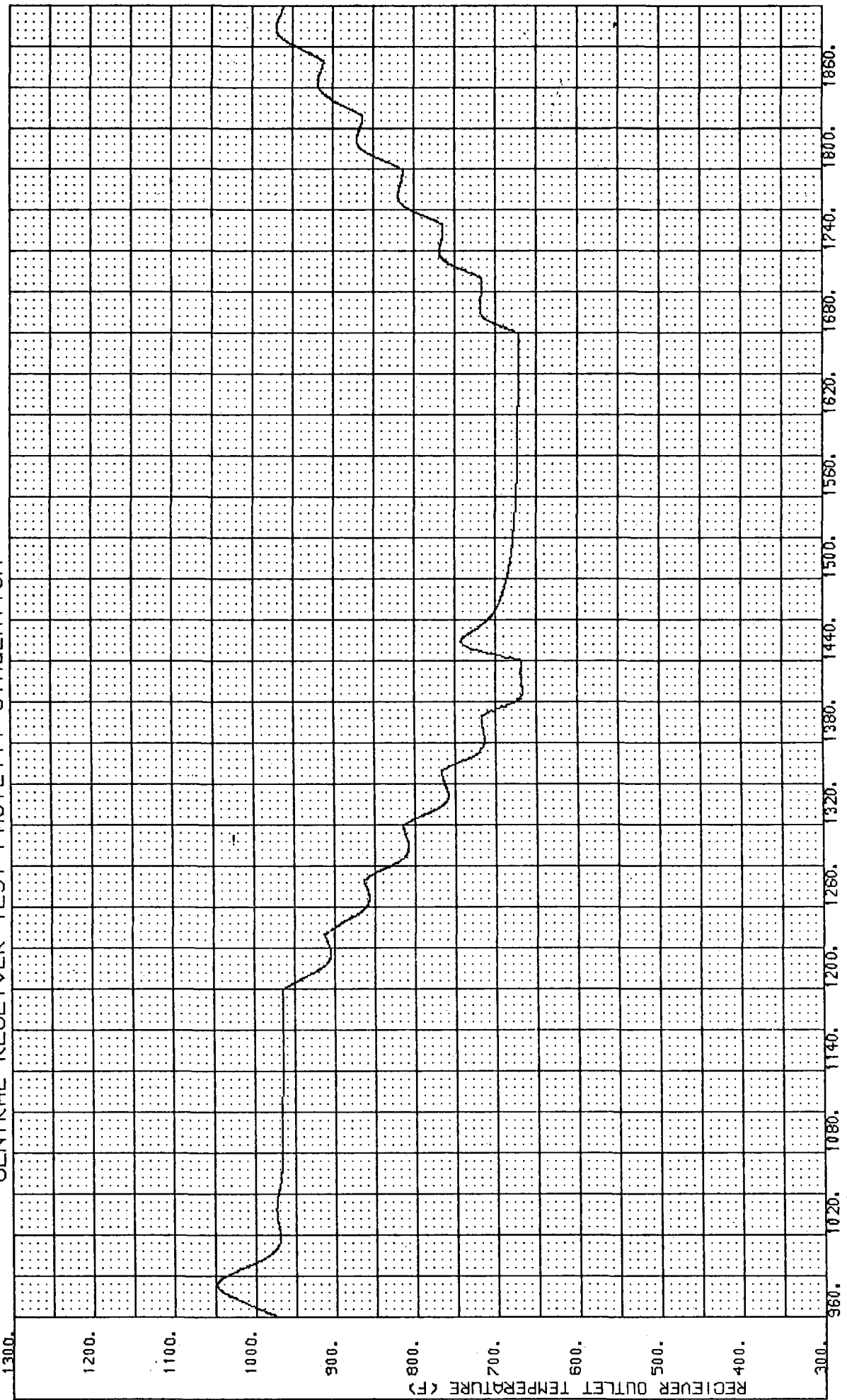


Figure 8

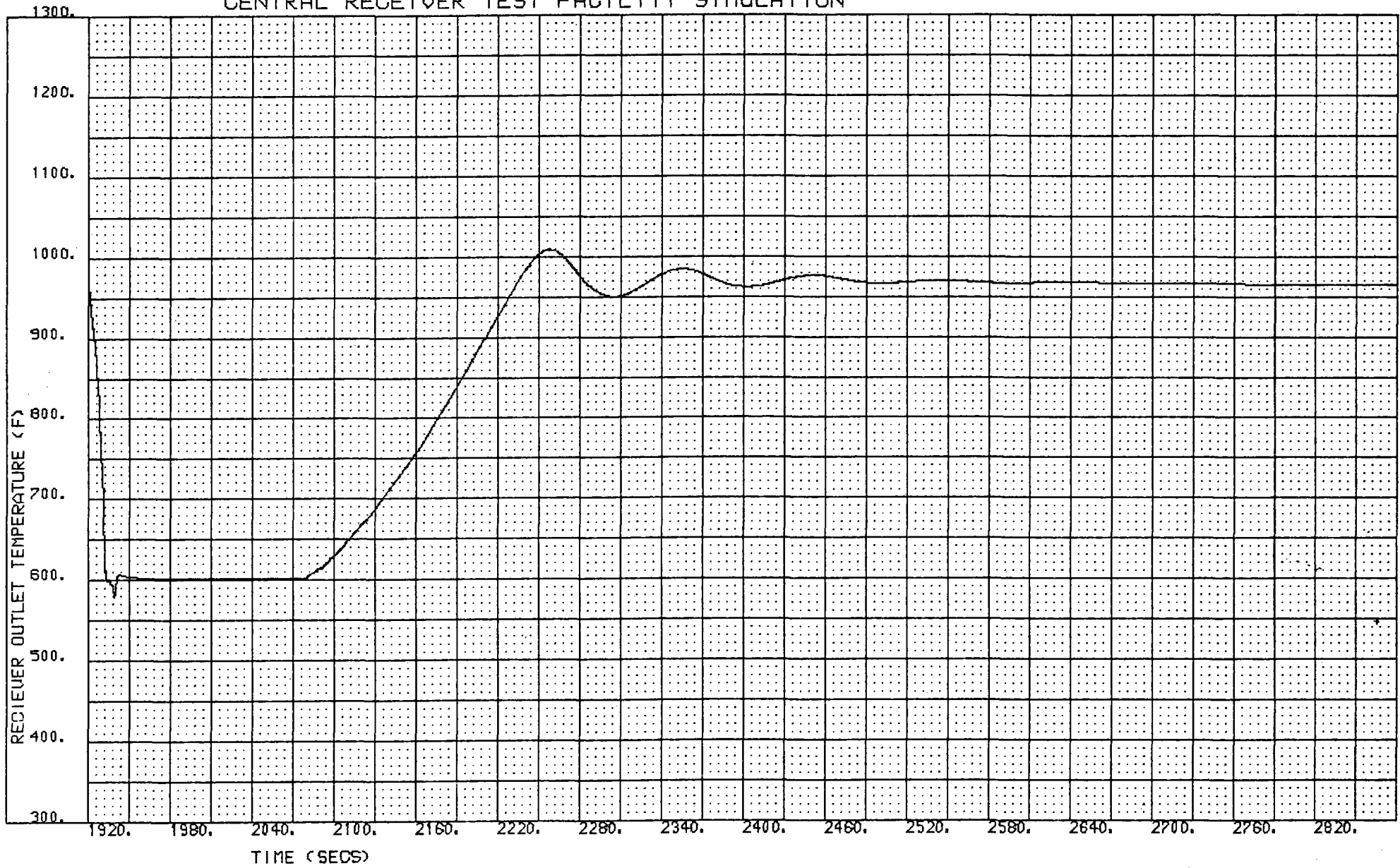
CENTRAL RECEIVER TEST FACILITY SIMULATION



TIME (SECS)

Figure 8

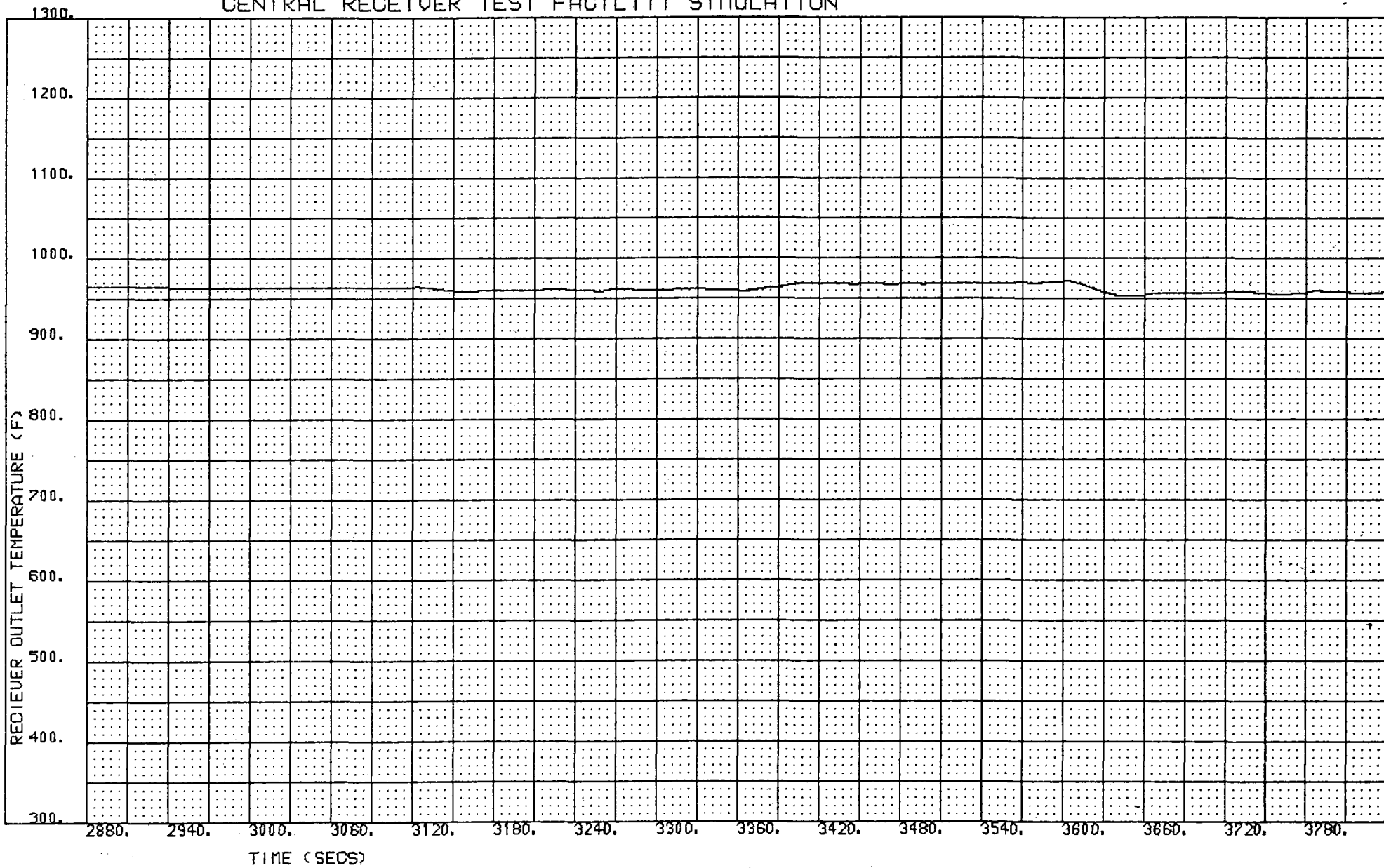
CENTRAL RECEIVER TEST FACILITY SIMULATION



