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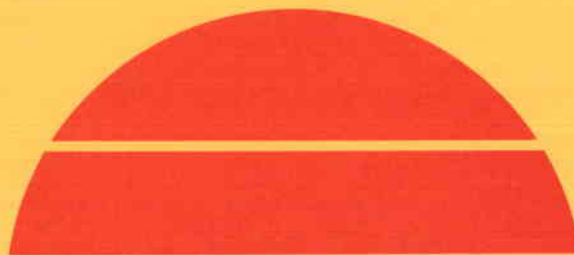
**ERDA 10MW_e SOLAR PILOT PLANT SUBSYSTEM RESEARCH
EXPERIMENTS, STEAM GENERATOR TESTS AT NORTHERN
STATES POWER RIVERSIDE STATION**

Volume III: Test Number 18

April 15, 1977

Work Performed Under Contract No. EY-76-C-03-1109

**Honeywell, Inc.
Energy Resources Center
Minneapolis, Minnesota**



U.S. Department of Energy



Solar Energy

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ERDA 10 MWe SOLAR PILOT PLANT
SUBSYSTEM RESEARCH EXPERIMENTS

VOLUME III
STEAM GENERATOR TEST NO. 18
NORTHERN STATES POWER RIVERSIDE STATION

APRIL 15, 1977

ERDA CONTRACT E(04-3)-1109

Honeywell
Energy Resources Center
2600 RIDGWAY PARKWAY,
MINNEAPOLIS, MINNESOTA 55413

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SECTION 1
EXPLANATORY SHEETS

Summary of SRE Steam Generator Testing

TEST NUMBER	DATE 1977	DURATION (HOURS)	OBJECTIVE	PEAK POWER (Mw) IN/OUT*	MANUFACTURER'S OPERATING MANUAL REFERENCE	DIFFICULTIES**
1	3/11	7.25	INITIAL STEAMING		3.0	RECIRCULATION PUMP INSTABILITY
2	3/14	4.95	RELIEF VALVE SETTING		3.0	DAC P-T OUTPUT
3	3/16	9.87	RELIEF VALVE SETTING		3.0	480-V CIRCUIT BREAKER TRIPS
4	3/17	4.55	SATURATION CHECK OF T/C RECIRCULATION VERSUS DRUM LEVEL COOLING WATER INSTRUMENTATION		3.0	- DAC INTERMITTENT - COOLING WATER PLUGGING
5	3/18	12.93	STEADY STATE AT HIGHER POWER TUNE AUTOMATIC CONTROLS		3.0	- ZONE 3 CIRCUIT BREAKER TRIP - ATTEMPERATOR AUTO CONTROL
6	3/19	9.93	TUNE AUTOMATIC CONTROLS		3.0	ZONE 3 CIRCUIT BREAKER TRIP
7	3/21	13.83	TUNE AUTOMATIC CONTROLS		3.0	ZONE 3 CIRCUIT BREAKER TRIP
8	3/22	10.00	CALIBRATE SIMULATOR AND CHECK FULL RANGE OPERATION		3.0	FAILED MANY LAMPS IN ARRAY
9	3/28	7.93	CHECK R/A AFTER RE-LAMPING STEADY STATE CHECKS; AUTO CONTROL TUNING	2.07/1.4	4.0	ZONE 3 TRIP PROBLEM
10	3/29	3.83	DETERMINE CAUSE OF ZONE 3 TRIP; STEADY STATE DATA		4.0	ZONE 3 TRIP; NO STEADY STATE DATA
11	3/30	6.25	CONFIRM CORRECTION OF ZONE 3 TRIP REPAIR; TAKE STEADY STATE DATA	2.07/1.4	4.0	ZONE 3 TRIP PROBLEM
12	3/31	3.04	ZONE 3 TRIP INVESTIGATION; STEADY STATE DATA	3.84/2.76	4.0	ZONE 3 TRIP 18 LAMPS FAILED
13	4/2	2.5	TAKE HEAT BALANCE DATA		4.0	NSP FEEDWATER FAILURE
14	4/4	5.5	CALIBRATE R/A POWER DELIVERY			ZONE 1 CIRCUIT BREAKER FAILED
15	4/7	5.0	R/A POWER DELIVERY CALIBRATION AND INSTALL 420V LIMITING			ZONE 3 POWER CONTROL CIRCUITRY
16	4/11	6.5	REPEAT TESTS 11 AND 12 TO NOTE EFFECT OF BOILER PAINTING	2.07/1.4	4.0	35 LAMPS FAILED

Summary of SRE Steam Generator Testing -- Concluded

TEST NUMBER	DATE 1977	DURATION (HOURS)	OBJECTIVE	PEAK POWER (Mw) IN/OUT*	MANUFACTURER'S OPERATING MANUAL REFERENCE	DIFFICULTIES**
17	4/13	10.7	TRANSIENT: MAIN STEAM TRANSIENT: RADIANT ARRAY	4.1/3.0	5.1.1 5.1.3	- 100 LAMPS FAILED - DAC RECORDING STOPPED
18	4/15	10.5	TRANSIENT: DRUM SHRINK-SWELL TRANSIENT: POWER RAMP CLOUD OBSTRUCTION ATTEMPERATOR POWER		5.1.4 5.1.5 5.1.6 5.1.2 5.1.7	DURING "SHRINK SWELL" - 154 LAMPS FAILED - DAC REMOTE CABINET OUTAGES
19	4/18	6.7	TRIP: RECIRCULATION PUMP FEEDWATER PUMP RECIRCULATION PUMP STABILITY STEADY STATE		6.1.2 6.1.4 --- ---	NONE NONE
20	4/19	10.5	TRANSIENT: POWER STEP INCREASE TRIP: HELIOSTAT - 800°F TRIP: HELIOSTAT - 700°F TRIP: HELIOSTAT - 595°F TRANSIENT: SHRINK-SWELL (REPEAT) TUNE ATTEMPERATOR CONTROL		--- 6.1.1 6.1.1 6.1.1 5.1.4 ---	LOW NSP WATER RESERVES
21	4/21 4/22	29.5	ASYMMETRIC HEAT INPUT	3.8/2.7	7.1.1 7.1.2	20 LAMPS FAILED DAC INTERMITTENT LOW NSP WATER SUPPLY SCR COOLING WATER PLUGGED SIMULATOR ZONE 1
22	4/26	11.75	STEADY STATE AND TRANSIENT TESTS - WITH AUTOMATIC ATTEMPERATION		4.0 5.0	FAILED 31 LAMPS LEAKAGE AT ATTEMPERATOR
23	4/28	4.5	MAXIMUM POWER STEADY STATE HEAT BALANCE	5.0/3.85	4.0	WATER SUPPLY FLANGE FAILED 350 LAMPS

*PEAK POWER ENTRIES ARE FROM THE TEST LOG FOR PERIODS WHEN HEAT BALANCE DATA WERE BEING TAKEN.

**DIFFICULTIES SHOWN DID NOT NECESSARILY PREVENT THE TAKING OF DATA.

TEST NO. 18

DATE: April 15, 1977

Test Objectives

1. To perform the following transient tests (Refer to Appendix A):
 - a) Power ramp transient.
 - b) Cloud obstruction transient.
 - c) Attenuator step transient.
 - d) 67% step power increase transient.

Description

The test went well except for difficulties encountered as described below. The Data Trac power programmers were first used today. They performed as intended.

Difficulties Encountered

1. The Data Acquisition System (DAC) caused a power trip due to a software problem.
2. The Zone 4 circuit breaker did not trip as it should have - probably has a burned out trip coil.
3. At least 154 bulbs were rendered inoperative during the test. 119 of these were in Zone 3.
4. The DAC remote cabinet quit several times during the testing.

Code Sheet for Recorder Charts

Recorder Number	Pen or Point Number	Process Variable	Data Source	Scale Range
RCD-1	1, Red	Main Steam Flow	FT-3	0-18,000 lb/hr*
	2, Blue	Drum Inlet Feedwater Flow	FT-1	0-18,000 lb/hr**
	3, Green	Attemperator Spraywater Flow	FT-480	0-2,000 lb/hr**
RCD-4	1, Red	Drum Water Level	LT-211	0-55 Inches
	2, Blue	Main Steam Pressure	PT-590	0-2,100 psig
	3, Green	Trend Panel PV-1: Water Conductivity	Beckman solu-meter®	0-100 ++ micromhos/cm
RCD-3	1	Feedwater Temperature (F)	TE-1	0-1,000°F (K)
	2	Attemperator Inlet Temperature (F)	TE-475	0-1,000°F (K)
	3	Attemperator Outlet Temperature (F)	TE-500	0-1,000°F (K)
	4	Main Steam Temperature (F)	TE-591	
	5	Lower 1st Stage Superheater (M)	TE-405	0-1,000°F (K)
	6	Upper 1st Stage Superheater (M)	TE-452	0-1,000°F (K)
	7-10	Recirculation Pump Inlet Water Temperature (F)	TE-301	0-1,000°F (K)
	11	Lower 2nd Stage Superheater (M)	TE-507	0-1,000°F (K)
	12	Upper 2nd Stage Superheater (M)	TE-550	0-1,000°F (K)

*lb/hr. at 955°F, $\rho = 2.06 \text{ lb}_m/\text{ft}^3$

**lb/hr. at 440°F, $\rho = 52.52 \text{ lb}_m/\text{ft}^3$

(F): Fluid Temperature

(M): Metal Temperature

†Datum is centerline of lower pipe;
transmitter output is for 80°F water;
alarm and trips set for 620°F water.

††Specific conductance at 25°C.

Parameter Identification Legend:
Operator and Performance Summaries

LABEL	PARAMETER	UNITS	SOURCE (5)
<u>OPERATOR SUMMARY</u>			
<u>BOILER DRUM</u>			
P-D	Pressure, drum	psig	PT-230
T-D	Temperature, drum	°F	CALC.
L-D	Level, drum	Inches above-55" reference	LT-210
W-FW	Flow, feedwater	Lbs /Hour	FT-1
W-BD	Flow, blowdown	Lbs ^m /Hour	FT-260
<u>PUMP</u>			
W-B	Flow, boiler recirculation	Lbs /Hour	FT-310
T-DC	Temperature, downcomer	°F ^m	TE-300
T-SUB	Temperature, pump suction subcooling	°F	CALC.
T-PC	Temperature, pump coolant	°F	TE-306
<u>SUPERHEATER 1</u>			
TE-	Temperature, thermocouples	°F	TE-420-440; 406-409; 450-454; 455-466
T-S11	Temperature, steam, superheater inlet	°F	TE-400-402
W-ATT	Flow, attemperator water	Lbs ^m /Hour	FT-480
<u>SUPERHEATER 2</u>			
TE-	Temperature, thermocouples	°F	TE-520-540; 506-509; 550-554; 555-566
T-S20	Temperature, steam, superheater outlet	°F	TT-590
P-S20	Pressure, steam, superheater outlet	psig	PT-590
W-S2	Flow, superheater	Lbs ^m /Hour	FT-3
<u>POWER</u>			
BOILER ABS	Absorbed power, boiler	Kilowatts	CALC.
S.H. #1 ABS	Absorbed power, superheater	Kilowatts	CALC.
S.H. #2 ABS	Absorbed power, superheater	Kilowatts	CALC.
TOTAL INPUT	Net power input (1)	Kilowatts	CALC.
TOTAL ABSORBED	Absorbed power, steam generator	Kilowatts	CALC.
POWER RATIO	$\frac{\text{Total Absorbed}}{\text{Total Input}}$	Dimensionless	

- (1) Electrical power to Radiant Array minus cooling water heat absorbed.
- (2) Recirculation flow divided by Superheater #1 flow.
- (3) Reciprocal of recirculation ratio (N-CR).
- (4) Electrical power to Radiant Array minus cooling water heat absorbed.
- (5) Sources are cited by transmitter or thermocouple designations as indicated in the P & ID Diagrams, or as calculated (Calc.) by the Data Acquisition System (DAC) (i.e., enthalpies, power). Transmitter and thermocouple raw outputs are modified by the DAC to provide readouts in engineering units.

Parameter Identification Legend:
Operator and Performance Summaries--Continued

LABEL	PARAMETER	UNITS	SOURCE (5)
<u>PERFORMANCE SUMMARY</u>			
<u>BOILER DRUM</u>			
P-D	Pressure, drum	psig	PT-230
T-D	Temperature, drum	°F	CALC.
H-GD	Enthalpy, drum steam	BTU/Lb _m	CALC.
H-FD	Enthalpy, drum water	BTU/Lb _m	CALC.
N-CR	Recirculation ratio (2)	Dimensionless	CALC.
<u>FEEDWATER</u>			
P-FW	Pressure, feedwater	psig	PT-1
T-FW	Temperature, feedwater	°F	TE-19
W-FW	Flow, feedwater	Lb _m /Hour	FT-1
H-FW	Enthalpy, feedwater	BTU/Lb _m	CALC.
<u>FLOW CIRCUITS</u>			
T-DC	Temperature, downcomer	°F	TE-300
T-SUB	Temperature, pump suction subcooling	°F	CALC.
W-B	Flow, boiler recirculation	Lbs _m /Hour	FT-310
W-BC1	Flow, boiler circuit (Transmitter #1)	Lb _m /Hour	FT-350
W-BC2	Flow, boiler circuit (Transmitter #2)	Lb _m /Hour	FT-351
W-BC3	Flow, boiler circuit (Transmitter #3)	Lb _m /Hour	FT-352
X-B	Quality, boiler steam (3)	Dimensionless	CALC.
<u>SUPERHEATERS</u>			
<u>S.H. Stage 1</u>			
W-SI	Flow, superheater #1	Lb _m /Hour	WS2-WATT
T-S11	Temperature, steam, superheater inlet	°F	TE-400-402
T-S10	Temperature, steam, superheater outlet	°F	TE-476
P-S10	Pressure, steam, superheater outlet	psig	PT-475
H-S10	Enthalpy, steam, superheater outlet	BTU/Lb _m	CALC.

- (1) Electrical power to Radiant Array minus cooling water heat absorbed.
- (2) Recirculation flow divided by Superheater #1 flow.
- (3) Reciprocal of recirculation ratio (N-CR).
- (4) Electrical power to Radiant Array minus cooling water heat absorbed.
- (5) Sources are cited by transmitter or thermocouple designations as indicated in the P & ID Diagrams, or as calculated (Calc.) by the Data Acquisition System (DAC) (i.e., enthalpies, power). Transmitter and thermocouple raw outputs are modified by the DAC to provide readouts in engineering units.

Parameter Identification Legend:
Operator and Performance Summaries--Concluded

LABEL	PARAMETER	UNITS	SOURCE (5)
<u>ATTEMPERATOR</u>			
P-ATT	Pressure, attemperator water inlet	psig	PT-1
T-ATT	Temperature, attemperator water inlet	°F	TE-480
W-ATT	Flow, attemperator water	Lb _m /Hour	FT-480
H-ATT	Enthalpy, attemperator water	BTU/Lb _m	CALC.
<u>S.H. Stage 2</u>			
W-S2	Flow, superheater #2	Lb _m /Hour	FT-3
T-S2I	Temperature, superheater #2 inlet	°F	TE-500,501
T-S2O	Temperature, steam, superheater outlet	°F	TT 590
P-S2O	Pressure, steam, superheater outlet	°F	PT 590
H-S2O	Enthalpy, steam, superheater outlet	BTU/Lb _m	CALC.
<u>BOILER</u>			
L-D	Level, drum	Inches above-55" reference	LT 210
T-BI	Temperature, boiler inlet	°F	TE-310, 311
H-BI	Enthalpy, boiler inlet	BTU/Lb _m	CALC.
R-BI	Density, boiler inlet	Lb _m /Ft ^m	CALC.
R-GD	Density, drum steam	Lb _m /Ft	CALC.
R-FD	Density, drum water	Lb _m /Ft	CALC.
<u>POWER</u>			
Boiler ABS	Absorbed power, boiler	Kilowatts	CALC.
S.H. #1 ABS	Absorbed power, superheater	Kilowatts	CALC.
S.H. #2, ABS	Absorbed power, superheater	Kilowatts	CALC.
Total Input	Net power input (4)		CALC.
Total Absorbed	Absorbed power, steam generator	Kilowatts	CALC.
Power Ratio	Total Absorbed / Total Input	Dimensionless	CALC.

- (1) Electrical power to Radiant Array minus cooling water heat absorbed.
- (2) Recirculation flow divided by Superheater #1 flow.
- (3) Reciprocal of recirculation ratio (N-CR).
- (4) Electrical power to Radiant Array minus cooling water heat absorbed.
- (5) Sources are cited by transmitter or thermocouple designations as indicated in the P & ID Diagrams, or as calculated (Calc.) by the Data Acquisition System (DAC) (i.e., enthalpies, power). Transmitter and thermocouple raw outputs are modified by the DAC to provide readouts in engineering units.

SRE Steam Generator Thermocouple Identifications/Locations

	AZIMUTH	#1 SUPERHEATER				#2 SUPERHEATER			
SUPERHEATER OUTSIDE* OF TUBES									
ROW 6	345	420	426	432	438	520	526	532	538
ROW 5	30	425	431	437		525	531	537	
ROW 4	120	424	430	436		524	530	536	
ROW 3	210	423	429	435		523	529	535	
ROW 2	240	422	428	434	440	522	528	534	540
ROW 1 (HOT SPOT)	300	421	427	433	439	521	527	533	539
SUPERHEATER INSIDE* OF TUBES AT BEGINNING OF THE HEATED LENGTH									
NEAR ROW 1		406				506			
NEAR ROW 3		407				507			
NEAR ROW 4		408				508			
NEAR ROW 5		409				509			
SUPERHEATER INSIDE* OF TUBES AT BEGINNING OF THE HEATED LENGTH									
NEAR ROW 1		450				550			
NEAR ROW 2		451				551			
NEAR ROW 3		452				552			
NEAR ROW 4		453				553			
NEAR ROW 5		454				554			
SUPERHEATER OUTSIDE* OF TUBES NEAR FLOW EXIT									
	330	455				555			
	300	456				556			
	270	457				557			
	240	458				558			
	210	459				559			
	180	460				560			
	150	461				561			
	120	462				562			
	90	463				563			
	60	464				564			
	30	465				565			
	0	466				566			

SRE Steam Generator Thermocouple Identifications/Locations--Concluded

BOILER	AZIMUTH	LOWER TANGENT** ←-----→ NEAR UPPER TANGENT**							
ROW 1	~ 10		333		332		331		330
ROW 2	~ 45		337		336		335		334
ROW 3	90		341		340		339		338
ROW 4	~140	349	348	347	346	345	344	343	342
ROW 5	~187½		353		352		351		350
ROW 6	~235	361	360	359	358	357	356	355	354
ROW 7	270	369	368	367	366	365	364	363	362
ROW 8 HOT SPOT (300°)	~295	377	376	375	374	373	372	371	370
ROW 9	~305	385	384	383	382	381	380	379	378
ROW 10	330		389		388		387		386

DRUM

T/C#

210	DRUM SURFACE: ADJACENT TO FEEDWATER (FW) INLET
211	DRUM SURFACE: FW INLET PLANE AT 270° AZIMUTH
212	DRUM SURFACE: 11" BELOW UPPER TANGENT AT 270° AZIMUTH
213	DRUM SUPPORT: ~240° AZIMUTH
214	DRUM GUSSET 1" FROM DRUM SURFACE: ~240° AZIMUTH
215	DRUM SURFACE 1" FROM T/C #214
216	FW INLET PIPE ~1/2" FROM WELD
217	DRUM SURFACE ~1/2" FROM DOWNCOMER PIPE AT 0° AZIMUTH

* WITH RESPECT TO STEAM GENERATOR CAVITY.

** WITH RESPECT TO VERTICAL SECTION OF BOILER TUBE.

Explanation of Array Flux Map

INCIDENT FLUX SENSOR	LOCATION	
IF 1	4 INCHES ABOVE TOP OF BOTTOM REFLECTOR	} THERE IS 15.5 IN. OF VERTICAL SEPARATION BETWEEN ADJACENT SENSORS IF 1 THROUGH IF 10.
IF 10	6 INCHES FROM CEILING	
IF 11	40 INCHES FROM CENTER OF CEILING AT CEILING	
IF 12	20 INCHES FROM CENTER OF CEILING AT CEILING	
IF 1 THROUGH IF 4 ARE IN THE BOILER REGION IF 5 IS ON THE LINE BETWEEN THE BOILER AND S.H. NO. 1 IF 6 THROUGH IF 7 ARE IN THE S.H. NO. 1 REGION IF 8 THROUGH IF 10 ARE IN THE S.H. NO. 2 REGION IF 11 THROUGH IF 12 ARE IN THE CEILING REGION		
BOOM POSITION	AZIMUTH	COMMENTS
1	20°	
2	30°	
.	.	
.	.	
8	90°	East
.	.	
17	180°	South
.	.	
26	270°	West
.	.	
.	.	
34	350°	
35	360° (0°)	North - not read.
36	10°	Not read.

Each incident flux sensor measures the incident flux over azimuthal positions 1 through 34. Positions 35 and 36 cannot be read due to the design of the flux boom which switches its direction of angular motion before revolving a full 360°.

The boom positions correspond to the center positions of each of the 18 boiler panels and to their intersections.

The unit of flux for each sensor is [hundreds of watts per square meter]

Data Acquisition System Real Time Plot Format

1. PLOT HEADERS

- NUMBER OF RECORDS - TOTAL VARIABLES PLOTTED (ARGUMENT PLUS FUNCTIONS)
- ARGUMENT SELECTED - INDEPENDENT VARIABLE - (1 THROUGH 4 IS TIME)
- FUNCTION NUMBERS - DEPENDENT VARIABLES PLOTTED, NUMBERS SHOWN ON GROUP LIST BELOW
- SEARCH MODE - SOFTWARE FUNCTION
- PLOT START TIME - TIME OF DAY IN SECONDS (I.E., 8 AM = 28,800 SEC.)
- (NO.) POINTS SKIPPED - RECORD SKIP FACTOR (PLOT ONLY Nth POINTS OF ALL DATA TAKEN)
- POINTS PLOTTED

2. PLOT GROUPING AND IDENTIFIERS

2.1 FLOWS - LBM/HR.

- 8 - WFW
- 10 - WS2
- 17 - WS1 SECTION 4.14 (PAGE 14)
- 9 - WATT (*)
- 11 - WBD (*)

2.2 PRESSURES - PSIG

- 18 - PD
- 19 - PFW SECTION 4.15 (PAGE 15)
- 20 - PS10
- 21 - PS20

2.3 FLUID TEMPS. DEG. F.

- 22 - TBI
- 24 - TFW
- 26 - TS10 SECTION 4.16 (PAGE 16)
- 27 - TS11
- 28 - TS20
- 29 - TS21

2.4 METAL TEMPS. DEG. F.

- 12 - TE400
- 13 - TE401
- 14 - TE402 SECTION 4.17 (PAGE 17)
- 23 - TDC
- 32 - TAS1
- 33 - TAS2

2.5 DRUM LEVEL - INCHES (*)

- 30 - LD SECTION 4.18 (PAGE 18)

2.6 RECIRC. FLOW (*)

- 31 - WB SECTION 4.19 (PAGE 19)

2.7 POWER LEVELS -

- 6 - QABS
- 7 - QIN SECTION 4.20 (PAGE 20)
- 15 - QB
- 16 - QS2

(*) OPTIONAL VARIABLES/PLOTS

0 = ZERO

Plot Labels and Descriptors

NUMBER	LABEL	DESCRIPTOR	WHERE USED
1-4	time		
5	year		
6	QABS	Total Absorbed Power	A-series, B-series, F-series, G1-1
7	QIN	Total Input Power	E1-1, G16-1, G16-2
8	WFW	Feedwater Flow	A1-4, G2-3, E2-1
9	WATT	Attemperator Flow	A1-2, E2-1, G3-1
10	WS2	Steam Flow	A1-1, E2-1, G2-1, B1b-2
11	WBD	Blowdown Flow	A1-3, E2-1
12	TE400		
13	TE401	Superheater #1 Inlet Temperature	
14	TE402		
15	QB	Boiler Absorbed Power	A6-1, F5-1, F6-1, G1-1
16	QS2	Second Stage Superheater Absorbed Power	A6-3, F5-3, F6-3, G1-4
17	WS-1	First Stage Superheater Flow	G2-1
18	PD	Drum Pressure	G4-1
19	PFW	Feedwater Pressure	G4-2
20	PS10	First Stage Superheater Outlet Pressure	A3-2, G5-1
21	PS20	Second Stage Superheater Outlet Pressure	A3-3, G5-2
22	TBI	Boiler Inlet Temperature	A5-2, G6-2
23	TDC	Downcomer Temperature	A5-1, G6-3
24	TFW	Feedwater Temperature	A2-1, G6-4

Plot Labels and Descriptors--Concluded

NUMBER	LABEL	DESCRIPTOR	WHERE USED
25	TATT	Attemperator Supply Temperature	A2-2, G6-5
26	TS1)	First Stage Superheater Outlet Temperature	A2-4, G7-1
27	TS1I	First Stage Superheater Inlet Temperature	
28	TS20	Second Stage Superheater Outlet Temperature	A2-6, G7-3
29	TS2I	Second Stage Superheater Inlet Temperature	A2-5, G7-2
30	LD	Drum Level	G-12
31	WB	Boiler Flow	A4-1, G13-1
32	TAS1	First Stage Superheater Average Metal Temp.	G15-1
33	TAS2	2nd Stage Superheater Average Metal Temp.	G15-2
51	QABS/QIN	Power Ratio	E-1
52	$\frac{(WFW + WATT)}{(WS2 + WBD)}$	Flow Ratio - Mass Balance	E-2
53	(WS2 + WBD)	Outlet Flows	E-2
54	(TD-TE400)	Drum-to-Superheater Temp. Loss	E-3.3
55	(TD-TE401)	Drum-to-Superheater Temp. Loss	E-3.3
56	(TD-TE402)	Drum-to-Superheater Temp. Loss	E-3.3
57	HS10	Steam Enthalpy, S.H. 1 Outlet	G-8.1
58	HS2I	Steam Enthalpy, S.H. 2 Inlet	G-8.2
59	HS20	Steam Enthalpy, S.H. 2 Outlet	G-8.3
60	H-GD	Drum - Steam Enthalpy	G-9.2
61	H-FD	Drum - Water Enthalpy	G-9.1
62	H-BI	Boiler Inlet Water Enthalpy	G-9.3
63	X-B	Boiler Outlet (Drum) Steam Quality	G-14

Radiant Array Calibration

POWER SETTING%	ZONE 1			ZONE 2			ZONE 3			ZONE 4		
	KW	LAMP VOLTS	CONTROL VOLTS	KW	LAMP VOLTS	CONTROL VOLTS	KW	LAMP VOLTS	CONTROL VOLTS	KW	LAMP VOLTS	CONTROL VOLTS
0												
10	210.5	134.5	0.44	224.4	138.7	0.47	229.5		0.45	230.4		0.45
20	420	209.3	0.89	445.5	217.3	0.97	460.8		0.90	459		0.90
30	633	270	1.34	682.5	284.3	1.47	679.5		1.35	670.5		1.35
40	849	322.7	1.79	922.5	340.3	1.97	909		1.80	900		1.79
50	1065	367.3	2.25	1155	396	2.48	1120.5		2.25	1120.5		2.24
60	1278	420	2.70	1287(2)	420.7	2.76	1350		2.71	1341		2.70
70							1575		3.16	1566		3.15
80							1809		3.60	1800		3.60
90												
100												
KW/Volt (1)			473	464.8			500.9			499		

(1) Based on averages in which 10% values were omitted for Zones 1 and 2;
10% to 20% values were omitted for Zones 3 and 4.

(2) Apparently erroneous

Data Acquisition System Printout Listing

PAGE NUMBER	TITLE
1	Operator Summary
2	Performance Summary
3	Base Data Report -- Metal Temperatures
4	Base Data Report -- Fluid
5	Cooling Water Temperature
6	First Stage Superheater Metal Temperatures
7	Second Stage Superheater Metal Temperatures
8	Boiler Temperature Profile
9	First Stage Superheater Temperature Profile
10	Second Stage Superheater Temperature Profile
11	Warnings and Alarms Report
12	Alarm Conditions
13	Array Flux Map
14	Flows, Plots
15	Pressures, Plots
16	Fluids Temperatures, Plots
17	Metal Temperatures, Plots
18	Drum Level, Plots
19	Recirculation Flow, Plots
20	Power Levels, Plots
21	Enthalpy
22	Ratios

SECTION 2

DATA SHEETS: TEST RUN LOG BOOK PAGES

DATE 15 APR 77

TIME	OPERATOR ACTION	COMMENTS
0730 To 0830	Work on Zone 4 Breaker; check Balls, Elevate Array	All Bulbs Lit & 2-3-4 Pattern is correct
0833	Start Recirc Pump	
0834	20% Power To Zones 3 & 4	
0846	Cut Power	I/O Error in Computer Standby For Zero Checking
0854	20% Power To Zones 3 & 4	
0855	Cut Power	
0855	Stop Recirc Pump Add 4 PSIG N ₂	For Zero Checking
	Rezeroed FT-310, 350 351 & 352	DAC Still Shows 4210 PPH with No Flow. Decision To Proceed OK AS IS.
1002	Restart Recirc Pump.	AT 80,000 PPH INDICATED ON CS-E, DAC SHOWS 100,000 PPH Drum Temp 105 pph Drum Press 4 PSIG.
1005	15% Power To Zones 3 & 4	
1010	Open Water Sample and Blowdown	Conductivity way high
1019	Superheater DRAIN OPEN	
1040	Increase Power To 20%, Zones 3 & 4	

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TEST NO. 18
DEV. NO. _____
PAGE 2 OF 7DATE 15 APR 77

TIME	OPERATOR ACTION	COMMENTS
1100	CLO SUPERHEATER DRAINS	
1102	ROTATION ON DRUM	
1109	CLO VALVE 22	
1110	OPEN CV10	
1111	OPEN CUL 30%	DRUM LEVEL 3-2.8
1117	CLO CUL	DRUM LEVEL 5.33
1125	OPEN WATER SAMPLE	
1128	OPEN BLENDOWN CUL	COND. 25.000
1130	OPEN CV1 TO 80% ADD FLOW WATER	
1132	INCREASE POWER TO 30% ZONES 3 & 4	
1134	30% POWER TO ZONES 1 & 2	
1141	Reduce Power To Zones 1 & 2 To 10%	1 st STG Superheaters Heating TOO FAST.
1142	INCREASE Zone 1 & 2 Power To 24%	
1242	CLOSE BLENDOWN CLOSE WATER SAMPLE. Zone 1 24% 2 24% 3 30% 4 30%	Power Levels 1.10 V 1.20 V 1.353 V 1.332 V FLUKE

TEST NO. 18
 DEV. NO. _____
 PAGE 3 OF 7

79

DATE 15 APR 77

Time	OPERATOR ACTION	Comments
1250	CLOSE VALVE 280	Boundaries will NOT Shift.
1314	TAKE DAC DATA TAKE ANALOG DATA	TT-22 59°F TT-2 78°F TT-27 74°F FT-13 260 GPM PT-11 88 PSIG TT-306 68°F TT-28 62°F FT-1 5700 MPH FLOW PRESS 1900 PSIG RECIIRC 80,000 MPH
1316	ZONES 1, 2, AND 3 Power Went To Zero! Turned off Zone 4.	UNIT BOTTLED ITSELF UP AUTOMATICALLY. 1, 2 & 3 ZONES TRIPPED 4 ZONE did NOT Found out the DAC TRIPPED US OUT due TO A SOFTWARE BUG.
1334	TRIP Removed by DAC	BILL TOOK ACTION TO Prevent recurrence.
1335	BREAKERS Reclosed Resume Power Zone 1 24% 2 24% 3 30% 4 30%	Power Levels 1.10 V 1.18 V 1.35 V 1.32 V
1415	TAKE DAC DATA TAKE ANALOG DATA	All Temperatures & Flows For Cooling Water are the SAME AS AT 1314; also Recirc RATE SAME

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DATE SEP 77TEST NO. 18
DEV. NO. _____
PAGE 4 OF 7

Time	OPERATOR ACTION	COMMENTS
1418	INCREASE POWER - STOP INCREASE 6.4%	Power Levels Zone 1 1.82 V Zone 2 1.99 V Zone 3 2.26 V Zone 4 2.22 V
1437	DATA TRAC AUTOMATIC PROGRAMMERS ON STARTING POWER RAMP TRANSIENT.	
1449	TAKE POWER LEVELS during DATA TRAC (TAKE DAC SUMMARY)	Zone 1 1.83 V Zone 2 1.98 V Zone 3 2.26 V Zone 4 2.25 V
1451	TAKE Heat Balance	TT-22 60°F TT-16 87°F TT-25 85°F TT-306 72°F TT-23 64°F FT-13 210 GPM FT-13 90 PSIG NII on AUTOMATIC FW PRESS 190 PSIG DRUM 1650 PSIG STEAM 1575 PSIG
1454	300 Sec Power Ramp STARTED.	
1503	TAKE Power Levels AT 57% Power	Zone 1 1.06 V Zone 2 1.13 V Zone 3 1.30 V Zone 4 1.28 V
1513	TOOK DAC SUMMARY	

DATE 15 APR 77

Time	OPERATOR ACTION	COMMENTS
1515	TAKE ANALOG DATA	Drum 1600 psig Steam 1575 psig TT-22 60°F TT-16 80°F TT-25 75°F FT-13 261 GPM PT-16 96 psig FW 1900 psig
1534	TAKE DAC SUMMARY	
1537	SWITCH TO MANUAL Control of Power - Set up for Cloud Disturbance Transient Power Transient Down	Zone 1 30% 1.40 VOLT Zone 2 30% 1.50 V * Zone 3 45% 2.03 V Zone 4 50% 2.23 V Lower Due To hi voltage in this Zone
1600		(Zone 3 has many Blown Bulbs AT this Time -
1602	TAKE DAC SUMMARY TAKE ANALOG DATA	PT-16 86 psig FT-13 266 GPM TT-22 60°F TT-25 83°F FW PRESS 1900 PSIG Steam 1575 psig Drum 1630 psig
1605	START Cloud OBSTRUCTION Transient (All controls on Auto)	
1629	Zone 1 31.5% Zone 2 31.5% Zone 3 37% Zone 4 43.5%	1.45 V 1.57 V 1.77 V 1.95 V

