SECTION I
DESCRIPTION
GENERAL TURBINE INFORMATION

TURBINE TYPE: LAND BASED TURBINE-GENERATOR (Direct Drive)

RATED OUTPUT: 25,625KW RATED SPEED: 3600 RPM

GOVERNING SYSTEM: WOODWARD 505E DIGITAL GOVERNOR

STEAM CONDITIONS:

INLET PRESSURE / TEMPERATURE ..... 685 PSIG/760°F

FIRST EXTRACTION PRESSURE ..... 174 PSIG

EXHAUST PRESSURE ..... 1.5" HgA

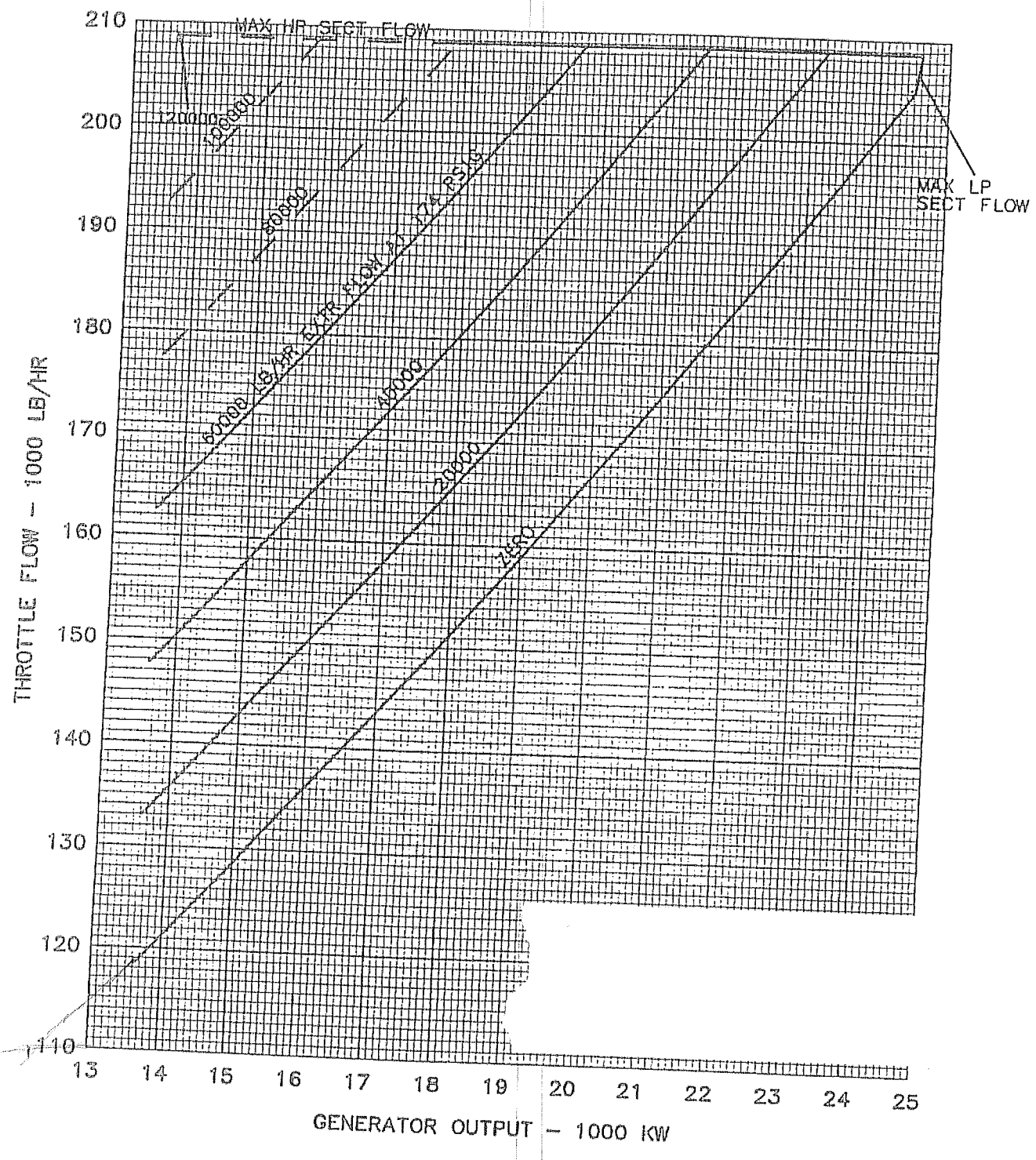
ALARM & TRIP CONDITIONS

(See Bill Of Material, Fig. A23, for complete setting information)

ITEM	ALARM SETTING	TRIP SETTING
HIGH VIBRATION (TURBINE)	3.0 MILS	5.0 MILS
ROTOR AXIAL POSITION	10 MILS	20 MILS
LOW LUBE OIL PRESSURE	12 PSIG DECR PRESS	10 PSIG DECR PRESS
DIFF. PRESS. ACROSS LUBE OIL FILTER	15 PSIG INCR Δ P	- - -
DIFF. PRESS. ACROSS CONTROL OIL FILTER	15 PSIG INCR Δ P	- - -
LOW CONTROL PRESS	160 PSIG DECR PRESS	
LOW HYDRAULIC HEADER	150 PSIG DECR PRESS	- - -
HIGH - LOW TANK OIL LEVEL	SEE BOM (FIG. A23)	- - -
HIGH OIL COOLER OUTLET	135°F INCR TEMP	- - -
HIGH BACK PRESSURE (LOW VACUUM)	6" HgA INCR PRESS	8.5" HgA PSIG INCR
HIGH EXHAUST TEMP	175°F INCR TEMP	225°F INCR TEMP
EMERGENCY OVERSPEED (ELECTRICAL)		3960 RPM
MECHANICAL OVERSPEED BOLT		4032 - 4068
FOR RTD ALARM & TRIP SETTINGS, SEE BILL OF MATERIAL (Fig. A23)		
MANUAL TRIP BUTTON (Located at Turbine Front Standard) & EMERGENCY TRIP PB ON WW505E		

THROTTLE FLOW VS GENERATOR OUTPUT

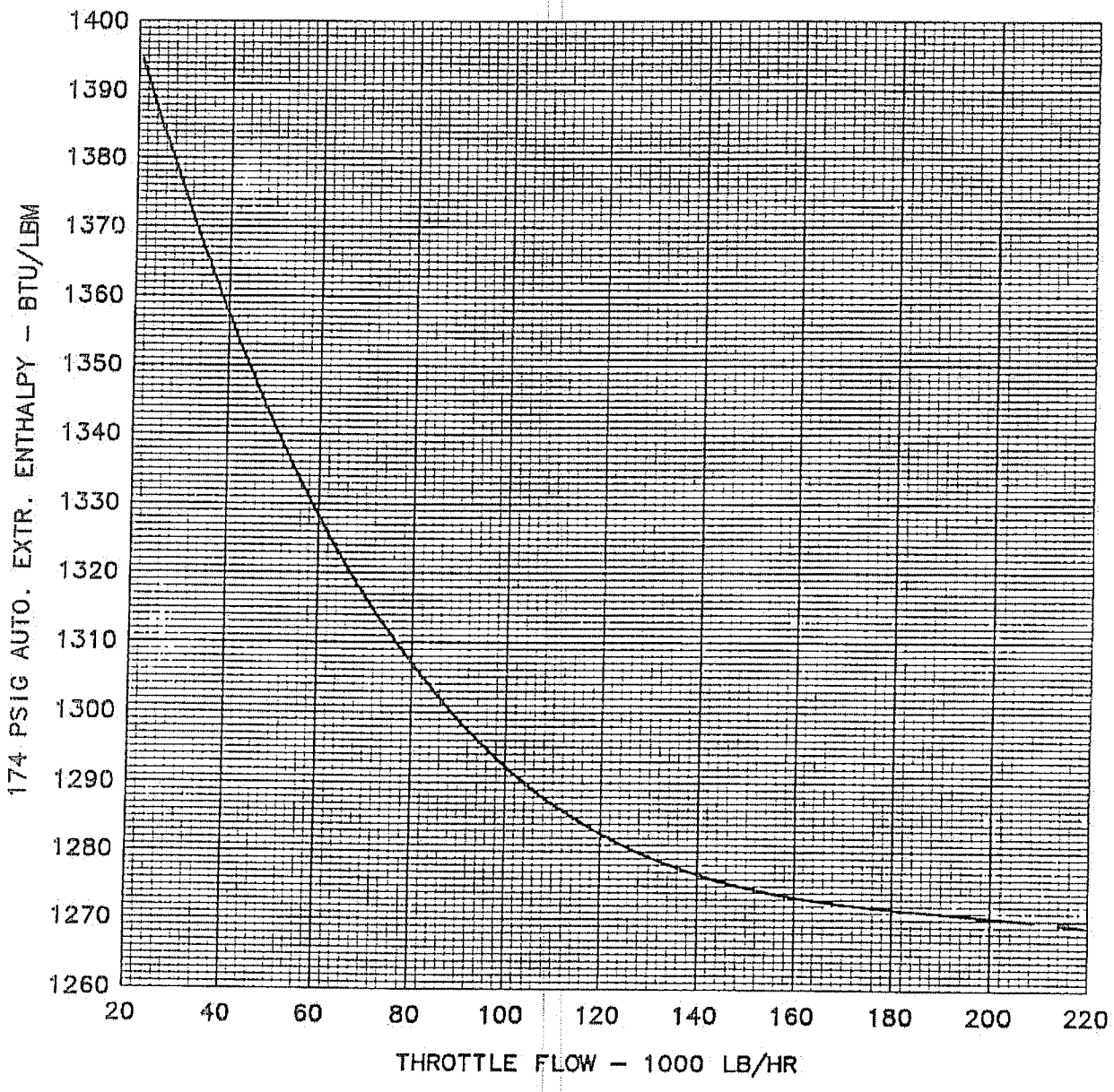
685 PSIG – 760 F – 1.5 IN. HG.
AE AT 174 PSIG
3600 RPM
LOCUS OF VALVE POINT PERFORMANCE



