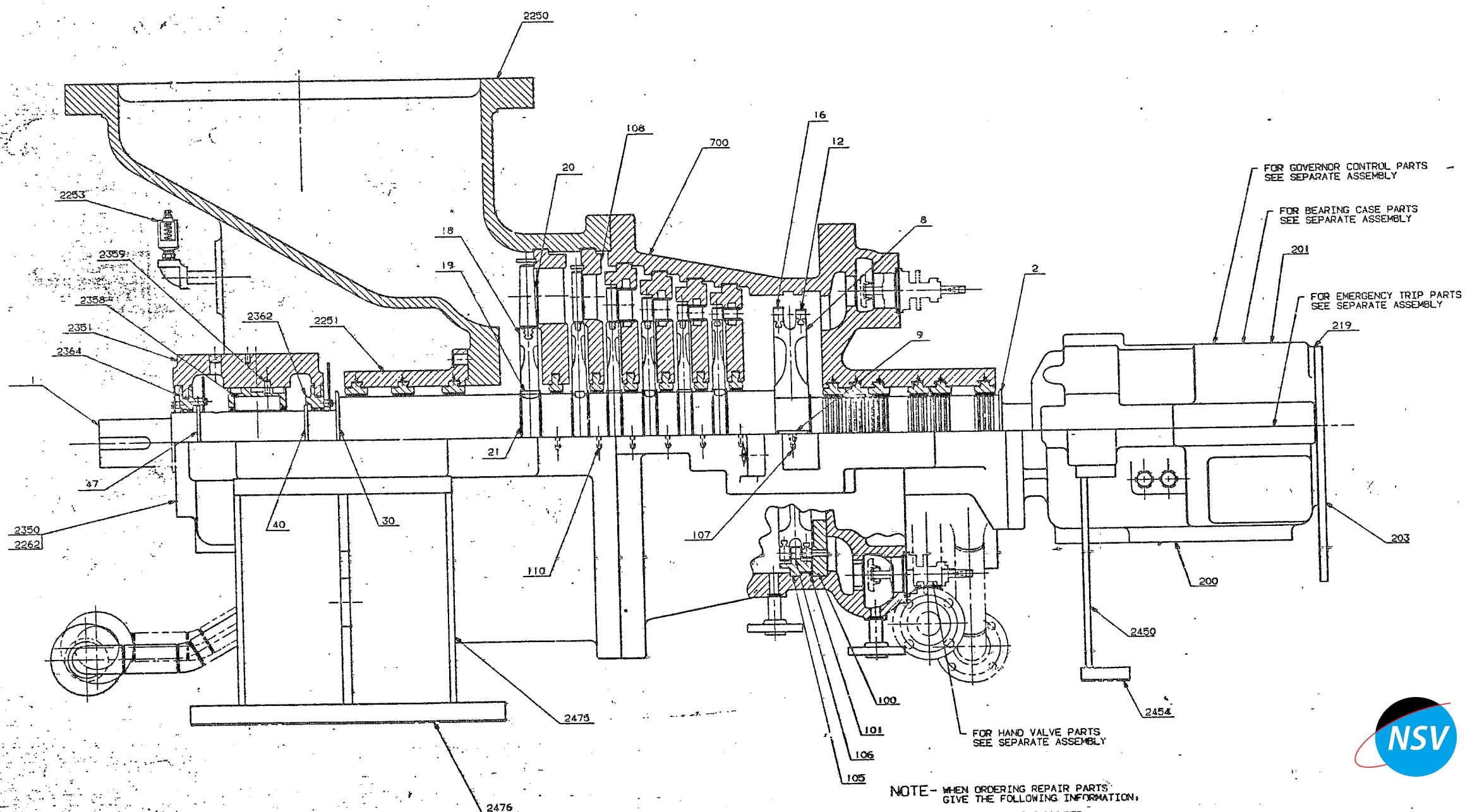


CAT. NO.	NAME OF PART	CAT. NO.	NAME OF PART	CAT. NO.	NAME OF PART	CAT. NO.	NAME OF PART
1	SHAFT - TURBINE			200	CASE - STEAM END BEARING	2350	CASE - EXHAUST END BEARING
2	SLINGER - STEAM END PACKING	40	SLINGER - OIL (INNER)	201	CAP - STEAM END BEARING CASE	2351	CAP - EXHAUST END BEARING CASE
8	WHEEL - CURTIS	47	SLINGER - OIL (OUTER)	203	COVER - END	2358	BEARING - EXHAUST END
9	KEY - CURTIS WHEEL			219	GASKET - END COVER	2359	STOP - EXHAUST END BEARING
12	BUCKETS, SPACERS, SHROUD - 1 <sup>ST</sup> ROW CURTIS	100	RING - NOZZLE	700	CASE - STEAM END	2362	BAFFLE - OIL (INNER)
16	BUCKETS, SPACERS, SHROUD - 2 <sup>ND</sup> ROW CURTIS	101	CAULKING STRIP				
18	WHEEL - RATEAU (SPECIFY STAGE)	105	RING - GUIDE BLADING	2250	EXHAUST END		
19	KEY - RATEAU (SPECIFY STAGE)	106	BUCKETS, SPACERS, SHROUD - GUIDE BLADING	2251	PACKING - EXHAUST END	2364	BAFFLE - OIL (OUTER)
20	BUCKETS, SPACERS, SHROUD - RATEAU (SPECIFY STAGE)	107	STOP - GUIDE BLADING RING	2253	VALVE - SENTINEL	2450	SUPPORT - STEAM END
21	RING - LOCATING (SPECIFY STAGE)	108	DIAPHRAGM (SPECIFY STAGE)	2262	SHTM - EXHAUST END TO EXHAUST END BEARING CASE	2454	SHIM - STEAM END SUPPORT
30	SLINGER - EXHAUST END PACKING	110	STOP - DIAPHRAGM			2475	SUPPORT - EXHAUST END
						2476	SHIM - EXHAUST END SUPPORT



**SECTION - TURBINE LONGITUDINAL**

NOTE - WHEN ORDERING REPAIR PARTS GIVE THE FOLLOWING INFORMATION:  
 1. THIS DRAWING NUMBER.  
 2. CATALOG NUMBER & NAME OF PART.  
 3. SIZE, TYPE & SERIAL NUMBER OF UNIT.

MST-56 (S4 CASE) 30"-125# FF UP EXHAUST  
 6,000 LABY/7,250 LABY  
 SEB-1 S.E. BRG. CASE & EEB-1 E.E. BRG. CASE  
 ORION TPJ BEARINGS, MANUAL HANOVVALVES  
 GLAND SEAL & CONDENSOR SYSTEM

THIS DRAWING IS CONFIDENTIAL AND SHOULD BE KEPT AS SUCH. IT IS THE PROPERTY OF ORION-AND COMPANY AND IS LOANED TO THE RECIPIENT. CONFIDENCE IN THE RECEIVED BY RETURNING IT TO THE ORIGINATOR. IT IS NOT TO BE REPRODUCED, COPIED, OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF ORION-AND COMPANY. ALL COPIES THEREOF TO BE DESTROYED.



SECTION-LONGITUDINAL		E-6012018
DATE: 11-23-56	SCALE: 3/16	FRAME: 56
NO. 1	U-26361	

D-6010298

REV. E-6008170

SHEET 2 OF 2

NOTES:

1. STEAM INLET AND EXHAUST PIPING MUST BE PROPERLY SUPPORTED SO AS NOT TO EXCEED ALLOWABLE FORCES AND MOMENTS GIVEN.
2. EXPOSED STEAM PIPING ABOVE 140°F SHOULD BE FIELD INSULATED BY CUSTOMER.
3. INLET CONNECTION CONFORMS TO ANSI B16.5 FOR FACING AND DRILLING REQUIREMENTS.
4. COMPRESSED LENGTH OF SPRING TO BE 4.62.
5. AN EXPANSION JOINT SHOULD BE PLACED IN EXHAUST LINE NEXT TO TURBINE.
6. ALL BOLT HOLES IN FLANGES TO STRADDLE HORIZONTAL AND VERTICAL CENTERLINES UNLESS OTHERWISE SPECIFIED.
7. ALL PIPING CONNECTIONS WILL BE LOCATED PER DRESSER-RAND SHOP SPEC. SS-4000.29.
8. 16 HOLES Ø 1.12 THRU LOWER FLANGE ONLY FOR Ø 1.00 FOUNDATION BOLTS (SEE NOTES 9 & 10).
9. FOUNDATION BOLTS, WASHERS, NUTS AND SLEEVES FURNISHED BY OTHERS.
10. ALL FOUNDATION BOLTS SHOULD NOT BE RIGIDLY LOCATED UNTIL UNIT IS IN PLACE ON FOUNDATION AS BOLT HOLES IN BASEPLATE MAY VARY .25 IN ANY DIRECTION.
11. STEAM END SUPPORT TO BE DOWELED TO BASEPLATE AFTER FINAL ALIGNMENT IN FIELD. 2-#10 P&W TAPER DOWELS FURNISHED BY DRESSER-RAND.
12. EXHAUST END SUPPORT TO BE DOWELED TO BASEPLATE AFTER FINAL ALIGNMENT IN FIELD. 4-#8 P&W TAPER DOWELS FURNISHED BY DRESSER-RAND.
13. GEAR TO BE DOWELED TO BASEPLATE AFTER FINAL ALIGNMENT IN FIELD. (2) 1/2" STRAIGHT DOWELS FURNISHED BY DRESSER-RAND.
14. GENERATOR TO BE DOWELED TO BASEPLATE AFTER FINAL ALIGNMENT IN FIELD. 2-#8 P&W TAPER DOWELS FURNISHED BY DRESSER-RAND.
15. TURBINE MUST BE ALIGNED PRIOR TO START-UP.
16. 6 HOLES 1"-8 UNC-3B TAP FOR VERTICAL POSITIONING, 2 IN STEAM END SUPPORT, 4 IN EXHAUST END SUPPORT. SCREWS FURNISHED BY DRESSER-RAND.
17. 4 HOLES 1/2"-13 UNC-3B TAP FOR VERTICAL POSITIONING IN GEAR CASE. SCREWS FURNISHED BY DRESSER-RAND.
18. 4 HOLES 3/4"-10 UNC-3B TAP FOR VERTICAL POSITIONING IN GENERATOR. SCREWS FURNISHED BY DRESSER-RAND.
19. 28 PROVISIONS FOR HORIZONTAL POSITIONING, 2 AT STEAM END SUPPORT, 8 AT EXHAUST END SUPPORT, 10 AT GEAR CASE AND 8 AT GENERATOR. 6 REMOVABLE BLOCKS WITH 1"-8 UNC SCREWS FURNISHED BY DRESSER-RAND.

20. SHIMS FURNISHED BY DRESSER-RAND.
21. ALLOW FOR GROUT.
22. 20 HOLES Ø 4.00, FOR GROUTING.
23. CUSTOMER TO PROVIDE ADEQUATE SUPPORT ALONG ALL BEAMS OR FOUNDATION TO BE SO BUILT AS TO SUPPORT ALL BEAMS.
24. 6 LIFTING LUGS PROVIDED. LUGS MUST BE USED FOR LIFTING UNIT.
25. PROVISION FOR LIFTING UPPER HALF OF TURBINE CASE ONLY.
26. THIS DIMENSION INCREASES BY 18.00 WHEN REMOVING UPPER HALF OF TURBINE CASE.
27. PROVISION FOR LIFTING UPPER HALF OF GEAR CASE ONLY.
28. THIS DIMENSION INCREASES BY 14.50 WHEN REMOVING UPPER HALF OF GEAR CASE.
29. HIGH SPEED COUPLING - AMERIGEAR FE 203 WITH A 5.00 D.B.S.E.
30. LOW SPEED COUPLING - AMERIGEAR FE 404 WITH A 5.00 D.B.S.E.
31. DISTANCE BETWEEN SHAFT ENDS.
32. DISTANCE BETWEEN SHAFT ENDS. THE TOLERANCE FOR THIS DIMENSION WITH THE TURBINE AND GEAR AT MID-FLOAT IS ±.005.
33. HIGH SPEED COUPLING GUARD.
34. LOW SPEED COUPLING GUARD.
35. CONTOUR OF STAINLESS STEEL JACKET - SHOWN IN PHANTOM.
36. PIPE CONNECTIONS TO EXTEND A MINIMUM OF 3.00 BEYOND JACKET.
37. HAND VALVES - 6 PROVIDED.
38. APPROXIMATE CENTER OF GRAVITY OF UNIT.
39. DISTANCE REQUIRED TO REMOVE MAIN OIL PUMP.
40. DISTANCE REQUIRED TO REMOVE IMMERSION HEATER.
41. CALCULATED THERMAL MOVEMENTS BASED ON A TRANSITION TO FULL LOAD FROM A COLD START AT 80°F.
42. SHAFT END GROWTH IS AWAY FROM DRIVEN MACHINE ON START-UP, BUT TOWARDS DRIVEN MACHINE AFTER STABILIZING (SEE NOTE 41).
43. SHAFT END RISE EQUALS .007(SEE NOTE 41).