-32-

Figure 8

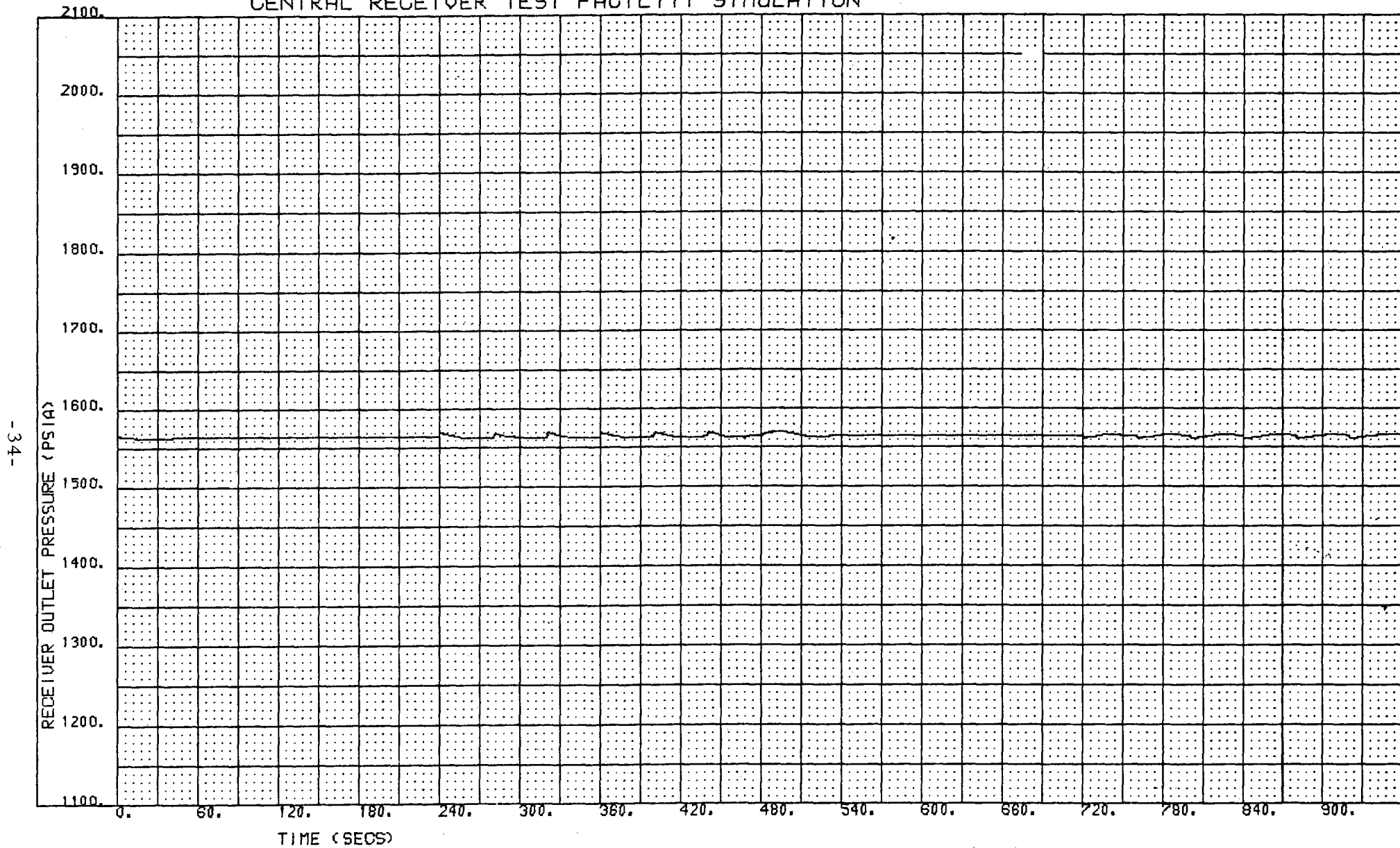
CENTRAL RECEIVER TEST FACILITY SIMULATION



- 33 -

Figure 8

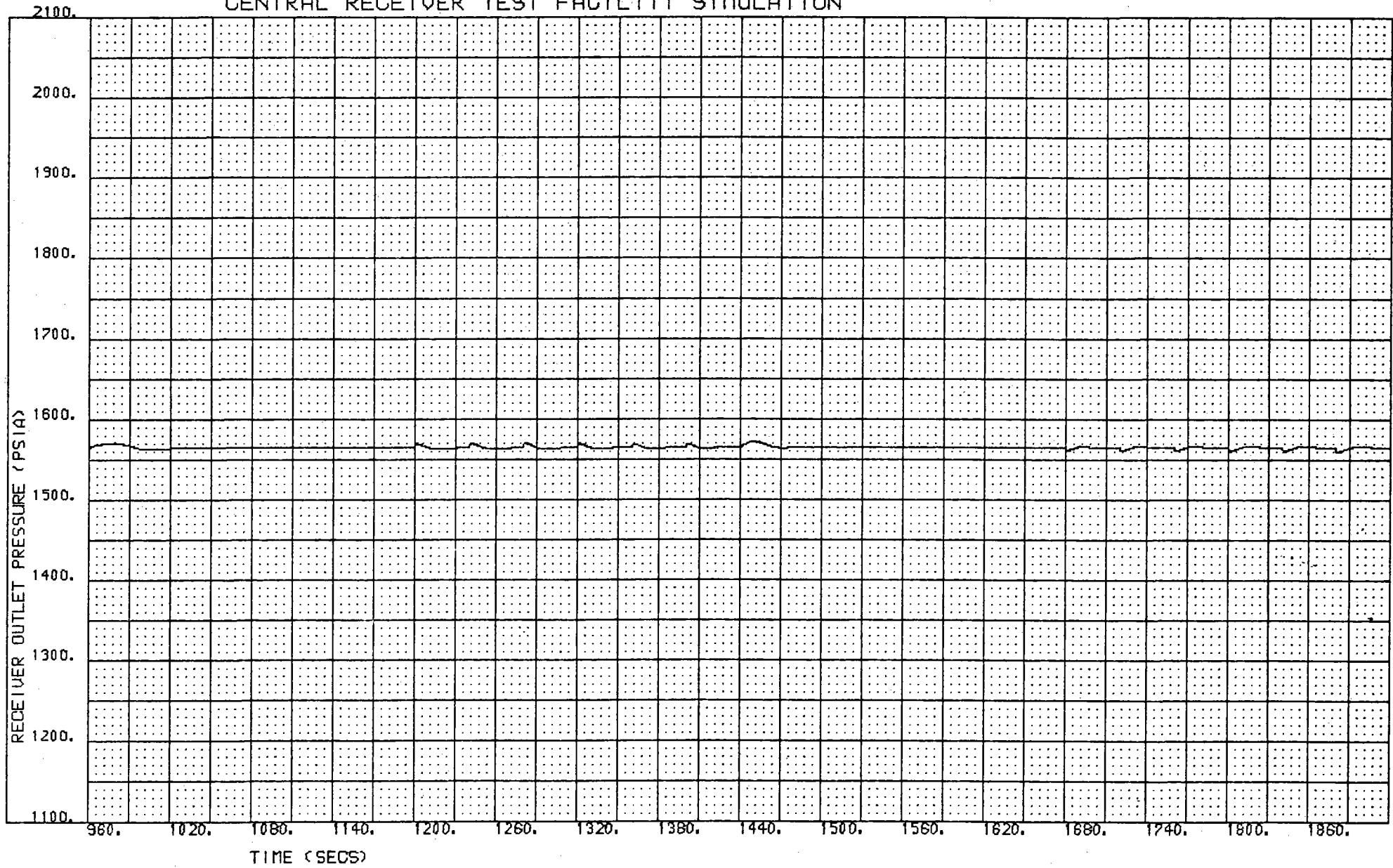
CENTRAL RECEIVER TEST FACILITY SIMULATION



- 34 -

Figure 9

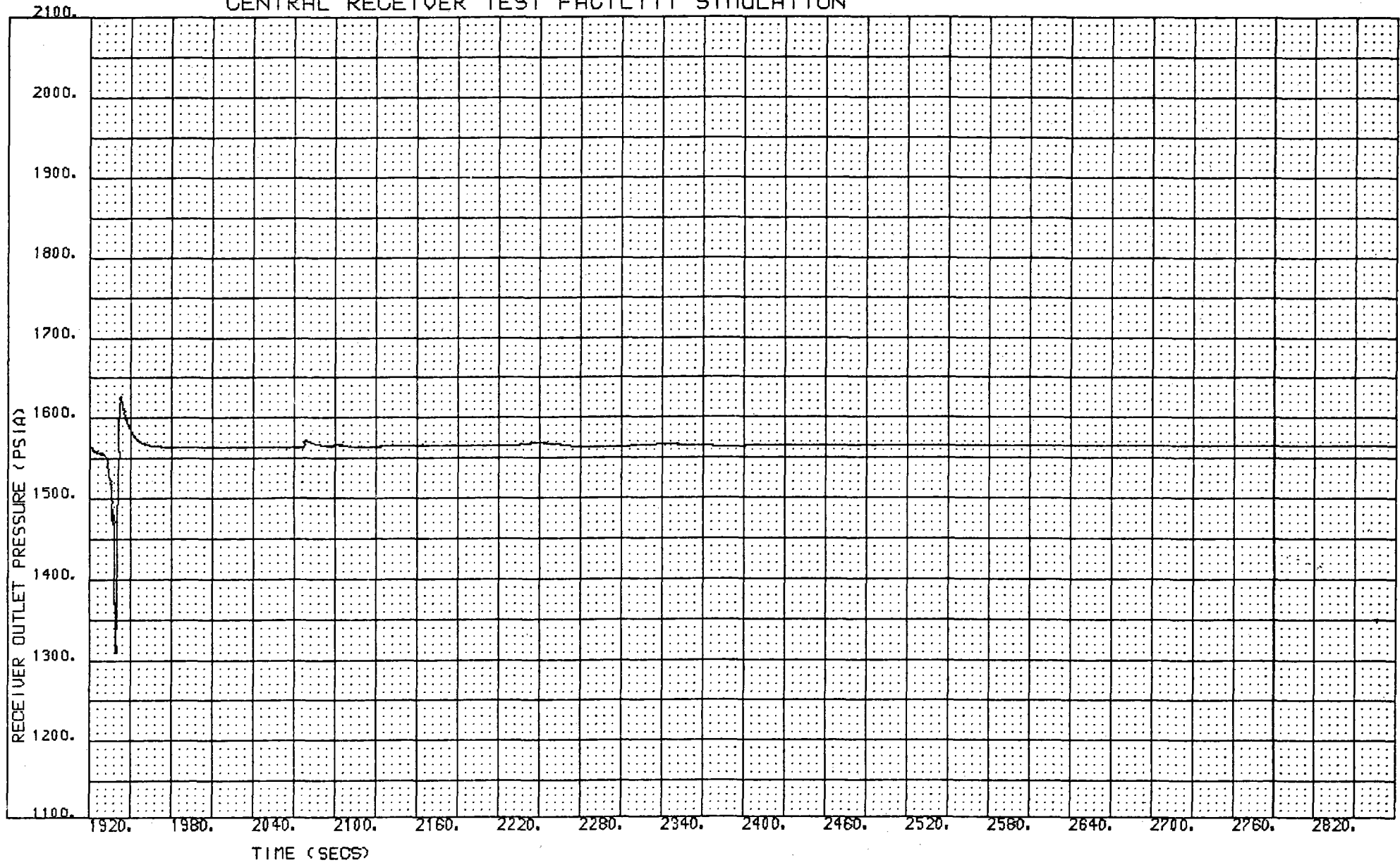
CENTRAL RECEIVER TEST FACILITY SIMULATION