82

DATE 15 APR 77

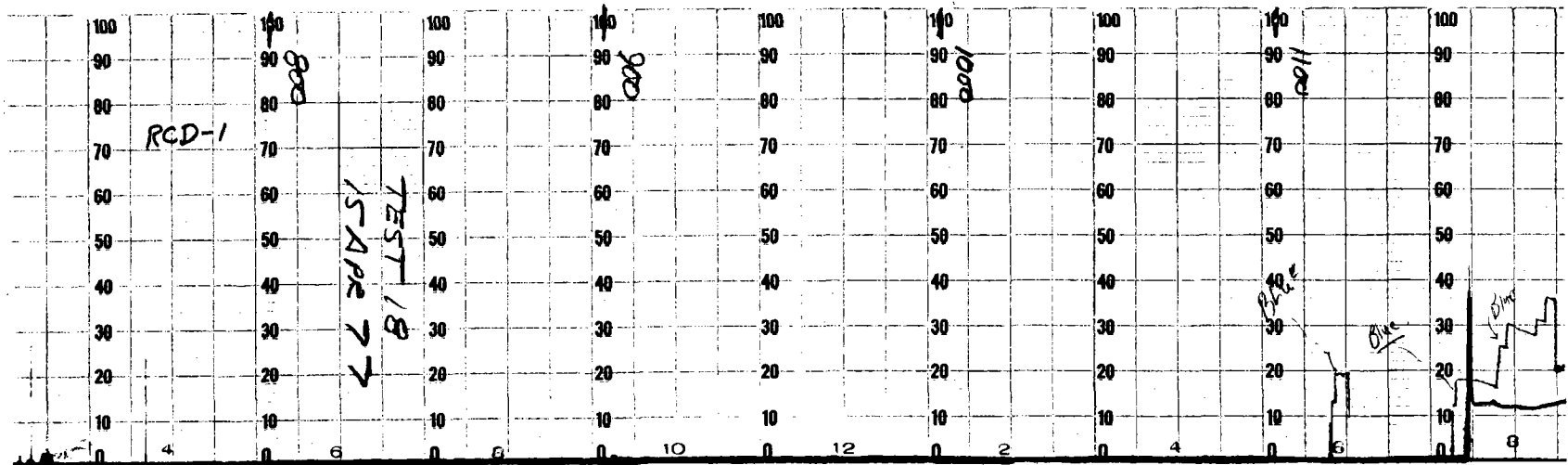
TEST NO. 18
DEV. NO. _____
PAGE 6 OF 7

Time	OPERATOR ACTION	Comments
1630	TAKE DAC SUMMARY TAKE ANALOG DATA	TT-22 60°F TT-25 80°F FT-13 261 GPM PT-16 8815.6 Steam Press: 1575 psig Drum Press: 1625 psig FW Press 1900 psig
1633	INCREASE Power Back To Previous "Normal" Zone 1 30% Zone 2 30% Zone 3 45% Zone 4 50%	1.37V 1.50V 2.03V 2.24V
1654	Reduce Zone 3 Power To 30% (1.37 volts)	Zone 3 Voltage Limiter Kicked in LAST Time Good For Heat Balance 1652 (1654 DAC Time)
1700	Begin ATTEMPERATOR Tuning ATTEMP - Manual Open To 92% Flow 220 PPH	
1707	Reduce Zone 3 To 20% 0.91V	Zone 3 AT 373 volts - 30% power
1713	Switched ATTEMPERATOR INTO AUTO AT STABILIZED TEMPERATURE.	
1848	Put CV-1 in Manual Increase ATTEMP. Flow to 165 pph.	← (ATTEMP Step Transient) Increased avg Flow From 32% To 42%

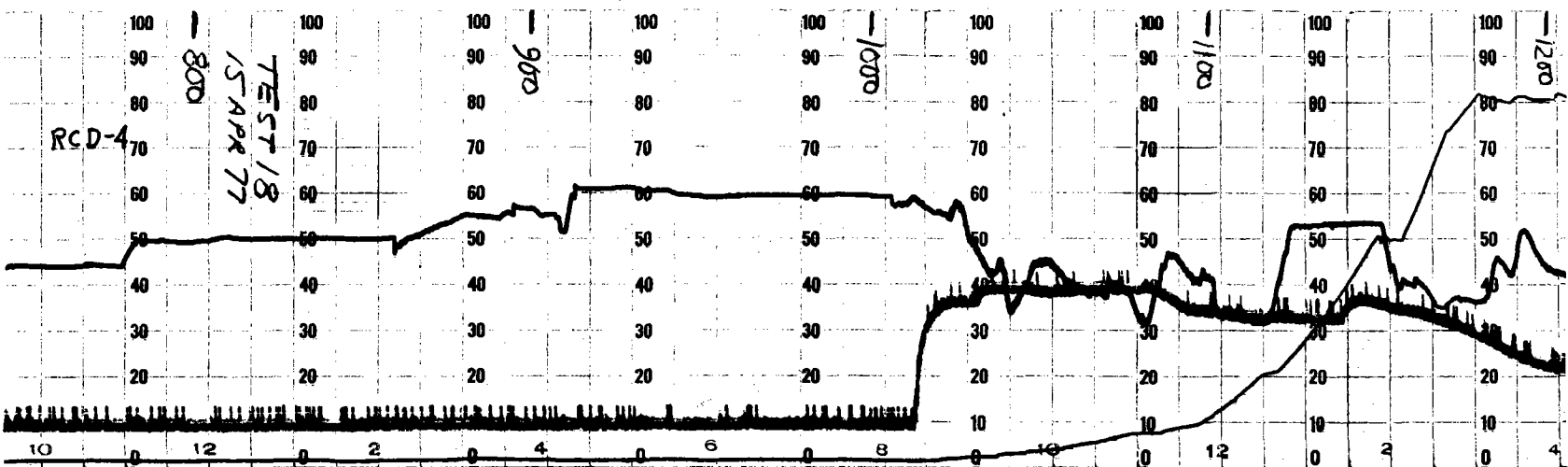
DATE 15 APR 71

TIME	OPERATOR ACTION	COMMENTS												
1840	End of Attenuator STEP TRANSIENT - DOWN CV 1 TO AUTOMATIC Attenuator Valve Returned To original Position													
1900	TRIPPED ARRAY CLOSED Attenuator	All controls on Auto. (Attenuator Step Test over)												
1905	Open CV-1 TO 90%	End of Automatic Btth up												
1955	CLOSE CV 10													
2010	OPEN 96B BRKR. & LIS													
2005	CLOSE #22 FW VLV.													
2039	Unpower Recirc Pump Lowered ARRAY	DAC TAPE QUIT AT 2030 154 Bulbs blown Decision To Lamp Lower Zones Like upper Zones ARE Lamped on Saturday.												
2052	Unpowered Analog Panel AND RI Panel	<table border="1"> <thead> <tr> <th></th> <th>Before Fri</th> <th>Run Fri 4/18</th> <th>Re-lamp Sat. 4/19</th> </tr> </thead> <tbody> <tr> <td>Upper</td> <td>2 lamps 1 spare 2 lamps</td> <td>Same</td> <td>Same</td> </tr> <tr> <td>Lower</td> <td>All lamps</td> <td>2 lamps 1 spare 4 lamps 1 spare 3 lamps 1 spare 2 lamps</td> <td>Same as Upper</td> </tr> </tbody> </table> <p>* "All lamps" changed to above on</p>		Before Fri	Run Fri 4/18	Re-lamp Sat. 4/19	Upper	2 lamps 1 spare 2 lamps	Same	Same	Lower	All lamps	2 lamps 1 spare 4 lamps 1 spare 3 lamps 1 spare 2 lamps	Same as Upper
	Before Fri	Run Fri 4/18	Re-lamp Sat. 4/19											
Upper	2 lamps 1 spare 2 lamps	Same	Same											
Lower	All lamps	2 lamps 1 spare 4 lamps 1 spare 3 lamps 1 spare 2 lamps	Same as Upper											

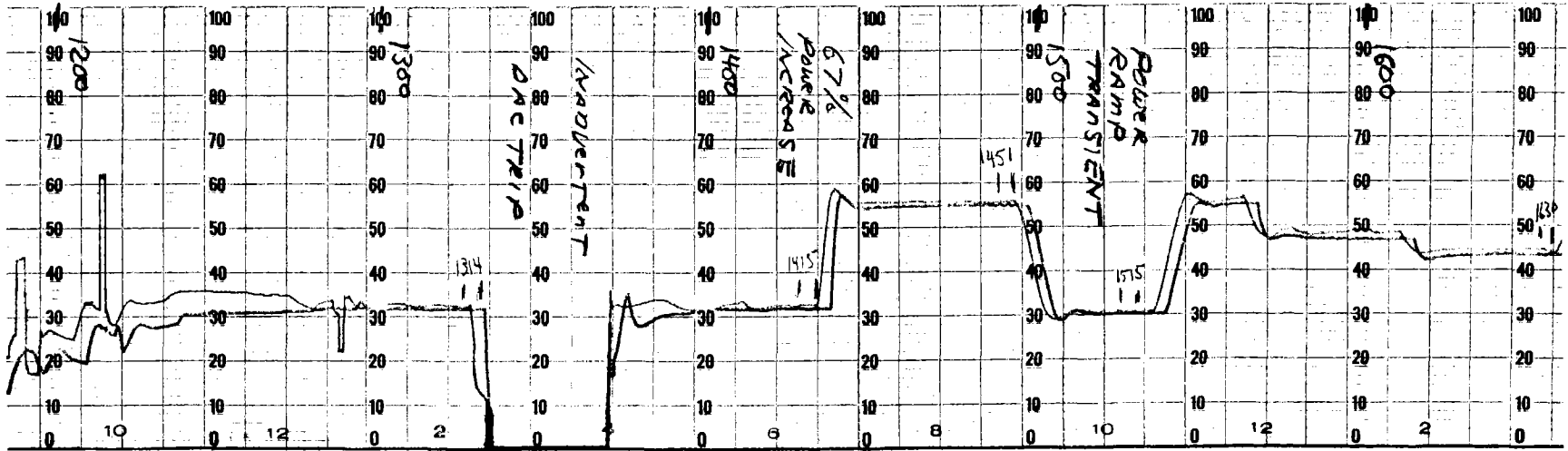
SECTION 3
DATA SHEETS: RECORDER CHARTS



RCD-1

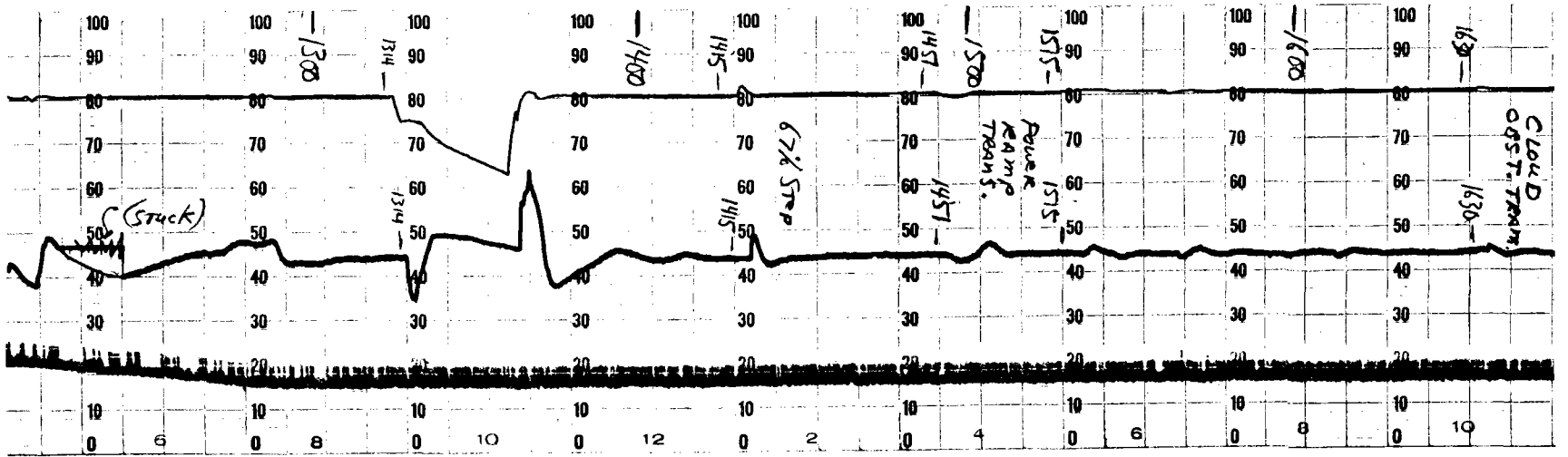


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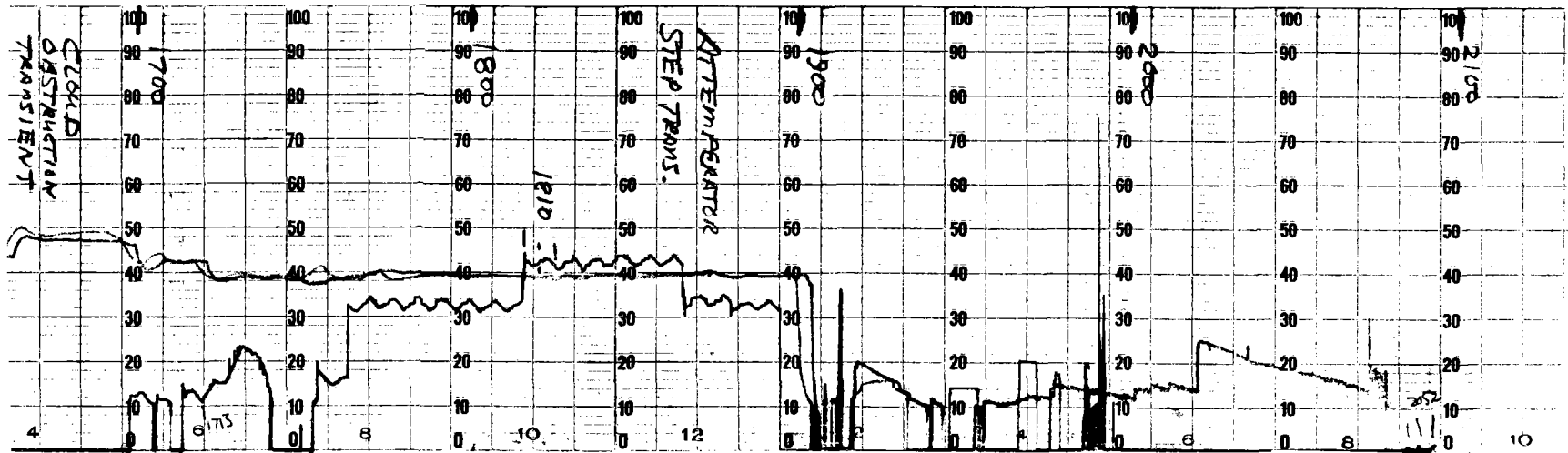


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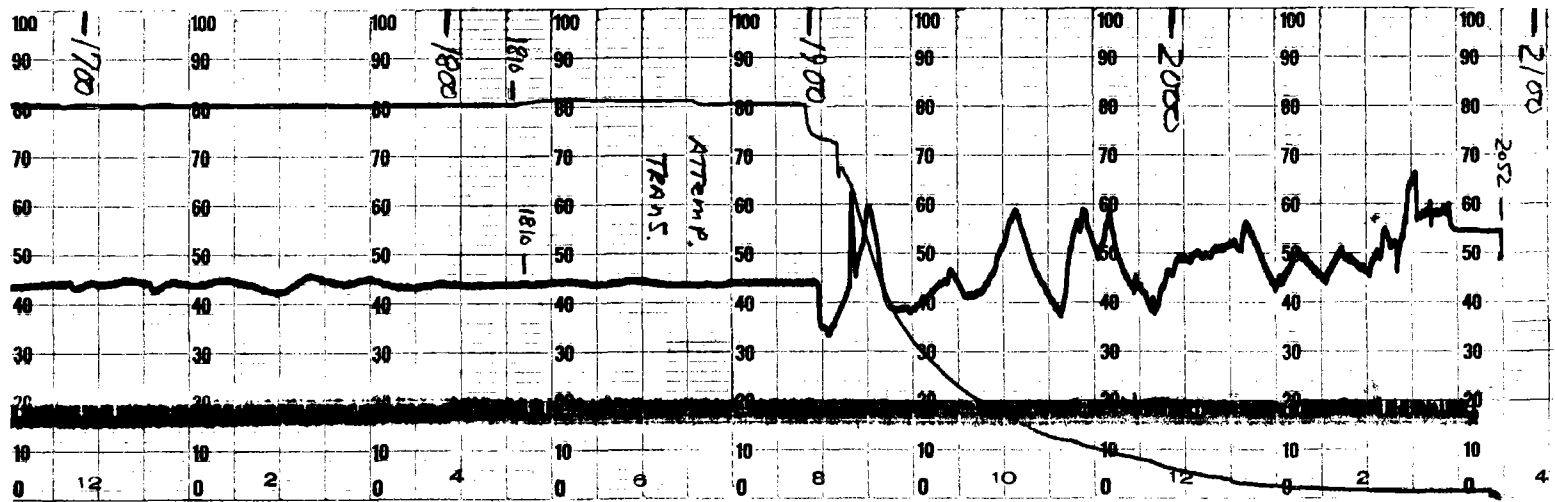
3-4



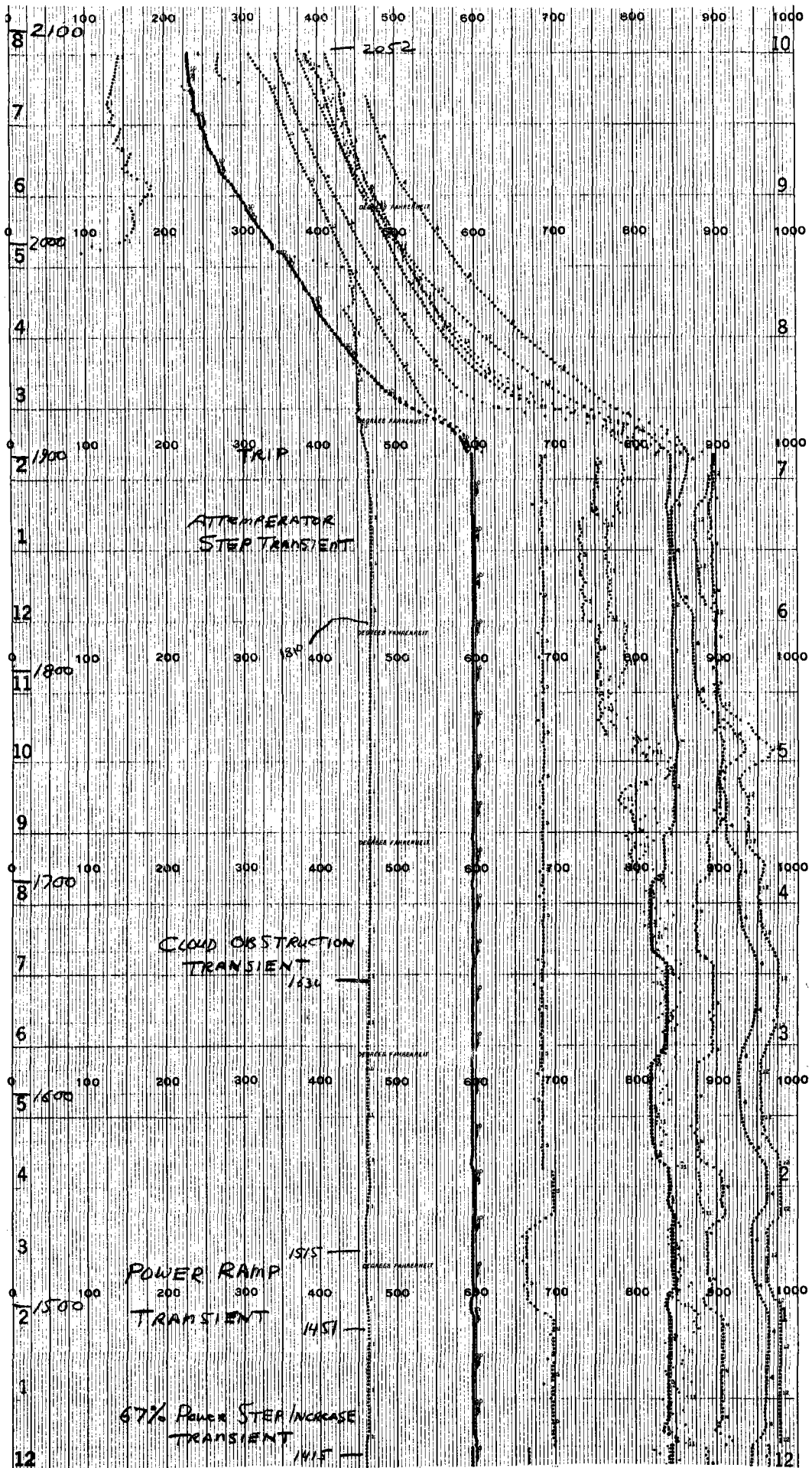
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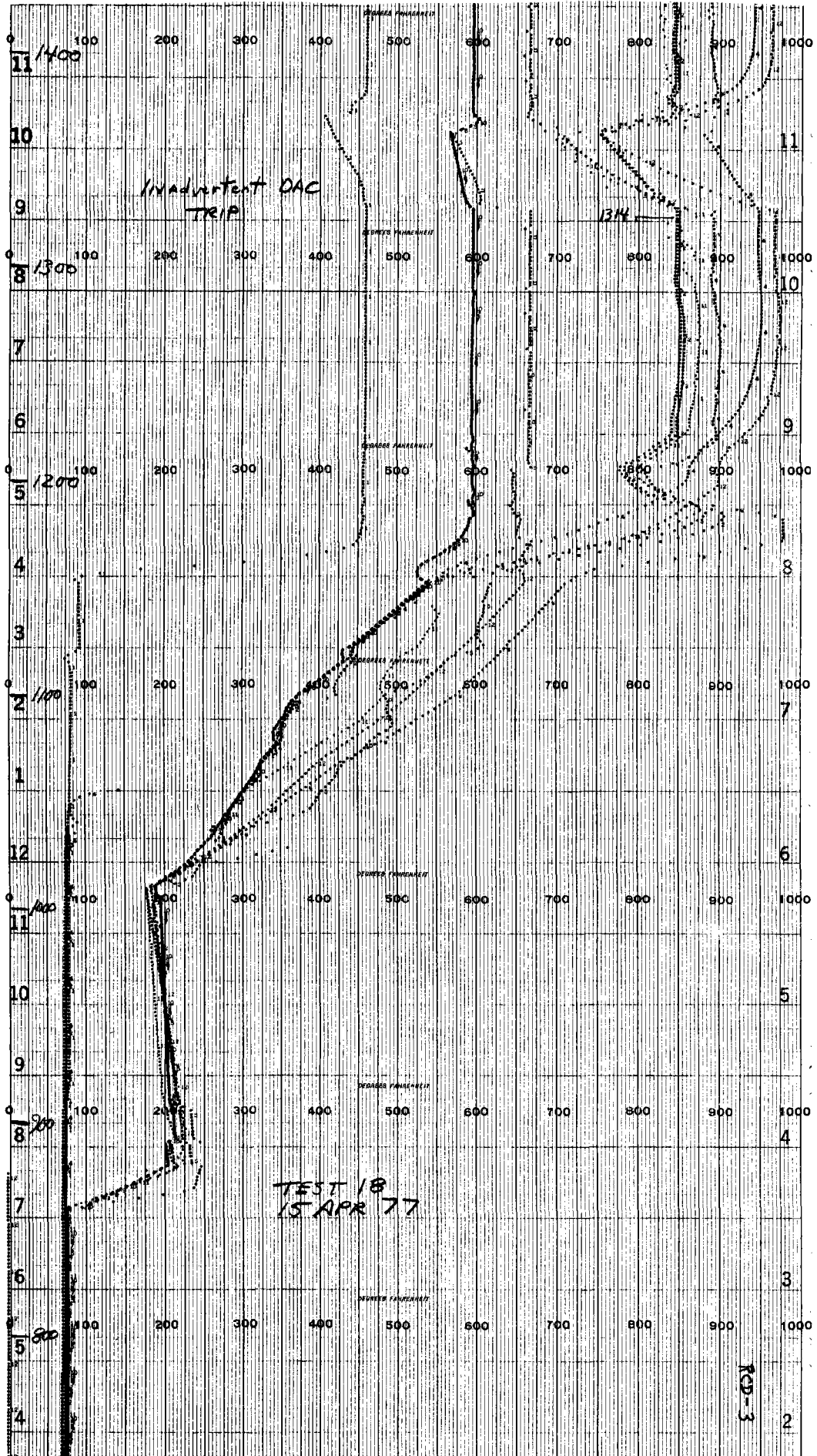


RCD-1



RCD-4





SECTION 4
DATA SHEETS: DATA ACQUISITION SYSTEM TABULATION
AND PLOT PRINTOUTS

PAGE 1
OPERATOR SUMMARY

 OPERATOR SUMMARY 1977 105 13 16 18

BOILER

DRUM

P-D 1606
 T-D 606
 L-D 32
 W-FW 4950
 W-BD 0

PUMP

W-B 87080
 T-DC 601
 T-SUB -5
 T-PC 64

SUPERHEATER 1

INLET METAL	OUTLET METAL
TE405 671	TE450 149
TE406 651	TE451 896
TE407 671	TE452 893
TE408 654	TE453 14
TE409 654	TE454 727

T-S11 606

W-ATT 55

SUPERHEATER 2

INLET METAL	OUTLET METAL
TE505 883	TE550 970
TE506 150	TE551 149
TE507 870	TE552 953
TE508 150	TE553 477
TE509 884	TE554 810

T-S20 946

P-S20 1584

W-S2 4929

POWER

BOILER ABS. KW	1005	NET INPUT KW	1893
S.H. *1 ABS. KW	334	TOTAL ABSORBED KW	1449
S.H. *2 ABS. KW	109	POWER RATIO	.7655

 OPERATOR SUMMARY 1977 105 14 16 18

BOILER

DRUM

P-D 1606
 T-D 606
 L-D 32
 W-FW 4948
 W-BD 0

PUMP

W-B 87080
 T-DC 602
 T-SUB -4
 T-PC 64

SUPERHEATER 1

INLET METAL	OUTLET METAL
TE405 672	TE450 149
TE406 650	TE451 892
TE407 673	TE452 891
TE408 655	TE453 31
TE409 650	TE454 823

SUPERHEATER 2

INLET METAL	OUTLET METAL
TE505 878	TE550 964
TE506 150	TE551 149
TE507 865	TE552 951
TE508 150	TE553 462
TE509 880	TE554 387

T-S11 607

T-S20 941

W-ATT 54

P-S20 1586

W-S2 4941

POWER

BOILER ABS. KW	1011	NET INPUT KW	1959
S.H. *1 ABS. KW	329	TOTAL ABSORBED KW	1449
S.H. *2 ABS. KW	108	POWER RATIO	.7398

 OPERATOR SUMMARY 1977 105 14 51 18

BOILER

DRUM

P-D 1655
 T-D 610
 L-D 32
 W-FW 8673
 W-BD 0

PUMP

W-B 86450
 T-DC 602
 T-SUB -8
 T-PC 65

SUPERHEATER 1

INLET METAL	OUTLET METAL
TE405 702	TE450 149
TE406 672	TE451 910
TE407 706	TE452 910
TE408 679	TE453 123
TE409 712	TE454 884

T-S11 610

W-ATT 54

SUPERHEATER 2

INLET METAL	OUTLET METAL
TE505 895	TE550 993
TE506 150	TE551 149
TE507 871	TE552 981
TE508 150	TE553 488
TE509 898	TE554 350

T-S20 961

P-S20 1586

W-S2 8667

POWER

BOILER ABS. KW	1774	NET INPUT KW	3181
S.H. *1 ABS. KW	585	TOTAL ABSORBED KW	2571
S.H. *2 ABS. KW	211	POWER RATIO	.8084

 OPERATOR SUMMARY 1977 105 15 13 18

BOILER

DRUM		PUMP	
P-D	1603	W-B	87000
T-D	606	T-DC	600
L-D	31	T-SUB	-6
W-FW	4728	T-PC	65
W-BD	0		

SUPERHEATER 1

INLET METAL	OUTLET METAL
TE405 668	TE450 149
TE406 648	TE451 890
TE407 672	TE452 890
TE408 654	TE453 126
TE409 647	TE454 895

T-S11 606

W-ATT 53

SUPERHEATER 2

INLET METAL	OUTLET METAL
TE505 876	TE550 964
TE506 150	TE551 149
TE507 867	TE552 950
TE508 150	TE553 477
TE509 882	TE554 437

T-S20 944

P-S20 1584

W-S2 4740

POWER

BOILER ABS. KW	972	NET INPUT KW	1818
S.H. *1 ABS. KW	318	TOTAL ABSORBED KW	1395
S.H. *2 ABS. KW	104	POWER RATIO	.7676

 OPERATOR SUMMARY 1977 105 15 36 18

BOILER

DRUM

P-D 1655
 T-D 610
 L-D 31
 W-FW 8738
 W-BD 0

PUMP

W-B 86450
 T-DC 602
 T-SUB -8
 T-PC 65

SUPERHEATER 1

INLET METAL	OUTLET METAL
TE405 702	TE450 149
TE406 672	TE451 909
TE407 707	TE452 908
TE408 680	TE453 156
TE409 712	TE454 920

T-S11 610

W-ATT 52

SUPERHEATER 2

INLET METAL	OUTLET METAL
TE505 889	TE550 993
TE506 150	TE551 149
TE507 881	TE552 980
TE508 150	TE553 484
TE509 897	TE554 369

T-S20 960

P-S20 1584

W-S2 8689

POWER

BOILER ABS. KW	1766	NET INPUT KW	3135
S.H. *1 ABS. KW	584	TOTAL ABSORBED KW	2562
S.H. *2 ABS. KW	211	POWER RATIO	.8173

 OPERATOR SUMMARY 1977 105 16 5 18

BOILER

DRUM

P-D 1636
 T-D 609
 L-D 32
 W-FW 7552
 W-BD 0

PUMP

W-B 87080
 T-DC 600
 T-SUB -9
 T-PC 66

SUPERHEATER 1

INLET METAL	OUTLET METAL
TE405 679	TE450 149
TE406 664	TE451 880
TE407 693	TE452 879
TE408 665	TE453 86
TE409 679	TE454 893

SUPERHEATER 2

INLET METAL	OUTLET METAL
TE505 854	TE550 954
TE506 150	TE551 149
TE507 852	TE552 943
TE508 150	TE553 465
TE509 866	TE554 440

T-S11 609

T-S20 927

W-ATT 52

P-S20 1586

W-S2 7522

POWER

BOILER ABS. KW	1539	NET INPUT KW	2747
S.H. *1 ABS. KW	468	TOTAL ABSORBED KW	2182
S.H. *2 ABS. KW	174	POWER RATIO	.7944

 OPERATOR SUMMARY 1977 105 16 33 18

BOILER

DRUM

P-D 1628
 T-D 608
 L-D 32
 W-FW 6946
 W-BD 0

PUMP

W-B 87080
 T-DC 600
 T-SUB -8
 T-PC 66

SUPERHEATER 1

INLET METAL

TE405 688
 TE406 655
 TE407 691
 TE408 664
 TE409 671

OUTLET METAL

TE450 149
 TE451 899
 TE452 898
 TE453 120
 TE454 846

SUPERHEATER 2

INLET METAL

TE505 877
 TE506 150
 TE507 870
 TE508 150
 TE509 884

OUTLET METAL

TE550 977
 TE551 149
 TE552 965
 TE553 478
 TE554 431

T-S11 609

T-S20 948

W-ATT 52

P-S20 1588

W-S2 6869

POWER

BOILER ABS. KW	1397	NET INPUT KW	2577
S.H. *1 ABS. KW	451	TOTAL ABSORBED KW	2008
S.H. *2 ABS. KW	159	POWER RATIO	.7792

4-13

PAGE 2
PERFORMANCE SUMMARY

 PERFORMANCE SUMMARY 1977 105 13 16 18

BOILER

DRUM
 P-D 1606
 T-D 606
 H-GD 1159
 H-FD 625
 N-CR 1.7866
 FEEDWATER
 P-FW 1883
 T-FW 466
 W-FW 4950
 H-FW 448

FLOW CIRCUITS

T-DC 601
 T-SUB -5
 W-B 87080
 W-BC1 10025
 W-BC2 9886
 W-BC3 9660
 X-B 10.879

SUPERHEATERS

S.H. STAGE 1
 W-S1 4874
 T-S1I 606
 T-S10 852
 P-S10 1596
 H-S10 1393
 ATTEMPERATOR
 P-ATT 1883
 T-ATT 85
 W-ATT 55
 H-ATT 46

S.H. STAGE 2

W-S2 4929
 T-S2I 850

 T S20 946
 P-S20 1584
 H-S20 1454

BOILER

L-D 32
 T-BI 600
 H-BI 634
 R-BI 39.258
 R-GD 4.0071
 R-FD 41.831

ARRAY - KW

ZONE 1 517
 ZONE 2 551
 ZONE 3 678
 ZONE 4 661

 TOTAL 2407

POWER

BOILER ABS. KW 1009 NET INPUT KW 1886
 S.H. *1 ABS. KW 334 TOTAL ABSORBED KW 1453
 S.H. *2 ABS. KW 109 POWER RATIO .7709

PERFORMANCE SUMMARY		1977	105	14	51	18
BOILER		SUPERHEATERS		BOILER		
DRUM		S.H. STAGE 1		L-D 32		
P-D	1655	W-S1	8613	T-BI 602		
T-D	610	T-S1I	610	H-BI 636		
H-GD	1156	T-S10	846	R-BI 39.068		
H-FD	631	P-S10	1627	R-GD 4.1680		
N-CR	1.0037	H-S10	1388	R-FD 41.485		
FEEDWATER		ATTEMPERATOR				
P-FW	1886	P-ATT	1886			
T-FW	468	T-ATT	88			
W-FW	8673	W-ATT	54			
H-FW	450	H-ATT	50			
FLOW CIRCUITS		S.H. STAGE 2		ARRAY - KW		
T-DC	602	W-S2	8667	ZONE 1 872		
T-SUB	-8	T-S2I	845	ZONE 2 923		
W-B	86450			ZONE 3 1134		
W-BC1	9950	T S20	961	ZONE 4 1110		
W-BC2	9811	P-S20	1586	TOTAL 4039		
W-BC3	9612	H-S20	1463			
X-B	19.140					
POWER						
BOILER ABS. KW		1774	NET INPUT KW		3181	
S.H. *1 ABS. KW		585	TOTAL ABSORBED KW		2571	
S.H. *2 ABS. KW		211	POWER RATIO		.8084	

 PERFORMANCE SUMMARY 1977 105 15 13 18

BOILER

DRUM
 P-D 1603
 T-D 606
 H-GD 1160
 H-FD 625
 N-CR 1.8562
 FEEDWATER
 P-FW 1886
 T-FW 466
 W-FW 4728
 H-FW 448

SUPERHEATERS

S.H. STAGE 1
 W-S1 4687
 T-S1I 606
 T-S1O 851
 P-S1O 1596
 H-S1O 1392
 ATTEMPERATOR
 P-ATT 1886
 T-ATT 89
 W-ATT 53
 H-ATT 51

BOILER

L-D 31
 T-BI 601
 H-BI 632
 R-BI 39.439
 R-GD 3.9919
 R-FD 41.826

FLOW CIRCUITS

T-DC 600
 T-SUB -6
 W-B 87000
 W-BC1 10015
 W-BC2 9792
 W-BC3 9593
 X-B 10.462

S.H. STAGE 2

W-S2 4740
 T-S2I 849
 T S2O 944
 P-S2O 1584
 H-S2O 1452

ARRAY - KW

ZONE 1 499
 ZONE 2 523
 ZONE 3 648
 ZONE 4 631
 TOTAL 2301

POWER

 BOILER ABS. KW 961 NET INPUT KW 1819
 S.H. *1 ABS. KW 314 TOTAL ABSORBED KW . 1380
 S.H. *2 ABS. KW 103 POWER RATIO .7587