44. DISTANCE REQUIRED TO REMOVE ROTOR ASSEMBLY.
45. 4 COVERED LIFTING SLOTS PROVIDED, 2 IN EACH END OF GENERATOR FOR LIFTING ENTIRE GENERATOR. A FOUR POINT LIFT IS REQUIRED.
46. PROVISION FOR LIFTING GENERATOR TOP COVER ONLY. DO NOT ATTEMPT TO LIFT THE ENTIRE GENERATOR USING THESE.
47. 4-OIL TANK CLEAN OUT HOLES, 1-EACH SIDE AND 2-ON TOP.
48. GENERATOR TERMINAL BOX.
49. DOWNWARD FORCES ARE CONSIDERED POSITIVE. UPWARD FORCES ARE CONSIDERED NEGATIVE. SHORT CIRCUIT TORQUE AS TABULATED IS FIVE TIMES NORMAL TORQUE FOR THE GENERATOR AND THREE TIMES NORMAL TORQUE FOR THE GEAR.
50. 2 PROVISIONS FOR RADIAL VIBRATION PROBES EACH BEARING CASE CAP, 3/4" PIPE TAP - PLUGGED.
51. 2-PROVISIONS FOR AXIAL VIBRATION PROBES IN STEAM END BEARING CASE COVER, 3/4" PIPE TAP - PLUGGED.
52. PROVISION FOR KEYPHASER STEAM END BEARING CASE COVER, 3/4" PIPE TAP PLUGGED.
53. NORMAL OPERATING OIL LEVEL.
54. ADD OIL AT THIS LEVEL.
55. SEE ALSO THE FOLLOWING DRAWINGS:  
ELECTRICAL SCHEMATIC: E-6010371  
ELECTRICAL LAYOUT: E-6010372  
P&I DIAGRAM: A-6010549 & E-6010549  
PIPING-GLAND CONDENSER: D-6011504  
TRIP LOGIC DIAGRAM: D-6010373  
GOVERNOR PROGRAM: E-6010374

P.Q #3837

THIS PRINT IS CERTIFIED CORRECT FOR

HARRISONBURG ELECTRIC COMMISSION

CUSTOMER'S ORDER NO. 3837

BRANCH OFFICE NO. 10-51156

WORK ORDER NO. U-26361

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

AL PLANK JR.

THE CONSTRUCTION SHOWN IS STANDARD FOR THIS MACHINE. ANY DEVIATION FROM STANDARD MAY INVOLVE ADDITIONAL COST, A CORRESPONDING INCREASE IN SELLING PRICE AND DELAY IN SHIPMENT. IF CHANGES ARE NECESSARY INDICATE THEM CAREFULLY AND IN DETAIL ON THIS PRINT AND RETURN TO DRESSER-RAND. YOU WILL BE ADVISED PROMPTLY AS TO THE ADDITIONAL PRICE. MEANWHILE THOSE DETAILS INVOLVED WILL BE HELD UP UNTIL YOUR AUTHORIZATION TO PROCEED IS RECEIVED.

STEAM TURBINE DIVISION

IMPORTANT:  
THIS DRAWING HAS BEEN RELEASED FOR PRODUCTION. ANY CHANGES MAY AFFECT PRICE AND DELIVERY.

OUTLINE NOTES

**DRESSER-RAND**  
STEAM TURBINE DIVISION  
KELSOVILLE, N.C. 28752

DRAWN BY: KGB DATE: 3/22/96

CHECKED: RMS SCALE: NTS

SUPER: BEF FRAME: S/M/T/L/B/E/L

SO: U-26361

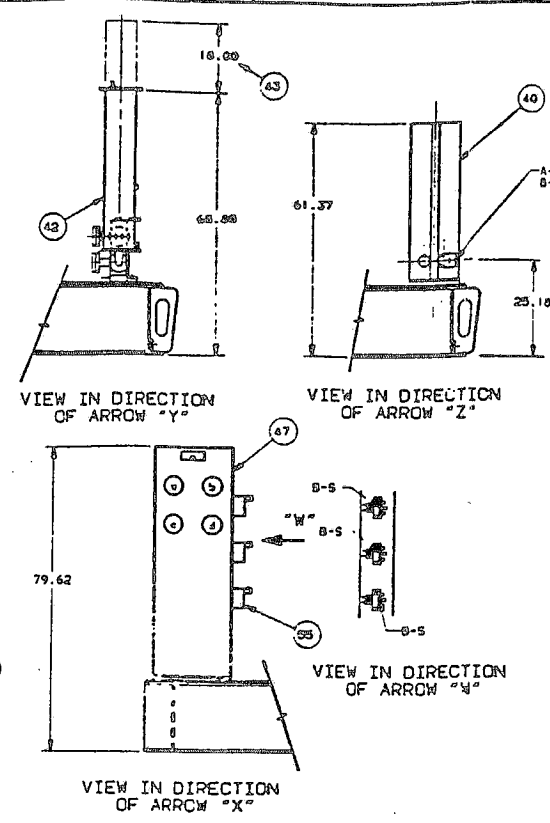
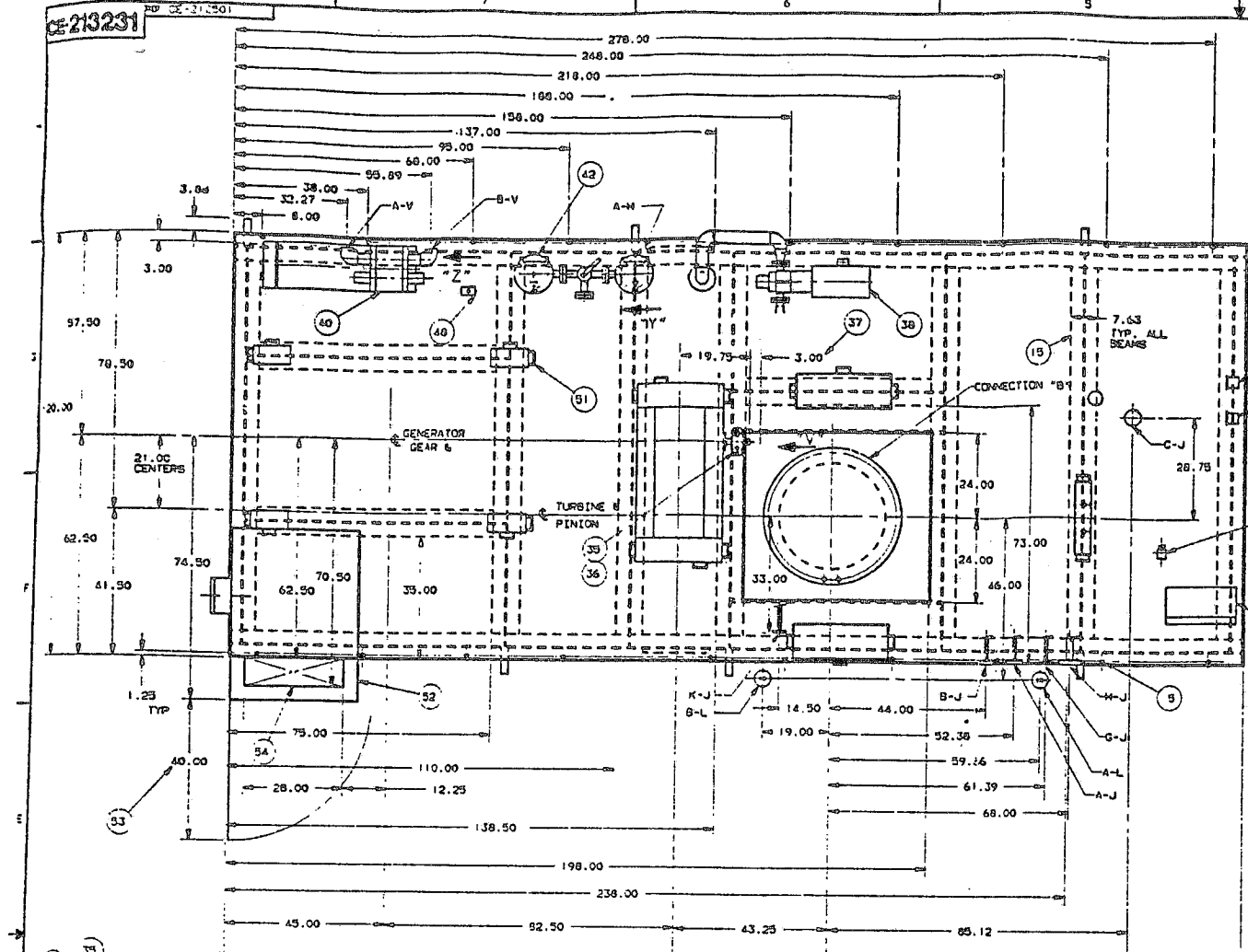
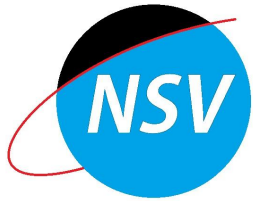
SHEET 2 OF 2

NO CHANGE THIS SHEET SEE SHEET 1 OF 2	NO CHANGE THIS SHEET SEE SHEET 1 OF 2	DELETED LATER FROM NOTES 38(CENTER OF GRAVITY), 41 & 43(THERMAL GROWTH), 44(REMOVAL FOR GEN. ROTOR) & 49(STATIC & DYNAMIC LOADING)	ADDED SHEET 2 OF 2.
D KGB 7/12/96 CK: KGB 7/12/96	C KGB 6/10/96 CK: HLB 6/11/96	B KGB 5/17/96 CK: HLB 5/21/96	A KGB 3/22/96 CK: RMS 4/1/96

CAD IDENT. NO.  
OM150A/6010298D/2/21

D-6010298

1-PILOT REQUIRED



FORM "S" MULTISTAGE STEAM TURBINE  
WITH  
WOODWARD 505 ELECTRONIC GOVERNOR  
DRIVING  
2500 KW, 4,160 VOLTS, 3-PHASE, 60 HZ, .87 PF  
GENERATOR  
THRU  
FORM J-6 GEAR 5636/1800 RPM

APPROXIMATE WEIGHTS LB

TURBINE	11,500
GEAR	7,025
GENERATOR	20,150
BASEPLATE (INCLUDING OIL)	18,500
ACCESSORIES	1,750
TOTAL	58,925

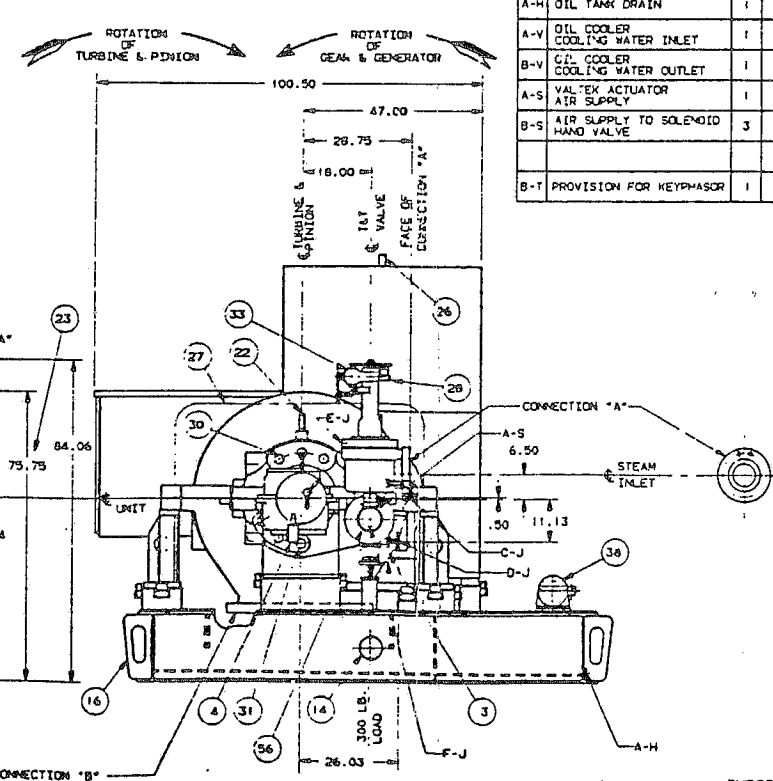
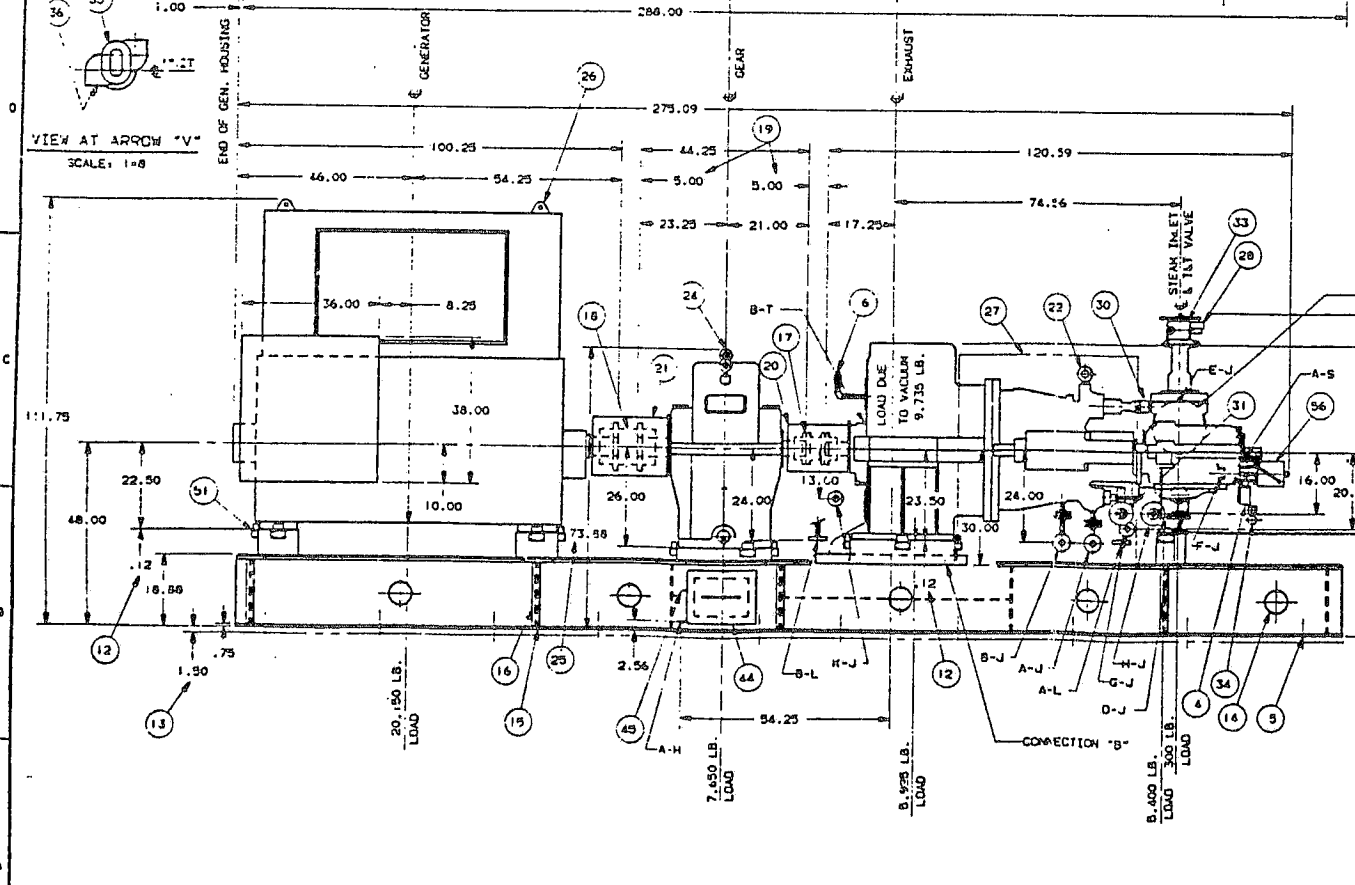
UPPER HALF OF TURBINE CASE 3,099  
TURBINE ROTOR 1,600  
GENERATOR ROTOR 4,250