09/03/92 –

174 PSIG AUTO. EXTR. ENTHALPY VS THROTTLE FLOW

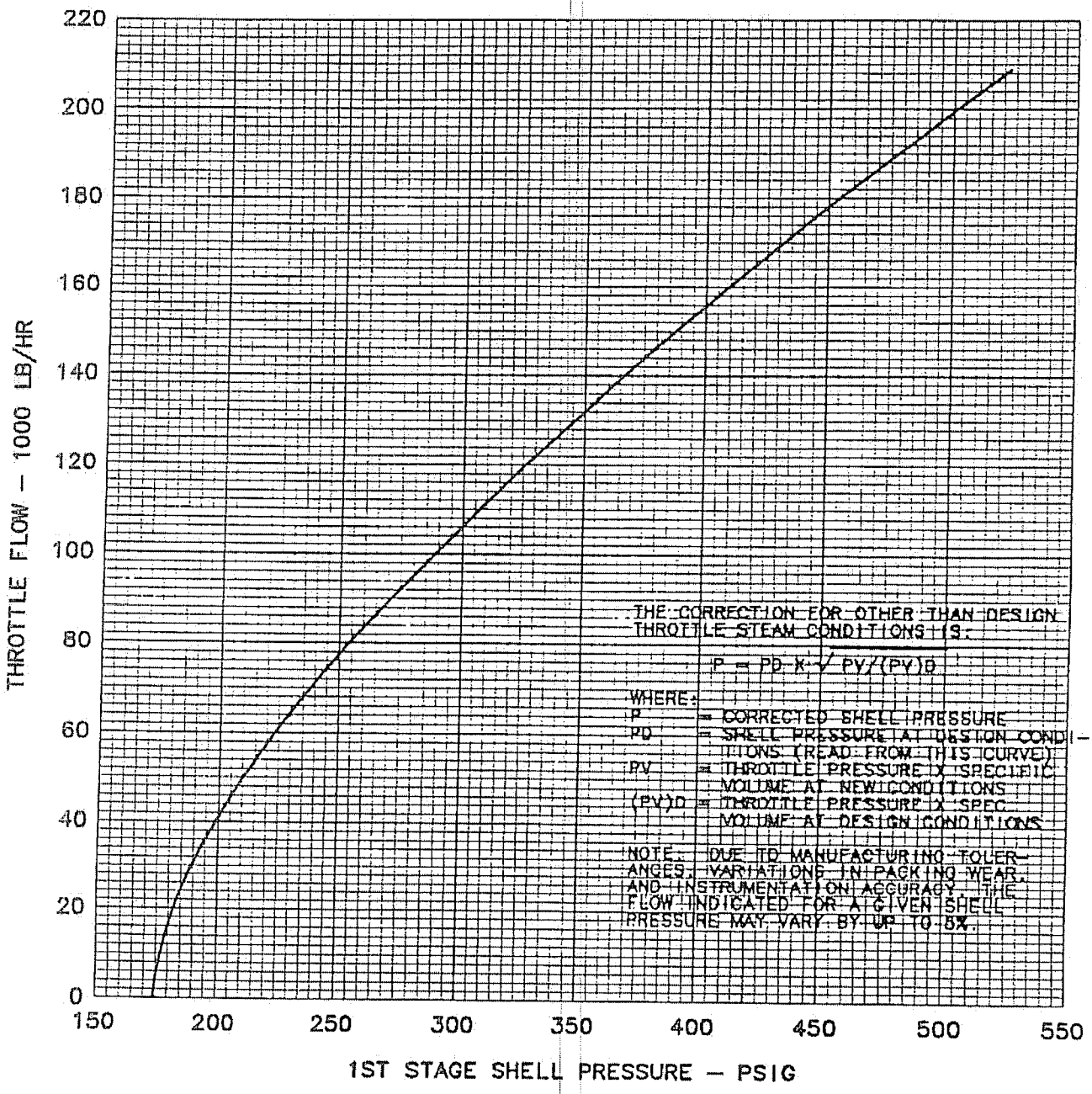
TG SET
685 PSIG – 760 F – 1.5 IN. HG.
AE AT 174 PSIG
3600 RPM
EXPECTED DATA – NOT GUARANTEED



09/02/92 – M. TOMASETTI

THROTTLE FLOW VS 1ST STAGE SHELL PRESSURE

TG SET
685 PSIG – 760 F – 1.5 IN. HG.
AE AT 174 PSIG
3600 RPM
EXPECTED DATA – NOT GUARANTEED



09/02/92 – M. TOMASETTI

APPARENT LP SECTION FLOW VS 7TH STAGE SHELL PRESSURE

TG SET
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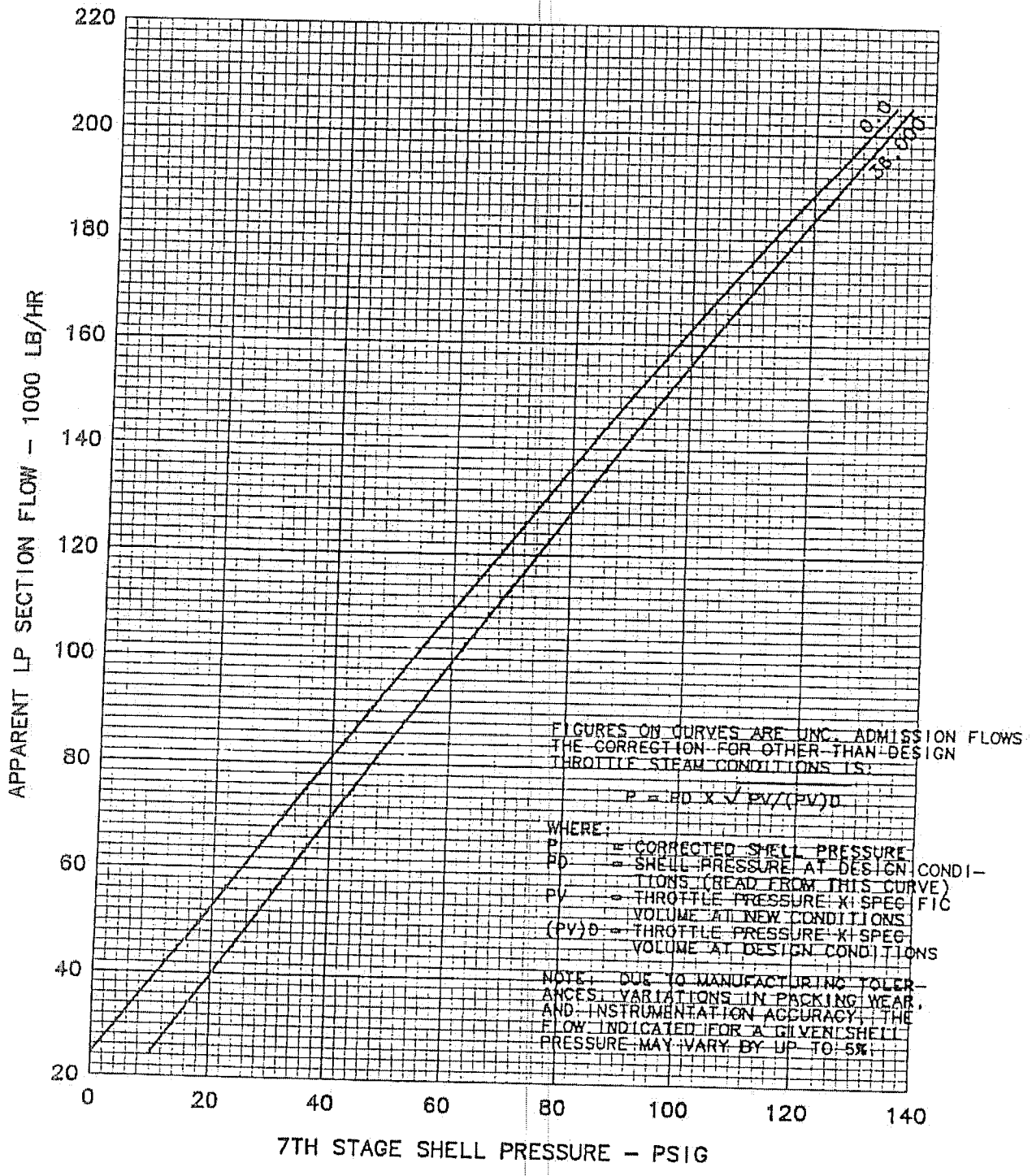
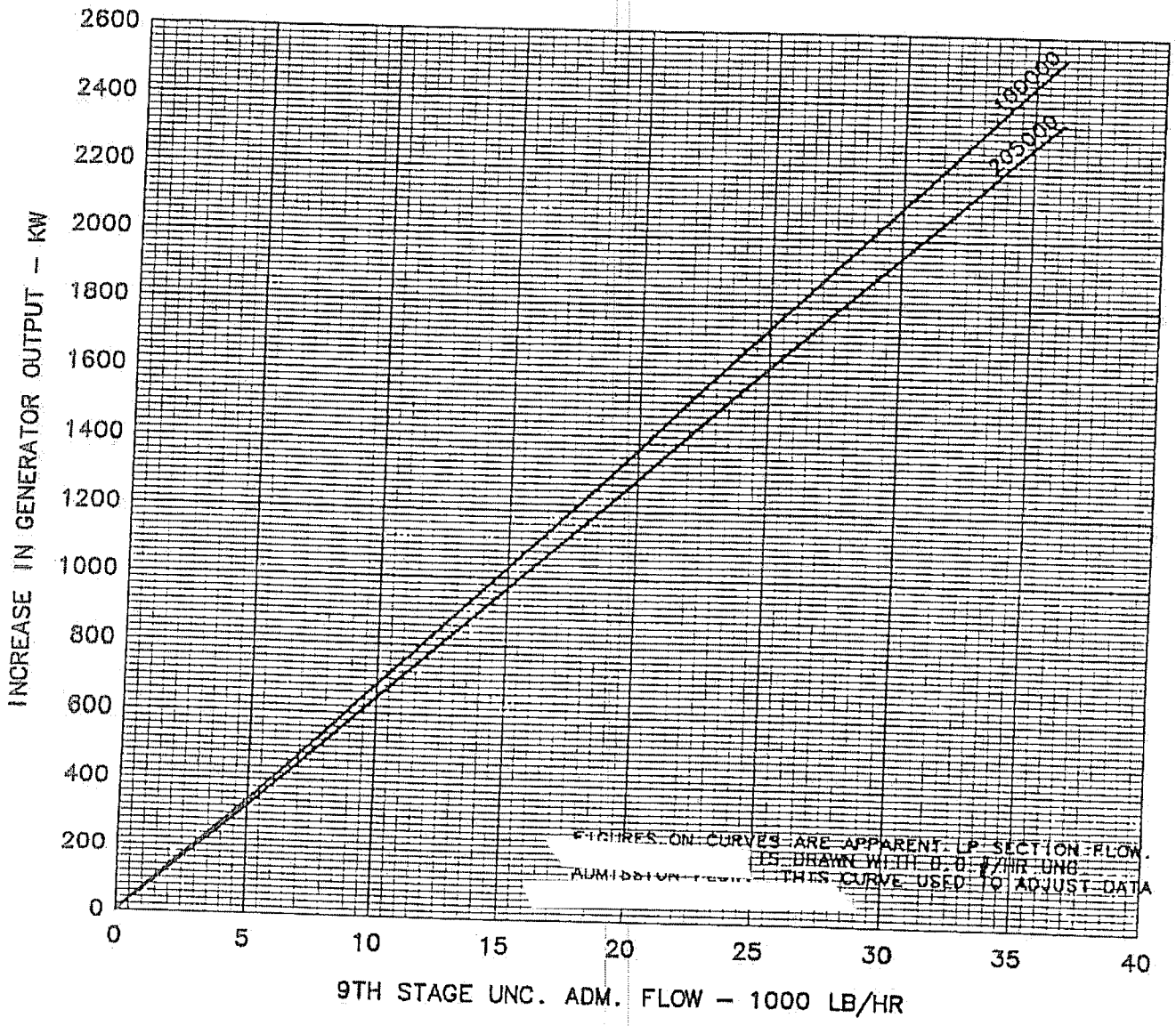
AE AT 174 PSIG
3600 RPM
EXPECTED DATA – NOT GUARANTEED