 PERFORMANCE SUMMARY 1977 105 15 36 18

BOILER

DRUM

P-D 1655
 T-D 610
 H-GD 1156
 H-FD 631
 N-CR 1.0009

FEEDWATER

P-FW 1883
 T-FW 470
 W-FW 8738
 H-FW 453

FLOW CIRCUITS

T-DC 602
 T-SUB -8
 W-B 86450
 W-BC1 9978
 W-BC2 9755
 W-BC3 9612
 X-B 19.066

POWER

 BOILER ABS. KW 1766 NET INPUT KW 3135
 S.H. *1 ABS. KW 584 TOTAL ABSORBED KW 2562
 S.H. *2 ABS. KW 211 POWER RATIO .8173

SUPERHEATERS

S.H. STAGE 1

W-S1 8637
 T-S1I 610
 T-S1O 845
 P-S1O 1628
 H-S1O 1387

ATTEMPERATOR

P-ATT 1883
 T-ATT 90
 W-ATT 52
 H-ATT 52

S.H. STAGE 2

W-S2 8689
 T-S2I 843
 T S2O 960
 P-S2O 1584
 H-S2O 1462

BOILER

L-D 31
 T-BI 602
 H-BI 636
 R-BI 39.068
 R-GD 4.1680
 R-FD 41.485

ARRAY - KW

ZONE 1 865
 ZONE 2 918
 ZONE 3 1134
 ZONE 4 1110
 TOTAL 4027

PERFORMANCE SUMMARY		1977	105	16	5	18
BOILER		SUPERHEATERS		BOILER		
-----		-----		-----		
DRUM		S.H. STAGE 1		L-D	32	
P-D	1636	W-S1	7470	T-BI	600	
T-D	609	T-S11	609	H-BI	632	
H-GD	1158	T-S10	823	R-BI	39.439	
H-FD	630	P-S10	1616	R-GD	4.0925	
N-CR	1.1657	H-S10	1372	R-FD	41.562	
FEEDWATER		ATTEMPERATOR				
P-FW	1889	P-ATT	1889			
T-FW	468	T-ATT	90			
W-FW	7552	W-ATT	52			
H-FW	450	H-ATT	52			
FLOW CIRCUITS		S.H. STAGE 2		ARRAY - KW		
T-DC	600	W-S2	7522	ZONE 1	650	
T-SUB	-9	T-S2I	822	ZONE 2	692	
W-B	87080	T S20	927	ZONE 3	1019	
W-BC1	9886	P-S20	1586	ZONE 4	1112	
W-BC2	9774	H-S20	1442	TOTAL	3473	
W-BC3	9632					
X-B	16.600					
POWER						

BOILER ABS. KW	1539	NET INPUT KW		2747		
S.H. *1 ABS. KW	468	TOTAL ABSORBED KW		2182		
S.H. *2 ABS. KW	174	POWER RATIO		.7944		

 PERFORMANCE SUMMARY 1977 105 16 33 18

BOILER

 DRUM
 P-D 1628
 T-D 608
 H-GD 1158
 H-FD 628
 N-CR 1.2774
 FEEDWATER
 P-FW 1892
 T-FW 469
 W-FW 6946
 H-FW 452

FLOW CIRCUITS

T-DC 600
 T-SUB -8
 W-B 87080
 W-BC1 9914
 W-BC2 9774
 W-BC3 9660
 X-B 15.082

POWER

 BOILER ABS. KW 1401 NET INPUT KW 2577
 S.H. *1 ABS. KW 451 TOTAL ABSORBED KW 2012
 S.H. *2 ABS. KW 159 POWER RATIO .7807

SUPERHEATERS

 S.H. STAGE 1
 W-S1 6817
 T-S11 609
 T-S10 843
 P-S10 1610
 H-S10 1386
 ATTEMPERATOR
 P-ATT 1892
 T-ATT 90
 W-ATT 52
 H-ATT 52

S.H. STAGE 2

W-S2 6869
 T-S21 840

 T S20 948
 P-S20 1588
 H-S20 1455

BOILER

 L-D 32
 T-BI 600
 H-BI 632
 R-BI 39.439
 R-GD 4.0744
 R-FD 41.656

ARRAY - KW

ZONE 1 683
 ZONE 2 727
 ZONE 3 884
 ZONE 4 970

 TOTAL 3264

BASE DATA REPORT -- METAL TEMPERATURES


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*****
BASE DATA REPORT - METAL TEMPERATURES
-----
1977 105 14 16 18
-----
TE 210-217 592 600 608 245 543 596 462 599
TE 330-339 629 431 631 628 628 638 629 629 626 628
TE 340-349 630 629 629 629 629 630 630 629 628 605
TE 350-359 629 631 631 626 626 628 629 629 628 629
TE 360-369 627 608 629 630 629 629 630 629 627 615
TE 370-379 150 629 630 630 630 628 623 617 627 627
TE 380-389 628 628 627 627 627 617 630 631 631 627

TE 405-409 672 650 673 655 650
TE 450-459 149 892 891 31 823 861 839 288 842 853
TE 460-466 150 857 836 854 852 852 856
TE 420-429 627 298 631 638 939 676 685 695 705 715
TE 430-439 737 756 770 775 786 797 814 828 839 843
TE 440 843

TE 505-509 878 150 865 150 880
TE 550-554 964 149 951 462 387
TE 555-560 942 946 149 950 946 943
TE 561-566 949 946 951 946 804 946
TE 520-529 -168 856 862 866 877 150 891 896 896 902
TE 530-539 911 916 920 925 927 932 936 943 944 554
TE 540 149

TE 470-471 832 829 TE 570-571 910 938

TE 601-606 776 637 519 826 808 792
TE 607-612 592 584 577 922 914 911
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 BASE DATA REPORT - METAL TEMPERATURES 1977 105 14 51 18

TE 210-217	593	603	612	250	547	598	466	603		
TE 330-339	647	437	651	647	647	659	648	648	642	645
TE 340-349	648	644	647	647	648	648	648	647	644	612
TE 350-359	647	652	653	645	642	645	647	648	646	647
TE 360-369	644	617	645	644	645	648	649	647	644	627
TE 370-379	150	646	648	649	648	646	638	630	643	643
TE 380-389	644	645	644	643	643	628	648	649	649	648
TE 405-409	702	672	706	679	712					
TE 450-459	149	910	910	123	884	857	832	299	842	847
TE 460-466	150	856	835	852	847	842	845			
TE 420-429	633	315	632	638	981	672	679	688	698	708
TE 430-439	729	748	761	767	779	788	806	821	830	836
TE 440	836									
TE 505-509	895	150	871	150	898					
TE 550-554	993	149	981	488	350					
TE 555-560	959	964	149	970	965	963				
TE 561-566	968	966	972	965	826	961				
TE 520-529	-74	854	861	866	877	150	894	899	899	906
TE 530-539	916	922	927	934	937	943	948	956	959	562
TE 540	149									
TE 470-471	829	832				TE 570-571	949	964		
TE 601-606	802	658	535	825	808	794				
TE 607-612	598	590	583	949	944	940				

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BASE DATA REPORT - METAL TEMPERATURES
-----
1977  105  15  13  18
-----
TE 210-217  592  599  608  251  544  594  461  599

TE 330-339  627  423  629  626  627  637  629  629  624  625
TE 340-349  626  624  628  627  628  628  628  626  624  605
TE 350-359  626  629  630  625  624  626  627  627  625  627
TE 360-369  625  607  627  627  627  627  628  628  625  614
TE 370-379  150  628  630  630  629  628  622  617  627  627
TE 380-389  628  628  627  627  625  615  627  629  629  626

TE 405-409  668  648  670  652  648
TE 450-459  149  892  891  125  893  861  840  292  843  854
TE 460-466  150  861  845  857  856  856  857
TE 420-429  626  308  631  637  1008  676  685  695  705  716
TE 430-439  737  757  771  776  787  798  816  829  839  845
TE 440      845

TE 505-509  876  150  867  150  882
TE 550-554  965  149  951  473  437
TE 555-560  943  946  149  949  946  943
TE 561-566  948  946  951  948  807  945
TE 520-529  -47  857  864  867  879  150  893  898  898  904
TE 530-539  912  917  921  926  929  934  937  943  946  555
TE 540      149

TE 470-471  832  834      TE 570-571  939  944

TE 601-606  791  655  536  829  812  797
TE 607-612  593  586  580  942  940  940
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BASE DATA REPORT - METAL TEMPERATURES
-----
1977 105 15 36 18
-----
TE 210-217 594 603 613 251 547 598 466 604

TE 330-339 647 431 651 647 647 658 650 650 642 644
TE 340-349 647 643 647 646 647 647 647 646 643 612
TE 350-359 647 654 654 647 642 645 648 648 646 647
TE 360-369 644 617 645 647 646 648 649 648 644 628
TE 370-379 150 648 649 651 649 648 638 629 645 646
TE 380-389 648 648 646 646 645 629 647 649 649 645

TE 405-409 702 672 707 680 712
TE 450-459 149 909 908 156 920 856 830 285 840 846
TE 460-466 150 856 834 851 845 839 843
TE 420-429 633 318 632 638 1037 672 679 688 698 708
TE 430-439 729 748 760 766 777 787 804 817 828 834
TE 440 834

TE 505-509 889 150 881 150 897
TE 550-554 993 149 980 484 369
TE 555-560 957 961 149 967 964 960
TE 561-566 966 965 970 964 822 959
TE 520-529 -39 853 861 866 876 150 893 899 899 906
TE 530-539 916 921 926 932 936 943 946 954 958 561
TE 540 149

TE 470-471 829 832 TE 570-571 946 960

TE 601-606 801 658 536 825 810 797
TE 607-612 598 590 582 947 941 938
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BASE DATA REPORT - METAL TEMPERATURES
-----
1977  105  16  5  18

TE 210-217  592  601  611  252  547  597  464  602

TE 330-339  638  421  644  640  638  650  643  643  634  636
TE 340-349  640  635  638  638  640  640  641  640  636  609
TE 350-359  639  646  648  642  636  639  642  643  642  643
TE 360-369  641  613  639  641  641  643  645  644  641  624
TE 370-379  150  641  644  646  645  644  636  627  638  641
TE 380-389  642  643  641  641  641  625  639  643  645  641

TE 405-409  679  664  693  665  679
TE 450-459  149  880  879  86  893  832  812  273  818  826
TE 460-466  150  834  812  829  825  818  822
TE 420-429  631  311  630  636  1074  667  675  685  694  703
TE 430-439  720  737  749  754  766  774  789  802  811  815
TE 440      815

TE 505-509  854  150  852  150  866
TE 550-554  954  149  943  465  440
TE 555-560  924  929  149  933  929  927
TE 561-566  932  931  934  930  801  926
TE 520-529  -41  830  837  841  851  150  866  872  872  878
TE 530-539  886  891  896  900  905  910  916  921  925  543
TE 540      149

TE 470-471  808  812      TE 570-571  926  930

TE 601-606  782  649  535  806  792  782
TE 607-612  597  591  582  927  927  927
*****

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PAGE 4
BASE DATA REPORT -- FLUID

 BASE DATA REPORT - FLUID 1977 105 13 16 18

TEMPERATURES - FLUID

TE 19	466
TE 260	507
TE 300	601
TE 301	600
TE 306	64
TE 310	600
TE 311	600
TE 400	607
TE 401	607
TE 402	606
TE 476	852
TE 480	85
TE 501	850
TT 590	946

LEVELS

LT 210	32
LT 211	33

PRESSURES

PT 1	1889
PT 2	1589
PT 3	91
PT 230	1606
PT 475	1596
PT 590	1584

FLOWS

FT 1	4919
FT 3	4929
FT 260	0
FT 310	87000
FT 350	10025
FT 351	9858
FT 352	9660
FT 480	55

FT 13	131250
PUMP JACKET	63

 BASE DATA REPORT - FLUID 1977 105 14 16 18

TEMPERATURES - FLUID

TE 19	467
TE 260	415
TE 300	602
TE 301	601
TE 306	64
TE 310	600
TE 311	601
TE 400	607
TE 401	607
TE 402	607
TE 476	849
TE 480	87
TE 501	845
TT 590	941

LEVELS

LT 210	32
LT 211	33

PRESSURES

PT 1	1886
PT 2	1589
PT 3	143
PT 230	1606
PT 475	1596
PT 590	1586

FLOWS

FT 1	4948
FT 3	4941
FT 260	0
FT 310	87080
FT 350	9970
FT 351	9802
FT 352	9574
FT 480	54

FT 13	131520
PUMP JACKET	63

 BASE DATA REPORT - FLUID 1977 105 14 51 18

TEMPERATURES - FLUID

TE 19	468
TE 260	380
TE 300	602
TE 301	602
TE 306	65
TE 310	602
TE 311	602
TE 400	610
TE 401	610
TE 402	610
TE 476	846
TE 480	88
TE 501	845
TT 590	961

LEVELS

LT 210	32
LT 211	33

PRESSURES

PT 1	1886
PT 2	1589
PT 3	143
PT 230	1655
PT 475	1627
PT 590	1586

FLOWS

FT 1	8673
FT 3	8667
FT 260	0
FT 310	86450
FT 350	9950
FT 351	9811
FT 352	9612
FT 480	54

FT 13	131340
PUMP JACKET	63

 BASE DATA REPORT - FLUID 1977 105 15 13 18

TEMPERATURES - FLUID

TE 19	466
TE 260	361
TE 300	602
TE 301	601
TE 306	65
TE 310	601
TE 311	600
TE 400	606
TE 401	607
TE 402	608
TE 476	851
TE 480	89
TE 501	847
TT 590	943

LEVELS

LT 210	31
LT 211	33

PRESSURES

PT 1	1889
PT 2	1589
PT 3	143
PT 230	1606
PT 475	1596
PT 590	1586

FLOWS

FT 1	4728
FT 3	4704
FT 260	0
FT 310	87000
FT 350	9960
FT 351	9764
FT 352	9593
FT 480	53

FT 13	131900
PUMP JACKET	64

 BASE DATA REPORT - FLUID 1977 105 15 36 18

TEMPERATURES - FLUID

TE 19	470
TE 260	343
TE 300	603
TE 301	602
TE 306	65
TE 310	602
TE 311	602
TE 400	610
TE 401	610
TE 402	610
TE 476	845
TE 480	90
TE 501	843
TT 590	961

LEVELS

LT 210	32
LT 211	33

PRESSURES

PT 1	1886
PT 2	1589
PT 3	143
PT 230	1655
PT 475	1627
PT 590	1586

FLOWS

FT 1	8738
FT 3	8667
FT 260	0
FT 310	86920
FT 350	9950
FT 351	9811
FT 352	9497
FT 480	52

FT 13	130210
PUMP JACKET	65

 BASE DATA REPORT - FLUID 1977 105 16 6 18

TEMPERATURES - FLUID

TE 19	468
TE 260	324
TE 300	601
TE 301	600
TE 306	66
TE 310	600
TE 311	600
TE 400	610
TE 401	610
TE 402	609
TE 476	823
TE 480	90
TE 501	822
TT 590	927

LEVELS

LT 210	32
LT 211	33

PRESSURES

PT 1	1886
PT 2	1592
PT 3	143
PT 230	1636
PT 475	1613
PT 590	1586

FLOWS

FT 1	7531
FT 3	7530
FT 260	0
FT 310	87080
FT 350	9998
FT 351	9717
FT 352	9545
FT 480	52

FT 13	130210
PUMP JACKET	65

 BASE DATA REPORT - FLUID 1977 105 16 34 18

TEMPERATURES - FLUID

TE 19	470
TE 260	307
TE 300	600
TE 301	600
TE 306	66
TE 310	600
TE 311	600
TE 400	609
TE 401	609
TE 402	609
TE 476	842
TE 480	90
TE 501	840
TT 590	948

LEVELS

LT 210	32
LT 211	33

PRESSURES

PT 1	1897
PT 2	1589
PT 3	143
PT 230	1628
PT 475	1610
PT 590	1584

FLOWS

FT 1	6898
FT 3	6869
FT 260	0
FT 310	86610
FT 350	9942
FT 351	9746
FT 352	9603
FT 480	52

FT 13	131150
PUMP JACKET	65

PAGE 5

COOLING WATER TEMPERATURE

 COOLING WATER TEMPERATURES 1977 105 13 16 18

INLET TEMPERATURE TE 26 59

OUTLET TEMPERATURES

RECIRCULATION PUMP TT 306 64
 PUMP JACKET TE 613 63

FLUX BOOM TT 16 80

POWER CONTROLLERS TT 23 62

ARRAY POINTS

FACET 12		FACET 3		FACET 6		FACET 9	
BUSBAR COOLERS							
TE 700	90	TE 701	89	TE 702	83	TE 703	91

REFLECTOR COOLERS

TE 704	76	TE 705	78	TE 706	70	TE 707	85
--------	----	--------	----	--------	----	--------	----

UPPER SKIRT	LOWER SKIRT	AMBIENT AIR
TE 708 67	TE 709 68	TE 710 116

ARRAY & FLUX BOOM OUTLET TE 24 73

 COOLING WATER TEMPERATURES 1977 105 14 16 18

INLET TEMPERATURE TE 26 61

OUTLET TEMPERATURES

RECIRCULATION PUMP TT 306 64
 PUMP JACKET TE 613 63

FLUX BOOM TT 16 80

POWER CONTROLLERS TT 23 63

ARRAY POINTS

FACET 12		FACET 3		FACET 6		FACET 9	
BUSBAR COOLERS							
TE 700	88	TE 701	89	TE 702	86	TE 703	90

REFLECTOR COOLERS

TE 704	74	TE 705	74	TE 706	83	TE 707	88
--------	----	--------	----	--------	----	--------	----

UPPER SKIRT		LOWER SKIRT		AMBIENT AIR	
TE 708	69	TE 709	69	TE 710	113

ARRAY & FLUX BOOM OUTLET TE 24 73

 COOLING WATER TEMPERATURES 1977 105 15 13 18

INLET TEMPERATURE TE 26 61

OUTLET TEMPERATURES

RECIRCULATION PUMP TT 306 65
 PUMP JACKET TE 613 64

FLUX BOOM TT 16 81

POWER CONTROLLERS TT 23 63

ARRAY POINTS

 FACET 12 FACET 3 FACET 6 FACET 9

BUSBAR COOLERS

TE 700 90 TE 701 88 TE 702 85 TE 703 92

REFLECTOR COOLERS

TE 704 76 TE 705 77 TE 706 72 TE 707 85

UPPER SKIRT

TE 708 68

LOWER SKIRT

TE 709 69

AMBIENT AIR

TE 710 116

ARRAY & FLUX BOOM OUTLET TE 24 74

 COOLING WATER TEMPERATURES 1977 105 15 36 18

INLET TEMPERATURE TE 26 61

OUTLET TEMPERATURES

RECIRCULATION PUMP TT 306 65
 PUMP JACKET TE 613 65

FLUX BOOM TT 16 89

POWER CONTROLLERS TT 23 65

ARRAY POINTS

FACET 12	FACET 3	FACET 6	FACET 9
BUSBAR COOLERS			
TE 700 106	TE 701 101	TE 702 99	TE 703 106

REFLECTOR COOLERS

TE 704 85	TE 705 86	TE 706 86	TE 707 98
--------------	--------------	--------------	--------------

UPPER SKIRT

TE 708 70	LOWER SKIRT	TE 709 78	AMBIENT AIR	TE 710 123
--------------	-------------	--------------	-------------	---------------

ARRAY & FLUX BOOM OUTLET TE 24 84

 COOLING WATER TEMPERATURES 1977 105 16 6 18

INLET TEMPERATURE TE 26 61

OUTLET TEMPERATURES

RECIRCULATION PUMP TT 306 66

PUMP JACKET TE 613 65

FLUX BOOM TT 16 87

POWER CONTROLLERS TT 23 65

ARRAY POINTS

FACET 12		FACET 3		FACET 6		FACET 9	
BUSBAR COOLERS							
TE 700	104	TE 701	101	TE 702	102	TE 703	102

REFLECTOR COOLERS

TE 704	78	TE 705	81	TE 706	88	TE 707	99
--------	----	--------	----	--------	----	--------	----

UPPER SKIRT

TE 708 72

LOWER SKIRT

TE 709 78

AMBIENT AIR

TE 710 121

ARRAY & FLUX BOOM OUTLET TE 24 82

 COOLING WATER TEMPERATURES 1977 105 16 34 18

INLET TEMPERATURE TE 26 61

OUTLET TEMPERATURES

RECIRCULATION PUMP TT 306 66
 PUMP JACKET TE 613 65

FLUX BOOM TT 16 85

POWER CONTROLLERS TT 23 65

ARRAY POINTS

FACET 12		FACET 3		FACET 6		FACET 9	
BUSBAR COOLERS							
TE 700	97	TE 701	95	TE 702	101	TE 703	97

REFLECTOR COOLERS

TE 704	76	TE 705	76	TE 706	92	TE 707	94
--------	----	--------	----	--------	----	--------	----

UPPER SKIRT

TE 708 70

LOWER SKIRT

TE 709 80

AMBIENT AIR

TE 710 121

ARRAY & FLUX BOOM OUTLET TE 24 79

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FIRST STAGE SUPERHEATER METAL TEMPERATURES

 FIRST STAGE SUPERHEATER METAL TEMPERATURES 1977 105 14 16 18

TUBE OUTLET METAL TEMPERATURES

TUBE NUMBER	2	5	4	11	8
ANGLE REF-N	300	210	240	30	120
	149	891	892	823	31

TUBE INLET METAL TEMPERATURES

TUBE NUMBER	6	9	4	3	12
ANGLE REF-N	300	210	0	30	120
	650	673	672	650	655

TUBE-TO-TUBE OUTLET TEMPERATURES

TUBE NUMBER	1	2	3	4	5	6
	839	288	842	853	150	857
TUBE NUMBER	7	8	9	10	11	12
	836	854	852	852	856	861

HEADER TEMPERATURES

METAL	861	829	FLUID	849
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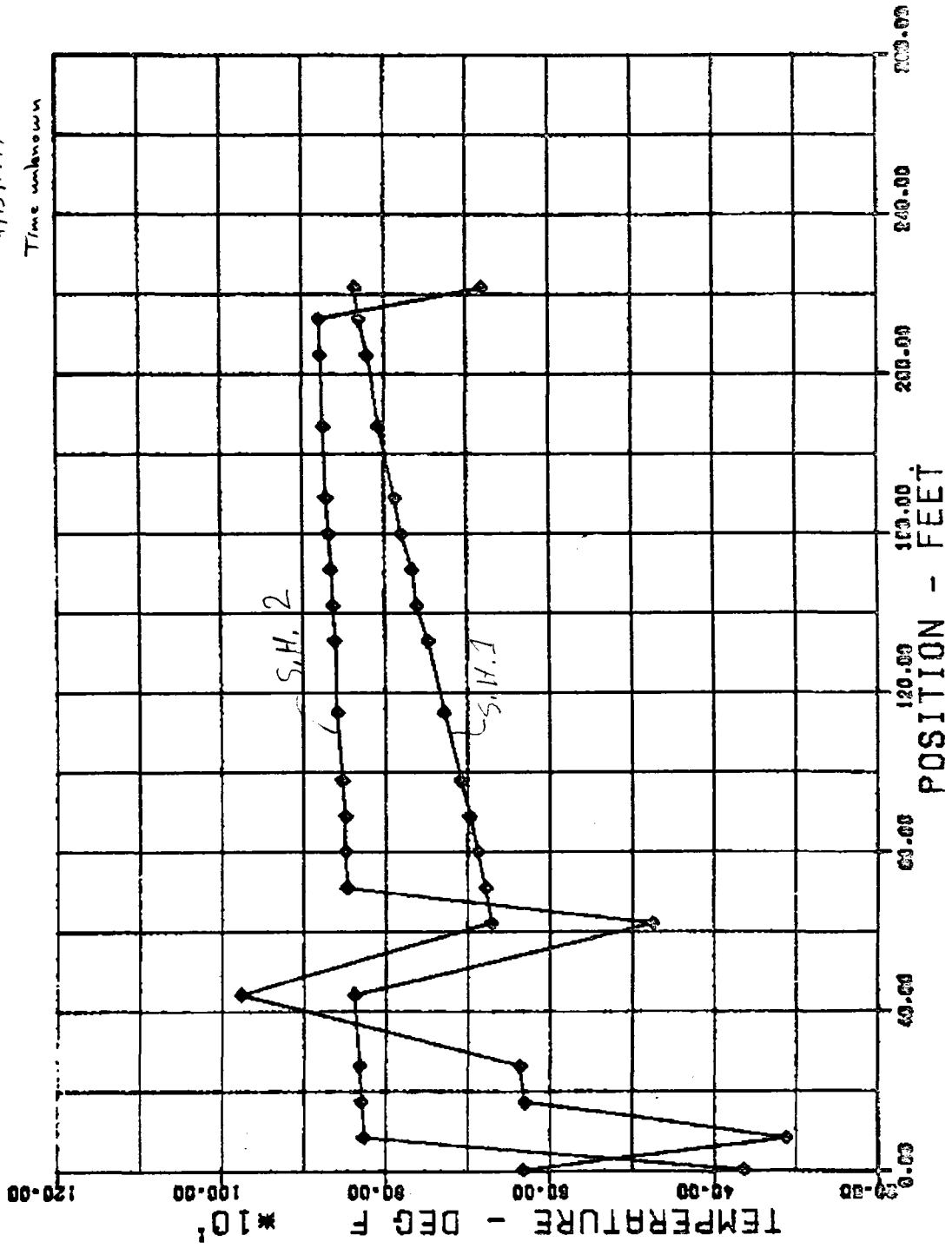
DRUM TEMPERATURES

GUSSET PLATE	DRUM	596	STEAM LEVEL	608
	BRACKET	543	WATER LEVEL	592
	BASE	245	DRUM AT FEED	600
			FEED LINE	462
			DOWNCOMER	599

Test No. 18
4/15/1977

Time unknown

6-?




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*****
FIRST STAGE SUPERHEATER METAL TEMPERATURES          1977  105  15  36  18
-----
TUBE OUTLET METAL TEMPERATURES
TUBE NUMBER      2      5      4      11      8
ANGLE REF-N     300    210    240    30    120
                149    907    902    916    156

TUBE INLET METAL TEMPERATURES
TUBE NUMBER      6      9      4      3      12
ANGLE REF-N     300    210     0    30    120
                673    706    702    710    679

TUBE-TO-TUBE OUTLET TEMPERATURES
TUBE NUMBER      1      2      3      4      5      6
                830    295    840    845    150    854
TUBE NUMBER      7      8      9      10     11     12
                835    851    845    839    843    856

HEADER TEMPERATURES
METAL    856    832    FLUID    845

DRUM TEMPERATURES
GUSSET PLATE  DRUM    598    STEAM LEVEL    613
                BRACKET  547    WATER LEVEL    594
                BASE    251    DRUM AT FEED   603
                                FEED LINE      466
                                DOWNCOMER      603

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 FIRST STAGE SUPERHEATER METAL TEMPERATURES 1977 105 16 34 18

TUBE OUTLET METAL TEMPERATURES

TUBE NUMBER	2	5	4	11	8
ANGLE REF-N	300	210	240	30	120
	149	898	899	844	120

TUBE INLET METAL TEMPERATURES

TUBE NUMBER	6	9	4	3	12
ANGLE REF-N	300	210	0	30	120
	662	691	681	679	664

TUBE-TO-TUBE OUTLET TEMPERATURES

TUBE NUMBER	1	2	3	4	5	6
	830	284	837	846	150	855
TUBE NUMBER	7	8	9	10	11	12
	829	849	844	840	842	852

HEADER TEMPERATURES

METAL	852	826	FLUID	842
-------	-----	-----	-------	-----

DRUM TEMPERATURES

GUSSET PLATE	DRUM	597	STEAM LEVEL	611
	BRACKET	547	WATER LEVEL	592
	BASE	253	DRUM AT FEED	602
			FEED LINE	465
			DOWNCOMER	602

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SECOND STAGE SUPERHEATER METAL TEMPERATURES

 SECOND STAGE SUPERHEATER METAL TEMPERATURES 1977 105 13 16 18

TUBE OUTLET METAL TEMPERATURES

TUBE NUMBER	2	5	4	11	8
ANGLE REF-N	300	210	240	30	120
	970	954	149	806	476

TUBE INLET METAL TEMPERATURES

TUBE NUMBER	6	9	4	3	12
ANGLE REF-N	300	210	0	30	120
	150	871	883	884	150

TUBE-TO-TUBE OUTLET TEMPERATURES

TUBE NUMBER	1	2	3	4	5	6
	950	149	954	950	946	953
TUBE NUMBER	7	8	9	10	11	12
	950	954	949	807	949	919

HEADER TEMPERATURES

METAL	947	944	FLUID	946
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LUG TEMPERATURES

HEADER DISTANCE (INCHES)

	875	2.125	3.375
BOILER OUTLET SUPRT	777	634	512
S.H.1 OUTLET SUPRT	825	805	788
S.H.2 SNUBBER PLATE	592	583	575
S.H.2 SNUBBER BRAKT	932	926	922

 SECOND STAGE SUPERHEATER METAL TEMPERATURES 1977 105 14 16 18

TUBE OUTLET METAL TEMPERATURES

TUBE NUMBER	2	5	4	11	8
ANGLE REF-N	300	210	240	30	120
	964	951	149	387	462

TUBE INLET METAL TEMPERATURES

TUBE NUMBER	6	9	4	3	12
ANGLE REF-N	300	210	0	30	120
	150	865	878	880	150

TUBE-TO-TUBE OUTLET TEMPERATURES

TUBE NUMBER	1	2	3	4	5	6
	946	149	950	946	943	949
TUBE NUMBER	7	8	9	10	11	12
	946	951	946	804	946	942

HEADER TEMPERATURES

METAL	942	938	FLUID	941
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LUG TEMPERATURES HEADER DISTANCE (INCHES)

	.875	2.125	3.375
BOILER OUTLET SUPRT	776	637	519
S.H.1 OUTLET SUPRT	826	808	792
S.H.2 SNUBBER PLATE	592	584	577
S.H.2 SNUBBER BRAKT	922	914	911

 SECOND STAGE SUPERHEATER METAL TEMPERATURES 1977 105 14 51 18

TUBE OUTLET METAL TEMPERATURES

TUBE NUMBER	2	5	4	11	8
ANGLE REF-N	300	210	240	30	120
	994	981	149	354	494

TUBE INLET METAL TEMPERATURES

TUBE NUMBER	6	9	4	3	12
ANGLE REF-N	300	210	0	30	120
	150	878	889	898	150

TUBE-TO-TUBE OUTLET TEMPERATURES

TUBE NUMBER	1	2	3	4	5	6
	964	149	970	965	963	968
TUBE NUMBER	7	8	9	10	11	12
	966	973	965	812	961	959

HEADER TEMPERATURES

METAL	959	965	FLUID	962
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LUG TEMPERATURES

	HEADER DISTANCE (INCHES)		
	.875	2.125	3.375
BOILER OUTLET SUPRT	802	658	534
S.H.1 OUTLET SUPRT	825	808	795
S.H.2 SNUBBER PLATE	598	590	582
S.H.2 SNUBBER BRAKT	950	944	940

 SECOND STAGE SUPERHEATER METAL TEMPERATURES 1977 105 15 14 18

TUBE OUTLET METAL TEMPERATURES

TUBE NUMBER	2	5	4	11	8
ANGLE REF-N	300	210	240	30	120
	965	953	149	438	470

TUBE INLET METAL TEMPERATURES

TUBE NUMBER	6	9	4	3	12
ANGLE REF-N	300	210	0	30	120
	150	854	876	881	150

TUBE-TO-TUBE OUTLET TEMPERATURES

TUBE NUMBER	1	2	3	4	5	6
	947	149	950	946	943	948
TUBE NUMBER	7	8	9	10	11	12
	946	951	948	811	946	943

HEADER TEMPERATURES

METAL	943	944	FLUID	944
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LUG TEMPERATURES

HEADER DISTANCE (INCHES)

	.875	2.125	3.375
BOILER OUTLET SUPRT	791	655	536
S.H.1 OUTLET SUPRT	829	812	797
S.H.2 SNUBBER PLATE	594	587	580
S.H.2 SNUBBER BRAKT	941	940	940

 SECOND STAGE SUPERHEATER METAL TEMPERATURES 1977 105 15 36 18

TUBE OUTLET METAL TEMPERATURES

TUBE NUMBER	2	5	4	11	8
ANGLE REF-N	300	210	240	30	120
	992	978	149	369	491

TUBE INLET METAL TEMPERATURES

TUBE NUMBER	6	9	4	3	12
ANGLE REF-N	300	210	0	30	120
	150	879	888	897	150

TUBE-TO-TUBE OUTLET TEMPERATURES

TUBE NUMBER	1	2	3	4	5	6
	962	149	968	963	960	966
TUBE NUMBER	7	8	9	10	11	12
	964	970	964	817	959	958

HEADER TEMPERATURES

METAL	958	960	FLUID	961
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LUG TEMPERATURES

HEADER DISTANCE (INCHES)

	875	2.125	3.375
BOILER OUTLET SUPRT	801	659	536
S.H.1 OUTLET SUPRT	825	810	797
S.H.2 SNUBBER PLATE	597	590	582
S.H.2 SNUBBER BRAKT	947	940	938

 SECOND STAGE SUPERHEATER METAL TEMPERATURES 1977 105 16 6 18

TUBE OUTLET METAL TEMPERATURES

TUBE NUMBER	2	5	4	11	8
ANGLE REF-N	300	210	240	30	120
	954	943	149	441	465

TUBE INLET METAL TEMPERATURES

TUBE NUMBER	6	9	4	3	12
ANGLE REF-N	300	210	0	30	120
	150	844	860	866	150

TUBE-TO-TUBE OUTLET TEMPERATURES

TUBE NUMBER	1	2	3	4	5	6
	929	149	933	930	927	932
TUBE NUMBER	7	8	9	10	11	12
	930	936	930	802	926	924

HEADER TEMPERATURES

METAL	924	930	FLUID	927
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LUG TEMPERATURES HEADER DISTANCE (INCHES)

	.875	2.125	3.375
BOILER OUTLET SUPRT	781	649	534
S.H.1 OUTLET SUPRT	806	792	782
S.H.2 SNUBBER PLATE	597	589	582
S.H.2 SNUBBER BRAKT	927	927	927

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BOILER TEMPERATURE PROFILE

 BOILER TEMPERATURE PROFILE 1977 105 13 16 18

DRUM T-SAT 606

LEVEL	COLUMN									
	1	2	3	4	5	6	7	8	9	10
8 66.0	629 T-81	627 T-82	626 T-83	629 T-84	628 T-85	626 T-86	629 T-87	150 T-88	628 T-89	630 T-810
7 57.2				629 T-74		628 T-76	630 T-77	630 T-78	629 T-79	
6 48.5	449 T-61	637 T-62	628 T-63	629 T-64	631 T-65	629 T-66	629 T-67	631 T-68	630 T-69	631 T-610
5 38.8				629 T-54		628 T-56	629 T-57	631 T-58	630 T-59	
4 29.0	630 T-41	628 T-42	629 T-43	629 T-44	631 T-45	628 T-46	630 T-47	630 T-48	629 T-49	631 T-410
3 19.2				629 T-34		629 T-36	630 T-37	629 T-38	628 T-39	
2 9.50	628 T-21	628 T-22	628 T-23	627 T-24	627 T-25	627 T-26	627 T-27	623 T-28	627 T-29	628 T-210
1 -.2				605 T-14		608 T-16	615 T-17	617 T-18	617 T-19	

 BOILER TEMPERATURE PROFILE 1977 105 14 16 18

DRUM T-SAT 606

LEVEL	COLUMN									
	1	2	3	4	5	6	7	8	9	10
8 66.0	629 T-81	628 T-82	626 T-83	629 T-84	629 T-85	626 T-86	629 T-87	150 T-88	627 T-89	630 T-810
7 57.2				629 T-74		628 T-76	630 T-77	629 T-78	627 T-79	
6 48.5	431 T-61	638 T-62	628 T-63	629 T-64	631 T-65	629 T-66	629 T-67	630 T-68	628 T-69	631 T-610
5 38.8				630 T-54		629 T-56	629 T-57	630 T-58	628 T-59	
4 29.0	631 T-41	629 T-42	630 T-43	630 T-44	631 T-45	628 T-46	630 T-47	630 T-48	627 T-49	631 T-410
3 19.2				629 T-34		629 T-36	629 T-37	628 T-38	627 T-39	
2 9.50	628 T-21	629 T-22	629 T-23	628 T-24	626 T-25	627 T-26	627 T-27	623 T-28	627 T-29	627 T-210
1 -.2				605 T-14		608 T-16	615 T-17	617 T-18	617 T-19	