CUSTOMER'S MAJOR FLANGED CONNECTIONS

FLANGE	SIZE	ANSI	O.D.	B.C.	NO. HOLES	MINIMUM THICKNESS	RAISED FACE	REMARKS	
A	TURBINE INLET	6	600	14.00	11.50	12	1.12	1.88	25 X 8.50 DIA. NOTES 1, 2
B	TURBINE EXHAUST	30	125	39.75	36.00	28	1.35	1.12	NONE NOTES 1, 7

CUSTOMER'S AUXILIARY CONNECTIONS

CONNECTION	NO.	SIZE & TYPE	VALVE REQ'D.	VALVE SUPPLIED BY	PIPE TO	REMARKS
A-J	NOZZLE BOWL DRAIN	1 3/4-6000 ANSI R.F. FLANGE	YES	CUSTOMER	OPEN DRAIN	NOTE 29
B-J	FIRST STAGE DRAIN	1 3/4-6000 ANSI R.F. FLANGE	YES	CUSTOMER	OPEN DRAIN	NOTE 29
C-J	T & T VALVE ABOVE SEAT DRAIN	1 3/4-6000 ANSI R.F. FLANGE	YES	CUSTOMER	OPEN DRAIN	NOTE 29
D-J	T & T VALVE BELOW SEAT DRAIN	1 3/4-6000 ANSI R.F. FLANGE	YES	CUSTOMER	OPEN DRAIN	NOTE 29
E-J	T & T VALVE STEIN LEAKOFF	1 3/4 PIPE TAP	NO		OPEN DRAIN	
F-J	GOVERNOR VALVE STEIN LEAKOFF	1 3/4 PIPE TAP	NO		OPEN DRAIN	
G-J	STEAM END PACKING CASE DRIP DRAIN	1 3/4-1500 ANSI R.F. FLANGE	NO		OPEN DRAIN	NOTE 29
H-J	STEAM END PACKING CASE ATMOSPHERIC LEAKOFF	1 1-1/2-3000 ANSI R.F. FLANGE	YES	CUSTOMER	OPEN DRAIN	NOTE 29
K-J	EXHAUST END PACKING CASE DRIP DRAIN	1 3/4-1500 ANSI R.F. FLANGE	NO		OPEN DRAIN	NOTE 29
A-L	STEAM END PACKING CASE SEALING STEAM SUPPLY	1 3/4-3000 ANSI R.F. FLANGE	YES	DRESSER-RAND		NOTE 29, 50
B-L	EXHAUST END PACKING CASE SEALING STEAM SUPPLY	1 3/4-3000 ANSI R.F. FLANGE	YES	DRESSER-RAND		NOTE 29, 50
A-H	OIL TANK DRAIN	1 3/4 PIPE TAP			PLUGGED	
A-V	OIL COOLER COOLING WATER INLET	1 PIPE TAP	YES	CUSTOMER		NOTE 41
B-V	OIL COOLER COOLING WATER OUTLET	1 PIPE TAP	NO			
A-S	VALTEX ACTUATOR AIR SUPPLY	1 1/4 PIPE TAP				CUSTOMER'S 30 PSIG AIR SUPPLY NOTE 56
B-S	AIR SUPPLY TO SOLENOID HAND VALVE	3 1/4 PIPE TAP	NO			NOTE 55
B-T	PROVISION FOR KEYPHASOR	1 3/4 PIPE TAP				PLUGGED



LIST OF GAUGES

Gauge	DIAL SIZE	DESCRIPTION
a	4.50	INITIAL STEAM PRESSURE
b	4.50	NOZZLE BOWL
c	4.50	FIRST STAGE PRESSURE
d	4.50	EXHAUST PRESSURE
e		NAMEPLATE

MEDINA POWER  
DELEVAN N.Y.  
ITEM 127

IMPORTANT:  
THIS DRAWING HAS BEEN  
RELEASED FOR PRODUCTION.  
ANY CHANGES MAY AFFECT  
PRICE AND DELIVERY.

NOTE: SEE CD-213231 FOR NOTES &  
PIPING CALCULATIONS

NOTES:  
THIS DRAWING AND ALL INFORMATION  
HEREON IS THE PROPERTY OF  
MEDINA POWER AND IS CONFIDENTIAL  
AND MUST NOT BE MADE PUBLIC  
OR COPIED. IT IS SUBJECT TO  
REVISION OR CANCELLATION.

THIS PRINT IS CERTIFIED CORRECT FOR  
AMERGY CORP.

CUSTOMER'S ORDER NO. 122382  
BRANCH OFFICE NO. 11223  
YOUR ORDER NO. 11223  
APPROVED BY: J.F. DATE: 1/11/70  
JEAN FRANKLIN

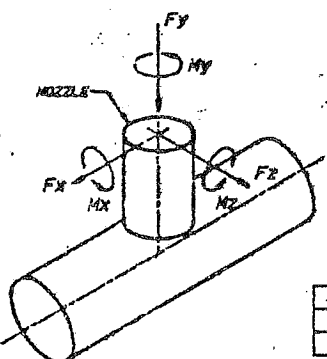
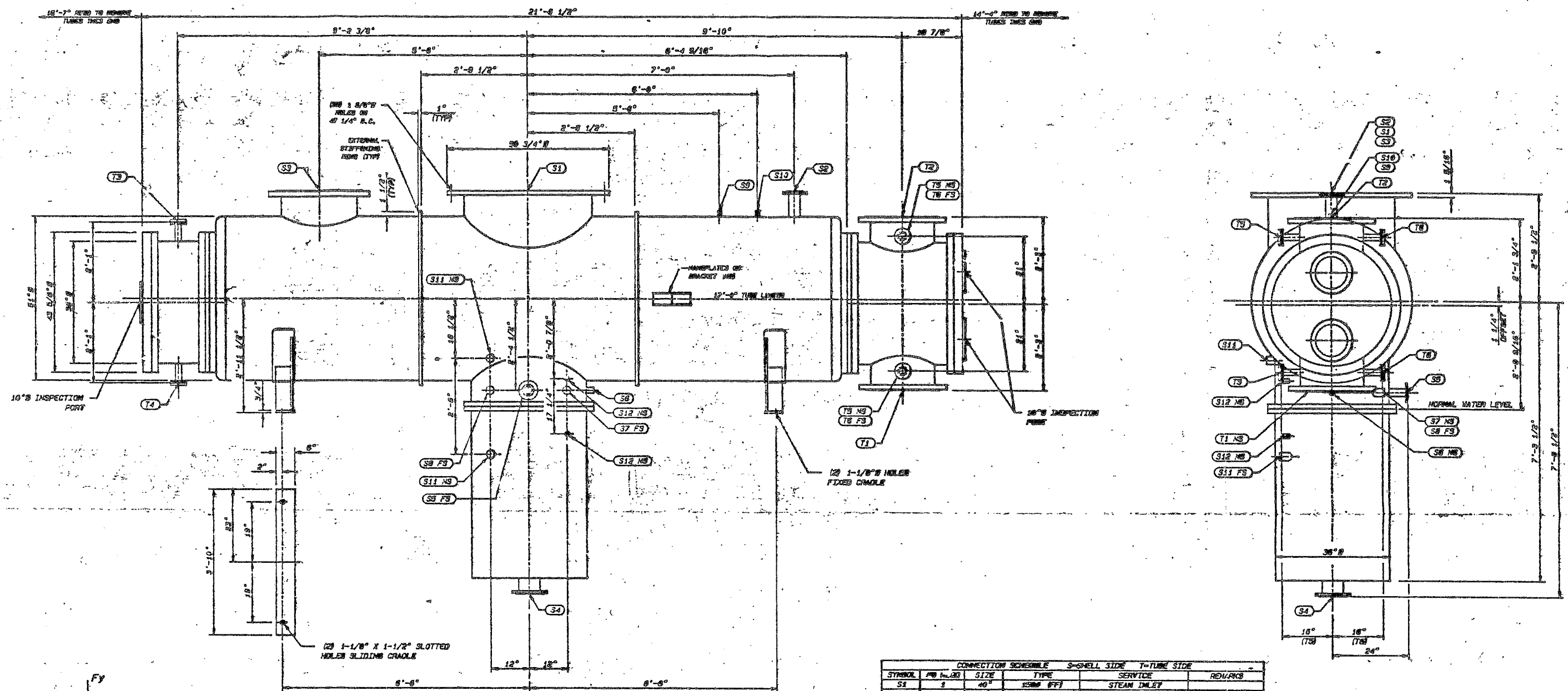
THE CONSTRUCTION shown is standard for this  
machine. ANY DEVIATION FROM STANDARD MAY BE  
AT THE CUSTOMER'S RISK. A CORRECTIVE ORDER  
FOR THE PRICE AND DELIVERY OF THE  
CHANGES AND REVISIONS INDICATED HEREIN  
AND IN DETAIL ON THIS PRINT AND RETURN TO  
THE ORIGINAL DESIGNER. YOU WILL BE ADVISED SEPARATELY  
IF ANY CHANGES ARE NECESSARY. THE  
DETAILS SHOWN ON THIS PRINT ARE SUBJECT TO  
REVISION OR CANCELLATION AS NECESSARY.  
AUTHORITY TO PROCEED IS RECEIVED.

STEAM TURBINE, MOTOR & GENERATOR DIVISION

DATE: 1/11/70  
SCALE: 75%  
DRAWN BY: R.H.  
CHECKED BY: R.H.  
APPROVED BY: C.B.