09/09/92 – M. TOMASETTI

INCREASE IN GENERATOR OUTPUT VS 9TH STAGE UNC. ADM. FLOW

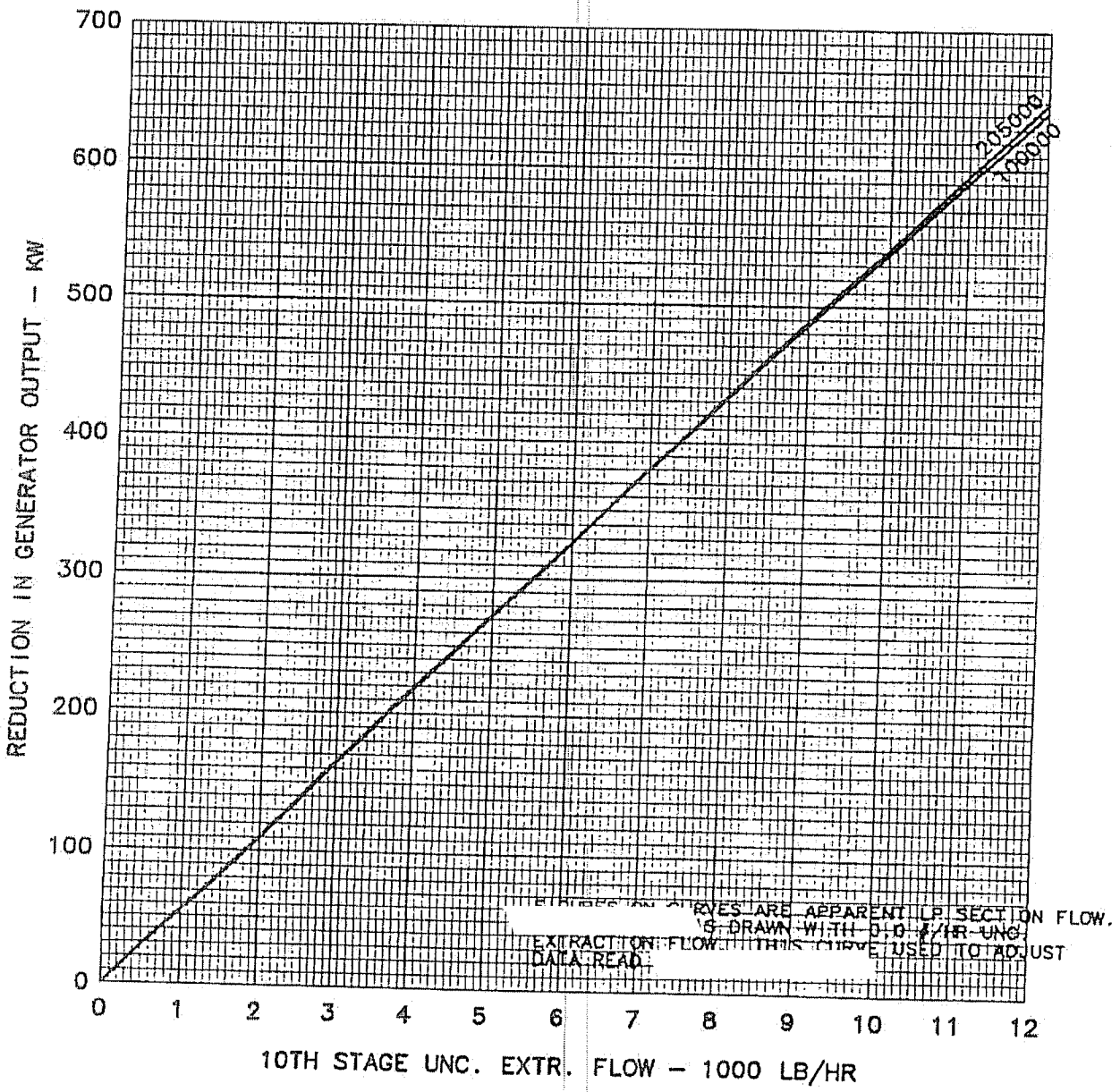
TG SET
685 PSIG – 760 F – 1.5 IN. HG.
AE AT 174 PSIG
3600 RPM
EXPECTED DATA – NOT GUARANTEED



09/02/92 – M. TOMASETTI

REDUCTION IN GENERATOR OUTPUT VS 10TH STAGE UNC. EXTR. FLOW

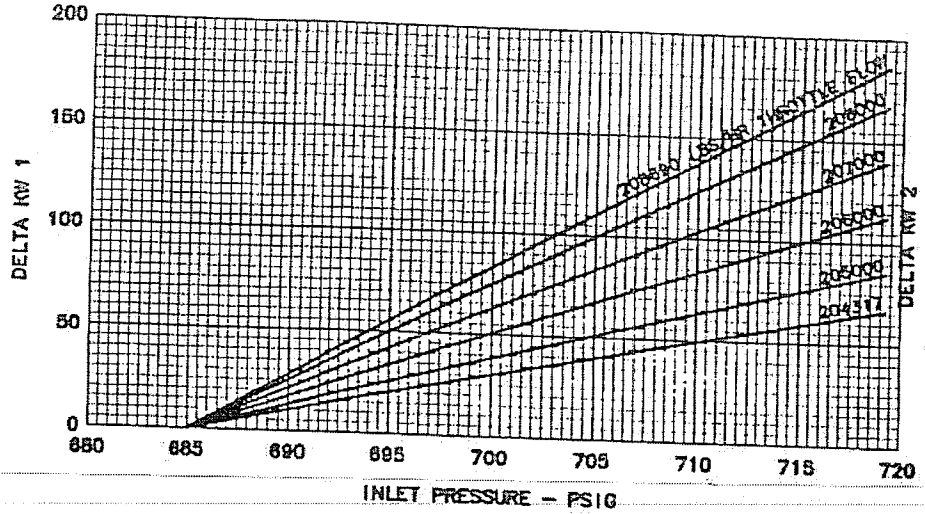
TG SET
685 PSIG – 760 F – 1.5 IN. HG.
AE AT 174 PSIG
3600 RPM
EXPECTED DATA – NOT GUARANTEED