- 35 -

Figure 9

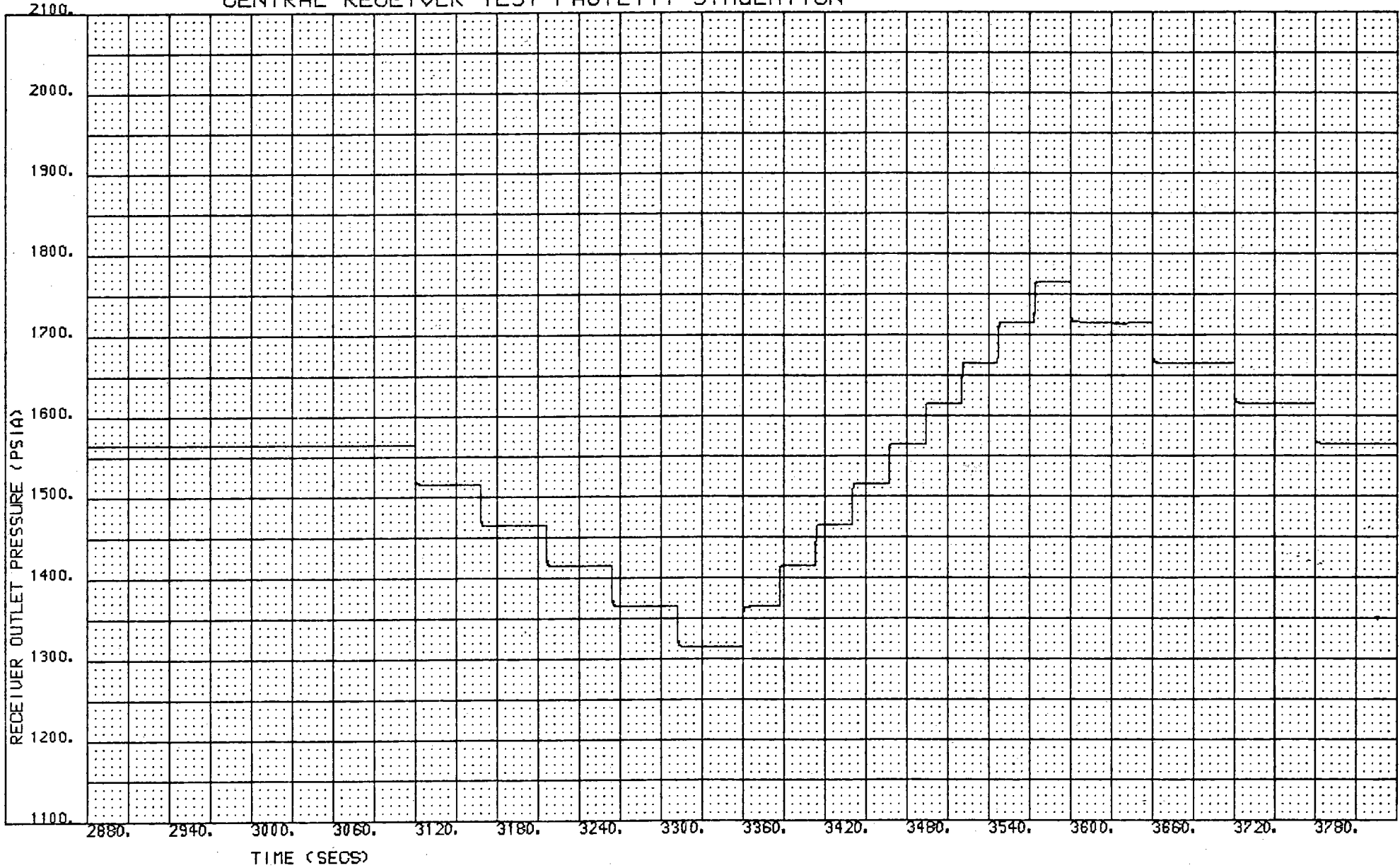
CENTRAL RECEIVER TEST FACILITY SIMULATION



-36-

Figure 9

CENTRAL RECEIVER TEST FACILITY SIMULATION



-37-

Figure 9

CENTRAL RECEIVER TEST FACILITY SIMULATION

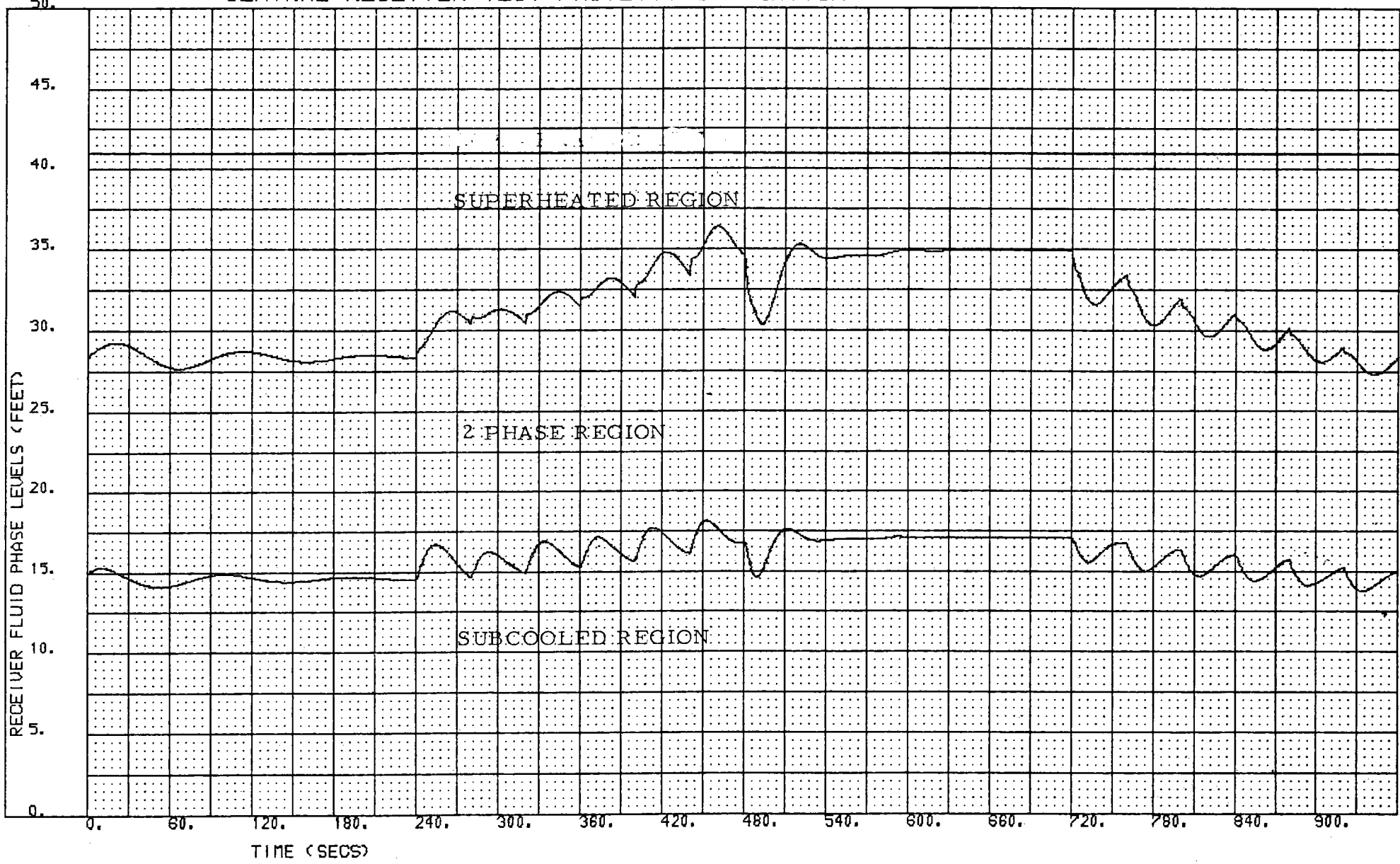
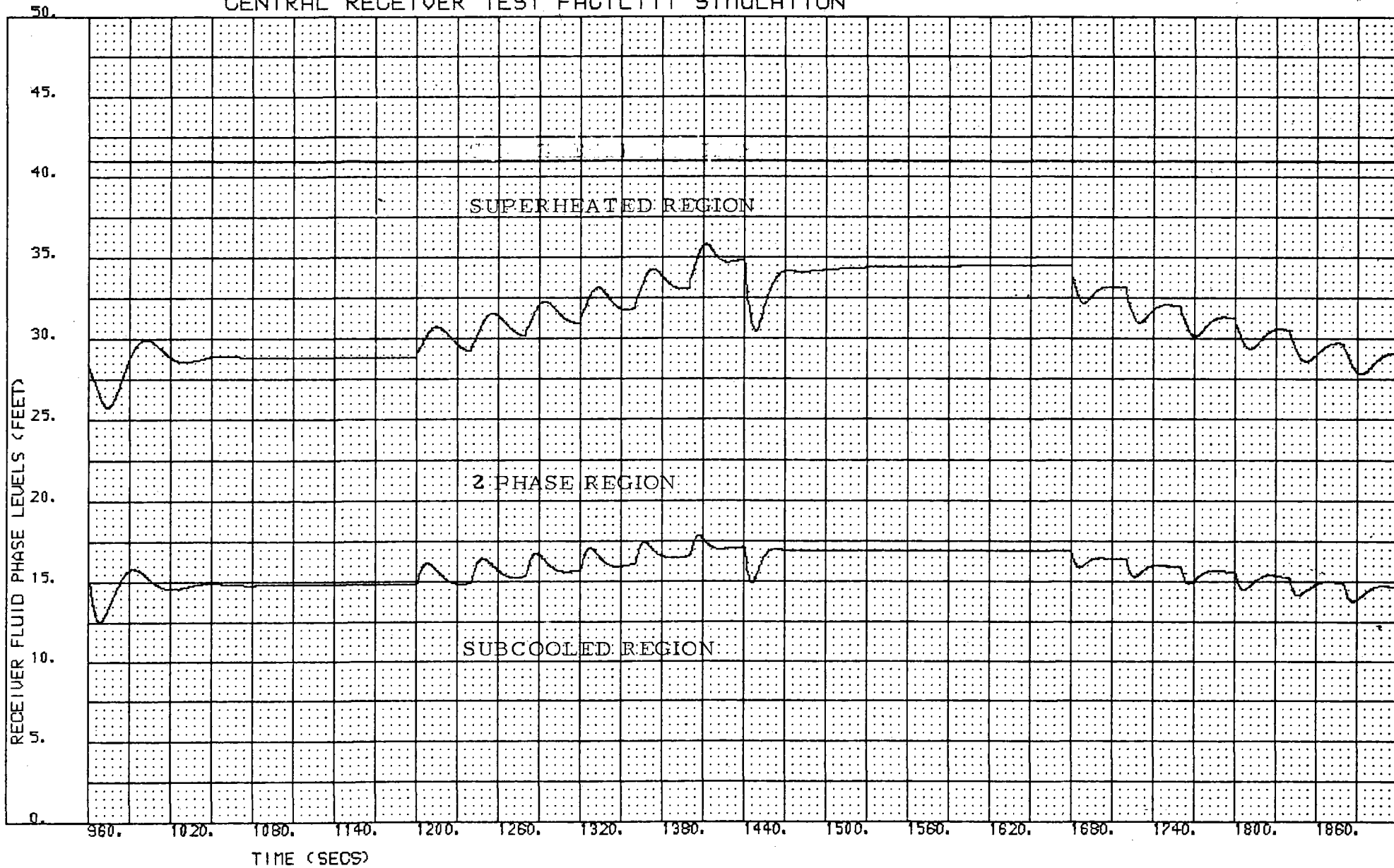