OUTLINE  
MEDINA POWER  
DELEVAN N.Y.  
ITEM 127

CD-213231  
FILE



MAX. NOZZLE LOADINGS FOR INDICATED CONN'S						
	FORCES (LBS)			MOMENTS (FT-LBS)		
	Fx	Fy	Fz	Mx	My	Mz
31	1770	1770	1770	10427	29498	10427

CONNECTION SCHEDULE						
SYMBOL	NO.	SIZE	TYPE	S-SHELL SIDE	T-TUBE SIDE	REMARKS
S1	1	40"	1500 ANSI (RF)		STEAM INLET	
S2	1	3"	1500 ANSI (RF)		AIR OFFTAKE	
S3	1	24"	1500 ANSI (RF)		A.R.V.	
S4	1	8"	1500 ANSI (RF)		CONDENSATE OUTLET	
S5	1	2"	1500 ANSI (RF)		RECYCLE	
S6	1	1"	NPT (COO)M		RAIN WATER STARTUP	
S7	1	1 1/2"	NPT (COO)M		CONDENSATE INLET	FROM I.C. TRAP
S8	1	1 1/2"	NPT (COO)M		CONDENSATE INLET	FROM A.C. TRAP
S9	1	1/2"	NPT (COO)M		VACUUM GAUGE	
S10	1	3/4"	NPT (COO)M		PUMP YEAT	
S11	2	1 1/2"	NPT (COO)M		LIQUID LEVEL CONTROL	
S12	2	3/4"	NPT (COO)M		GAUGE GLASS	
T1	1	20"	1500 ANSI (RF)		WATER INLET	
T2	1	20"	1500 ANSI (RF)		WATER OUTLET	
T3	1	1 1/2"	1500 ANSI (RF)		VENT	W/BLIND FLANGE
T4	1	1 1/2"	1500 ANSI (RF)		DRAIN	W/BLIND FLANGE
T5	2	1 1/2"	1500 ANSI (RF)		PRESSURE INDICATOR	W/BLIND FLANGE
T6	2	1 1/2"	1500 ANSI (RF)		THERMOMETER	W/BLIND FLANGE

CUSTOMER - ORDERED AS SHOWN  
 CUSTOMER ORDER NO. - T-383616  
 DESIGN - ASME SECTION VIII DIV 1 1985 EDITION  
 CONSTRUCTION - ASME  
 INSPECTION - ASME  
 STAMPING - ASME - TUBESIDE ONLY  
 PAINTING - EXTERNAL CARBON STEEL SURFACES  
 SURFACE PREPARATION - GRAHAM STD  
 PAINTS - INTERMEDIATE IC-6888 RED OXIDE PRIMER

NOTES:  
 1) BOLT HOLES STRADDLE C.L.'S.  
 2) ALL N.P.T. CONNECTIONS ARE FEMALE TAPERED PIPE THREAD.  
 3) CONNECTION FLANGES ARE ANSI STD. DRILLING & THICKNESS UNLESS OTHERWISE NOTED.  
 4) SAFETY DEVICES OR OVER-PRESSURE PROTECTION SHALL BE PROVIDED PRIOR TO PLACING VESSEL IN SERVICE.  
 5) DIMENSIONAL TOLERANCES UNLESS OTHERWISE NOTED: TENS STD.  
 6) EJECTOR PACKAGE MOUNTED ON SURFACE CONDENSER.  
 7) INTERIOR INTERIORS TO BE COAL TAR EPOXY COATED.

OPTIONAL LIST:  
 SURFACE CONDENSER - D-47187-8  
 EJECTOR PACKAGE - D-47187-13  
 ACCESSORY LIST - A-47187-23  
 A.R.V. - A-47187-33

EST'D. WTS. (LBS.)  
 EMPTY - 26,000  
 FLOODED - 46,630  
 OPERATING - 26,000

CERTIFIED CORRECT  
 GRAHAM MFG. CO., INC.  
 A.V. McLaughlin

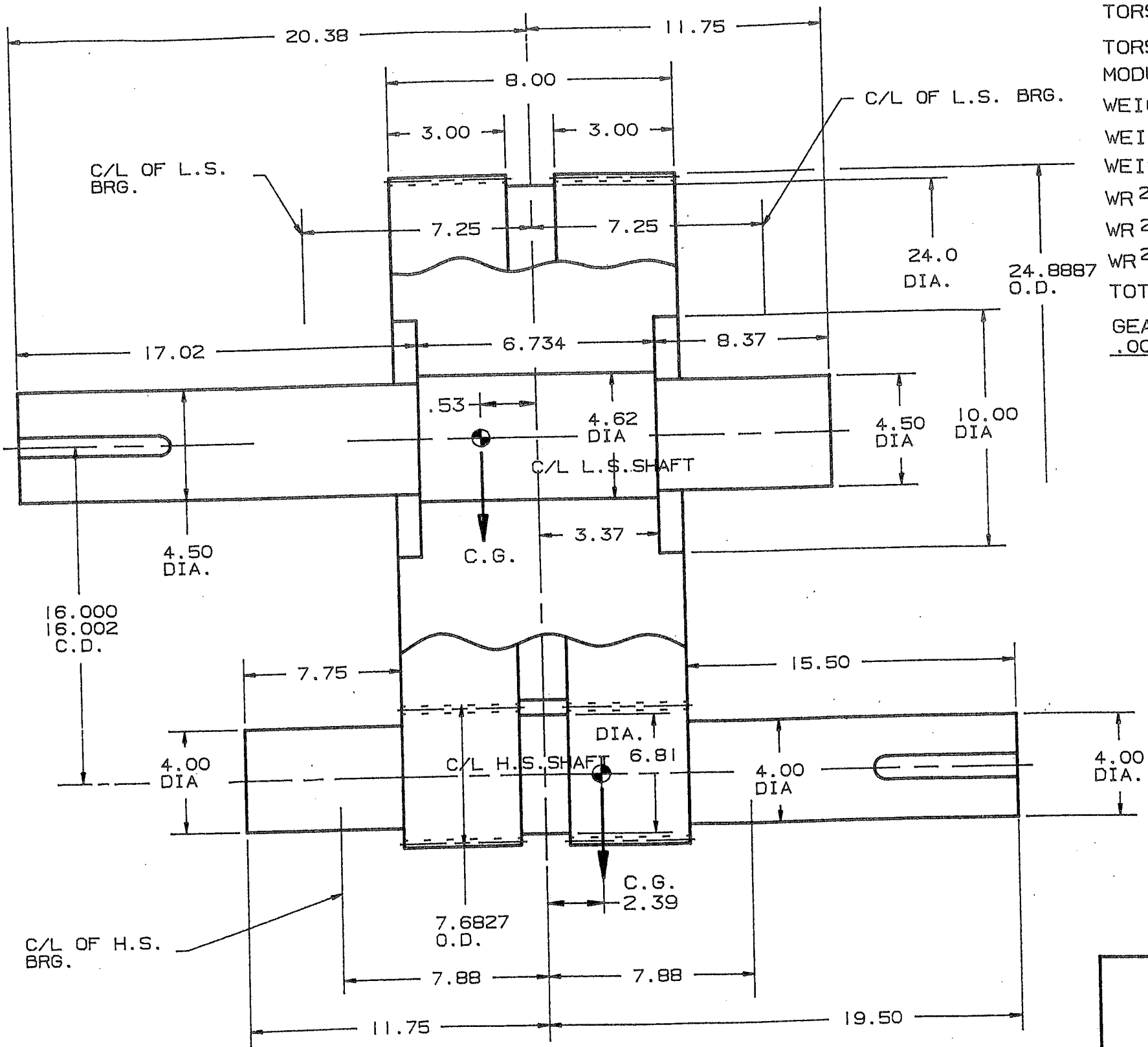
N.A.S.P. P.S.I.B.S.	DESIGN TEMP (°F)	WINDS TEST PRESS. (P.S.I.B.S.)	CORR. ALLIG. (DIMENSIONS)
SHELL SIDE	FV 6 15	200	FLOODED 0.6863"
TUBE SIDE	120	1.6	267.5 0.6863"

A		B		C		D	
REV.	DESCRIPTION	MADE	CHKD	DATE	SCALE	OSB/ORM	CHKD/APPD
	ADDED NOZZLE LOADS FOR S1						
	ORIGINAL DESIGN						

DATE: 03/12/96  
 Dwg. No.: D-47187-1  
 REV: A

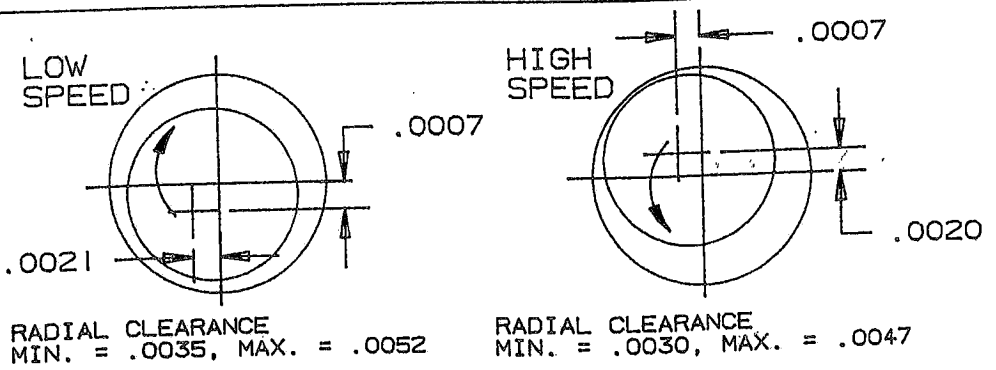
GRAHAM MANUFACTURING CO., INC.  
 20 FLORENCE AVE. BATAVIA, NEW YORK

SURFACE CONDENSER



TORSIONAL STIFFNESS OF H.S. PINION SHAFT -  $18.65 \times 10^6$  INCH LBS/RADIAN  
 TORSIONAL MESH STIFF. AT H.S. SHAFT  $238 \times 10^6$  INCH LBS/RADIAN  
 TORSIONAL STIFFNESS L.S. SHAFT  $27.20 \times 10^6$  INCH LBS/RADIAN  
 MODULUS OF RIGIDITY OF L.S. SHAFT -  $12 \times 10^6$  PSI  
 WEIGHT OF L.S. SHAFT - 147 LBS.  
 WEIGHT OF L.S. GEAR - 1042 LBS  
 WEIGHT OF H.S. PINION SHAFT - 181 LBS  
 WR<sup>2</sup> FOR L.S. GEAR - SHAFT ASSY - 569 LB FT<sup>2</sup>  
 WR<sup>2</sup> FOR H.S. PINION SHAFT - 5.80 LB FT<sup>2</sup>  
 WR<sup>2</sup> TOTAL AT H.S. SHAFT - 57.3 LB FT<sup>2</sup>  
 TOTAL BACKLASH - .0136 TO .0096  
 GEAR DRIVE WILL EXPAND APPROX. .0097 VERTICALLY AND .0071 HORIZONTALLY DUE TO TEMPERATURE RISE OF 70 °F

GEAR DATA		
	PINION	GEAR
SERV. HORSEPOWER	2500 KW	
RPM	5987	1800
RATIO	3.3261 : 1	
NO. TEETH	46	153
PITCH DIA.	7.3970	24.6030
PITCH NORM.	7	
HELIX ANGLE	27° 19' 41"	
PRESS. ANGLE	20°	
MATERIAL	4150H	
HEAT TREAT	390 - 410	360 - 380



JOURNAL BEARING OPERATING ECCENTRICITYS  
LOOKING AT L.S. SHAFT EXT'N. SIDE OF UNIT

CUSTOMER: DRESSER RAND CO.  
 WELLSVILLE, N.Y.  
 P.O. #T-26361-5, QTY. 1  
 PART #6010241  
 FOR: CITY OF HARRISONBURG,  
 VIRGINIA

NUTTALL GEAR G.O. NO. - NC 236B IT.1  
 NUTTALL GEAR S.O. NO. - 96R60785  
 UNIT SIZE - SD 16-6L  
 H.P. - 2500 KW  
 S.F. - 1.3  
 RPM IN 5987  
 RPM OUT 1800  
 CW ROT. FACING L.S. SHAFT.  
 R.H. ASSY.  
 RATIO 3.3261 : 1

**noc Nuttall Gear Corporation**

**TITLE MASS ELASTICITY DATA, GEAR DATA & BEARING ECCENTRICITY DATA**

B205970

DIMENSIONS IN INCHES-SCALE NTS.

DFTM. D. KNOWL 1/31/96 APPD. OPS 2/14/96

WIL 2-14-96 APPD.

APPD.