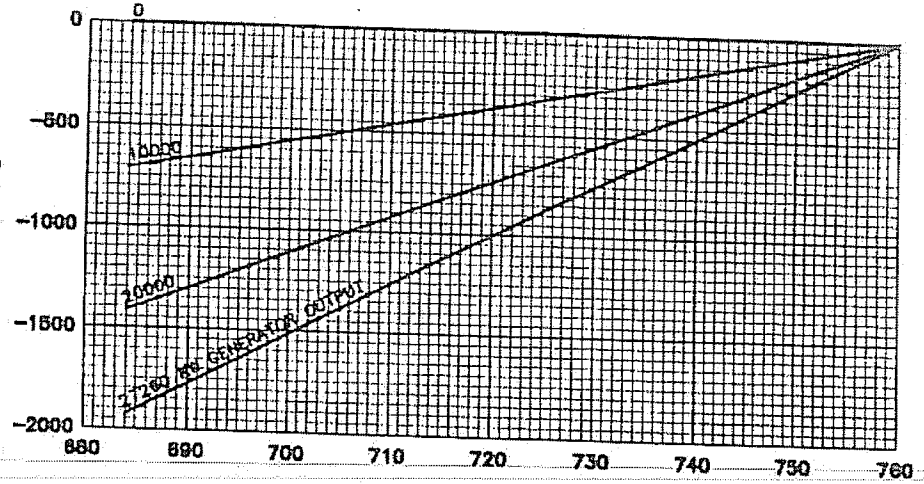


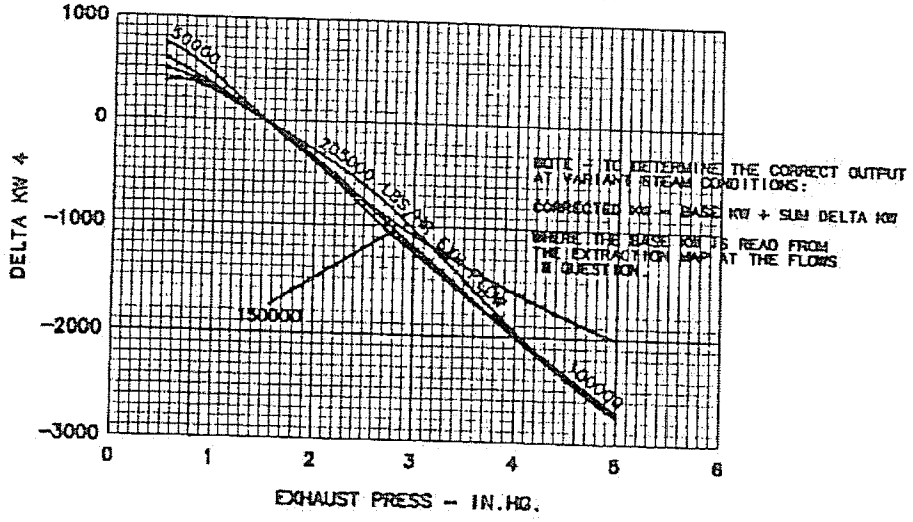
09/03/92 – M. TOMASETTI

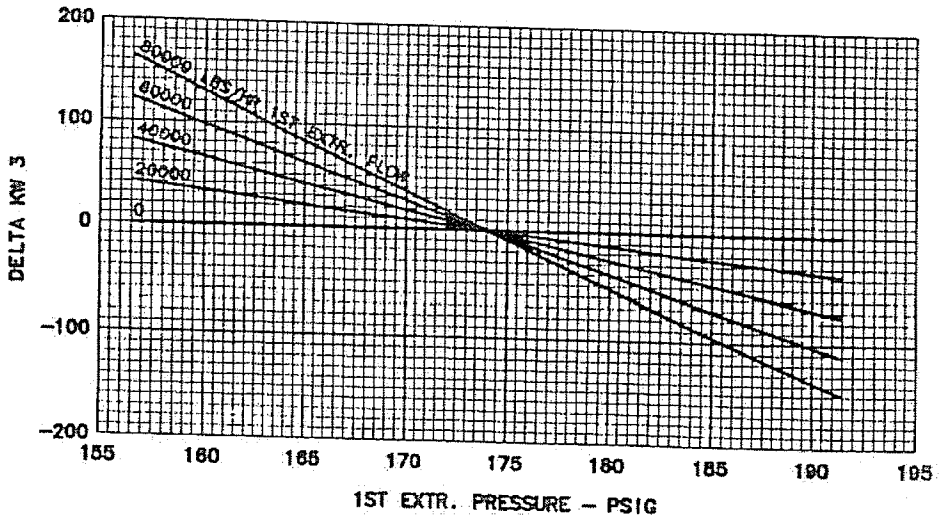
CORRECTION FACTORS FOR VARIANT STEAM CONDITIONS
AUTOMATIC EXTRACTION OPERATION

TO SET
685 PSIG – 760 F – 1.5 IN. HG.
AE AT 174 PSIG
3600 RPM
EXPECTED DATA – NOT GUARANTEED

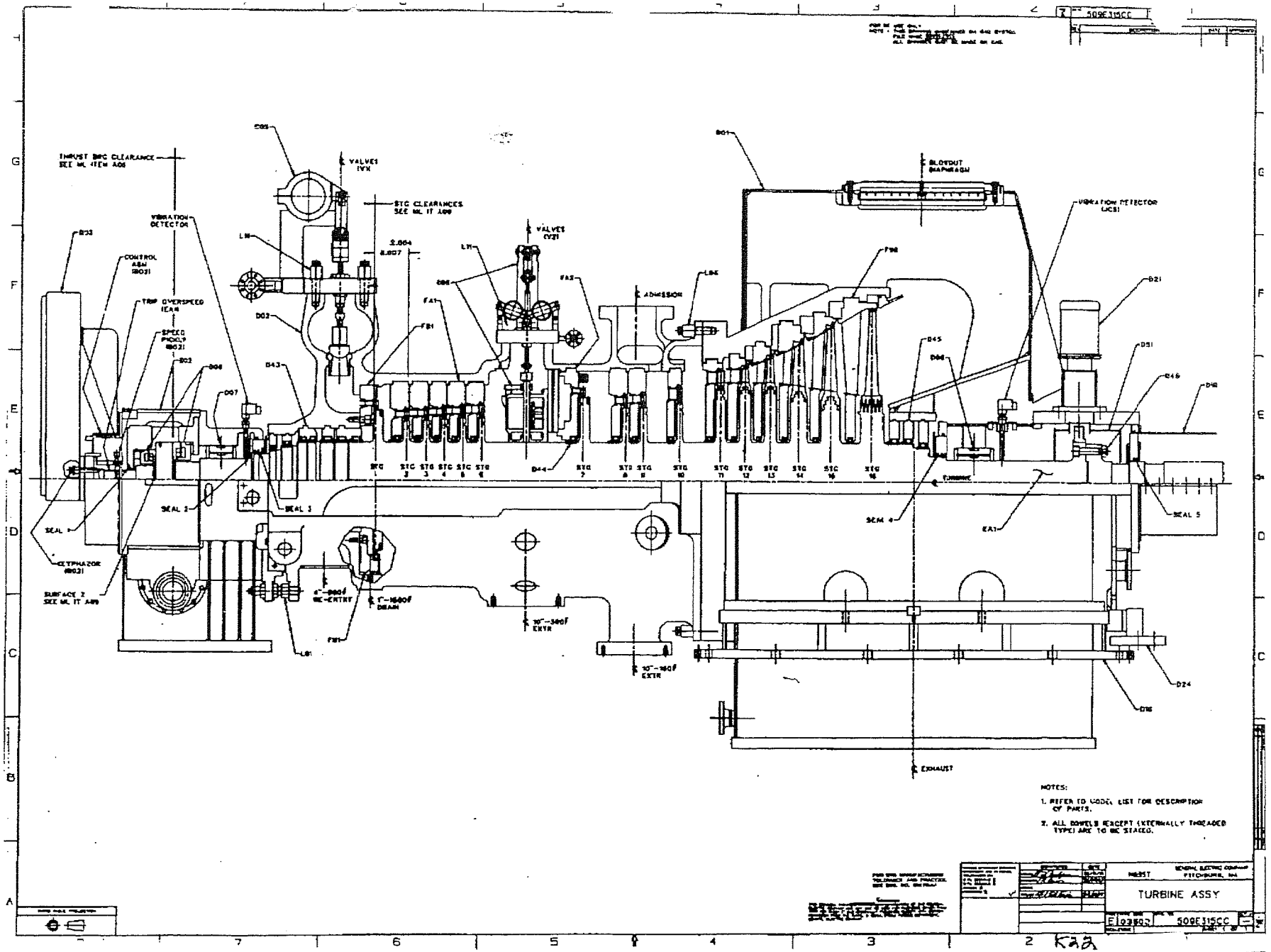


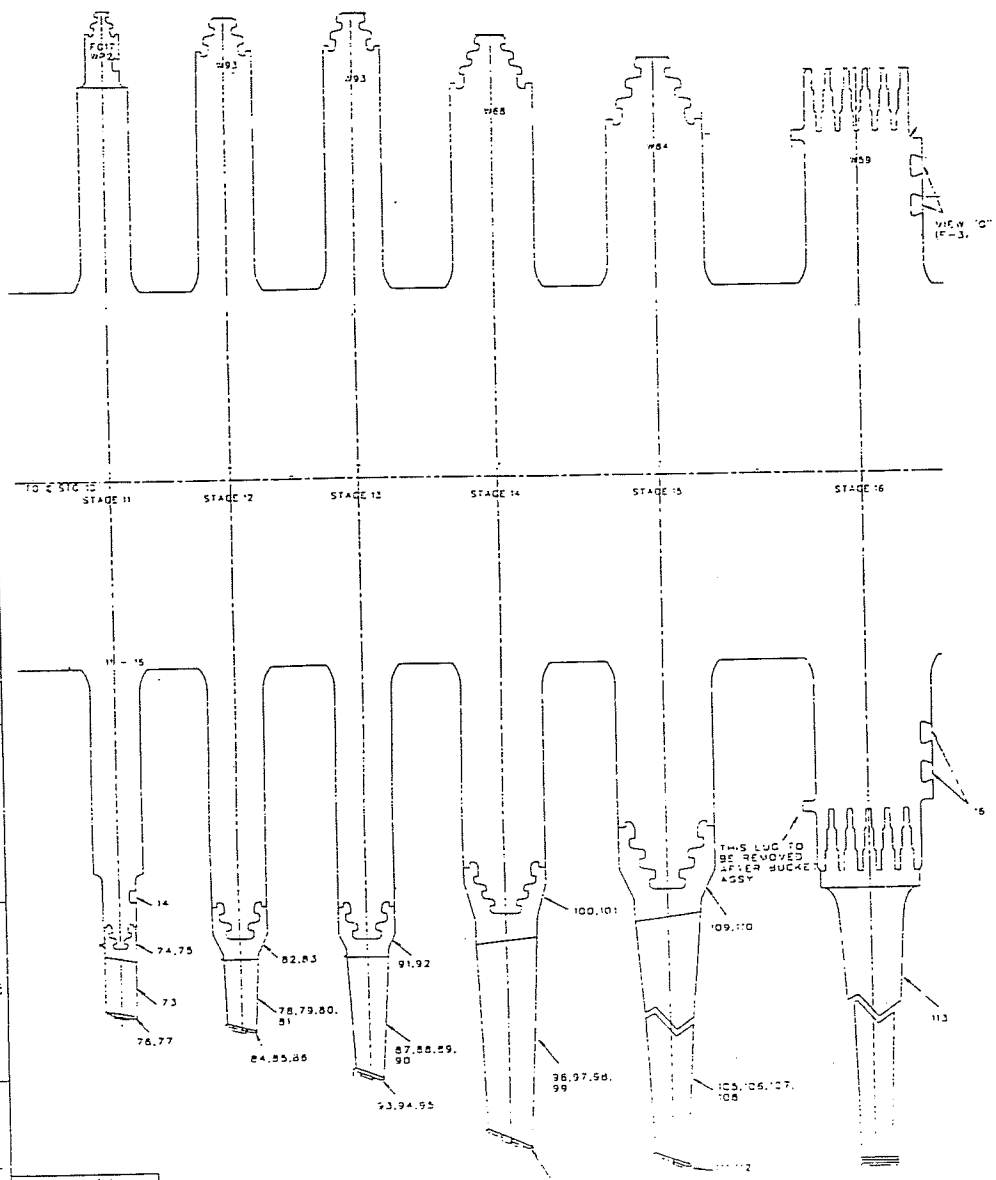






09/03/92 – M. TOMASETTI

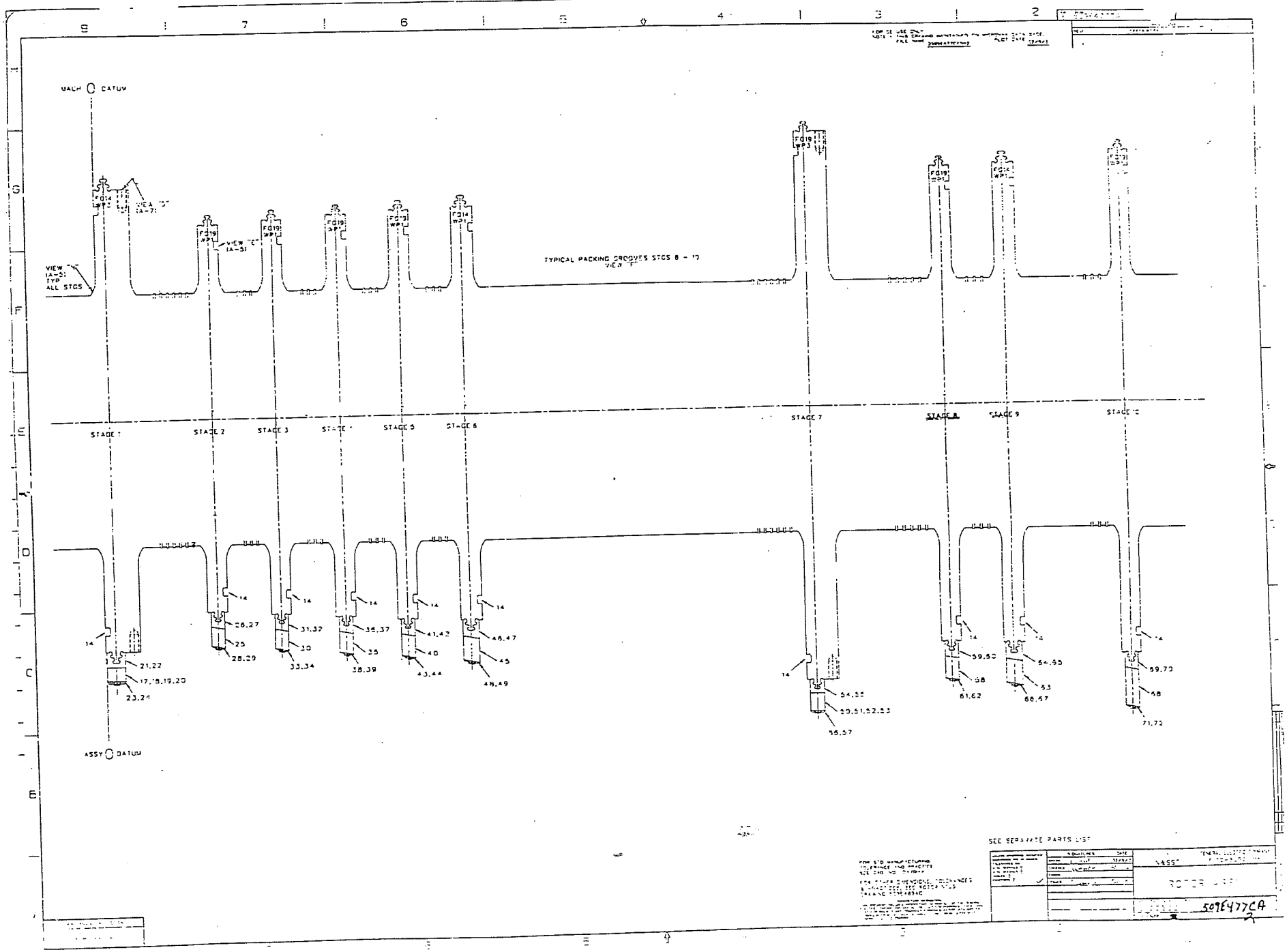

THRUST BRG CLEARANCE SEE ML ITEM A08
VIBRATION DETECTOR
CONTROL ABM (8031)
TRIP OVERSPEED ITEM
SPEED PICKUP (8031)
VALVES (VV1)
STG CLEARANCES SEE ML IT A08
VALVES (CV2)
ADMISSION
BLOWOUT DIAPHRAGM
VIBRATION DETECTOR (VD1)
SEAL 1
SEAL 2
SEAL 3
SEAL 4
SEAL 5
KEYPHAZOR (8031)
SURFACE 2 SEE ML IT A09
4"-900F RE-ENTRY
1"-1500F DRAIN
10"-360F EXTR
10"-360F EXTR
TURBINE
EXHAUST
NOTES:
1. REFER TO CODES LIST FOR DESCRIPTION OF PARTS.
2. ALL DOWELS (EXCEPT EXTERNALLY THREADED TYPE) ARE TO BE STAGED.
TURBINE ASSY
509E315CC