Figure 10

CENTRAL RECEIVER TEST FACILITY SIMULATION



-39-

Figure 10

CENTRAL RECEIVER TEST FACILITY SIMULATION

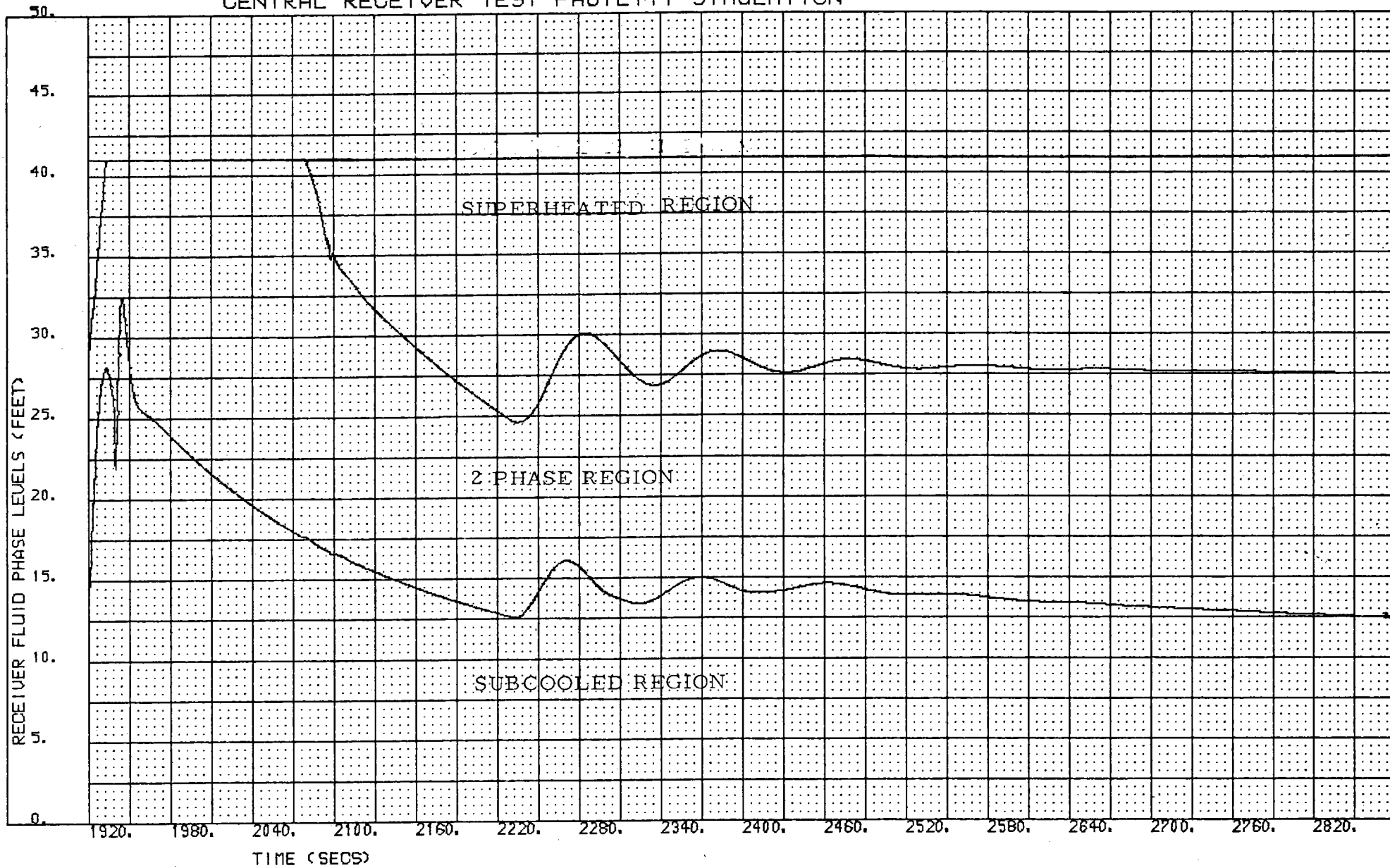
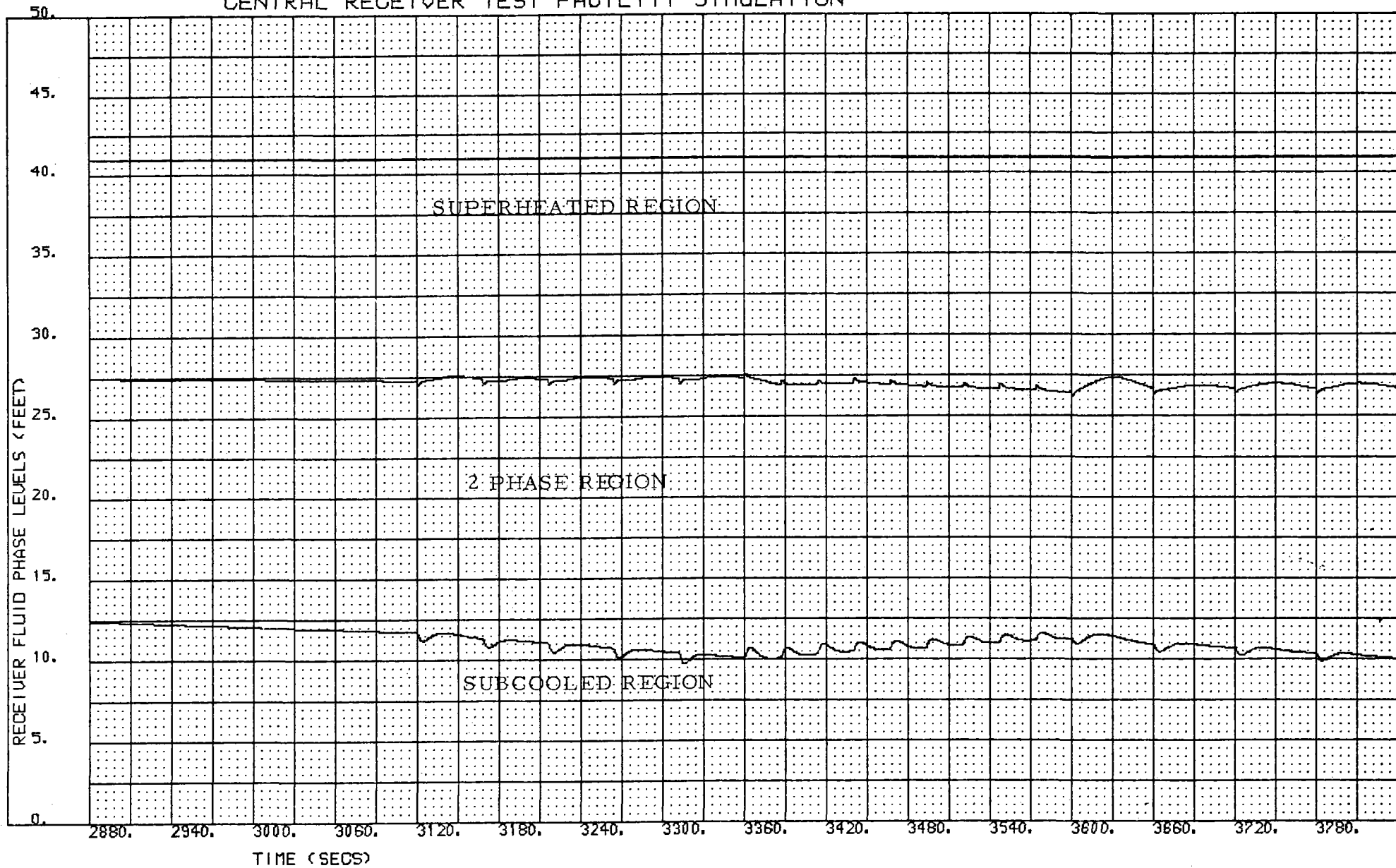