 BOILER TEMPERATURE PROFILE 1977 105 14 51 18

DRUM T-SAT 610

LEVEL	COLUMN									
	1	2	3	4	5	6	7	8	9	10
8 66.0	645 T-81	646 T-82	642 T-83	647 T-84	647 T-85	642 T-86	646 T-87	150 T-88	645 T-89	646 T-810
7 57.2				647 T-74		645 T-76	647 T-77	648 T-78	646 T-79	
6 48.5	437 T-61	658 T-62	645 T-63	648 T-64	652 T-65	648 T-66	645 T-67	649 T-68	648 T-69	649 T-610
5 38.8				648 T-54		648 T-56	648 T-57	651 T-58	648 T-59	
4 29.0	648 T-41	648 T-42	648 T-43	648 T-44	652 T-45	646 T-46	649 T-47	649 T-48	646 T-49	649 T-410
3 19.2				647 T-34		647 T-36	648 T-37	648 T-38	645 T-39	
2 9.50	645 T-21	648 T-22	643 T-23	643 T-24	645 T-25	644 T-26	644 T-27	638 T-28	644 T-29	644 T-210
1 -.2				612 T-14		617 T-16	627 T-17	629 T-18	628 T-19	

 BOILER TEMPERATURE PROFILE 1977 105 15 14 18

DRUM T-SAT 606

LEVEL	COLUMN									
	1	2	3	4	5	6	7	8	9	10
8 66.0	627 T-81	627 T-82	623 T-83	628 T-84	627 T-85	624 T-86	627 T-87	150 T-88	627 T-89	628 T-810
7 57.2				626 T-74		626 T-76	627 T-77	628 T-78	627 T-79	
6 48.5	421 T-61	638 T-62	624 T-63	627 T-64	630 T-65	628 T-66	627 T-67	629 T-68	628 T-69	629 T-610
5 38.8				627 T-54		627 T-56	628 T-57	630 T-58	629 T-59	
4 29.0	629 T-41	628 T-42	626 T-43	628 T-44	630 T-45	627 T-46	629 T-47	629 T-48	627 T-49	629 T-410
3 19.2				626 T-34		627 T-36	627 T-37	628 T-38	627 T-39	
2 9.50	626 T-21	628 T-22	623 T-23	624 T-24	626 T-25	625 T-26	625 T-27	622 T-28	625 T-29	626 T-210
1 -.2				605 T-14		607 T-16	615 T-17	617 T-18	615 T-19	

 BOILER TEMPERATURE PROFILE 1977 105 15 37 18

 DRUM T-SAT 610

LEVEL	COLUMN									
	1	2	3	4	5	6	7	8	9	10
8 66.0	647 T-81	646 T-82	642 T-83	647 T-84	647 T-85	642 T-86	645 T-87	150 T-88	643 T-89	648 T-810
7 57.2				645 T-74		645 T-76	646 T-77	646 T-78	643 T-79	
6 48.5	445 T-61	657 T-62	644 T-63	648 T-64	652 T-65	648 T-66	645 T-67	648 T-68	644 T-69	649 T-610
5 38.8				648 T-54		648 T-56	648 T-57	649 T-58	645 T-59	
4 29.0	650 T-41	650 T-42	647 T-43	648 T-44	653 T-45	646 T-46	648 T-47	648 T-48	643 T-49	651 T-410
3 19.2				647 T-34		646 T-36	648 T-37	646 T-38	643 T-39	
2 9.50	647 T-21	650 T-22	643 T-23	643 T-24	646 T-25	644 T-26	644 T-27	638 T-28	643 T-29	645 T-210
1 -.2				612 T-14		617 T-16	627 T-17	630 T-18	629 T-19	

 BOILER TEMPERATURE PROFILE 1977 105 16 6 18

DRUM T-SAT 609

LEVEL	COLUMN									
	1	2	3	4	5	6	7	8	9	10
8 66.0	640 T-81	638 T-82	633 T-83	639 T-84	640 T-85	636 T-86	639 T-87	150 T-88	637 T-89	639 T-810
7 57.2				639 T-74		639 T-76	641 T-77	639 T-78	638 T-79	
6 48.5	431 T-61	650 T-62	636 T-63	640 T-64	646 T-65	642 T-66	641 T-67	641 T-68	640 T-69	643 T-610
5 38.8				641 T-54		643 T-56	643 T-57	643 T-58	641 T-59	
4 29.0	646 T-41	642 T-42	639 T-43	641 T-44	648 T-45	644 T-46	645 T-47	642 T-48	639 T-49	644 T-410
3 19.2				640 T-34		644 T-36	644 T-37	641 T-38	639 T-39	
2 9.50	642 T-21	642 T-22	635 T-23	636 T-24	642 T-25	641 T-26	641 T-27	633 T-28	639 T-29	640 T-210
1 -.2				609 T-14		613 T-16	625 T-17	626 T-18	625 T-19	

 BOILER TEMPERATURE PROFILE 1977 105 16 34 18

DRUM T-SAT 608

LEVEL	COLUMN									
	1	2	3	4	5	6	7	8	9	10
8 66.0	637 T-81	636 T-82	633 T-83	637 T-84	637 T-85	634 T-86	637 T-87	150 T-88	636 T-89	636 T-810
7 57.2				636 T-74		640 T-76	638 T-77	639 T-78	638 T-79	
6 48.5	428 T-61	650 T-62	634 T-63	637 T-64	643 T-65	640 T-66	637 T-67	641 T-68	639 T-69	639 T-610
5 38.8				638 T-54		639 T-56	641 T-57	643 T-58	639 T-59	
4 29.0	641 T-41	638 T-42	635 T-43	637 T-44	643 T-45	638 T-46	641 T-47	641 T-48	638 T-49	639 T-410
3 19.2				636 T-34		639 T-36	640 T-37	639 T-38	638 T-39	
2 9.50	637 T-21	638 T-22	631 T-23	634 T-24	638 T-25	637 T-26	637 T-27	631 T-28	637 T-29	635 T-210
1 -.2				607 T-14		611 T-16	622 T-17	624 T-18	622 T-19	

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FIRST STAGE SUPERHEATER TEMPERATURE PROFILE

 FIRST STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 13 16 18

TUBE * 4

INLET	TS11	TE400	607
		TE401	607
		TE402	606
OUTLET	TS10	TE476	852
	LEG	TE459	857

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	842 T-46	846 T-41	846 T-42			
3	773 T-36	778 T-31	790 T-32	800 T-33	817 T-34	831 T-35
2	685 T-26	695 T-21	706 T-22	717 T-23	737 T-24	758 T-25
1	627 T-16	279 T-11	632 T-12	638 T-13	864 T-14	676 T-15

 FIRST STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 14 16 18

TUBE * 4

INLET TS11 TE400 607
 TE401 607
 TE402 607
 OUTLET TS10 TE476 849
 LEG TE459 853

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	839 T-46	843 T-41	843 T-42			
3	770 T-36	775 T-31	786 T-32	797 T-33	814 T-34	828 T-35
2	685 T-26	695 T-21	705 T-22	715 T-23	737 T-24	756 T-25
1	627 T-16	298 T-11	631 T-12	638 T-13	939 T-14	676 T-15

 FIRST STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 14 51 18

TUBE * 4

INLET TS11 TE400 610
 TE401 610
 TE402 610
 OUTLET TS10 TE476 846
 LEG TE459 847

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	830 T-46	836 T-41	836 T-42			
3	761 T-36	767 T-31	779 T-32	788 T-33	806 T-34	821 T-35
2	679 T-26	688 T-21	698 T-22	709 T-23	729 T-24	748 T-25
1	632 T-16	316 T-11	631 T-12	637 T-13	981 T-14	672 T-15

 FIRST STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 15 14 18

TUBE * 4

INLET TS1I TE400 607
 TE401 606
 TE402 606
 OUTLET TS10 TE476 851
 LEG TE459 854

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	839 T-46	845 T-41	845 T-42			
3	770 T-36	776 T-31	788 T-32	797 T-33	815 T-34	829 T-35
2	685 T-26	695 T-21	705 T-22	716 T-23	737 T-24	756 T-25
1	626 T-16	307 T-11	631 T-12	638 T-13	1009 T-14	676 T-15

 FIRST STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 15 37 18

TUBE * 4

INLET	TS11	TE400	610
		TE401	610
		TE402	610
OUTLET	TS10	TE476	844
	LEG	TE459	845

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	828 T-46	834 T-41	834 T-42			
3	760 T-36	766 T-31	776 T-32	787 T-33	804 T-34	818 T-35
2	679 T-26	688 T-21	698 T-22	708 T-23	729 T-24	747 T-25
1	633 T-16	309 T-11	632 T-12	637 T-13	1038 T-14	672 T-15

 FIRST STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 16 6 18

TUBE * 4

INLET	TS11	TE400	609
		TE401	609
		TE402	609
OUTLET	TS10	TE476	823
	LEG	TE459	826

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	811 T-46	816 T-41	816 T-42			
3	749 T-36	754 T-31	764 T-32	774 T-33	790 T-34	802 T-35
2	675 T-26	685 T-21	693 T-22	702 T-23	720 T-24	737 T-25
1	631 T-16	311 T-11	631 T-12	636 T-13	1074 T-14	667 T-15

 FIRST STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 16 34 18

TUBE * 4

INLET	TS11	TE400	609
		TE401	609
		TE402	609
OUTLET	TS10	TE476	843
	LEG	TE459	847

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	830 T-46	835 T-41	835 T-42			
3	763 T-36	769 T-31	780 T-32	790 T-33	807 T-34	821 T-35
2	681 T-26	690 T-21	701 T-22	712 T-23	731 T-24	749 T-25
1	629 T-16	302 T-11	631 T-12	637 T-13	1112 T-14	673 T-15

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SECOND STAGE SUPERHEATER TEMPERATURE PROFILE

 SECOND STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 13 16 18

TUBE * 4
 INLET TS2I TE501 850
 OUTLET TS20 TT590 946
 LEG TE559 950

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	949 T-46	556 T-41	149 T-42			
3	924 T-36	929 T-31	932 T-32	937 T-33	939 T-34	946 T-35
2	895 T-26	900 T-21	900 T-22	907 T-23	915 T-24	919 T-25
1	-241 T-16	859 T-11	866 T-12	870 T-13	881 T-14	150 T-15

 SECOND STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 14 16 18

TUBE * 4

INLET TS2I TE501 845

OUTLET TS20 TT590 941
 LEG TE559 946

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	944 T-46	554 T-41	149 T-42			
3	920 T-36	925 T-31	927 T-32	932 T-33	936 T-34	943 T-35
2	891 T-26	896 T-21	896 T-22	902 T-23	911 T-24	916 T-25
1	-168 T-16	856 T-11	862 T-12	866 T-13	877 T-14	150 T-15

 SECOND STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 14 52 18

TUBE * 4
 INLET TS2I TE501 844

OUTLET TS20 TT590 962
 LEG TE559 965

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	959 T-46	562 T-41	149 T-42			
3	927 T-36	933 T-31	937 T-32	943 T-33	949 T-34	956 T-35
2	893 T-26	899 T-21	899 T-22	907 T-23	916 T-24	922 T-25
1	-73 T-16	853 T-11	861 T-12	866 T-13	878 T-14	150 T-15

 SECOND STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 15 14 18

TUBE * 4
 INLET TS2I TE501 849

OUTLET TS20 TT590 944
 LEG TE559 946

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	946 T-46	555 T-41	149 T-42			
3	921 T-36	926 T-31	929 T-32	933 T-33	937 T-34	943 T-35
2	893 T-26	898 T-21	898 T-22	904 T-23	912 T-24	916 T-25
1	-47 T-16	857 T-11	864 T-12	867 T-13	878 T-14	150 T-15

 SECOND STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 15 37 18

TUBE * 4

INLET TS2I TE501 843

OUTLET TS20 TT590 961
 LEG TE559 964

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	959 T-46	561 T-41	149 T-42			
3	926 T-36	932 T-31	936 T-32	941 T-33	946 T-34	954 T-35
2	893 T-26	899 T-21	899 T-22	905 T-23	916 T-24	921 T-25
1	-38 T-16	853 T-11	860 T-12	865 T-13	876 T-14	150 T-15

 SECOND STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 16 6 18

TUBE * 4

INLET TS2I TE501 822

OUTLET TS20 TT590 927

LEG TE559 930

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	926 T-46	543 T-41	149 T-42			
3	895 T-36	901 T-31	905 T-32	910 T-33	916 T-34	921 T-35
2	866 T-26	871 T-21	871 T-22	878 T-23	885 T-24	892 T-25
1	-39 T-16	830 T-11	836 T-12	840 T-13	851 T-14	150 T-15

 SECOND STAGE SUPERHEATER TEMPERATURE PROFILE 1977 105 16 34 18

TUBE * 4

INLET TS2I TE501 840

OUTLET TS20 TT590 948

LEG TE559 952

TURN	COLUMN					
	6	1	2	3	4	5
	345	300	255	210	120	30
4	948 T-46	556 T-41	149 T-42			
3	919 T-36	924 T-31	927 T-32	934 T-33	937 T-34	945 T-35
2	887 T-26	893 T-21	893 T-22	900 T-23	909 T-24	914 T-25
1	56 T-16	851 T-11	856 T-12	862 T-13	873 T-14	150 T-15

PAGE 11
WARNINGS AND ALARMS REPORT

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*****
WARNINGS AND ALARMS REPORT                                1977 105 13 19 18
HIGH WARNINGS      HIGH WARNINGS      HIGH ALARMS      HIGH ALARMS
LT211    44      0 TE552 1040      0 LT211    47      0 TE505 1060      0
TE300    610     0 TE553 1040      0 LT211    50      0 TE506 1060      0
PT230   1775     0 TE554 1040      0 TE300    615     0 TE507 1060      0
PT590   1600     0 DT215   40    110 TE300    620     0 TE508 1060      0
TT590    970     0 TT306    95     0 PT230   1800     0 TE509 1060      0
TE501    895     0 TT 23   160     0 PT230   1825     0 TE550 1060      0
TE476    950     0 TE 24   160     0 PT590   1640     0 TE551 1060      0
TE405   1040     0 TT 16   160     0 PT590   1650     0 TE552 1060      0
TE406   1040     0 TS230 18000     0 TT590    980     0 TE553 1060      0
TE407   1040     0 TS310   200     0 TT590    990     0 TE554 1060      0
TE408   1040     0 TS476   200     0 TE501    895     0 DT215    60     0
TE409   1040     0 TS559   200     0 TE501    905     0 TT306   100     0
TE450   1040     0      0      0      0 TE476    955     0 TT306   120     0
TE451   1040     0      0      0      0 TE476    960     0 TT 23   175     0
TE452   1040     0      0      0      0 TE405   1060     0 TT 23   195     0
TE453   1040     0      0      0      0 TE406   1060     0 TT 24   175     0
TE454   1040     0      0      0      0 TE407   1060     0 TT 24   195     0
TE505   1040     0      0      0      0 TE408   1060     0 TT 16   175     0
TE506   1040     0      0      0      0 TE409   1060     0 TT 16   195     0
TE507   1040     0      0      0      0 TE450   1060     0 TS230 20000     0
TE508   1040     0      0      0      0 TE451   1060     0 TS310   400     0
TE509   1040     0      0      0      0 TE452   1060     0 TS476   400     0
TE550   1040     0      0      0      0 TE453   1060     0 TS559   400     0
TE551   1040     0      0      0      0 TE454   1060     0
*****
LOW WARNINGS      LOW ALARMS      LOW ALARMS
LT211    17      0      0      0      0 FT 13  9664      0
FT310   7500     0      0      0      0 FT 13  8512      0
FT 13  10020     0      0      0      0 DT301  -100      0
DT301  -100     0      0      0      0
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PAGE 12
ALARM CONDITIONS

4-105

PAGE 13
ARRAY FLUX MAP

ARRAY FLUX MAP

YEAR DAY HR MIN TEST
1977 105 13 17 18

TOTAL BOILER INCIDENT FLUX 158
TOTAL S.H.#1 INCIDENT FLUX 62
TOTAL S.H.#2 INCIDENT FLUX 34
TOTAL SRE INCIDENT FLUX 258

ARRAY INPUT POWER
SECTION * 1 517
SECTION * 2 551
SECTION * 3 678
SECTION * 4 663

TOTAL INPUT POWER 2410

BOOM	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF10	IF11	IF12
1	874	997	1045	942	874	648	509	399	362	288	198	233
2	874	988	1053	938	887	648	509	403	362	264	198	211
3	874	976	1049	925	866	655	521	396	353	288	224	220
4	897	1005	1074	946	883	640	524	415	353	288	213	220
5	901	1005	1070	938	874	630	528	403	353	288	209	228
6	889	992	1049	938	858	630	509	396	345	288	209	245
7	912	1009	1074	946	874	651	517	396	349	288	209	220
8	897	1005	1066	946	874	640	524	396	345	296	209	228
9	897	997	1058	930	866	637	509	396	353	276	209	233
10	897	1013	1083	959	874	648	513	403	358	284	213	237
11	882	988	1049	921	858	633	517	396	353	288	217	245
12	886	1005	1062	955	866	648	505	403	353	288	202	224
13	897	1009	1066	946	883	648	521	392	358	288	213	237
14	867	988	1041	921	858	640	501	388	345	288	217	224
15	870	988	1053	938	866	637	524	388	353	300	205	228
16	867	976	1049	938	854	633	509	384	353	272	198	233
17	844	959	1024	900	841	615	494	388	337	272	205	220
18	855	972	1024	930	858	626	505	392	345	300	198	220
19	844	955	1033	913	849	626	509	388	345	288	209	228
20	836	947	1016	905	837	619	494	392	362	288	205	203
21	840	955	1016	896	841	626	517	388	353	288	202	254
22	855	964	1037	917	854	633	524	396	345	288	202	254
23	829	939	1004	905	833	622	501	392	349	288	232	211
24	836	947	1012	913	841	622	509	399	353	292	194	220
25	844	964	1024	913	854	637	505	396	374	288	217	224
26	821	931	999	892	841	619	509	392	353	276	213	211
27	848	955	1024	938	858	651	521	392	358	288	202	207
28	851	964	1024	913	866	640	509	396	358	288	198	203
29	836	947	1008	909	837	630	505	403	353	284	209	224
30	851	959	1024	921	858	640	521	396	345	288	209	228
31	851	955	1024	913	858	640	509	396	362	296	213	228
32	825	943	1008	905	849	640	524	388	353	288	198	224
33	829	972	1049	942	874	651	517	411	362	304	198	211
34	829	955	1024	913	858	640	509	411	370	296	198	211

ARRAY FLUX MAP

YEAR	DAY	HR	MIN	TEST
1977	105	14	18	18

TOTAL BOILER INCIDENT FLUX	158
TOTAL S.H.#1 INCIDENT FLUX	62
TOTAL S.H.#2 INCIDENT FLUX	34
TOTAL SRE INCIDENT FLUX	250

ARRAY INPUT POWER

SECTION # 1	517
SECTION # 2	551
SECTION # 3	678
SECTION # 4	661

TOTAL INPUT POWER	2410
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ROOM	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF10	IF11	IF12
1	867	976	1037	930	874	651	513	403	383	272	194	228
2	882	997	1049	938	866	640	517	403	345	272	220	228
3	878	988	1033	921	849	630	509	388	353	296	198	203
4	893	1001	1074	938	874	648	521	407	358	264	194	224
5	889	1005	1058	930	866	633	528	396	345	264	217	224
6	893	997	1058	942	866	640	501	392	353	280	209	220
7	901	1009	1083	963	874	640	517	411	337	280	202	241
8	889	997	1053	946	858	640	517	403	345	276	202	220
9	897	1009	1058	946	874	640	517	396	345	280	220	207
10	905	1005	1074	963	874	655	524	403	353	276	209	207
11	882	988	1041	925	858	640	524	388	353	264	194	220
12	889	1005	1066	946	891	644	517	403	358	280	202	211
13	897	1005	1066	946	883	651	524	396	353	272	198	224
14	859	988	1041	921	845	626	505	388	358	272	194	220
15	882	997	1053	938	866	640	509	380	345	276	202	211
16	867	976	1041	921	849	626	509	392	366	296	198	224
17	840	955	1016	896	845	604	501	380	337	272	213	207
18	851	972	1024	913	845	626	509	388	345	288	187	211
19	859	964	1033	917	849	637	517	403	337	288	194	241
20	836	939	1008	905	833	619	509	396	345	280	198	211
21	840	951	1016	913	837	626	494	388	337	280	202	220
22	855	964	1033	913	849	637	505	399	345	280	202	224
23	829	931	1008	892	833	626	509	380	341	276	194	220
24	836	947	1016	921	841	622	501	396	345	288	198	220
25	844	955	1024	925	854	655	505	399	362	280	209	207
26	825	939	999	896	833	615	509	392	345	276	217	211
27	840	959	1020	925	858	633	517	403	345	276	209	203
28	844	955	1020	925	858	640	536	388	353	268	209	233
29	836	939	1004	896	841	640	501	380	349	280	217	220
30	851	964	1020	921	858	640	521	403	345	304	194	237
31	844	947	1016	921	858	655	517	396	358	272	202	220
32	829	939	1016	913	849	633	517	396	349	288	194	241
33	821	964	1033	930	874	651	524	403	349	280	187	211
34	829	955	1016	913	858	644	501	403	358	288	217	220

ARRAY FLUX MAP

YEAR	DAY	HR	MIN	TEST
1977	105	14	52	18

TOTAL BOILER INCIDENT FLUX	251
TOTAL S.H.#1 INCIDENT FLUX	96
TOTAL S.H.#2 INCIDENT FLUX	46
TOTAL SRE INCIDENT FLUX	390

ARRAY INPUT POWER	
SECTION * 1	872
SECTION * 2	923
SECTION * 3	1134
SECTION * 4	1110

TOTAL INPUT POWER	4040
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BOOM	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF10	IF11	IF12
1	1407	1573	1683	1516	1391	1011	783	597	480	384	262	271
2	1422	1590	1691	1525	1399	1015	779	566	488	368	277	292
3	1422	1582	1674	1491	1370	979	749	559	471	372	269	279
4	1460	1623	1733	1541	1387	1015	775	559	480	368	243	296
5	1414	1590	1695	1500	1399	993	760	563	471	372	258	279
6	1380	1573	1691	1491	1366	982	749	543	450	356	277	271
7	1372	1565	1695	1516	1387	1000	760	551	467	360	247	262
8	1300	1499	1645	1466	1358	972	745	543	459	344	254	296
9	1270	1483	1624	1479	1366	986	756	551	463	352	258	279
10	1258	1483	1624	1483	1374	993	772	551	463	352	254	271
11	1243	1454	1587	1458	1341	979	741	563	471	348	262	262
12	1315	1520	1653	1500	1387	1000	760	563	480	352	232	262
13	1353	1549	1670	1500	1383	1000	783	559	463	352	269	262
14	1376	1561	1658	1479	1366	982	752	547	471	360	247	262
15	1414	1606	1703	1500	1391	1000	775	574	488	392	247	275
16	1429	1615	1716	1516	1374	986	775	547	480	376	250	271
17	1380	1557	1658	1474	1341	957	749	559	476	356	250	279
18	1410	1590	1695	1500	1374	986	760	566	480	376	247	275
19	1376	1553	1658	1479	1349	968	760	563	476	368	277	275
20	1361	1524	1633	1449	1320	957	745	551	471	372	277	266
21	1369	1532	1637	1458	1345	968	745	547	480	364	258	279
22	1380	1540	1658	1487	1358	982	752	559	471	376	254	279
23	1323	1491	1591	1432	1333	964	752	563	467	360	254	279
24	1353	1524	1637	1466	1358	986	752	563	471	376	254	296
25	1338	1499	1624	1466	1353	986	760	582	492	392	262	279
26	1319	1483	1591	1458	1337	964	745	551	488	352	254	279
27	1331	1495	1616	1466	1366	993	775	566	480	368	232	262
28	1346	1507	1616	1466	1366	993	760	574	480	368	269	275
29	1300	1474	1578	1449	1333	964	752	551	480	356	250	262
30	1357	1528	1641	1479	1370	997	772	566	480	368	247	271
31	1331	1495	1608	1479	1358	986	772	566	471	376	262	283
32	1312	1483	1591	1441	1358	993	756	574	476	368	254	296
33	1300	1532	1653	1500	1399	1015	783	582	480	372	247	275
34	1323	1503	1624	1462	1358	993	779	551	471	376	284	279

ARRAY FLUX MAP

YEAR	DAY	HR	MIN	TEST
1977	105	15	14	18

TOTAL BOILER INCIDENT FLUX	151
TOTAL S.H.#1 INCIDENT FLUX	60
TOTAL S.H.#2 INCIDENT FLUX	32
TOTAL SRE INCIDENT FLUX	240

ARRAY INPUT POWER

SECTION * 1	499
SECTION * 2	523
SECTION * 3	648
SECTION * 4	631

TOTAL INPUT POWER	2300
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BOOM	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF10	IF11	IF12
1	859	955	1012	913	841	622	505	388	349	280	202	228
2	874	976	1029	909	845	619	490	376	345	280	198	211
3	870	964	1020	896	824	604	482	368	345	276	205	220
4	897	992	1045	913	849	619	494	388	341	280	194	245
5	874	980	1037	913	837	619	490	380	328	272	213	228
6	844	947	999	879	824	601	501	361	337	264	194	237
7	829	939	1008	888	833	615	494	376	337	276	187	220
8	772	885	962	888	808	612	486	372	337	276	205	228
9	722	848	924	850	820	608	479	365	332	272	194	220
10	730	848	949	863	816	612	501	380	341	272	194	224
11	722	844	937	858	816	597	486	372	328	272	202	220
12	749	873	958	863	820	604	494	384	328	276	202	211
13	798	931	999	896	841	630	517	380	328	272	202	211
14	836	947	1016	892	837	608	501	365	324	276	202	216
15	882	992	1041	925	841	612	501	376	332	272	209	211
16	886	997	1058	921	841	612	490	380	345	264	194	224
17	859	964	1016	888	816	597	479	380	345	272	187	194
18	859	964	1029	905	837	604	490	380	345	276	202	220
19	836	943	1008	879	808	594	479	392	337	264	198	203
20	821	914	983	863	804	597	490	372	324	264	187	203
21	825	931	983	863	804	597	486	380	345	264	202	220
22	829	931	987	884	820	604	479	392	337	280	198	224
23	798	906	958	858	799	597	479	380	328	276	209	228
24	810	910	974	858	808	601	479	380	337	280	202	220
25	813	914	983	871	808	615	482	403	345	264	194	220
26	798	898	949	846	799	590	479	372	337	280	209	211
27	817	910	983	888	824	597	482	376	337	264	194	220
28	813	922	987	888	820	612	501	380	337	264	217	228
29	806	902	966	863	808	597	494	372	341	272	194	228
30	829	931	983	888	824	612	490	392	328	280	202	211
31	813	922	983	871	824	604	501	396	345	272	209	237
32	798	906	979	875	824	604	482	380	345	280	194	216
33	798	931	991	892	833	612	505	380	337	292	187	211
34	806	927	987	871	816	604	494	380	353	264	187	211

ARRAY FLUX MAP

YEAR DAY HR MIN TEST
1977 105 15 37 10

TOTAL BOILER INCIDENT FLUX 251
TOTAL S.H.#1 INCIDENT FLUX 95
TOTAL S.H.#2 INCIDENT FLUX 45
TOTAL SRE INCIDENT FLUX 390

ARRAY INPUT POWER
SECTION # 1 965
SECTION # 2 918
SECTION # 3 1134
SECTION # 4 1110

TOTAL INPUT POWER 4030

ROOM	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF 10	IF 11	IF 12
1	1403	1565	1691	1500	1399	997	703	566	518	360	250	280
2	1426	1590	1699	1516	1399	1000	768	574	476	360	247	296
3	1429	1590	1683	1483	1366	972	749	566	463	352	254	305
4	1475	1639	1724	1550	1400	997	752	559	400	372	247	280
5	1433	1610	1695	1495	1374	972	745	551	459	360	258	313
6	1399	1565	1674	1491	1374	968	745	547	400	352	247	271
7	1365	1540	1650	1500	1374	993	752	566	476	352	247	275
8	1266	1466	1591	1449	1345	964	745	535	455	344	269	279
9	1224	1425	1574	1449	1349	972	749	543	463	352	254	262
10	1209	1425	1574	1462	1358	986	752	559	463	352	247	279
11	1194	1409	1558	1407	1320	964	749	535	471	356	269	266
12	1285	1499	1641	1466	1358	993	752	535	455	360	247	262
13	1331	1540	1666	1483	1374	986	760	559	476	356	247	288
14	1376	1569	1674	1491	1341	968	737	551	467	352	262	271
15	1437	1619	1720	1512	1374	979	752	566	476	376	243	271
16	1467	1639	1741	1529	1374	979	752	555	471	372	247	266
17	1422	1590	1687	1479	1341	964	733	555	471	344	239	296
18	1452	1623	1716	1516	1374	986	760	547	463	360	262	280
19	1407	1569	1666	1466	1349	964	745	547	463	360	299	280
20	1384	1557	1650	1479	1341	972	745	551	471	356	250	279
21	1376	1549	1641	1466	1333	957	745	535	450	376	250	280
22	1376	1557	1653	1407	1366	979	760	551	484	360	265	271
23	1315	1483	1570	1416	1303	946	737	543	488	360	262	296
24	1353	1524	1641	1466	1349	979	749	559	480	364	247	262
25	1331	1487	1603	1432	1324	961	752	539	471	372	250	305
26	1327	1483	1591	1445	1328	964	733	535	471	360	269	296
27	1330	1507	1624	1466	1374	982	752	566	480	372	273	266
28	1331	1499	1600	1462	1358	979	764	559	463	364	265	280
29	1331	1499	1600	1466	1341	993	749	559	480	360	262	262
30	1361	1520	1641	1491	1374	993	779	566	480	372	247	262
31	1323	1487	1591	1432	1353	972	752	563	480	372	254	262
32	1323	1516	1641	1483	1387	1000	772	563	480	356	247	275
33	1315	1524	1653	1500	1391	1015	794	563	480	360	247	266
34	1315	1512	1641	1462	1366	982	760	559	480	376	250	275

ARRAY FLUX MAP

YEAR DAY HR MIN TEST
1977 105 16 6 18

TOTAL BOILER INCIDENT FLUX 223
TOTAL S.H.#1 INCIDENT FLUX 79
TOTAL S.H.#2 INCIDENT FLUX 39
TOTAL SRE INCIDENT FLUX 340

ARRAY INPUT POWER

SECTION * 1 650
SECTION * 2 692
SECTION * 3 1019
SECTION * 4 1112

TOTAL INPUT POWER 3470

ROOM	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF10	IF11	IF12
1	1327	1470	1512	1294	1170	820	630	473	400	312	217	233
2	1330	1479	1533	1307	1150	824	630	473	404	300	232	266
3	1312	1450	1491	1265	1137	802	616	473	400	300	232	233
4	1323	1450	1500	1294	1153	806	627	465	404	300	232	254
5	1266	1400	1470	1257	1124	813	616	454	391	300	235	245
6	1194	1343	1424	1240	1100	780	619	450	391	300	220	237
7	1140	1314	1416	1240	1133	795	600	450	400	296	217	245
8	1057	1244	1350	1181	1003	777	597	454	387	296	239	254
9	1026	1227	1345	1194	1091	792	600	450	400	300	224	254
10	1034	1236	1353	1206	1103	806	619	465	391	296	217	237
11	1034	1223	1333	1181	1003	780	600	454	387	320	220	245
12	1110	1293	1399	1227	1100	795	616	473	391	296	224	233
13	1175	1351	1449	1257	1137	813	623	462	396	304	217	241
14	1216	1376	1450	1244	1100	792	623	469	412	324	217	250
15	1205	1441	1524	1294	1141	810	623	454	396	324	213	233
16	1319	1474	1533	1290	1141	806	616	473	400	344	220	245
17	1315	1466	1500	1282	1124	792	616	450	400	304	220	233
18	1346	1503	1549	1303	1145	813	631	473	400	320	213	237
19	1330	1474	1520	1290	1145	806	631	473	400	320	224	233
20	1300	1433	1483	1265	1116	792	616	454	396	304	220	241
21	1300	1441	1491	1261	1124	795	616	485	391	320	224	271
22	1300	1454	1503	1294	1150	820	646	489	404	324	220	280
23	1270	1400	1453	1240	1100	784	623	450	404	320	247	262
24	1281	1417	1474	1265	1133	806	631	481	421	320	232	254
25	1293	1429	1491	1282	1141	810	616	481	404	312	232	237
26	1270	1400	1449	1261	1124	806	631	481	417	336	235	245
27	1293	1425	1474	1282	1149	820	627	473	412	312	217	245
28	1285	1429	1478	1290	1149	813	646	477	412	312	220	220
29	1262	1409	1449	1240	1124	799	616	462	412	320	220	237
30	1293	1433	1499	1290	1150	824	646	473	412	320	217	241
31	1285	1425	1483	1282	1150	820	631	481	404	300	239	237
32	1250	1417	1483	1273	1153	817	635	489	400	300	224	220
33	1254	1450	1516	1290	1170	842	646	481	412	320	250	245
34	1254	1433	1487	1269	1149	806	630	489	412	320	224	237

ARRAY FLUX MAP

YEAR DAY HR MIN TEST
1977 105 16 34 18

TOTAL BOILER INCIDENT FLUX 207
 TOTAL S.H.#1 INCIDENT FLUX 78
 TOTAL S.H.#2 INCIDENT FLUX 39
 TOTAL SRE INCIDENT FLUX 320

ARRAY INPUT POWER
 SECTION # 1 683
 SECTION # 2 727
 SECTION # 3 884
 SECTION # 4 965

TOTAL INPUT POWER 3260

BOOM	IF 1	IF 2	IF 3	IF 4	IF 5	IF 6	IF 7	IF 8	IF 9	IF10	IF11	IF12
1	1194	1338	1408	1240	1149	820	635	481	412	340	224	237
2	1201	1334	1399	1231	1137	813	638	481	412	312	217	262
3	1163	1293	1374	1206	1103	806	623	462	404	308	235	237
4	1171	1293	1374	1227	1116	813	631	465	391	320	217	233
5	1087	1236	1316	1177	1091	792	623	458	391	312	239	262
6	1049	1190	1295	1164	1083	781	616	454	396	308	224	262
7	1003	1170	1299	1189	1099	799	627	465	404	292	239	245
8	927	1112	1237	1148	1066	792	600	450	387	312	247	245
9	920	1108	1249	1148	1083	792	600	469	404	328	209	245
10	935	1120	1266	1160	1091	795	627	473	396	312	235	245
11	935	1112	1241	1122	1053	777	597	458	391	296	224	241
12	1019	1166	1324	1181	1091	799	612	462	396	304	213	237
13	1064	1236	1349	1206	1099	792	623	465	412	320	217	237
14	1106	1260	1353	1198	1091	788	616	473	396	312	217	245
15	1178	1334	1408	1231	1116	806	616	473	412	336	217	233
16	1194	1343	1420	1236	1108	795	616	481	396	320	254	237
17	1201	1343	1408	1215	1091	777	616	458	396	300	228	254
18	1224	1367	1424	1248	1124	806	623	477	421	328	213	250
19	1194	1334	1391	1223	1099	799	623	473	425	320	224	258
20	1178	1318	1387	1215	1099	799	627	473	412	328	232	237
21	1182	1318	1387	1223	1103	799	616	481	400	328	239	245
22	1171	1310	1383	1223	1124	806	627	473	412	312	232	245
23	1148	1277	1349	1185	1087	792	608	473	404	324	232	250
24	1163	1301	1387	1215	1116	802	638	489	412	304	213	237
25	1178	1306	1391	1223	1128	820	661	489	425	320	247	254
26	1140	1277	1358	1194	1103	792	627	465	404	300	235	250
27	1167	1306	1387	1227	1133	813	638	473	412	324	217	262
28	1144	1289	1353	1206	1108	799	627	481	412	320	232	228
29	1144	1277	1349	1198	1103	795	623	465	408	332	217	245
30	1163	1301	1378	1227	1133	824	646	481	404	328	220	262
31	1156	1293	1378	1223	1124	820	638	473	412	324	220	254
32	1125	1268	1358	1198	1112	813	631	473	400	320	232	241
33	1129	1310	1387	1248	1149	824	654	489	429	352	217	245
34	1133	1301	1374	1215	1124	810	646	473	412	320	220	245