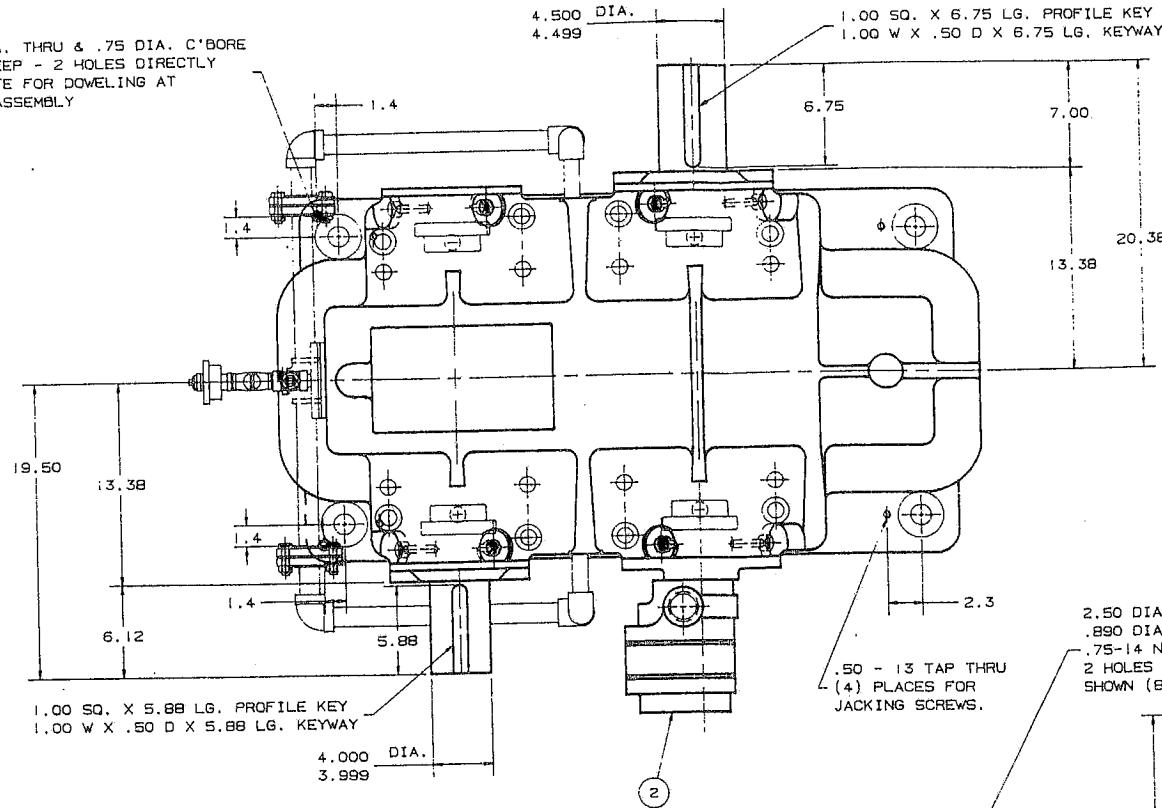
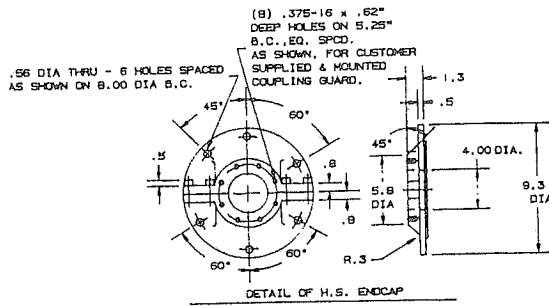
**B206060**

NIAGARA FALLS, NEW YORK 14302

ACCESSORIES-

- 1.) GLOBE VALVE WITH LOCKSHIELD IS FACTORY PRESET FOR 10 TO 15 PSIG TO SPRAY. (GLOBE VALVE HANDLE IS MOVED AND SHAFT IS CAPPED OFF PRIOR TO SHIPMENT)
- 2.) SHAFT DRIVEN PUMP - BROWN & SHARP MODEL #537  
38 GPM @ 50 PSI & 1800 RPM.  
ROTATION IS CW, 1.5" INLET, 1.5" OUTLET.
- 3.) 'ASHCROFT' BI-METAL 5.0" DIA. DIAL TYPE THERMOMETER WITH 0° TO 200°F (-20 TO 90°C) DUAL SCALE LOCATED AT EACH BEARING. MODEL #50E160L-060
- 4.) PROVISIONS FOR MOUNTING CUSTOMERS BENTLY NEVADA SERIES #2100, X & Y VIBRATION PROBE HOLDER & PROXIMITOR (2 AT EACH BRG, 8 PLACES TOTAL)

.50 DIA. THRU & .75 DIA. C'BORE  
2.00 DEEP - 2 HOLES DIRECTLY  
OPPOSITE FOR DOWELING AT  
FINAL ASSEMBLY



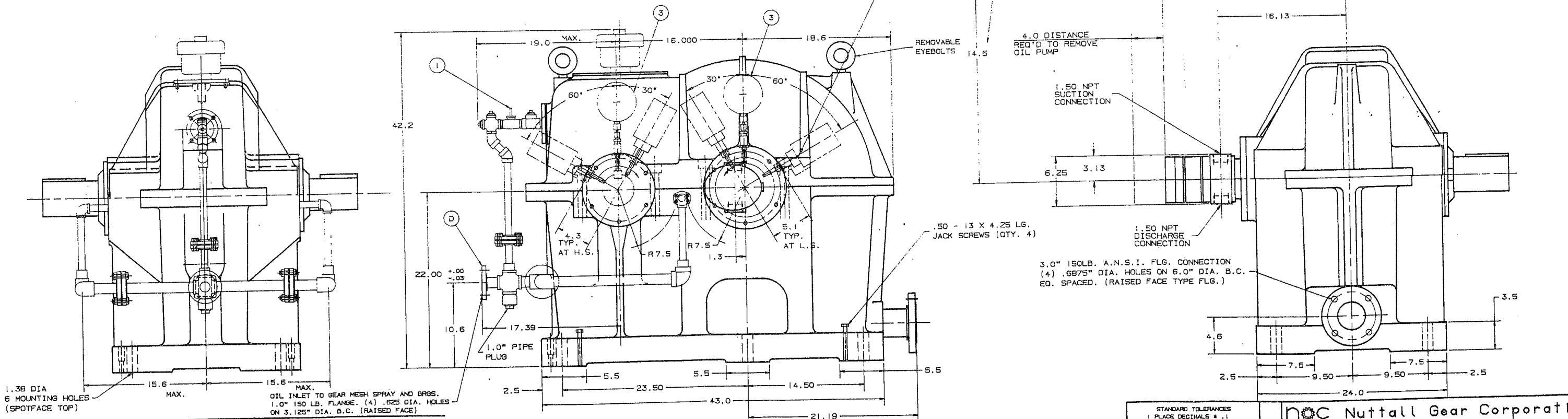
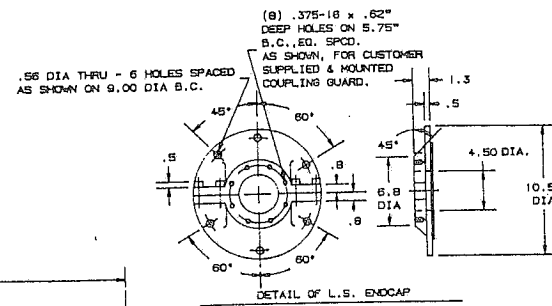
NOTES:

- A.) LOW SPEED SHAFT TOTAL ENDFLOAT SET AT .020 TO .050.
- B.) IF EXCESS OIL VAPOR PERSISTS AFTER INSTALLATION CUSTOMER MAY VENT SAME TO OUTSIDE.
- C.) APPROX. WEIGHT OF UNIT W/O OIL 4100 LBS.
- D.) THIS LUBE SYSTEM IS DRY SUMP DESIGN WITH AN OVERSIZED SHAFT DRIVEN MAIN OIL PUMP FOR CONNECTION TO CUSTOMER'S LUBE OIL SYSTEM. GEAR UNIT LUBE OIL REQUIREMENTS AS FOLLOWS:  
TYPE OF LUBE OIL REQUIRED: AGMA #2, ISO 68, ASTM 315  
10 GPM OIL @ 120°F AND 25 PSI TO GEAR. GEAR HEAT LOAD IS 136,720 BTU/HR. 28 GPM OF OIL REQUIRED BY CUSTOMER.
- E.) GEAR MECHANICAL RATING = 4771 HP (3559 KW)  
GEAR DRIVE EFFICIENCY = 98.4%

F.) RECOMMENDED SET POINTS.  
BEARINGS: ALARM 180°F  
SHUTDOWN 190°F

SHAFT VIBRATION:  
L.S. SHAFT  
ALARM 2.5 MILS P/P  
SHUTDOWN 3.0 MILS P/P

H.S. SHAFT  
ALARM 1.9 MILS P/P  
SHUTDOWN 2.4 MILS P/P



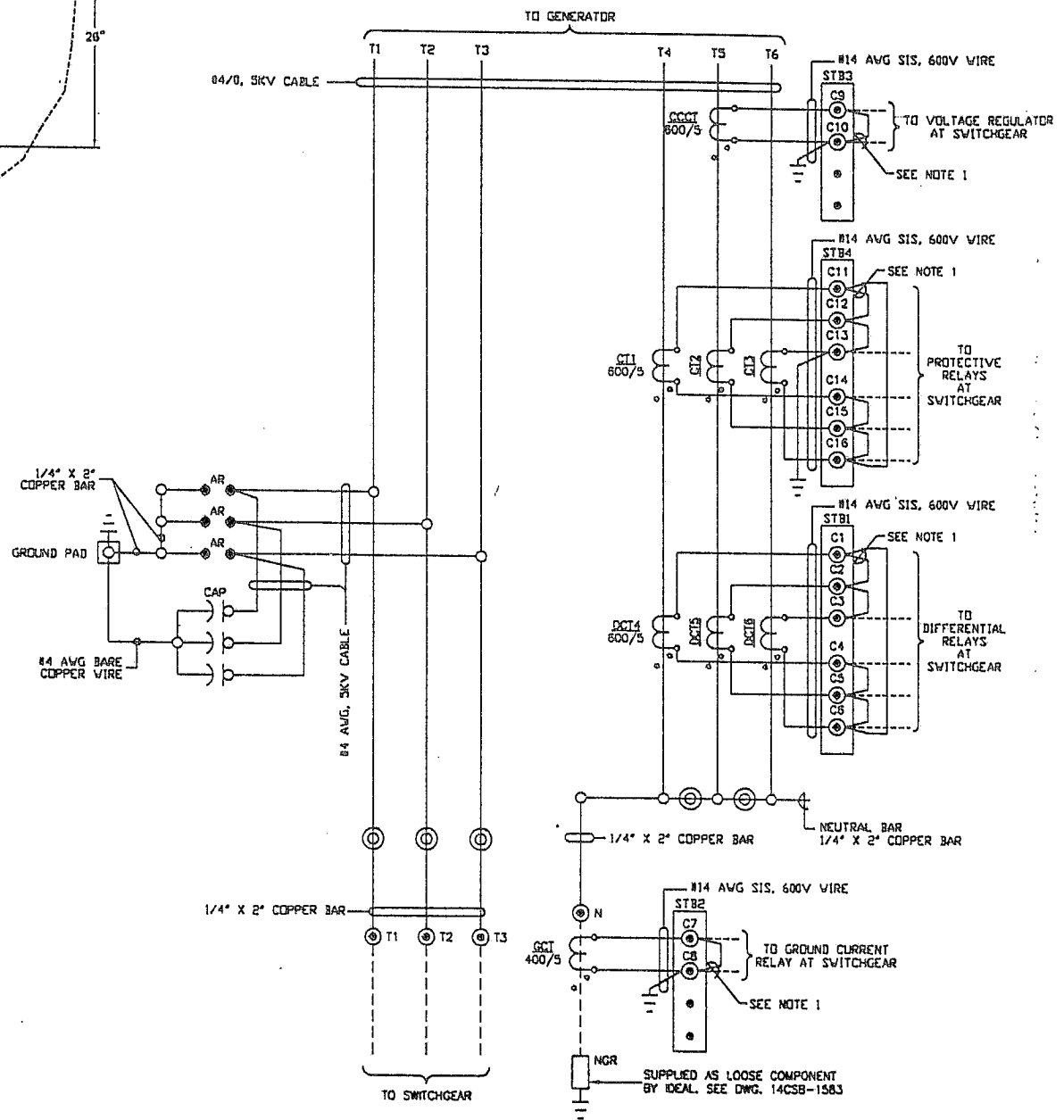
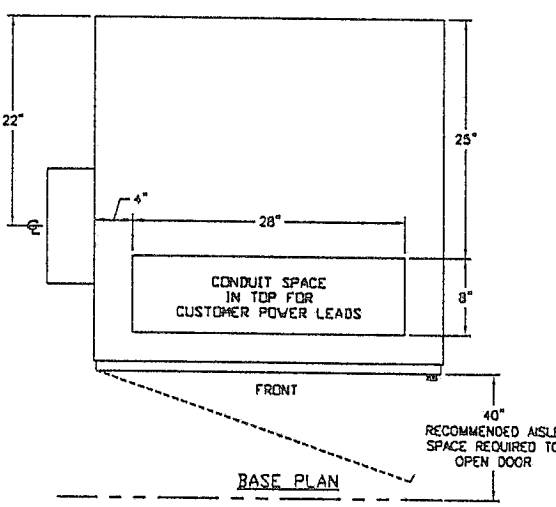
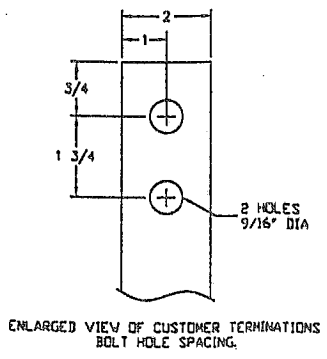
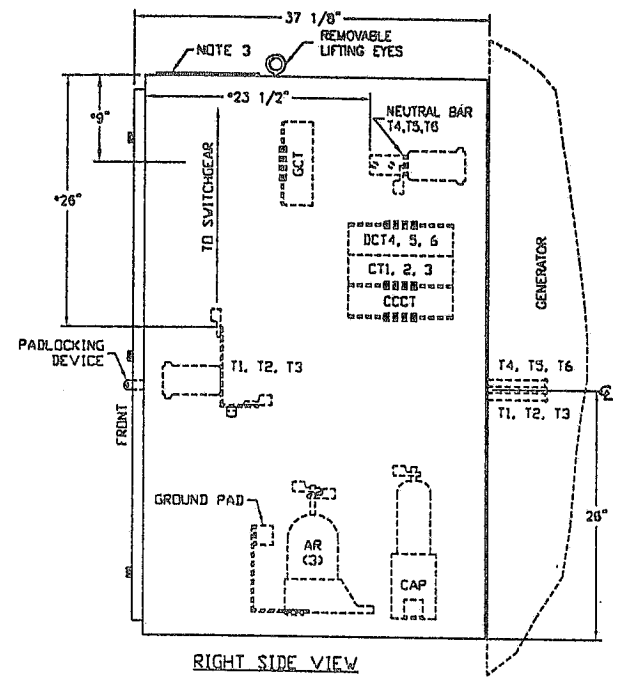
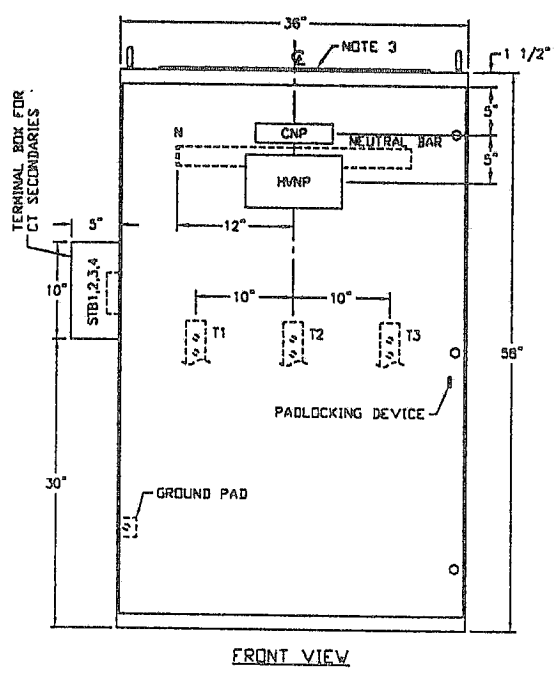
CUSTOMER: DRESSER RAND CO.  
WELLSVILLE, N.Y.  
P.O. #T-26361-5, QTY. 1  
PART #6010241  
FOR: CITY OF HARRISONBURG,  
VIRGINIA