Figure 10

CENTRAL RECEIVER TEST FACILITY SIMULATION



-41-

Figure 10

CENTRAL RECEIVER TEST FACILITY SIMULATION

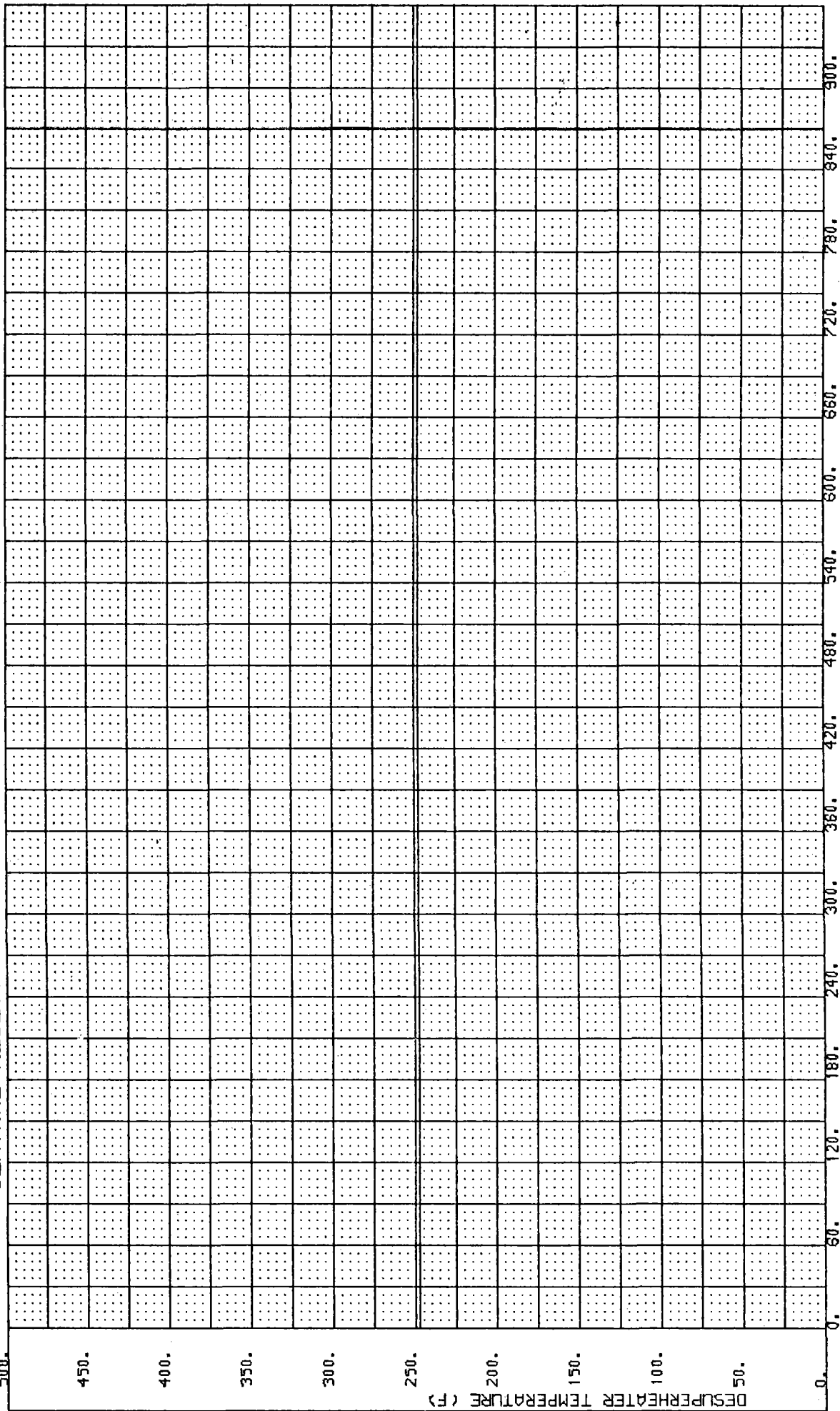
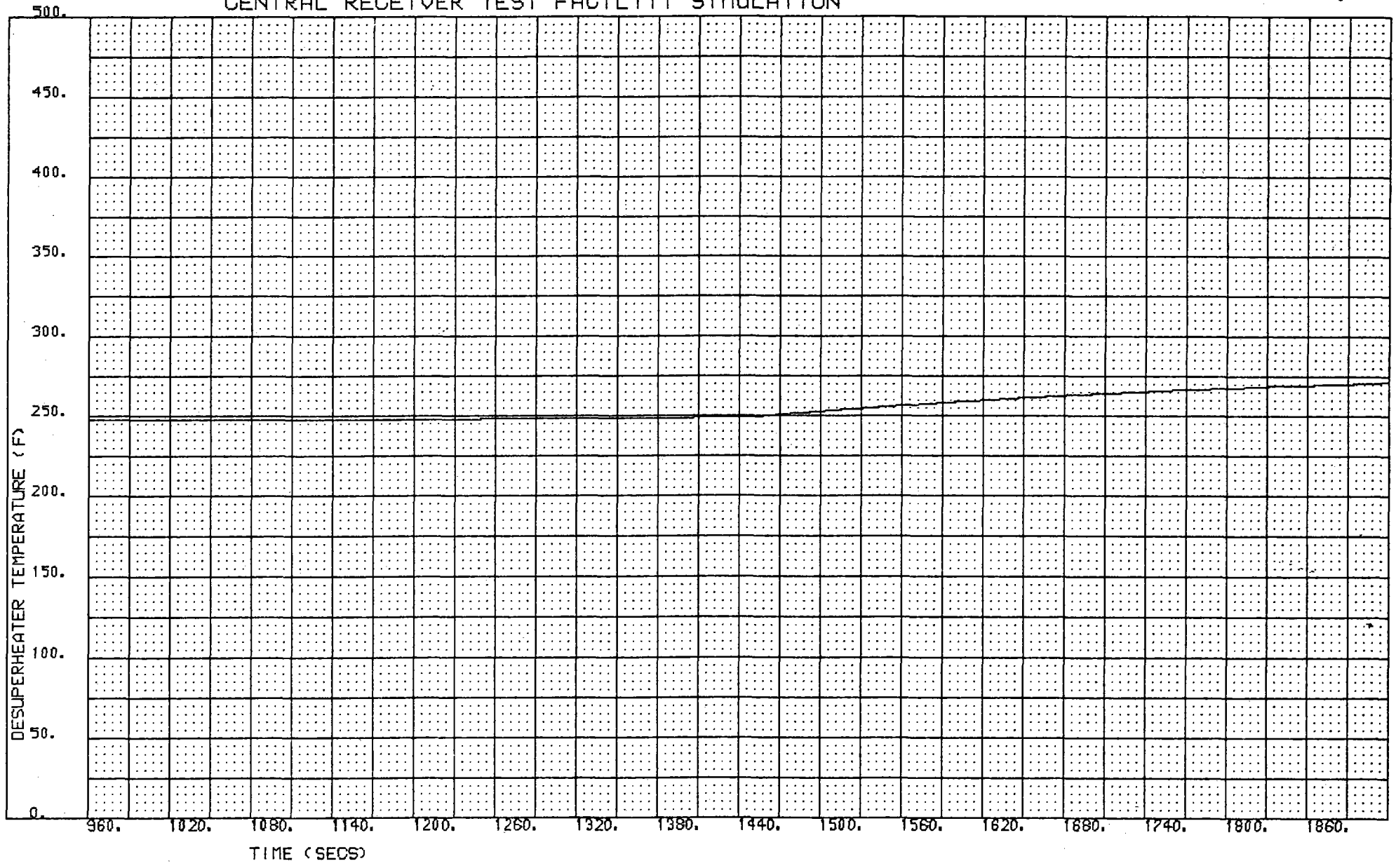