PAGE 14
FLOWS, PLOTS

SEARCH START
DAY #105 1977 TIME 10: 5
NUMBER OF RECORDS = 2

ARGUMENT SELECTED : 1

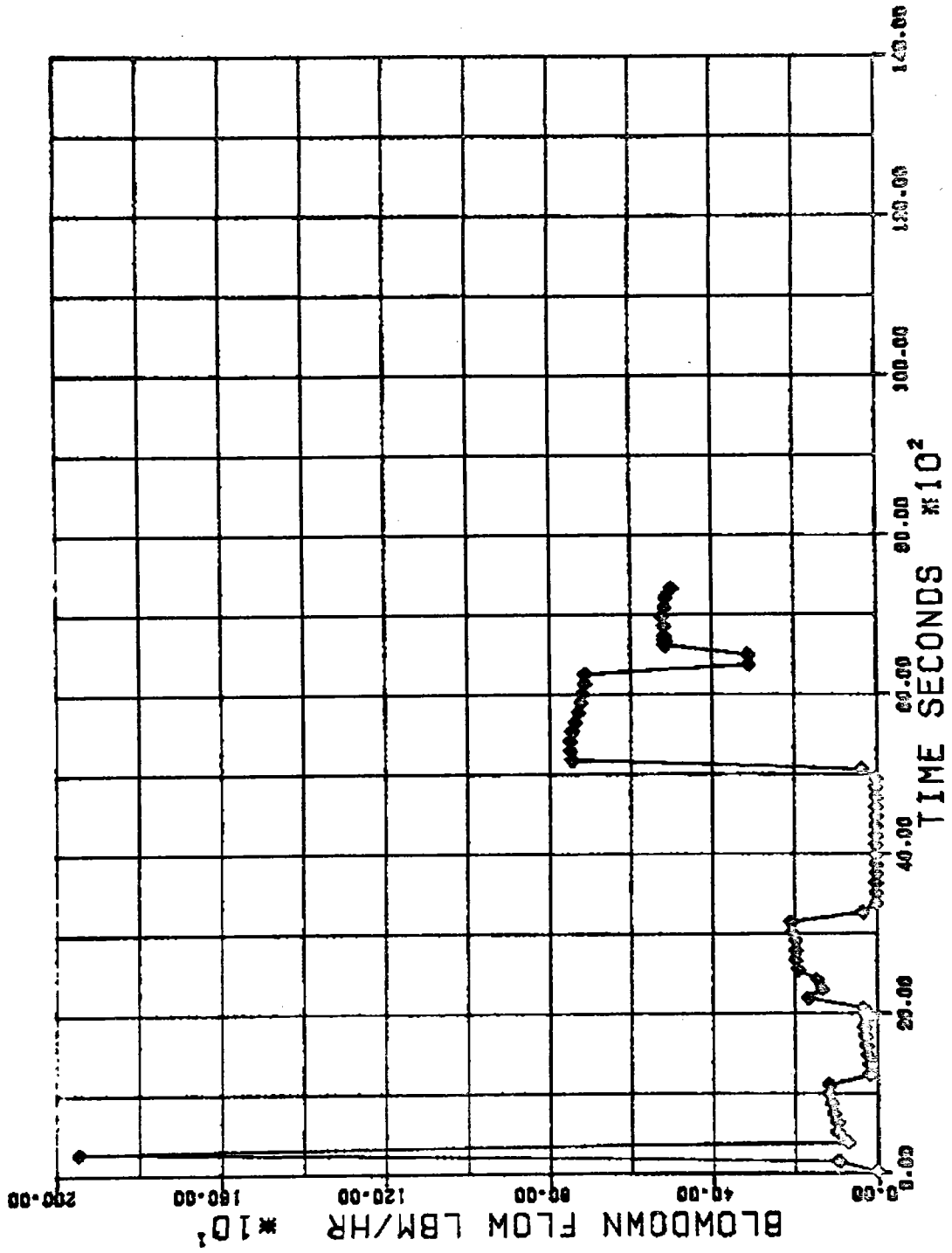
FIRST FUNCTION #11 OPEN BOX

SEARCH MODE 2

PLOT START TIME = 36300.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 90 POINTS PER FUNCTION
SCATTER PLOT HAS 45 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 10: 5
NUMBER OF RECORDS = 4

ARGUMENT SELECTED : 1

FIRST FUNCTION # 8 OPEN BOX

SECOND FUNCTION #10 TRIANGLE

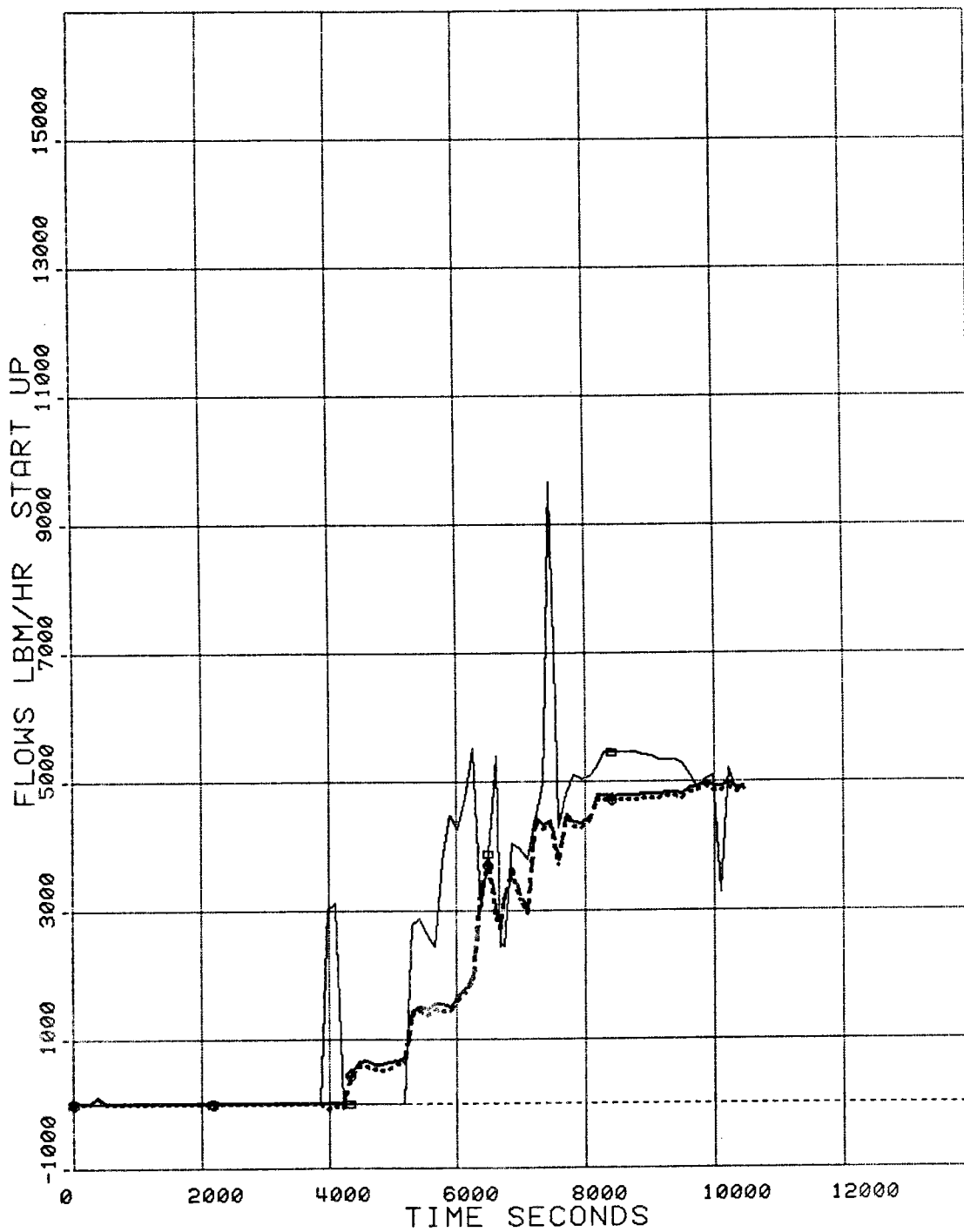
THIRD FUNCTION #17 CROSS-CIRCLE

SEARCH MODE 2

PLOT START TIME = 36300.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 90 POINTS PER FUNCTION
SCATTER PLOT HAS 45 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 10: 5
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION * 9 OPEN BOX
SECOND FUNCTION *30 TRIANGLE

SEARCH MODE 2

PLOT START TIME = 36300.0

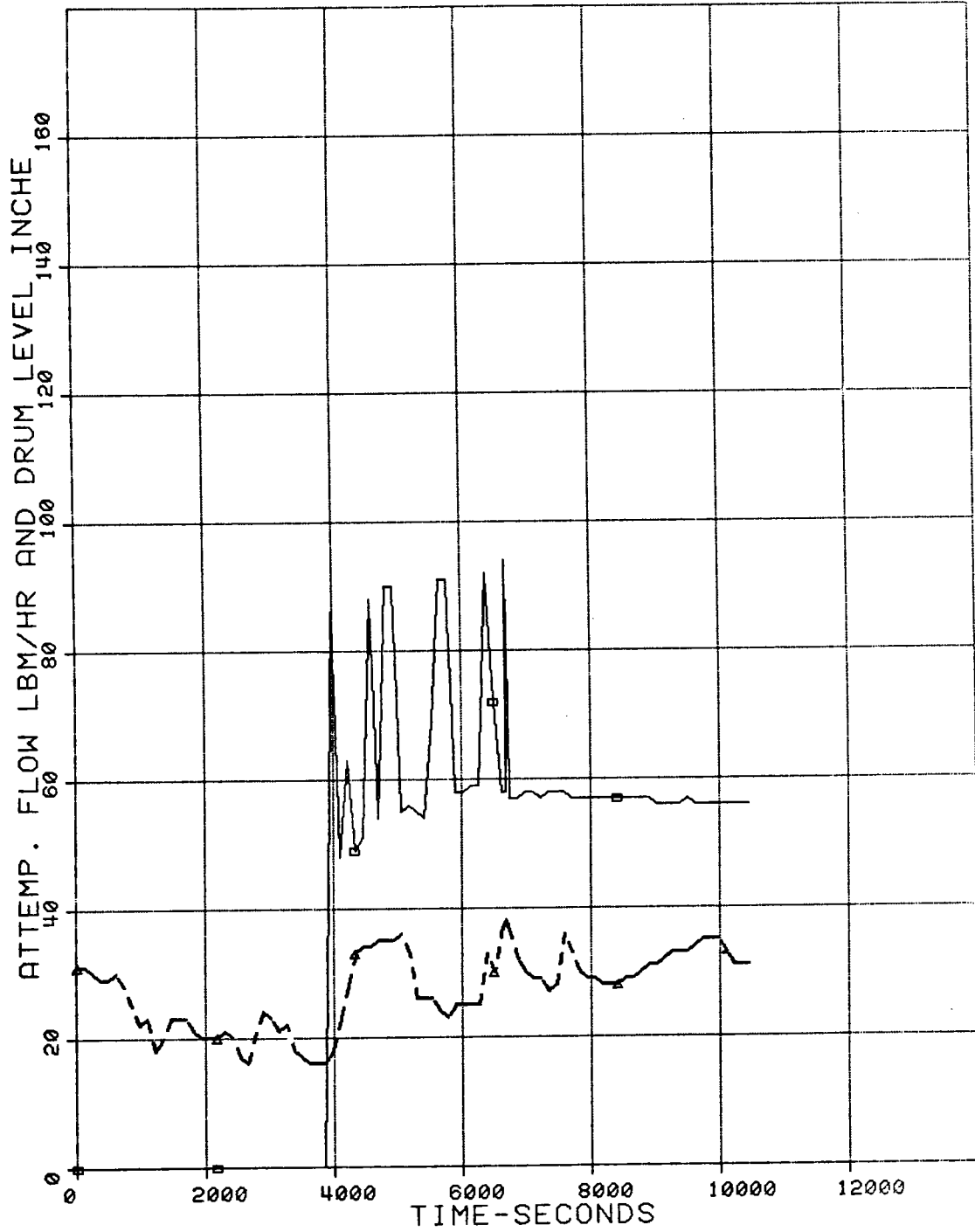
EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 90 POINTS PER FUNCTION

Replot 4/25/77

Test No. 18

14-
18-



SEARCH START
DAY #105 1977 TIME 14:15
NUMBER OF RECORDS = 4

ARGUMENT SELECTED : 1

FIRST FUNCTION # 8 OPEN BOX

SECOND FUNCTION #10 TRIANGLE

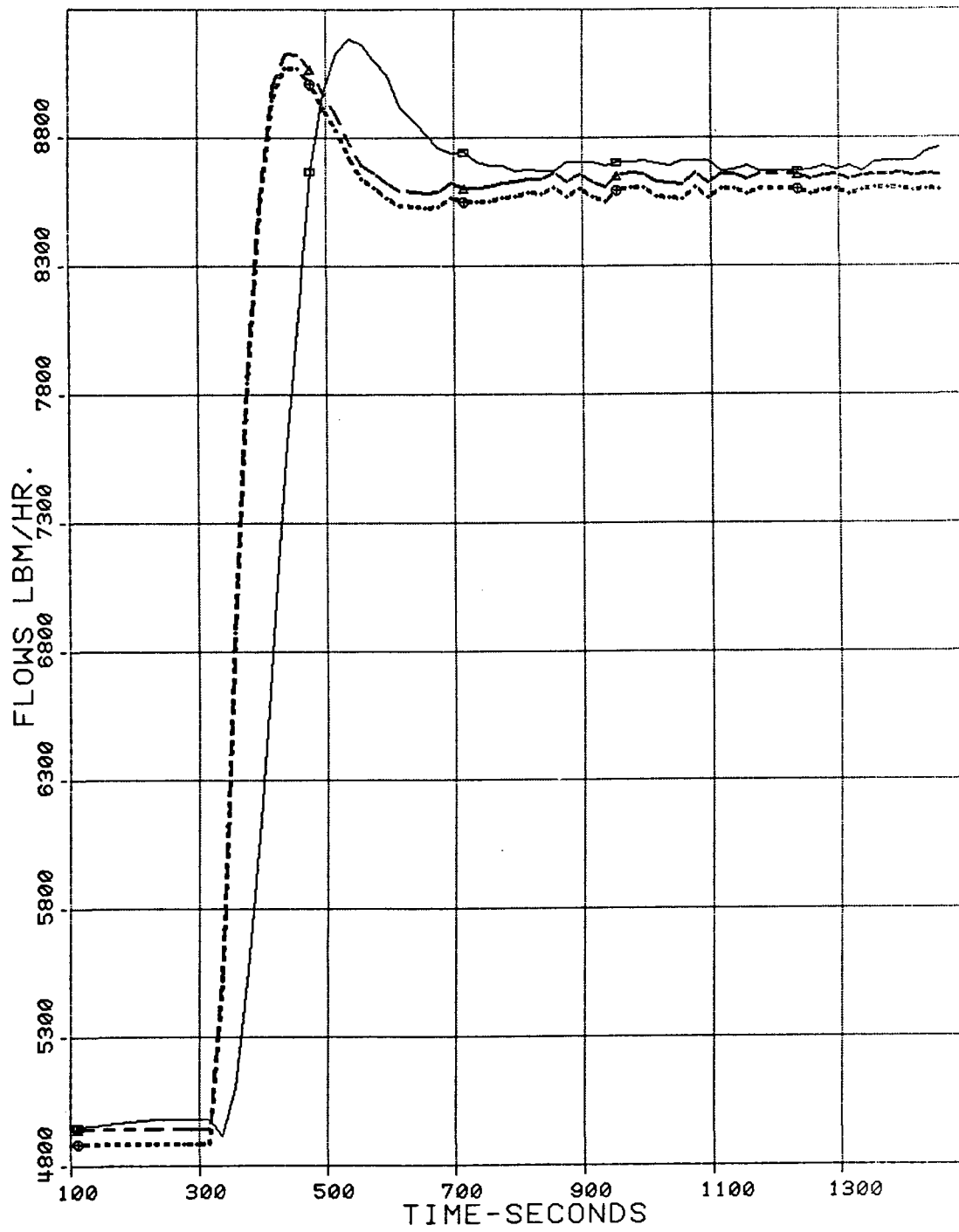
THIRD FUNCTION #17 CROSS-CIRCLE

SEARCH MODE 2

PLOT START TIME = 51300.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 60 POINTS PER FUNCTION
SCATTER PLOT HAS 30 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 14:15
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION * 9 OPEN BOX

SECOND FUNCTION *30 TRIANGLE

SEARCH MODE 2

PLOT START TIME = 51300.0

EACH 1TH POINT IS PLOTTED

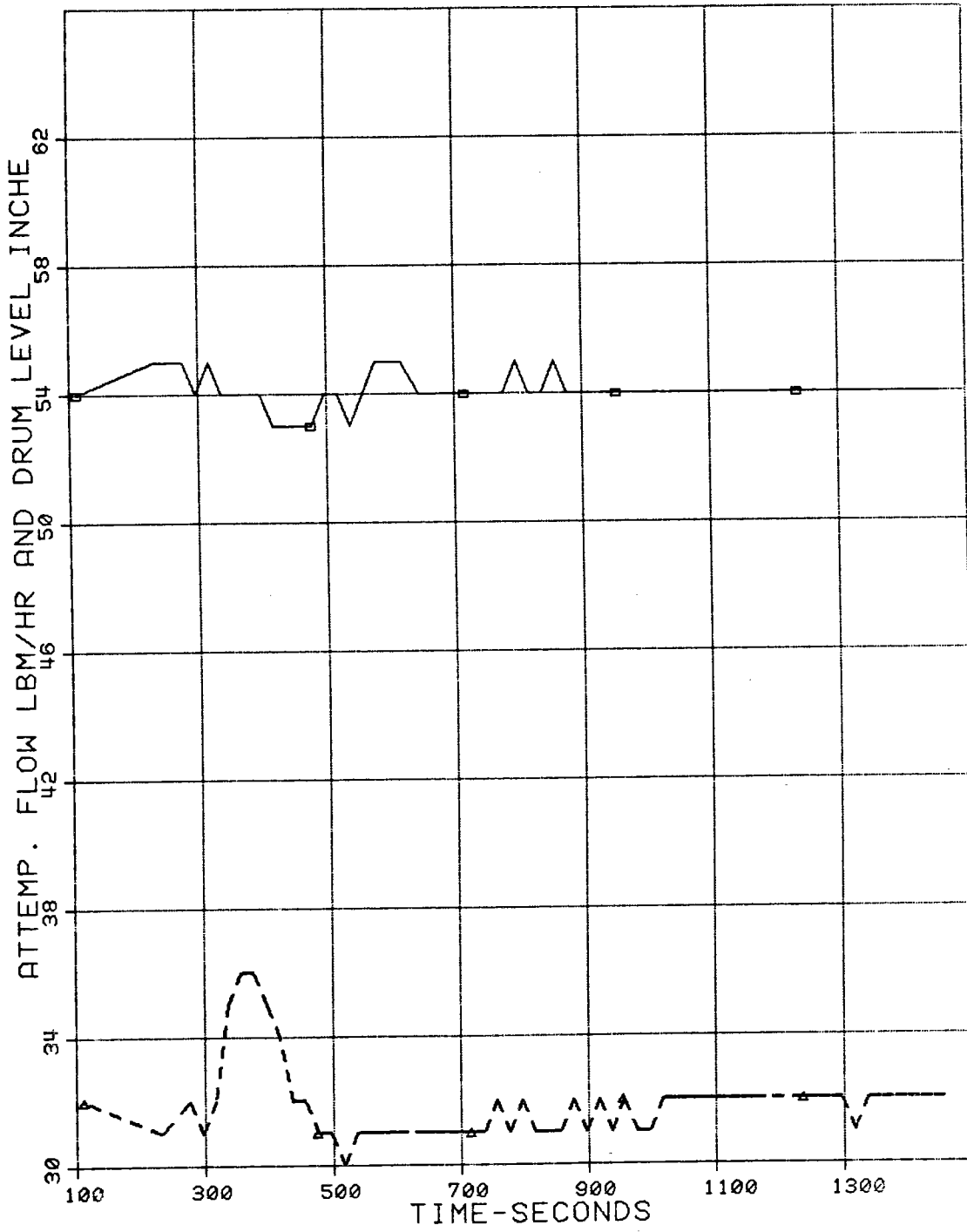
LINE PLOT HAS 60 POINTS PER FUNCTION

Test No. 18

14-

18-

Replot 4/25/77



SEARCH START
DAY #105 1977 TIME 14:55
NUMBER OF RECORDS = 4

ARGUMENT SELECTED : 1

FIRST FUNCTION # 8 OPEN BOX

SECOND FUNCTION #10 TRIANGLE

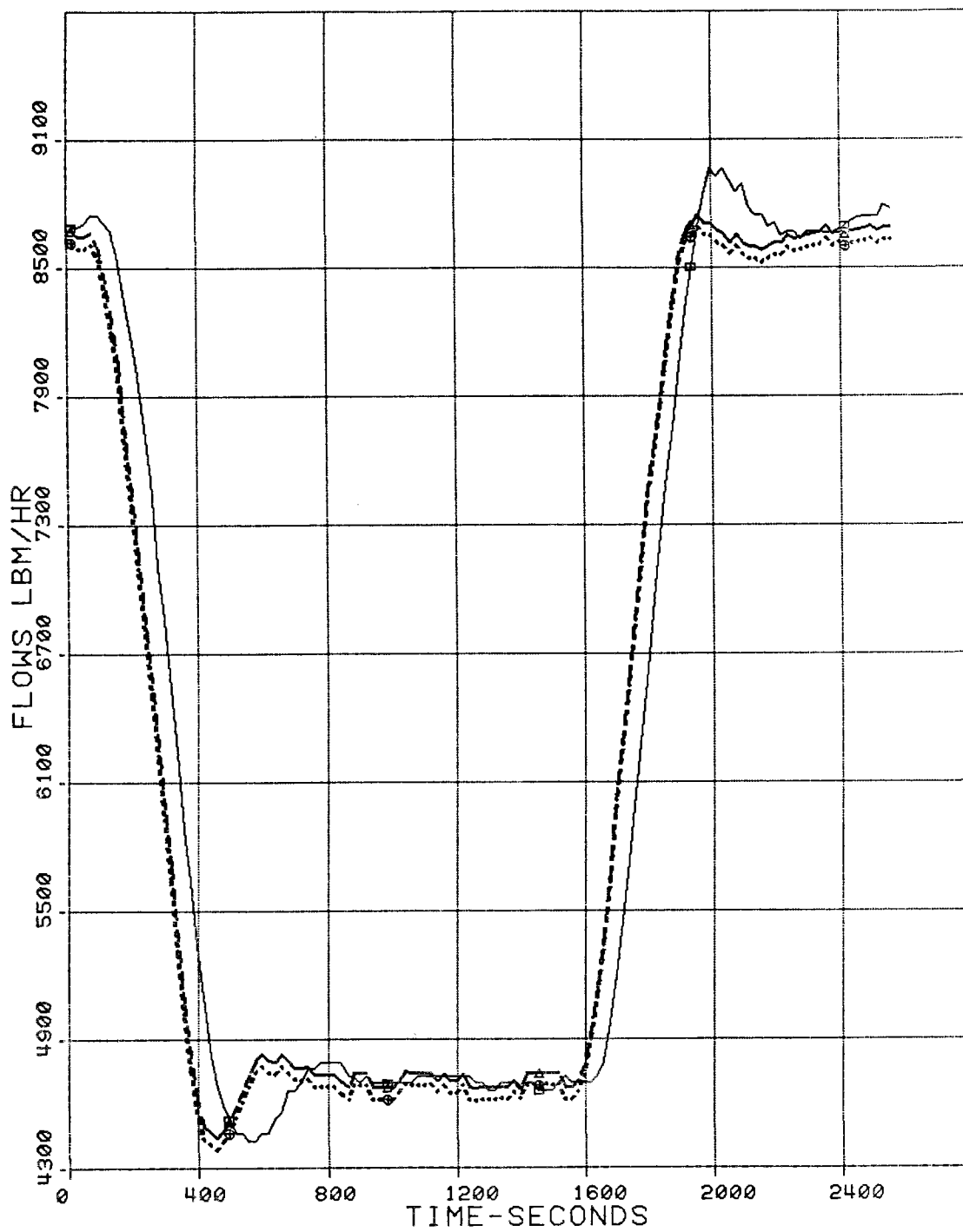
THIRD FUNCTION #17 CROSS-CIRCLE

SEARCH MODE 2

PLOT START TIME = 53700.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 14:55
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION * 9 OPEN BOX

SECOND FUNCTION *30 TRIANGLE

SEARCH MODE 2

PLOT START TIME = 53700.0

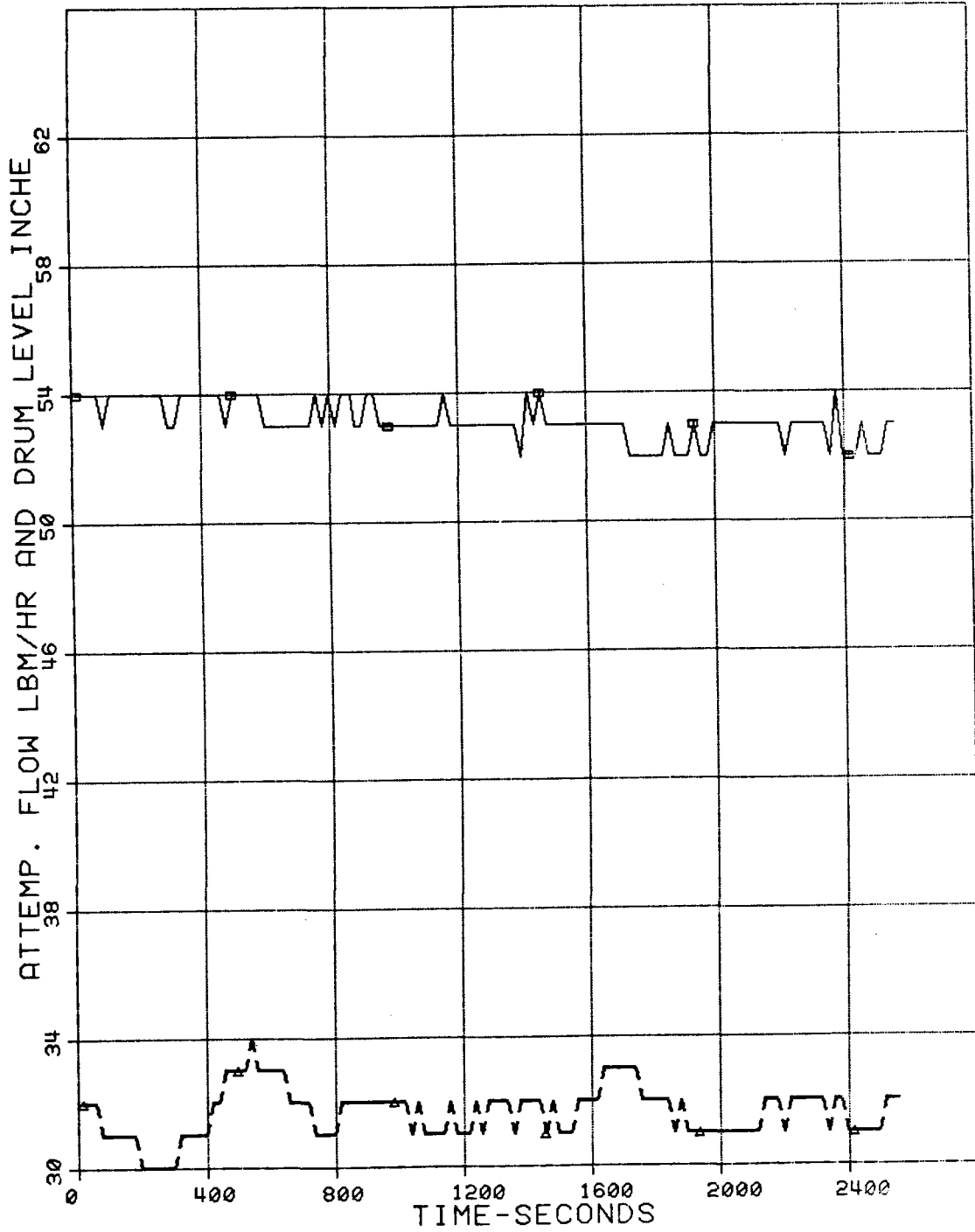
EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION

Replot 4/25/77

Test No. 18

14 -
18 -



SEARCH START
DAY #105 1977 TIME 16: 3

SEARCH STOP
TIME 16:56

SEARCH INTERVAL
TIME 0:30
NUMBER OF RECORDS = 4

ARGUMENT SELECTED : 1

FIRST FUNCTION # 8 OPEN BOX

SECOND FUNCTION #10 TRIANGLE

THIRD FUNCTION #17 CROSS-CIRCLE

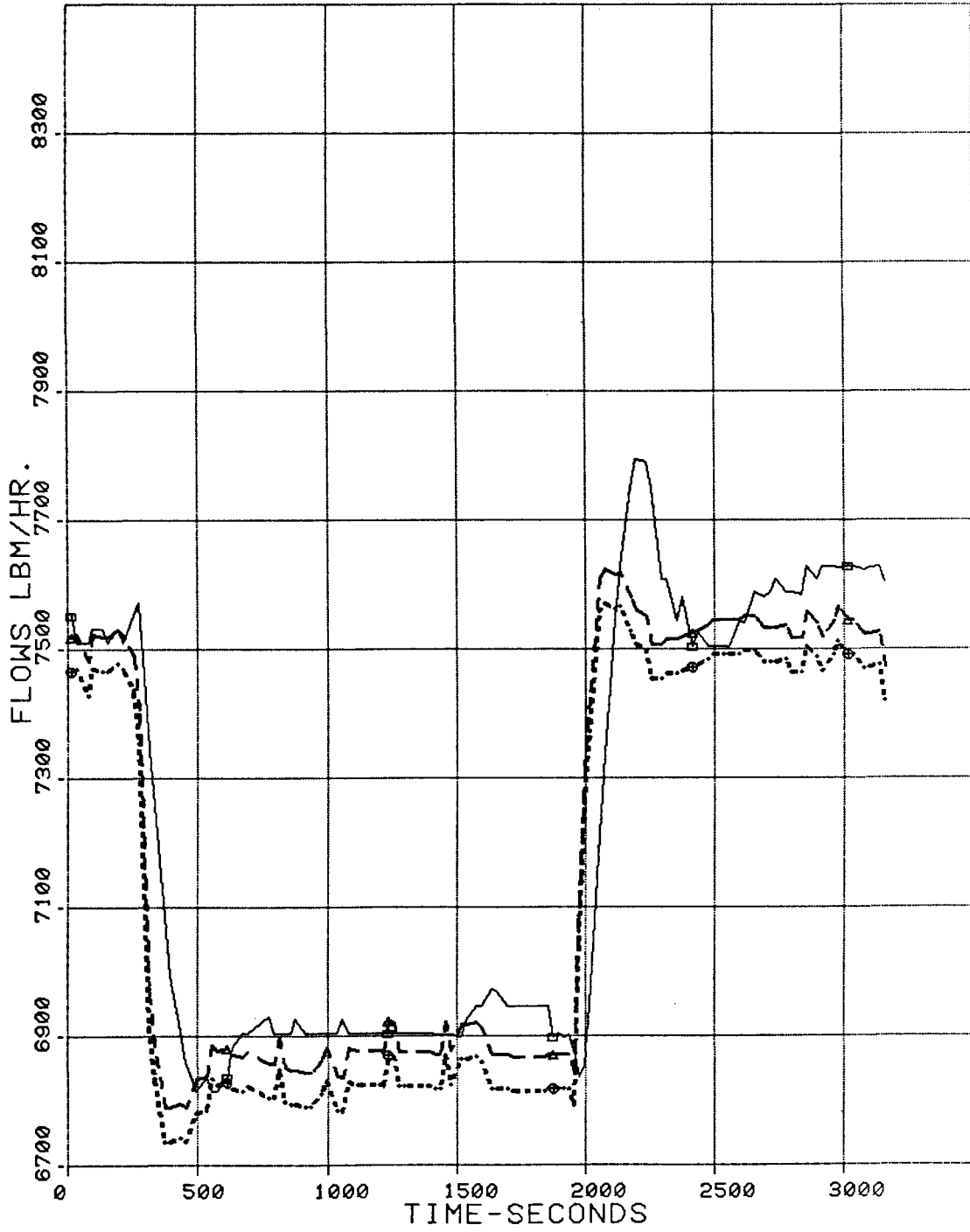
SEARCH MODE 1

PLOT START TIME = 57780.0

STOP TIME = 60960.0

INTERVAL = 30.0

LINE PLOT HAS 106 POINTS PER FUNCTION
SCATTER PLOT HAS 53 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 16: 3

SEARCH STOP
TIME 16:56

SEARCH INTERVAL
TIME 0:30
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION # 9 OPEN BOX