SEE SEPARATE PARTS LIST

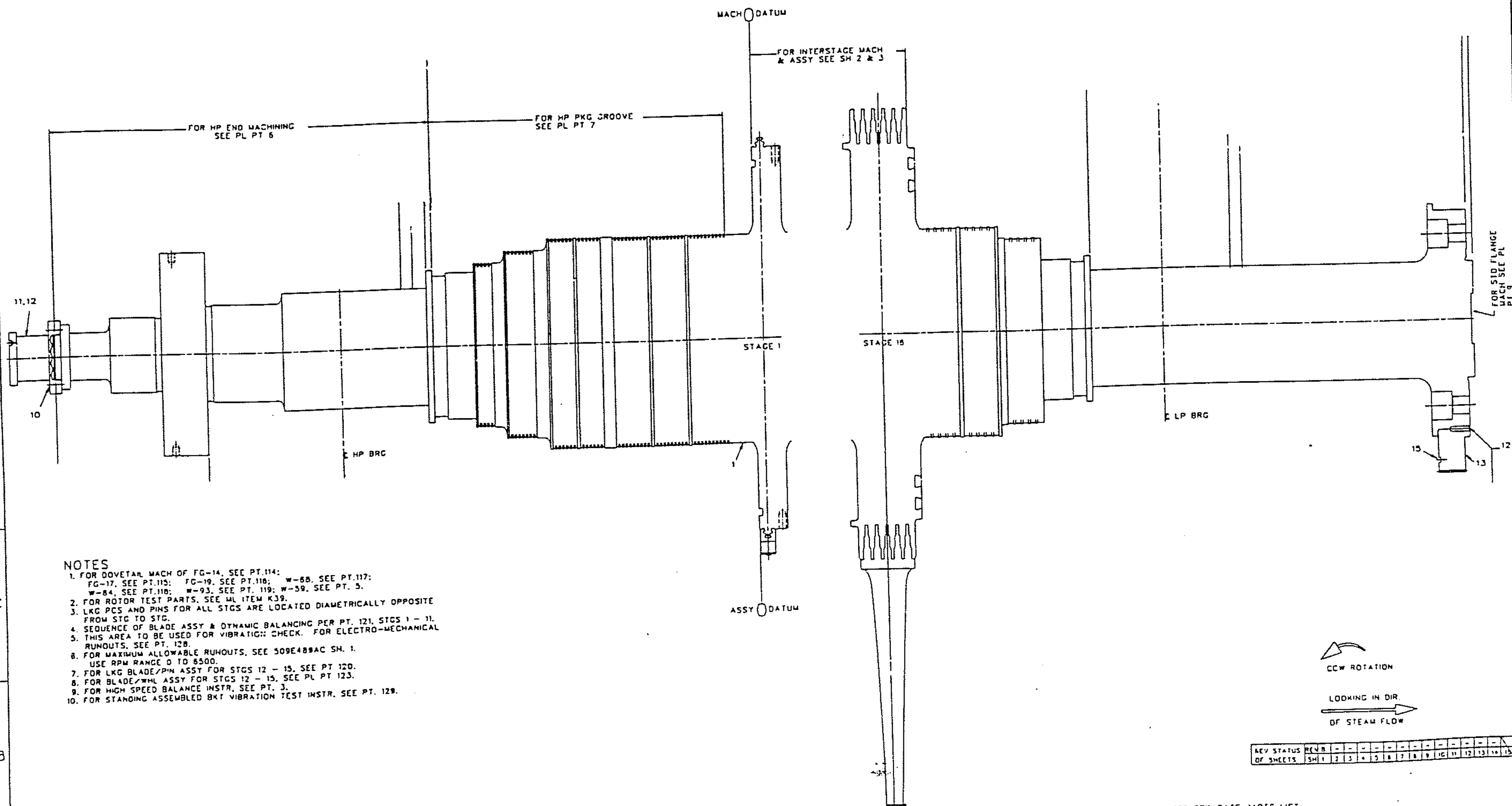
ROTOR ASSY

5078775A


MACH DATUM
VIEW C (A-5)
VIEW C (A-5) TYP ALL STGS
TYPICAL PACKING GROOVES STGS 8 - 10 VIEW F
STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5
STAGE 6
STAGE 7
STAGE 8
STAGE 9
STAGE 10
ASSY DATUM
SEE SEPARATE PARTS LIST
ROTOR ASSY
509E477CA

REV	DESCRIPTION	DATE	APPROVED
A	M.C. WOODS CN92-2863 ZONE 1D-11: 18.88 DIA P.C. WAS 21.75 DIA P.C.	92/11/18	M.C.W.
B	M.C. Woods CN92-2895 ZONE 1B-81: ADDED NOTE 10.	92/12/4	MCW

FOR GE USE ONLY
NOTE - THIS DRAWING MAINTAINED ON MICROVAX DATA BASE.
PLOT DATE 93/13/3
FILE NAME 8509E477CASH1



NOTES
1. FOR DOVETAIL MACH OF FG-14, SEE PT.114; FG-17, SEE PT.115; FG-19, SEE PT.116; W-68, SEE PT.117; W-84, SEE PT.118; W-93, SEE PT. 119; W-59, SEE PT. 5.
2. FOR ROTOR TEST PARTS, SEE ML ITEM K39.
3. LKG PCS AND PINS FOR ALL STGS ARE LOCATED DIAMETRICALLY OPPOSITE FROM STG TO STG.
4. SEQUENCE OF BLADE ASSY & DYNAMIC BALANCING PER PT. 121, STGS 1 - 11.
5. THIS AREA TO BE USED FOR VIBRATION CHECK. FOR ELECTRO-MECHANICAL RUNOUTS, SEE PT. 128.
6. FOR MAXIMUM ALLOWABLE RUNOUTS, SEE 509E489AC SH. 1. USE RPM RANGE 0 TO 6500.
7. FOR LKG BLADE/PIN ASSY FOR STGS 12 - 15, SEE PT 120.
8. FOR BLADE/WHL ASSY FOR STGS 12 - 15, SEE PL PT 123.
9. FOR HIGH SPEED BALANCE INSTR, SEE PT. 3.
10. FOR STANDING ASSEMBLED BKT VIBRATION TEST INSTR, SEE PT. 129.

REV STATUS OF SHEETS															
REV	B	-	-	-	-	-	-	-	-	-	-	-	-	-	
SH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SEE SEPARATE PARTS LIST

FOR STD MANUFACTURING TOLERANCE AND PRACTICE SEE DWG NO. 4047014A

SIGNATURES	DATE
M.C. WOODS	92/8/3
M.C. WOODS	92/11/4
S.B. BERNARD	92/11/4

N&SST
GENERAL ELECTRIC COMPANY
FITCHBURG, MA

ROTOR ASSY

E 225021 509E477CA

GE Generator

Generator Data

Nameplate Data

2 Poles, 3 Phase, WYE Connected, 60 Hertz, 3600 RPM

Total Temperature at Rating Guaranteed not to Exceed: 110°C on Armature by Detector
125°C on Field by Resistance

Maximum Cold Gas/Air Temperature 40°C.

	Rating
kVA (0 ft)	29,900
Armature Amps	1,251
Armature Volts	13,800
Field Amps	427
Exciter Volts	250
Power Factor	0.90

Design Data

Voltage Range at 60 Hertz	±5 Percent

Brush Data

Shaft Grounding Brushes, 2 per set	Recommended Grade, National Carbon 634

Gas Cooler Data

Inlet Water Temperature	95°F
Water Flow at Rated Load	600 GPM
Head Loss Through Cooler	11 Ft.
Air or Gas Flow Through Generator	26,094 CFM

ESTIMATED GENERATOR DATA

Reactance Data (Per Unit)		Direct Axis		Quadrature Axis	
Saturated Synchronous	(Xdv)	1.864	(Xqv)	1.733
Unsaturated Synchronous	(Xdi)	1.864	(Xqi)	1.733
Saturated Transient	(X'dv)	0.204	(X'q)	0.468
Unsaturated Transient	(X'di)	0.266		
Saturated Subtransient	(X"dv)	0.139	(X"qv)	0.136
Unsaturated Subtransient	(X"di)	0.183	(X"qi)	0.181
Saturated Negative Sequence	(X2v)	0.133		
Unsaturated Negative Sequence	(X2i)	0.174		
Saturated Zero Sequence	(Xov)	0.082		
Unsaturated Zero Sequence	(Xoi)	0.097		
Leakage Reactance, Overexcited	(XLM,OEX)	0.154		
Leakage Reactance, Underexcited	(XLM,UEX)	0.154		

Field Time Constant Data (Sec. at 125°C)				
Open Circuit	(T'do)	4.011	(T'qo)	0.402
Three Phase Short Circuit Transient	(T'd3)	0.440	(T'q)	0.402
Line to Line Short Circuit Transient	(T'd2)	0.677		
Line to Neutral Short Circuit Transient	(T'd1)	0.810		
Short Circuit Subtransient	(T"d)	0.015	(T"q)	0.015
Open Circuit Subtransient	(T"do)	0.022	(T"qo)	0.052

Armature DC Component Time Constant Data (Sec. at 100°C)		
Three Phase Short Circuit	(Ta3)	0.271
Line to Line Short Circuit	(Ta2)	0.271
Line to Neutral Short Circuit	(Ta1)	0.237