Figure 11

CENTRAL RECEIVER TEST FACILITY SIMULATION



-43-

Figure 11

CENTRAL RECEIVER TEST FACILITY SIMULATION

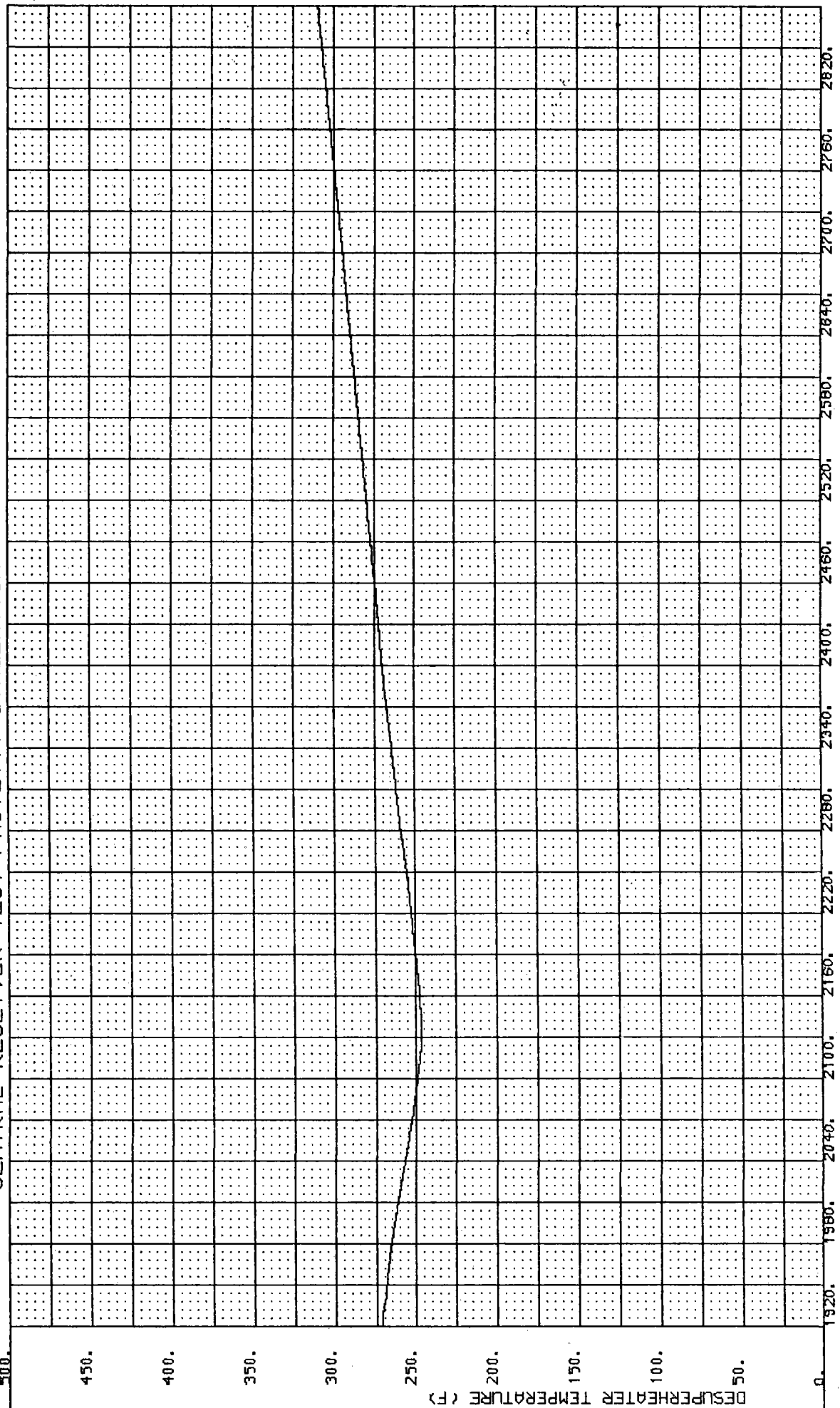


Figure 11

CENTRAL RECEIVER TEST FACILITY SIMULATION

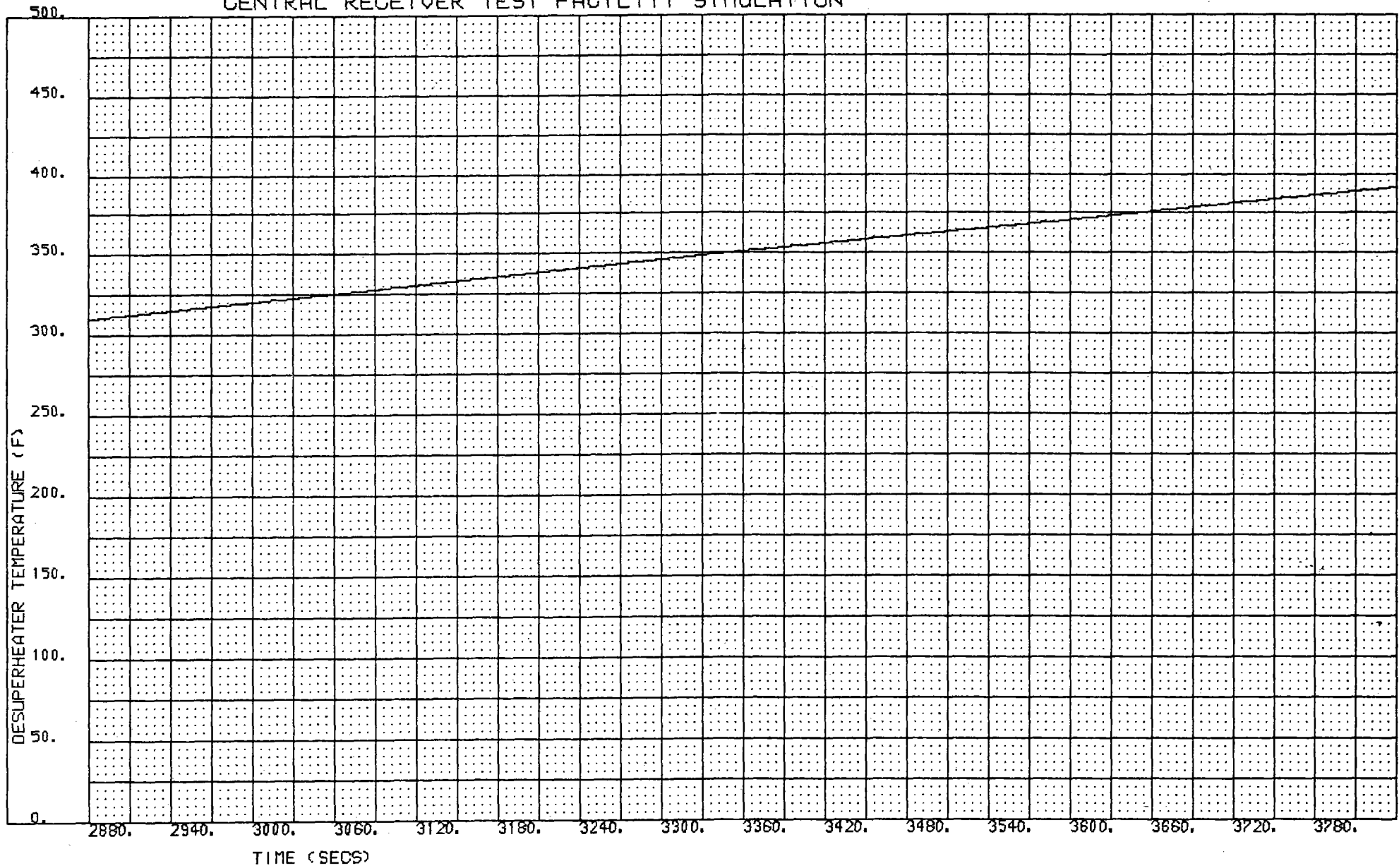


Figure 11

CENTRAL RECEIVER TEST FACILITY SIMULATION

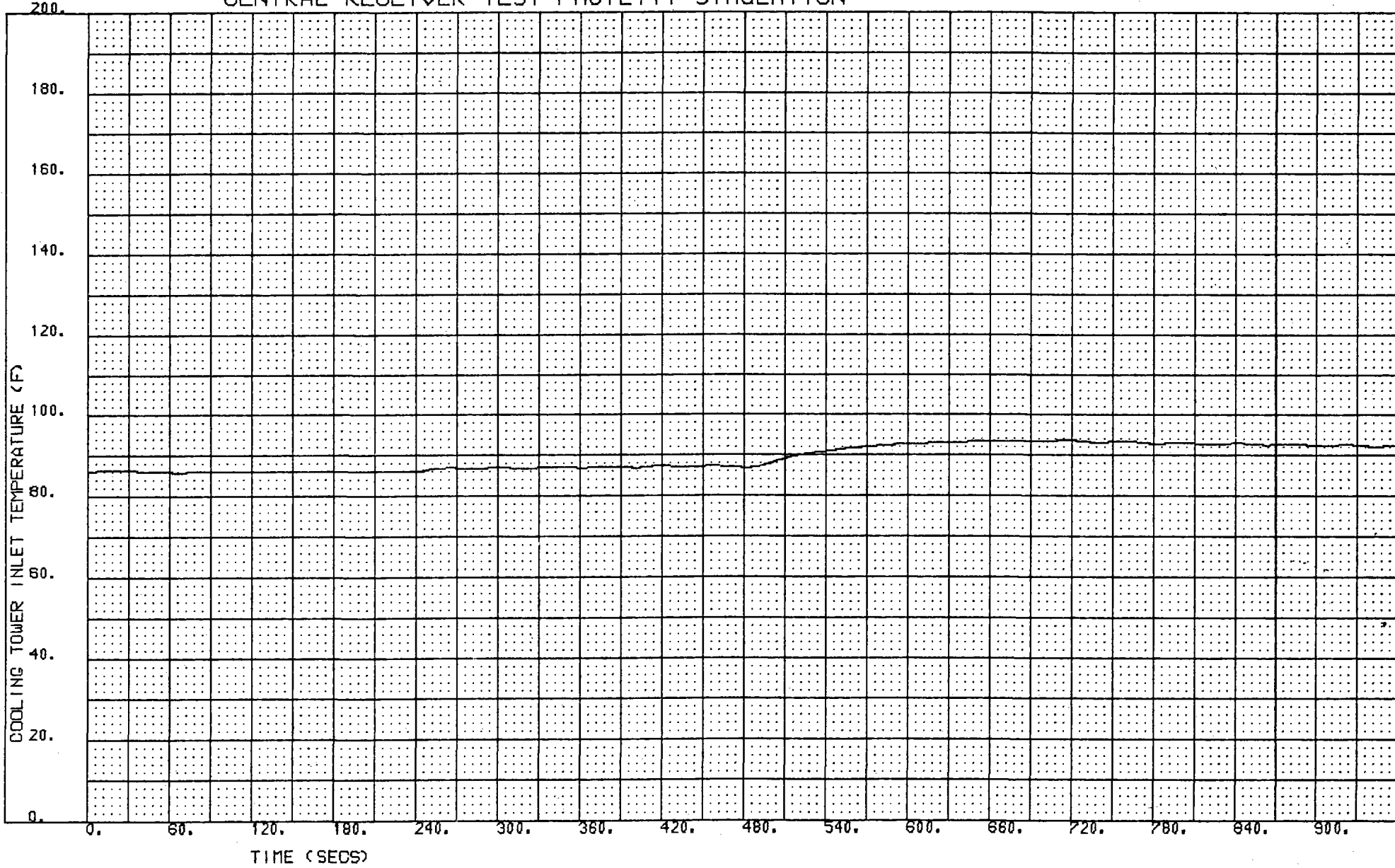


Figure 12

CENTRAL RECEIVER TEST FACILITY SIMULATION

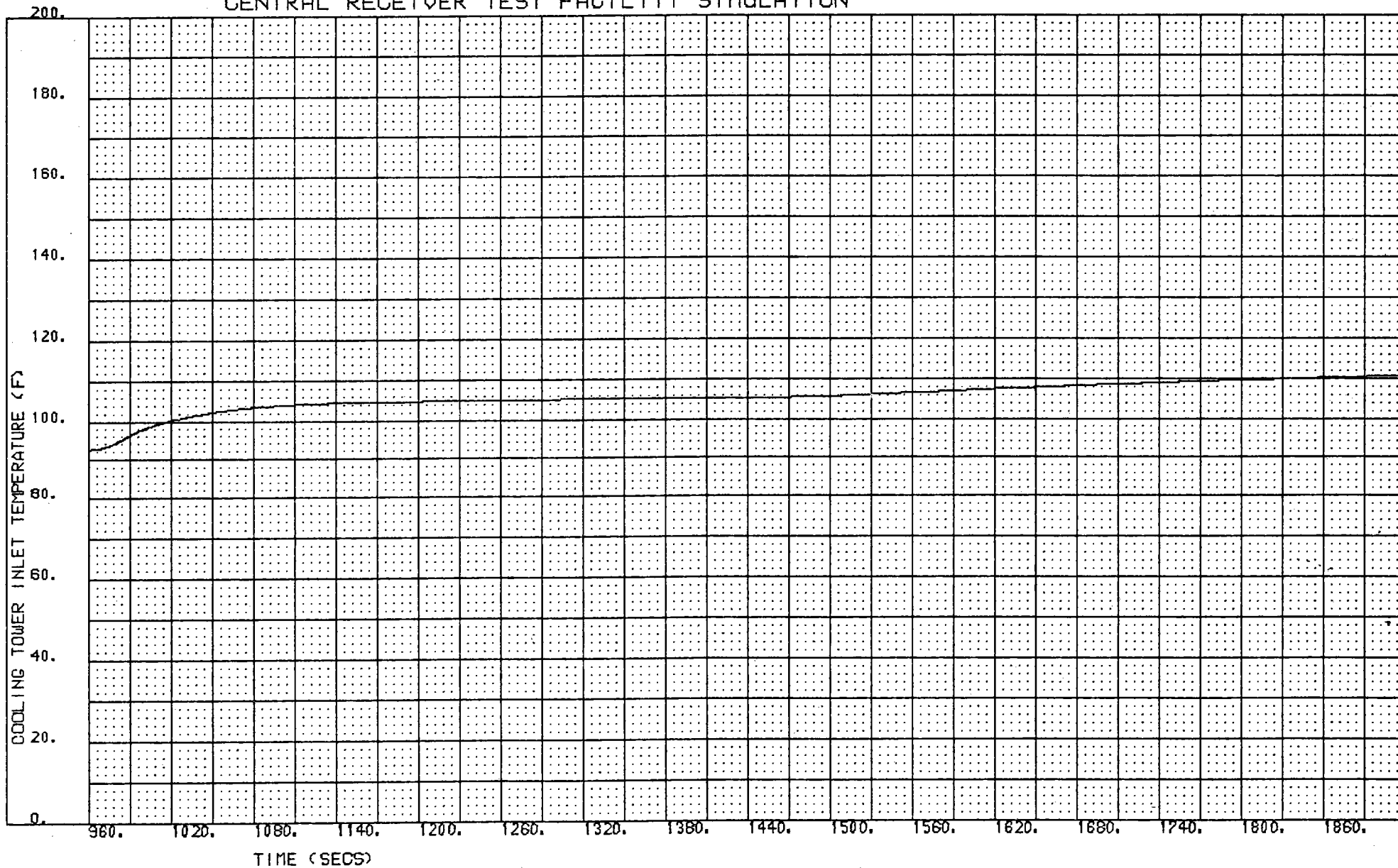


Figure 12

CENTRAL RECEIVER TEST FACILITY SIMULATION

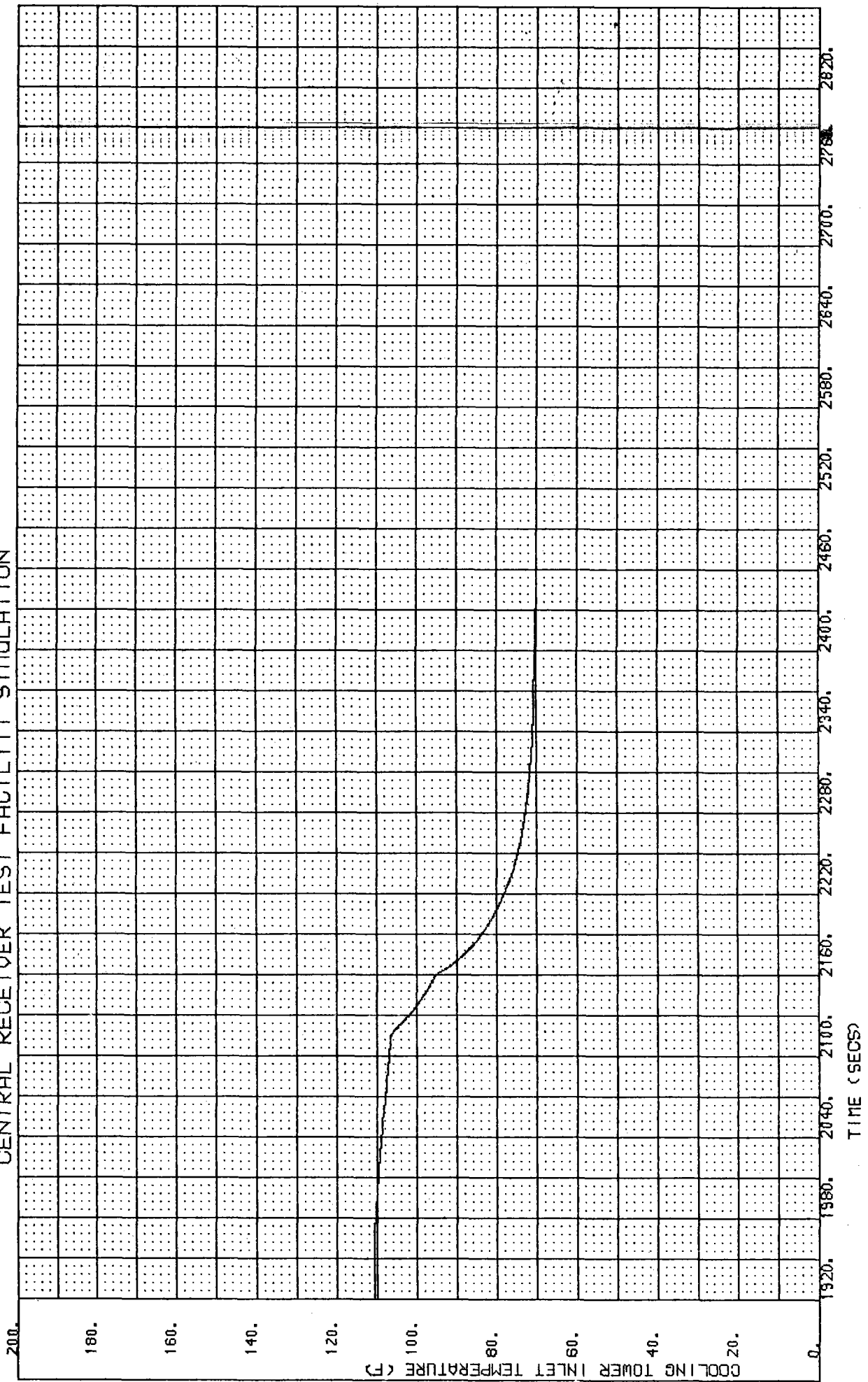


Figure 12

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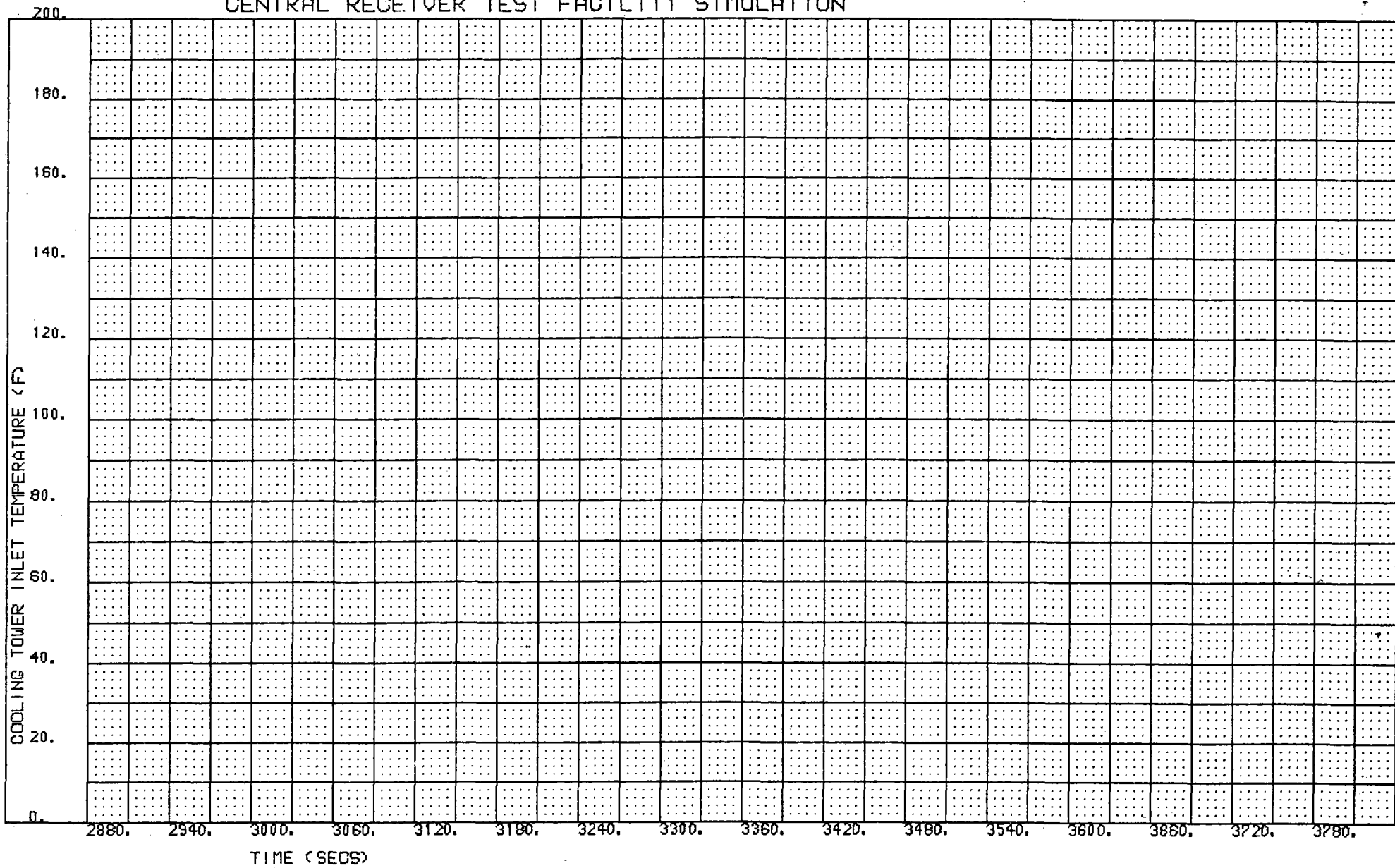


Figure 12

-49-



Department of Energy
 San Francisco Operations Office
 1333 Broadway
 Oakland, California 94612

Reply to:
 DOE Solar One Project Office
 Post Office Box 366
 Daggett, CA 92327
 (619) 254-2672

Mr. Harry D. Eden
 Energy Systems Directorate
 Building D-5, Room 1110
 The Aerospace Corporation
 Post Office Box 92957
 Los Angeles, CA 90009

MAR 13 1984

Subj.: Identification and Clearance for DOE Technical Information Center of
 Aerospace Documents Related to 10-MWe Solar Thermal Pilot Plant (Solar One)

Dear Harry:

We are finalizing the current edition (covering the period through mid-1982) of the Solar One Project Bibliography; a proof copy is provided for your reference (publication by the Electric Power Research Institute is expected at the end of March). While we are in the process of establishing a reference library at the Plant site, which will include all of the 555 documents identified in the Bibliography, we would like to be able to refer inquiries from recipients of this document for individual copies of reports cited to the DOE Technical Information Center (DOE contractors) or the National Technical Information Service. In order to do this, we must insure that proper TIC/NTIS stock numbers are provided, and that all reports in the Bibliography have been properly patent cleared and sent to TIC and NTIS for preparation of microfiche. Unfortunately, this is the case at present for only about 300 of the documents listed; specifically, those for which the "Other Recipients" (line 10 of the document identification block) includes these agencies. We propose to issue an update to the Bibliography following completion of the Experimental Testing and Evaluation phase of Plant Operation (currently scheduled for the end of July, 1984). This update, in addition to providing documents produced by the Project since mid-1982, will include proper TIC/NTIS citation for all documents listed; it will also include a small number of documents from the earlier period which are omitted from the initial edition, but may be of interest to users of the Bibliography.

→ STMPD, 019, 021, 026, 027, 028, 034, 035, 038, 039 or will be included in the update
 (NEW) 563, 564, 565

We have identified twelve Aerospace documents which are listed, but for which no TIC-approved citation has been located; most of these appear not to have been submitted in the first place, apparently having been treated as "working papers", while others are conference reports or journal articles. In addition, we have three NSF- and ERDA-era documents which, we feel sure, are "somewhere in the system", but which we have been unable to identify in the periodic reports lists issued by TIC, or - thus far - by inquiries to the data base. The latter three documents are described in the attached memorandum to Don Holz, the DOE/SAN Technical Information Officer; if, however, Aerospace records indicate the TIC/NTIS identifiers assigned (most likely "PB-" followed by six or eight digits), we would be most appreciative if you could pass them to us.

STMPD
 -013, -015
 -018