SECOND FUNCTION #30 TRIANGLE

SEARCH MODE 1

PLOT START TIME = 57780.0

STOP TIME = 60960.0

INTERVAL = 30.0

LINE PLOT HAS 106 POINTS PER FUNCTION
SCATTER PLOT HAS 53 POINTS PER FUNCTION

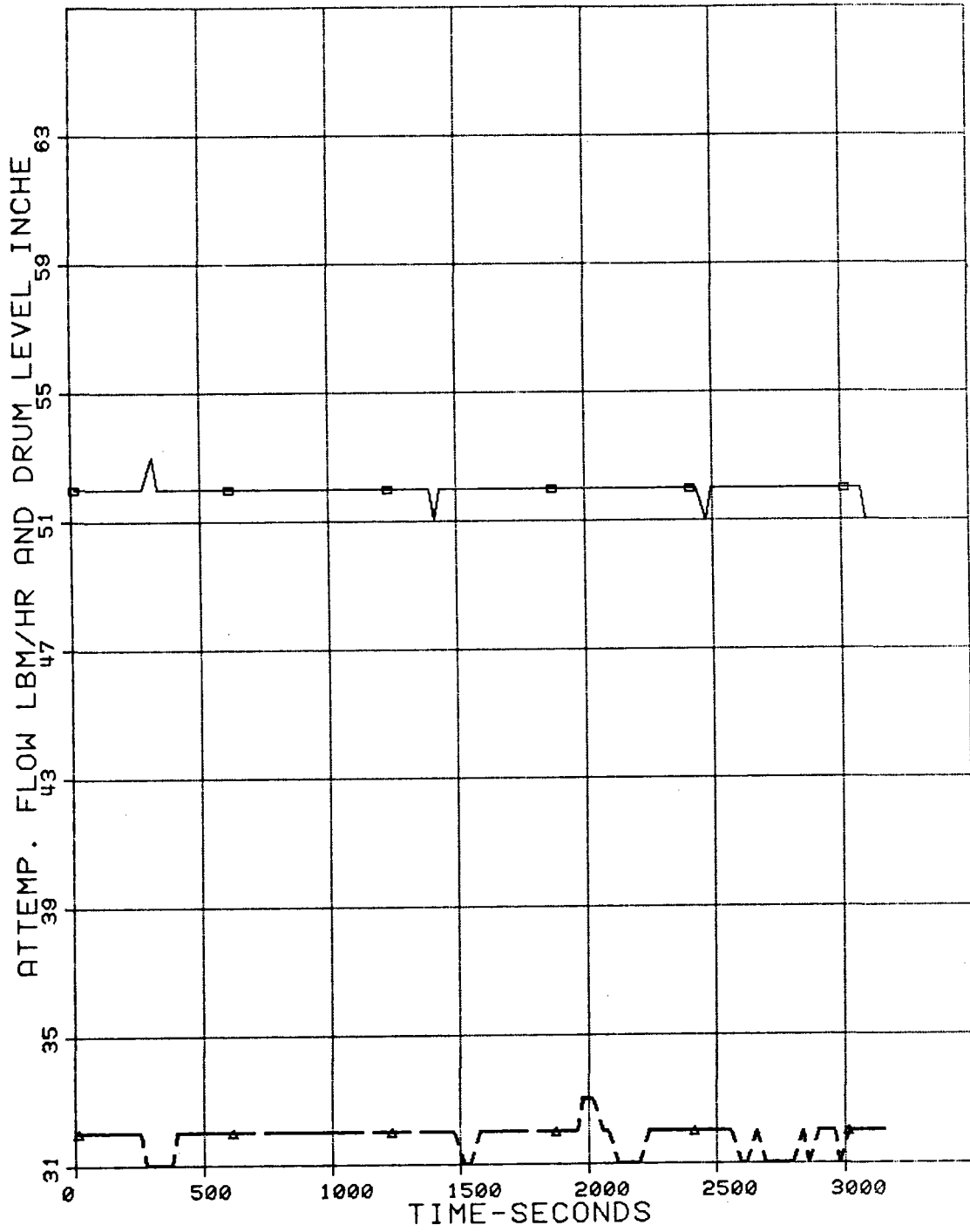
LINE PLOT HAS 106 POINTS PER FUNCTION

Replot 4/25/77

Test No. 18

14-

18-



SEARCH START
DAY #105 1977 TIME 18: 0
NUMBER OF RECORDS = 2

ARGUMENT SELECTED : 1

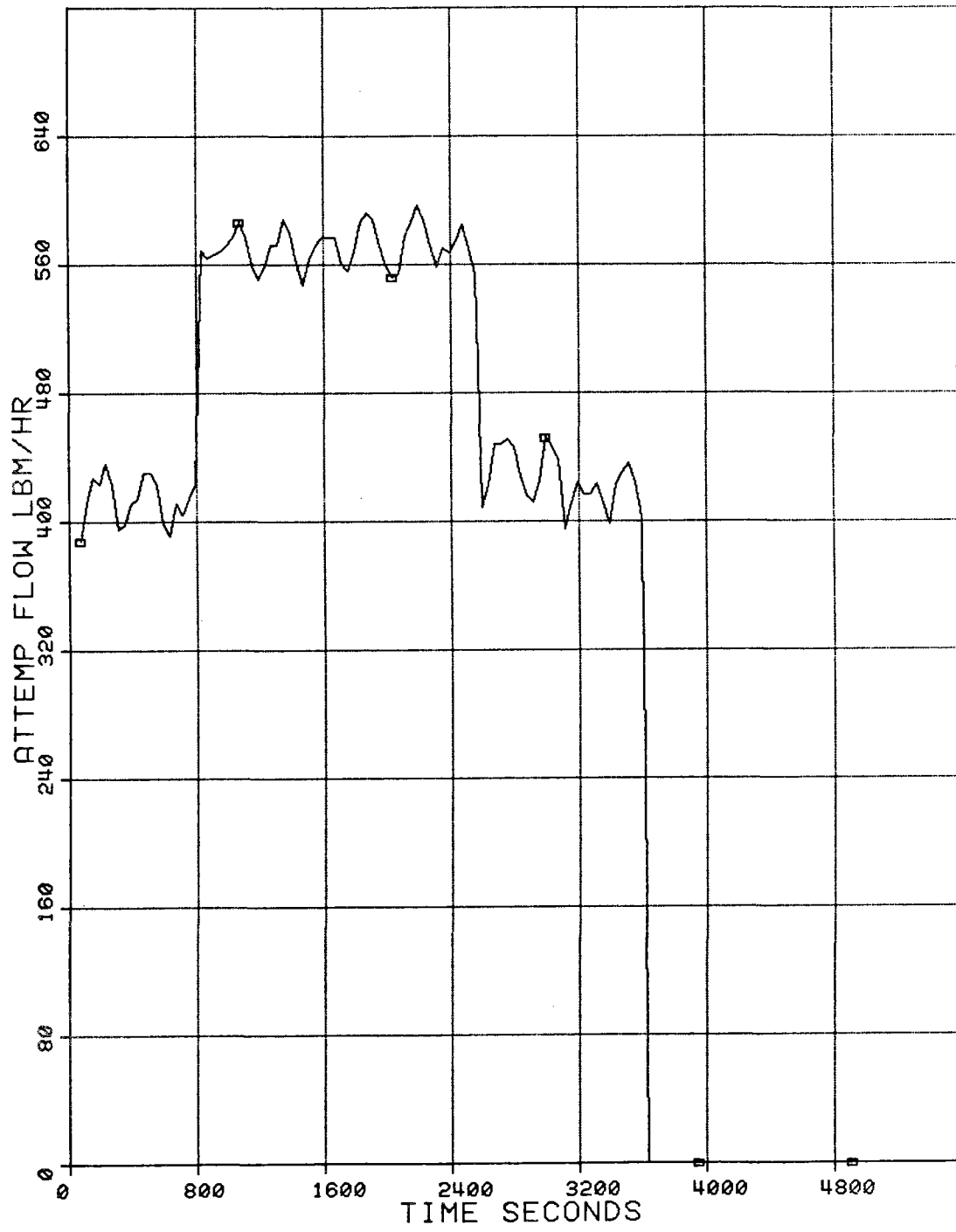
FIRST FUNCTION # 9 OPEN BOX

SEARCH MODE 2

PLOT START TIME = 64800.0

EACH 2TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 18:10
NUMBER OF RECORDS = 2

ARGUMENT SELECTED : 1

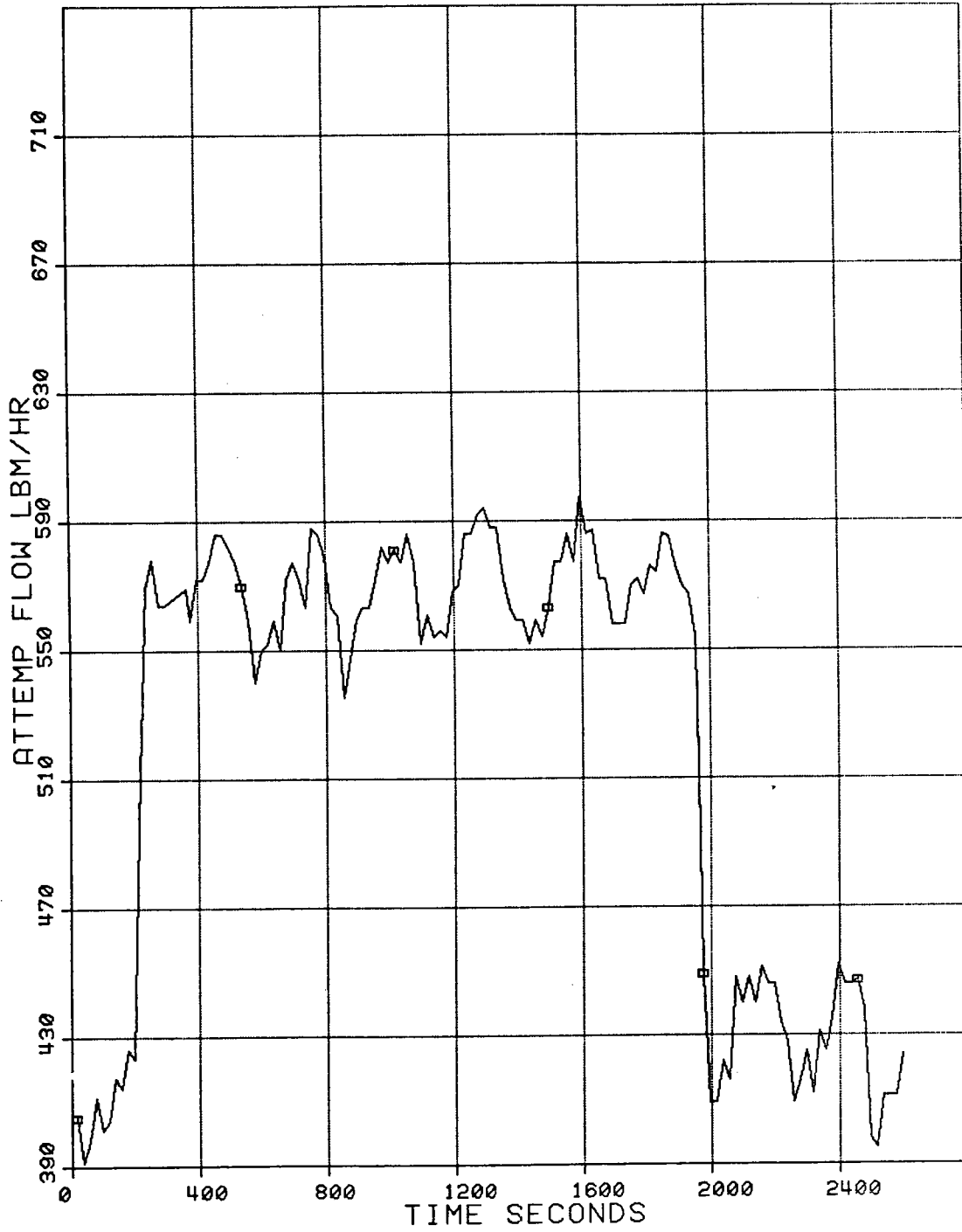
FIRST FUNCTION # 9 OPEN BOX

SEARCH MODE 2

PLOT START TIME = 65400.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 18:10
NUMBER OF RECORDS = 2

ARGUMENT SELECTED : 1

FIRST FUNCTION • 9 OPEN BOX

SEARCH MODE 2

PLOT START TIME = 65400.0

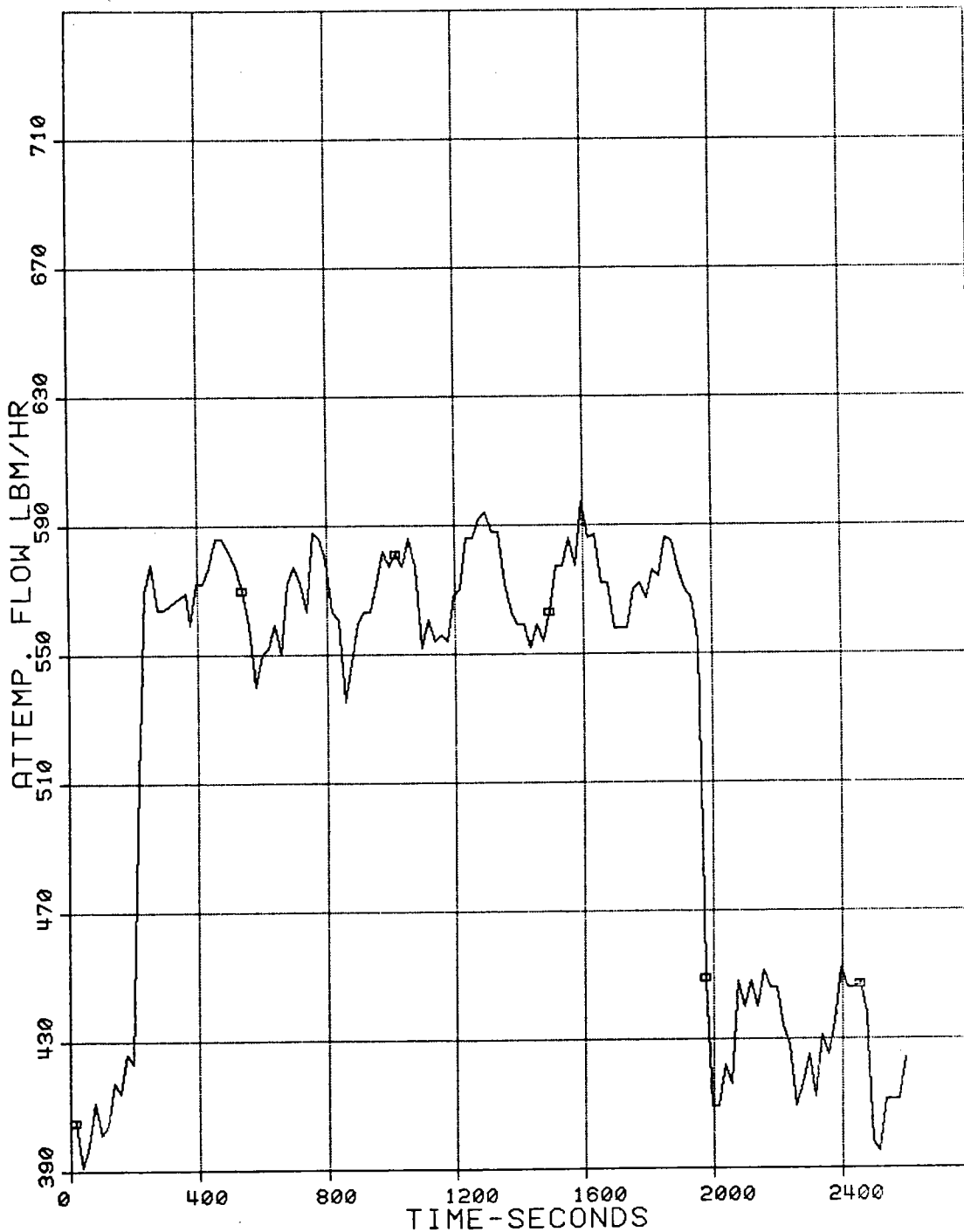
EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION

Replot 4/25/77

Test No. 18

14-



SEARCH START
DAY #105 1977 TIME 18:10
NUMBER OF RECORDS = 4

ARGUMENT SELECTED : 1

FIRST FUNCTION # 8 OPEN BOX

SECOND FUNCTION #10 TRIANGLE

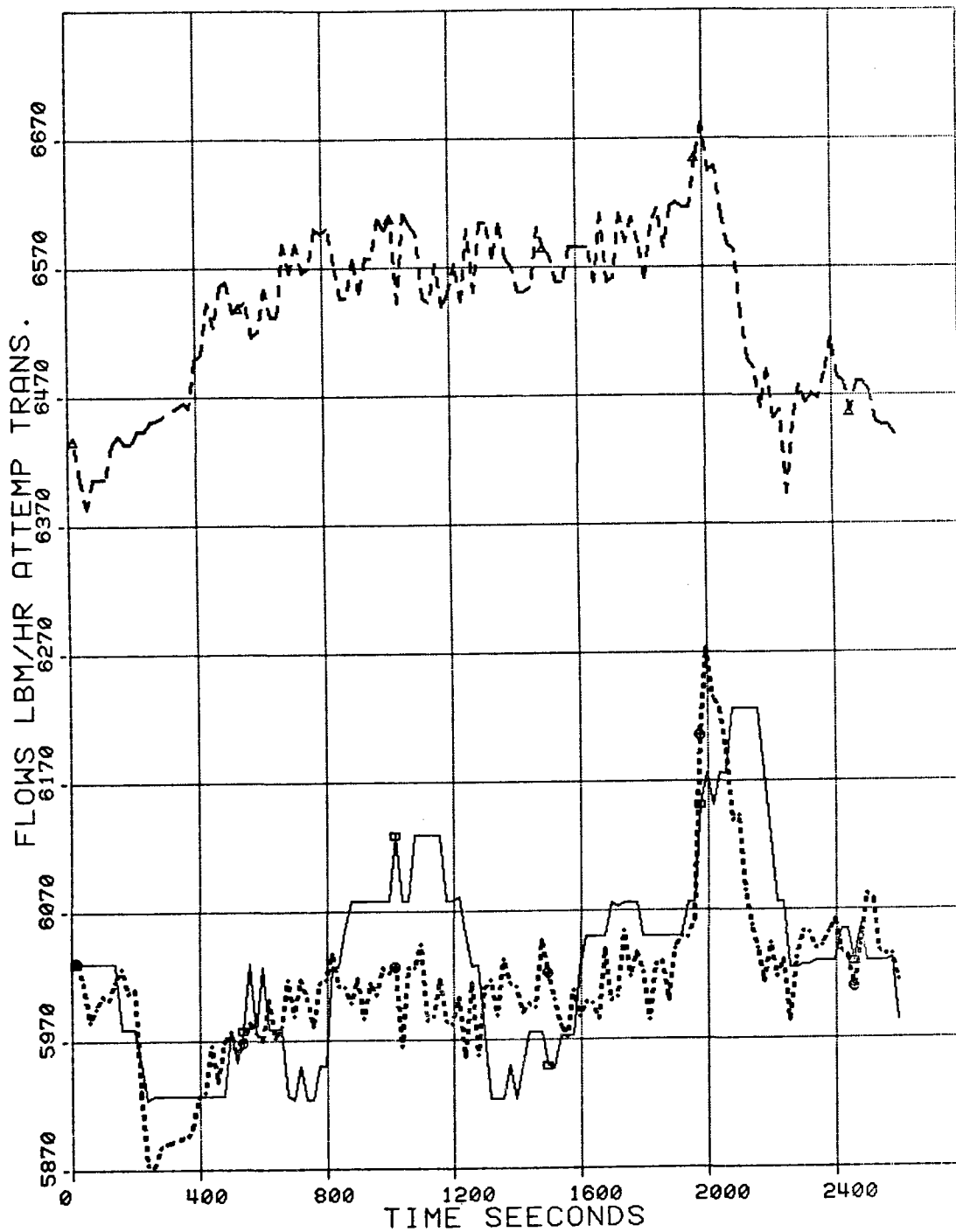
THIRD FUNCTION #17 CROSS-CIRCLE

SEARCH MODE 2

PLOT START TIME = 65400.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



SEARCH START
DAY *105 1977 TIME 18:10
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION *30 OPEN BOX

SECOND FUNCTION *11 TRIANGLE

SEARCH MODE 2

PLOT START TIME = 65400.0

EACH 1TH POINT IS PLOTTED

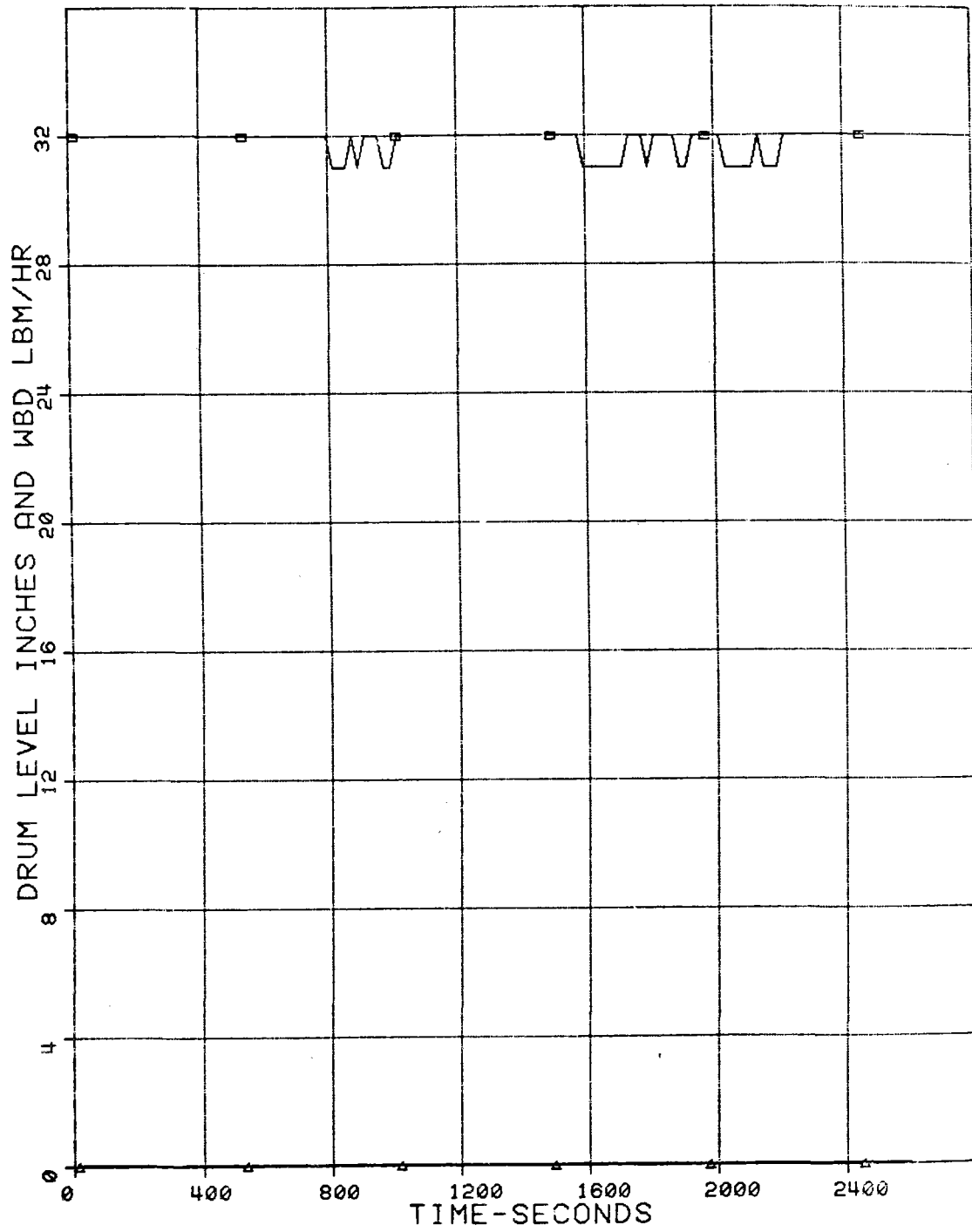
LINE PLOT HAS 128 POINTS PER FUNCTION

Replot 4/25/77

Test No. 18

18-

14-



PAGE 15
PRESSURES, PLOTS

SEARCH START
DAY #105 1977 TIME 10: 5
NUMBER OF RECORDS = 5

ARGUMENT SELECTED : 1

FIRST FUNCTION #18 OPEN BOX

SECOND FUNCTION #19 TRIANGLE

THIRD FUNCTION #20 CROSS-CIRCLE

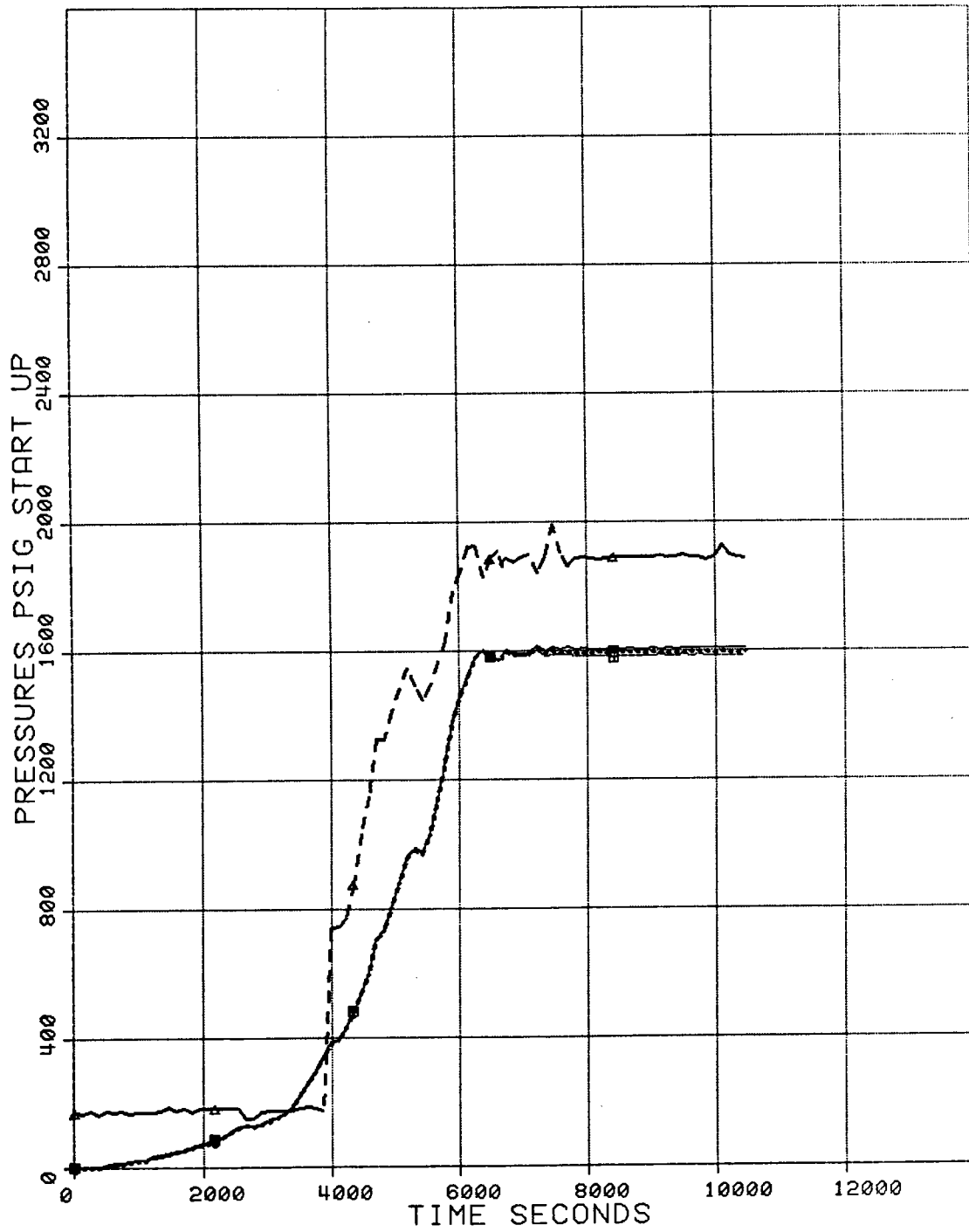
FOURTH FUNCTION #21 CROSS-BOX

SEARCH MODE 2

PLOT START TIME = 36300.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 90 POINTS PER FUNCTION
SCATTER PLOT HAS 45 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 14:15
NUMBER OF RECORDS = 5

ARGUMENT SELECTED : 1

FIRST FUNCTION #18 OPEN BOX

SECOND FUNCTION #19 TRIANGLE

THIRD FUNCTION #20 CROSS-CIRCLE

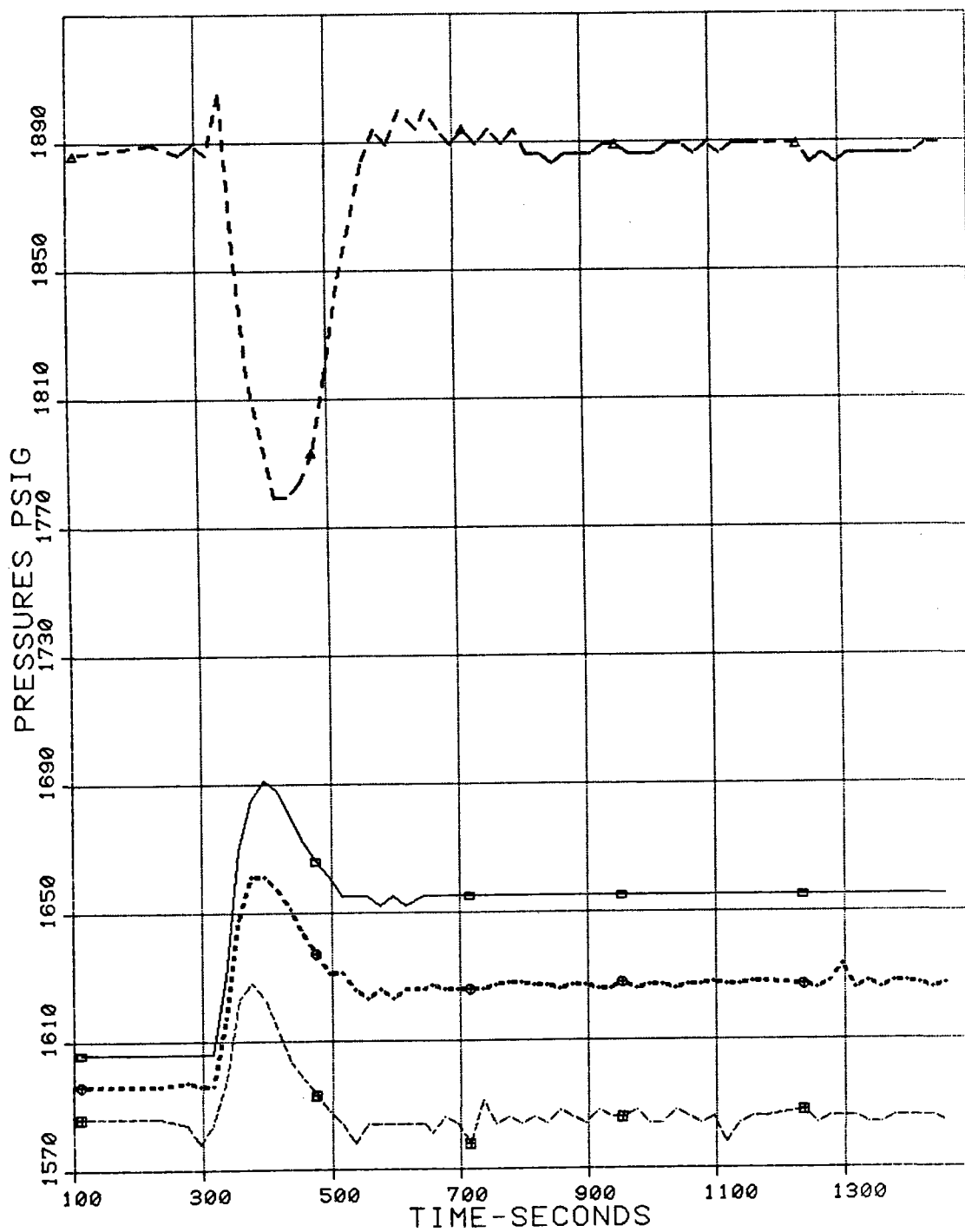
FOURTH FUNCTION #21 CROSS-BOX

SEARCH MODE 2

PLOT START TIME = 51300.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 60 POINTS PER FUNCTION
SCATTER PLOT HAS 30 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 14:55
NUMBER OF RECORDS = 5

ARGUMENT SELECTED : 1

FIRST FUNCTION #18 OPEN BOX

SECOND FUNCTION #19 TRIANGLE

THIRD FUNCTION #20 CROSS-CIRCLE

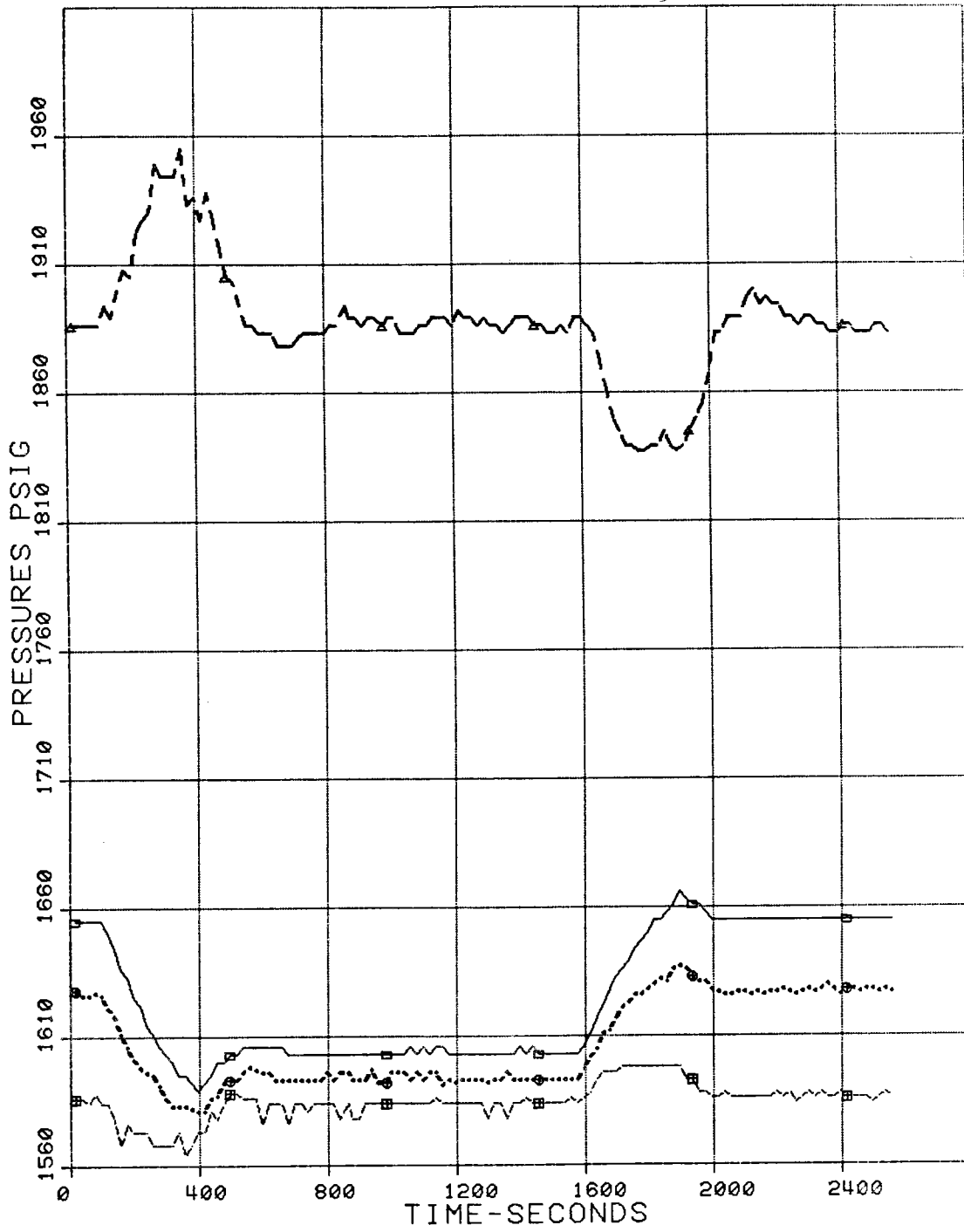
FOURTH FUNCTION #21 CROSS-BOX

SEARCH MODE 2

PLOT START TIME = 53700.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 16: 3