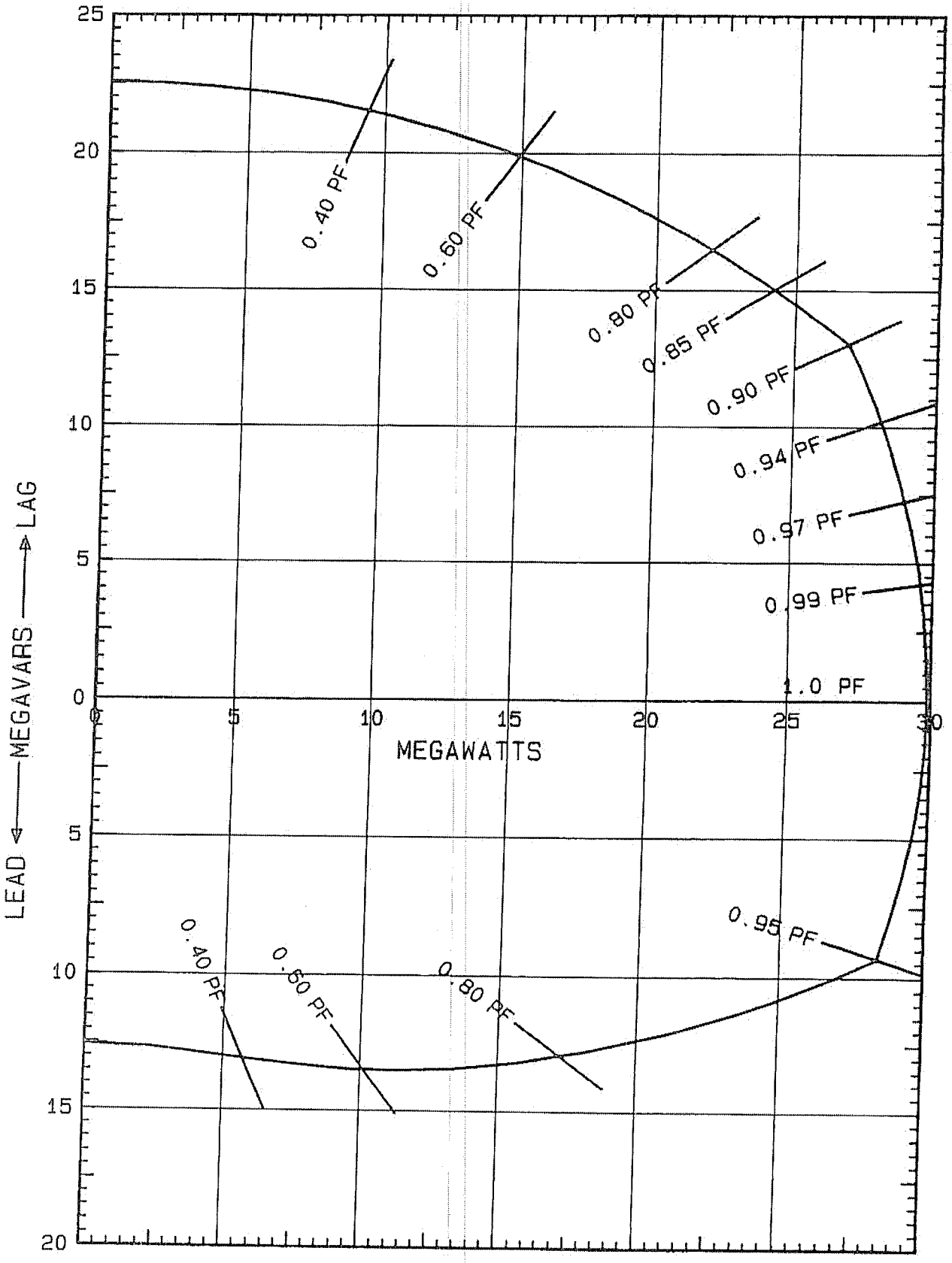
Armature Winding Sequence Resistance Data (Per Unit)		
Positive	(R1)	0.004
Negative	(R2)	0.016
Zero	(R0)	0.009

Rotor Short–Time Thermal Capacity, $(I_2)^2t$	10
Turbine–Generator Combined Inertia Constant, H	4.84 kW SEC/kVA
Three Phase Armature Winding Capacitance	0.322 Microfarads
Armature Winding DC Resistance (Per Phase)	0.00828 Ohms at 100°C
Field Winding DC Resistance	0.400 Ohms at 125°C
Field Current at Rated kVA, Armature Voltage and PF	422.0 Amperes
Field Current at Rated kVA and Armature Voltage, 0 PF Lagging	514.9 Amperes

(FOR SYSTEMS STUDY ONLY – NOT ALLOWABLE OPERATING POINT)

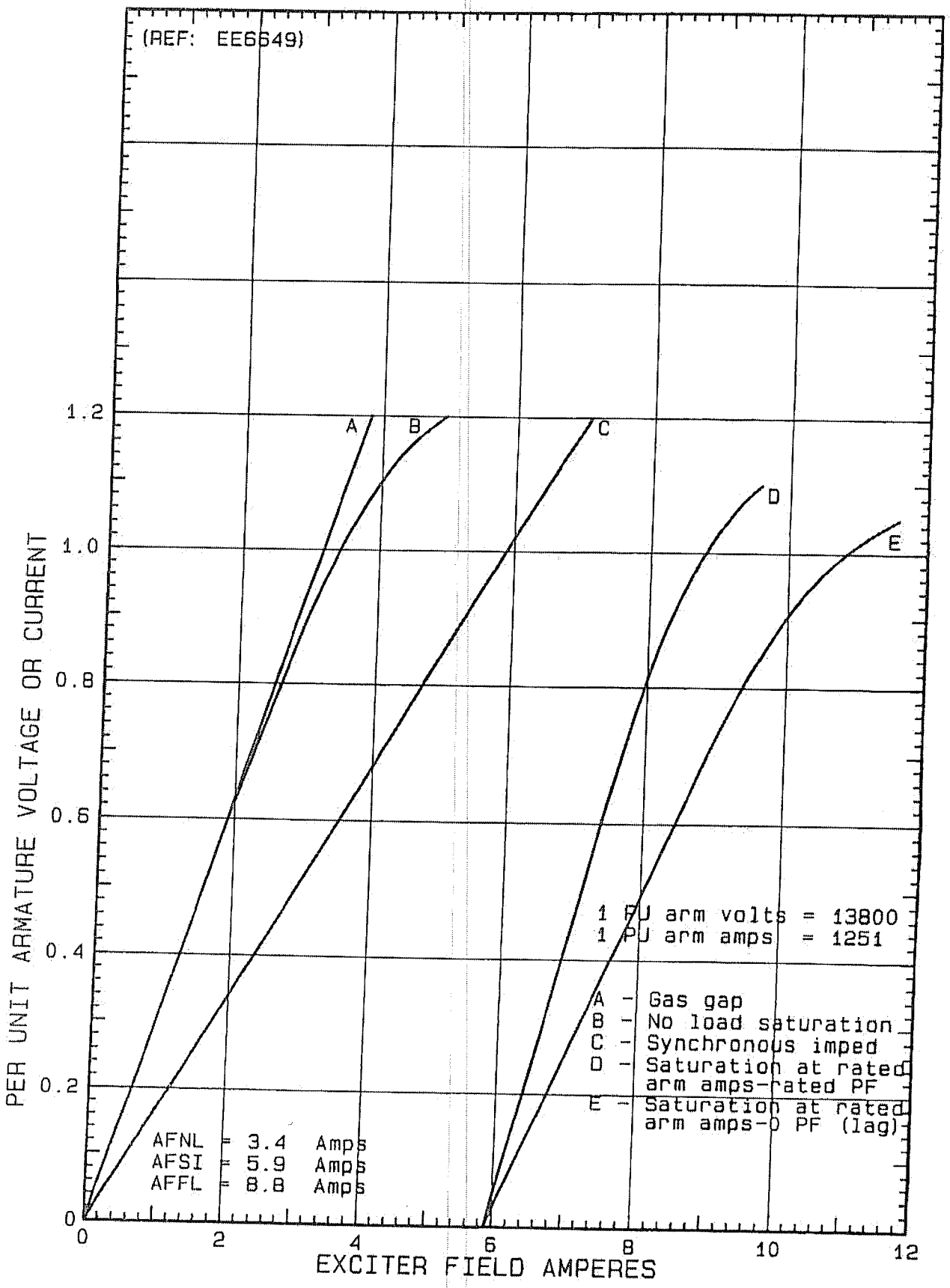
General Electric Company
One River Road, Schenectady, NY 12345
518 • 385 • 2211 TX: 145354

29900 kVA — 3600 RPM — 13800 VOLTS — 0.90 PF
0.57 SCR — 280 FT ALT — 250 FLD VOLTS



ESTIMATED REACTIVE CAPABILITY CURVES

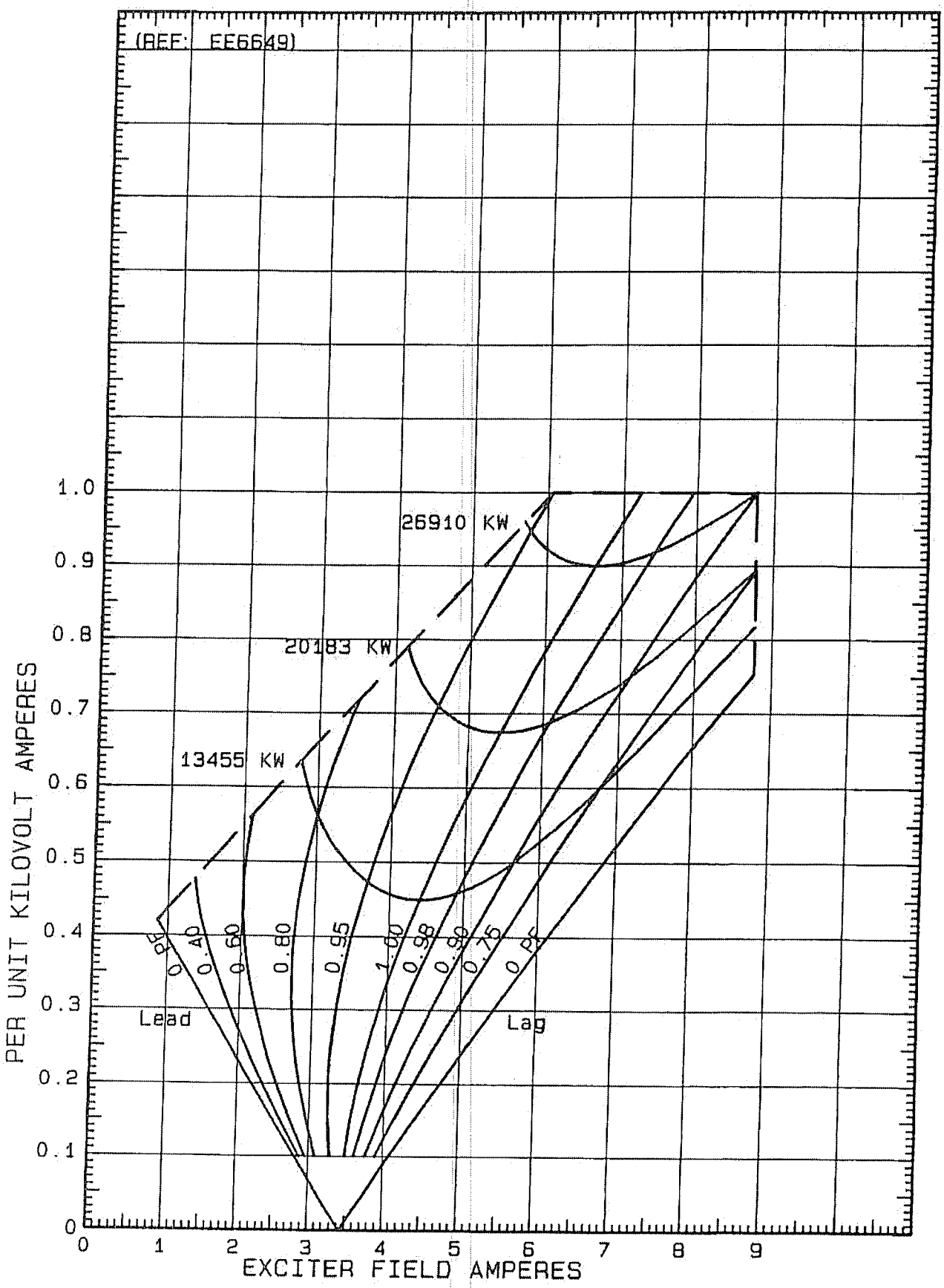
29900 kVA — 3600 RPM — 13800 VOLTS — 0.90 PF
0.57 SCR — 280 FT ALT — 250 FLD VOLTS



ESTIMATED SATURATION AND SYNCHRONOUS IMPEDANCE CURVES

BASED ON TEST[illegible]

29900 kVA — 3600 RPM — 13800 VOLTS — 0.90 PF
0.57 SCR — 280 FT ALT — 250 FLD VOLTS



ESTIMATED EXCITATION V CURVES

GRAHAM MFG. CO., INC.