For the twelve documents in the first group, I have provided copies for your reference; I have also prepared SAN Form 70 for completion by your staff for each of them (unless you have copies of previous patent clearances from SAN/OPC). While

I appreciate that Aerospace is no longer formally involved in the Project, and thus cannot assign a very high priority to dealing with these materials, I anticipate that you would be as eager as we are to get them cleaned up and on the way to TIC. (The "routine" on line 3 of the Form 70 is addressed to SAN/OPC.)

In preparing these documents and the Form 70's, I have assigned two identification numbers to each. The primary number is the normal TIC identifier: an ATR-series number, where such is provided on the document, or a number derived from the DOE contract number, where it is not. (Three Aerospace contracts are involved: DE-AT03-76CS51101 - formerly EY-76-C-03-1101/PA#2 -, DE-AT03-76ET21060 - formerly -1101/PA#14 - and the STMPO contract, DE-AC03-78ET20517; I have tried to assign the reports to the proper contract, where it is not cited in the document itself, using date or subject matter). If you know of appropriate ATR-number assignments, or if you wish to make such assignments, please do so and so advise me.

The secondary number (STMPO-xxx) is for convenience in filing and tracking Project documents; it will probably occur to you fairly promptly that it is connected with the Bibliography listing, and, in fact, it is the Bibliography page number. Aerospace documents comprise the first thirty-nine listings (STMPO-001 to STMPO-039), as well as the first three in the prospective update (STMPO-563 to STMPO-565) to the Bibliography. In any discussions with the Project Office, communication will be enhanced by using these numbers, and they should be preserved in the event your staff wishes to alter or re-type the relevant Form 70's.

I need, in order to track progress on a total of some 300 reports in processing, to have the Form 70's, together with the reference copies provided, returned to me at the Project Office, and not to SAN/OPC or TIC; I have made special arrangements with Roger Gaither at SAN and Bill Matheny at TIC, and the process seems to be working well at this point.

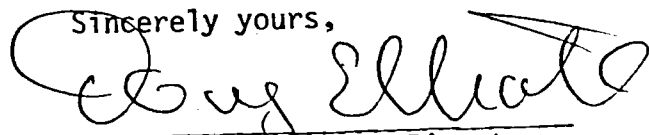
The advice of your patent/copyright staff on how best to deal with conference reports and journal articles (STMPO-28, -34, -38 and -39) and specifications including manufacturers' data sheets (STMPO-564, -565) would be welcomed. If copyright issues arise with these items, we can request TIC to limit further distribution as appropriate.

If you do wish copies of any of the documents provided, or cited in the Aerospace section of the Bibliography, I shall be happy to provide them. Thank you for your assistance.

Attch.: memo dtd. 3/12/84

Encls.: 12 Aerospace documents,
w/ SAN Form 70
Proof copy of Solar One
Project Bibliography

Sincerely yours,



S. D. Elliott, Jr., Director,
DOE Solar One Project Office



DEPARTMENT OF ENERGY
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Prime Contract No. DE-AT03-76ET21060
Subcontract No. (N/A)
Report No. DOE/ET/21060-3 (STMP0-026)
Date of Report 23 February, 1979
Name & Phone No. of DOE Technical Representative S. D. Elliott, Jr. (619) 254-2672

TO: Roger S. Gaither, Asst. Chief for Prosecution
Office of Patent Counsel/Livermore Office
P.O. Box 808, L-376
Livermore, California 94550

FROM: DOE Solar One Project Office
Post Office Box 366
Daggett, CA 92327

- Document Title:
"PRELIMINARY SIMULATION OF THE MDAC RECEIVER PANEL TEST SEQUENCES AT THE CR-STTF"
- Type of Document: Technical Report, Conference Paper, Journal Article, Abstract or Summary,
 Copy of Oral Presentation, Other (please specify): _____
- In order to meet a publication schedule or submission deadline, patent clearance by _____ (Routine) _____ would be desired.

SENDER IS TO CHECK BOX #4 OR #5 BELOW.