SEARCH STOP
TIME 16:56

SEARCH INTERVAL
TIME 0:30
NUMBER OF RECORDS = 5

ARGUMENT SELECTED : 1

FIRST FUNCTION #18 OPEN BOX

SECOND FUNCTION #19 TRIANGLE

THIRD FUNCTION #20 CROSS-CIRCLE

FOURTH FUNCTION #21 CROSS-BOX

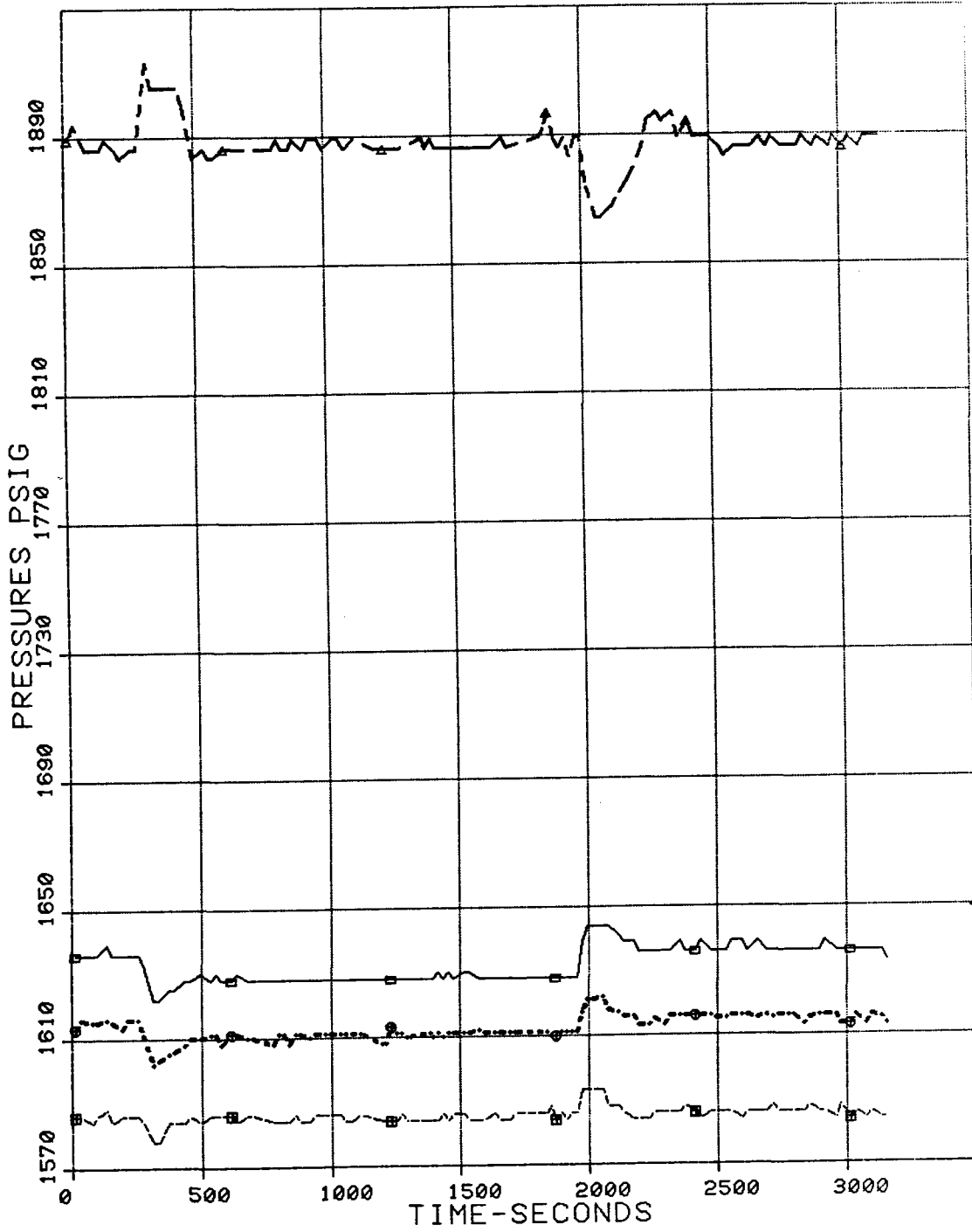
SEARCH MODE 1

PLOT START TIME = 57780.0

STOP TIME = 60960.0

INTERVAL = 30.0

LINE PLOT HAS 106 POINTS PER FUNCTION
SCATTER PLOT HAS 53 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 18:10
NUMBER OF RECORDS = 5

ARGUMENT SELECTED : 1

FIRST FUNCTION #18 OPEN BOX

SECOND FUNCTION #19 TRIANGLE

THIRD FUNCTION #20 CROSS-CIRCLE

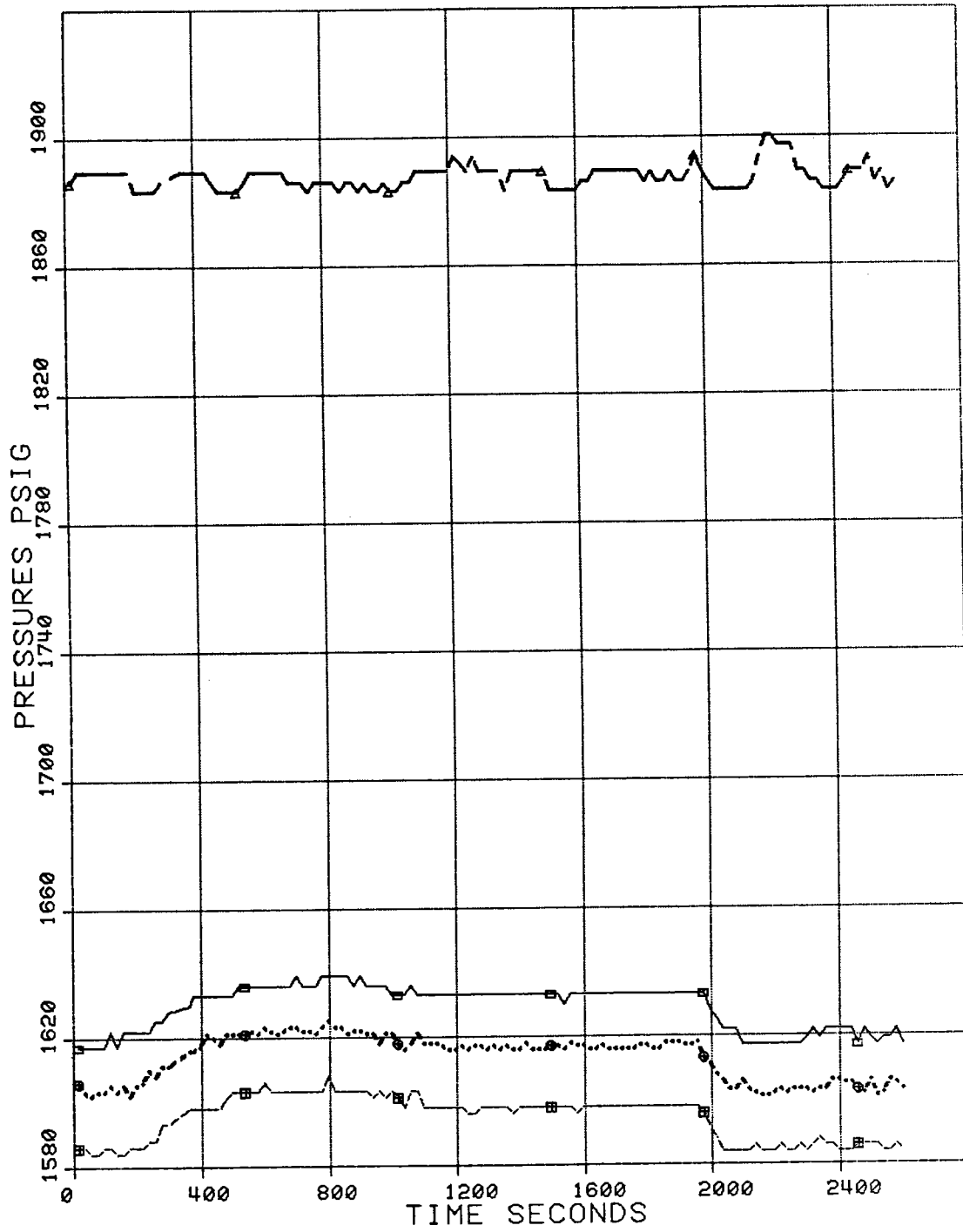
FOURTH FUNCTION #21 CROSS-BOX

SEARCH MODE 2

PLOT START TIME = 65400.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



PAGE 16
FLUIDS TEMPERATURES, PLOTS

SEARCH START
DAY #105 1977 TIME 10:10
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #22 OPEN BOX

SECOND FUNCTION #24 TRIANGLE

THIRD FUNCTION #26 CROSS-CIRCLE

FOURTH FUNCTION #27 CROSS-BOX

FIFTH FUNCTION #28 CROSS-DIAMOND

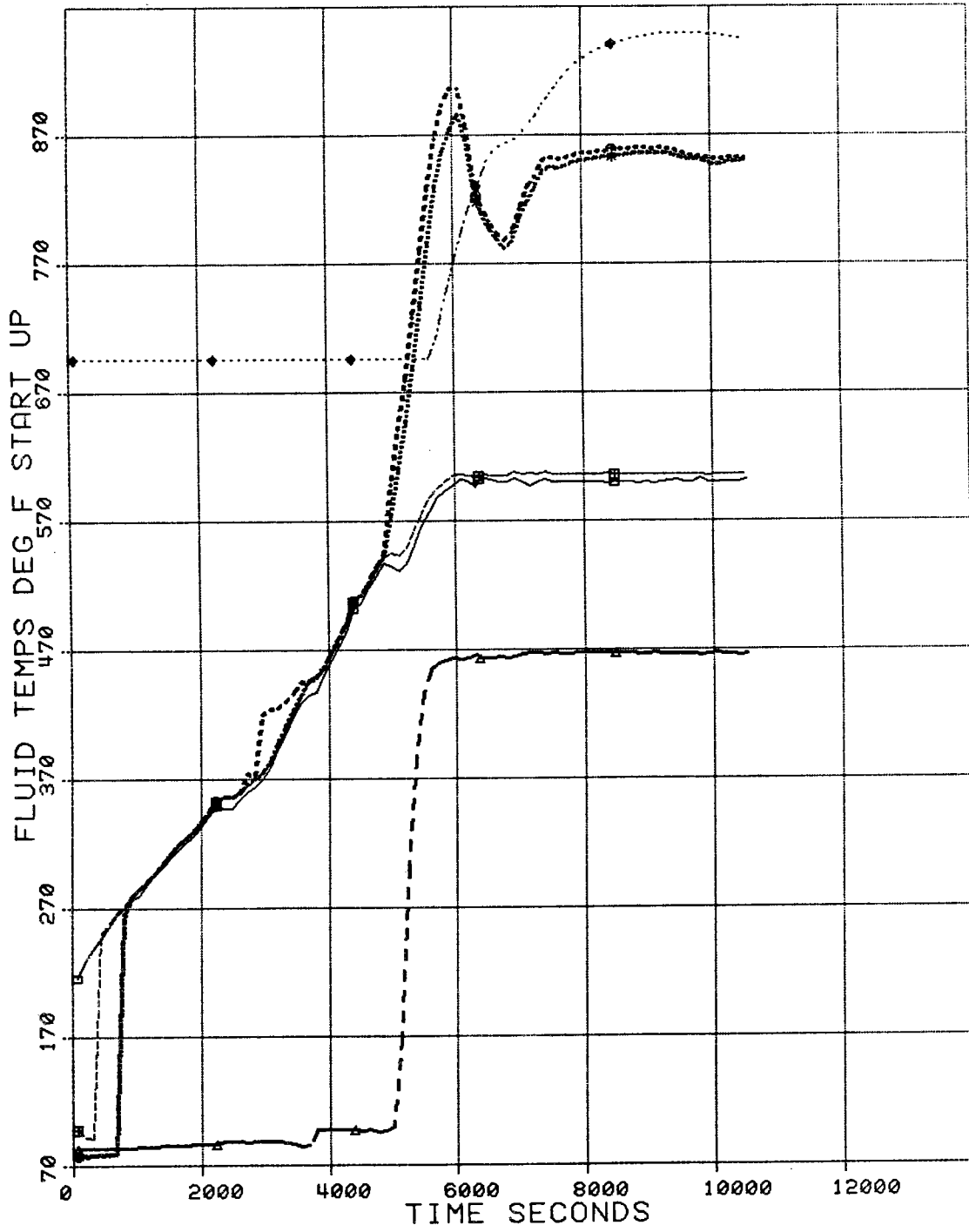
SIXTH FUNCTION #29 ASTERISK

SEARCH MODE 2

PLOT START TIME = 36600.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 90 POINTS PER FUNCTION
SCATTER PLOT HAS 45 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 14:15
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #22 OPEN BOX

SECOND FUNCTION #24 TRIANGLE

THIRD FUNCTION #26 CROSS-CIRCLE

FOURTH FUNCTION #27 CROSS-BOX

FIFTH FUNCTION #28 CROSS-DIAMOND

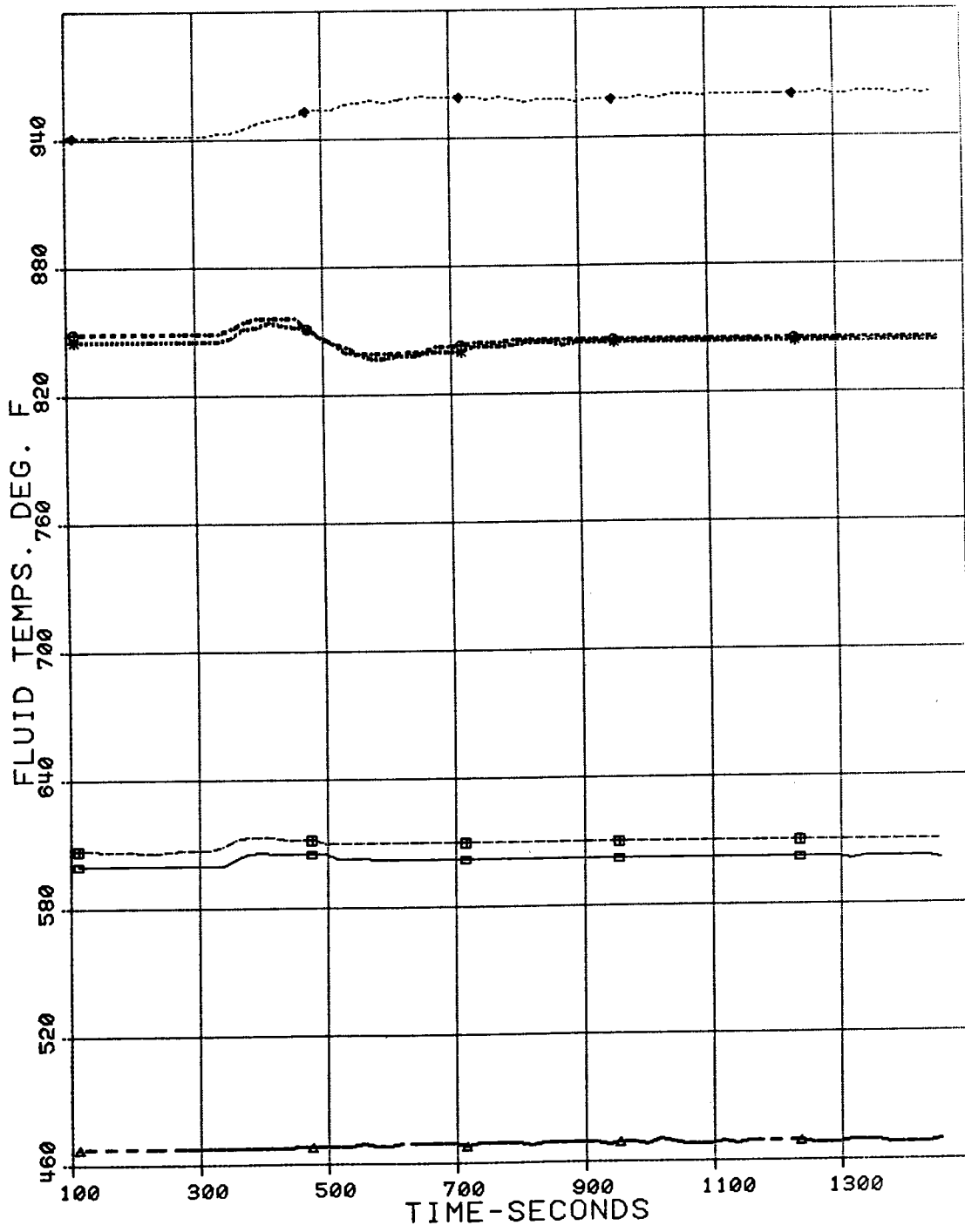
SIXTH FUNCTION #29 ASTERISK

SEARCH MODE 2

PLOT START TIME = 51300.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 60 POINTS PER FUNCTION
SCATTER PLOT HAS 30 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 14:55
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #22 OPEN BOX

SECOND FUNCTION #24 TRIANGLE

THIRD FUNCTION #26 CROSS-CIRCLE

FOURTH FUNCTION #27 CROSS-BOX

FIFTH FUNCTION #28 CROSS-DIAMOND

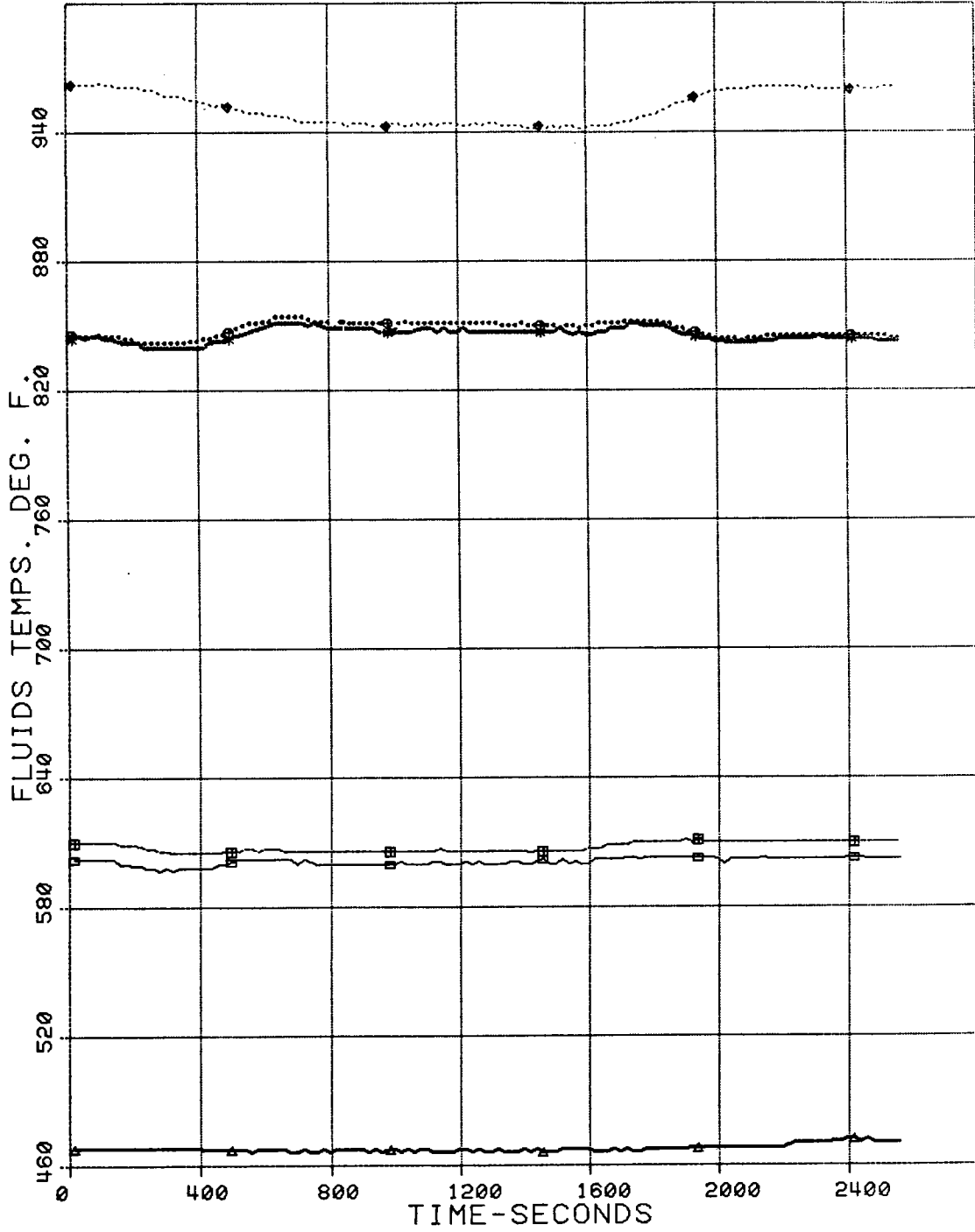
SIXTH FUNCTION #29 ASTERISK

SEARCH MODE 2

PLOT START TIME = 53700.0

EACH 1TH POINT IS PLOTTED

~~LINE~~ PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 16: 3

SEARCH STOP
TIME 16:56

SEARCH INTERVAL
TIME 0:30
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #22 OPEN BOX

SECOND FUNCTION #24 TRIANGLE

THIRD FUNCTION #26 CROSS-CIRCLE

FOURTH FUNCTION #27 CROSS-BOX

FIFTH FUNCTION #28 CROSS-DIAMOND

SIXTH FUNCTION #29 ASTERISK

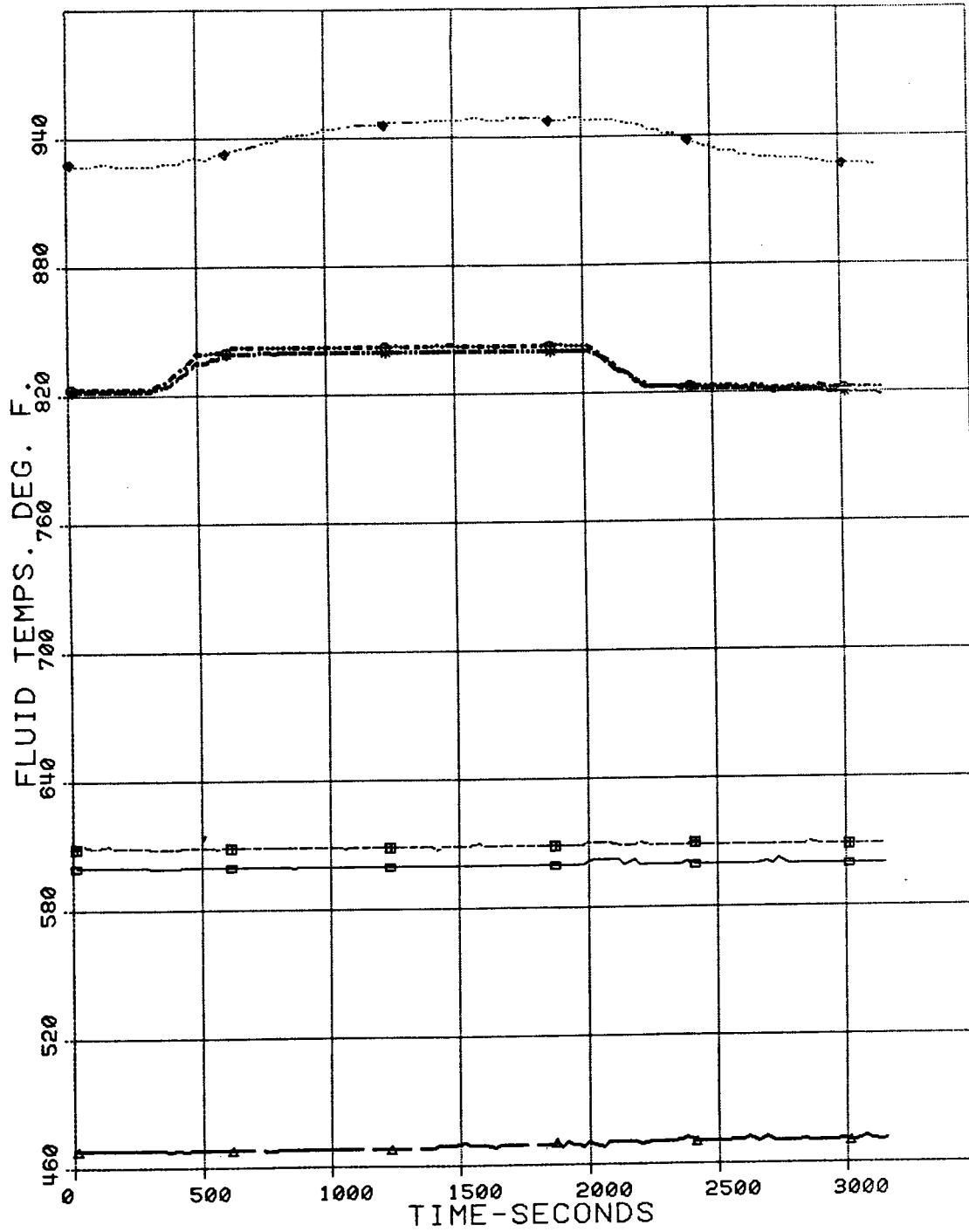
SEARCH MODE 1

PLOT START TIME = 57780.0

STOP TIME = 60960.0

INTERVAL = 30.0

LINE PLOT HAS 106 POINTS PER FUNCTION
SCATTER PLOT HAS 53 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 18:10
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #22 OPEN BOX

SECOND FUNCTION #24 TRIANGLE

THIRD FUNCTION #26 CROSS-CIRCLE

FOURTH FUNCTION #27 CROSS-BOX

FIFTH FUNCTION #28 CROSS-DIAMOND

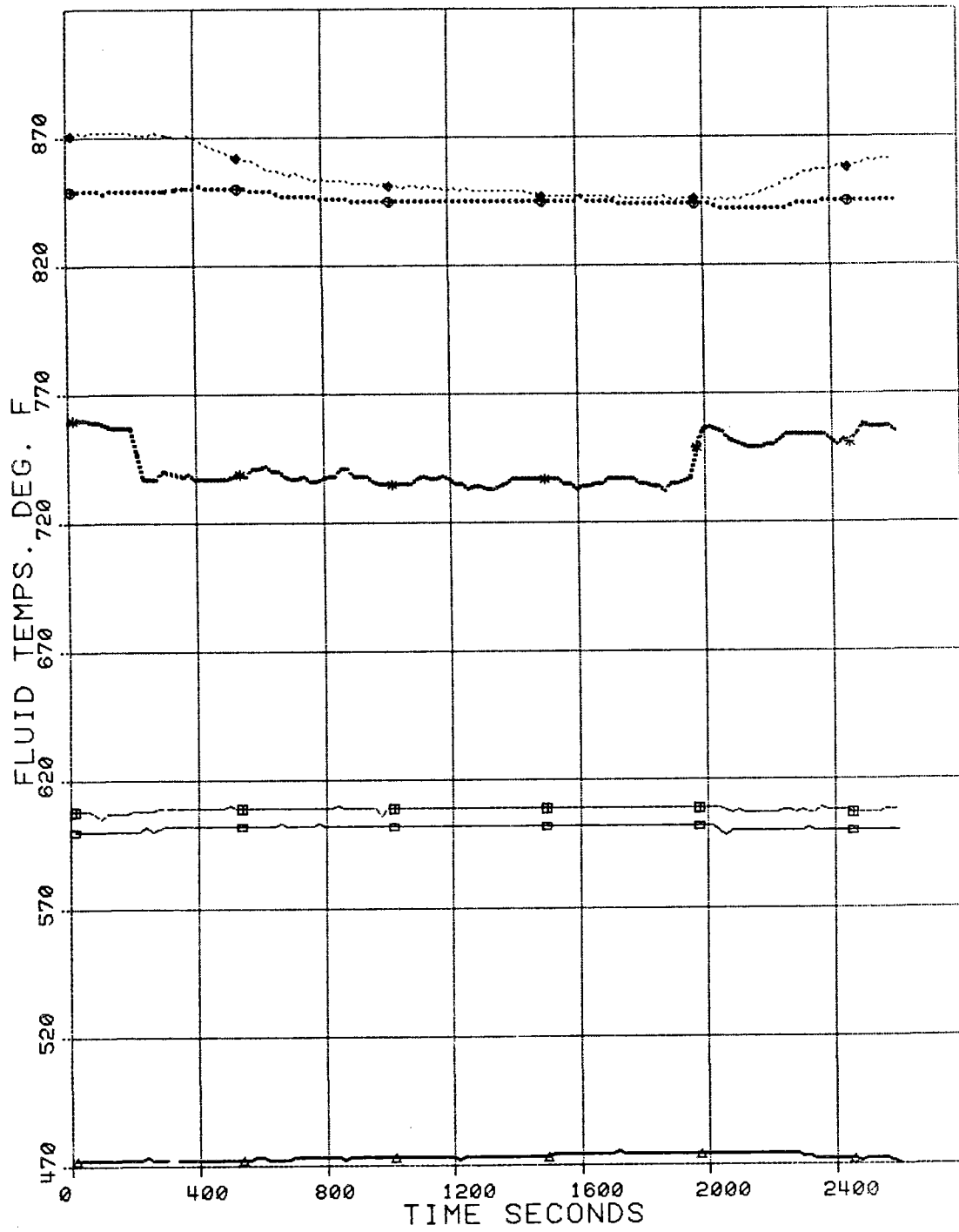
SIXTH FUNCTION #29 ASTERISK

SEARCH MODE 2

PLOT START TIME = 65400.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



METAL TEMPERATURES, PLOTS

SEARCH START
DAY #105 1977 TIME 10: 5
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #12 OPEN BOX

SECOND FUNCTION #13 TRIANGLE

THIRD FUNCTION #14 CROSS-CIRCLE

FOURTH FUNCTION #23 CROSS-BOX

FIFTH FUNCTION #32 CROSS-DIAMOND

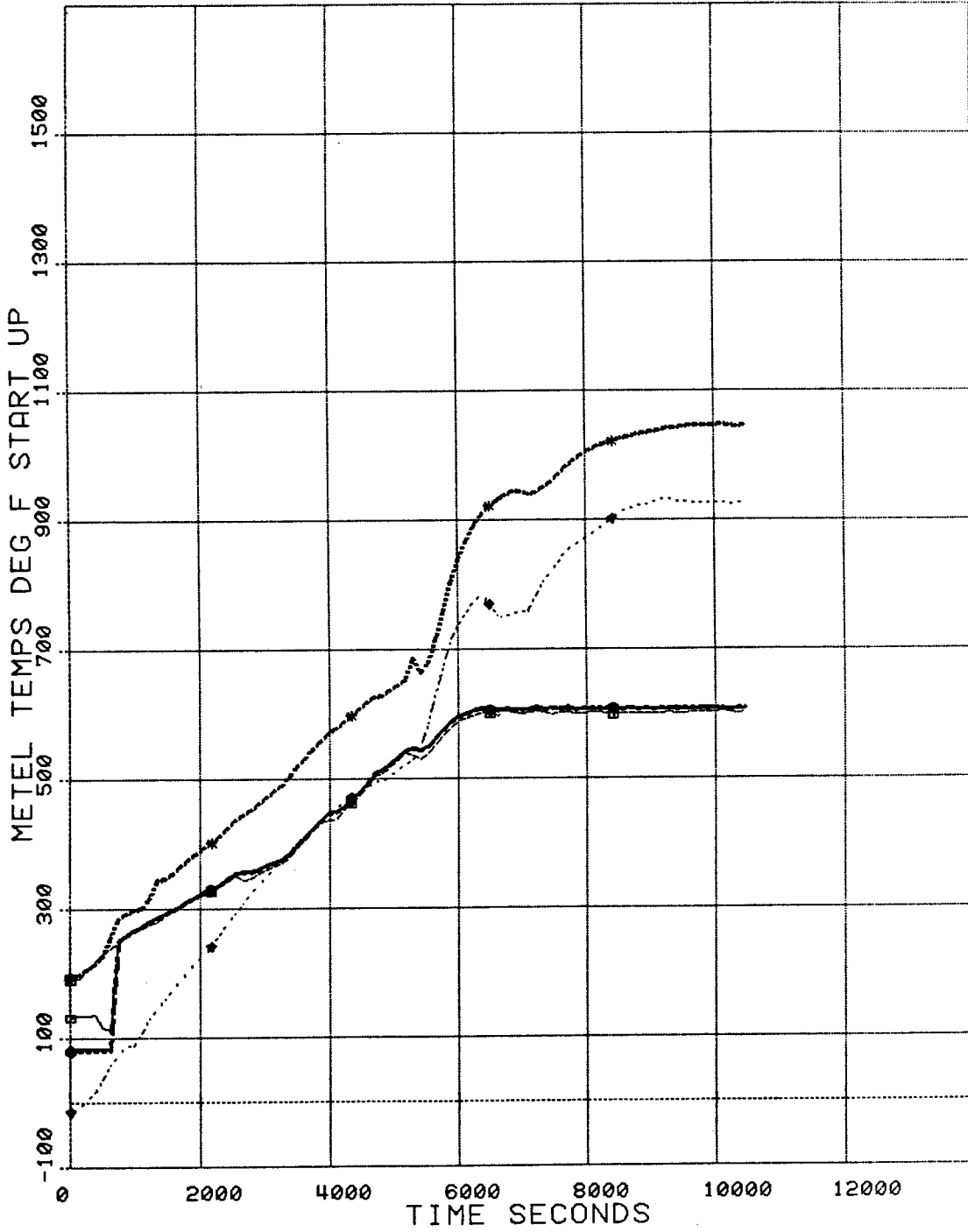
SIXTH FUNCTION #33 ASTERISK

SEARCH MODE 2

PLOT START TIME = 36300.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 90 POINTS PER FUNCTION
SCATTER PLOT HAS 45 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 14:15
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #12 OPEN BOX

SECOND FUNCTION #13 TRIANGLE

THIRD FUNCTION #14 CROSS-CIRCLE

FOURTH FUNCTION #23 CROSS-BOX

FIFTH FUNCTION #32 CROSS-DIAMOND

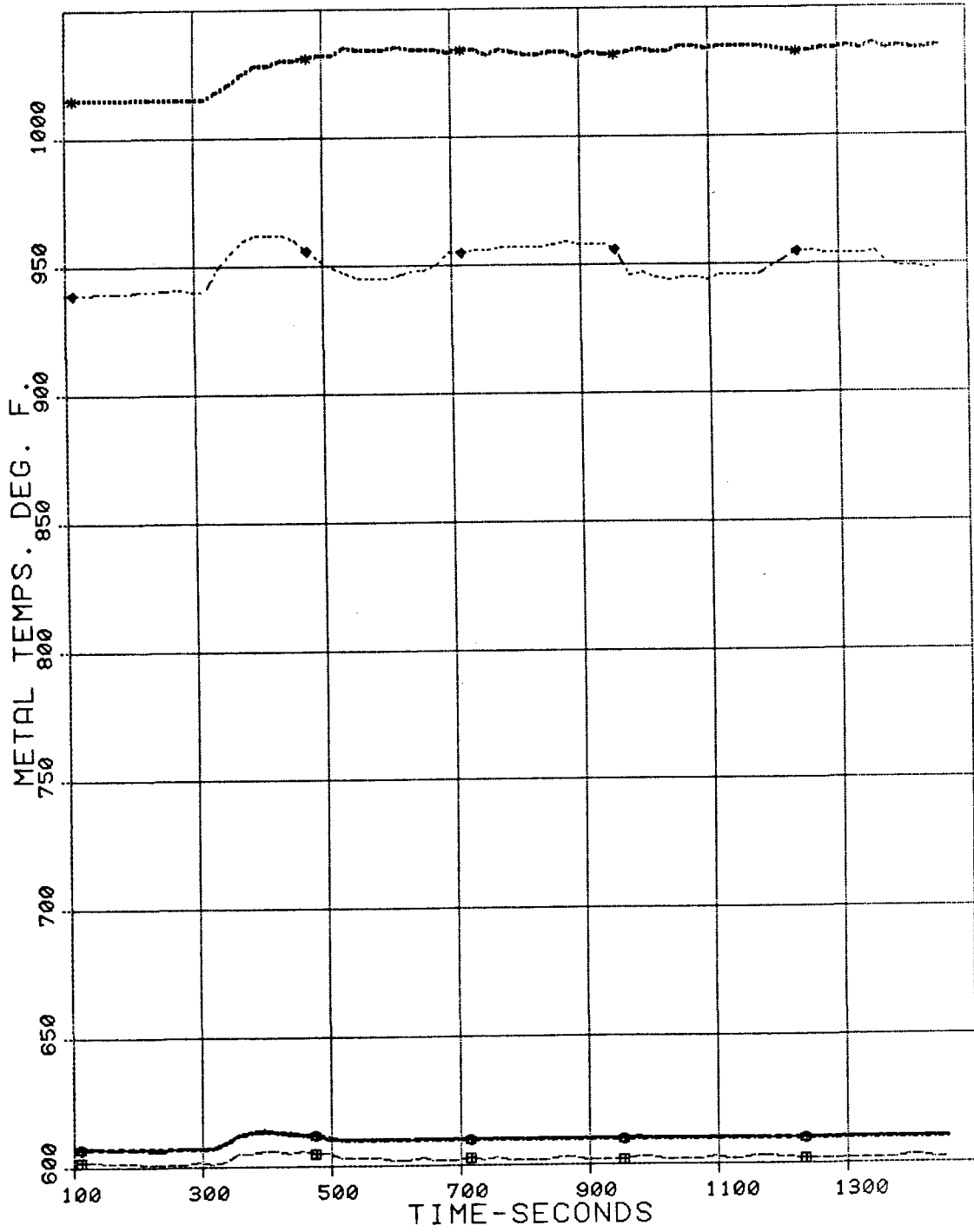
SIXTH FUNCTION #33 ASTERISK

SEARCH MODE 2

PLOT START TIME = 51300.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 60 POINTS PER FUNCTION
SCATTER PLOT HAS 30 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 14:55
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #12 OPEN BOX