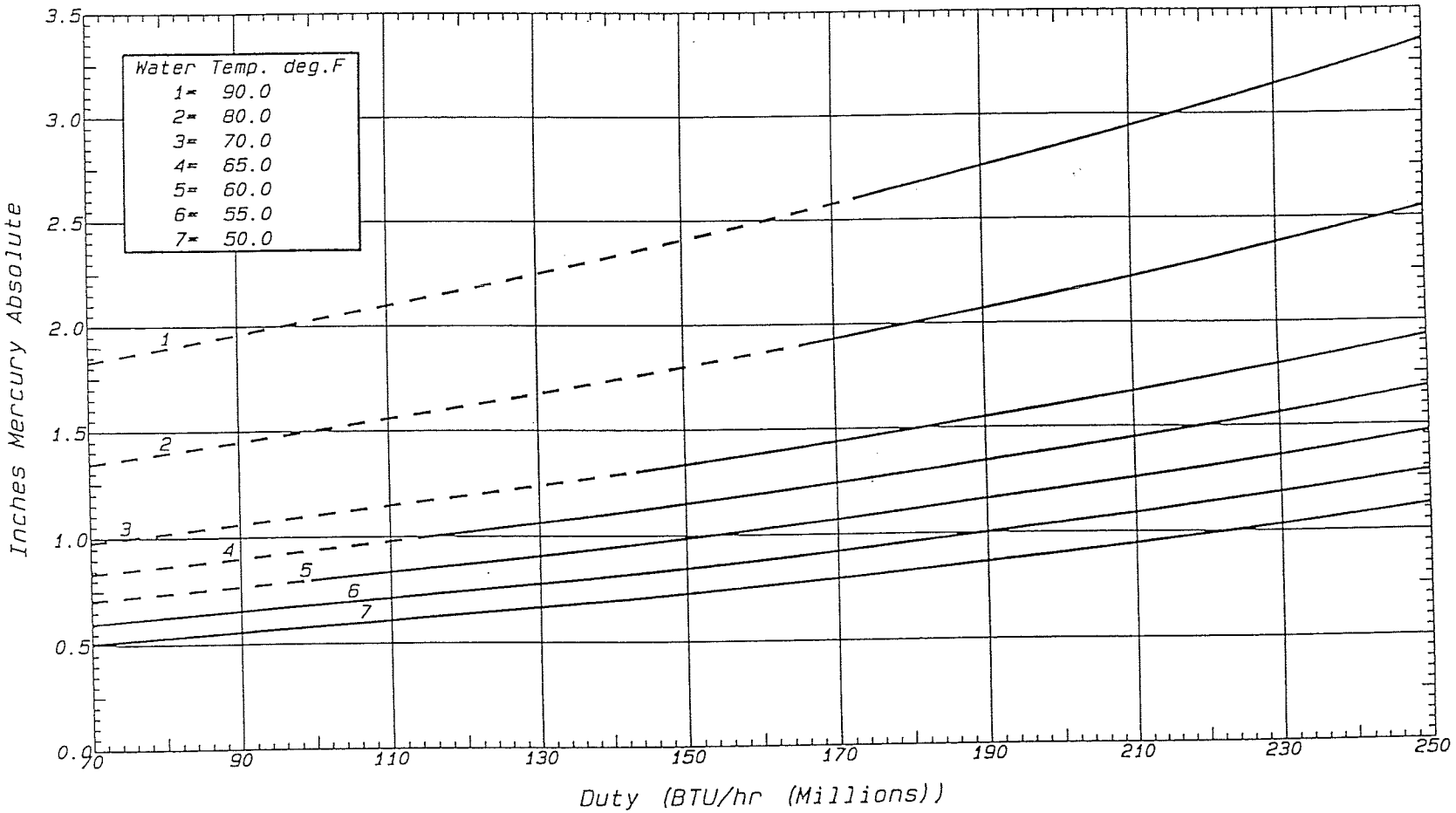
PREDICTED CONDENSER PERFORMANCE

4/6/93

Engineer: RTS

Model 86108 / 27.75TBTD
Surface Area (sq.ft.) 30023.7
Water Flow Rate (gpm) 22326.0

Dashed lines indicate less than HEI requirement of a 5 deg.F approach.



ATTACHMENT B CIRCULATING WATER PUMPS

PUMP DATA SHEET

1.	Pump Name/Equipment No.	28HOOD-1STAGE	
2.	Manufacturer, Type, Model, Size, Quantity	BWIP INTL. INC	BYRON JACKSON PUMPS
3.	Flow, Run Out	12830 gpm	15500 gpm
4.	Pressure, Differential, Design Point	58' ft.	34' ft.
5.	Dead Head Pressure		120 ft.
6.	Efficiency, Design Point		87 %
7.	BHP, Design Point/Maximum for Impeller Furnished	216 hp	240 hp
8.	NPSH Required at Design Point	22 ft.	30 ft.
9.	Impeller Diameter, Minimum/Bid/Maximum	16 13/16" in.	17 3/8 in 18 1/4 in.
10.	RPM/Rotation Viewed from Driver End	885 / CCW	
11.	Case Design Pressure/Hydro Test Pressure	> 800 psig	1 1/2 x 50 psig
12.	Minimum Flow to Prevent Overheating	STABLE OPERATION	4000 gpm
13.	Discharge Head Type	3 MITERED ELBOW	3 SEGMENTS
14.	Wearing Ring Material	Ni Al BRONZE	
15.	Packing, Type/Number of Rings/Size	BRAIDED / 5 / 1/2 in.	
16.	Mechanical Seal, Type, Manufacturer, Model	NOT APPLICABLE	
17.	Flexible Coupling, Make/Spacer Type (Yes, No)	BWIP / No	
18.	Shaft Sleeves, Material/Outside Diameter	— / — in.	
19.	Shaft Sleeves Extend Through Gland (Yes, No)	— NONE FURNISHED —	
20.	Coupling Guard (Yes, No)	YES	
21.	Type Bearings, Radial/Thrust	MOTOR ONLY	BALL / ROLLER
22.	Lubrication, Radial/Thrust Bearings	MOTOR GREASE / OIL (MOTOR)	
23.	Lubricators, Type/Capacity	STATIONARY RESERVOIRS	
24.	Suction Connection, Size/Rating/Face	AS SHOWN in. —	lb. ANSI —
25.	Suction Position	VERT	
26.	Discharge Connection, Size/Rating/Face	24" in. 150	lb. ANSI FLANGED
27.	Discharge Position	HORIZONTAL - NOTE DWG.	

P.O. #.

28. Size, Vent/Drain (1/2 in., Minimum) VENT-GAUGE TAP = 1/2" in. _____ in.

29. Minimum Water Level 4'-6" MIN. IN SUMP IS SATISFACTORY in.

30. Cooling Water Required 0 gpm — °F — psig

Motors

31. Motor, HP/Service Factor 250 hp 1.15

32. Motor, RPM 885 rpm

33. Voltage, Phase, Frequency 4000 / 3 / 60

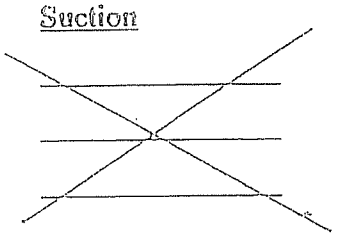
34. Enclosure Type INEAT

35. Motor Weight Including Driver, Actual Shipping 4100 lb. + 200 lb.

Nozzle Loads

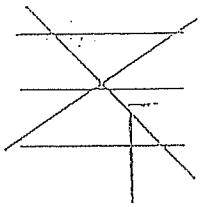
36. Thermal Displacements

	Suction	Discharge
x, in		Nil
y, in		"
z, in		"



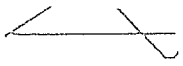
Allowable Forces

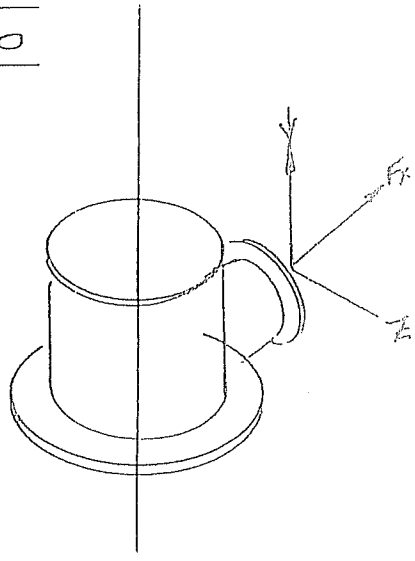
Fx, lb	13,500	INCH-lbs
Fy, lb	2935	
Fz, lb	2935	



Allowable Momen

Mx, ft-lb	0400
My, ft-lb	1400
Mz, ft-lb	400





Date: 9-10-1992 Supplier: BW/IP INTL. INC

Specification No. 202.3

MOTOR DATA SHEET

Driven Load		Equipment #
Supplier/Manufacturer		USEM
Quantity		3
Model/Size		HV4
Frame No.		5808 P
Horsepower, hp (at each speed)		250
Rated Voltage, V		4160
Service Factor		1.15
Enclosure Type		WP I
Type:	Single Speed	X
	Two Speed Single Winding	
	Other	
Full Load Speed, RPM		887
Full Load Current, A		36
Locked Rotor Current, A		198 Space
Htrs., Watts (If specified)		384 Net
Weight, lb		4100 lbs. Full
Load Torque in lb-ft		1481 lb. ft. ~~Mounting~~
Arrangement		VSS Description
of Insulation System		F W/B Insulation
Class (B,F,H)		
Bearing Type		angular contact
P.F.-Full Load		78.5
Eff.-Full Load, %		93.4
Locked Rotor Code Letter		G

Following information required only for motors greater than 100 Horsepower:

Eff.-3/4 Load, %	93.8
Eff.-1/2 Load, %	93.2
Eff.-Full Load, %	93.4
P.F.-3/4 Load	73.5

Revision B

SHT 2B-7

P.F.-1/2 Load	63.0
P.F.-Full Load	78.5
P.F. At Starting	
Starting Torque, % FL	to follow
Pull-Out Torque, % FL	to follow
Permissible Starts Per Hr With:	
Motor At Ambient Temp.	2
Motor At Rated Total Temp.	1
Description of Insulation System	VPI
Full Load Temp. Rise	80°C @ 1.0
Insulation Class (B,F,H)	F
Accel. Time, Fully Loaded	
With 100% V, Sec.	to follow
With 80% V, Sec.	to follow
With % V, Sec.	to follow
Stall Time, hot, at 100% Voltage, Sec.	12-15 sec.
Stall Time, cold, at 100% Voltage, Sec.	
WK^2 of Rotor, LB-Ft^2	
Sound Level, DB	85 dBA @ 5 ft.