NUTTALL GEAR S.O. NO. - NC 2368 17.1  
NUTTALL GEAR S.O. NO. - 96R607B5  
UNIT SIZE - SD 16-6L  
H.P. - 2500 KW  
S.F. - 1.3  
RPM IN 5987  
RPM OUT 1800  
CW ROT. FACING L.S. SHAFT.  
R.H. ASSY.  
RATIO 3.3261 : 1

STANDARD TOLERANCES		Nuttall Gear Corporation TITLE OUTLINE - SD 16-6L R.H. ASSY. C.W. ROT OVERSIZE BROWN & SHARP PUMP #537
1 PLACE DECIMALS	± .1	
2 PLACE DECIMALS	± .02	
3 PLACE DECIMALS	± .005	
4 PLACE DECIMALS	± .0005	
DRILLED HOLES		
DRILLED HOLES		± .0005
DRILLED HOLES		± .015
SUPPLIER TO PRIME PAINT ALL CASTINGS AND FABRICATIONS PER NUTTALL SPEC PDS 32230-8R		
DIMS IN INCHES-SCALE NTS		
APPROV. BY	DATE	APPROV. BY
KNOWL	2/8/98	APPROV. BY
D402931		D40579
NIAGARA FALLS, NEW YORK 14302		

96R607B5  
CHANGE

REV	DESCRIPTION	BY
0	FEBRUARY 26, 1996	RAMS
1	MARCH 18, 1996 ADDED CT1-3 & CCCT, CHANGED DCT TYPE FROM RD TO SCP, CHANGED DWG. NO. FROM 14CSB-1581 TO 14DSB-1442	HM
2	MARCH 27, 1996 TOOK GROUND OFF OF DCT'S	HM
3	APRIL 9, 1996 ADDED "NGR" TO WIRING DIAGRAM	RAMS



- DEVICE LEGEND
- AR SURGE ARRESTER, GENERAL ELECTRIC, 5.1KV. CAT #9L11XGB005
  - CAP SURGE CAPACITOR, GENERAL ELECTRIC, 4160V, 3 PHASE. CAT #1815UJ
  - CCCT CROSS CURRENT COMPENSATION TRANSFORMER, ASEA BROWN BOVERI, TYPE SCP-3, RATIO 600/5. CAT #962BA07G08
  - CNP COMPANY NAMEPLATE
  - CT CURRENT TRANSFORMER, ASEA BROWN BOVERI, TYPE SCP-2, RATIO 600/5. CAT #962BA06G08
  - GCT GROUND CURRENT TRANSFORMER, ASEA BROWN BOVERI, TYPE SCC, RATIO 400/5. CAT #7326A83G03
  - HVNP HIGH VOLTAGE NAMEPLATE
  - NGR NEUTRAL GROUNDING RESISTOR, POST GLOVER 2400V (L-N), 400 AMPS, 6 ohms
  - STB SHORTING TERMINAL BLOCK, GENERAL ELECTRIC, TYPE E327
- NOTES
- (1) CUSTOMER TO REMOVE APPROPRIATE JUMPERS WHEN CONNECTIONS ARE MADE. GROUND COMMON SIDE, EXCEPT FOR DCT'S (GROUND AT SWITCHGEAR).
  - (2) INDOOR ENCLOSURE.
  - (3) REMOVABLE COVER PLATE, PURCHASER TO DRILL FOR CONDUIT ENTRANCE.
  - (4) ⊙ INDICATES TERMINAL FOR CUSTOMER CONNECTION.
  - (5) ALL WIRING SHOWN DOTTED ON WIRING DIAGRAM TO BE SUPPLIED BY OTHERS.
  - (6) # INDICATES APPROXIMATE DIMENSIONS.
  - (7) WEIGHT APPROXIMATELY 1300 LBS.

**CAUTION:**  
ANY INSTALLATION, OPERATION, INSPECTION OR MAINTENANCE OF THE EQUIPMENT COVERED BY THIS DOCUMENT MUST BE PERFORMED BY QUALIFIED PERSONS WHO ARE THOROUGHLY TRAINED AND WHO UNDERSTAND ANY HAZARD THAT MAY BE INVOLVED. THIS DOCUMENT HAS BEEN PREPARED ONLY FOR SUCH QUALIFIED PERSONS AND IS NOT INTENDED TO BE A SUBSTITUTE FOR ADEQUATE TRAINING AND EXPERIENCE IN SAFETY PROCEDURES FOR THIS TYPE OF EQUIPMENT. BEFORE PERFORMING THE OPERATIONS DESCRIBED IN THIS DOCUMENT THE NECESSARY SAFETY PROCEDURES RELATIVE TO THIS TYPE OF EQUIPMENT MUST BE CARRIED OUT.

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ALL DIMENSIONS ARE IN INCHES, UNLESS OTHERWISE NOTED. TOLERANCE OF ±1/16" EXCEPT AS NOTED.

ASSEMBLY & WIRING DIAGRAM  
GENERATOR MAIN TERMINAL BOX  
5 KV  
DRESSER-RAND CO. P.O.T-26361A  
CITY OF HARRISONBURG, VA.

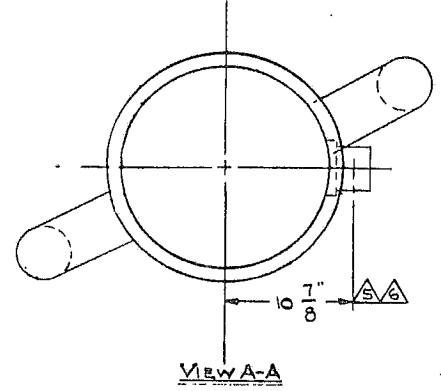
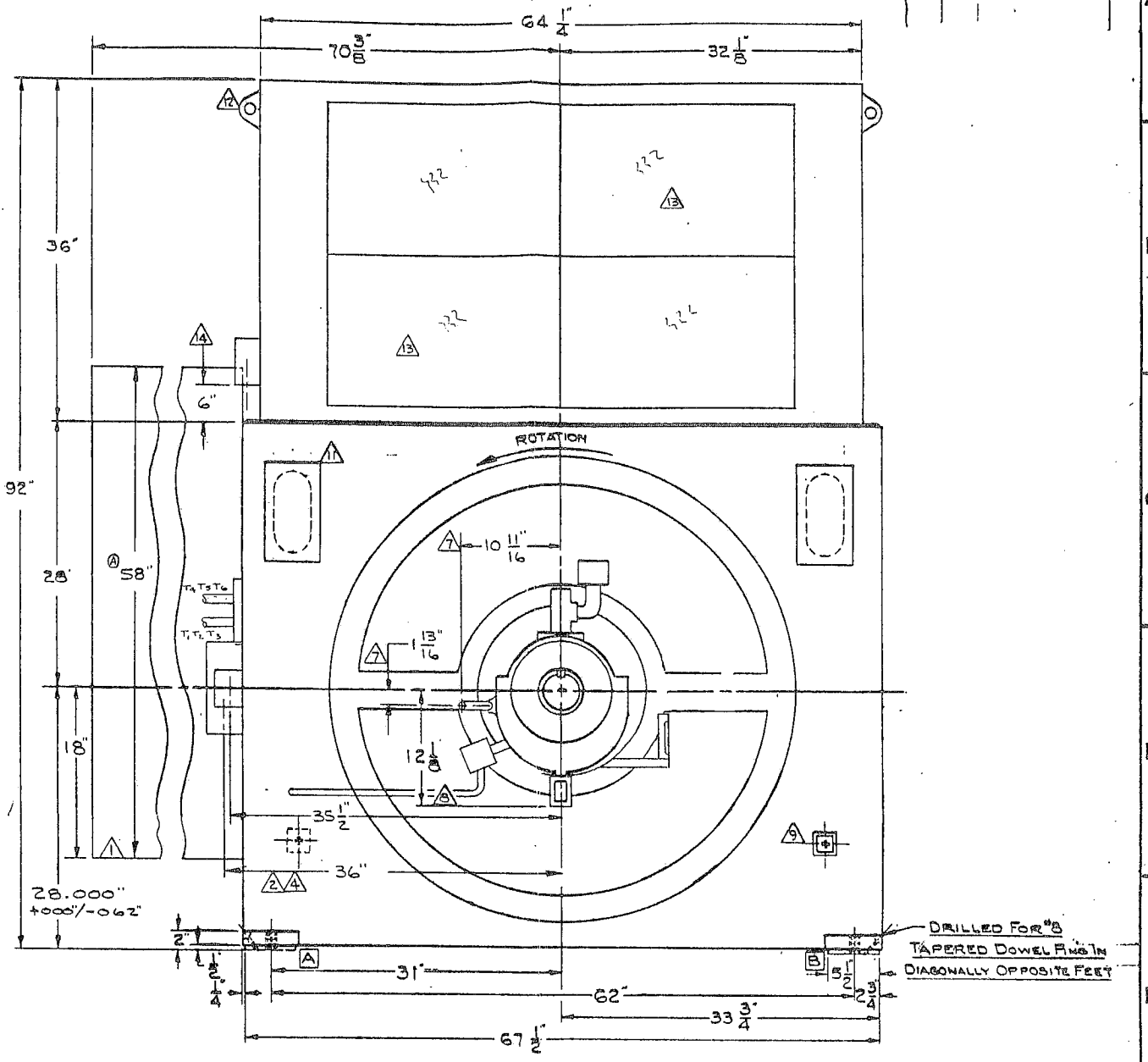
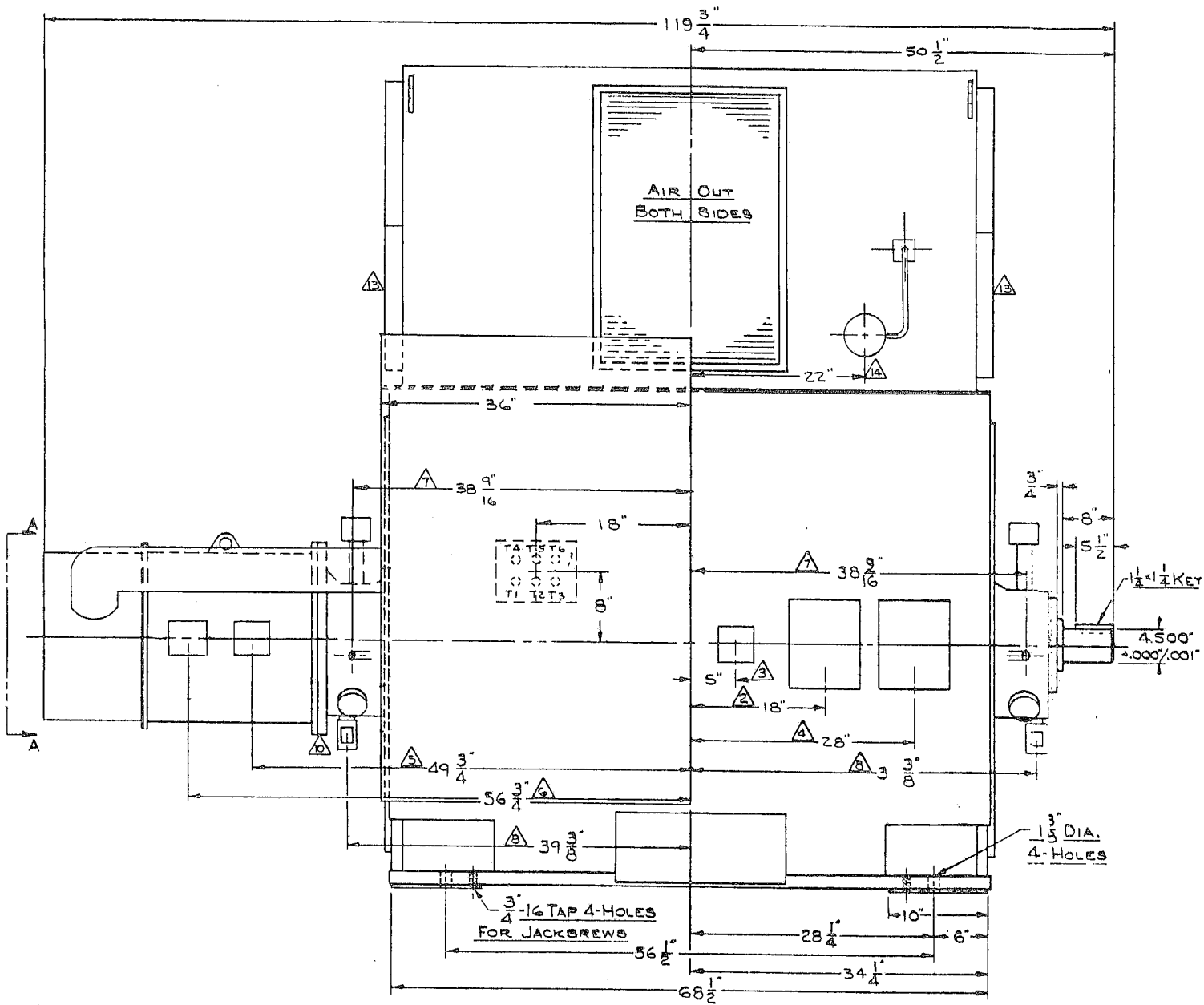
SCALE: 1"=10"  
S.N. 961013-03