- I have reviewed (or have had reviewed by technically knowledgeable personnel) this document for possible inventive subject matter (Subject Inventions) and that no inventions or discoveries (Subject Inventions) are deemed to be disclosed in this document except as stated below:
 - Attention should be directed to pages _____ of this document.
 - This document describes matter relating to an invention:
 - Contractor Invention Docket No. _____
 - A disclosure of the invention was submitted to DOE on _____ (date)
 - A disclosure of the invention will be submitted shortly _____ (approximate date)
 - A waiver of DOE's patent rights to the contractor:
 has been granted, has been applied for; or will be applied for _____ (date)
- This document is being submitted, but no review has been made of this document for possible inventive subject matter.
- Remarks: Send clearance to Project Office; document may be destroyed

Reviewing/Submitting Official: Name (Print/Type) _____
Title _____
Signature _____ Date _____

TO: INITIATOR OF REQUEST
FROM: ASSISTANT CHIEF FOR PROSECUTION
Office of Patent Counsel/Livermore Office

- No patent objection to above-identified release.
- Please defer release until advised by this office.

Signed _____ Date Mailed _____

THE AEROSPACE CORPORATION



Post Office Box 92957, Los Angeles, California 90009, Telephone: (213) 648-5000

1220-P-139
April 12, 1984

Mr. Roger S. Gaither
Assistant Chief for Prosecution
Office of Patent Counsel
P. O. Box 808 - L-376
Livermore, California 94550

SUBJECT: Patent Clearance Release Forms

Dear Mr. Gaither:

Enclosed please find three separate Patent Clearance Release Forms covering the following contracts:

DE-AT03-76ET21060 - Report No. DOE/ET21060-3
DE-AT03-76CS51101 - Report No. ATR-78 (7695-02)-1
DE-ATO3-76CS51101 - Report No. ATR-78 (7695-05)-1

We have been requested to execute these at this time to ensure that our portion of processing for clearance has been properly completed. The release form for Contract No. DE-AC03-78ET20517 - Report No. ATR-81 (7747)-4 has not been included since our records indicate an executed release form has previously been provided.

Very truly yours,

THE AEROSPACE CORPORATION

Ronald L. Taylor
Patent Counsel

RLT/bt

cc: S. D. Elliott, Jr. ✓
DOE Project Office
Daggett, Ca.

bcc: L. Barnes
H. D. Eden

An Equal Opportunity Employer



DEPARTMENT OF ENERGY
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Roger S. Gaither, Asst. Chief for Prosecution
Office of Patent Counsel/Livermore Office
P.O. Box 808, L-376
Livermore, California 94550

FROM: DOE Solar One Project Office
Post Office Box 366
Daggett, CA 92327

Prime Contract No. DE-AT03-76ET21060
Subcontract No. (N/A)
Report No. DOE/ET/21060-3 (STMPO-026)
Date of Report 23 February, 1979
Name & Phone No. of DOE Technical Representative S. D. Elliott, Jr. (619) 254-2672

- Document Title:
"PRELIMINARY SIMULATION OF THE MDAC RECEIVER PANEL TEST SEQUENCES AT THE CR-STTF"
- Type of Document: Technical Report, Conference Paper, Journal Article, Abstract or Summary,
 Copy of Oral Presentation, Other (please specify): _____
- In order to meet a publication schedule or submission deadline, patent clearance by (Routine) would be desired.

SENDER IS TO CHECK BOX #4 OR #5 BELOW.

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 - Attention should be directed to pages _____ of this document.
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 - Contractor Invention Docket No. _____
 - A disclosure of the invention was submitted to DOE on _____ (date)
 - A disclosure of the invention will be submitted shortly _____ (approximate date)
 - A waiver of DOE's patent rights to the contractor:
 has been granted, has been applied for; or will be applied for _____ (date)
- This document is being submitted, but no review has been made of this document for possible inventive subject matter.
- Remarks: **Send clearance to Project Office; document may be destroyed**

Reviewing/Submitting Official: Name (Print/Type) RONALD L. TAYLOR
 Title PATENT COUNSEL
 Signature _____ Date 4/12/84

TO: INITIATOR OF REQUEST
 FROM: ASSISTANT CHIEF FOR PROSECUTION
 Office of Patent Counsel/Livermore Office

- No patent objection to above-identified release.
- Please defer release until advised by this office.

Signed _____ Date Mailed _____

U.S. DEPARTMENT OF ENERGY

memorandum

DATE

APR 17 1984

REPLY TO
ATTN OF

S. D. Elliott, Jr., Director, DOE Solar One Project Office

SUBJECT

Submission of Four Reports by Aerospace Corporation in Support of the Ten-Megawatt Pilot Plant Project for TIC Processing

TO

William D. Matheny, DOE/TIC Document Control

Enclosed are two copies each of four reports prepared by the Aerospace Corporation in support of the Solar Ten-Megawatt Project Office (STMPO):

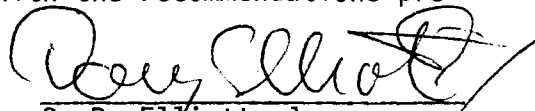
<u>Primary Document No.</u>	<u>Secondary No.</u>	<u>Title</u>
ATR-78(7695-02)-1	(STMPO-019)	"Dynamic Simulation Model of the Solar Thermal Test Facility (STTF)"
ATR-78(7695-05)-1	(STMPO-021)	"Pilot Plant Computer Model (STMPSS): Preliminary Description"
DOE/ET/21060-3	(STMPO-026)	"Preliminary Simulation of the MDAC Receiver Panel Test Sequences to be Simulated at the CR-STTF"
ATR-81(7747)-4	(STMPO-038)	"An Infrared Sensor for Remote Temperature Monitoring of Solar Thermal Central Receivers"

One copy of each of these documents has been submitted to DOE/SAN Office of Patent Counsel for patent clearance.

Please process these four documents in accordance with the recommendations provided in the attached DOE Forms RA-426.

Attch.: Transmittal Memo to DOE/SAN (OPC)

Encls.: Four Aerospace Reports w/DOE Forms RA-426


S. D. Elliott, Jr.

cc: Mike Lopez, DOE/SAN (FGS)
Don Holz, DOE/SAN (ISEA)
M. Soderstrum, Burns & McDonnell
Roger Gaither, DOE/SAN (OPC)

U.S. DEPARTMENT OF ENERGY
memorandum

DATE: **APR 17 1984**

REPLY TO
ATTN OF

S. D. Elliott, Jr., Director, DOE Solar One Project Office

SUBJECT: Patent Clearance for Four Reports by Aerospace Corporation

TO: Roger Gaither, DOE/SAN (OPC)

In response to a request by this office, the Aerospace Corporation has reviewed four documents produced under various DOE contracts in support of the Solar Ten-Megawatt Project Office, for patent release:

<u>Document No.</u>	<u>Secondary No.</u>	<u>Contract No.</u>	<u>Partial Title</u>
ATR-78(7695-02)-1	STMPO-019	76CS51101	"Dynamic Simulation...STTF"
ATR-78(7695-05)-1	STMPO-021	76CS51101	"Pilot Plant Computer Model..."
DOE/ET/21060-3	STMPO-026	76ET21060	"Preliminary Simulation..."
ATR-81(7747)-4	STMPO-038	78ET20517	"An Infrared Sensor..."


Mr. Taylor's (Aerospace) letter of April 12, 1984 (Attachment 1) provided completed copies of SAN Form 70 directly to SAN/OPC for the first three of these; he states that the Form 70 for the last report (ATR-81(7747)-4; Contract ET20517) was provided previously. Since Mr. Taylor's letter does not make it clear whether he included copies of these four documents for your reference, I am taking the liberty of so doing at this time. Two additional copies of each of these four documents are being provided to DOE Technical Information Center, for archiving and forwarding to NTIS.

Please provide me with a copy of the completed Form 70's, once you have completed the review and clearance process; please include a copy of the clearance previously provided for Report ATR-81(7747)-4. When you are done with these document copies, they may be sent to Mr. Mike Lopez, DOE/SAN (FGS).

Attch.: Aerospace ltr. 4/12/84 w/attchs. (3)

Encls.: Four Aerospace Reports
Transmittal Memo to DOE/TIC

cc: Mike Lopez, DOE/SAN (FGS)
Don Holz, DOE/SAN (ISEA)
M. Soderstrum, Burns & McDonnell
William D. Matheny, DOE/TIC Document Control



S. D. Elliott, Jr.



DEPARTMENT OF ENERGY
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Prime Contract No. DE-AT03-76ET21060
Subcontract No. (N/A)
Report No. DOE/ET/21060-3 (STMP0-026)
Date of Report 23 February, 1979
Name & Phone No. of DOE Technical Representative S. D. Elliott, Jr. (619) 254-2672

TO: Roger S. Gaither, Asst. Chief for Prosecution
Office of Patent Counsel/Livermore Office
P.O. Box 808, L-376
Livermore, California 94550

FROM: DOE Solar One Project Office
Post Office Box 366
Daggett, CA 92327

1. Document Title:
"PRELIMINARY SIMULATION OF THE MDAC RECEIVER PANEL TEST SEQUENCES AT THE CR-STTF"
2. Type of Document: Technical Report, Conference Paper, Journal Article, Abstract or Summary,
 Copy of Oral Presentation, Other (please specify): _____
3. In order to meet a publication schedule or submission deadline, patent clearance by (Routine) would be desired.

SENDER IS TO CHECK BOX #4 OR #5 BELOW.

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 - i. Contractor Invention Docket No. _____.
 - ii. A disclosure of the invention was submitted to DOE on _____ (date)
 - iii. A disclosure of the invention will be submitted shortly _____ (approximate date)
 - iv. A waiver of DOE's patent rights to the contractor:
 has been granted, has been applied for; or will be applied for _____ (date)
5. This document is being submitted, but no review has been made of this document for possible inventive subject matter.
6. Remarks: Send clearance to Project Office; document may be destroyed

Reviewing/Submitting Official: Name (Print/Type) RONALD L. TAYLOR
Title PATENT COUNSEL
Signature [Signature] Date 4/12/84

TO: INITIATOR OF REQUEST X

FROM: ASSISTANT CHIEF FOR PROSECUTION
Office of Patent Counsel/Livermore Office

- No patent objection to above-identified release.
- Please defer release until advised by this office.

[Handwritten initials]
4/16/84

4/19/84

Signed [Signature] Date Mailed _____



DEPARTMENT OF ENERGY
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Prime Contract No. DE-AT03-76ET21060
Subcontract No.
Report No. Feb. 23, 1979
Date of Report S. Elliott (619) 254-2672
Name & Phone No. of DOE Technical Representative

DOE ET/21060-3
STAMP 026
DUPL.

TO: Roger S. Gaither, Asst. Chief for Prosecution
Office of Patent Counsel/Livermore Office
P.O. Box 808, L-376
Livermore, California 94550

FROM: DOE SOLAR ONE PROJECT OFFICE
P O BOX 366
DAGGETT, CA 92327

1. Document Title:
PRELIMINARY SIMULATION OF THE MDAC RECEIVER PANEL TEST SEQUENCES AT CR-STTF
2. Type of Document: Technical Report, Conference Paper, Journal Article, Abstract or Summary,
 Copy of Oral Presentation, Other (please specify): _____
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5. This document is being submitted, but no review has been made of this document for possible inventive subject matter.

6. Remarks:

Reviewing/Submitting Official: Name (Print/Type) _____
Title _____
is 4/23/84 Signature _____ Date _____

TO: INITIATOR OF REQUEST
FROM: ASSISTANT CHIEF FOR PROSECUTION
Office of Patent Counsel/Livermore Office

- No patent objection to above-identified release.
 Please defer release until advised by this office.

Signed L. E. Cameron Date Mailed 4/25/84

LAC
4/23/84
4/25/84