For Motors Over 250 Horsepower:

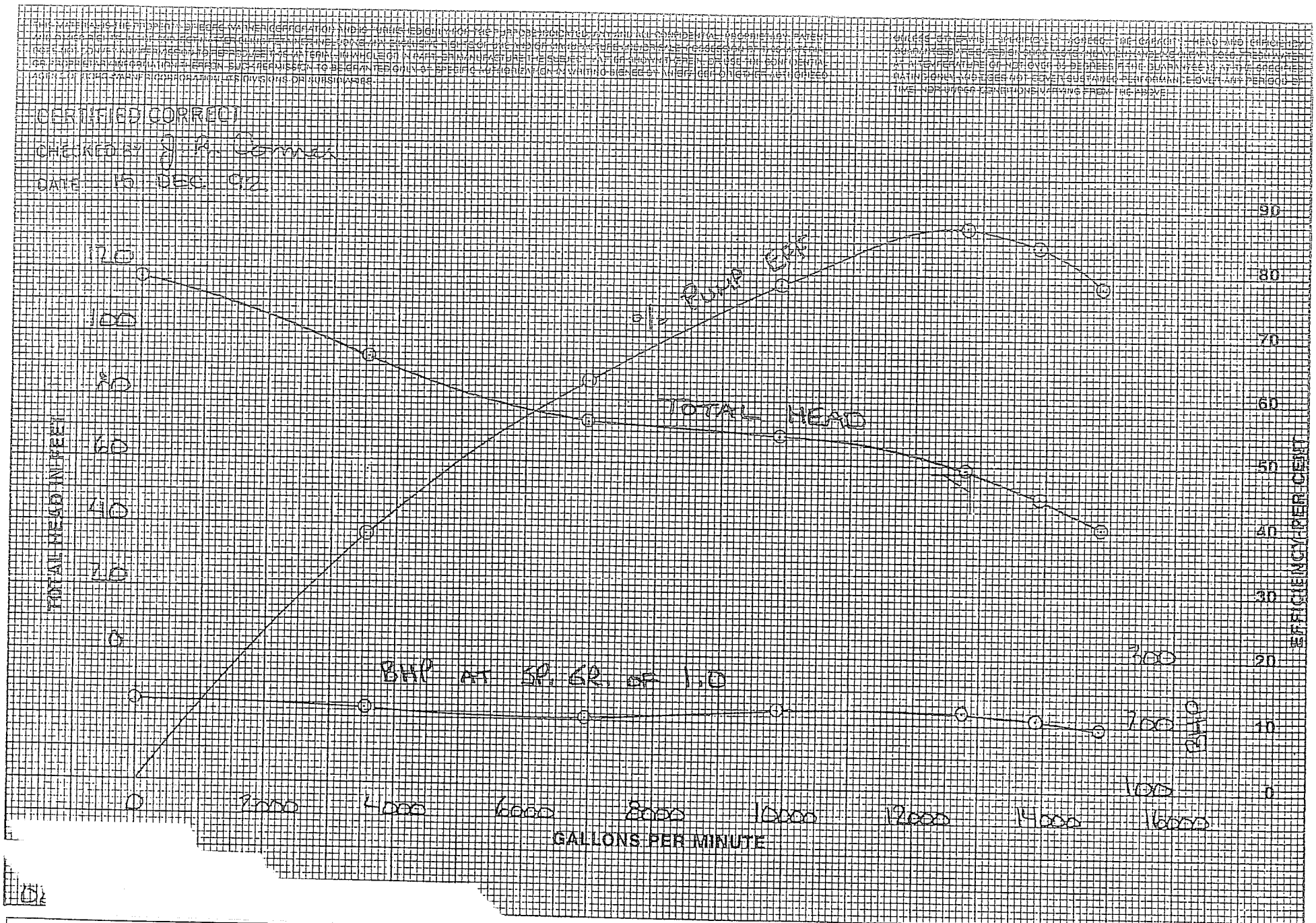
Short Circuit AC Time Constant, Sec.	
X/R Ratio	
Winding Temperature Device	

Accessories:

RTD's in windings	100 OHM PLAT.
Thermal switch in winding	
Winding thermistor	

P-201

BYRON · JACKSON



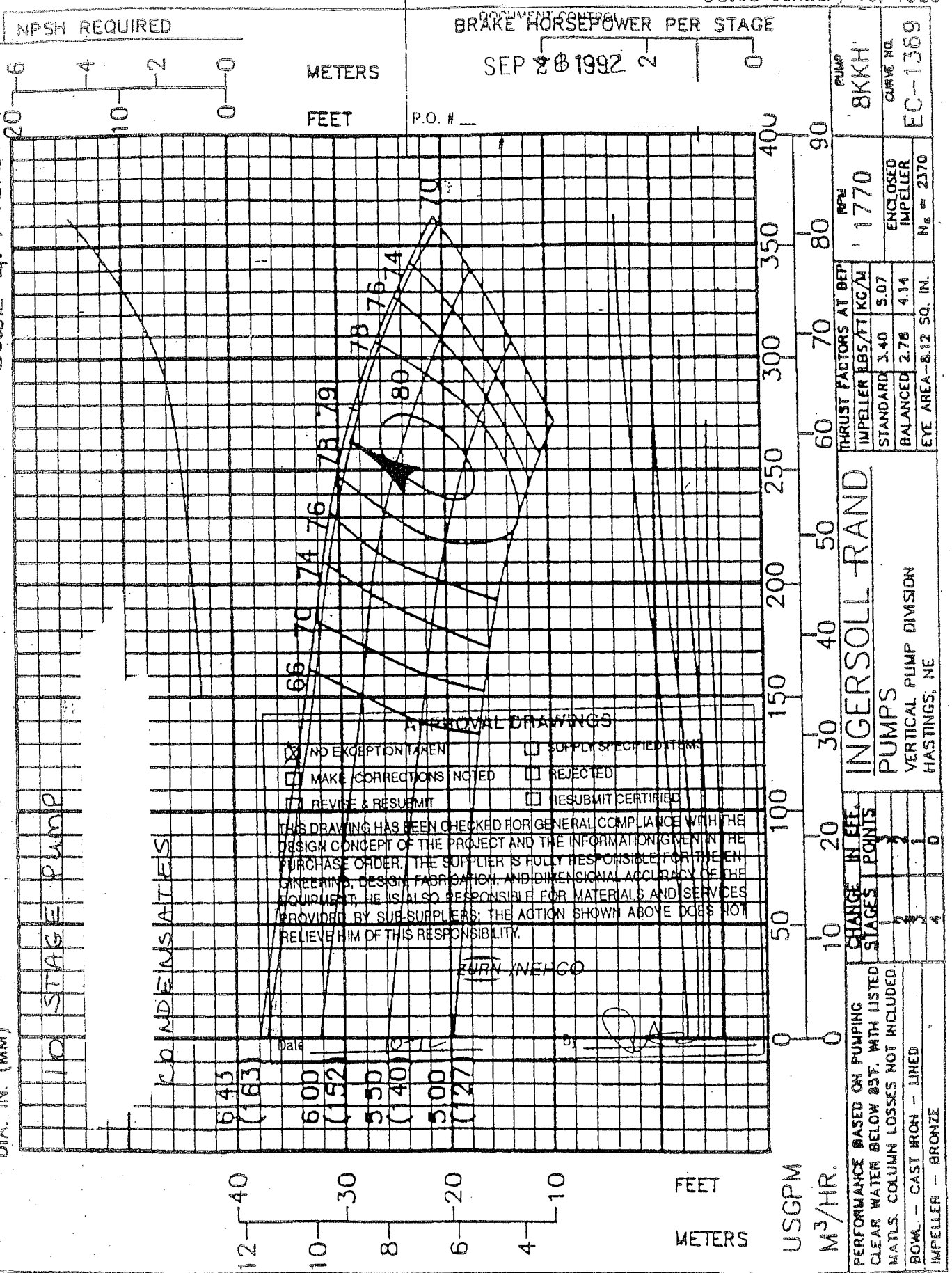
PUMP SIZE AND TYPE		RPM	IMPELLER				BYRON JACKSON TEST
28HQO-D	1 STAGE VERTICAL	885	28HQO	17 1/4" DIA	UNDER } FILED TO 1/16 x 2 1/2		T-41144
			DATE 14 DEC 92	DATA BY MA	DRAWN BY MA		

INGERSOLL RAND PUMPS

VERTICAL PUMPS

7155.00
New Sheet
Dated January 16, 1989

P.O. # ___



MATERIAL CORRECTIONS TO 263 GPM @ 288.6 FT. = 73.6% CORRECTED

CONDENSATE EXTRACTION PUMPS

10 STAGE PUMP

INDEMNIFIES

APPROVAL DRAWINGS

- [X] NO EXCEPTION TAKEN
- [ ] MAKE CORRECTIONS NOTED
- [ ] REVISE & RESUBMIT
- [ ] SUPPLY SPECIFIED ITEMS
- [ ] REJECTED
- [ ] RESUBMIT CERTIFIED

THIS DRAWING HAS BEEN CHECKED FOR GENERAL COMPLIANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND THE INFORMATION GIVEN IN THE PURCHASE ORDER. THE SUPPLIER IS FULLY RESPONSIBLE FOR THE ENGINEERING, DESIGN, FABRICATION, AND DIMENSIONAL ACCURACY OF THE EQUIPMENT. HE IS ALSO RESPONSIBLE FOR MATERIALS AND SERVICES PROVIDED BY SUB-SUPPLIERS. THE ACTION SHOWN ABOVE DOES NOT RELIEVE HIM OF THIS RESPONSIBILITY.

RETURN XNEHCO

Date ___ By ___

INGERSOLL-RAND PUMPS
VERTICAL PUMP DIVISION
HASTINGS, NE

THRUST FACTORS AT BEP		
IMPELLER LBS/FT	KG/M	
STANDARD	3.40	5.07
BALANCED	2.78	4.14
EYE AREA = 8.12 SQ. IN.		

RPM 1770
ENCLOSED IMPELLER
N_s = 2370

PUMP 8KKH
CURVE NO. EC-1369

CHANGE IN EFF. POINTS	STAGES
1	3
1	2
1	1
4	0

PERFORMANCE BASED ON PUMPING CLEAR WATER BELOW 85°F. WITH LISTED MATLS. COLUMN LOSSES NOT INCLUDED.

BOWL – CAST IRON – LINED
IMPELLER – BRONZE