DRAWN BY: RAMS    CHECKED BY: JRS    APPROVED BY:

IDEAL ELECTRIC COMPANY  
MANSFIELD, OHIO  
USA

14DSB-1442

REV.	ZONE	CHANGE DESCRIPTION	BY
		3/21/96	
①	C7	4-10-96 PER ECN 19313	RM



- ① INCOMING LINE CURTICLE, SEE DRAWING 140SB-1442.
- ② ONE HOLE FOR 1-1/2" CONDUIT FOR STATOR TEMPERATURE DETECTORS, AND BEARING TEMPERATURE DETECTORS.
- ③ ONE HOLE FOR 1" CONDUIT FOR SPACE HEATER LEADS.
- ④ ONE HOLE FOR 1-1/2" CONDUIT FOR (4) VIBRATION PROXIMITORS, (2) FOR EACH BEARING.
- ⑤ ONE HOLE FOR 1" CONDUIT FOR PERMANENT ALTERNATOR LEADS.
- ⑥ ONE HOLE FOR 1-1/2" CONDUIT FOR EXCITER FIELD LEADS.
- ⑦ ONE HOLE FOR 1/2" N.P.T. MALE THREAD, OIL SUPPLY, ONE PER BEARING.
- ⑧ ONE HOLE FOR 1-1/4" N.P.T. FEMALE THREAD, OIL RETURN, ONE PER BEARING.
- ⑨ GROUNDING PADS - 5/16"-18 TAPPED HOLE LOCATED DIAGONALLY OPPOSITE OF EACH OTHER.
- ⑩ THIS BEARING IS INSULATED FROM GROUND, AND CONNECTION MUST BE INSULATED TO PRESERVE THE INTEGRITY OF THE INSULATION.
- ⑪ COVERED LIFTING SLOTS BOTH ENDS FOR LIFTING ENTIRE MACHINE. A FOUR POINT IS REQUIRED.
- ⑫ LIFTING LUGS FOR TOP COVER ONLY. DO NOT ATTEMPT TO LIFT ENTIRE MACHINE.
- ⑬ ALUMINUM AIR INTAKE FILTERS EACH END.
- ⑭ ONE HOLE FOR 1/2" CONDUIT FOR AIR PRESSURE DIFFERENTIAL SWITCH LEADS.

CERTIFICATION FOR: DRESSER RAND CO. CUST. NO. T-26361A  
 STEAM TURBINE, MOTOR, GEN DIV D.O. OPEN  
 37 COATS ST  
 WELLSVILLE, NY 14895

FOR: CITY OF HARRISONBURG, VA

SN 961013-01  
 QUANTITY: 1  
 TYPE "SAB" HORIZONTAL BRUSHLESS SYNCHRONOUS GENERATOR RATED AS FOLLOWS:

2941 KVA, 2500 KW, .85 PF, 1800 RPM, 3 PHASE, 60 HZ, 4160 VOLTS, 6 LEADS, WYE CONNECTED, 105°C RISE BY RESISTANCE ABOVE A 40° C AMBIENT, CONTINUOUS DUTY, CLASS "F" INSULATION, 21120-18 FRAME.

CLOCKWISE SHAFT ROTATION FACING OPPOSITE DRIVE END OF UNIT WILL PRODUCE PHASE SEQUENCE OF T1-A, T2-B, T3-C.

	STATIC LOADS	FULL LOAD TORQUE	SHORT CIRCUIT TORQUE
A	8643 LBS. ↑	10869 LBS. ↑	28,258 LBS. ↑
B	8643 LBS. ↑	6,415 LBS. ↑	10,913 LBS. ↑

BEARING OIL REQUIREMENTS  
 VISCOSITY ----- 100S.S.U. @ 100°F  
 PRESSURE ----- 20 P.S.I.  
 FLOW ----- 48 G.P.M.  
 MAXIMUM OIL IN TEMP -- 140°F  
 LOSSES ----- 1516 BTU/HR/ORG

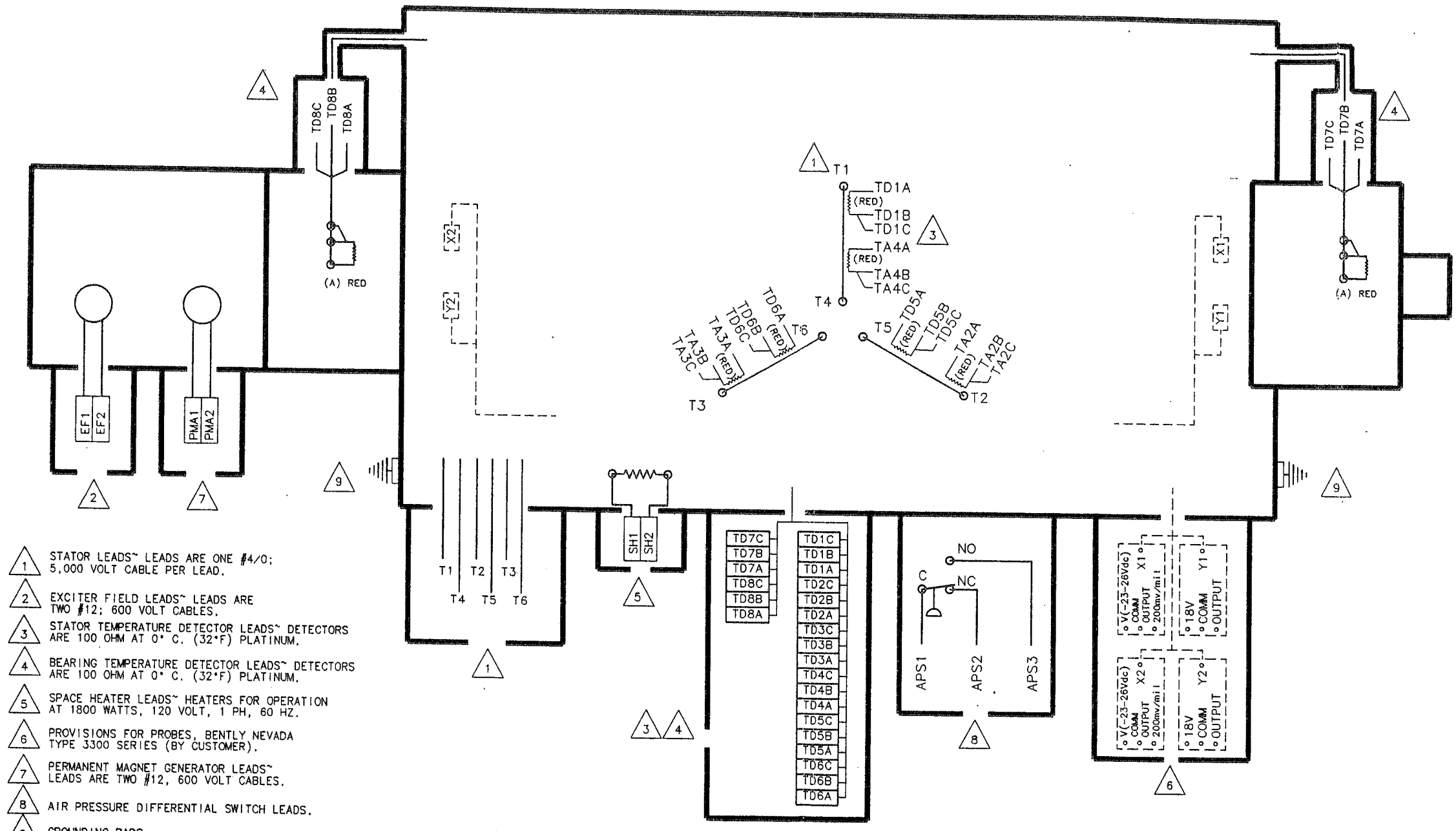
ESTIMATED WEIGHTS  
 ROTOR ----- 3,785  
 STATOR ----- 13,500  
 TOTAL ----- 17,285  
 PR = 5284 KM PER ELECTRICAL RADIAN  
 WR = 2430 LB. FT.<sup>2</sup>

THIS UNIT IS EQUIPPED WITH SLEEVE BEARINGS ALLOWING A NOMINAL 1/2 INCH MAXIMUM TOTAL COUPLING END FLOAT MUST BE .19 INCHES PER NFMA R21-81.

WORKING TOLERANCES UNLESS OTHERWISE SPECIFIED		SURFACE ROUGHNESS		DESCRIPTION	
MACHINING	FABRICATING	1.12 THRU 24.00	2.50 OVER 24.00	TH 21120-4-18/BE13-4/PMA13-3 OUTLINE	
± .01 THRU 2.00"	± .12 THRU 24.00	125 MICRO	1.00 OVER 24.00		
± .016 OVER 2.00" THRU 10.00"		100 MICRO			
± .03 OVER 10.00" ANGLES ± 0.5°		75 MICRO		DRAWN BY: [Signature]	
ALL THREADS TO BE CLASS 2 UNIFIED				ROYAL ELECTRIC COMPANY HARRISFIELD, OHIO, U.S.A.	



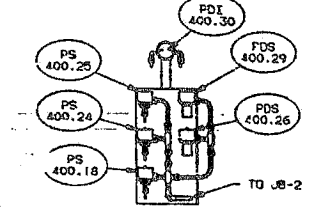
REVISIONS					
ZONE	REV	ECN	DESCRIPTION	DATE	APP.
-	-	-	ORIGINAL ISSUE	03-27-96	
A-1	1	19484	REVISE NOTE 6	06-17-96	



- 1 STATOR LEADS~ LEADS ARE ONE #4/0; 5,000 VOLT CABLE PER LEAD.
- 2 EXCITER FIELD LEADS~ LEADS ARE TWO #12; 600 VOLT CABLES.
- 3 STATOR TEMPERATURE DETECTOR LEADS~ DETECTORS ARE 100 OHM AT 0° C. (32°F) PLATINUM.
- 4 BEARING TEMPERATURE DETECTOR LEADS~ DETECTORS ARE 100 OHM AT 0° C. (32°F) PLATINUM.
- 5 SPACE HEATER LEADS~ HEATERS FOR OPERATION AT 1800 WATTS, 120 VOLT, 1 PH, 60 HZ.
- 6 PROVISIONS FOR PROBES, BENTLY NEVADA TYPE 3300 SERIES (BY CUSTOMER).
- 7 PERMANENT MAGNET GENERATOR LEADS~ LEADS ARE TWO #12, 600 VOLT CABLES.
- 8 AIR PRESSURE DIFFERENTIAL SWITCH LEADS.
- 9 GROUNDING PADS.