SECOND FUNCTION #13 TRIANGLE

THIRD FUNCTION #14 CROSS-CIRCLE

FOURTH FUNCTION #23 CROSS-BOX

FIFTH FUNCTION #32 CROSS-DIAMOND

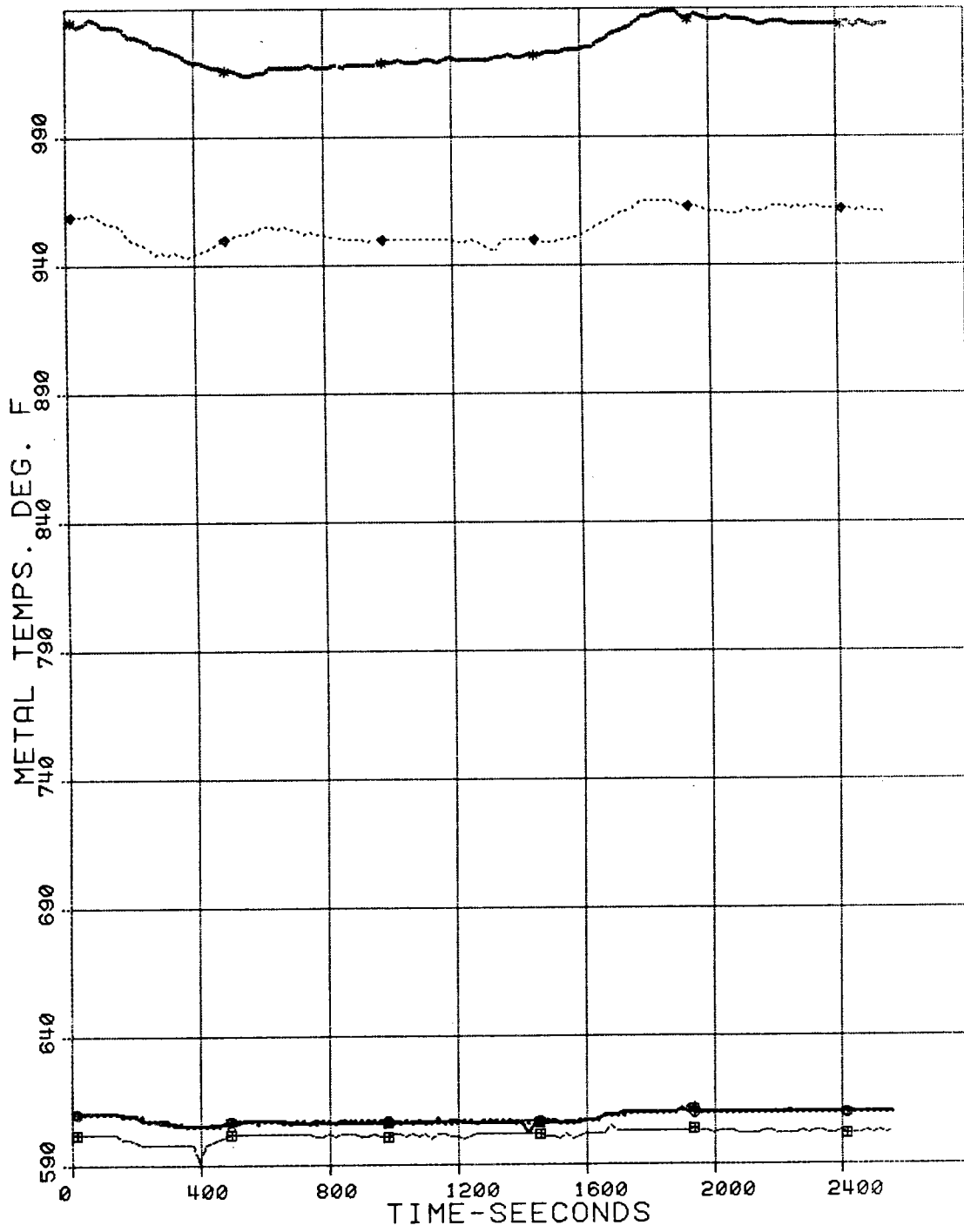
SIXTH FUNCTION #33 ASTERISK

SEARCH MODE 2

PLOT START TIME = 53700.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 16: 3

SEARCH STOP
TIME 16:56

SEARCH INTERVAL
TIME 0:30
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #12 OPEN BOX

SECOND FUNCTION #13 TRIANGLE

THIRD FUNCTION #14 CROSS-CIRCLE

FOURTH FUNCTION #23 CROSS-BOX

FIFTH FUNCTION #32 CROSS-DIAMOND

SIXTH FUNCTION #33 ASTERISK

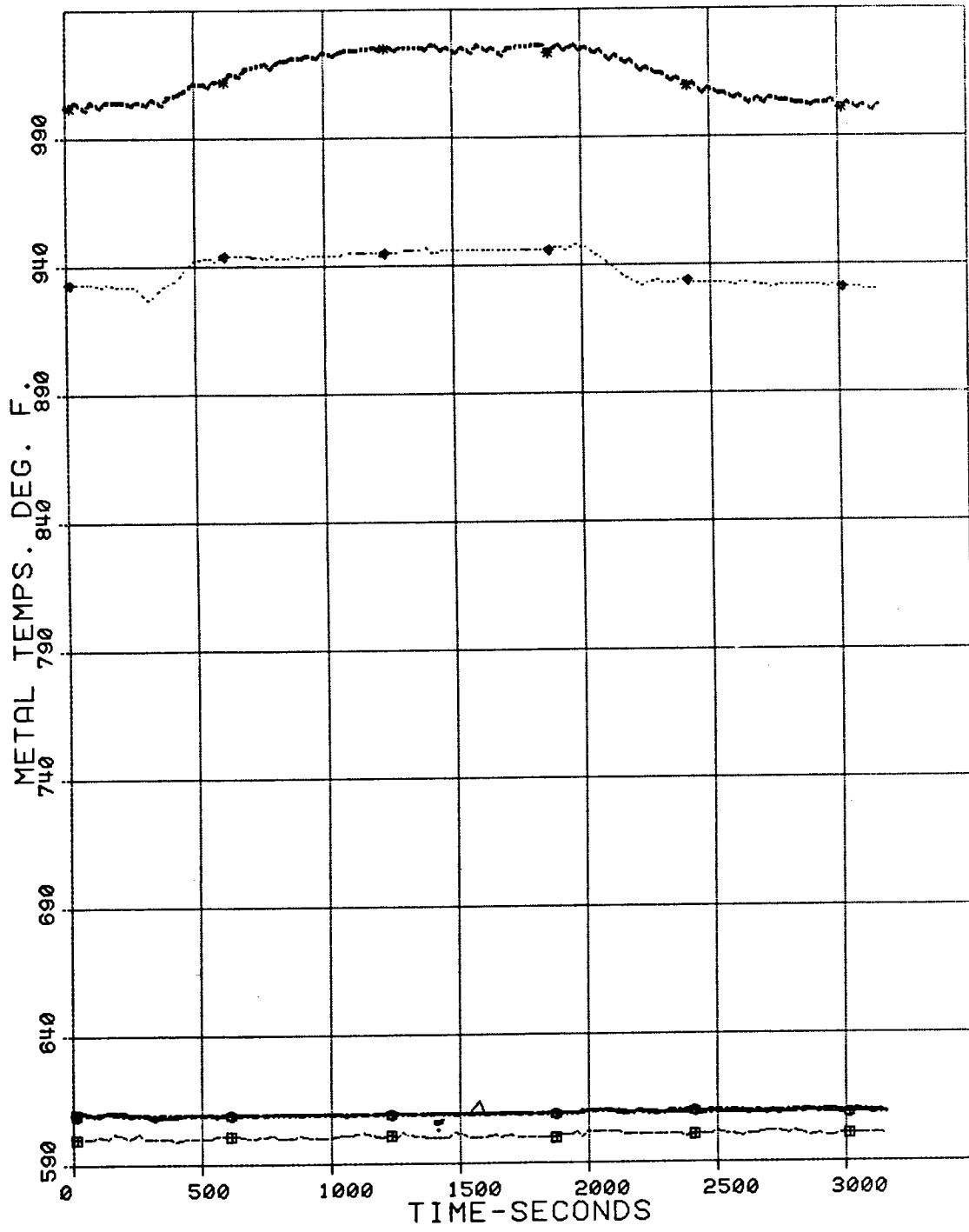
SEARCH MODE 1

PLOT START TIME = 57780.0

STOP TIME = 60960.0

INTERVAL = 30.0

LINE PLOT HAS 106 POINTS PER FUNCTION
SCATTER PLOT HAS 53 POINTS PER FUNCTION



SEARCH START
DAY #105 1977 TIME 18:10
NUMBER OF RECORDS = 7

ARGUMENT SELECTED : 1

FIRST FUNCTION #12 OPEN BOX

SECOND FUNCTION #13 TRIANGLE

THIRD FUNCTION #14 CROSS-CIRCLE

FOURTH FUNCTION #23 CROSS-BOX

FIFTH FUNCTION #32 CROSS-DIAMOND

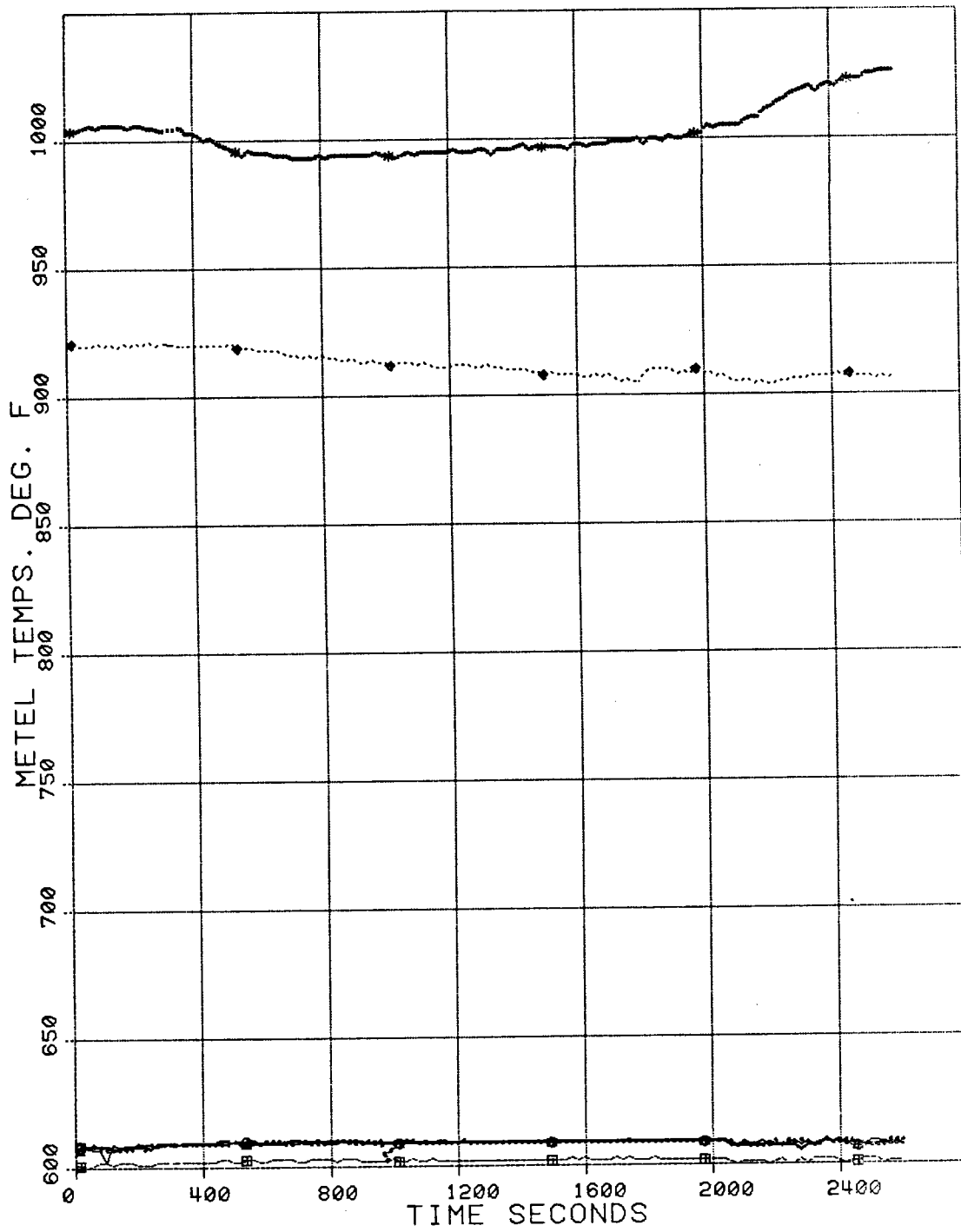
SIXTH FUNCTION #33 ASTERISK

SEARCH MODE 2

PLOT START TIME = 65400.0

EACH 1TH POINT IS PLOTTED

LINE PLOT HAS 128 POINTS PER FUNCTION
SCATTER PLOT HAS 64 POINTS PER FUNCTION



PAGE 18
DRUM LEVEL, PLOTS

SEARCH START
DAY #105 1977 TIME 10: 5
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION * 9 OPEN BOX
SECOND FUNCTION *30 TRIANGLE

SEARCH MODE 2

PLOT START TIME = 36300.0

EACH 1TH POINT IS PLOTTED

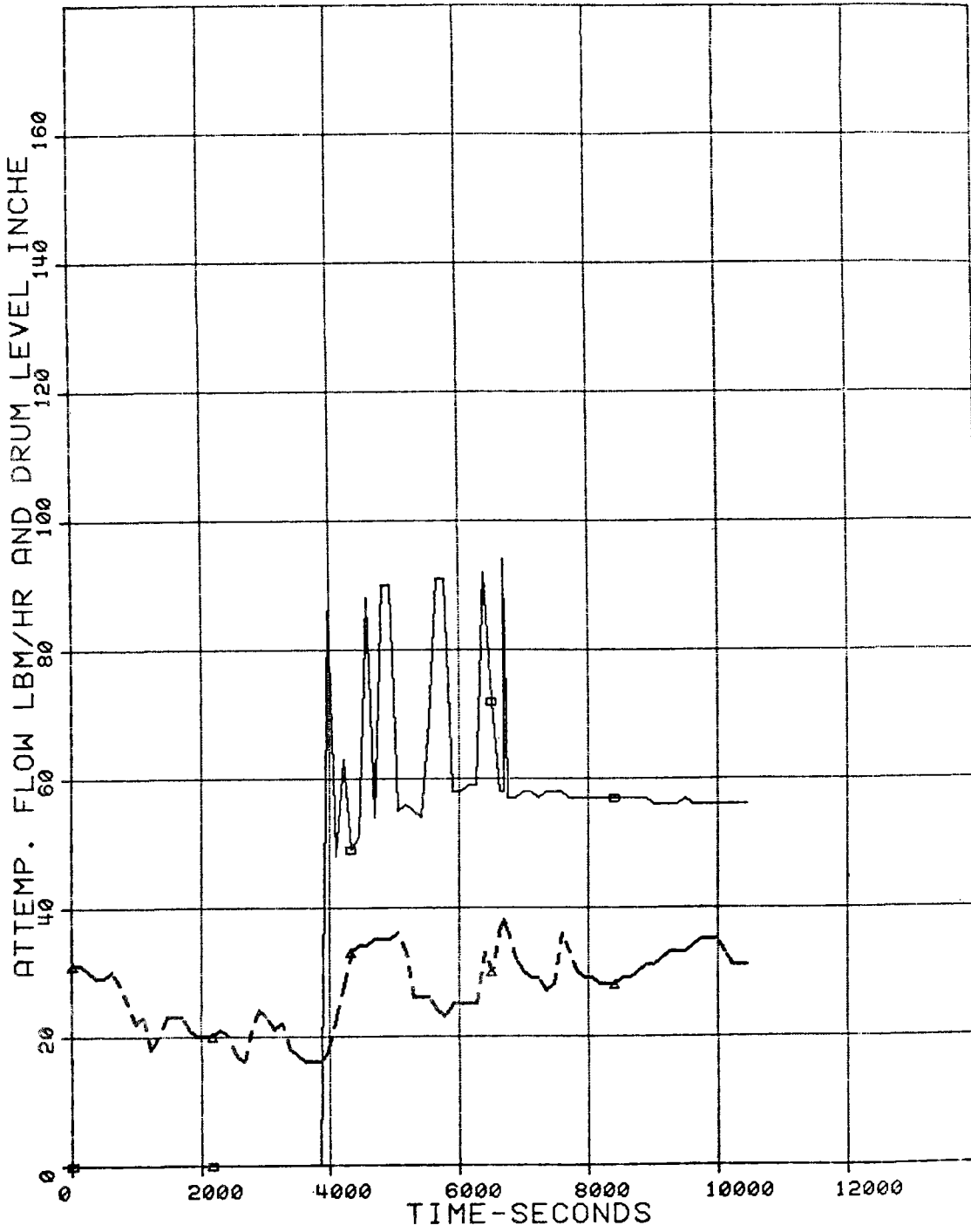
LINE PLOT HAS 90 POINTS PER FUNCTION

Test No. 18

Replot 4/25/77

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18-



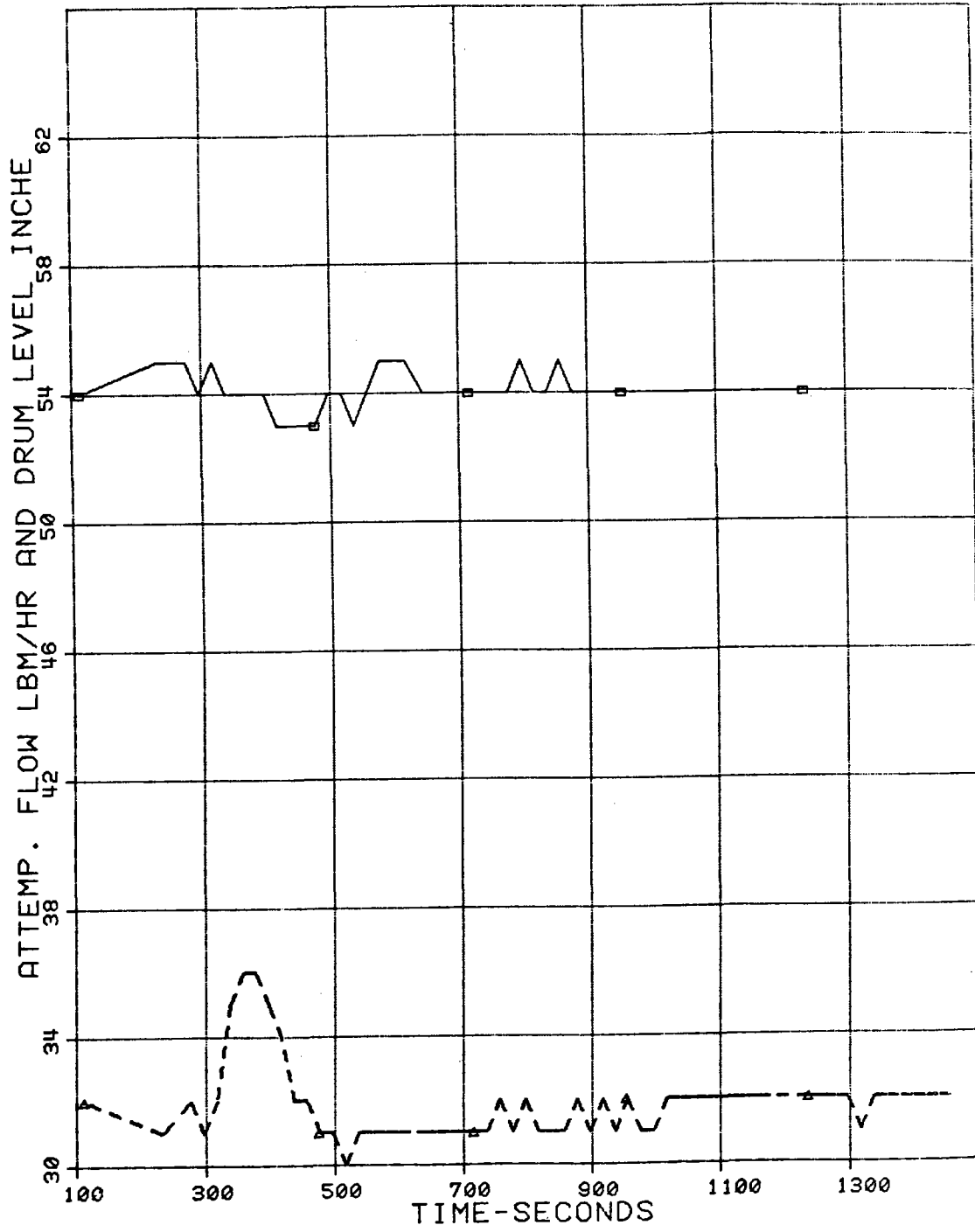
SEARCH START
DAY #105 1977 TIME 14:15
NUMBER OF RECORDS = 3
ARGUMENT SELECTED : 1
FIRST FUNCTION * 9 OPEN BOX
SECOND FUNCTION *30 TRIANGLE
SEARCH MODE 2
PLOT START TIME = 51300.0
EACH 1TH POINT IS PLOTTED
LINE PLOT HAS 60 POINTS PER FUNCTION

Test No. 18

14-

18-

Replot 4/25/77



SEARCH START
DAY #105 1977 TIME 14:55
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION * 9 OPEN BOX

SECOND FUNCTION *30 TRIANGLE

SEARCH MODE 2

PLOT START TIME = 53700.0

EACH 1TH POINT IS PLOTTED

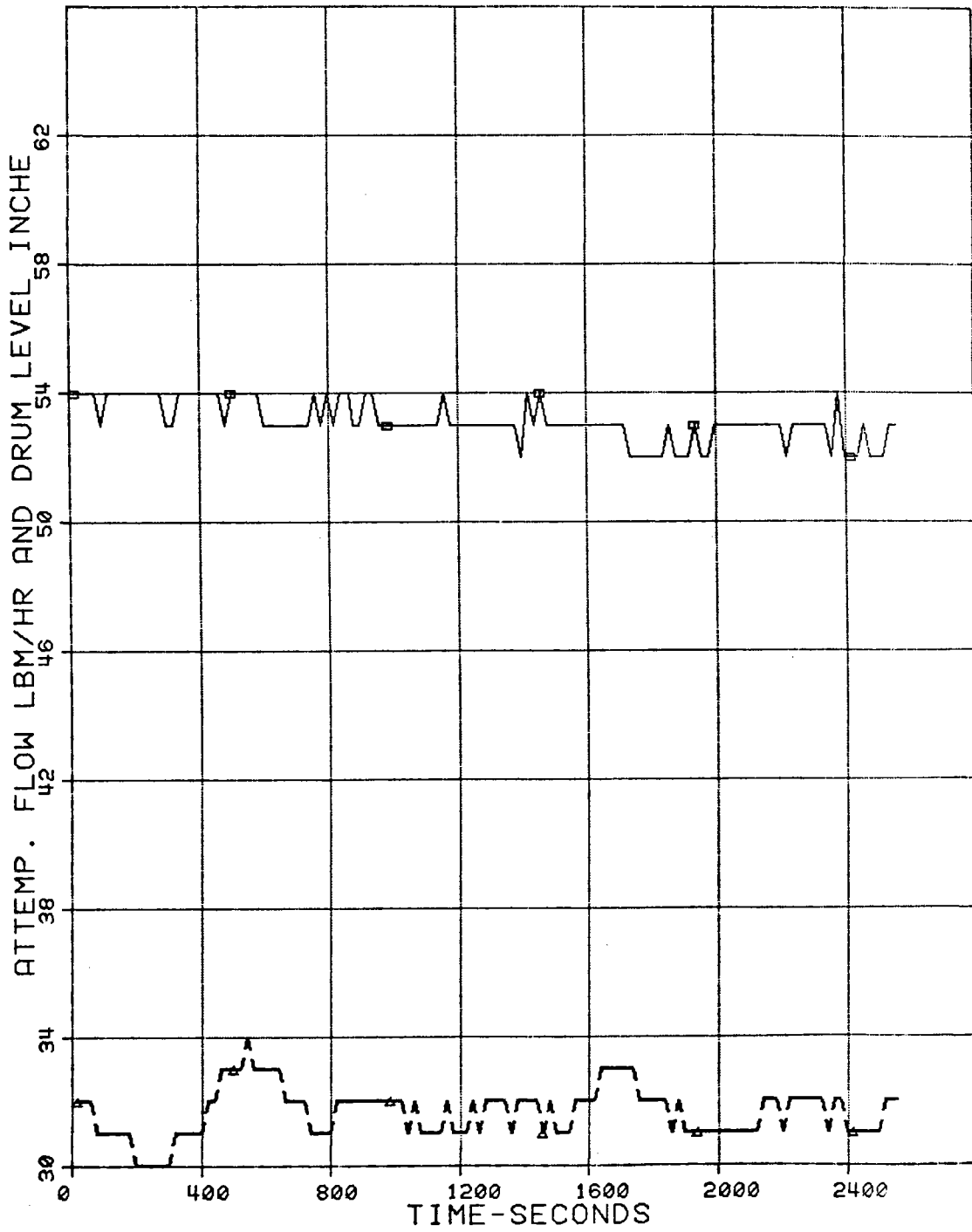
LINE PLOT HAS 128 POINTS PER FUNCTION

Test No. 18

Replot 4/25/77

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SEARCH START
DAY #105 1977 TIME 16: 3

SEARCH STOP
TIME 16:56

SEARCH INTERVAL
TIME 0:30
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION * 9 OPEN BOX

SECOND FUNCTION *30 TRIANGLE

SEARCH MODE 1

PLOT START TIME = 57800.0

STOP TIME = 60960.0

INTERVAL = 30.0

LINE PLOT HAS 106 POINTS PER FUNCTION
SCATTER PLOT HAS 53 POINTS PER FUNCTION

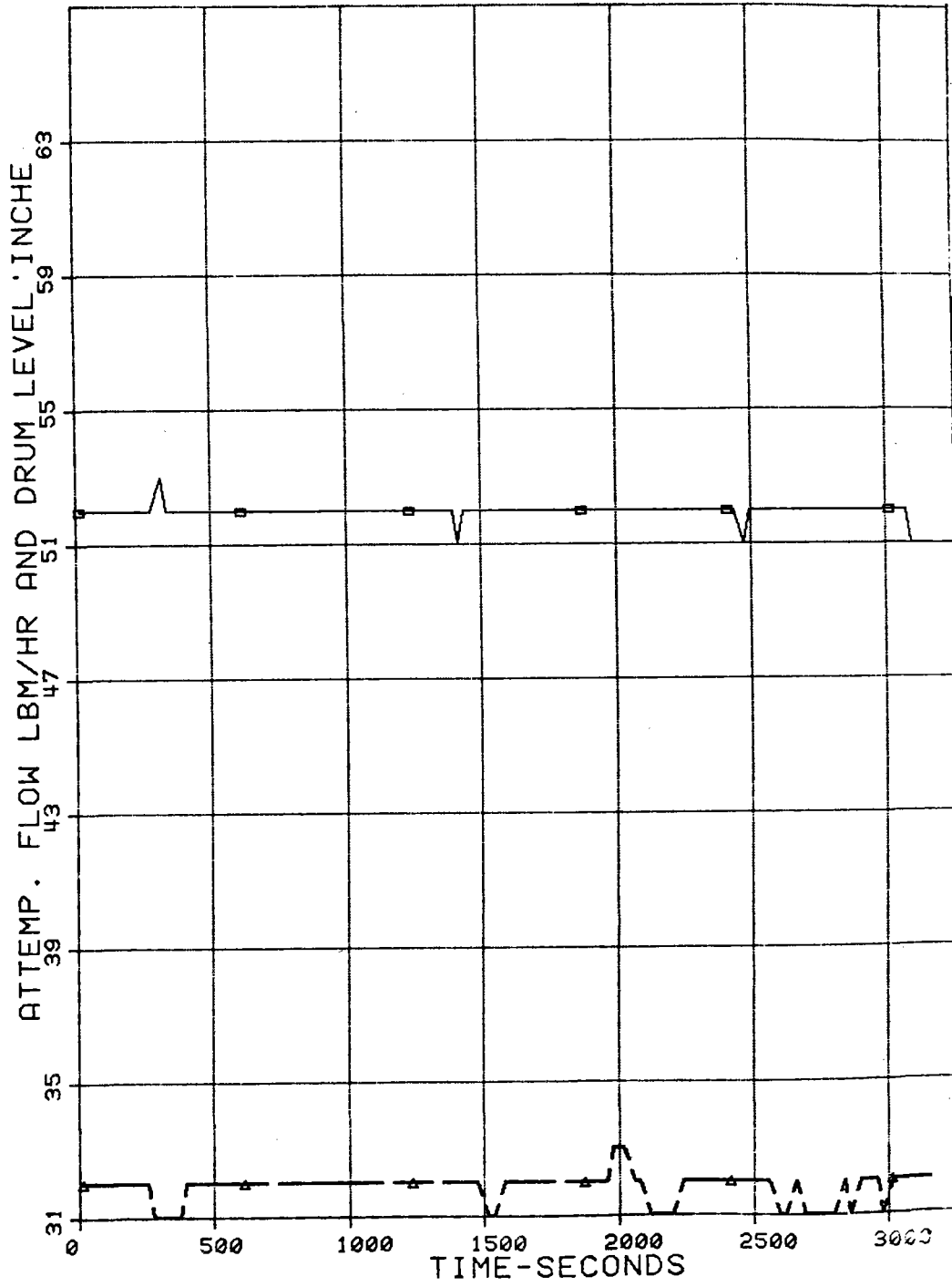
LINE PLOT HAS 106 POINTS PER FUNCTION

Replot 4/25/77

Test No. 18

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SEARCH START
DAY #105 1977 TIME 18:10
NUMBER OF RECORDS = 3

ARGUMENT SELECTED : 1

FIRST FUNCTION #30 OPEN BOX

SECOND FUNCTION #11 TRIANGLE

SEARCH MODE 2

PLOT START TIME = 65400.0

EACH 1TH POINT IS PLOTTED

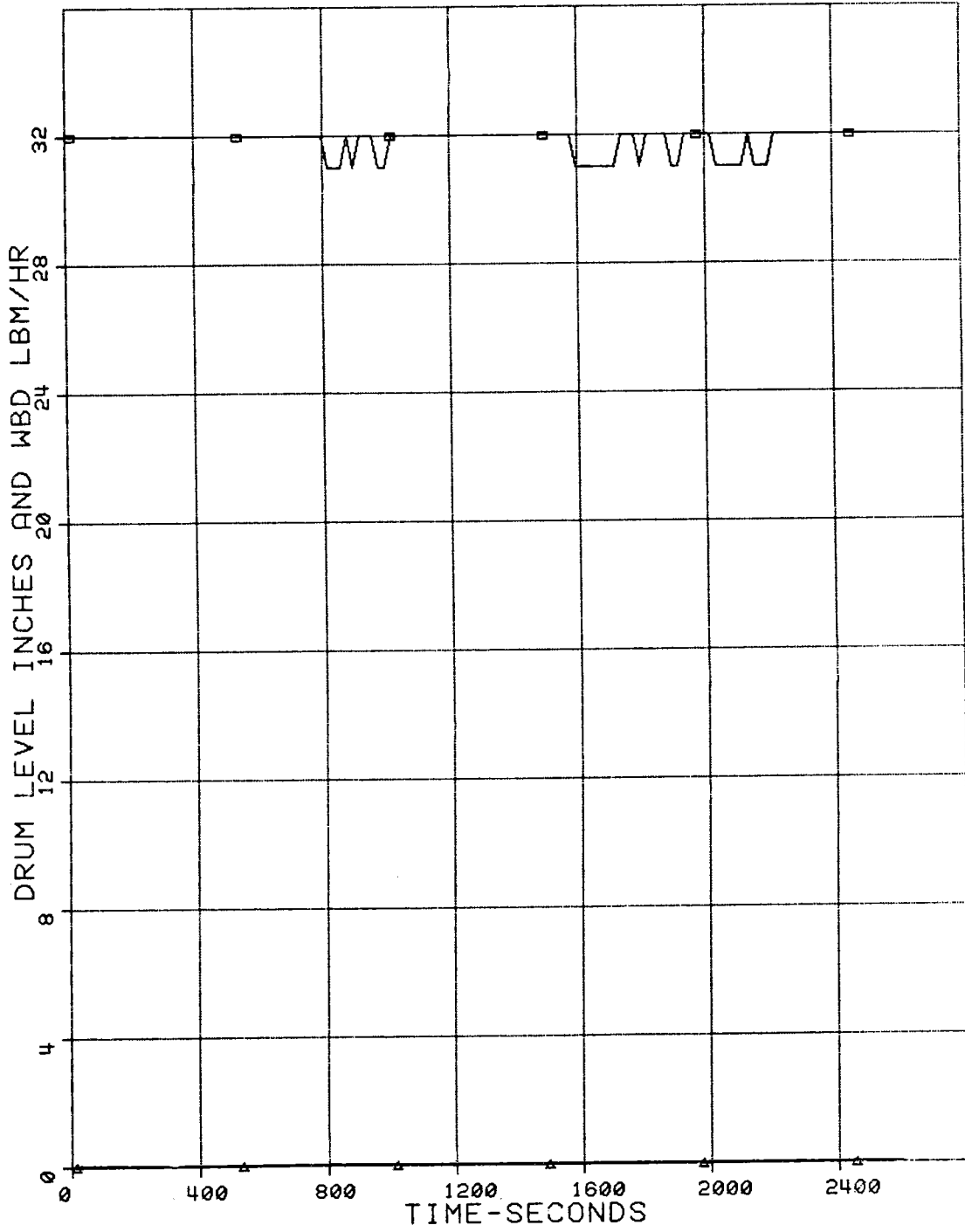
LINE PLOT HAS 128 POINTS PER FUNCTION

Replot 4/25/77

Test No. 18

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RECIRCULATION FLOW, PLOTS

PAGE 20
POWER LEVELS, PLOTS

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ENTHALPY

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RATIOS