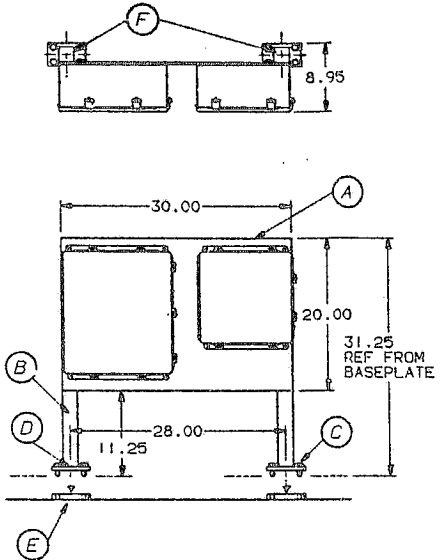
FILE: 25A -2	WORKING TOLERANCES UNLESS OTHERWISE SPECIFIED			FIRST USED ON <b>C961013-01</b> IEC ORDER NO.	<b>IDEAL ELECTRIC CO.</b> 330 EAST FIRST STREET MANFIELD, OHIO 44802-7700	
	MACHINING	FABRICATION	FINISH			BY DATE
	.01 THRU 2.00" *.015 OVER 2.00" THRU 10.00" *.03 OVER 10.00" ANGLE .8.5"	.12 THRU 24.00" *.24 OVER 24.00"	125 MICR ✓ THICKS			DR. DLK 03-27-96
	ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED					CK.
ALL THREADS TO BE CLASS 2 UNIFIED			APP. *	SIZE C	DRG NO. C-72914 : 0	
<small>THIS DRAWING IS THE PROPERTY OF IDEAL ELECTRIC COMPANY. IT IS LOANED SUBJECT TO RETURN UPON DEMAND AND ALL INFORMATION THEREIN IS CONFIDENTIAL AND MUST NOT BE REPRODUCED OR USED IN ANY MANNER WITHOUT THE WRITTEN PERMISSION OF IDEAL ELECTRIC COMPANY. ANY VIOLATION OF THESE TERMS WILL BE PROSECUTED TO THE FULL EXTENT OF THE LAW.</small>				APP.	SCALE NONE WEIGHT SHEET 01 of 01	

REF: C72202



VIEW IN DIRECTION OF ARROW "Y"

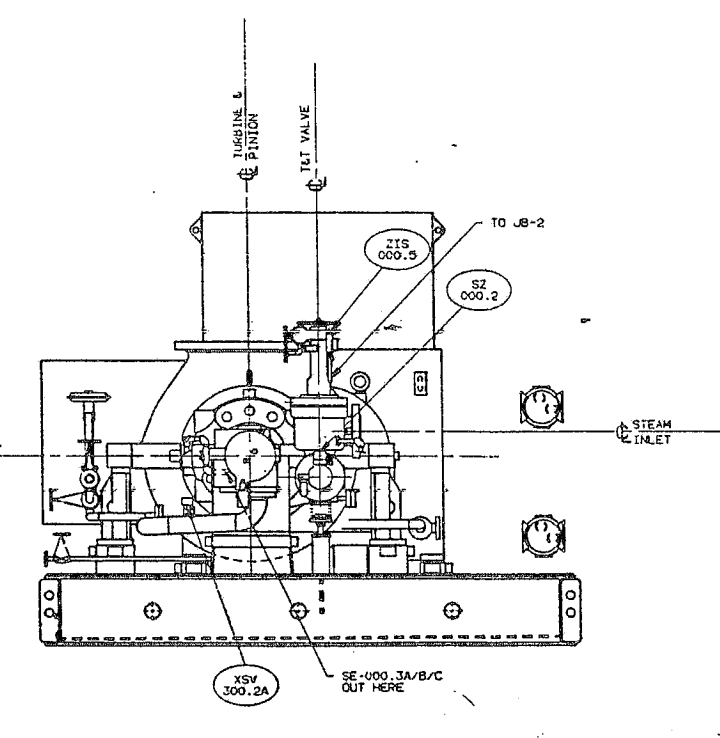
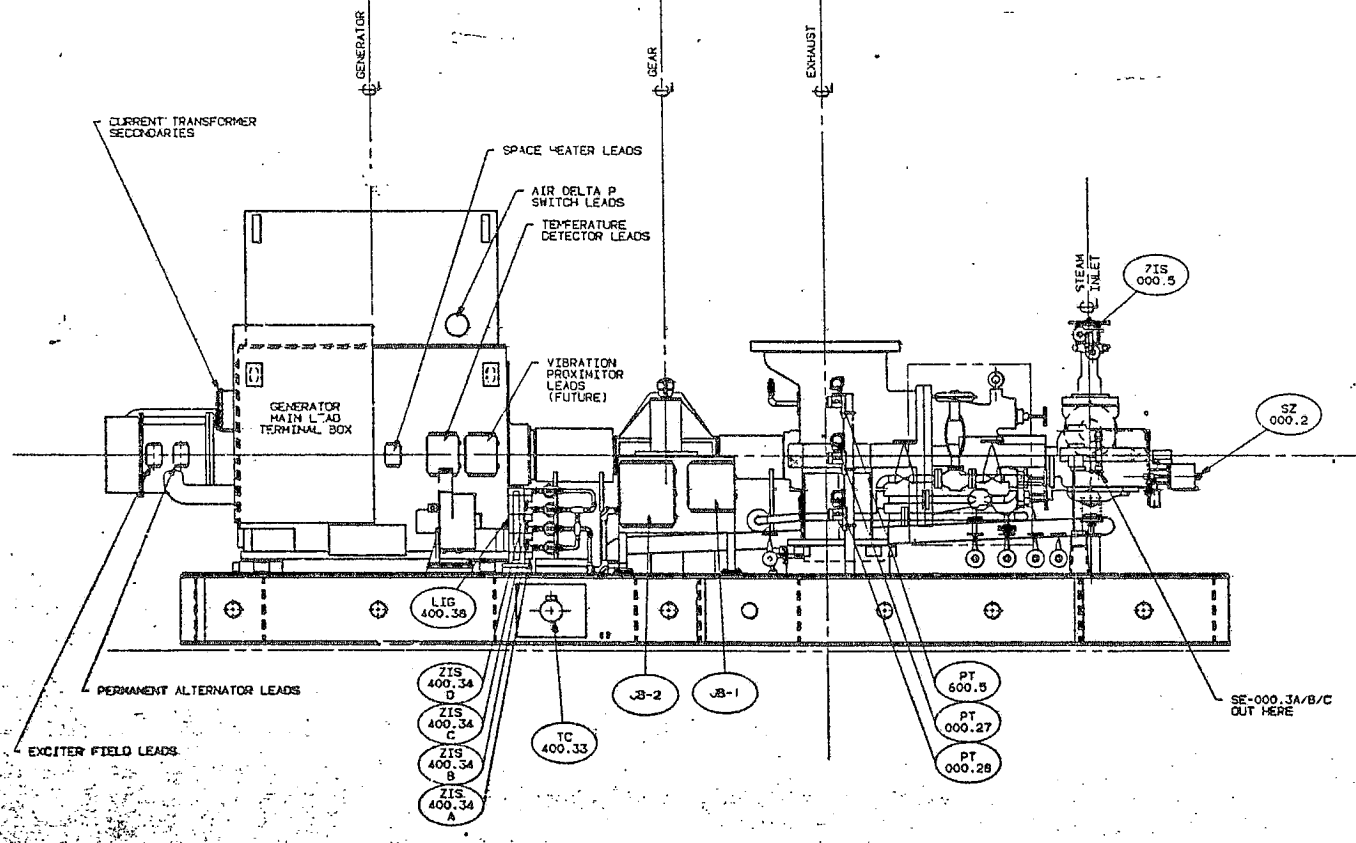
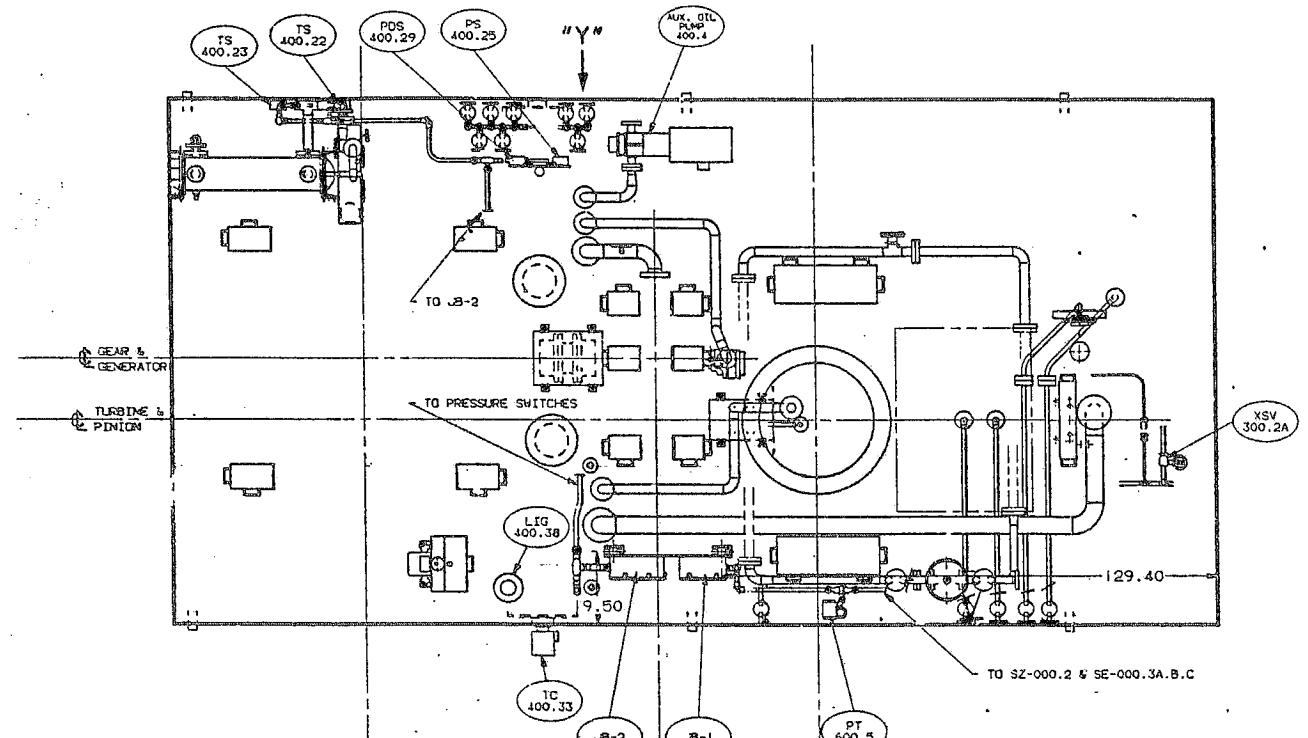
JB-1 & JB-2 MOUNTING DETAIL



SHOP NOTES

- 1) THE PARTS FOR THIS MOUNTING ASSEMBLY CAN BE FOUND IN D-R SPEC #6010372-003.
- 2) PANEL BOARD BASE PAD TO BE WELDED TO SOLEPLATE. 3/16" SKIP WELD, 4-12, WELD PER W10.1-10.
- 3) ROUND ALL CORNERS ON MOUNTING PLATE.

- (A) PLATE - 1/4 x 20 x 30 CC-162723-034, 1 REQUIRED
- (B) 2 x 2" SQUARE TUBING - 30" LONG CB-232019-005, 2 REQUIRED
- (C) 1/2-13 x 1-1/8" HEX HEAD BOLT CA-130472-002, 8 REQUIRED
- (D) PANEL BOARD TOP PAD CB-232021-001, 2 REQUIRED
- (E) PANEL BOARD BASE PAD CB-232020-001, 2 REQUIRED
- (F) PLUG - 2 x 2" A-236947-001, 2 REQUIRED



**NOTE:**  
ALL CONDUIT RUNS ARE SUGGESTED ONLY. FINAL ROUTING AND CONDUIT SUPPORT WILL BE DETERMINED ON FINAL ASSEMBLY BY ELECTRICIANS. TERMINAL BOXES WILL BE LOCATED AS SHOWN ON THIS DRAWING.

REFER TO IDEAL ELECTRIC DRAWINGS #1405B-1442 & #D-72913

THIS PRINT IS CERTIFIED CORRECT FOR		HARRISBURG ELECTRIC COMMISSION	CUSTOMER'S ORDER NO. 3837	DRAWN OFFICE NO. 10-2115	WORK ORDER NO. 10-2532	APPROVED BY: CB DATE: 10/28/76	AL PLUMB JR. 1R
DRAWN BY: TDH							
THE CONSTRUCTION SHOP IS STANDARD FOR THIS PROJECT. ANY DEVIATION FROM STANDARD AND DISCUSS ADDITIONAL COST, A CORRESPONDING INCREASE IN DELIVERY PRICE AND DELAY IN DELIVERY. IF CHANGES ARE NECESSARY INDICATE THEM CAREFULLY AND IN DETAIL. GET THEIR PRICES AND RETURN TO CONSTRUCTION SHOP. YOU WILL BE ADVISED PROMPTLY AS TO THE ADDITIONAL PRICE. REVISIONS TO THESE DETAILS DRAWING WILL BE HELD UP UNTIL YOUR APPROVATION IS RECEIVED.							
STEAM TURBINE DIVISION							
DRAWN BY: TDH		DATE: 05/11/76	SCALE: 1=1/8"	PROJECT: HARRISBURG SUPERVISOR: SUPERVISOR	NO. 10-2532	ELECTRICAL LAYOUT	
DRAWN BY: TDH		DATE: 05/11/76	SCALE: 1=1/8"	PROJECT: HARRISBURG SUPERVISOR: SUPERVISOR	NO. 10-2532	E-6010372	

